

# **Service Manual**

## **Rocket 3 GT/R**

### **2021**





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## Introduction

### Introduction

This manual is designed primarily for use by trained technicians in a properly equipped workshop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. The work can only be carried out if the owner has the necessary hand and special service tools to complete the job.

A basic knowledge of mechanics, including the proper use of tools and workshop procedures is necessary in order to carry out maintenance and repair work satisfactorily. Whenever the owner has insufficient experience or doubts regarding his ability to do the work, an authorised Triumph dealer must undertake all adjustments, maintenance, and repair work.

In order to perform the work efficiently and to avoid costly mistakes, read the text and thoroughly familiarise yourself with procedures before starting work.

All work should be performed with great care and in a clean working area with adequate lighting.

Always use the correct special service tools or equipment specified. Under no circumstances use makeshift tools or equipment since the use of substitutes may adversely affect safe operation.

Where accurate measurements are required, they can only be made using calibrated, precision instruments.

For the duration of the warranty period, an authorised Triumph dealer must perform all repairs and scheduled maintenance.

To maximise the life of your motorcycle:

- Accurately follow the maintenance requirements of the periodic maintenance chart in the Service Manual.
- Do not allow problems to develop. Investigate unusual noises and changes in the riding characteristics of the motorcycle. Rectify all problems as soon as possible (immediately if safety related).
- Use only genuine Triumph parts as listed in the electronic parts catalogue (EPC).

- Follow the procedures in this manual carefully and completely. Do not take short cuts.
- Keep complete records of all maintenance and repairs with dates and any new parts installed.
- Use only approved lubricants, as specified in the Owner's Handbook, in the maintenance of the motorcycle.

### How to use this manual

To assist in the use of this manual, the section title is given at the top.

Each major section starts with a contents page, listing the information contained in the section.

The individual steps comprising repair operations are to be followed in the sequence in which they appear.

Adjustment and repair operations include reference to service tool numbers and the associated illustration depicts the tool.

Where usage is not obvious, the tool is shown in use.

Adjustment and repair operations also include reference to wear limits, relevant data, torque figures, specialist information and useful assembly details.

## Warnings, Cautions and Notes

Particularly important information is presented in the following form:

### A WARNING

#### **WARNING**

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

#### **CAUTION**

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

#### **NOTICE**

This note symbol indicates points of particular interest for more efficient and convenient operation.

## Noise Control System

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use and,
2. the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

- Removal of, or puncturing the muffler, baffles, header pipes or any other component which conducts exhaust gases.
- Removal of, or puncturing of any part of the intake system.
- Lack of proper maintenance.
- Replacing any moving parts of the vehicle, or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.

### References

References to the left hand or right hand side given in this manual are made when viewing the motorcycle from the rear.

Operations covered in this manual do not always include reference to testing the motorcycle after repair. It is essential that work is inspected and tested after completion and, if necessary, a road test of the motorcycle is carried out particularly where safety related items are concerned.

### Dimensions

The dimensions quoted are to design engineering specification with service limits where applicable.

During the period of running-in from new, certain adjustments may vary from the specification figures given in this manual. These will be reset by the dealer at the 500 mile/800 km service, and thereafter should be maintained at the figures specified in this manual.

### Repairs and Replacements

Before removal and disassembly, thoroughly clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle.



Particular attention should be paid when installing a new part, that any dust or metal filings are cleared from the immediate area.

### Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Never lever a component as this will cause damage both to the component itself and to the surface being levered against.

Whenever tapping to aid removal of an item is necessary, tap lightly using a hide or plastic faced mallet.

### Edges

Watch for sharp edges, especially during engine disassembly and assembly. Protect the hands with industrial quality gloves. When replacement parts are required, it is essential that only genuine Triumph parts are used.

Safety features and corrosion prevention treatments embodied in the motorcycle may be impaired if parts other than genuine Triumph parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification.

### Tightening procedure

Generally, when installing a part with several bolts, nuts or screws, they should all be started in their holes and tightened to a snug fit, evenly and in a cross pattern. This is to avoid distortion of the part and/or gas or oil leakage. Conversely, bolts, nuts, or screws, should all be loosened (in sequence if specified) by about a quarter of a turn and then removed.

Where there is a tightening sequence specified in this Service Manual, the bolts, nuts, or screws must be tightened in the order and by the method indicated.

Torque wrench setting figures given in this manual must be observed. The torque tools used must be of accurate calibration.

## Torque Tolerance

| <b>Torque</b>    | <b>Tolerance</b> |
|------------------|------------------|
| 0 Nm to 25 Nm    | +/- 10%          |
| 26 Nm to 100 Nm  | +10% -0%         |
| 101 Nm to 200 Nm | +10% -0%         |

Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed.

This applies particularly to micro-encapsulated fixings which must always be replaced if disturbed.

Where necessary, the text in this manual will indicate where such a fixing is used.

### Use of Crow Foot Spanner Adapters with Torque Wrenches

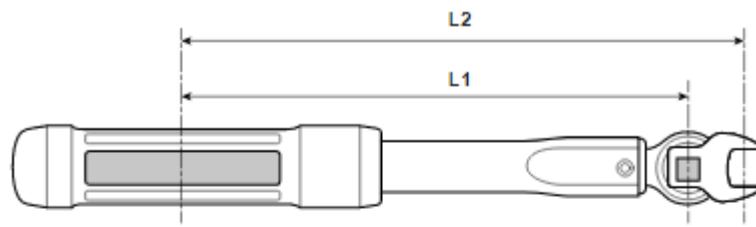
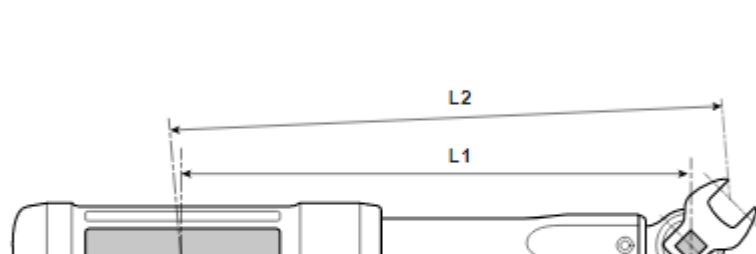
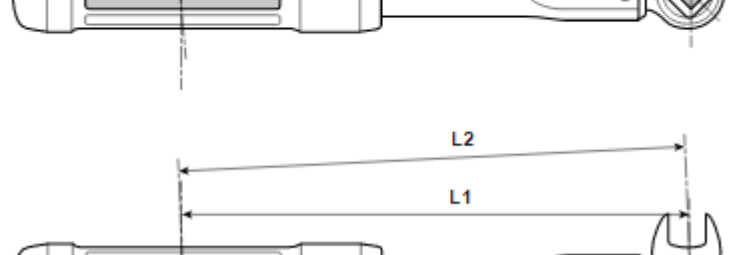

The use of a crow foot spanner adapter will effectively lengthen the lever arm of a torque wrench. The amount of torque applied to a fastener is increased as the torque wrench lever arm is extended, therefore the torque wrench setting must be adjusted in order to achieve the correct tightening torque.

Before tightening a fixing using a crow foot spanner adapter, measure the normal length of the torque wrench from the centre of the drive square to the centre of the handle (dimension L1). Fit the crow foot spanner adapter to the torque wrench as shown below. Measure the extended length of the torque wrench from the centre of the crow foot spanner head to the centre of the handle (dimension L2).

Use the following formula to calculate the correct torque wrench setting to achieve the required tightening torque.

#### **NOTICE**

The example shown below is calculated using a crow foot spanner measuring 25 mm from the centre of the spanner head to the centre of the drive square.

|   |  |         |
|---|--|---------|
|  | $M1 = M2 \times L1/L2$   | Example |
|  | M2 is the required tightening torque to be applied   | 90 Nm   |
|  | L1 is the normal length of the torque wrench, measured from the centre of the drive square to the centre of the handle             | 300 mm  |
|  | L2 is the extended length of the torque wrench, measured from the centre of the crow foot spanner head to the centre of the handle | 325 mm  |
|   | M1 is the calculated torque wrench setting   | 83 Nm   |

## General information

### Ignition System Safety Precautions

#### **⚠ WARNING**

The ignition system produces extremely high voltages. Do not touch any part of the ignition system or any cables while the engine is running.

An electric shock caused by contact with the ignition system may lead to illness, injury or death.

## **WARNING**

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits and or diagnostic equipment.

The ignition system and any diagnostic equipment may interrupt the normal operation of such devices causing illness or death.

### Dangerous Substances

## **WARNING**

Many liquids and other substances used in motor vehicles are poisonous and should under no circumstances be consumed and should, as far as possible, be kept from contact with the skin. These substances among others include acid, antifreeze, asbestos, brake fluid, fuel, lubricants, and various adhesives. Always pay close attention to the instructions printed on labels and obey the instructions contained within. These instructions are included for your safety and well-being.

**NEVER DISREGARD THESE INSTRUCTIONS!**

### Third Party Products

## **WARNING**

Many proprietary products, such as chemicals, solvents and cleaning agents, will cause damage to components if used incorrectly or inappropriately. Always follow the manufacturer's instructions printed on the product container's labels and obey the instructions given. These instructions are included for your safety and well-being.

Damage to the motorcycle components caused by the incorrect or inappropriate use of chemicals, solvents and cleaning agents may reduce the components efficiency, resulting in loss of motorcycle control and an accident.

## Fluoroelastomers

### **WARNING**

Fluoroelastomer material is used in the manufacture of various seals in Triumph motorcycles.

In fire conditions involving temperatures greater than 315°C this material will decompose and can then be potentially hazardous. Highly toxic and corrosive decomposition products, including hydrogen fluoride, carbonyl fluoride, fluorinated olefins and carbon monoxide can be generated and will be present in fumes from fires.

In the presence of any water or humidity, hydrogen fluoride may dissolve to form extremely corrosive liquid hydrofluoric acid.

If such conditions exist, do not touch the material and avoid all skin contact. Skin contact with liquid or decomposition residues can cause painful and penetrating burns leading to permanent, irreversible skin and tissue damage.

## Oils

### **WARNING**

The engine oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.

### **WARNING**

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.

## Health Protection Precautions

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets.
- Overalls must be cleaned regularly. Discard heavily soiled clothing and oil impregnated footwear.
- First aid treatment should be obtained immediately for open cuts and wounds. Always be aware of who your nearest First Aider is and where the medical facilities are kept.
- Use barrier creams, applying before each work period to protect the skin from the effects of oil and grease and to aid removal of the same after completing work.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use petrol, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practicable, degrease components prior to handling.

### **WARNING**

Any risk of eye injury must be avoided. Always wear eye protection when using a hammer, air line, cleaning agent or where there is ANY risk of flying debris or chemical splashing.

## Environmental Protection Precautions

### CAUTION

Do not pour oil on the ground, down sewers or drains, or into water courses. To prevent pollution of water courses etc., dispose of used oil sensibly. If in doubt contact your local authority.

Burning of used engine oil in small space heaters or boilers can be recommended only for units of approved design. If in doubt, check with the appropriate local authority and/or manufacturer of the approved appliance.

Dispose of used oil and used filters through authorised waste disposal contractors, to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact your local authority for advice on disposal facilities.

**⚠ WARNING**

Brake fluid is hygroscopic which means it will absorb moisture from the air. Any absorbed moisture will greatly reduce the boiling point of the brake fluid causing a reduction in braking efficiency.

Replace brake fluid in line with the routine maintenance schedule. A dangerous riding condition could result if this important maintenance item is neglected!

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake fluid from a sealed container and never use fluid from an unsealed container or from one that has been previously opened.

Do not mix different brands of fluid. Check for fluid leakage around brake fittings, seals and joints.

Check regularly for brake hose damage.

**FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY REDUCE BRAKING EFFICIENCY LEADING TO AN ACCIDENT.**

**⚠ WARNING**

If there has been an appreciable drop in the level of the fluid in either brake fluid reservoir, consult your authorised Triumph dealer for advice before riding.

If the brake lever or pedal feels soft when it is applied, or if the lever/pedal travel becomes excessive, there may be air in the brake lines or the brake may be defective.

It is dangerous to operate the motorcycle under such conditions and remedial action must be taken by your authorised Triumph dealer before riding the motorcycle.

Failure to take remedial action may reduce braking efficiency leading to an accident.



**⚠ WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident.

Failure to change the brake fluid at the interval specified in the routine maintenance schedule may reduce braking efficiency resulting in an accident.

**⚠ WARNING**

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in an accident.

**⚠ WARNING**

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

## Diagnostic Trouble Codes

### **WARNING**

If the motorcycle falls over or is involved in an accident, diagnostic trouble codes may be triggered and stored.

If the motorcycle has fallen over or been involved in an accident, always clear any diagnostic trouble codes.

If diagnostic codes reappear, address them immediately.

## Jacking and Lifting

### **WARNING**

Always ensure that any lifting apparatus has adequate load and safety capacity for the weight to be lifted. Ensure the motorcycle is well supported to prevent any possibility of the machine falling prior to lifting or jacking or while repairs and servicing are carried out.

Never rely on a single means of support when working with the motorcycle. Use additional safety supports and straps to prevent toppling.

Do not leave tools, lifting equipment, spilled oil, etc. in a place where they could become a hazard to health. Always work in a clean, tidy area and put all tools away when the work is finished.

## Precautions Against Damage

Avoid spilling brake fluid or battery acid on any part of the bodywork. Wash spillages off with water immediately.

Disconnect the battery earth lead before starting work, see [ELECTRICAL PRECAUTIONS](#).

Always use the recommended service tool where specified.

Protect exposed bearing and sealing surfaces, and screw threads from damage.

## Coolant

### **WARNING**

Coolant mixture, which is blended with antifreeze and corrosion inhibitors contains toxic chemicals which are harmful to the human body. Never swallow antifreeze, corrosion inhibitors or any of the motorcycle coolant.

### **WARNING**

Do not remove the radiator cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.

### **CAUTION**

The coolant antifreeze contains a corrosion inhibitor which helps prevent damage to the metal surfaces inside the cooling system. Without this inhibitor, the coolant would 'attack' the metals and the resulting corrosion would cause blockages in the cooling system leading to engine overheating and damage. Always use the correct antifreeze as specified in the Owner's Handbook. Never use a methanol based antifreeze as this does not contain the required corrosion inhibition properties.

### **CAUTION**

Distilled water must be used with the antifreeze (see specification for antifreeze) in the cooling system.

If hard water is used in the system, it causes scale accumulation in the water passages, and considerably reduces the efficiency of the cooling system. Reduced cooling system efficiency may lead to the engine overheating and engine damage.

## Cleaning Components

A high flashpoint solvent is recommended to reduce fire hazard.

Always follow container directions regarding the use of any solvent.

Always use the recommended cleaning agent or equivalent.

Do not use degreasing equipment for components containing items which could be damaged by the use of this process. Whenever possible, clean components and the area surrounding them before removal. Always observe scrupulous cleanliness when cleaning dismantled components.

## Lubrication

The majority of engine wear occurs while the engine is warming up and before all the rubbing surfaces have an adequate lubrication film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface, which has lost its lubrication film. Old grease and dirty oil should be cleaned off. This is because used lubricants will have lost some lubrication qualities and may contain abrasive foreign particles.

Use recommended lubricants. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulphide grease in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

## Joints and Joint Faces

Assemble joints dry unless otherwise specified in this manual.

If gaskets and/or jointing compound is recommended for use; remove all traces of old jointing material prior to reassembly. Do not use a tool which will damage the joint faces and smooth out any scratches or burrs on the joint faces using an oil stone. Do not allow dirt or jointing material to enter any tapped holes.

## Gaskets, O-rings

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

### Liquid Gasket, Non-permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly as excessive amounts of sealer may block engine oil passages and cause serious damage.

Prior to reassembly, blow through any pipes, channels or crevices with compressed air.

### **WARNING**

To prevent injury, always use eye, face and ear protection when using compressed air. Always wear protective gloves if the compressed air is to be directed in proximity to the skin.

## Screw Threads

Metric threads to ISO standard are used.

Damaged nuts, bolts and screws must always be discarded.

Castellated nuts must not be loosened back to accept a split pin, except in those recommended cases when this forms part of an adjustment.

Do not allow oil or grease to enter blind threaded holes. The hydraulic action on screwing in the bolt or stud could split the housing. Always tighten a nut or bolt to the recommended torque figure. Damaged or corroded threads can affect the torque reading.

Unless specified, threaded fixings must always be fitted dry (no lubrication).

## **WARNING**

Never lubricate a thread unless instructed to do so.

When a thread of a fixing is lubricated, the thread friction is reduced. When the fixing is tightened, reduced friction will cause over tightening and possible fixing failure.

A fixing which fails in service could cause component detachment leading to loss of control and an accident.

### Locking Devices

Always release locking tabs and fit new locking washers. Do not reuse locking tabs.

### Fitting a Split Pin

Always fit new split pins of the correct size for the hole in the bolt or stud. Do not loosen back castle nuts when fitting a split pin, except in those recommended cases when this forms part of an adjustment.

Always fit new roll pins of an interference fit in the hole.

### Circlips, Retaining Rings

Replace any circlips and retaining rings that are removed. Removal weakens and deforms circlips causing looseness in the circlip groove. When installing circlips and retaining rings, take care to compress or expand them only enough to install them.

Always use the correct replacement circlip as recommended in the Triumph parts catalogue.

### Self-Locking Nuts

Self-locking nuts can be reused, provided resistance can be felt when the locking portion passes over the thread of the bolt or stud.

DO NOT reuse self-locking nuts in critical locations, e.g. suspension components. Always use the correct replacement self-locking nut.

### Encapsulated Bolts

An encapsulated bolt can be identified by a coloured section of thread which is treated with a locking agent.

Unless a specified repair procedure states otherwise, encapsulated bolts cannot be reused and **MUST** be replaced if disturbed or removed.

### **WARNING**

Failure to replace an encapsulated bolt could lead to a dangerous riding condition. Always replace encapsulated bolts.

### Oil and Grease Seals

Replace any oil or grease seals that are removed. Removal will cause damage to an oil seal which, if reused, would cause an oil leak.

Ensure the surface on which the new seal is to run is free of burrs or scratches. Renew the component if the original sealing surface cannot be completely restored.

Protect the seal from any surface which could cause damage over which it has to pass when being fitted. Use a protective sleeve or tape to cover the relevant surface and avoid touching the sealing lip.

Lubricate the sealing lips with a recommended lubricant. This will help to prevent damage in initial use. On dual lipped seals, smear the area between the lips with appropriate grease.

When pressing in a seal which has manufacturer's marks, press in with the marks facing out.

Seals must be pressed into place using a suitable driver. Use of improper tools will damage the seal.

## Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil or grease on its outer or inner circumference so that it will locate smoothly.

## Ball Bearing

When installing a ball bearing, the bearing race which is an interference fit should be pushed by a suitable driver. This prevents severe stress or damage to the load carrying components. Press a ball bearing until it touches the shoulder in the bore or on the shaft.

With the sealing lip facing the lubricant, press or drift a seal to the depth of its housing, if the housing is shouldered, or flush with the face of the housing where no shoulder is provided.

## Chassis Bearing Lubrication

### **NOTICE**

This information relates only to bearing lubrication. For the procedures necessary to replace a bearing, always refer to the relevant section of this Service Manual. Bearings installed in engine and transmission applications are not covered by this information. Refer to the Lubrication chapter or the relevant engine chapter for additional information.



## General

For a bearing to be serviceable for its anticipated life span it must be checked, adjusted and lubricated at regular intervals, as specified in the service schedules given in the Owner's Handbook and this Service Manual.

A correctly lubricated bearing will have a film of lubrication that separates the moving parts, disperses heat and protects the bearing surfaces from corrosion.

### **NOTICE**

In all cases, use the lubricant recommended.

Grease the bearing, not the cavity where it is located.

A bearing that is not regularly checked and lubricated will have a reduced life span.

## New Bearings

New bearings are typically protected with an oil preservative to prevent corrosion etc. during storage. This is NOT the lubrication for the bearing but DOES NOT need to be washed off prior to assembly and in-service lubrication.

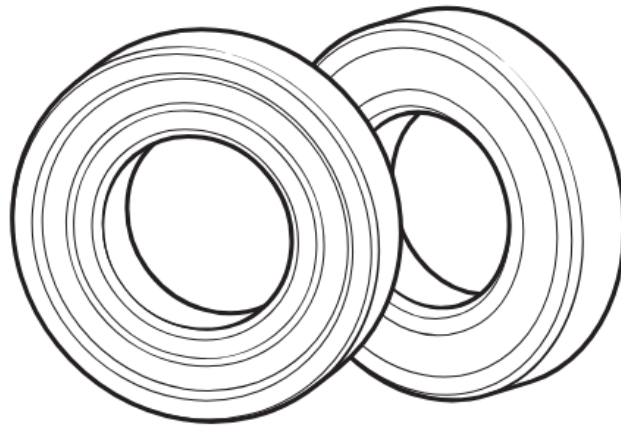
When lubricating a new bearing with grease the following steps should be taken:

1. Do not clean off the oil preservative.
2. Grease must be forced between the roller elements and the roller cage.
3. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.
4. Any excess grease should be smeared on the outside of the rollers.

## Lubrication and Checks While Servicing a Bearing

1. Disassemble parts as necessary to access the bearing.
2. Inspect the old grease covering the bearing, looking for signs of bearing damage, i.e. flakes or specks of metal.
3. Remove the old grease.
4. Check the bearing for smooth operation and visually check for corrosion, dents and flaking in the bearing race, rollers or cage. Replace if necessary.

Several common bearing types and the lubrication procedures for each are identified below:

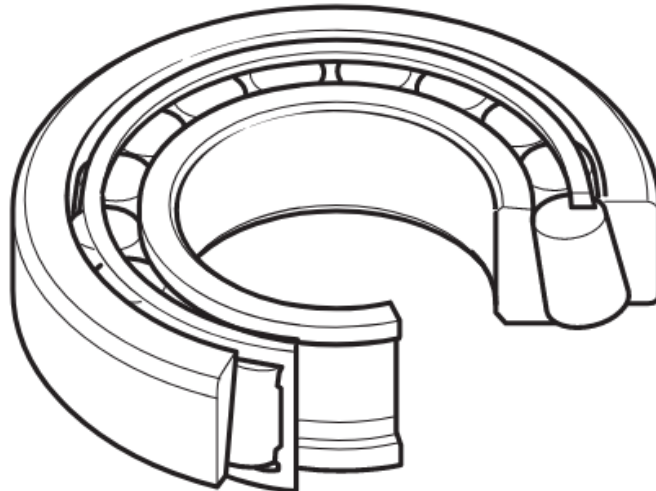


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Sealed Bearings

**NOTICE**

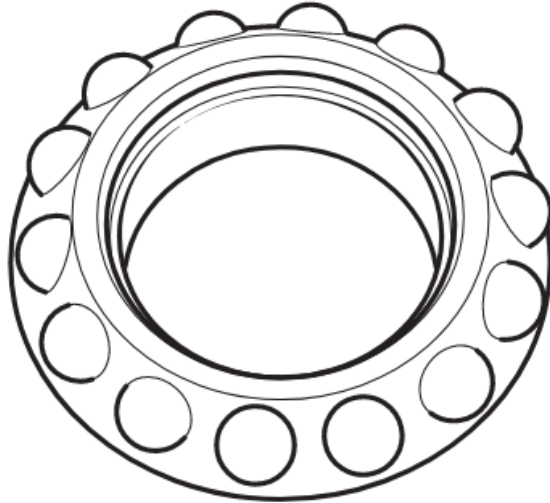
Sealed bearings can be identified by their integrated seals. Sealed bearings are lubricated for life by the manufacturer. Any attempt to change the grease in a sealed bearing will damage the integrated seals. If the seals are damaged, dirt and water will ingress and the life of the bearing will be greatly reduced.



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Taper Bearings

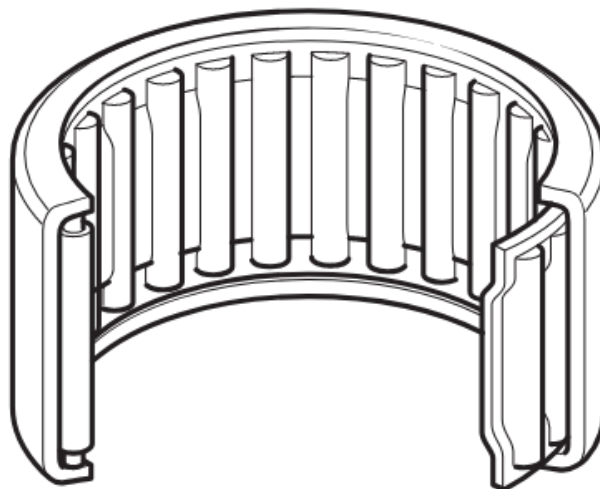
1. Grease must be forced between the inner race and the roller carrier.
2. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.
3. Any excess grease should be smeared on the outside of the rollers.



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Angular Contact and Ball Bearing

1. Grease the bearing races and the ball bearing carrier.
2. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.



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Needle Roller Bearings

1. Coat the needle rollers with grease.
2. Ensure the needle rollers turn so that the grease is distributed over the entire circumference of the internal parts.
3. Assemble the parts, adjust and check as necessary.

### Metal Bushes

1. Disassemble the parts as necessary to access the bush.
2. Remove the old grease.
3. Apply fresh grease to the metal bush.

### Fuel Handling Precautions

#### General

The following information provides basic precautions which must be observed if petrol (gasoline) is to be handled safely. It also outlines other areas of risk which must not be ignored. This information is issued for basic guidance only and, if in doubt, appropriate enquiries should be made to your local Fire Officer.

#### Petrol - Gasoline

When petrol (gasoline) evaporates it produces 150 times its own volume in vapour which when diluted with air becomes a readily ignitable mixture. The vapour is heavier than air and will always fall to the lowest level. It can readily be distributed throughout any indoor environment by air currents, consequently, even a small spillage of petrol (gasoline) is potentially very dangerous.

## **WARNING**

Petrol (gasoline) is highly flammable and can be explosive under certain conditions. When opening the fuel tank cap always observe all the following items:

Turn the motorcycle ignition switch OFF.

Do not smoke.

Always have a suitable fire extinguisher close at hand when handling or draining fuel or fuel systems. Fire extinguishers must also be present in areas where fuel is stored.

Always disconnect the vehicle battery, negative (black) lead first, before carrying out, dismantling or draining work on a fuel system.

Whenever petrol (gasoline) is being handled, drained, stored or when fuel systems are being dismantled, make sure the area is well ventilated. All potential forms of ignition must be extinguished or removed (this includes any appliance with a pilot light). Any lead- lamps must be flame-proof and kept clear of any fuel spillage.

Warning notices must be posted at a safe distance from the site of the work to warn others that petrol (gasoline) is being openly handled. The notice must instruct the reader of the precautions which must be taken.

Failure to observe any of the above warnings may lead to a fire hazard which could result in personal injury.

## **WARNING**

No one should be permitted to repair components associated with petrol (gasoline) without first having specialist training on the fire hazards which may be created by incorrect installation and repair of items associated with petrol (gasoline).

Repairs carried out by untrained personnel could bring about a safety hazard leading to a risk of personal injury.

## WARNING

Draining or extraction of petrol (gasoline) from a vehicle fuel tank must be carried out in a well ventilated area.

The receptacle used to contain the petrol (gasoline) must be more than adequate for the full amount of fuel to be extracted or drained. The receptacle should be clearly marked with its contents, and placed in a safe storage area which meets the requirements of local authority regulations.

When petrol (gasoline) has been extracted or drained from a fuel tank, the precautions governing naked lights and ignition sources should be maintained.

Failure to observe any of the above warnings could bring about a safety hazard leading to a risk of personal injury.

### Fuel Tank Removal

Fuel tanks should have a 'PETROL (GASOLINE) VAPOUR' warning label attached to them as soon as they are removed from the vehicle. In all cases, they must be stored in a secured, marked area.

### Chassis Repairs

## WARNING

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for repair or inspection. Any accident can cause damage to the motorcycle, which if not correctly repaired, may cause a second accident which may result in injury or death.

The frame must not be modified as any modification to the frame such as welding or drilling may weaken the frame resulting in an accident.

## Electrical Precautions

The following guidelines are intended to ensure the safety of the operator whilst preventing damage to the electrical and electronic components fitted to the motorcycle. Where necessary, specific precautions are detailed in the relevant sections of this manual which should be referred to prior to commencing repair operations.

Equipment - Prior to commencing any test procedure on the motorcycle ensure that the relevant test equipment is working correctly and any harness or connectors are in good condition, in particular mains leads and plugs.

### **WARNING**

The ignition system produces extremely high voltages. Do not touch any part of the ignition system or any cables while the engine is running.  
An electric shock caused by contact with the ignition system may lead to illness, injury or death.

### **WARNING**

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits and/or diagnostic equipment.  
The ignition system and any diagnostic equipment may interrupt the normal operation of such devices causing illness or death.

### **WARNING**

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

Do not jump start the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gases causing a risk of personal injury.

High Voltage Circuits - Whenever disconnecting live H.T. circuits always use insulated pliers. Exercise caution when measuring the voltage on the coil terminals while the engine is running. High voltage spikes can occur on these terminals.

Connectors and Harness - The engine of a motorcycle is a particularly hostile environment for electrical components and connectors. Always ensure these items are dry and oil-free before disconnecting and connecting test equipment. Never force connectors apart either by using tools or by pulling on the wiring itself. Always ensure locking mechanisms are disengaged before removal and note the orientation to enable correct reconnection. Ensure that any protective covers and substances are replaced if disturbed.

Having confirmed a component to be faulty, switch off the ignition and disconnect the battery negative (black) lead first. Remove the component and support the disconnected harness. When replacing the component keep oily hands away from electrical connection areas and push connectors home until any locking mechanism becomes fully engaged.

### Battery Disconnecting

Before disconnecting the battery, switch off all electrical equipment.

#### **WARNING**

To prevent the risk of a battery exploding and to prevent damage to electrical components ALWAYS disconnect the battery negative (black) lead first. When reconnecting the battery, always connect the positive (red) lead first, then the negative (black) lead. Always disconnect the battery when working on any part of the electrical system.

Failure to observe the above warnings may lead to electrical damage and a fire hazard which could cause personal injury.

Always ensure that battery leads are routed correctly and are not close to any potential chafing points.



## Disciplines

Switch off the ignition prior to making any connection or disconnection in the system. An electrical surge can be caused by disconnecting 'live' connections which can damage electronic components.

Ensure hands and work surfaces are clean and free of grease, swarf, etc. as grease collects dirt which can cause tracking or high- resistance contacts.

Prior to commencing any test, and periodically during any test, touch a good earth to discharge body static. This is because some electronic components are vulnerable to static electricity.

## Electrical Wires

All the electrical wires are either single-colour or two-colour and, with only a few exceptions, must be connected to wires of the same colour. On any of the two-colour wires there is a greater amount of one colour and a lesser amount of a second colour. A two-colour wire is identified by first the primary colour and then the secondary colour. For example, a yellow wire with thin red stripes is referred to as a 'yellow/red' wire; it would be a 'red/yellow' wire if the colours were reversed to make red the main colour.

## Electrical Testing

For any electrical system to work, electricity must be able to flow in a complete circuit from the power source (the battery) via the components and back to the battery. No circuit means no electrical flow. Once the power has left the positive side of the battery and run through the component it must then return to the battery on its negative side (this is called earth or ground). To save on wiring, connections and space, the negative side of the battery is connected directly to the frame or engine. Around the frame and engine will be various other ground points to which the wiring coming from components will be connected. In the case of the starter motor it bolts directly to the engine, which is bolted to the frame. Therefore the frame and engine also form part of the earth return path.

## Ohm's Law

The relationship between voltage, current and resistance is defined by Ohm's Law.

- The potential of a battery is measured in volts (V).
- The flow of current in a circuit (I) is measured in amperes.
- The power rating of a consumer is measured in watts (W).
- The resistance (R) of a circuit is measured in Ohms.

Ohm's law, for practical work can be described as -

$$\frac{\textit{Voltage}}{\textit{Current}} = \textit{Resistance}$$

Power is calculated by multiplying Volts x Amps -

$$\textit{Watts} = \textit{Volts} \times \textit{Amps}$$

By transposing either of these formulae, the value of any unit can be calculated if the other two values are known.

For example, if a battery of 12 V is connected to a bulb of 60 W:

- the current flowing in the circuit can be calculated by using –

$$\frac{W}{V} = I \qquad \frac{60}{12} = 5$$

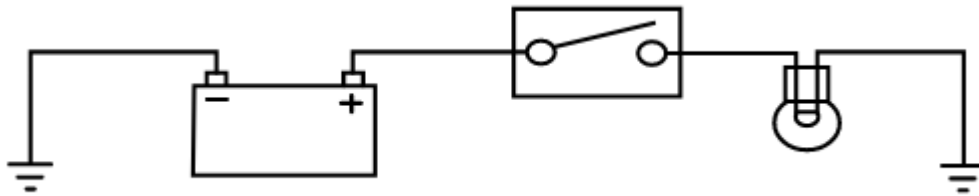
- the bulb resistance can be calculated by using-

$$\frac{V}{I} = R \qquad \frac{12}{5} = 2.4$$

To use either of the following triangles, put your finger over the value you want to find. Multiply the remaining values if side by side, or divide if one is over the other.



## Basic Electrical Circuits



## Basic Circuit Diagram

In the above circuit an electrical reservoir (the battery) is connected via a cable to a terminal on the controlling device (the switch) whose contacts are either open or closed. The other terminal on the switch is connected via a cable to the consumer (the bulb), and the other side of the bulb filament is connected to ground (earth) by another cable. The ground point is usually a part of the frame or engine, to which the battery negative terminal is also connected.

When the switch contacts are open (as shown in the diagram), the circuit is broken and no current flows. When the switch contacts are closed, the circuit is made and current flows from the battery positive terminal through the switch contacts and bulb filament to ground. The frame completes the circuit to the battery negative terminal and the bulb illuminates.

Although some circuits on the circuit diagram may at first seem more complicated, it will generally be found that they can be broken down into sections which do not differ greatly from the basic circuit above.

## Circuit Diagrams

### Circuit Diagrams

Circuit diagrams are created to provide a 'picture' of the electrical system and to identify the route taken by each individual wire through the system, in order to identify which components it feeds and which connectors the wire runs through. Circuit diagrams are an essential tool for fault finding, as it is possible to locate start and finish points for a circuit without having to manually trace the wire through the motorcycle itself. Circuit diagrams may look confusing at first but when they are studied closely they soon become logical.

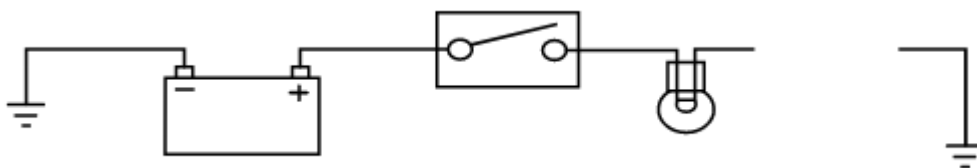
Circuit diagrams also depict the inner workings of a switch housing (i.e. which wire connects to which when a switch is turned from one position to another) so that a test of that switch can be made using the wire terminals in the connector instead of disassembling the switch itself.

More information can be found in Circuit Diagrams, in the Electrical section of the Service Manual.

### Tracing Circuits

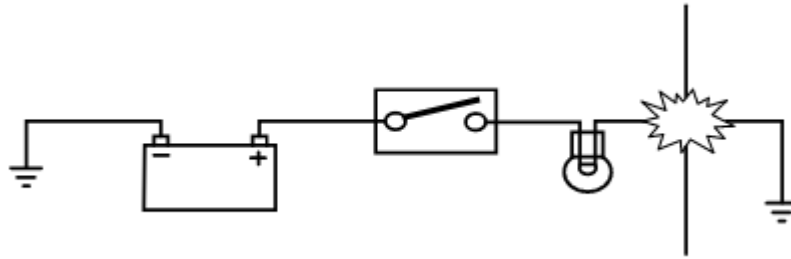
The following is a description of two types of common electrical failures, and some of the methods which may be used to find them.

#### Open Circuit



A break in an electrical circuit - current cannot flow. Usually caused by a break in a wire or cable or by a loose connection. Open circuits can often be intermittent, making diagnosis difficult.

## Short Circuit



A 'short cut' in an electrical circuit - current bypasses the intended circuit, either to ground or to another, different circuit. Often caused by failure of the cable insulation due to chafing or trapping of the wire. There are two different types of short circuit - short to ground and short to battery Voltage.

A short to ground means that the current is going to ground before it reaches the component it is supposed to feed. These are often caused by chafing of the harness to the frame or wires trapped between a bolted component, and will often blow the fuse on that circuit.

A short to battery voltage (12 Volts) is caused by a live power supply wire contacting an adjacent cable. Note that it is also possible for a 5 Volt sensor reference voltage to short to an adjacent circuit, which can also cause electrical failures and DTCs (Diagnostic Trouble Code) to be stored.

When tracing a wire that is suspect, carefully check the circuit diagram before starting. Remember:

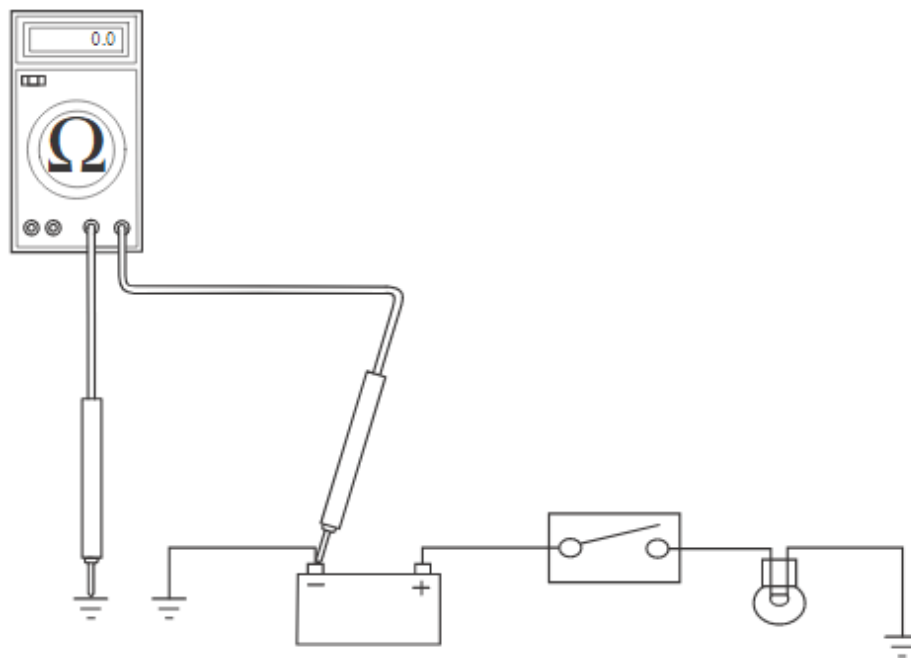
- a wire may diverge at a splice and go off to feed other circuits. If these circuits are working, check for wiring faults from the splice onwards.
- the circuit diagram is not an accurate guide to the actual location of the parts when fitted on the motorcycle. It is a schematic diagram of the circuits.
- particularly where engine management items are concerned, the circuit is only completed by the ECM. If the ECM is not connected, the circuit may register as open.

To Check Continuity:

## ⚠ CAUTION

Ensure the circuit being tested is switched off before measuring continuity. Damage to the Digital Multi Meter (DMM) may result from testing a 'live' circuit with the meter set to resistance (Q).

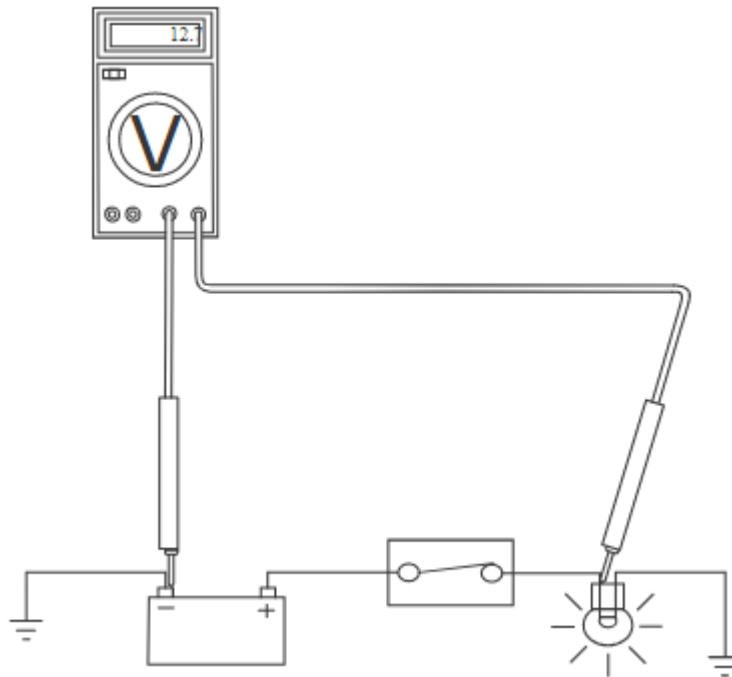
In the example below, the ground circuit continuity is being tested from the battery to the frame.



- Locate each end of the wire.
- Set the Digital Multi Meter (DMM) to resistance check Ohms.
- Probe each end of the wire.
- If there is continuity, the meter will usually beep or register the resistance of the cable.
- A high resistance figure could indicate a dirty or corroded connection.
- If there is a break in the wire, the meter will not beep or register a resistance.
- By probing the wire in various places, the position of a high resistance or break in the wire (open circuit) can be narrowed down until it is found.

To Measure Voltage:

In the example below, the circuit voltage is being measured at the bulb positive (+) terminal.



- Turn the circuit to be tested 'ON'.
- Set the Digital Multi Meter (DMM) to Voltage Check (V). Ensure the multi meter is set to DC Volts for direct current circuits (most circuits) or AC Volts for alternating current circuits (typically alternator output voltage tests).
- Set the range of the DMM to the range best suited to the voltage of the circuit being tested (typically 20 Volts for most DMMs). Refer to the DMM manufacturers instructions.
- Connect the black (ground) lead of the DMM to a reliable ground connection (usually the battery or frame ground).
- Locate the positive terminal of the wire or component to be tested.
- Connect the red (positive) lead of the DMM to the positive terminal.
- Read the voltage from meter.

## Splices

Splices are probably the most common cause of wiring faults after connectors. Splices are made where two or more wires come together and diverge in different directions, usually to feed a different circuit.

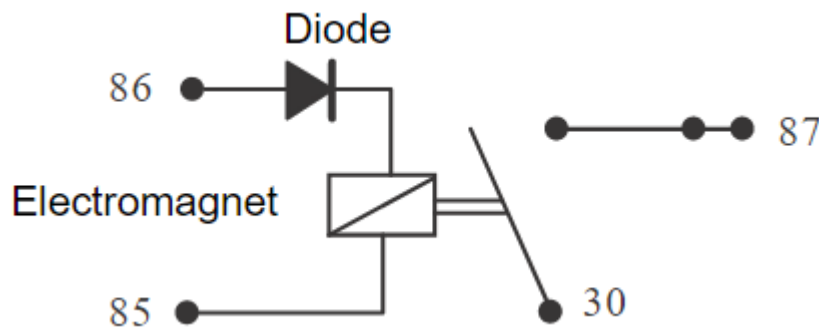
To locate a splice, it is necessary to peel back the insulation and examine the splice for its integrity. The most common fault is where one of the wires at the joint has come adrift usually causing the circuit it feeds or grounds to become 'dead'.

## Switches

To check a switch, set the multimeter to resistance/continuity and probe the two pins that form a closed circuit when the switch is pushed. If the switch is working correctly, the resistance should register or the meter will beep.

## Relays

All relay cases have a circuit path engraved on them showing the circuit path across the electromagnet and the switch. Before making any checks, first note the pin designations, current paths, and whether or not there is a diode in either circuit path.



Make continuity checks across the electromagnet first, usually from pin 86 (positive) to pin 85 (negative). If a diode appears in the circuit use the diode check on the multimeter (Volts scale) in the direction of current flow. If there is no diode, use the resistance check facility. An open circuit or unusually high resistance value indicates a faulty relay.

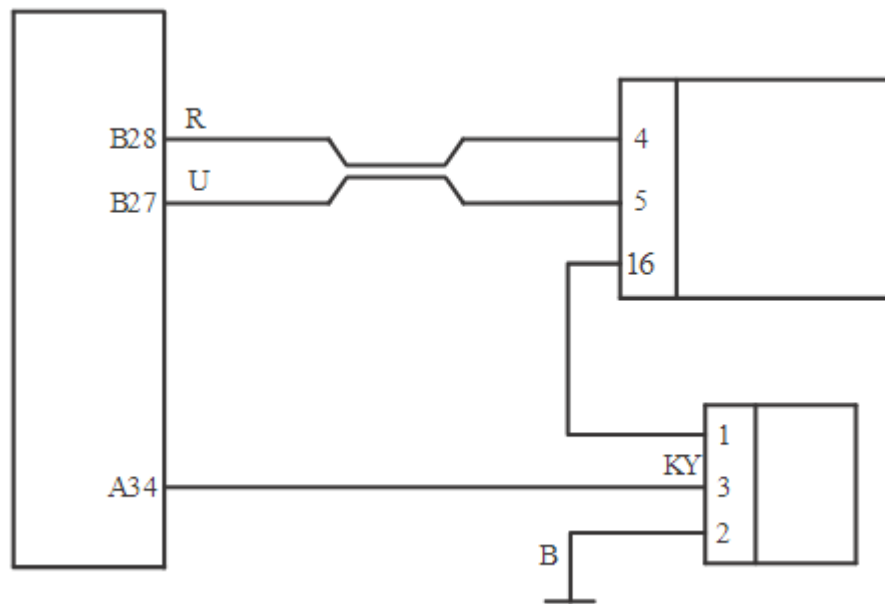
To check the switch side, apply a 12 Volt supply between pins 86 and 85. With the supply connected, the relay should be heard to click and there should be continuity between pins 30 and 87. An open circuit indicates a faulty relay.



## CAN (Controller Area Networking)

CAN (sometimes called CANbus) is a protocol for data communication between Electronic Control Modules (ECMs). Each ECM on the network is connected by a single pair of twisted wires (or bus) which are used for the transmission of vehicle sensor data. By using CAN, the overall number of system sensors, and the amount of cabling required to allow ECMs to communicate with each other is greatly reduced.

This saves cost, weight and space, and makes the system more reliable, as the physical number of wires and connections is reduced.



CAN works by each ECM sending out 'packets' of information (such as engine speed or fuel consumption information) on to the network bus (note that the network must be free of data before any ECM is allowed to transmit). This data is given a priority according to its importance (for example 'engine speed' may have a higher priority than 'low fuel level'), so that even if two ECMs send data at the same time, high priority information is always sent first. Lower priority data is then resent after the high priority data has been received by all ECMs on the network.

The receiving ECM confirms the data has been received correctly and that the data is valid, and this information is then used by the ECM as necessary. Specific data not required by an ECM will still be received and acknowledged as correct but then disregarded (for example if an ECM does not require 'clutch switch position' information, this data packet would be ignored).

This allows for a very high speed system of communication, which is also very reliable. Should one ECM fail or transmit corrupted or otherwise incorrect messages, none of the other ECMs on the network will be affected, and after a certain time that ECM will be prevented from transmitting further messages until the fault is rectified. This stops the ECM from clogging the network with incorrect data and preventing other messages from getting through. The fault would then be reported by a DTC (Diagnostic Trouble Code).

Triumph currently uses CAN for communication between the following ECMs:

- Engine ECM
- Instruments
- ABS ECM
- Immobiliser or Chassis ECM
- Diagnostic connector
- Inertial Measurement Unit (if fitted)
- Audio system (if fitted)
- Electronic steering lock (if fitted)
- LED Headlights (if fitted).
- Suspension ECM (if fitted)

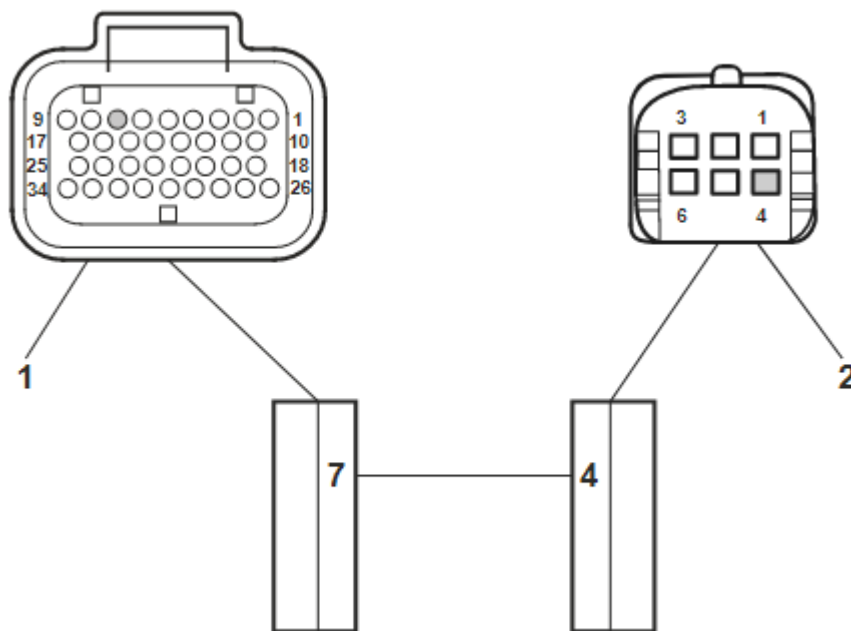
## LIN (Local Interconnect Network)

LIN (Local Interconnect Network) is a serial network protocol used for communication between components in vehicles. The bus is a single master/multiple slave bus that uses a single wire to transmit data.

By using LIN, the amount of cabling required to allow components to communicate with each other is greatly reduced. This saves cost, weight and space, and makes the system more reliable, as the physical number of wires and connections is reduced.

The instruments use some of this data internally and also broadcasts it on the CANbus (Controller Area Networking) for use on the motorcycle as necessary.

Information (such as headlight main beam) is being requested continuously by the Instruments, once a confirmation of the request is recognised the instruments will react accordingly.



1. Instruments
2. Switch housing (left hand side)

## Example

- Pressing the headlight main beam button on the switch housing (left hand handlebar) confirms to the instruments that headlight main beam is required.
- The instruments confirm the data has been received correctly and that the data is valid.
- Once confirmed the headlight main beam is switched on.
- Triumph currently uses LIN on certain models for communication between the instruments and the following components:
  - Fog light button
  - Heated seat
  - Dip beam/Daytime running lights (DRL) switch (if equipped)
  - Mode button
  - Turn signal switch
  - Joystick button
  - Horn button
  - High beam button

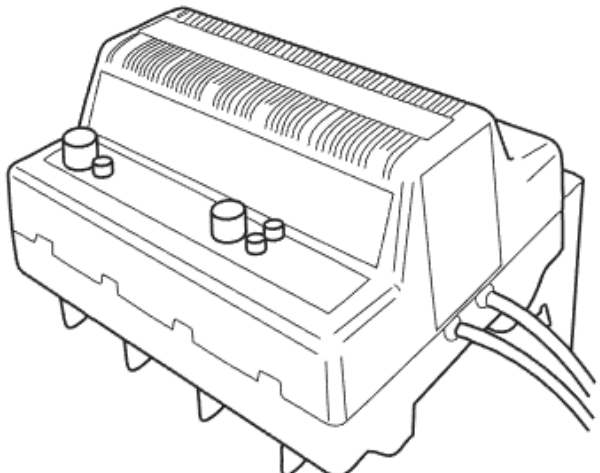
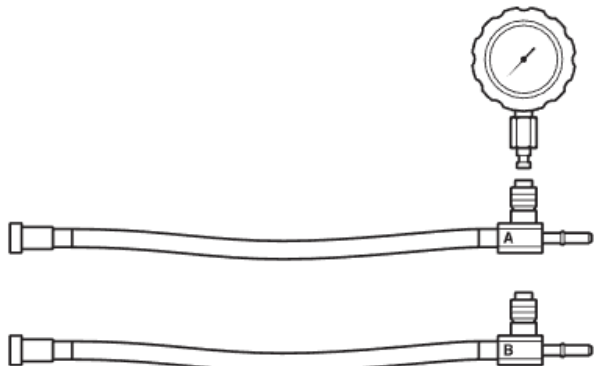
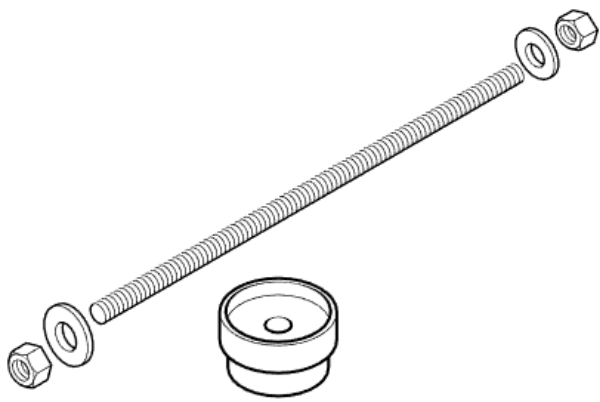
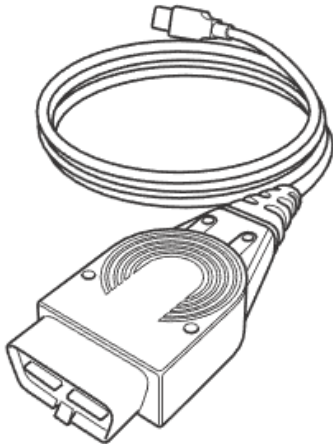
## Service Tools

### Service Tools and Garage Equipment

### Service Tools and Garage Equipment

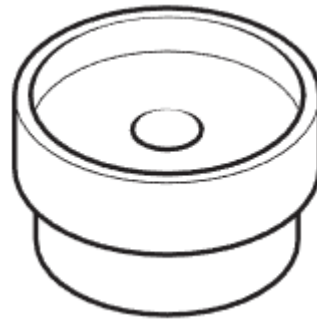
Special service tools have been developed to facilitate removal, dismantling and assembly of certain mechanical components in a practical manner without causing damage. Some operations in this Service Manual cannot be carried out without the aid of the relevant service tools. Where this is the case, the tools required will be described during the procedure.

Special Service Tools:

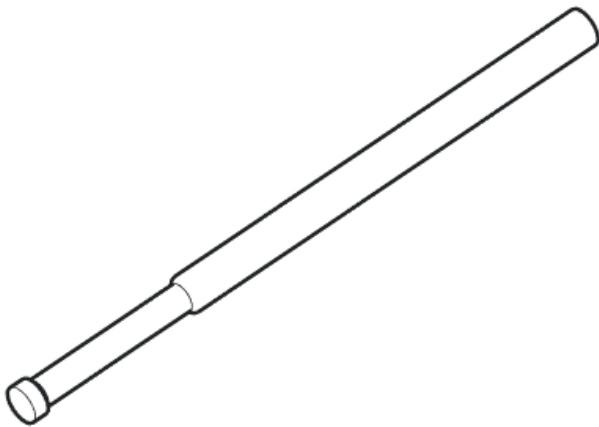
|  |  |
|--|--|
|  A line drawing of a BatteryMate battery charger. It is a rectangular unit with a textured top surface and a control panel on the front. Two power cables are connected to the back. |  A line drawing of a fuel pressure gauge. It features a circular gauge with a needle, connected to two flexible hoses. The hoses are labeled 'A' and 'B'. |
| BatteryMate Battery Charger - See Latest Parts Catalogue for Part Number Information   | T3880001- Fuel Pressure Gauge  |
|  A line drawing of a wheel bearing extraction kit. It consists of a long threaded rod with a nut at one end, a washer, and a cylindrical bearing cap.                               |  A line drawing of a Triumph Diagnostic Interface. It is a rectangular device with a coiled cable and a connector at the end.                            |
| T3880053 - Wheel Bearing Extraction Kit  | T3880057 - Triumph Diagnostic Interface  |



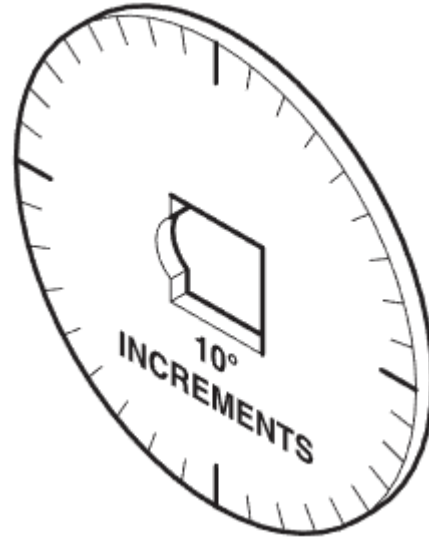
T3880070 - Bearing Installer



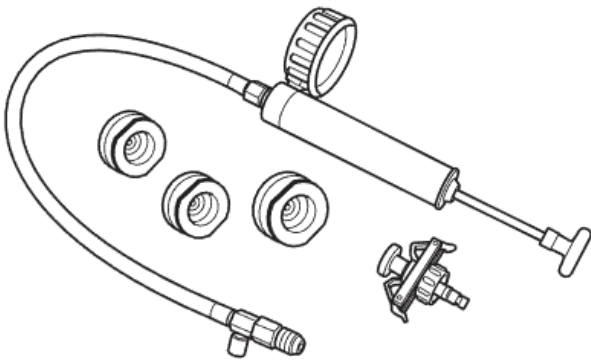
T3880075 - Bearing Installer



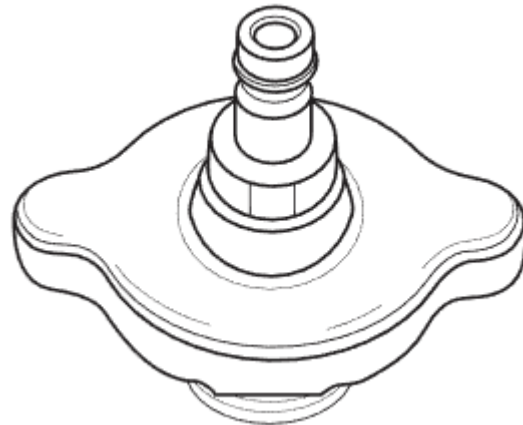
T3880085 - Fork Piston Holder



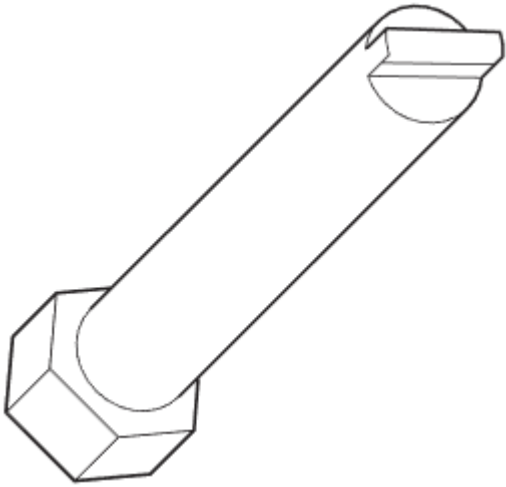
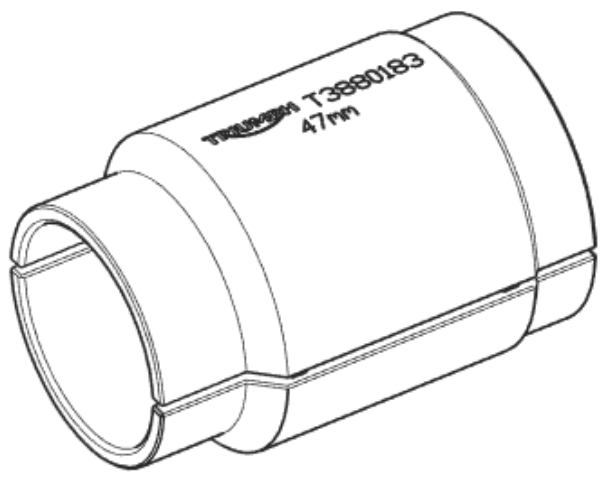
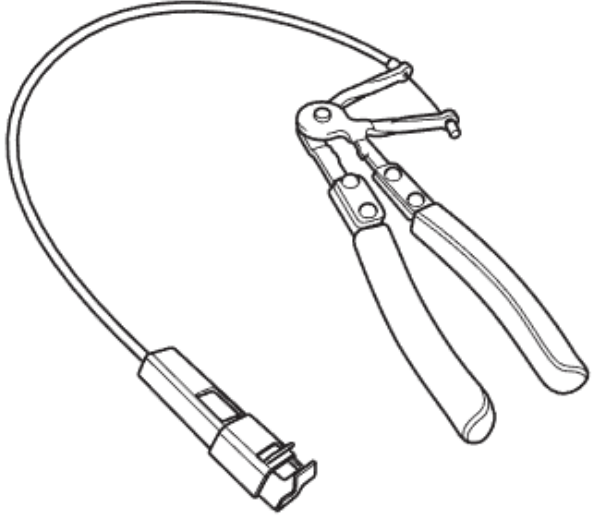
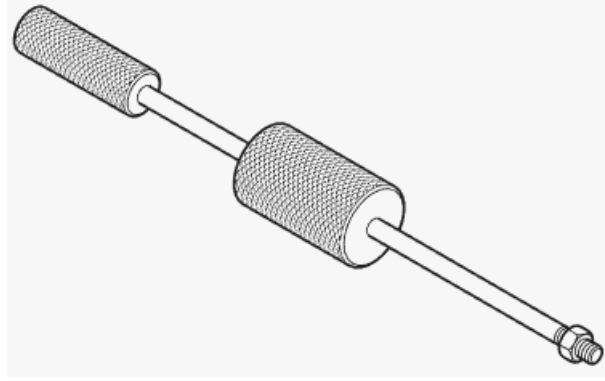
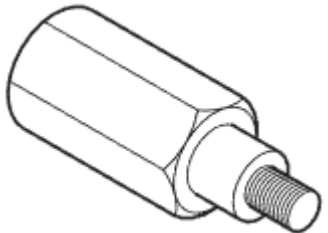

T3880105-Torque Angle Gauge

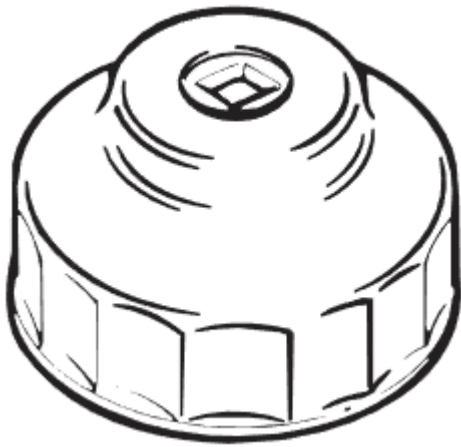


T3880147 - Radiator and Cap Tester Kit

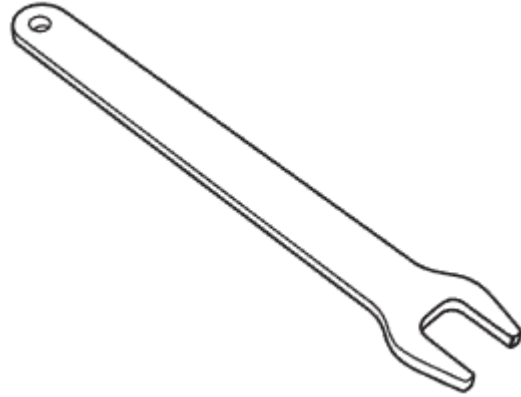


T3880176 - Radiator Pressure Test (use with T3880147)

|   |  |
|---|--|
|    |    |
| <p>T3880181 - Wrench Frame Adjuster</p>   | <p>T3880183 - Fork Seal Tool, 47 mm</p>  |
|   |   |
| <p>T3880207 - Hose Clip Pliers</p>  | <p>T3880208 - Slide Hammer</p>   |
|  |  |
| <p>T3880209 – Adaptor</p>   | <p>T3880215 - Fork Seal Cleaner, 35-45 mm forks</p>                                  |



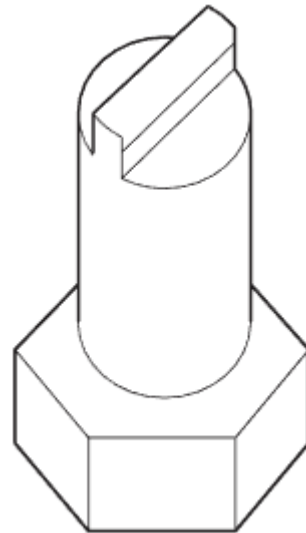
T3880313 - Oil Filter Wrench



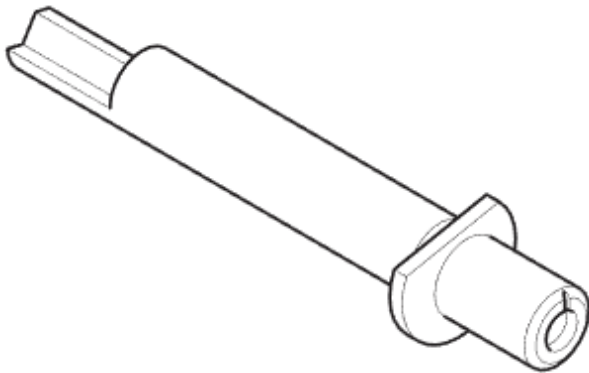
T3880342 - 17 mm U-Spanner



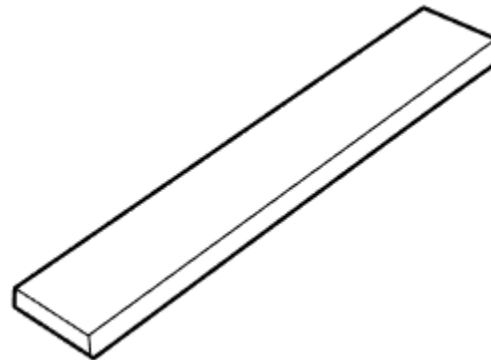
T3880365 - Alternator Housing Puller



T3880377 - Engine Mounting Adjuster

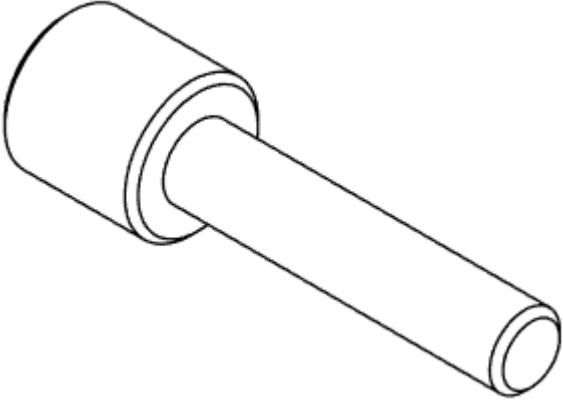
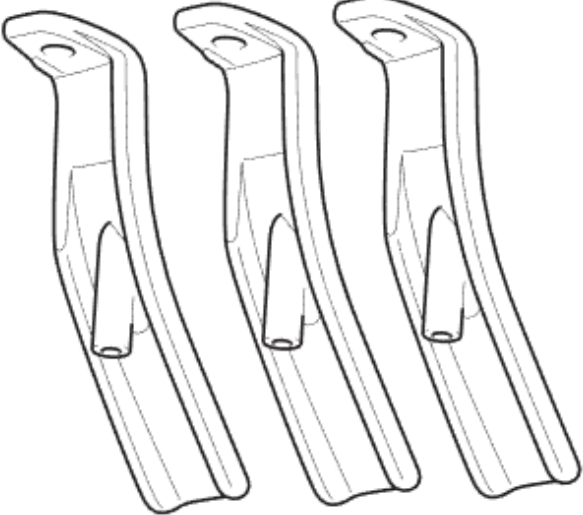
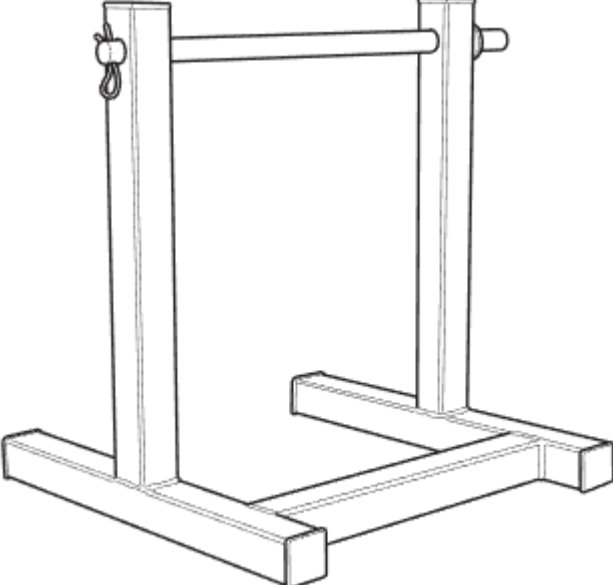
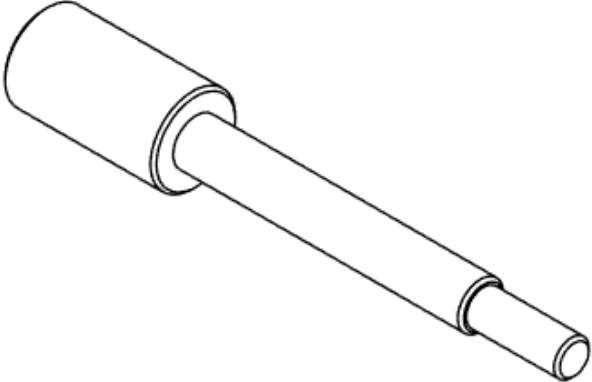
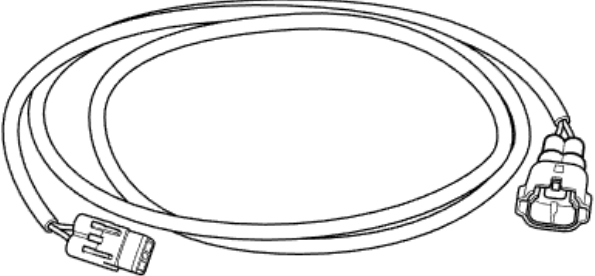
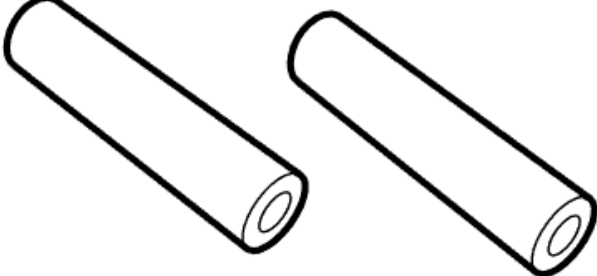


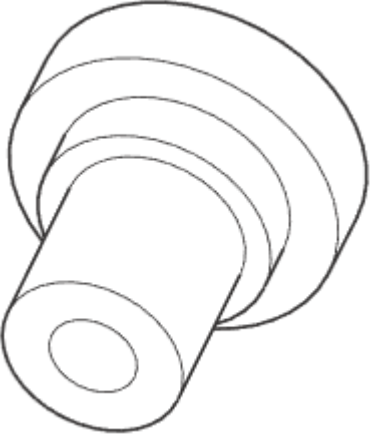
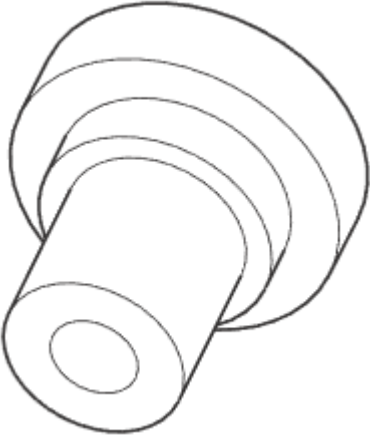
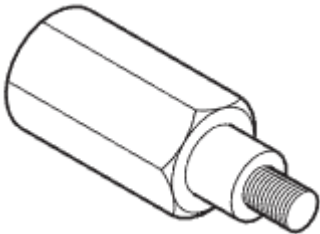
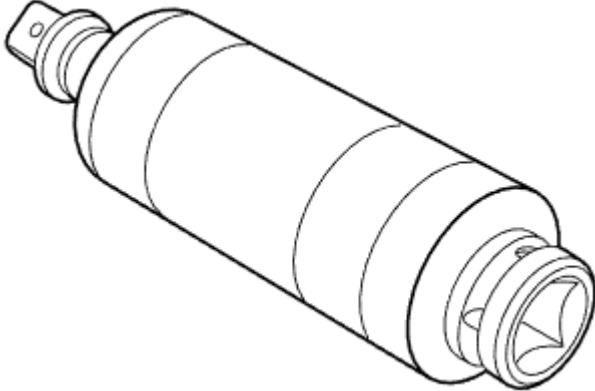
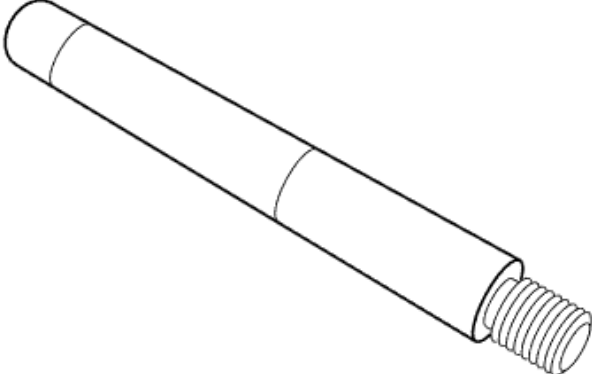
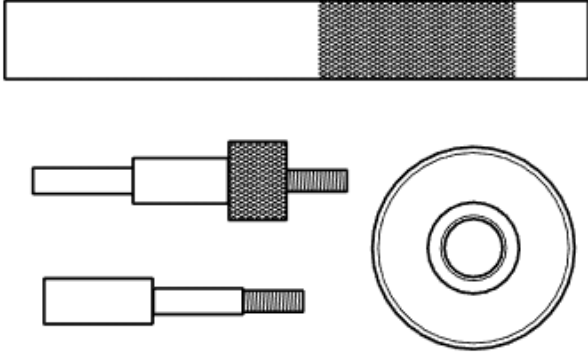
T3880501 Crankshaft Locking Pin

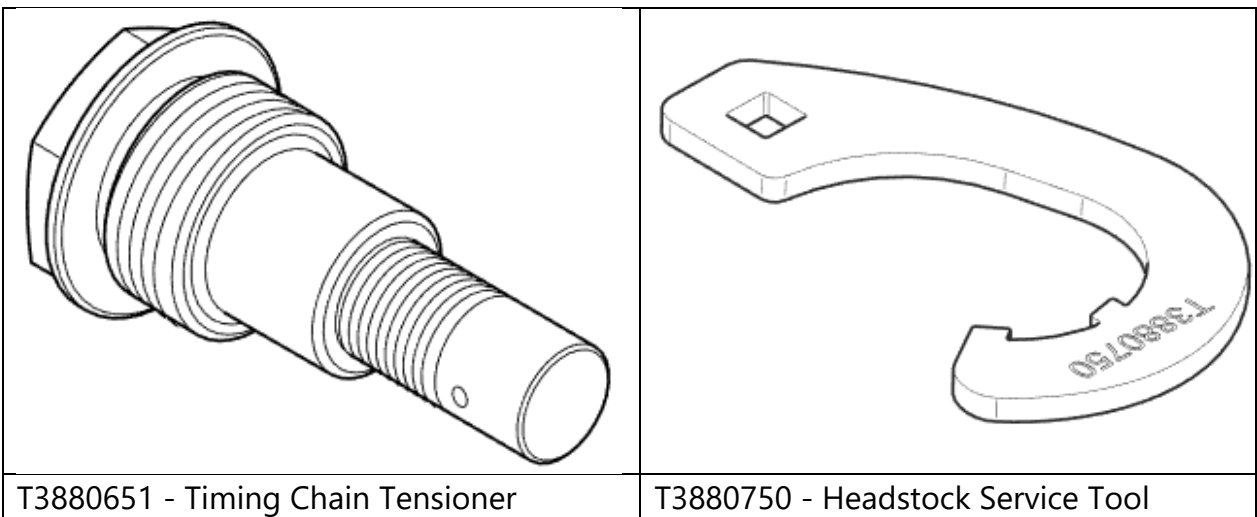


T3880502 - Camshaft timing bar



|   |  |
|---|--|
|    |    |
| <p>T3880503 - Drop link alignment pin</p>   | <p>T3880504 - Oil spray jet protectors</p>   |
|   |   |
| <p>T3880505 - Main frame support</p>  | <p>T3880506 - Outrigger dowel removal</p>  |
|  |  |
| <p>T3880507 - Cable extension, fuel pump</p>  | <p>T3880518 - Spacer</p>   |

|   |  |
|---|--|
|    |    |
| <p>T3880511 - Needle Bearing Installer<br/>6.5mm</p>                                | <p>T3880512 - Needle Bearing Installer<br/>7.5mm</p>                                 |
|   |   |
| <p>T3880513 - Adaptor 12mm</p>  | <p>T3880609 - Timing Torque Limiter</p>  |
|  |  |
| <p>T3880629 - Bearing Installer Handle</p>  | <p>T3880636 - Kit, Brake Lever Pivot Sleeve</p>                                      |



## Specifications

### Engine

|                      |                                  |
|----------------------|----------------------------------|
| Engine Configuration | Liquid cooled in-line 3 cylinder |
| Arrangement          | Longitudinal in-line             |
| Displacement         | 2458 cc                          |
| Bore x Stroke        | 110.2 x 85.9                     |
| Compression Ratio    | 10.9:1                           |
| Cylinder numbering   | Front to rear                    |
| Firing order         | 1-3-2                            |

## Cylinder Head and Valves

|                           |                    |                             |
|---------------------------|--------------------|-----------------------------|
| Cylinder head             | Flatness tolerance | 0.030 mm                    |
| Valve Head Diameter       | Inlet              | 37.9 mm                     |
|                           | Exhaust            | 32.3 mm                     |
| Valve Lift                | Inlet              | 9.15 mm                     |
|                           | Exhaust            | 9.64 mm                     |
| Valve Stem Diameter       | Inlet              | 5.475 – 5.490 mm (standard) |
|                           |                    | 5.465 mm (service limit)    |
|                           | Exhaust            | 5.47- 5.48 mm (standard)    |
|                           |                    | 5.46 mm (service limit)     |
| Valve Guide Bore Diameter | Inlet              | 5.500- 5.512 mm (standard)  |
|                           |                    | 5.540 mm (service limit)    |
|                           | Exhaust            | 5.500- 5.512 mm (standard)  |
|                           |                    | 5.540 mm (service limit)    |

|   |         |                           |
|---|---------|---------------------------|
| Valve Stem to Guide Clearance               | Inlet   | 0.010-0.037 mm (standard) |
|   |         | 0.075 mm (service limit)  |
|   | Exhaust | 0.020-0.042 mm (standard) |
|   |         | 0.080 mm (service limit)  |
| Valve Seat Width (in cylinder head)         | Inlet   | 1.000 mm (standard)       |
|   |         | 1.500 mm (service limit)  |
|   | Exhaust | 1.200 mm (standard)       |
|   |         | 1.700 mm (service limit)  |
| Valve Seat Width (valve)                    |         | 2.14 mm                   |
| Valve Seat Angle                            |         | 90° inclusive             |
| Valve Spring Length                         |         | 51.79 mm                  |
| Inlet/Exhaust Valve Spring "Load at Length" |         | 159 N +/- 8N at 37 mm     |
| Valve Clearance                             | Inlet   | 0.09-0.14 mm              |
|   | Exhaust | 0.18-.023 mm              |

## Camshafts

|                                |         |                                   |
|--------------------------------|---------|-----------------------------------|
| Camshaft Timing (at 1mm lift)  | Inlet   | Open 3.0°                         |
|                                |         | Close 57.0°<br>ABDC               |
|                                | Exhaust | Duration<br>234°                  |
|                                |         | Open 53°<br>BBDC                  |
|                                |         | Close 13°<br>ATDC                 |
|                                |         | Duration<br>246°                  |
| Camshaft Journal Diameter      |         | 22.94 –<br>22.96 mm               |
| Camshaft Journal Clearance     |         | 0.040 –<br>0.081 mm<br>(standard) |
|                                |         | 0.12<br>(service<br>limit)        |
| Camshaft Journal Bore Diameter |         | 23.000 –<br>23.021 mm             |
| Camshaft End Float             |         | 0.03 – 0.23                       |
| Camshaft Run-out               |         | 0.015 mm                          |

## Clutch and Primary Drive

|  |                        |
|--|------------------------|
| Primary Drive Type                       | Gear                   |
| Reduction Ratio                          | 1.246:1 (57/71)        |
| Clutch Type                              | Wet multi-plate        |
| No. of Friction Plates                   | 10                     |
| Steel Plate Flatness Limit               | 0.15 mm                |
| Friction Plate Flatness Limit            | 0.2 mm                 |
| Friction Plate Thickness (new)           | 3.8 mm                 |
| Friction Plate Thickness (service limit) | 3.6 mm                 |
| Clutch Pack Height                       | 56 mm +0.32/-0.68 mm   |
| Clutch Actuation Method                  | Hydraulic              |
| Clutch Fluid                             | DOT 4 brake and clutch |

## Pistons

|   |  |
|---|--|
| Cylinder Bore Diameter                  | 110.185 - 110.203 mm (standard)                                    |
|   | 110.293 mm (service limit)   |
| Piston Diameter (at 90° to gudgeon pin) | 110.17 - 110.18 mm (@ 42 mm down from crown) (standard) (standard) |
|   | 110.13 mm (service limit)  |
| Piston Ring to Groove Clearances        |  |
| Top                                     | 0.02-0.06 mm (standard) (standard)                                 |
|   | 0.075 mm (service limit) (service limit)                           |
| Second                                  | 0.02-0.06 mm (standard) (standard)                                 |
|   | 0.075 mm (service limit) (service limit)                           |
| Piston Ring End Gaps                    |  |
| Top                                     | 0.25 -0.4 mm (standard) (standard)                                 |
|   | 0.52 mm (service limit) (service limit)                            |
| Second                                  | 0.4 -0.55 mm (standard) (standard)                                 |
|   | 0.67 mm (service limit) (service limit)                            |
| Oil                                     | 0.2-0.7 mm (standard) (standard)                                   |
|   | 0.84 mm (service limit) (service limit)                            |
| Gudgeon Pin Bore Diameter in Piston     | 25.004 - 25.012 mm (standard) (standard)                           |
|   | 25.04 mm (service limit) (service limit)                           |
| Gudgeon Pin Diameter                    | 24.992 - 25.000 mm (standard) (standard)                           |
|   | 24.982 mm (service limit) (service limit)                          |



## Connecting Rods

|                                       |                               |
|---------------------------------------|-------------------------------|
| Connecting Rod Small End Diameter     | 25.032 - 25.045 mm (standard) |
|                                       | 25.055 mm (service limit)     |
| Connecting Rod Big End Diameter       | 55.500-55.518 mm (standard)   |
| Connecting Rod Big End Side Clearance | 0.15 -0.30 mm (standard)      |
|                                       | 0.5 mm (service limit)        |

## Crankshaft

|   |                               |
|---|-------------------------------|
| Crankshaft Big End Journal Diameter                         | 52.458 - 52.472 mm (standard) |
|   | 52.434 mm (service limit)     |
| Crankshaft Big End Bearing Clearance                        | 0.034 -0.066 mm (standard)    |
|   | 0.071 mm (service limit)      |
| Crankshaft Number 1 Main Journal Diameter (front of engine) | 52.471 - 52.495 mm (standard) |
|   | 52.44 mm (service limit)      |
| Crankshaft Number 2, 3 and 4 Main Journal Diameter          | 52.479 - 52.495 mm (standard) |
|   | 52.455 mm (service limit)     |
| Crankshaft Main Bearing Clearance                           | 0.02 -0.046 mm (standard)     |
|   | 0.078 mm (service limit)      |
| Crankshaft End Float  | 0.1 -0.35 mm (standard)       |
|   | 0.5 mm (service limit)        |
| Crankshaft Run-out  | 0.035 mm (standard)           |
|   | 0.05 mm (service limit)       |

## Transmission

|  |                 |   |
|--|-----------------|---|
| Transmission Type                      |                 | 6 Speed, Constant Mesh<br>(Helical 2nd, 3rd, 4th, 5th, 6th) |
| Gear Ratios                            | 1 <sup>st</sup> | 2.389:1 (43/18)   |
|  | 2 <sup>nd</sup> | 1.840:1 (46/25)   |
|  | 3rd             | 1.414:1 (41/29)   |
|  | 4th             | 1.121:1 (37/33)   |
|  | 5th             | 0.972:1 (35/36)   |
|  | 6th             | 0.838:1 (31/37)   |
| Gear Selector Fork Thickness           |                 | 5.90 - 6.00 mm (standard)                                   |
|  |                 | 5.8 mm  |
| Gear Selector Groove Width             |                 | 6.10 - 6.20 mm (standard)                                   |
|  |                 | 6.3 mm (service limit)                                      |
| Gear Selector Fork to Groove Clearance |                 | 0.1 -0.3 mm (standard)                                      |
|  |                 | 0.5 mm (service limit)                                      |

## Final Drive

|                          |  |
|--------------------------|--|
| Final Drive              | Bevel geared crown wheel and pinion  |
| Final Drive Ratio        | 2.846:1 (37/13)  |
| Final Drive Oil          | 75W/90 fully synthetic hypoid oil<br>(specification API Service Level GL5, such as<br>Castrol SAF-XO fully synthetic hypoid oil) |
| Final Drive Oil Capacity | 170 ml   |

## Lubrication

|   |  |
|---|--|
| Oil Capacity (including filter, dry fill) | 5.2 litres   |
| Oil and Filter Change                     | 4.6 litres   |
| Oil Change only                           | 4.4 litres   |
| Recommended Oil Approval Rating           | API SH (or higher) and JASO MA-2   |
| Oil Viscosity                             | Semi or fully synthetic 15W/50 motorcycle engine oil which meets specification API SH (or higher) and JASO MA, such as Castrol Power 1 4T. |
| Oil Type                                  | Semi or fully synthetic  |
| Oil Pressure (in main gallery)            | 2.0-2.6 bar at 3000 rpm  |
| Oil Pump Rotor Tip Clearance              | 0.15 mm (standard)   |
|   | 0.20 mm (service limit)  |
| Oil Pump Body Clearance                   | 0.1 -0.185 mm (standard)   |
|   | 0.315 mm (service limits)  |
| Oil Pump Rotor End Float                  | 0.03 -0.12 mm (standard)   |
|   | 0.315 mm (service limits)  |

## Ignition System

|                         |                        |
|-------------------------|------------------------|
| Type                    | Digital electronic     |
| Electronic Rev Limiter  | 7000 rpm               |
| Primary Coil Resistance | 0.56 Kohms             |
| Ignition Coil Type      | Inductive, twin output |
| Spark Plug Type         | NGK LMAR8A-9           |
| Spark Plug Gap          | 0.9 mm +0.0/-0.1 mm    |

## Fuel System

|                         |   |
|-------------------------|---|
| Fuel Type               | Unleaded, 95 RON (CLC or AKI octane rating (R+M)/2 of 89 or higher) |
| Fuel Tank Capacity      | 18.8 litres   |
| Low Level Warning Lamp  | 4.5 litres remaining  |
| Fuel Pump Type          | Submerged, electric   |
| Fuel Pressure (nominal) | 3.5 bar   |
| Purge Control System    | Modulated, vacuum   |

## Fuel Injection System

|                                |   |
|--------------------------------|---|
| Type                           | Electronic fuel injection   |
| Idle Speed                     | 1000rpm   |
| Injector Type                  | Multi point sequential  |
| Fuel Injector Resistance Value | 11.4 to 13 Ohms   |
| Throttle                       | Electronically controlled throttle bodies   |
| Control Sensors                | Atmospheric air pressure, throttle position, twist grip position, coolant temperature, crankshaft position, oxygen sensor, intake air temperature, gear position, MAP, vehicle speed (from ABS), IMU, Quickshift sensor |

## Emissions Control

|                         |                                      |
|-------------------------|--------------------------------------|
| Catalysts               | One, in the catalytic converter box  |
| Oxygen Sensor           | One, heated, in header pipe          |
| Secondary Air Injection | Solenoid controlled, reed valve type |
| Evaporative Control     | Activated carbon canister            |

## Coolant system

|                                     |  |
|-------------------------------------|--|
| Coolant Mixture                     | Premixed   |
| Anti-Freeze Type                    | Triumph HD4X Hybrid OAT coolant                          |
| Cooling System Capacity             | 2.6 litres   |
| Radiator Cap Opening Pressure       | 1.2 bar  |
| Thermostat Opening Temperature      | 88°C   |
| Cooling Fan Switch On Temperature   | 10% fan speed at 91°C variable speed up to 100% at 103°C |
| Temperature Gauge Sensor Resistance | 173 Ohms (+/- 10%) at 100°C                              |

## Suspension

|  |   |
|--|---|
| Front Fork Travel  | 120 mm  |
| Recommended Fork Oil Grade   | Showa SS47G   |
| Oil Level (spring, spring seat and spacer removed and fork fully compressed) | 94 mm   |
| Oil Volume (dry fill)  | 669 ml  |
| Front Fork Pull Through  | upper surface of the fork top cap flange is 55.7 mm above the lower surface of the upper yoke |
| Fork Spring Rate   | $K = 7.5 \text{ N/mm}$  |
| Rear Wheel Travel  | 107 mm  |

## Brakes

|                                      |  |
|--------------------------------------|--|
| Front Brakes Type                    | Four piston monobloc calipers acting on twin discs |
| Front Caliper Piston Diameter        | 30 mm  |
| Front Disc Diameter                  | 320 mm   |
| Front Disc Thickness                 | 4.5 mm (standard)                                  |
|                                      | 4.0 mm (service limit)                             |
| Front Disc Run-out Max. (installed)  | 0.25 mm  |
| Front Brake Master Cylinder Diameter | 18 mm  |
| Recommended Brake Fluid              | DOT 4 brake and clutch                             |
| Rear Brakes Type                     | Fixed twin piston caliper on single floating disc  |
| Rear Caliper Piston Diameter         | 32 mm  |
| Rear Disc Diameter                   | 300 mm   |
| Rear Disc Thickness                  | 6.0 mm (standard)                                  |
|                                      | 5.4 mm (min limit)                                 |
| Rear Disc Run-out Max. (installed)   | 0.25 mm  |
| Rear Master Cylinder Diameter        | 12.7 mm  |
| Recommended Brake Fluid              | DOT 4 brake and clutch                             |

## Wheels and Tyres

|                                |  |
|--------------------------------|--|
| Front Wheel Size               | MT 17 x 3.6  |
| Front Tyre Size                | 150/80 R17 72 V  |
| Front Tyre Pressure            | 2.9 bar (42 lb/in <sup>2</sup> )   |
| Front Wheel Rim Axial run-out  | 0.5 mm   |
| Front Wheel Rim Radial Run-out | 0.5 mm   |
| Rear Wheel Size                | MT 16x7.5  |
| Rear Tyre Size                 | MT 16x7.5  |
| Rear Tyre Pressure             | 2.9 bar (42 lb/in <sup>2</sup> )   |
| Rear Wheel Rim Axial run-out   | 0.5 mm   |
| Rear Wheel Rim Radial Run-out  | 0.5 mm   |
| Approved Tyres                 | A list of approved tyres specific to these models is available from your authorised Triumph dealer, or on the Internet at <a href="http://www.triumph.co.uk">www.triumph.co.uk</a> . |

## Frame

|  |                              |
|--|------------------------------|
| Frame Type   | Modular cast aluminium frame |
| Rake (headstock angle)                                       | 28°                          |
| Trail  | 135.4 mm                     |
| Maximum. Payload (rider, passenger, luggage and accessories) | 232 kg                       |



## Electrical

|                              |                               |
|------------------------------|-------------------------------|
| Battery Type                 | YTX20CH-BS                    |
| Battery Rating               | 12 V-18.9 Amp. Hour           |
| Alternator Rating            | 25 Amps at 1000 rpm minimum   |
|                              | 46.5 Amps at 3000 rpm maximum |
| Headlight                    | LED                           |
| Rear Light/Brake Light       | LED                           |
| Licence Plate Light          | LED                           |
| Directional Indicator Lights | LED                           |

## Torque Wrench Settings

### Engine Covers

| Application                                 | Torque (Nm) | Notes   |
|---|-------------|---|
| Alternator cover                            | *           | See <a href="#">Alternator Cover - Installation</a>                             |
| Alternator cover crankshaft inspection plug | 8 Nm        | Apply a thin smear of proprietary high temp. copper-based grease to the threads |
| Alternator cover face seal plug             | 6 Nm        |   |
| Camshaft cover                              | *           | See <a href="#">Camshaft Cover - Installation</a>                               |
| Clutch cover                                | *           | See <a href="#">Clutch Cover - Installation</a>                                 |
| Clutch cover finisher                       | 10 Nm       |   |
| M10 sealing plug                            | 8 Nm        | Fit new if loosened or removed  |
| M14 sealing plug                            | 18 Nm       | Fit new if loosened or removed  |
| M14 sealing plug with washer                | 25 Nm       | Fit new sealing washer(s)   |
| Oil pick-up filter retainer                 | 8 Nm        | Fit new fixing(s) if loosened or removed  |
| Oil tank cover                              | *           | See <a href="#">Oil Tank Cover - Installation</a>                               |
| Starter drive cover                         | 9 Nm        |   |
| Starter motor cover                         | 9 Nm        |   |
| Strainer pickup keeper plate                | 8 Nm        | Fit new fixing(s) if loosened or removed  |
| Sump baffle                                 | 8 Nm        | Fit new fixing(s) if loosened or removed  |
| Sump M6 x 130 mm bolt                       | 10 Nm       |   |
| Sump M6 x 30 mm bolt                        | 10 Nm       |   |
| Sump M6 x 50 mm bolt                        | 10 Nm       | Fit new fixing(s) if loosened or removed  |
| Sump M6 x 35 mm screw                       | 8 Nm        |   |
| Water pump cover                            | *           | See <a href="#">Clutch Cover - Installation</a>                                 |

## Cylinder Head

| Application                               | Torque (Nm)        | Notes   |
|---|--------------------|---|
| Camshaft caps bolts                       | *                  | See <a href="#">Camshaft - Installation</a>                       |
| Camshaft caps bolts stage 1               | 5 Nm               | Fit new fixing(s) if loosened or removed                          |
| Camshaft caps bolts stage 2               | 10 Nm              |   |
| Camshaft drive chain hydraulic tensioner  | 16 Nm              | See <a href="#">Camshaft Drive Chain Tensioner – Installation</a> |
| Camshaft drive chain tensioner blade      | 18 Nm              |   |
| Camshaft drive sprocket to crankshaft     | 44 Nm              | Fit new fixing(s) if loosened or removed                          |
| Cylinder head bolts                       | *                  | See <a href="#">Cylinder Head - Installation</a>                  |
| Cylinder head bolts stage 1               | 25 Nm              | Fit new fixing(s) if loosened or removed                          |
| Cylinder head bolts stage 2               | 39 Nm              | Fit new fixing(s) if loosened or removed                          |
| Cylinder head bolts stage 3               | 140°               |   |
| Cylinder head bolts stage 4               | 80 Nm<br>Overcheck |   |
| Cylinder head bolts in timing chain chest | 25 Nm              |   |
| Decompressor hub                          | 5 Nm               |   |
| Dry seal plug                             | 6 Nm               | Fit new fixing(s) if loosened or removed                          |
| Exhaust stud                              | 10 Nm              | Fit new fixing(s) if loosened or removed                          |
| Plug 3/8                                  | 25 Nm              |   |

|                                     |                         |   |
|-------------------------------------|-------------------------|---|
| Secondary air injection plugs       | 6<br>completes<br>turns |   |
| Service tool 3880609 pre-set torque | 0.6 Nm                  |   |
| Service tool 3880651                | 16 Nm                   |   |
| Spark plug                          | 12 Nm                   |   |
| Sprocket to camshaft                | *                       | See <a href="#">Camshaft - Installation</a> |

## Clutch

| Application                            | Torque (Nm) | Notes   |
|--|-------------|---|
| Clutch centre nut                      | 160 Nm      | Fit new fixing(s) if loosened or removed<br>Fit new Belleville washer |
| Clutch hose to master cylinder         | 25 Nm       | Fit new sealing washer(s)   |
| Clutch hose to slave cylinder          | 25 Nm       | Fit new sealing washer(s)   |
| Clutch lever nut                       | 6 Nm        |   |
| Clutch lever pivot bolt                | 6 Nm        |   |
| Clutch master cylinder clamp bolts     | 8 Nm        |   |
| Clutch master cylinder reservoir cover | 1.5 Nm      |   |
| Clutch plate lifter                    | 10 Nm       |   |
| Clutch reservoir fixing                | 25 Nm       |   |
| Clutch reservoir sealing screw         | 6 Nm        |   |
| Clutch slave cylinder                  | 10 Nm       |   |
| Clutch slave cylinder bleed screw      | 5 Nm        |   |

## Balancer, Crankshaft and Crankcase

| Application   | Torque (Nm) | Notes   |
|---|-------------|---|
| Alternator rotor to sprag clutch housing                            | *           | See <a href="#">Starter Drive/Sprag Clutch - Installation</a>                             |
| Alternator rotor to sprag clutch housing                            | 16 Nm       | Fit new fixing(s) if loosened or removed  |
| Balancer adjuster plug  | 25 Nm       |   |
| Camshaft sprocket to crankshaft                                     | 44 Nm       | Fit new fixing(s) if loosened or removed  |
| Connecting rod bolts  | *           | See <a href="#">Crankshaft - Installation</a><br>Fit new fixing(s) if loosened or removed |
| Connecting rod bolts stage 1  | 50 Nm       |   |
| Connecting rod bolts stage 2  | 120°        |   |
| Crankcase protector   | 12 Nm       |   |
| Crankcase tightening sequence                                       | *           | See <a href="#">Output shaft - Installation</a>   |
| Crankcase tightening sequence Stage 1<br>Bearing cap 1 to 4         | 10 Nm       |   |
| Crankcase tightening sequence Stage 2<br>Bearing cap 1 to 2         | 32 Nm       |   |
| Crankcase tightening sequence Stage 2<br>Bearing cap 3 to 4         | 12 Nm       |   |
| Crankcase tightening sequence -<br>Transmission Cover               | *           | See <a href="#">Transmission Cover - Installation</a>                                     |
| Crankcase tightening sequence Stage 1<br>Transmission cover 1 to 14 | 10 Nm       |   |

|   |       |  |
|---|-------|--|
| Crankcase tightening sequence Stage 2<br>Transmission cover 1 to 4      | 32 Nm |  |
| Crankcase tightening sequence Stage 2<br>Transmission cover 5 to 14     | 12 Nm |  |
| Crankcase tightening sequence - Lower<br>Crankcase                      | *     | See <a href="#">Lower Crankcase - Installation</a> |
| Crankcase tightening sequence Stage 1<br>Lower Crankcase 1 to 27        | 10 Nm |  |
| Crankcase tightening sequence Stage 2<br>Lower Crankcase 1 to 8 release | 140°  |  |
| Crankcase tightening sequence Stage 2<br>Lower Crankcase 1 to 8 tighten | 85°   |  |
| Crankcase tightening sequence Stage 2<br>Lower Crankcase 9 to 27        | 12 Nm |  |
| Front balancer dead shaft retaining plate                               | 10 Nm |  |
| M14 sealing plug  | 18 Nm |  |
| M16 sealing plug  | 33 Nm |  |
| M18 sealing plug  | 36 Nm |  |
| M22 sealing plug  | 40 Nm |  |
| Oil baffle plate  | 10 Nm | Fit new fixing(s) if loosened or removed           |
| Rear balancer dead shaft stage 1  | 5 Nm  |  |
| Rear balancer dead shaft stage 2  | 21.5° |  |
| Rear balancer dead shaft clamp bolt                                     | 10 Nm |  |
| Rear balancer dead shaft pinch bolt                                     | 7 Nm  |  |

## Transmission

| Application                        | Torque (Nm) | Notes                                    |
|------------------------------------|-------------|--|
| Detent arm                         | 10 Nm       | Fit new fixing(s) if loosened or removed |
| Detent arm spring                  | 10 Nm       | Fit new fixing(s) if loosened or removed |
| Detent wheel                       | 12 Nm       | Fit new fixing(s) if loosened or removed |
| Gear change actuator knuckle       | 28 Nm       | Fit new fixing(s) if loosened or removed |
| Gear change clamp pinch bolt       | 8 Nm        | Fit new fixing(s) if loosened or removed |
| Gear change pedal pivot bolt       | 22 Nm       | Fit new fixing(s) if loosened or removed |
| Gear change rod ball joints        | 8 Nm        |  |
| Gear change rod extension          | 6 Nm        |  |
| Gear change rod lock nuts          | 6 Nm        |  |
| Gear selector drum retaining plate | 10 Nm       | Fit new fixing(s) if loosened or removed |
| Input shaft retaining plate        | 12 Nm       | Fit new fixing(s) if loosened or removed |
| Output shaft retaining plate       | 16 Nm       | Fit new fixing(s) if loosened or removed |
| Selector shaft retainer plate      | 10 Nm       | Fit new fixing(s) if loosened or removed |
| Torsional damper                   | 80 Nm       |  |
| Torsional damper spring            | 160 Nm      |  |

## Starter Drive and Sprag Clutch

| Application          | Torque (Nm) | Notes   |
|----------------------|-------------|---|
| Sprag clutch housing | *           | See <a href="#">Starter Drive/Sprag Clutch - Installation</a> |
| Sprag clutch housing | 16 Nm       |   |

## Lubrication

| Application                            | Torque (Nm) | Notes   |
|--|-------------|---|
| Engine oil filler tube                 | 10 Nm       |   |
| Engine oil filter                      | 10 Nm       | Apply clean engine oil to the seal(s)             |
| Engine oil filter adapter to crankcase | 16 Nm       | Fit new oil filter adapter if loosened or removed |
| Engine oil jet spray, piston           | 4 Nm        | Fit new fixing(s) if loosened or removed          |
| Oil drain plugs                        | 30 Nm       | Fit new sealing washer(s)                         |
| Oil pressure switch                    | 15 Nm       | Fit new sealing washer(s)                         |
| Oil pump to crankcase                  | 9 Nm        | Fit new fixing(s) if loosened or removed          |
| Transmission oil spray bar             | 4 Nm        | Fit new fixing(s) if loosened or removed          |

## Fuel System, Exhaust System and Airbox

| Application                            | Torque (Nm) | Notes                          |
|--|-------------|--------------------------------|
| Air filter element box                 | 6 Nm        |                                |
| Air intake runner clips                | 1.5 Nm      |                                |
| Air intake runner to plenum            | 10 Nm       | Fit new if loosened or removed |
| Air pressure sensor                    | 3 Nm        |                                |
| Air temperature sensor                 | 3 Nm        |                                |
| Ambient air pressure sensor            | 3 Nm        |                                |
| Ambient air temperature sensor         | 3 Nm        |                                |
| Catalytic converter                    | 28 Nm       |                                |
| Catalytic converter centre heat shield | 5 Nm        |                                |



| Application                                   | Torque (Nm) | Notes   |
|---|-------------|---|
| Catalytic converter clamp                     | 11 Nm       |   |
| Catalytic converter left hand covers          | 5 Nm        |   |
| Catalytic converter right hand covers         | 5 Nm        |   |
| Coolant temperature sensor                    | 18 Nm       | Fit new sealing washer(s)                             |
| Engine ECM bracket                            | 9 Nm        |   |
| Evaporative canister                          | 5 Nm        |   |
| Evaporative canister bracket                  | 22 Nm       | Fit new fixing(s) if loosened or removed              |
| Exhaust header heat shields                   | 5 Nm        |   |
| Exhaust header to cylinder head               | *           | See <a href="#">Exhaust Headers - Installation</a>    |
| Exhaust header to cylinder head               | 22 Nm       |   |
| Fuel filler cap                               | 3 Nm        |   |
| Fuel hose retention bracket                   | 4 Nm        |   |
| Fuel hose to fuel pump                        | 15 Nm       | Fit new sealing washer(s)                             |
| Fuel pump baffle clamp                        | 4 Nm        |   |
| Fuel pump clamp                               | 4 Nm        |   |
| Fuel pump mounting bracket to fuel pump plate | 7 Nm        |   |
| Fuel pump mounting plate to fuel tank         | *           | See <a href="#">Fuel Pump Assembly - Installation</a> |
| Fuel pump mounting plate to fuel tank         | 5 Nm        |   |
| Fuel rail                                     | 6 Nm        |   |

| Application                              | Torque (Nm) | Notes  |
|--|-------------|--|
| Fuel tank front fixing to frame          | 8 Nm        |  |
| Fuel tank rear pivot                     | 8 Nm        |  |
| Fuel tank right hand mounting bracket    | 22 Nm       |  |
| Fuel tank strap front hook               | 2.5 Nm      |  |
| Fuel tank strap rear fixing              | 1.5 Nm      |  |
| Fuel tank strap to front bracket         | 1.5 Nm      |  |
| Gear position sensor                     | 10 Nm       |  |
| Intake runner                            | 10 Nm       | Fit new sealing washer(s)  |
| Manifold Absolute Pressure (MAP) Sensor  | 3 Nm        |  |
| Oxygen sensor                            | 25 Nm       |  |
| Plenum cover                             | *           | See <a href="#">Plenum - Installation (All Markets Except US)</a> or <a href="#">Plenum - Installation (US Markets Only)</a> |
| Plenum cover stage 1                     | 4 Nm        |  |
| Plenum cover stage 2                     | 8 Nm        |  |
| Plenum cover finisher                    | 10 Nm       |  |
| Plenum rear                              | 8 Nm        |  |
| Purge valve                              | 5 Nm        |  |
| Secondary air injection reed valve cover | 9 Nm        |  |
| Secondary air injection silencer         | 5 Nm        |  |

| Application                      | Torque (Nm) | Notes  |
|----------------------------------|-------------|--------|
| Spark plug                       | 12 Nm       | 2.5 Nm |
| Throttle bodies clamps           | 1.5 Nm      |        |
| Throttle body T30 blanking screw | 5 Nm        |        |
| Transition Piece                 | 9 Nm        |        |
| Twist grip position sensor clamp | 2.5         |        |

### Cooling

| Application   | Torque (Nm) | Notes |
|---|-------------|-------|
| Clutch cover bracket to radiator mounting bracket           | 3 Nm        |       |
| Clutch cover bracket upper fixing                           | 3 Nm        |       |
| Coolant expansion tank                                      | 4 Nm        |       |
| Coolant expansion tank and heatsink for regulator/rectifier | 4 Nm        |       |
| cooling fan controller                                      | 28 Nm       |       |
| Expansion tank cowl lower mounting bracket lower fixings    | 4 Nm        |       |
| Expansion tank cowl lower mounting bracket to clutch cover  | 5 Nm        |       |
| Expansion tank cowl lower mounting bracket to sump          | 5 Nm        |       |
| Expansion tank lower surround lower fixings                 | 4 Nm        |       |

| Application                              | Torque (Nm) | Notes                                    |
|--|-------------|--|
| Lower cowl upper fixing                  | 6 Nm        |  |
| Radiator cowl side fixings               | 5 Nm        | Fit new fixing(s) if loosened or removed |
| Radiator cowl upper fixings              | 3 Nm        |  |
| Radiator fan assembly to radiator        | 8 Nm        |  |
| Radiator fans control module             | 3 Nm        |  |
| Radiator filler cover bracket            | 5 Nm        | Fit new fixing(s) if loosened or removed |
| Radiator grille lower fixings            | 3 Nm        |  |
| Radiator grille upper fixings            | 5 Nm        |  |
| Radiator lower bracket                   | 6 Nm        |  |
| Radiator lower fixing                    | 6 Nm        |  |
| Radiator surround lower fixing           | 4 Nm        |  |
| Radiator surround moulding to upper cowl | 2 Nm        |  |
| Radiator upper cowl upper fixings        | 3 Nm        |  |
| Radiator upper fixings                   | 6 Nm        |  |
| Thermostat housing                       | 9 Nm        |  |
| Water pump drain plug                    | 8 Nm        | Fit new sealing washer(s)                |

## Front Suspension

| Application                             | Torque (Nm) | Notes  |
|---|-------------|--|
| Damping cylinder bolt                   | 20 Nm       |  |
| Damping rod to top cap lock nut         | 20 Nm       |  |
| Fork top cap                            | 35 Nm       |  |
| Handlebar end weights                   | 5 Nm        |  |
| Handlebar riser                         | 60 Nm       |  |
| Handlebar riser clamp                   | 26 Nm       |  |
| Headstock bearing adjuster and lock nut | *           | <a href="#">Steering Head Bearing - Adjustment</a> |
| Tighten adjuster nut stage 1            | 40 Nm       |  |
| Tighten adjuster nut stage 2            | 15 Nm       |  |
| Tighten adjuster nut stage 3            | 45 Nm       |  |
| Tighten adjuster nut stage 4            | 45°         |  |
| Tighten adjuster nut stage 5            | 65 Nm       |  |
| Heated grip switch housing              | 0.5 Nm      |  |
| Left hand grip                          | 3 Nm        |  |
| Left hand switch housing cover          | 1 Nm        |  |
| Lower yoke pinch bolts                  | *           | <a href="#">Front Forks - Installation</a>         |
| Lower yoke pinch bolts                  | 25 Nm       |  |
| Twist grip housing                      | 2.5 Nm      |  |
| Upper yoke nut                          | 90 Nm       |  |
| Upper yoke pinch bolts                  | 25 Nm       |  |
| Wheel spindle pinch bolts               | 22 Nm       |  |

## Rear Suspension

| Application                              | Torque (Nm) | Notes  |
|--|-------------|--|
| Cable guide on swinging arm              | 3 Nm        |  |
| Drag link bracket                        | *           | <a href="#">Rear Suspension Linkage - Installation</a> |
| Drag link bracket lower fixing           | 48 Nm       |  |
| Drag link bracket to drag link fixing    | *           | <a href="#">Rear Suspension Linkage - Installation</a> |
| Drag link bracket to drag link fixing    | 48 Nm       |  |
| Drag link bracket upper fixing           | 48 Nm       |  |
| Drag link rocker centre fixing           | 48 Nm       |  |
| Drag link rocker to drag link            | 48 Nm       |  |
| Guard on swinging arm                    | 6 Nm        |  |
| Hugger                                   | 3 Nm        |  |
| Rear suspension unit reservoir           | 15 Nm       |  |
| Rear suspension unit to drag link rocker | *           | <a href="#">Rear Suspension Linkage - Installation</a> |
| Rear suspension unit to drag link rocker | 48 Nm       |  |
| Rear suspension unit to frame            | *           |  |
| Rear suspension unit to frame            | 48 Nm       |  |
| Swinging arm spindle                     | 100 Nm      |  |

## Front Brakes

| Application                                 | Torque (Nm) | Notes                                    |
|---|-------------|--|
| Brake caliper to front fork                 | 45 Nm       |  |
| Brake disc to wheel                         | 22 Nm       | Fit new fixing(s) if loosened or removed |
| Brake lever pivot bolt                      | 6 Nm        |  |
| Brake lever pivot bolt lock nut             | 6 Nm        |  |
| Brake line union to front brake caliper     | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Brake line union to front master cylinder   | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Brake master cylinder reservoir cap fixings | 1.5 Nm      |  |
| Brake reservoir fixing                      | 25 Nm       |  |
| Brake reservoir bleed screw                 | 6 Nm        |  |
| Caliper bleed screw                         | 8 Nm        |  |
| Front brake master cylinder to handlebar    | *           |  |
| Front brake master cylinder to handlebar    | 8 Nm        |  |

## Rear Brakes

| Application                              | Torque (Nm) | Notes   |
|--|-------------|---|
| Brake caliper bleed screw                | 6 Nm        |   |
| Brake pad retaining pin                  | 6 Nm        |   |
| Brake line union to rear brake caliper   | 25 Nm       | Fit new sealing washer(s)   |
| Brake line union to rear master cylinder | 25 Nm       | Fit new sealing washer(s)   |
| Brake pedal pivot bolt                   | 22 Nm       |   |
| Master cylinder reservoir cap            | 1.5 Nm      |   |
| Rear brake caliper                       | 45 Nm       | Apply a thin smear of proprietary high temperature copper based grease to the threads |
| Rear brake disc                          | 22 Nm       | Fit new sealing washer(s)   |
| Rear brake master cylinder               | 18 Nm       |   |

## ABS System

| Application                                 | Torque (Nm) | Notes                                    |
|---|-------------|--|
| ABS line bracket to front subframe          | 9 Nm        |  |
| ABS line P-clips                            | 5 Nm        |  |
| ABS modulator bracket front fixing to frame | 9 Nm        | Fit new fixing(s) if loosened or removed |
| ABS modulator bracket rear fixing to frame  | 16 Nm       | Fit new fixing(s) if loosened or removed |



| Application  | Torque (Nm) | Notes                                    |
|--|-------------|--|
| ABS modulator to bracket                           | 9 Nm        | Fit new fixing(s) if loosened or removed |
| ABS pulser ring to wheel                           | 4 Nm        | Fit new fixing(s) if loosened or removed |
| ABS rear pulser ring                               | 4 Nm        | Fit new fixing(s) if loosened or removed |
| ABS sensor   | 9 Nm        | Fit new fixing(s) if loosened or removed |
| Anti-rotation moulding to ABS modulator            | 5 Nm        | Fit new fixing(s) if loosened or removed |
| Brake line front bracket - front left hand fixing  | 4 Nm        |  |
| Brake line front bracket - front right hand fixing | 8 Nm        |  |
| Brake line front bracket - rear right hand fixing  | 5 Nm        |  |
| Brake line union block to headstock                | 9 Nm        |  |
| Brake line union to brake line bracket             | 5 Nm        |  |
| Brake line union to front brake caliper            | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Brake line union to front master cylinder          | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Brake line union to modulator                      | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Brake line union to rear brake caliper             | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Brake line union to rear master cylinder           | 25 Nm       | Fit new fixing(s) if loosened or removed |
| Cable retainer to sump                             | 5 Nm        |  |

| Application                            | Torque (Nm) | Notes                                    |
|--|-------------|--|
| Front ABS sensor conduit               | 9 Nm        | Fit new fixing(s) if loosened or removed |
| Rear brake caliper bleed screw         | 8 Nm        |  |
| Rear brake line to sump                | 4 Nm        |  |
| Rear brake line to swinging arm p-clip | 5 Nm        |  |

## Wheels and Tyres

| Application                       | Torque (Nm) | Notes   |
|-----------------------------------|-------------|---|
| Bearing retaining plate           | 18 Nm       |   |
| Cush drive inner                  | 80 Nm       | Fit new fixing(s) if loosened or removed      |
| Cush drive outer                  | 20 Nm       | Fit new fixing(s) if loosened or removed      |
| Fork to wheel spindle pinch bolts | 22 Nm       |   |
| Front wheel spindle bolt          | 65 Nm       |   |
| Rear Wheel Finisher               | 4 Nm        | Fit new fixing(s) if loosened or removed      |
| Rear Wheel Nuts                   | *           | See <a href="#">Rear Wheel – Installation</a> |
| Rear Wheel Nuts Stage 1           | 25 Nm       |   |
| Rear Wheel Nuts Stage 2           | 100 Nm      |   |
| Rear wheel spindle bolt           | 70 Nm       |   |
| Tyre pressure sensor              | 2.1 Nm      |   |
| Tyre valve                        | 6 Nm        |   |
| Wheel nut stud                    | 60 Nm       |   |

## Final Drive

| Application                        | Torque (Nm) | Notes                                    |
|------------------------------------|-------------|--|
| Bevel box finisher                 | 4 Nm        | Fit new fixing(s) if loosened or removed |
| Bevel box oil drain plug           | 25 Nm       | Fit new sealing washer(s)                |
| Bevel box oil level plug           | 25 Nm       | Fit new sealing washer(s)                |
| Bevel box to swinging arm nuts     | *           | Fit new fixing(s) if loosened or removed |
| Bevel box to swinging arm stage 1  | 20 Nm       |  |
| Bevel box to swinging arm stage 2  | 100 Nm      |  |
| Cush drive bearing retaining plate | 18 Nm       | Fit new fixing(s) if loosened or removed |
| Final drive studs                  | 56 Nm       | Fit new if loosened or removed           |

## Frame, Footrests, Control Plates and Engine Mountings

| Application             | Torque (Nm) | Notes                                     |
|-------------------------|-------------|---|
| Bank angle indicator    | 9 Nm        |   |
| Bracket moulding        | 1.5 Nm      |   |
| Control plates          | 25 Nm       |   |
| Control plate mounting  | 25 Nm       |   |
| Flyscreen (YJ1)         | 1 Nm        |   |
| Flyscreen (YK1 YL1)     | 3 Nm        |   |
| Flyscreen mounting      | 5 Nm        |   |
| Footrest rubber inserts | 6 Nm        | Fit new fixing(s) if loosened or removed  |
| Frame adjusters         | *           | See <a href="#">Engine - Installation</a> |

| Application                             | Torque (Nm) | Notes                                    |
|---|-------------|--|
| Frame adjusters                         | 3 Nm        |  |
| Frame mounting bolts stage 1            | 10 Nm       |  |
| Frame mounting bolts stage 2            | 80 Nm       |  |
| Frame rear lower mounting bolts         | 48 Nm       |  |
| Front bridge to sub frame               | *           |  |
| Front bridge to sub frame               | 12 Nm       |  |
| Front mudguard bracket (front fixings)  | 6 Nm        |  |
| Front mudguard bracket (rear fixing)    | 3 Nm        |  |
| Front mudguard to its bracket           | 3 Nm        |  |
| Front subframe                          | 13 Nm       |  |
| Heel guard                              | 7 Nm        |  |
| Ignition master switch                  | 1.5 Nm      |  |
| Licence plate hanger arm to final drive | 20 Nm       |  |
| Licence plate hanger arm to spray guard | 3 Nm        |  |
| Licence plate hanger M5 x 14mm fixing   | 3 Nm        | Fit new fixing(s) if loosened or removed |
| Licence plate hanger M5 x 12mm fixing   | 1 Nm        | Fit new fixing(s) if loosened or removed |
| Licence plate harness cover             | 1 Nm        |  |
| Licence plate mounting                  | 3 Nm        | Fit new fixing(s) if loosened or removed |

| Application  | Torque (Nm) | Notes  |
|--|-------------|--|
| Mirror pinch bolt  | 3.5 Nm      |  |
| Oil filler cap fixings   | 1.5 Nm      |  |
| Outrigger bolts  | 80 Nm       |  |
| Passenger seat backrest finisher                                     | 3 Nm        |  |
| Passenger seat backrest leg  | 32 Nm       |  |
| Passenger seat backrest lower tie bar front fixings                  | 27 Nm       |  |
| Passenger seat backrest lower tie bar rear fixings                   | 27 Nm       |  |
| Passenger seat backrest upper tie bar                                | 3 Nm        |  |
| Passenger seat badge   | 2 Nm        |  |
| Passenger seat fixings   | 8 Nm        |  |
| Phone storage box  | 3 Nm        |  |
| Rear bridge to subframe  | *           | See <a href="#">Battery Box - Installation</a> |
| Rear bridge to subframe  | 12          |  |
| Rear direction indicator bracket                                     | 1 Nm        |  |
| Rear direction indicators lower moulding to licence plate hanger arm | 3 Nm        |  |
| Rear direction indicators lower moulding to upper moulding           | 3 Nm        |  |
| Rear footrest hanger   | 31 Nm       |  |
| Rear mudguard carrier  | 3 Nm        |  |

| Application  | Torque (Nm) | Notes                                    |
|--|-------------|--|
| Rear mudguard finisher   | 3 Nm        |  |
| Rear mudguard finisher bracket   | 1 Nm        |  |
| Rear mudguard under tray   | 3 Nm        |  |
| Rear mudguard upper moulding   | 3 Nm        |  |
| Rear reflector bracket (US markets)  | 3 Nm        |  |
| Rear splash guard  | 3 Nm        | Fit new fixing(s) if loosened or removed |
| Rear subframe rear piece   | 48 Nm       | Fit new fixing(s) if loosened or removed |
| Rear subframe to main frame  | 22 Nm       |  |
| Rider seat finisher  | 3 Nm        |  |
| Right hand panel bracket   | 5 Nm        |  |
| Right hand side panel bracket M5 x 12mm fixing                                   | 3 Nm        |  |
| Right hand side panel bracket M6 x 16mm fixing<br>Right hand side panel finisher | 6 Nm        |  |
| Right hand side panel finisher   | 3 Nm        |  |
| Seat lock to frame   | 8 Nm        |  |
| Side stand bracket   | 41 Nm       |  |

| Application              | Torque (Nm) | Notes                                    |
|--------------------------|-------------|--|
| Side stand magnet        | 3 Nm        |  |
| Side stand switch        | 3 Nm        | Fit new fixing(s) if loosened or removed |
| Steering lock fixings    | *           |  |
| Steering lock fixings    | 16          | Fit new fixing(s) if loosened or removed |
| Upper yoke harness cover | 5 Nm        |  |

### Electrical

| Application                             | Torque (Nm) | Notes   |
|---|-------------|---|
| Air pressure sensor                     | 3 Nm        |   |
| Alarm panel                             | 3 Nm        |   |
| Alternator cable bracket                | 10 Nm       |   |
| Alternator regulator/rectifier          | 4 Nm        | See <a href="#">Alternator Rotor - Installation</a> |
| Alternator rotor to crankshaft          | *           |   |
| Alternator rotor to crankshaft stage 1  | 85 Nm       |   |
| Alternator rotor to crankshaft stage 2  | 160 Nm      |   |
| Alternator stator to cover              | 12 Nm       |   |
| Battery box                             | 6 Nm        |   |
| Battery box base fixings                | 3 Nm        |   |
| Battery box outer moulding lower fixing | 6 Nm        |   |
|   |             |   |

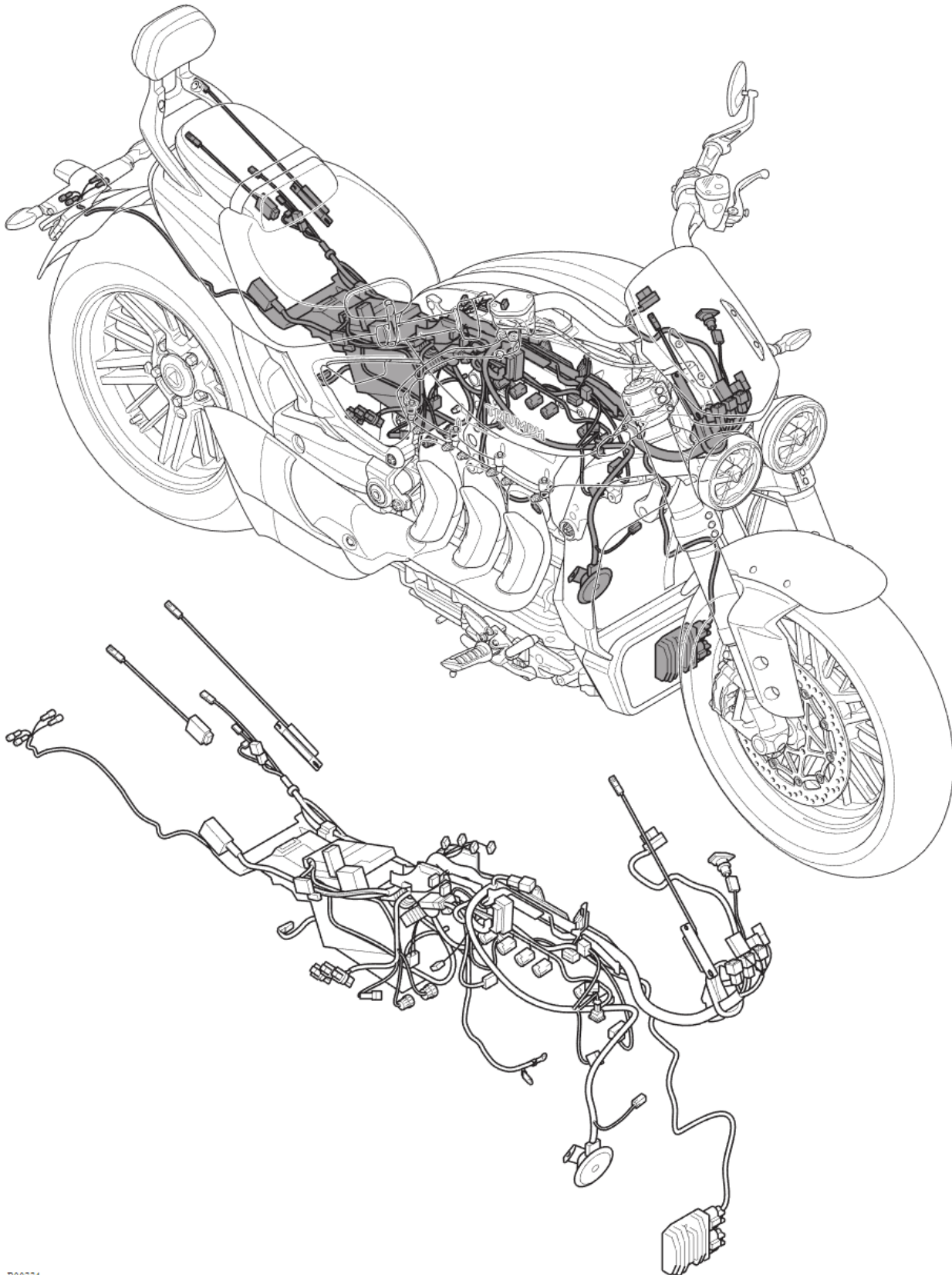
| Application   | Torque (Nm) | Notes                                    |
|---|-------------|--|
| Battery box outer moulding side fixing                    | 3 Nm        |  |
| Battery terminal  | 4.5 Nm      |  |
| Crankshaft position sensor                                | 6 Nm        | Fit new fixing(s) if loosened or removed |
| Engine ECM bracket  | 6 Nm        |  |
| Front direction indicator clamp                           | 3 Nm        |  |
| Front direction indicator to clamp (all except UC and CA) | 3 Nm        |  |
| Front direction indicator to clamp (UC and CA)            | 3 Nm        |  |
| Headlight clamp   | 15 Nm       |  |
| Headlight rim   | 4 Nm        |  |
| Headlight to Bracket                                      | 5 Nm        |  |
| Horn  | 9 Nm        |  |
| Ignition coil   | 5 Nm        | Fit new fixing(s) if loosened or removed |
| Ignition coil bracket                                     | 9 Nm        | Fit new fixing(s) if loosened or removed |
| Ignition master switch (US market only)                   | 1.5 Nm      |  |
| Instrument clamp  | 9 Nm        |  |
| Instruments electrical connector cover                    | 3 Nm        |  |
| Instruments position fixings                              | 2.5         |  |
| Instruments risers to instruments bracket                 | 5.5 Nm      |  |



| Application                            | Torque (Nm) | Notes |
|--|-------------|-------|
| Instruments to mounting bracket        | 3 Nm        |       |
| Keyless ECM                            | 3 Nm        |       |
| LF antenna, rear                       | 3 Nm        |       |
| LF antenna, front                      | 3 Nm        |       |
| Rear direction indicators              | 3 Nm        |       |
| Rear licence plate light               | 1.5 Nm      |       |
| Rear light                             | 3 Nm        |       |
| Starter motor                          | 9 Nm        |       |
| Starter motor power lead connection    | 5 Nm        |       |
| Starter motor solenoid bracket         | 6 Nm        |       |
| Starter motor solenoid lead connection | 5 Nm        |       |
| Smart Key Fob                          | 0.3 Nm      |       |

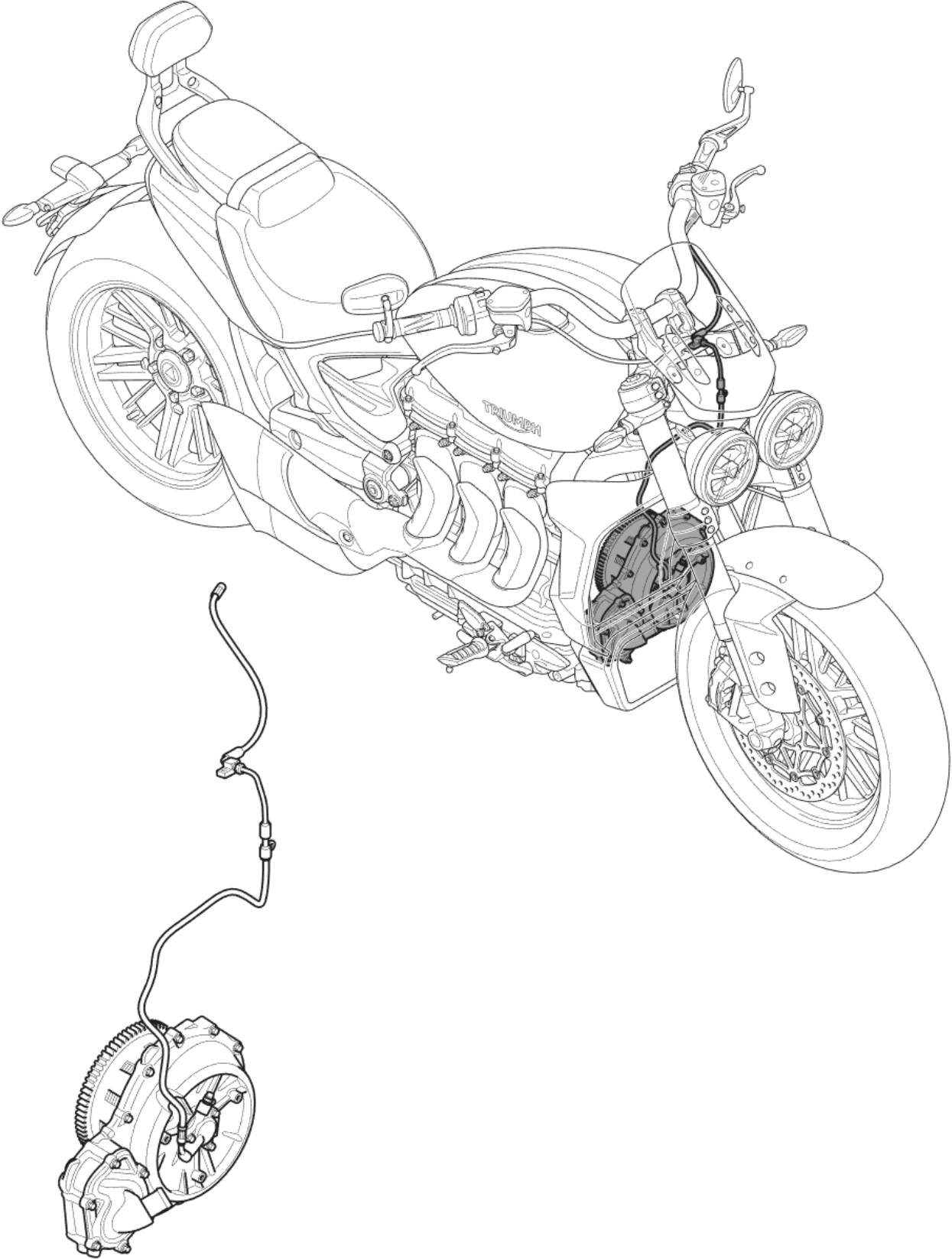
# Routing

## Main Wiring Harness Routing

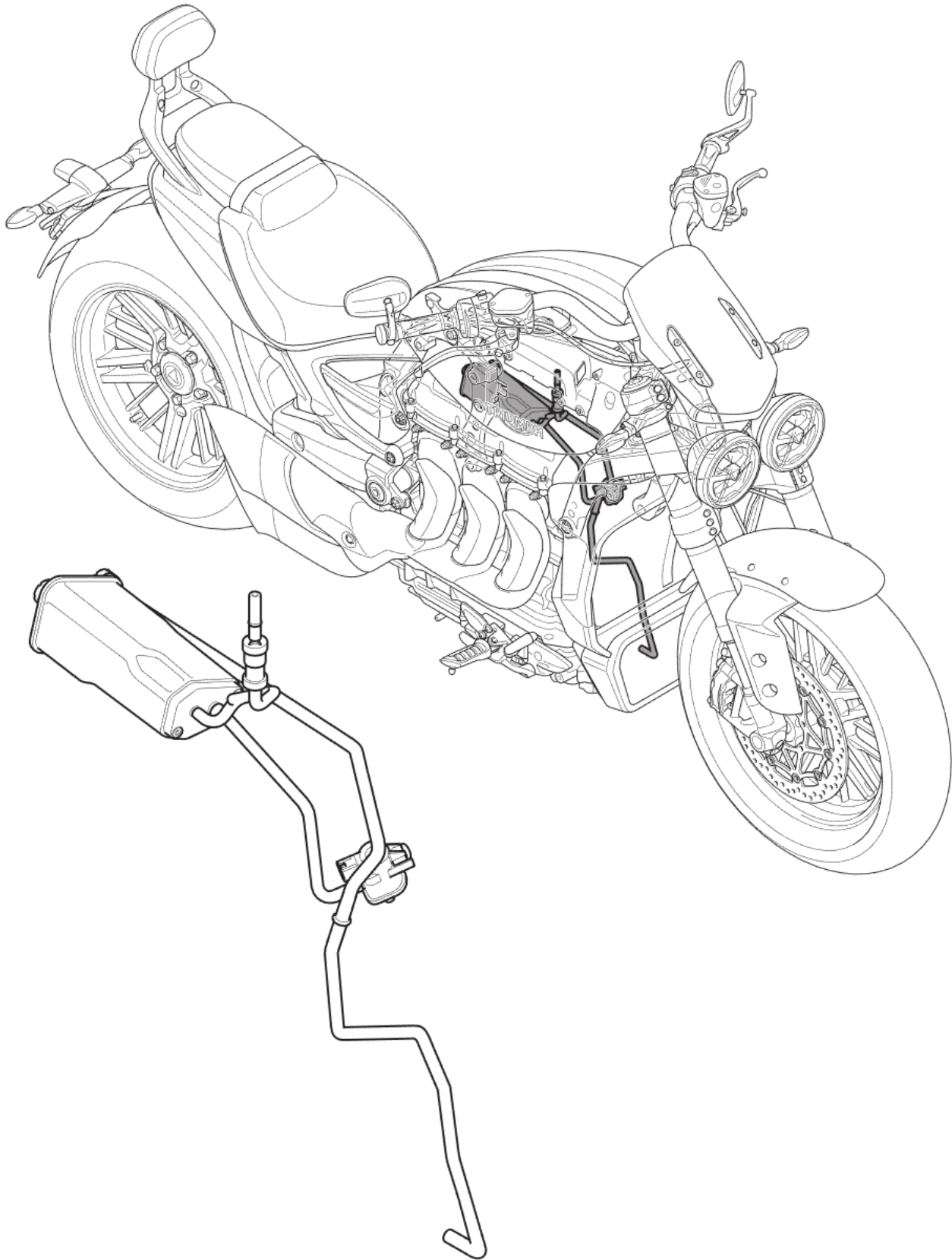


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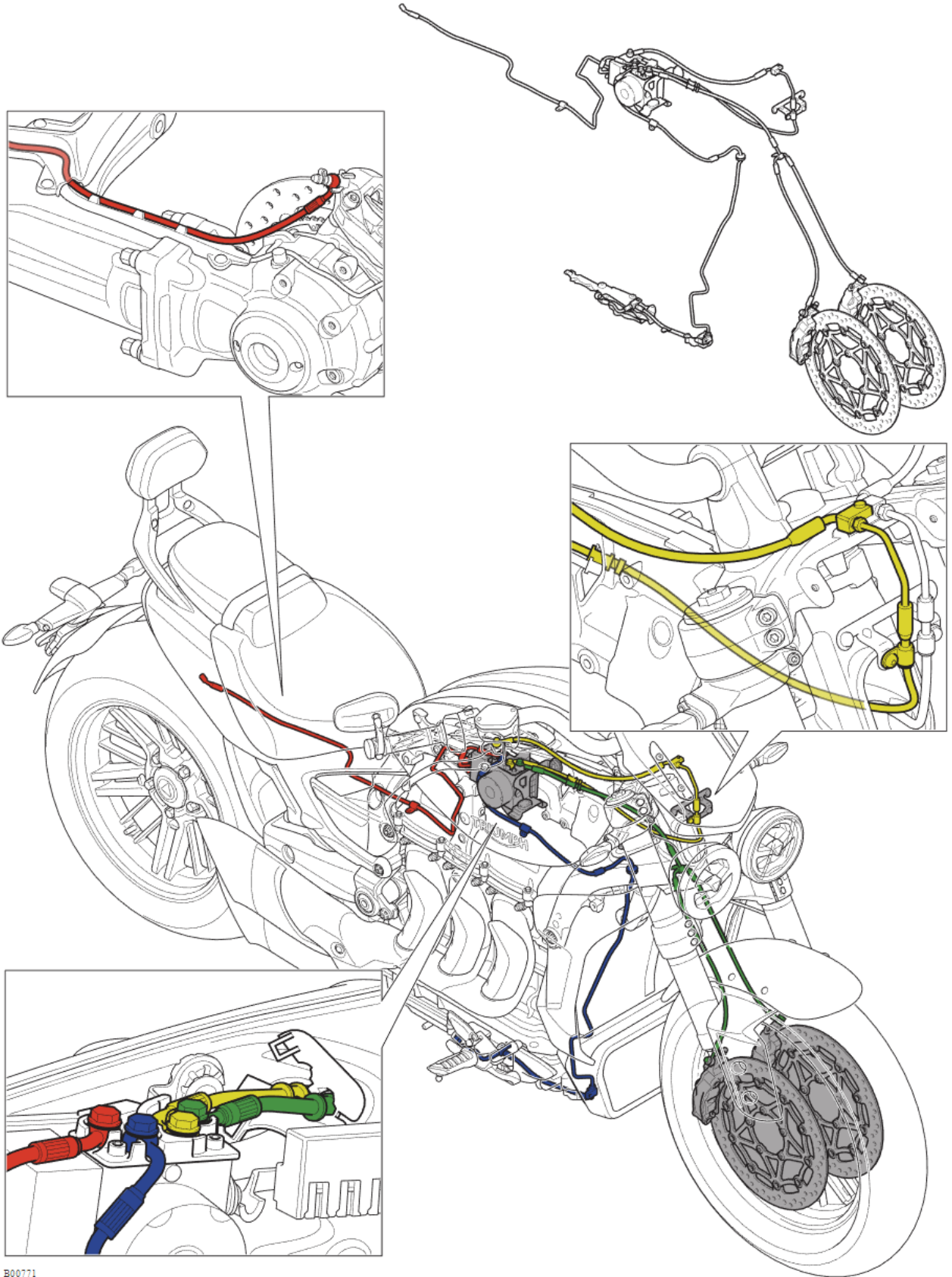
Clutch Control Routing



# Fuel Tank Evaporative Hose Routing



# ABS Routing



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## Scheduled Maintenance

### Scheduled Maintenance

#### **WARNING**

Triumph Motorcycles cannot accept any responsibility for damage or injury resulting from incorrect maintenance or improper adjustment carried out by the owner. Incorrect or neglected maintenance can lead to a dangerous riding condition. Always have an authorised Triumph dealer carry out the scheduled maintenance of this motorcycle.

#### **WARNING**

All maintenance is vitally important and must not be neglected. Incorrect maintenance or adjustment may cause one or more parts of the motorcycle to malfunction. A malfunctioning motorcycle may lead to loss of control and an accident. Weather, terrain and geographical location affect maintenance. The maintenance schedule should be adjusted to match the particular environment in which the motorcycle is used and the demands of the individual owner. Special tools, knowledge and training are required in order to correctly carry out the maintenance items listed in the scheduled maintenance chart. Only an authorised Triumph dealer will have this knowledge and equipment. Incorrect or neglected maintenance can lead to a dangerous riding condition. Always have an authorised Triumph dealer carry out the scheduled maintenance of this motorcycle.

To maintain the motorcycle in a safe and reliable condition, the maintenance and adjustments outlined in this section must be carried out as specified in the schedule of daily checks, and also in line with the scheduled maintenance chart. The information that follows describes the procedures to follow when carrying out the daily checks and some simple maintenance and adjustment items.

Scheduled maintenance may be carried out by your authorised Triumph dealer in three ways; annual maintenance, mileage based maintenance or a combination of both, depending on the mileage the motorcycle travels each year.

1. Motorcycles travelling less than 10,000 miles (16,000 km) per year must be maintained annually. In addition to this, mileage based items require maintenance at their specified intervals, as the motorcycle reaches this mileage.
2. Motorcycles travelling approximately 10,000 miles (16,000 km) per year must have the annual maintenance and the specified mileage based items carried out together.
3. Motorcycles travelling more than 10,000 miles (16,000 km) per year must have the mileage based items maintained as the motorcycle reaches the specified mileage. In addition to this, annual based items will require maintenance at their specified annual intervals.

In all cases maintenance must be carried out at or before the specified maintenance intervals shown. Consult an authorised Triumph dealer for advice on which maintenance schedule is most suitable for your motorcycle.

Triumph Motorcycles cannot accept any responsibility for damage or injury resulting from incorrect maintenance or improper adjustment.

#### Service Symbol/General Warning Symbol

- The service symbol will illuminate for five seconds after the motorcycle start up sequence as a reminder that a service is due in approximately 60 miles (100 km). The service symbol will illuminate permanently when the mileage is reached, it will remain permanently illuminated until the service interval is reset using the Triumph Diagnostic tool.
- The general warning symbol will flash if an ABS or engine management fault has occurred and the ABS and/or MIL warning lights are illuminated. Contact an authorised Triumph dealer as soon as possible to have the fault checked and rectified.

## Scheduled Maintenance Table

| Operation Description  | Odometer Reading in Miles (km) or Time Period, whichever comes first |                            |                |  |                    |                    |
|--|--|----------------------------|----------------|--|--------------------|--------------------|
|  |  | First Service              | Annual Service | Mileage Based Service                    |                    |                    |
|  | Every  | 600<br>(1,000)<br>6 months | Year           | 10,000<br>(16,000)<br>30,000<br>(48,000) | 20,000<br>(32,000) | 40,000<br>(64,000) |
| <b>Lubrication</b>   |  |                            |                |  |                    |                    |
| Engine - check for leaks   | Day  | •                          | •              | •  | •                  | •                  |
| Engine oil – renew   | -  | •                          | •              | •  | •                  | •                  |
| Engine oil filter – renew  | -  | •                          | •              | •  | •                  | •                  |
| <b>Fuel System and Engine Management</b>   |  |                            |                |  |                    |                    |
| Autoscan - carry out a full Autoscan using the Triumph diagnostic tool (print a customer copy) | -  | •                          | •              | •  | •                  | •                  |
| Fuel system - visually check fuel hoses for chafing, cracks or damage. Replace if necessary    | Day  | •                          | •              | •  | •                  | •                  |
| Air filter - renew (replace more often if consistently riding in wet or dusty conditions)      | -  |                            |                | •  | •                  | •                  |
| Fuel filter – renew  | -  |                            |                | •  | •                  | •                  |
| Throttle bodies – balance  | -  |                            |                | •  | •                  | •                  |
| <b>Ignition System</b>   |  |                            |                |  |                    |                    |
| Spark plugs – check  | -  |                            |                | •  |                    |                    |
| Spark plugs – renew  | -  |                            |                |  | •                  | •                  |
| <b>Cooling System</b>  |  |                            |                |  |                    |                    |
| Cooling system - check for leaks   | Day  | •                          | •              | •  | •                  | •                  |
| Coolant level - check/adjust   | Day  | •                          | •              | •  | •                  | •                  |
| Cooling system - check coolant hoses for chafing, cracks or damage. Replace if necessary       | -  |                            |                | •  | •                  | •                  |
| Coolant - renew  | Every 3 years, regardless of mileage                                 |                            |                |  |                    |                    |



| Engine   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|
| Clutch - check operation   | Day   | • | • | • | • | • |
| Clutch fluid levels – check  | Day   | • | • | • | • | • |
| Clutch fluid renew   | Every 2 years, regardless of mileage                |   |   |   |   |   |
| Valve clearances - check/adjust  | -   |   |   |   | • | • |
| Camshaft timing – check/adjust   | -   |   |   |   | • | • |
| Wheels and Tyres   |   |   |   |   |   |   |
| Wheel bearings - check for wear/smooth operation                         | First check at 30,000 miles then every 10,000 miles |   |   |   |   |   |
| Rear wheel needle roller bearing (left hand side outer only) – lubricate | -   |   |   | • | • | • |
| Tyre wear/tyre damage – check  | Day   | • | • | • | • | • |
| Tyre pressures - check/adjust  | Day   | • | • | • | • | • |
| Steering and Suspension  |   |   |   |   |   |   |
| Steering - check for free operation                                      | Day   | • | • | • | • | • |
| Front and rear suspension - check for damage/leaks/smooth operation      | Day   | • | • | • | • | • |
| Fork oil – renew   | Every 30,000 miles                                  |   |   |   |   |   |
| Headstock bearings – check   | -   |   | • | • | • | • |
| Headstock bearings – lubricate   | Every 30,000 miles                                  |   |   |   |   |   |
| Swinging arm spindle – lubricate   | Every 30,000 miles                                  |   |   |   |   |   |
| Rear suspension linkage – lubricate                                      | Every 30,000 miles                                  |   |   |   |   |   |
| Brakes   |   |   |   |   |   |   |
| Brake system - check operation   | Day   | • | • | • | • | • |
| Brake pads - check wear levels   | Day   | • | • | • | • | • |
| Brake fluid levels – check   | Day   | • | • | • | • | • |
| Brake fluid - renew  | Every 2 years, regardless of mileage                |   |   |   |   |   |

| <b>Final Drive</b>  |     |   |   |   |   |   |
|---|-----|---|---|---|---|---|
| Final drive - check for oil leaks   | Day | • | • | • | • | • |
| Final drive oil level – check   | -   |   | • | • | • | • |
| Final drive oil – renew   |     | • |   |   | • | • |
| <b>Electrical</b>   |     |   |   |   |   |   |
| Lights, instruments and electrical systems - check  | Day | • | • | • | • | • |
| <b>General</b>  |     |   |   |   |   |   |
| Instruments, chassis ECM and engine ECM - check for latest calibration download using the Triumph diagnostic tool | -   | • | • | • | • | • |
| Bank angle indicators - check for wear  | Day | • | • | • | • | • |
| Side stand check for smooth operation   | Day | • | • | • | • | • |
| Side stand pivot pin – clean  | -   |   |   | • | • | • |
| Backrest (if fitted) - check for smooth operation   | Day | • | • | • | • | • |
| Accessory Pannier Rails - check for smooth operation  | Day | • | • | • | • | • |
| Carry out all outstanding Service Bulletin and warranty work  | -   | • | • | • | • | • |
| Carry out road test   | -   | • | • | • | • | • |
| Complete the service record book and reset the service indicator  | -   | • | • | • | • | • |

## Engine Check For Fluid Leaks

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Standard required:

All engine components must be free from fluid leaks.

Check:

Check the visible areas of the crankcase, cylinder head and transmission for fluid leaks.

Visually inspect the oil hoses (if fitted) for fluid leaks and signs of damage or chafing (where accessible).

Rectification if required:

A leaking or damaged component must be replaced.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

In order for the engine, transmission, and clutch to function correctly, maintain the engine oil at the correct level, and change the oil and oil filter in accordance with scheduled maintenance requirements.

**⚠ WARNING**

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

**⚠ WARNING**

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated engine wear and may result in engine or transmission seizure. Seizure of the engine or transmission may lead to loss of motorcycle control and an accident.

## WARNING

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

## CAUTION

Running the engine with insufficient oil will cause engine damage. If the low oil pressure indicator remains on, stop the engine immediately and investigate the cause.

## CAUTION

Never check or adjust the engine oil when the engine is hot. Any attempt to check or adjust the engine oil when the engine is hot may result in insufficient engine oil causing engine damage.

Always check or adjust the engine oil when the engine is cold.

## CAUTION

An accurate indication of the level of oil in the engine is only shown when the engine is cold and the motorcycle is on the side stand.

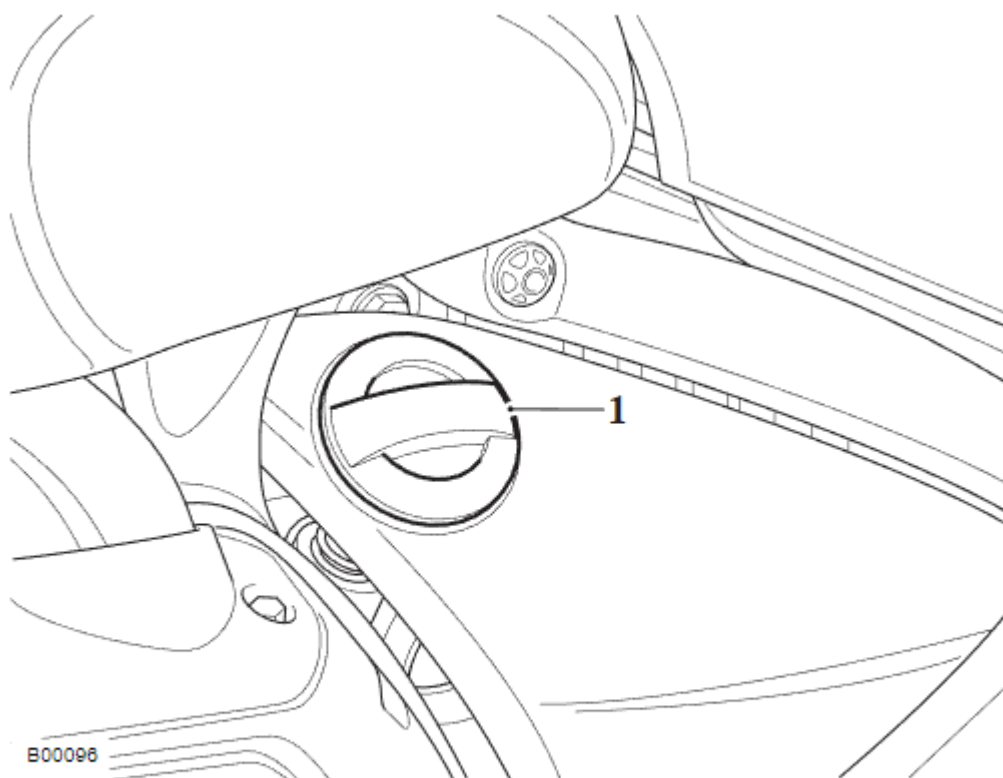
This method of checking the engine oil is especially important to make sure the oil capacities are distributed correctly because this model has a dry sump engine. Failure to follow this method will result in an inaccurate indication of oil in the engine.

- Make sure the engine is cold.
- Start the engine and run at idle for 60 - 90 seconds.

## NOTICE

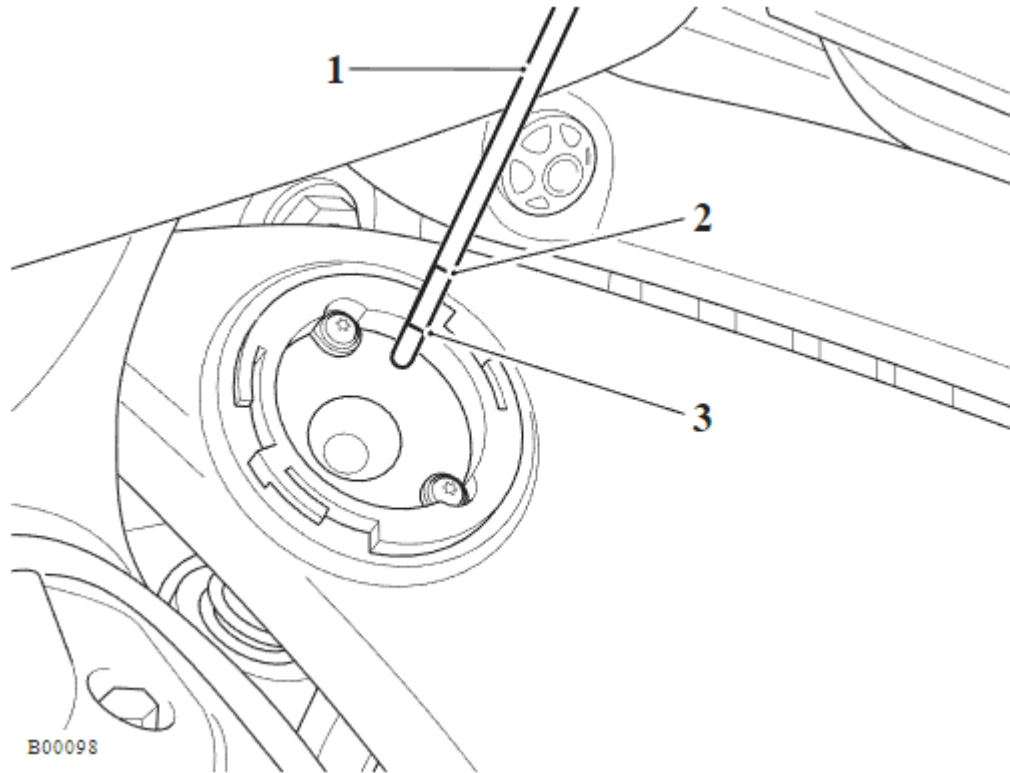
Do not operate the throttle while the engine is at idle. This will give an inaccurate oil level on the engine oil dipstick.

- Stop the engine, then wait for at least three minutes to allow the oil to settle.
- Turn the oil filler cap anticlockwise and remove it.



1. Oil filler cap

- Remove the oil dipstick from the oil filler tube, wipe the dipstick clean and refit into the oil filler tube, making sure to push the engine oil dipstick fully in.
- Remove the engine oil dipstick.
- The engine contains a sufficient amount of oil if the oil level is between the minimum and maximum marks on the engine oil dipstick.



1. Engine oil dipstick
2. Maximum limit
3. Minimum limit

- If the level is near or below the minimum mark, add the recommended engine oil, a little at a time, up to the maximum mark on the engine oil dipstick.

#### **NOTICE**

Make sure no foreign matter or contamination enters the engine during an engine oil change or top up. Contamination entering the engine may lead to engine damage.

- Once the correct level is reached, fit the engine oil dipstick and the oil filler cap.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contamination which can cause cancer. Wear suitable clothing and avoid skin contact.

The engine oil and filter must be replaced in accordance with scheduled maintenance requirements.

**⚠ WARNING**

If the engine has recently been running, the engine oil will be hot to the touch. Contact with the hot oils may cause damage to exposed skin. To avoid skin damage, do not touch hot oil.

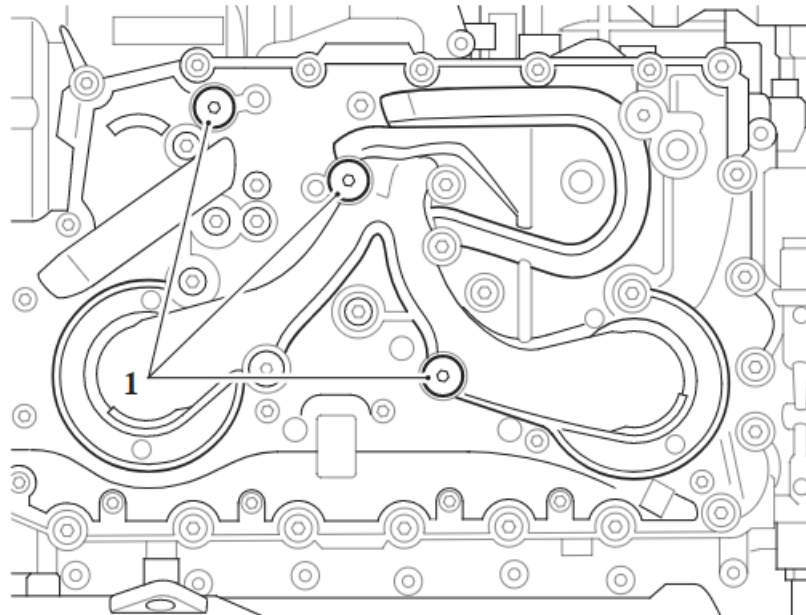
**⚠ CAUTION**

Do not pour engine oil on the ground, down sewers or drains, or into watercourses. To prevent pollution of watercourses etc., dispose of used oil sensibly. If in doubt contact your local authority.



The engine oil and oil filter must be replaced in accordance with scheduled maintenance requirements.

- Warm up the engine thoroughly, and then stop the engine. Secure the motorcycle on the side stand on level ground.
- Place an oil drain pan beneath the engine.
- Remove the three sump plugs from the bottom of the sump and allow the engine oil to drain. Discard the washers.



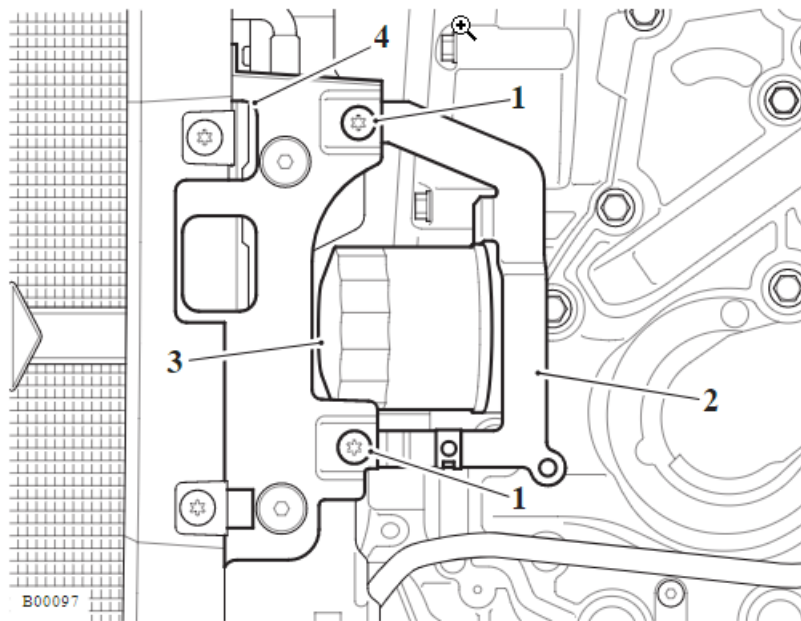
1. Engine oil drain plugs

#### **NOTICE**

To access the oil filter, the radiator lower surround will need to be pivoted slightly forward.

- Position the oil drain pan beneath the engine oil filter.
- Release the two fixings securing the radiator lower surround to its bracket.

- Pivot the radiator lower surround and unscrew and remove the engine oil filter using the Triumph service tool T3880313. Dispose of the old filter in an environmentally friendly way.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Fixings</li> <li>2. Bracket</li> <li>3. Oil filter</li> <li>4. Radiator lower surround</li> </ol> |
|---|

- Prefill the replacement engine oil filter with new engine oil.
- Apply a smear of clean engine oil to the sealing ring of the new engine oil filter. Fit the engine oil filter and tighten to 10 Nm.
- Secure the radiator lower surround to its bracket and tighten the fixings to 4 Nm.
- After the engine oil has completely drained out, fit new sealing washers to the three sump plugs. Fit and tighten the plugs to 30 Nm.

### NOTICE

An accurate indication of the level of oil in the engine is only shown when the engine is cold and the motorcycle is on the side stand.

This method of checking the engine oil is especially important to make sure the oil volume is distributed correctly because this model has a dry sump engine. Failure to follow this method will result in an inaccurate indication of oil in the engine.

- Using a suitable funnel, fill the engine with 4.6 litres of new semi or fully synthetic 15W/50 motorcycle engine oil which meets specification API SH (or higher) and JSO MA, such as Castrol Power 1 4T.
- Fit the dipstick, start the engine and allow it to idle for 60 to 90 seconds.

### NOTICE

Do not operate the throttle while the engine is at idle. This will give an inaccurate oil level on the engine oil dipstick.

- Make sure that the low oil pressure warning light remains off after starting and a warning message is not shown in the display screen.
- Stop the engine, then wait for at least three minutes to allow the oil to settle.
- Add the recommended engine oil, a little at a time, up to the maximum mark on the engine oil dipstick.

### CAUTION

Raising the engine speed above idle before the oil reaches all parts of the engine can cause engine damage or seizure. Only raise engine speed after running the engine for 60 to 90 seconds to allow the oil to circulate fully.

## CAUTION

If the engine oil pressure is too low, the low oil pressure warning light will illuminate. If this light stays on when the engine is running, stop the engine immediately and investigate the cause. Running the engine with low oil pressure will cause engine damage.

### Autoscan

#### Actions required

Perform an Autoscan using the Triumph Diagnostic Software in accordance with the Triumph Diagnostic Tool User Guide.

#### Check

Check all results pass the Autoscan, and save the results.

Print a customer copy.

### Fuel/Evaporative System - Check For Leaks, Routing, Chafing and Security

#### Standard required:

Fuel/evaporative hoses must be secure and routed in such a way that they do not chafe against moving parts of the motorcycle.

Fuel/evaporative hoses must not be routed around sharp curves. This could cause restrictions in the flow of fuel.

Fuel/evaporative system components must be free from damage.

The fuel tank cap must be easy to open and close.

The fuel tank cap seal must be free from damage.

The fuel cap lock barrel and key (if fitted) must operate easily and smoothly.

Check:

Visually check fuel/evaporative system components for signs of fuel leakage.

Visually check fuel/evaporative system components for signs of damage.

Visually check fuel/evaporative system components for security (where accessible).

Check the operation of the fuel filler cap and lock (if fitted).

Visually inspect the fuel cap seal for signs of damage.

Rectification if required:

Fuel/evaporative leaks must be rectified.

Damaged fuel/evaporative system components must be replaced.

An incorrectly fitting fuel cap must be replaced.

[Air Filter – Renew](#)

Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

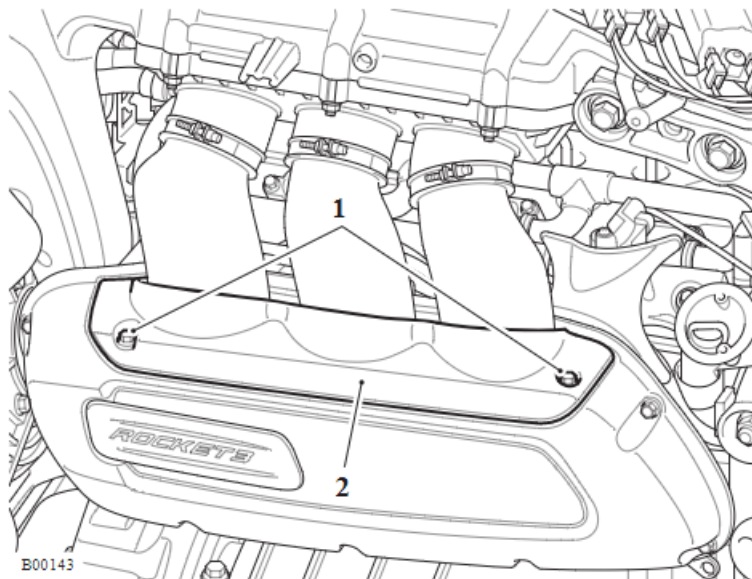
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat – Removal](#)
- [Battery – Removal](#)
- [Fuel Tank – Removal](#)
- Remove the left hand [Side Panels – Removal](#)

1. Release the two fixings and remove the plenum cover finisher. Discard the fixings.



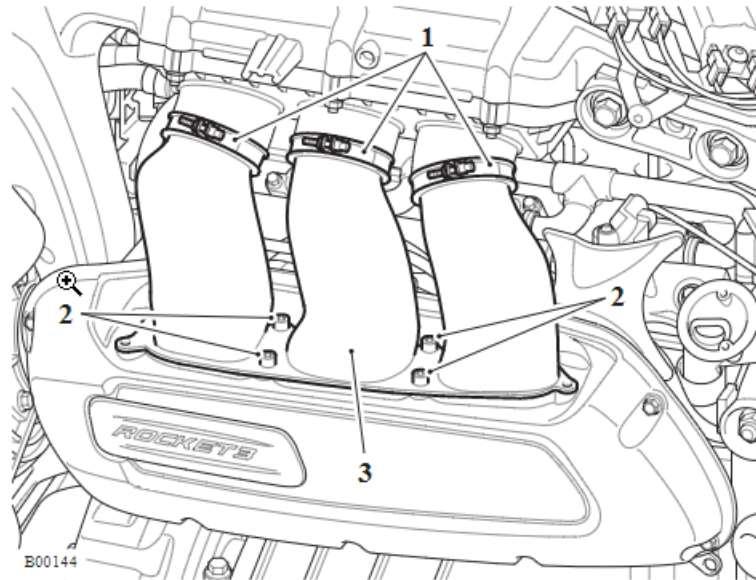
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Plenum cover finisher</li></ol> |
|---|

2. Noting their orientation, release the three clips securing the air intake runner to the air filter element box.

**NOTICE**

Note the position of the four fixings securing the air intake runner to the plenum for installation.

3. Release the four fixings and remove the air intake runner. Remove and discard the gasket and the four fixings.

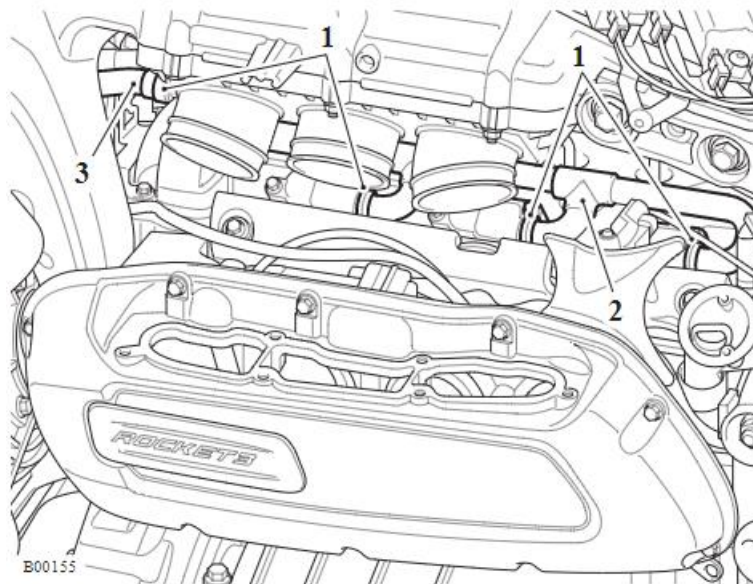


1. Clips
2. Fixings
3. Air intake runner

#### **NOTICE**

Note the routing of the secondary air inject pipe to the reed covers for installation.  
Note the routing of the secondary air inject pipe to the air filter element box for installation.

4. Release the four clips and detach the secondary air injection (SAI) pipe from the reed valve covers and the air filter element box.



1. Clips
2. SAI pipe to reed valves
3. SAI pipe to air filter box

5. Carefully manoeuvre the secondary air injection pipe to the front of the engine.

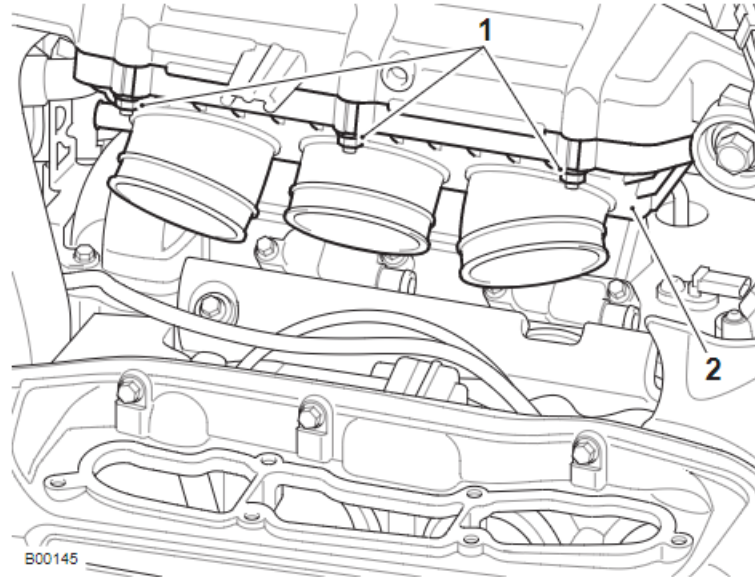
### **NOTICE**

Note how the air filter element box is secured to the frame for installation.

Not the orientation of the air filter element for installation.

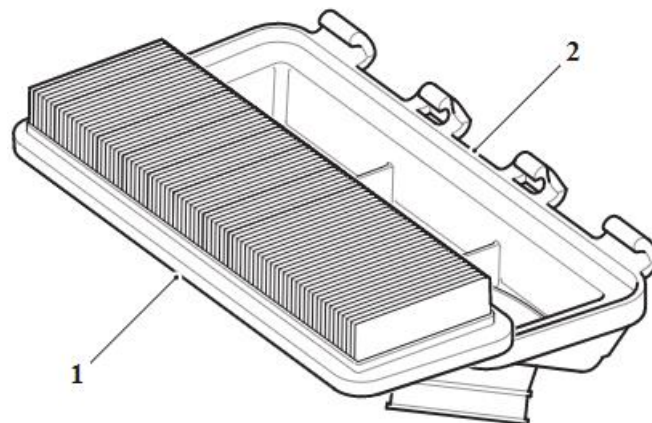


6. Release the three fixings, lower the air filter box and detach the rear of the box from the frame. Remove the air filter box and air filter element.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Air filter element box</li></ol> |
|--|

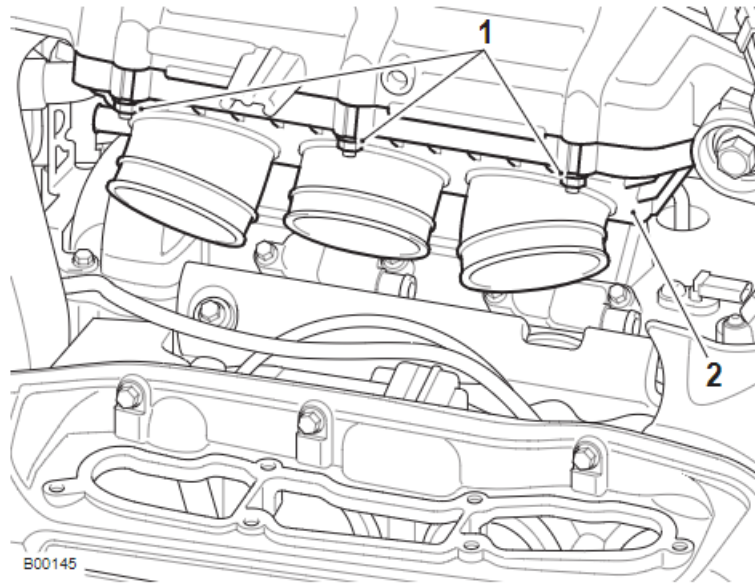
7. Remove the air filter element.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Air filter element</li><li>2. Air filter element box</li></ol> |
|---|

## Installation

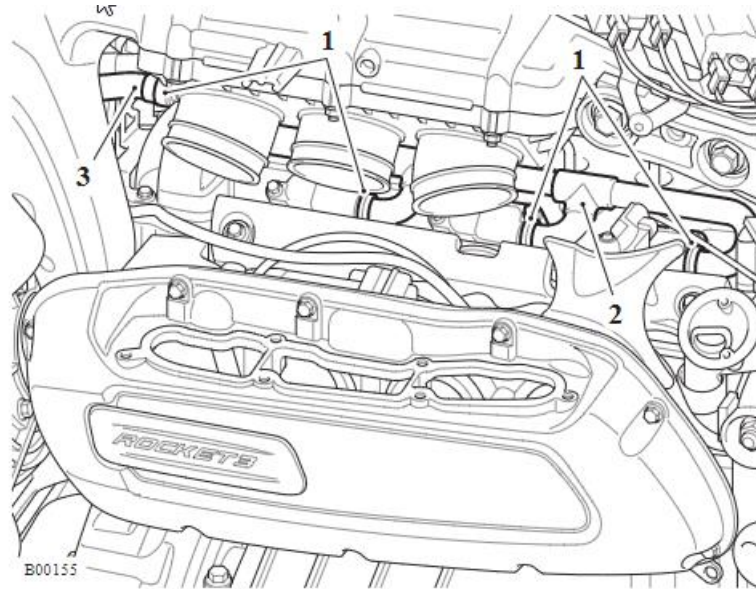
1. Clean the air filter element box and the interior of the frame air intake.
2. Locate the new filter element into the air filter element box, as noted for removal.
3. Fit the air filter element and box assembly to the frame as noted for removal, tighten its fixings to 1.5 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Air filter element box</li></ol> |
|--|

4. Carefully manoeuvre the SAI pipe to the reed covers as noted for removal.
5. Fit the SAI pipe to the reed covers and secure with their retaining clips.

6. Fit the SAI pipe to the air filter element box and secure with its clip.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Clips</li><li>2. SAI pipe to reed valves</li><li>3. SAI pipe to air filter box</li></ol> |
|---|

7. Fit a new gasket to the plenum cover for the air intake runner.
8. Fit the air intake runner to the plenum cover and the air filter element box. Secure to the plenum cover with four new fixings in the following three stages:

**9. Stage 1**

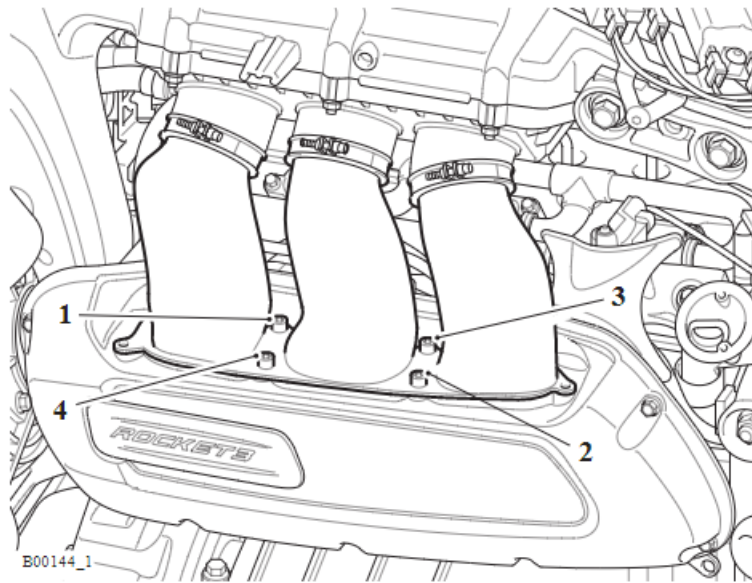
- Fit the two fixings for the plenum cover finisher to the outer fixing position on the plenum cover. Do not fully tighten.

**10. Stage 2**

- Tighten the fixings one to four in the sequence shown to 10 Nm.

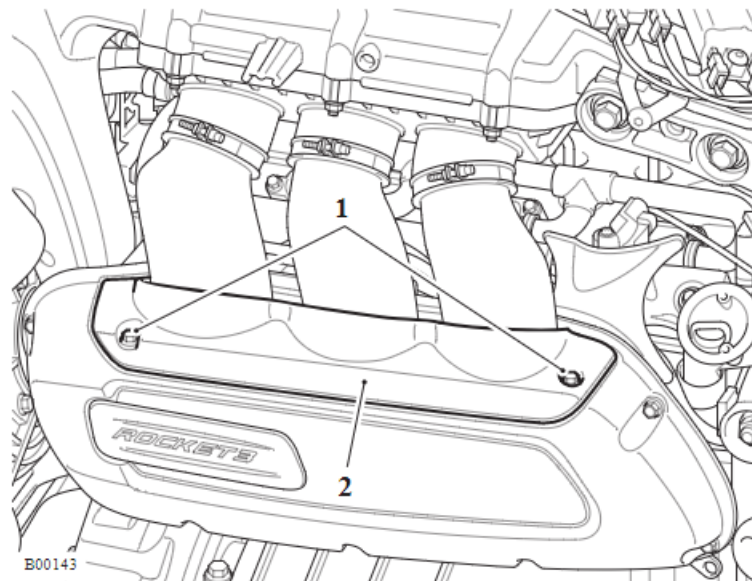
### 11. Stage 3

- Retighten fixings one and two to 10 Nm. Remove the two fixings for the plenum cover finisher.



Air Intake Runner Tightening Sequence

12. Position the three clips as noted for removal and tighten to 10 Nm.
13. Fit the plenum cover finisher and tighten the new fixings to 10 Nm.



1. Fixings
2. Plenum cover finisher

## WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

- Fit the left hand [Side Panels – Removal](#)
- [Fuel Tank – Installation](#)
- [Battery – Installation](#)
- [Seat - Installation](#)

Fuel Filter – Renew

## WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

## Removal

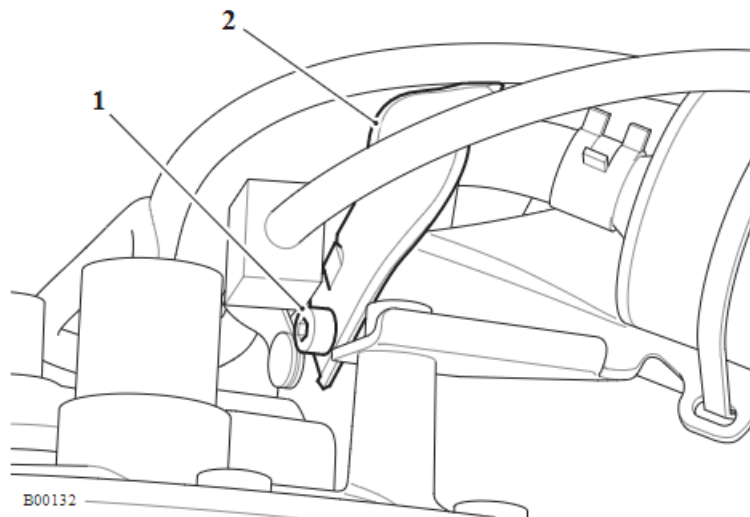
Perform the following operations:

- **Fuel Pump Assembly - Removal**

### **NOTICE**

Note the orientation of the hose bracket and all hose retaining clips for installation.

1. Release the fixing and remove the hose bracket from the fuel pump bracket.



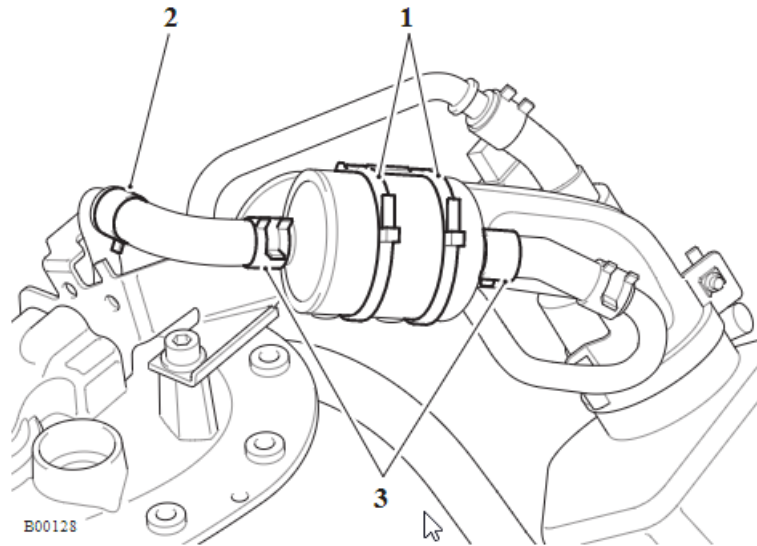
1. Fixing
2. Hose bracket

### **NOTICE**

Prior to removing the filter, note the direction of the arrow on the side of the filter. The arrow should point away from the fuel pump, towards the pressure regulator.

2. Remove and discard the two fuel filter cable ties.
3. Release clip securing the fuel hose to fuel outlet pipe.
4. Release the two fuel hose clips from either side of the fuel filter.

5. Detach the fuel hose from the fuel outlet pipe.



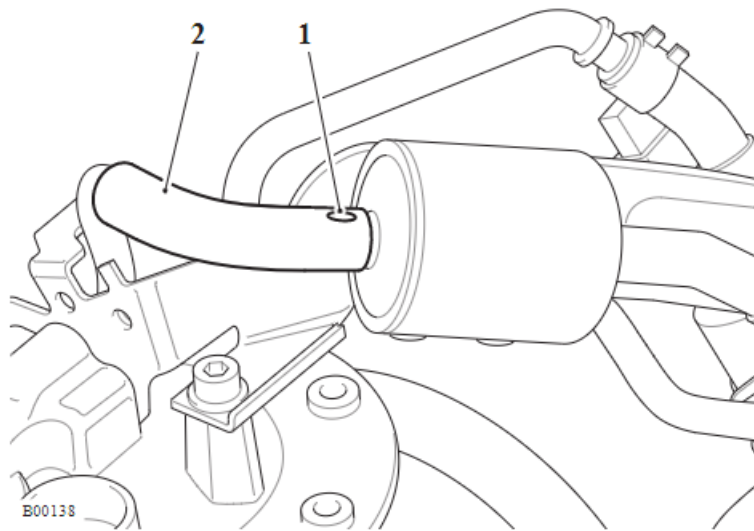
- 1. Cable ties
- 2. Hose clip (fuel outlet pipe)
- 3. Hose clips (fuel filter)

6. Remove the fuel filter from the fuel pump assembly.

**NOTICE**

Note the position and orientation of the dot alignment mark on the fuel filter outlet hose for installation.

7. Remove the fuel hose from the outlet of the fuel filter.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Dot alignment mark</li><li>2. Fuel outlet pipe</li></ol> |
|---|

### Inspection

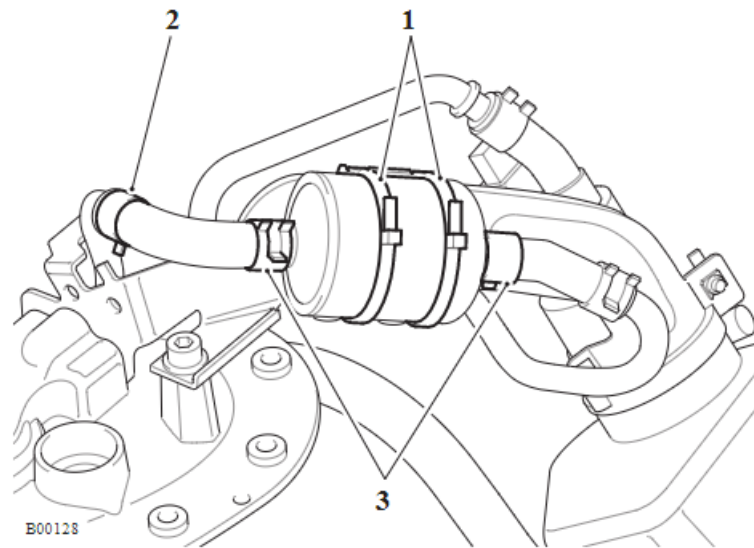
1. Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary.
2. Check all hose clamps for cracks and signs of distortion. Replace as necessary.
3. Check the mesh filter for damage and replace if necessary.

### Installation

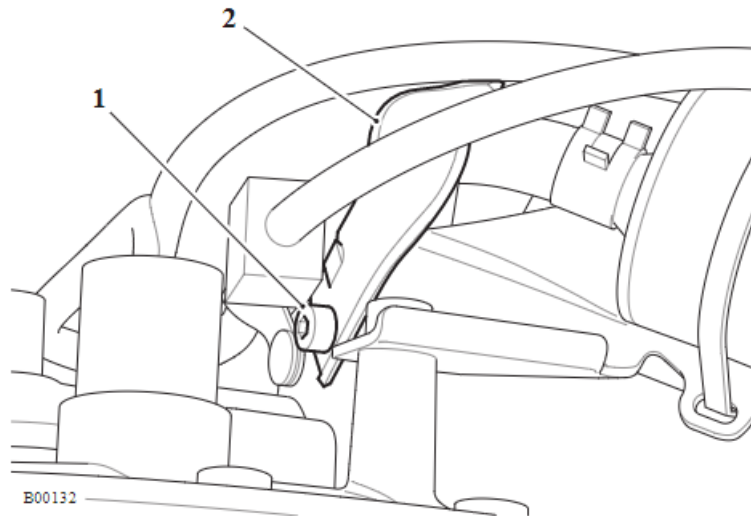
1. Install the fuel filter to the hose from the fuel pump, ensuring the arrow on the filter points away from the pump.
2. Fit the fuel hose to the outlet of the fuel filter, make sure the dot alignment mark is positioned as noted for removal.
3. Attach the fuel filter hose to the fuel outlet pipe.
4. Secure the two filter hoses with the three hose clips, make sure the orientation of the clips are as noted for removal.



5. Secure the fuel filter to the fuel pump bracket with two cable ties.



6. Fit the hose bracket to the fuel pump bracket as noted for removal and tighten its fixing to 4 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Hose bracket</li></ol> |
|---|

## Throttle Body Balancing

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

The throttles cannot be balanced using equipment to measure vacuum in each throttle. Instead, the Triumph diagnostic tool must be used.

Perform the following operations:

- [Seat – Removal](#)
- [Battery – Removal](#)
- [Plenum – Removal \(All markets Except US\)](#) or [Plenum – Removal \(Us Markets only\)](#)


### **WARNING**

If the engine has recently been running, the components beneath the fuel tank may be hot to the touch.

1. Temporarily refit the fuel tank and reconnect the fuel supply and fuel pump connection using service tool T3880001 (minus the fuel pressure gauge) and service tool T3880123 (see [Fuel Pressure Checking](#)).
2. Using proprietary professional automotive workshop equipment approved for fuel handling, partially refill the fuel tank with the fuel removed earlier.
3. Temporarily reconnect the battery, positive (red) lead first.
4. Attach exhaust extraction hoses to the silencers.
5. Attach the Triumph diagnostic tool, start the engine and navigate to ADJUST TUNE (see [System Diagnostic Tool Connection](#)).

## 6. Select BALANCE THROTTLES.

### Adjust Tune Procedure

|   |                    |
|---|--------------------|
| Adjust the throttle balance as described in the Service Manual until balanced   |                    |
| Press cancel to cancel the adjustment process   |                    |
| Press OK to finish  |                    |
| Throttle Status:  | Throttles Balanced |
| Cylinder 1 MAP Pressure:  | 480 mmHg           |
| Cylinder 2 MAP Pressure:  | 481 mmHg           |
| Cylinder 3 MAP Pressure:  | 480 mmHg           |
|  Adjusting parameter - Balance Throttles |                    |

Balance Throttles Screen

### NOTICE

The balance throttles screen shows the vacuum value of each throttle in mmHg. In addition, when the throttles are balanced to an acceptable range of each other the words 'THROTTLES BALANCED' in green text will appear on the right of the screen. At this point, no further adjustment is necessary or productive.

If the throttles are not balanced to each other the words 'THROTTLES UNBALANCED' in red text will appear on the right of the screen. At this point adjustment will be necessary.

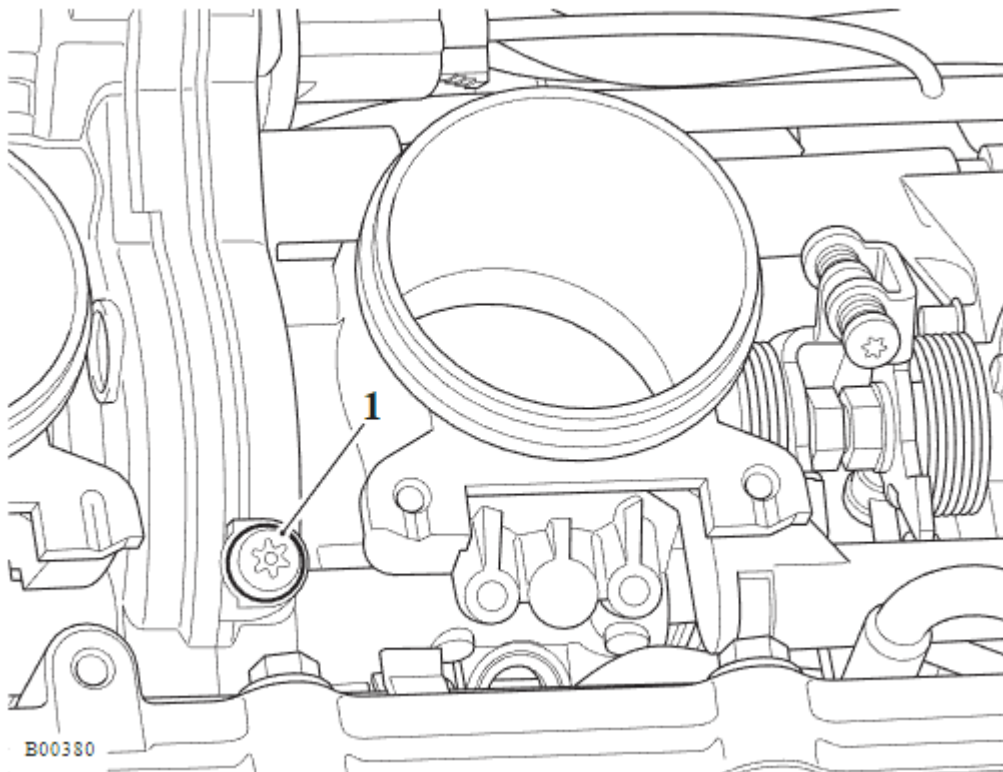
The adjusters operate on the outer cylinders only (cylinders 1 and 3). The centre throttle (cylinder 2) adjustment is fixed, this being controlled by the throttle control motor. Note that the centre reading may alter slightly as the two outer cylinders are adjusted.

DO NOT attempt to adjust the throttle stop screws, located below the fuel rail. The stop screws are set at the factory during manufacture, and must not be adjusted.

## **⚠ WARNING**

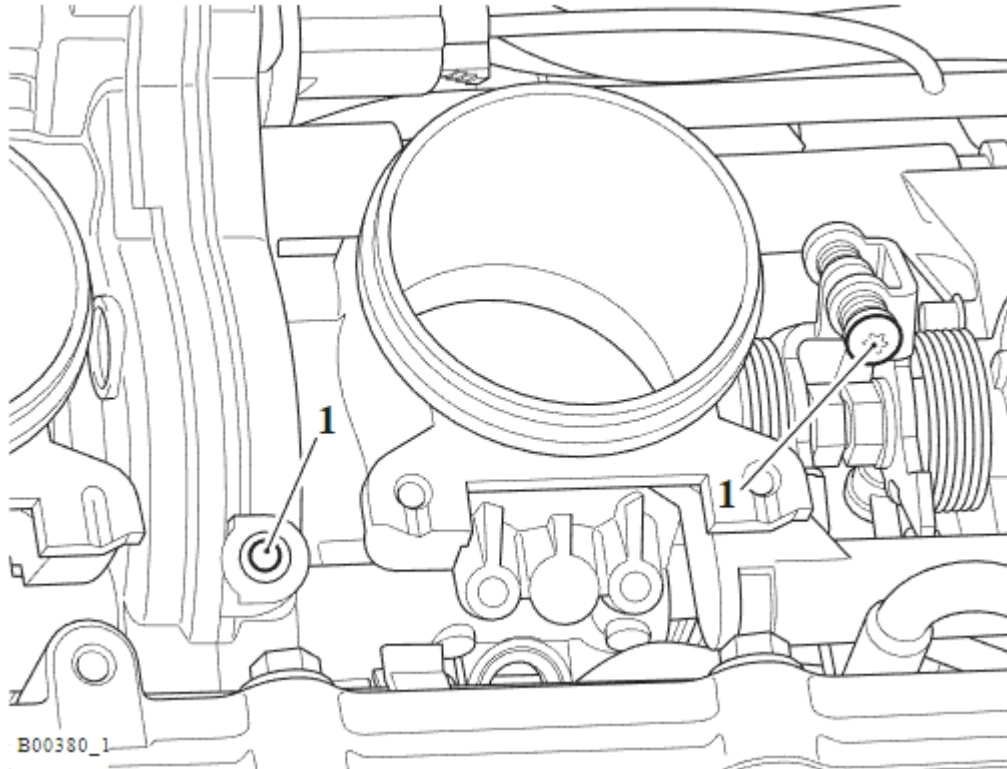
Total cleanliness must be observed at all times whilst the throttle balance blanking screw is removed, and adjustment must take place in a dirt/dust-free environment. Dirt or dust ingress to the throttle motor housing will cause the throttles to stick, leading to loss of motorcycle control and an accident.

7. Remove the Torx T30 blanking screw from the throttle control motor housing, located between cylinders one and two.



1. Throttle balance blanking screw

8. Using a suitable Torx T20 screwdriver adjust the throttle adjusters until the words 'THROTTLES BALANCED' appear on the diagnostic tool.



1. Adjusters

9. When balanced, stop the engine and disconnect the diagnostic tool.
10. Refit the Torx T30 blanking screw to the throttle control motor housing and tighten to 5 Nm.
11. Disconnect the battery, negative (black) lead first.
12. Using proprietary professional automotive workshop equipment approved for fuel handling, drain any remaining fuel from the fuel tank. Perform the following operations:
  - [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
  - [Battery – Installation](#)
  - [Seat - Installation](#)

## Spark Plugs – Inspection

Assessing the condition of a spark plug can be a valuable aid to a technician, and a good source of information about the engines overall operating condition.

In general, a light brown/grey colour tells you that the spark plug is operating at optimum temperature and that the engine is in good condition.

Dark colouring, such as heavy wet or dry deposits, can indicate:

- an overly rich condition
- too cold a heat range spark plug
- a possible vacuum leak
- low compression
- overly retarded timing
- too large a spark plug gap.

If the deposits are wet, it can be an indication of:

- a breached head gasket
- poor oil control from the piston rings
- valve train problems
- an extremely rich condition - depending on the actual liquid present at the firing tip.

Signs of fouling or excessive heat must be traced quickly to prevent further deterioration of performance and possible engine damage.

## Normal Condition



An engines condition can be judged by the appearance of the spark plugs firing end. If the firing end of a spark plug is light brown or grey, the condition can be judged to be good and the spark plug is functioning optimally.

## Dry and Wet Fouling



Although there are many different scenarios, if the insulation resistance between the centre electrode and the shell is over 10 Ohms, the engine can be started normally. If the insulation resistance drops to 0 Ohms, the firing end is fouled by either wet or dry carbon.



## Overheating



When a spark plug overheats, deposits that have accumulated on the insulator tip melt and give the insulator a glazed or glossy appearance.

## Deposits



The accumulation of deposits on the firing end is influenced by oil leakage, fuel quality and the engines operating duration.

## Breakage



Breakage is usually caused by thermal expansion and thermal shock due to sudden heating or cooling.

## Normal Life



A worn spark plug not only wastes fuel but also strains the whole ignition system because the expanded gap (due to erosion) requires higher voltages. Normal rates of gap growth are:

0.00063 -0.00126 inches per 1000 miles (0.01 -0.02 mm per 1000 km).

## Melting



Melting is caused by overheating. Mostly, the electrode surface is rather lustrous and uneven. The melting point of nickel alloy is 1200 to 1300 °C (2200 to 2400 °F).

## Erosion, Corrosion and Oxidation



The material of the electrodes has oxidised, and when the oxidation is heavy, it will be green on the surface. The surface of the electrodes will also be fretted and rough.



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

**⚠ CAUTION**

If the coolant level is found to be low, or if coolant has to be added regularly, inspect the cooling system for coolant leaks. If necessary, pressure test the system to locate the source of the leak and rectify as necessary. Loss of coolant may cause the engine to overheat and suffer severe damage.

All cooling system components must be free from fluid leaks.

Check the visible areas of the radiator heat exchanger/oil cooler (if fitted) for fluid leaks.

Visually inspect the coolant hoses for fluid leaks.

A leaking or damaged cooling system component must be replaced.

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**⚠ CAUTION**

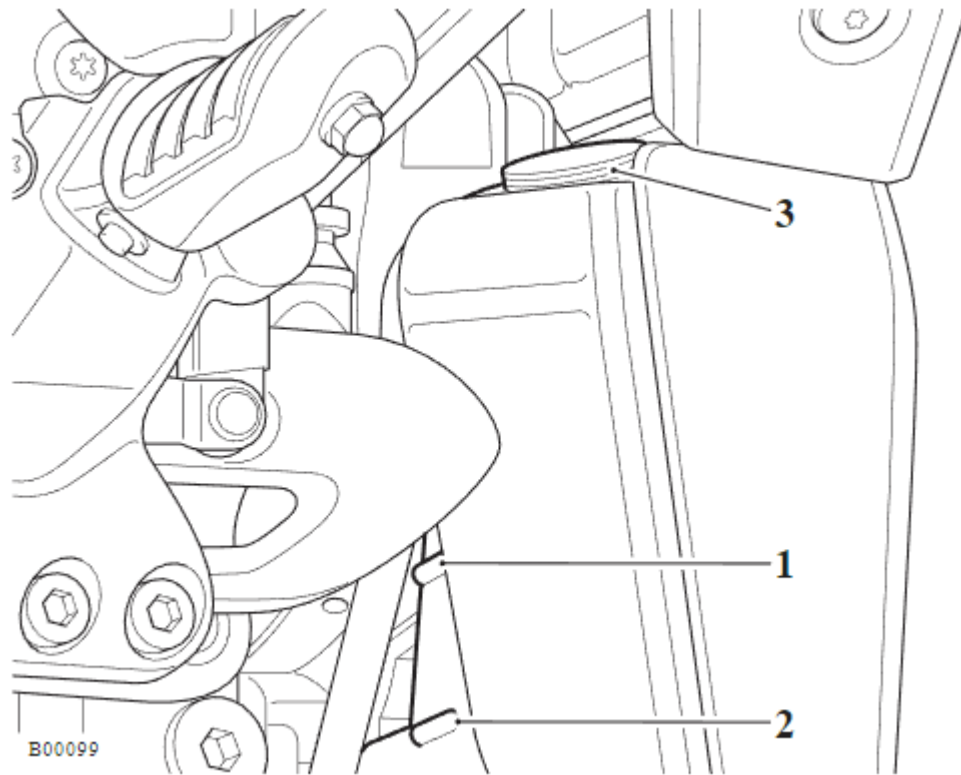
If the coolant level is found to be low, or if coolant has to be added regularly, inspect the cooling system for coolant leaks. If necessary, pressure test the system to locate the source of the leak and rectify as necessary. Loss of coolant may cause the engine to overheat and suffer severe damage.

**NOTICE**

Only inspect the coolant level when the engine is cold.

The coolant level within the expansion tank can be inspected without removing any covers. The expansion tank can be viewed from the right hand side of the motorcycle, in the radiator lower cowl.

1. Position the motorcycle on level ground and in an upright position.
2. The coolant level must be between the MAX (upper line) and MIN (lower line) marks in the expansion tank.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. MAX mark</li><li>2. MIN mark</li><li>3. Expansion tank cap</li></ol> |
|---|

**⚠ WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

3. If the level of coolant is low, remove the cap from the expansion tank and add coolant mixture as necessary to bring the level up to the MAX mark. Refit the cap.

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

### **NOTICE**

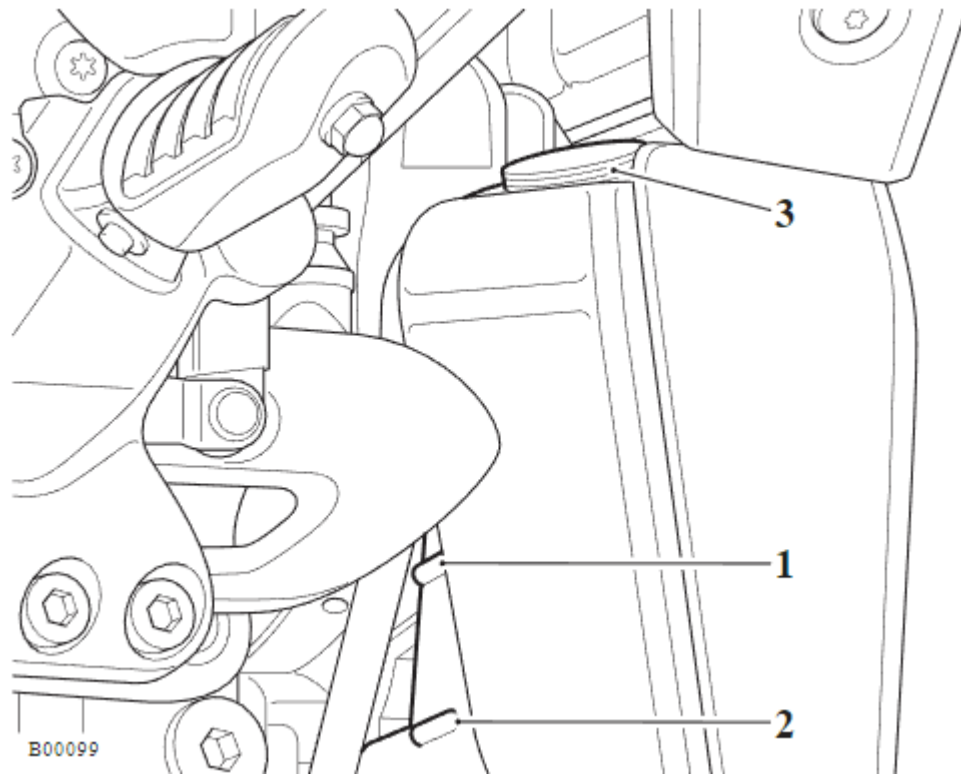
If the coolant level is being checked because the coolant has overheated, also check the level in the radiator and top up if necessary.

In an emergency, distilled water can be added to the cooling system. However, the coolant must then be drained and replenished with HD4X Hybrid OAT coolant as soon as possible.

1. Allow the engine to cool for a minimum of 30 minutes.
2. Position the motorcycle on level ground and in an upright position.



3. The coolant level must be between the MAX (upper line) and MIN (lower line) marks in the expansion tank.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. MAX mark</li><li>2. MIN mark</li><li>3. Expansion tank cap</li></ol> |
|---|

4. Remove the coolant expansion tank cap from the coolant expansion tank.
5. Add coolant mixture through the filler opening until the level reaches the MAX mark.
6. Refit the coolant expansion tank cap.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

**⚠ CAUTION**

If the coolant level is found to be low, or if coolant has to be added regularly, inspect the cooling system for coolant leaks. If necessary, pressure test the system to locate the source of the leak and rectify as necessary. Loss of coolant may cause the engine to overheat and suffer severe damage.

1. Visually inspect the coolant hoses for cracks, damage, leaks or splits.
2. Check the coolant hoses for correct routing, they are secured by the relevant brackets and are not chafing.
3. Check the hose clamps for damage and corrosion.
4. If necessary, pressure test the system to locate the source of the leak and rectify as necessary.
5. Replace any defective components as required.
6. If the level of coolant is low, remove the cap from the expansion tank and add coolant mixture as necessary to bring the level up to the MAX mark. Refit the cap (see [Coolant Level Adjustment](#)).

## Coolant Renew

### **WARNING**

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Allow the engine to cool for a minimum of 30 minutes.
2. Drain the coolant (see [Coolant Replacement - Drainage](#)).
3. Refill the coolant with Triumph HD4X Hybrid OAT coolant (see [Coolant Replacement - Filling](#)).

## Clutch Fluid Level Inspection

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

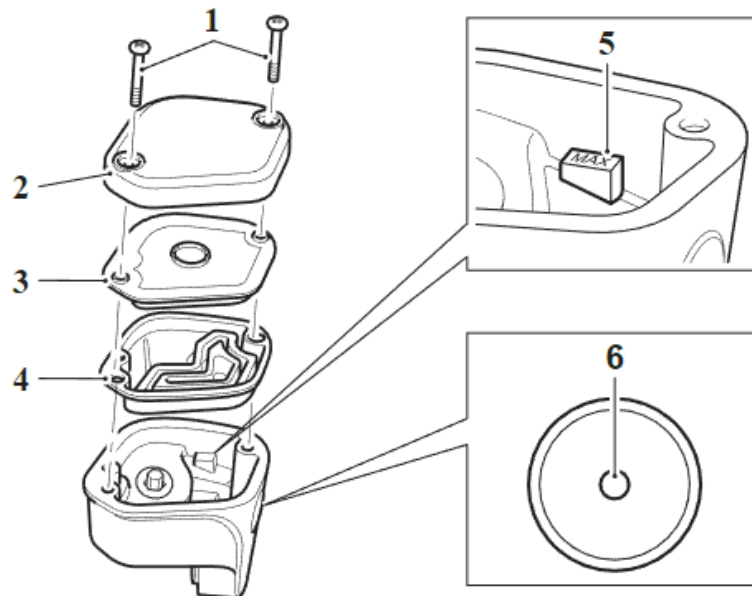
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

In accordance with the scheduled maintenance chart, inspect the clutch fluid level in the master cylinder reservoir.

1. The clutch fluid level must be kept between the upper and lower level lines (reservoir held horizontal).

### Clutch Fluid Level Adjustment

1. Clean the reservoir cap before removing.
2. Remove the two fixings.
3. Remove the reservoir cap and the diaphragm seal.
4. Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
5. Refit the reservoir cap ensuring that the diaphragm seal is correctly positioned between the cap and the reservoir body.
6. Refit the two fixings and tighten to 1.5 Nm.



1. Fixings
2. Reservoir cap
3. Plastic plate
4. Diaphragm seal
5. MAX mark
6. MIN mark

## Changing Clutch Fluid

Clutch and brake fluid must be changed every two calendar years, irrespective of the mileage the motorcycle has covered in that time. (see [Bleeding the Clutch](#)).

## Bleeding the Clutch

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Make sure absolute cleanliness when adding clutch fluid to the clutch fluid reservoir.

Do not allow moisture or debris to enter the cylinder as this will adversely affect the fluid properties.

Always use fluid from a sealed container and do not use fluid from a container which has been opened for any period of time.

Always check for fluid leakage around hydraulic fittings and for damage to hoses.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

### **WARNING**

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of brake and clutch fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the clutch system leading to an accident.

## CAUTION

To prevent body damage, do not spill brake and clutch fluid onto any area of the bodywork or the brake and clutch reservoirs.

Perform the following operations:

- [Seat – Removal](#)
- [Battery – Removal](#)
- [Coolant Expansion Tank – Removal](#)
- [Radiator - Removal](#)

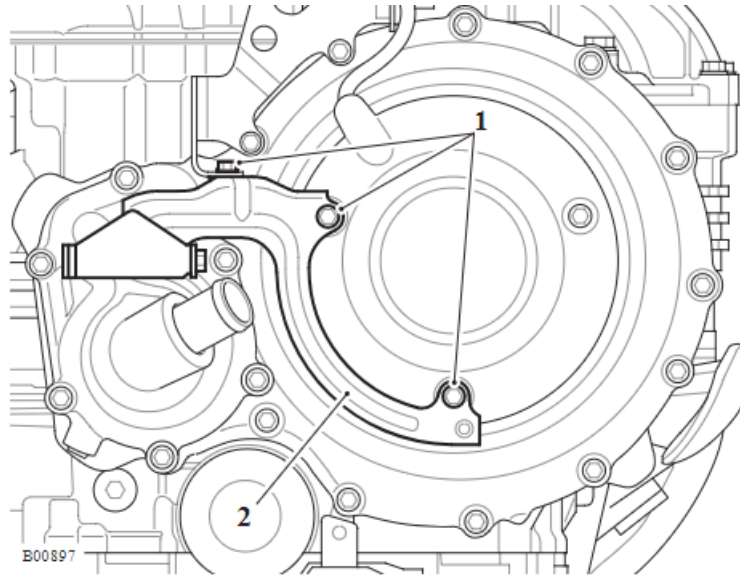
## NOTICE

Two fixings for the clutch cover finisher will have been removed when the expansion tank assembly was removed.

Note the position of the remaining fixing for installation.

1. Note the original setting of the clutch lever adjuster in order that it can be returned to the same position when the bleeding operation is complete. Set the clutch lever adjuster to position No. 1.
2. Turn the handlebars to bring the fluid reservoir to a level position.

3. Release the three fixings and remove the lower radiator cowl bracket.

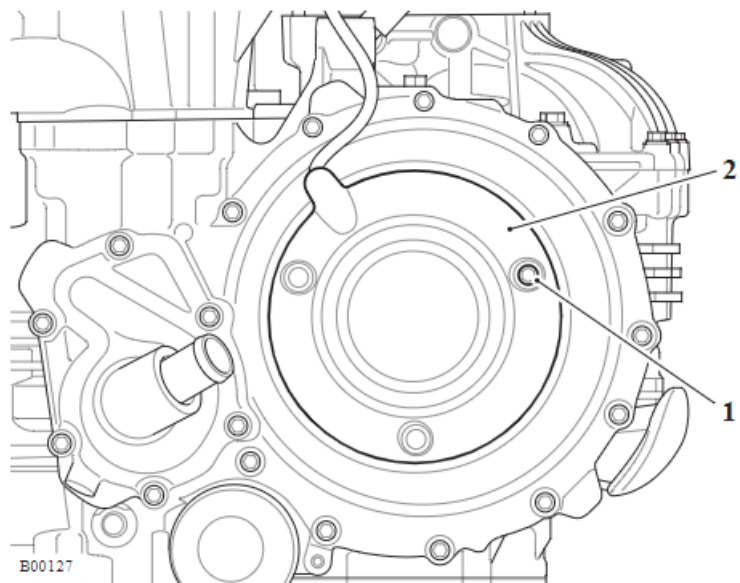


1. Fixings
2. Bracket

**NOTICE**

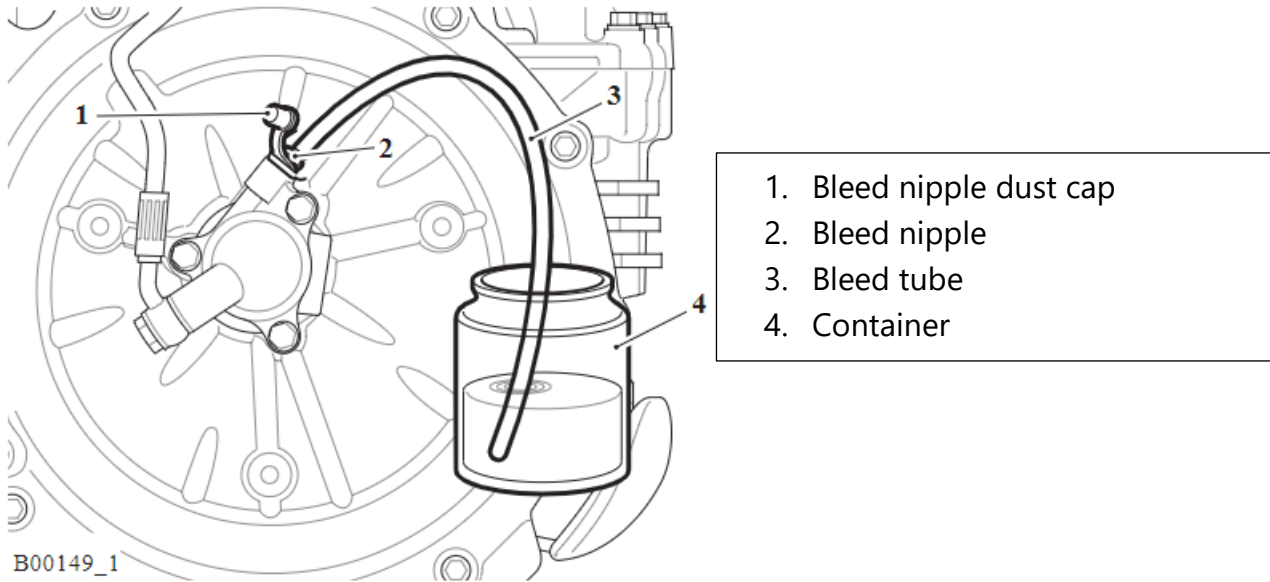
Note the position of the single fixing of the clutch cover finisher for installation.

4. Release the fixing and remove the clutch cover finisher.



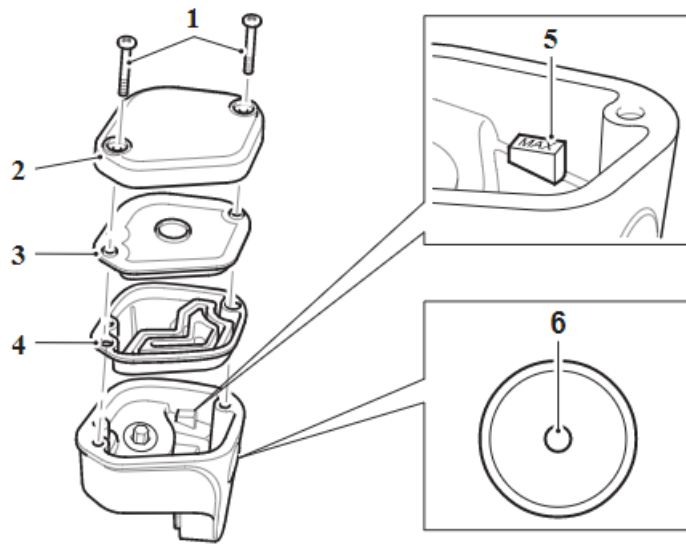
1. Fixings
2. Clutch cover finisher

5. Remove the dust cap from the bleed nipple on the slave cylinder.
6. Attach a transparent plastic tube to the bleed nipple.



- |                          |
|--------------------------|
| 1. Bleed nipple dust cap |
| 2. Bleed nipple          |
| 3. Bleed tube            |
| 4. Container             |

7. Place the other end of the tube into a suitable receptacle containing new clutch fluid.
8. Clean the reservoir cap before removing.
9. Remove the two fixings for the reservoir cap.
10. Remove the reservoir cap, plastic plate and the diaphragm seal. Check the condition of the diaphragm seal fitted, replace the diaphragm if necessary.



- |                                    |
|------------------------------------|
| 4. Fixings                         |
| 5. Reservoir cap                   |
| 6. Plastic plate 4. Diaphragm seal |
| 7. MAX mark                        |
| 8. MIN mark                        |

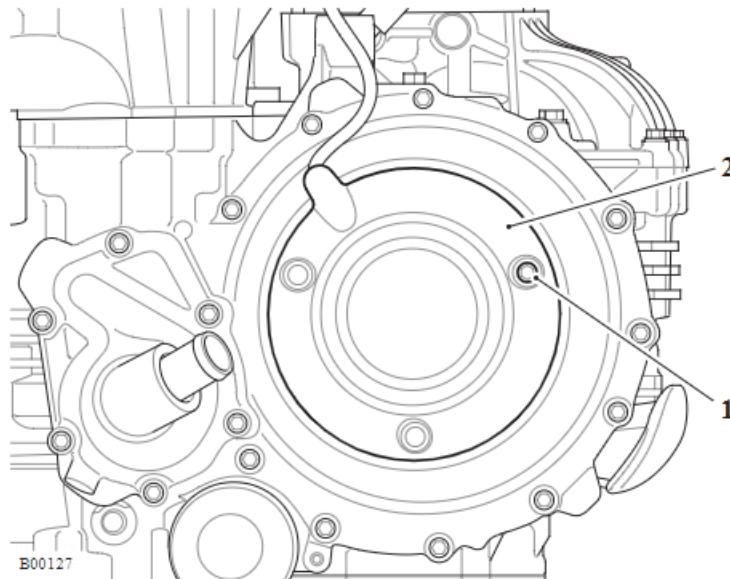


11. Release the bleed nipple.

### NOTICE

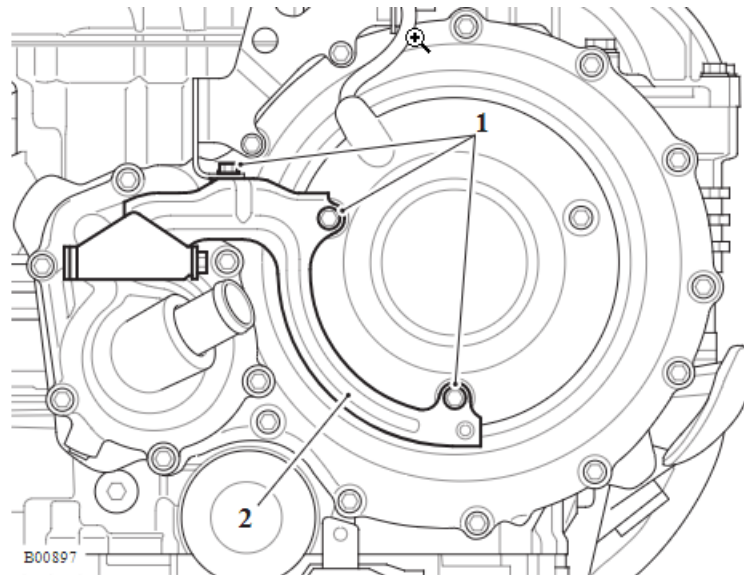
During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

12. Slowly pull in and release the clutch lever several times until no more bubbles appear in the tube.
13. When all the air has been expelled from the system, hold in the clutch lever and close the bleed nipple. Tighten to 5 Nm.
14. Fill the reservoir to the upper level.
15. Replace the reservoir cover and diaphragm ensuring correct fitment of the diaphragm. Tighten the screws to 1.5 Nm.
16. Remove the transparent bleed tube.
17. Replace the bleed nipple dust cap.
18. Check the clutch for correct operation and fluid leaks. Rectify as necessary.
19. Fit the clutch cover finisher and secure with the single fixing as noted for removal. Do not fully tighten the fixing at this stage.



1. Fixings
2. Clutch cover finisher

20. Fit the lower radiator cowl bracket and tighten the clutch cover fixings to 10 Nm.
21. Secure the radiator lower bracket to the lower radiator cowl bracket and tighten the fixing to 5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Bracket</li></ol> |
|---|

## **⚠ WARNING**

Always return the lever adjuster to the original setting as noted in step 1. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of control or an accident.

22. Reset the adjuster on the clutch lever to the original setting.

Perform the following operations:

1. [Radiator – Installation](#)
2. [Coolant Expansion Tank – Installation](#)
3. [Battery – Installation](#)
4. [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

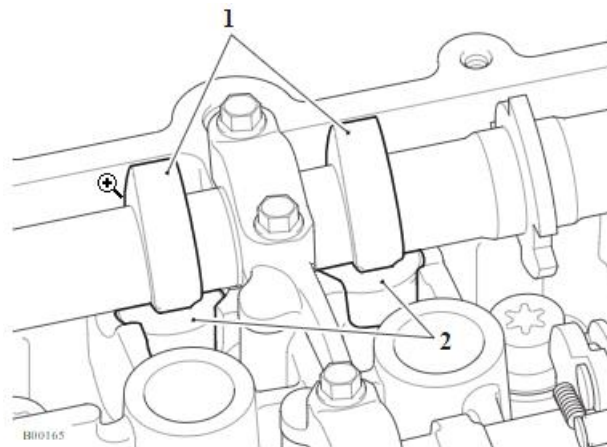
**NOTICE**

Valve clearance measurement must be carried out with the engine cold.

Perform the following operations:

- **Camshaft Cover - Removal**

1. Remove the spark plugs to reduce compression resistance when turning the engine.
2. Select a high gear and, using the rear wheel, turn the engine until a pair of camshaft lobes are positioned pointing away from the valves.



1. Camshaft lobe
2. Tappet bucket

3. Using feeler gauges, measure and record the clearances for this pair of valves only.
4. Repeat the process until the valve clearances for all valves have been checked.

**NOTICE**

The correct valve clearances are in the range given below:

|         |              |
|---------|--------------|
| Inlet   | 0.09-0.14 mm |
| Exhaust | 0.18-0.23 mm |

**⚠ CAUTION**

If the valve clearances are not checked and corrected, wear could cause the valves to remain partly open, which lowers performance, burns the valves and valve seats and may cause serious engine damage.

5. Record the measured valve clearances on a chart similar to the example shown.

Typical Valve Clearance Chart

| Inlet Valve No.   | Gap Measured     |
|-------------------|------------------|
| 1                 | as measured (mm) |
| 2                 | as measured (mm) |
| 3                 | as measured (mm) |
| 4                 | as measured (mm) |
| 5                 | as measured (mm) |
| 6                 | as measured (mm) |
| Exhaust Valve No. | Gap Measured     |
| 1                 | as measured (mm) |
| 2                 | as measured (mm) |
| 3                 | as measured (mm) |
| 4                 | as measured (mm) |
| 5                 | as measured (mm) |
| 6                 | as measured (mm) |

Perform the following operations:

- If the measurement does not fall within the specified range see [Valve Clearance Adjustment](#)
- If the measurement does fall within the specified range fit the [Camshaft Cover – Installation](#)
- Refit the spark plugs and tighten to 12 Nm

Valve Clearance Adjustment

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

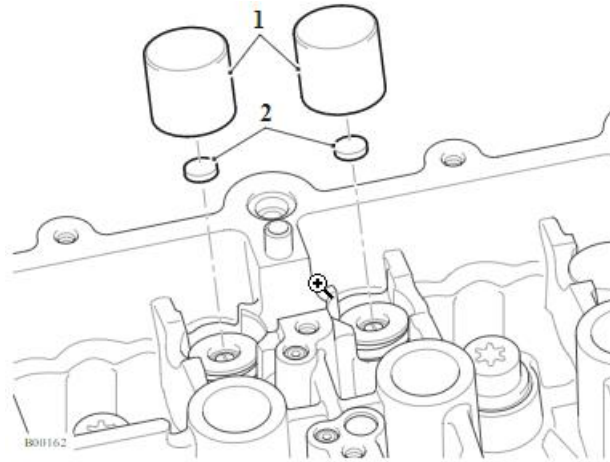
### **NOTICE**

To adjust the valve clearances the camshaft must be removed.

Perform the following operations:

- [Camshaft Cover - Removal](#)

1. Remove the tappet bucket from the cylinder head.
2. Remove the shim.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Tappet bucket</li><li>2. Shim</li></ol> |
|--|

#### **NOTICE**

The shim may withdraw with the tappet bucket.

3. Measure the original shim, using a micrometer and select the appropriate new shim as required.

- Clearance too small - Fit a thinner shim.
- Clearance too large - Fit a thicker shim.

#### **NOTICE**

Shims are available ranging from 1.70 mm to 3.10 mm in increments of 0.025 mm.

4. Fit the new shim to the valve.
5. Lubricate the tappet bucket(s) with a 50/50 solution of engine oil and molybdenum disulphide grease.
6. Refit the tappet bucket.
7. Repeat the procedure until all valves requiring adjustment have been correctly set.

Perform the following operations:

- [Camshaft - Installation](#)
- Recheck all valve clearances. Repeat the procedure if the valves require further adjustment
- [Camshaft Cover - Installation](#)
- Refit the spark plugs and tighten to 12 Nm

Camshaft Timing Check/Adjust

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **CAUTION**

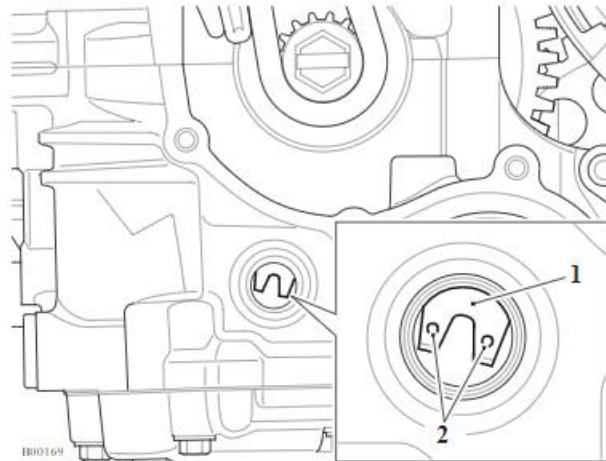
When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.  
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.  
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operations:

- [Clutch Cover - Removal](#)
- [Camshaft Cover - Removal](#)

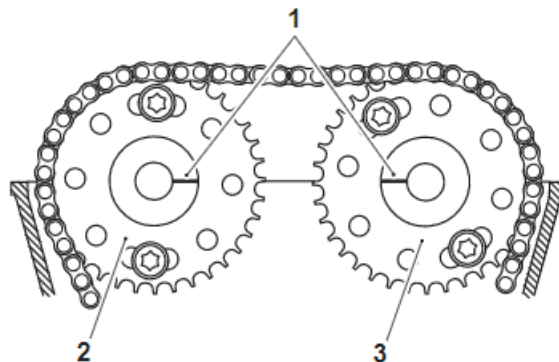
## Camshaft Timing Check

1. Remove the spark plugs to reduce compression resistance when turning the engine.
2. Remove the crankshaft locking pin plug from the crankcase.
3. At the front of the engine, rotate the crankshaft anticlockwise using the bolt fitted to the end of the crankshaft until the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin.



4. Crankshaft primary gear
5. Alignment marks

4. Check that the camshafts alignment marks on the sprocket end of the camshaft are pointing inwards. If they are pointing outwards, turn the crankshaft anticlockwise 360 degrees until the two gear teeth with an alignment mark on each is visible in the hole for the crankshaft locking pin.



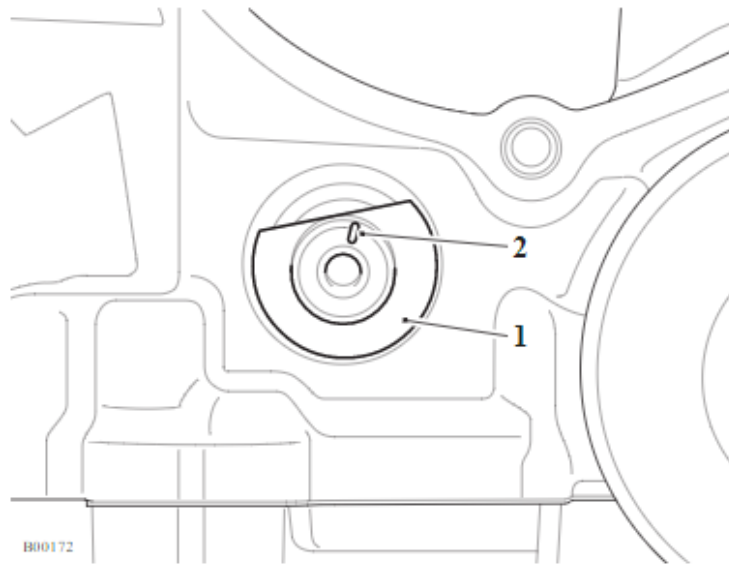
1. Camshaft alignment marks
2. Exhaust camshaft
3. Inlet camshaft



### NOTICE

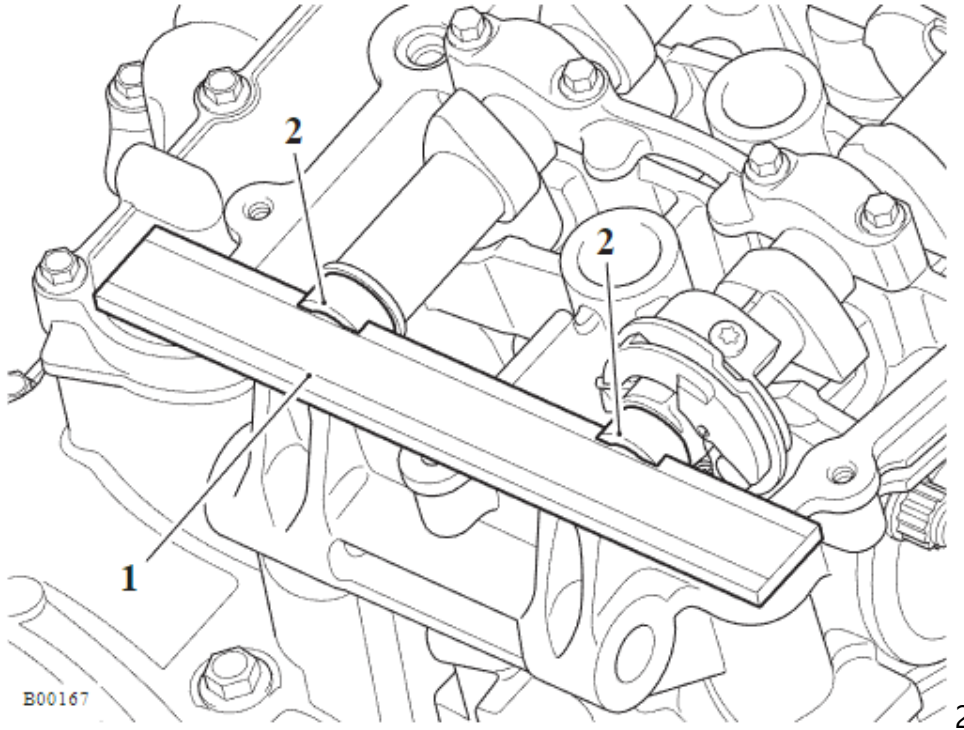
The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

5. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

6. Insert service tool T3880502 into the camshaft slots. Make sure the tool is centrally located between the camshafts.



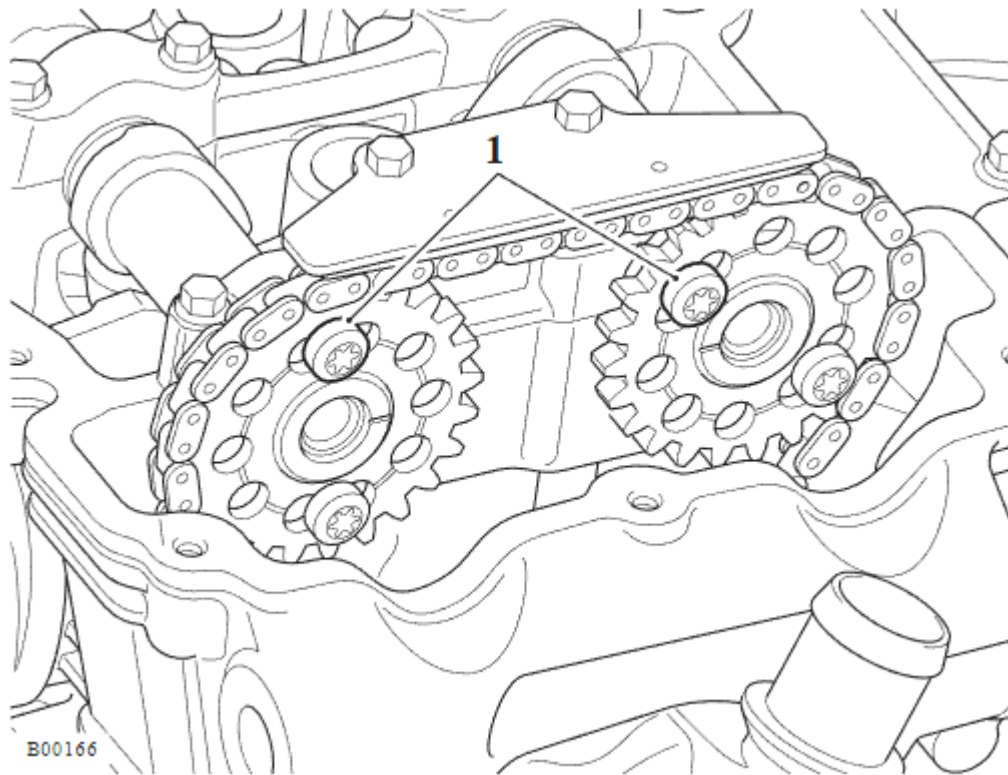
- |   |
|---|
| <ol style="list-style-type: none"><li>1. T3880502 - Camshaft timing bar</li><li>2. Camshaft slots</li></ol> |
|---|

With the camshaft alignment marks, at the sprocket end, pointing inwards and the camshaft timing bar in the slots of the camshaft, adjustment is not required.

If the camshaft timing bar will not fit into the camshaft slots, adjust the camshaft timing as described in the procedure below.

## Camshaft Timing Adjustment (if required)

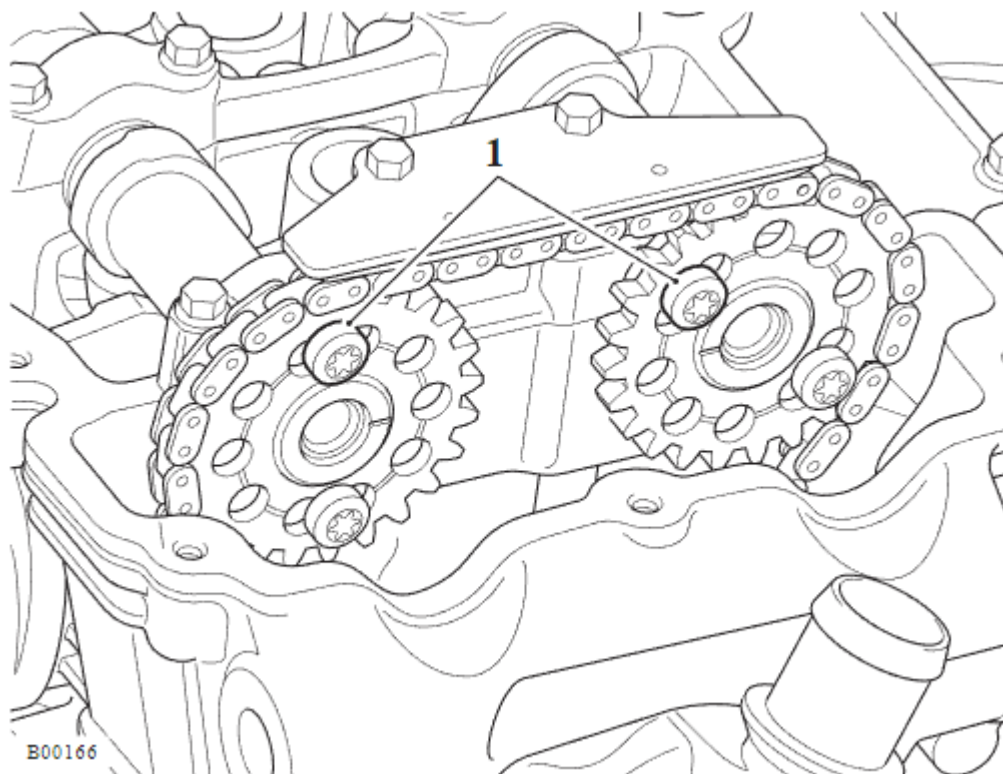
1. Loosen the two accessible camshaft sprocket fixings, do not remove at this stage.



1. Fixings

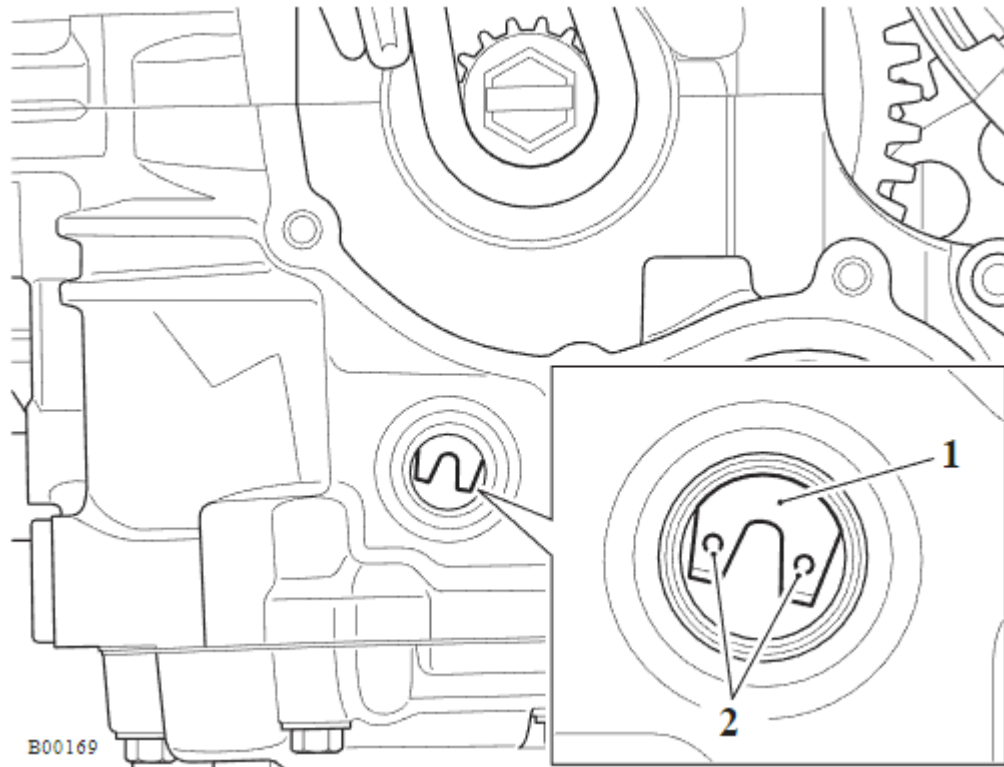
2. Remove service tool T3880501 from the crankcase.

3. At the front of the engine, rotate the crankshaft anticlockwise 360 degrees using a suitable socket on the bolt fitted to the end of the crankshaft (do not use the water pump drive slot in the bolt to turn the engine). Loosen the two accessible camshaft sprocket fixings, do not remove at this stage.



1. Fixings

4. Turn the crankshaft anticlockwise 360 degrees until the two gear teeth with an alignment mark on each is visible in the hole for the crankshaft locking pin.



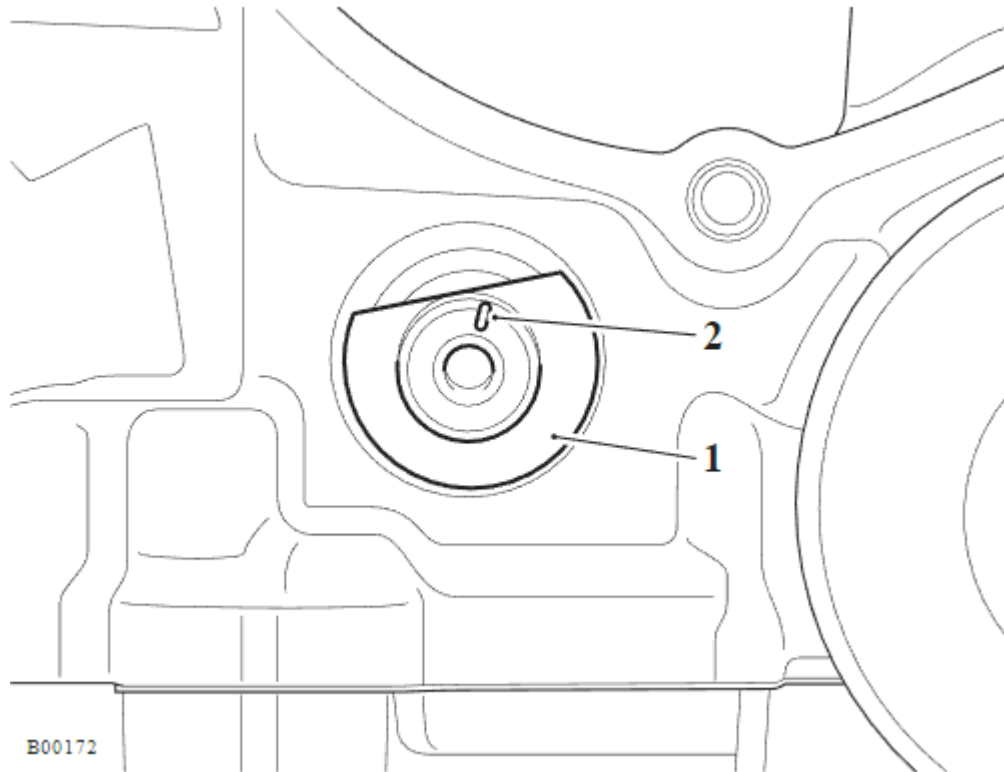
1. Crankshaft primary gear
2. Alignment marks

5. Check that the camshafts alignment marks on the sprocket end of the camshaft are pointing inwards. If they are pointing outwards, turn the crankshaft anticlockwise 360 degrees until the two gear teeth with an alignment mark on each is visible in the hole for the crankshaft locking pin.

#### **NOTICE**

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

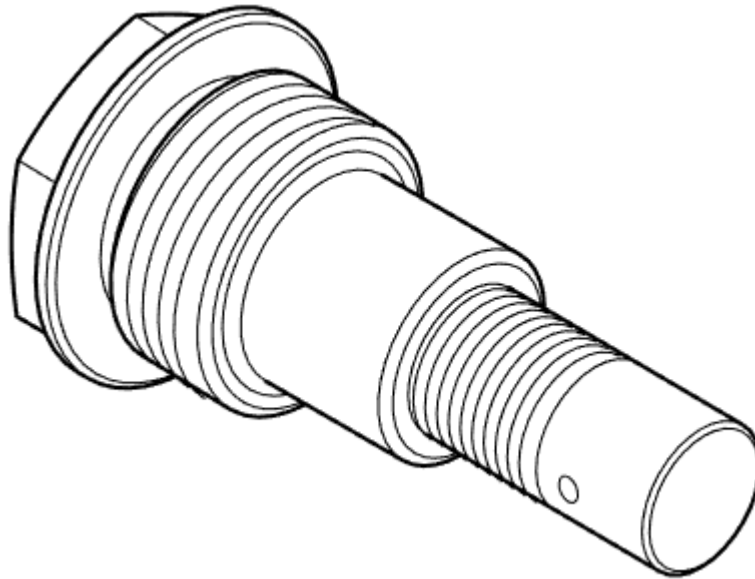
6. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. T3880501 - Crankshaft Locking Pin</li><li>2. Alignment mark</li></ol> |
|--|

7. Place suitable wedges between the camshaft sprockets and the crankcase, to hold the camshaft drive chain taut during removal of camshaft drive tensioner and the fitting of service tool T3880651.
8. Remove the camshaft drive tensioner (see [Camshaft Drive Chain Tensioner - Removal](#)).
9. Check that the camshaft drive chain is engaged around the camshaft drive sprocket on the crankshaft, the camshaft sprockets and is positioned against the tensioner blade.

10. Fit the service tool T3880651 and tighten to 16 Nm.

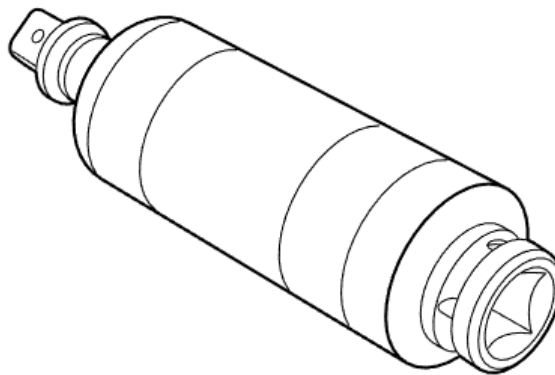


T3880651 - Timing Chain Tensioner

**⚠ CAUTION**

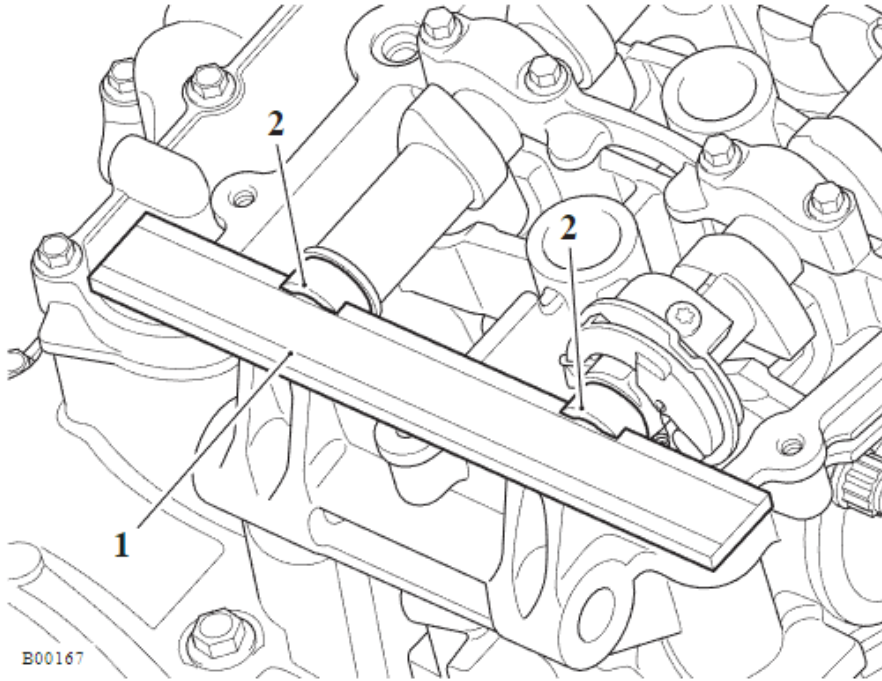
The torque value stated is very important to accurate timing. Always use the correct value of 0.6 Nm, as set using T3880609 - Timing Torque Limiter. Using an incorrect torque value will result in incorrect valve timing being set, or damage to the tensioner blade or other valve train components. Either condition may result in serious damage to the engine, reduced engine performance, or reduced fuel economy.

11. Using service tool T3880609 tighten service tool T3880651 to 0.6 Nm.



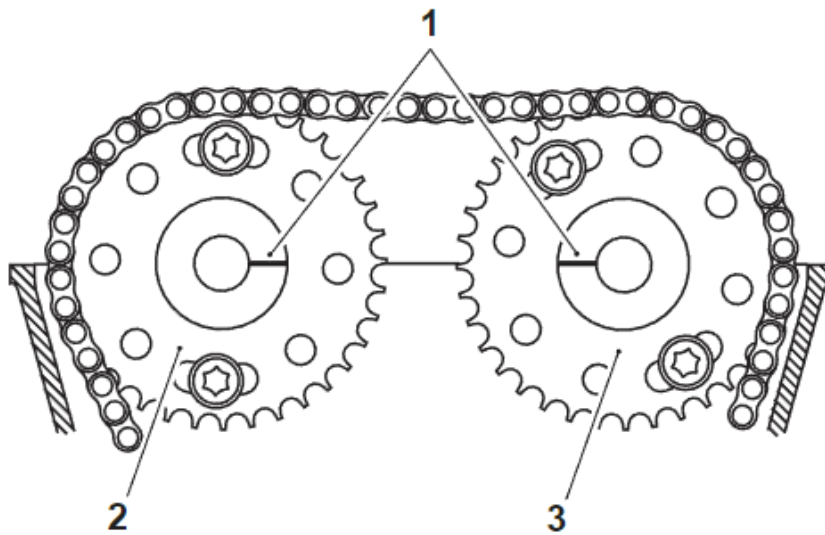
T3880609 - Timing Torque Limiter

12. Turn the camshafts only to allow service tool T3880502 to fit into the camshaft slots.



- 1. T3880502 - Camshaft timing bar
- 2. Camshaft slots

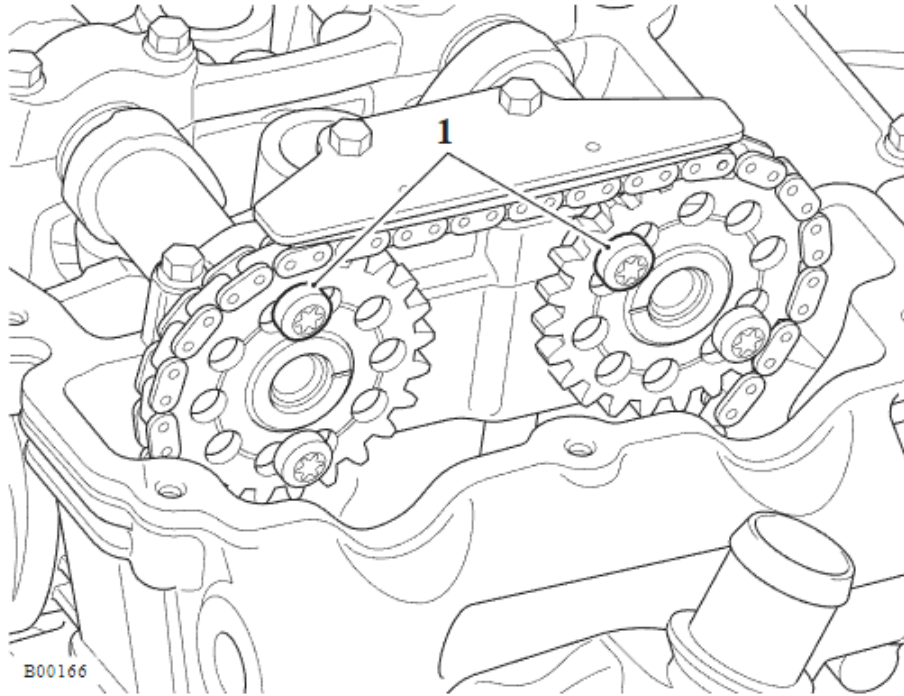
13. Check that the camshafts alignment marks on the sprocket end of the camshaft are pointing inwards.



- 1. Camshaft alignment marks
- 2. Exhaust camshaft
- 3. Inlet camshaft



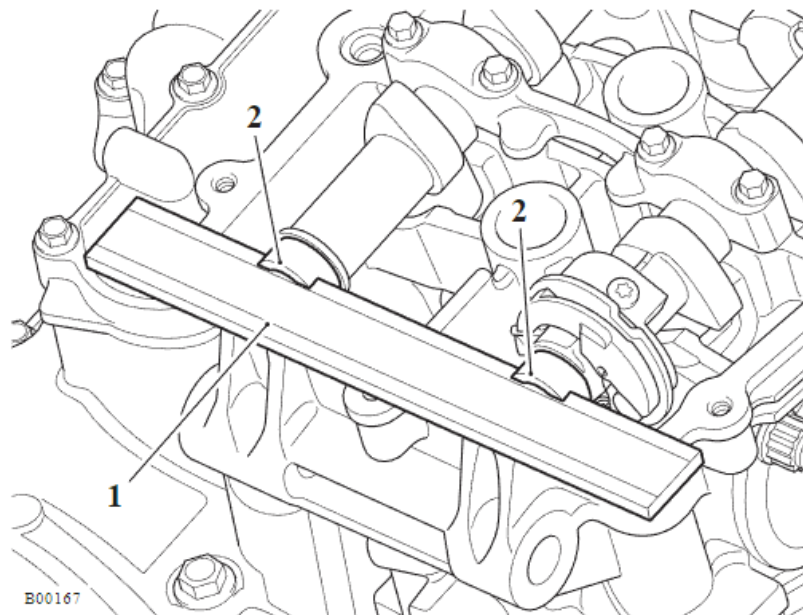
14. Tighten the two accessible (uppermost) camshaft sprocket fixings to 16 Nm.



1. Fixings

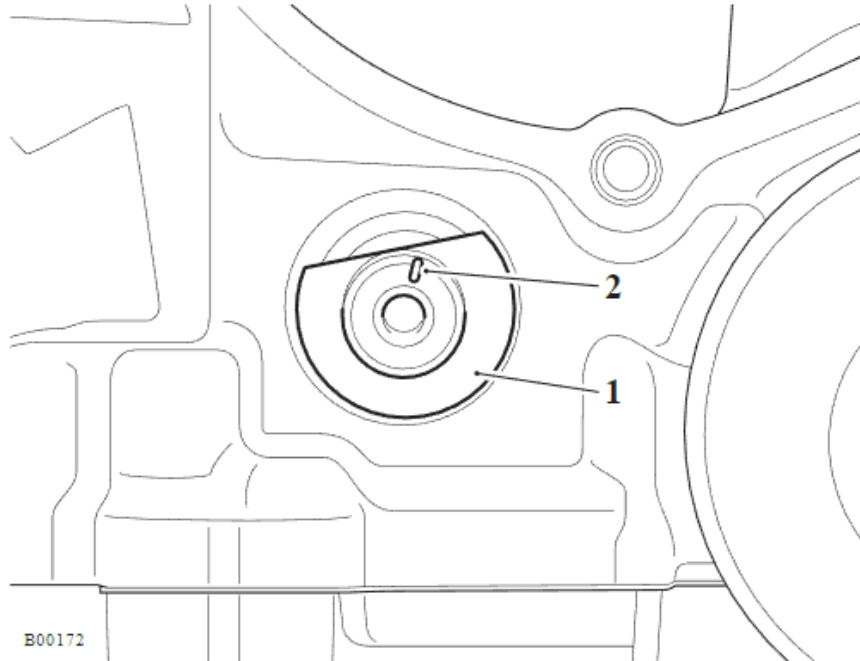
15. Remove the wedges between the camshaft sprockets and the crankcase.

16. Remove service tool T3880502 from the camshaft slots.



1. T3880502 Camshaft timing bar  
2. Camshaft slots

17. Remove service tool T3880501 from the crankcase.



1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

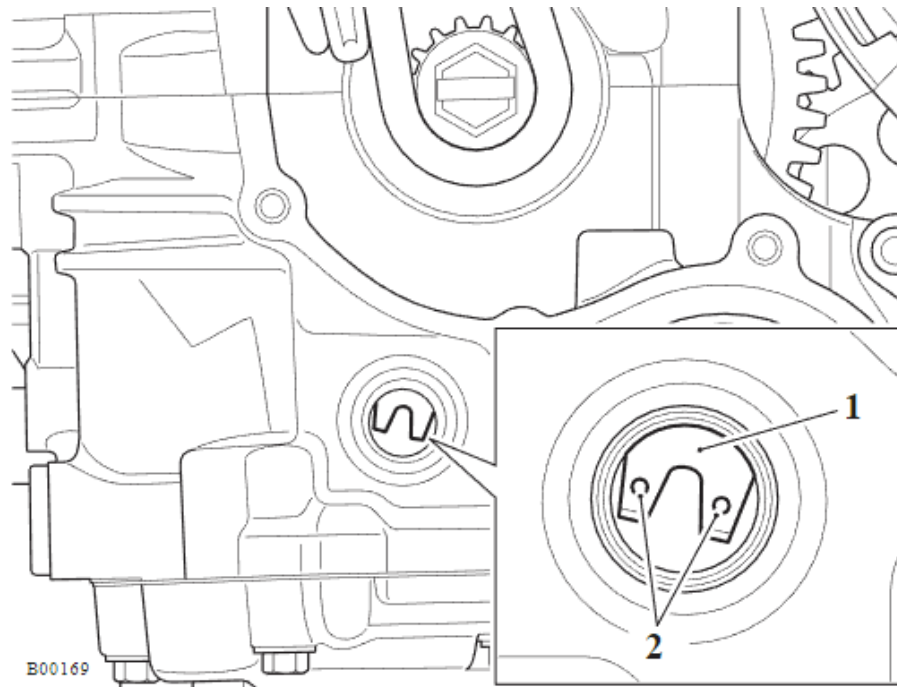
**⚠ CAUTION**

Always check that service tool T3880502 has been removed before rotating the engine. Severe damage will result to the camshafts or service tool T3880502 if engine rotation is attempted with the tool installed.

18. Rotate the engine until the remaining two sprocket bolts are accessible.

19. Tighten the two remaining camshaft sprocket fixings to 16 Nm.

20. Make sure the two gear teeth with an alignment mark on each is visible in the hole for the crankshaft locking pin and install the service tool T3880501.

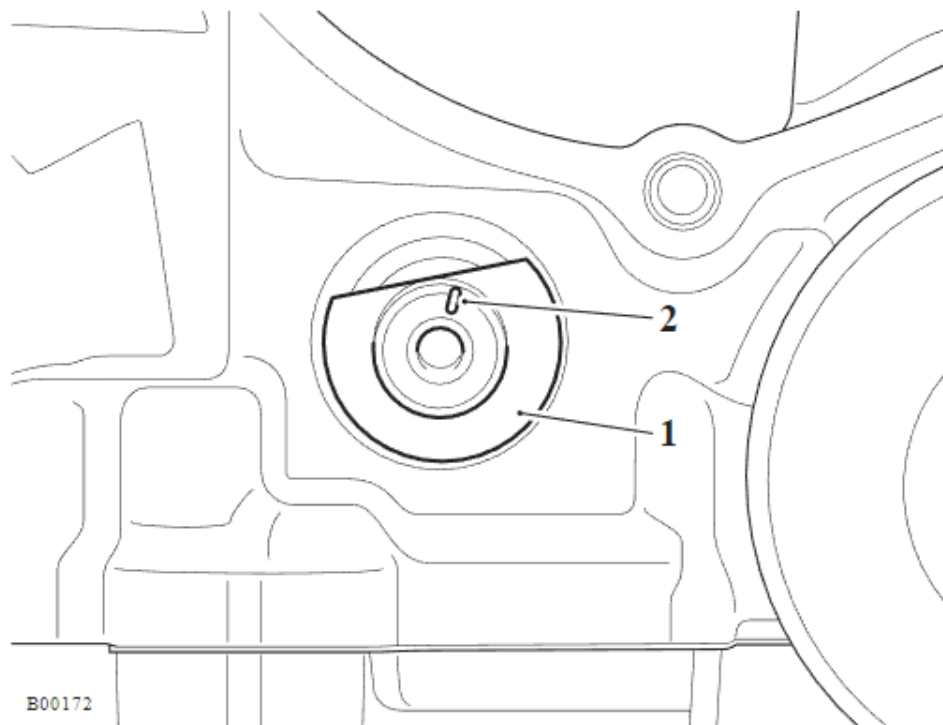


1. Crankshaft primary gear
2. Alignment marks

#### **NOTICE**

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

21. Insert service tool T3880501 through the hole in the crankcase .Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



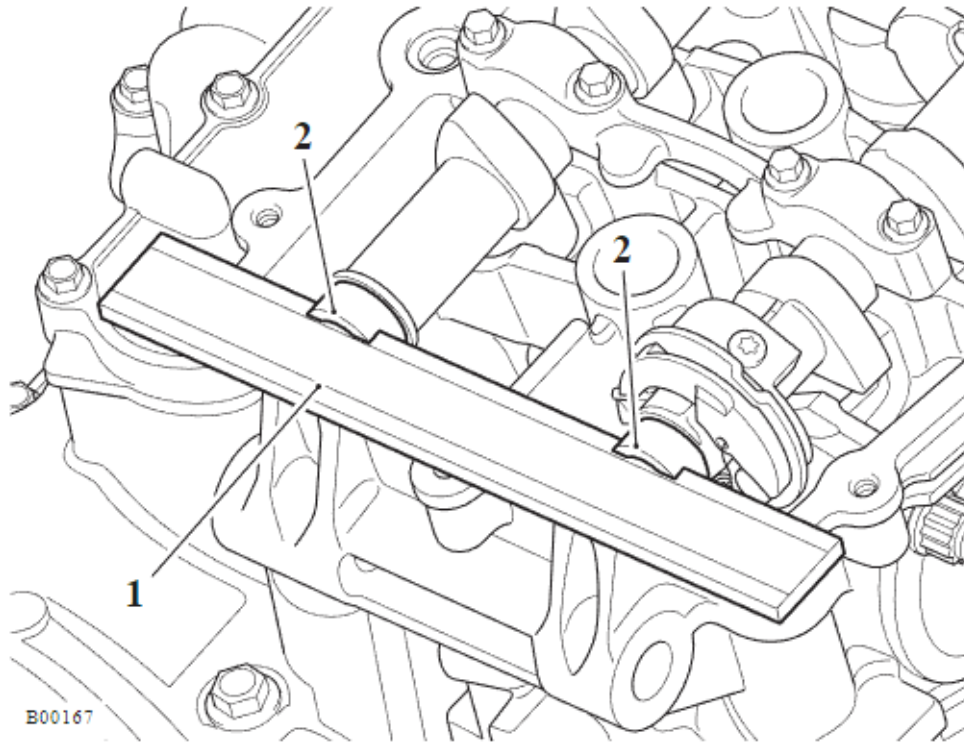
1. T3880501 Crankshaft Locking Pin
2. Alignment mark

#### **NOTICE**

With the camshaft alignment marks pointing inwards and the camshaft timing bar in the slots of the camshaft, adjustment is not required. Continue from step 23.

If the camshaft timing bar will not fit into the camshaft slots, repeat the camshaft timing adjustment procedure.

22. Insert service tool T3880502 into the camshaft slots. Make sure that the tool is centrally located between the camshafts.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. T3880502 Camshaft timing bar</li><li>2. Camshaft slots</li></ol> |
|---|

**NOTICE**

Make sure the camshaft drive chain remains on the crankshaft sprocket when removing service tool T3880651 and fitting the camshaft drive chain tensioner.

23. Maintain tension on the camshaft drive chain, release the tension on service tool T3880651 and remove it.
24. Refit the timing chain tensioner, incorporating a new O-ring (see [Camshaft Drive Chain Tensioner - Installation](#)).
25. Remove service tool T3880501.
26. Fit the crankshaft locking pin plug and tighten to 33 Nm.

Perform the following operations:

- [Camshaft Cover – Installation](#)
- [Clutch Cover – Installation](#)
- [Fuel Tank – Installation](#)
- [Battery – Installation](#)
- [Seat – Installation](#)

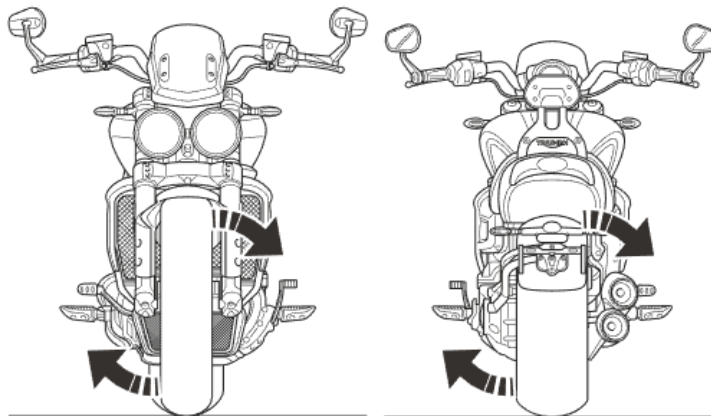
### Wheel Bearings – Inspection

#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Position the motorcycle on level ground, raise and support the front or rear of the motorcycle until the wheel is off the ground.
1. Hold the wheel at the top and bottom and rock the wheel checking for movement when a force is applied.
  2. Check the wheel bearings spin smoothly with no signs of play.
  3. If the bearings do not spin smoothly or there is excessive play in the wheel bearings, replace all bearings in that wheel.

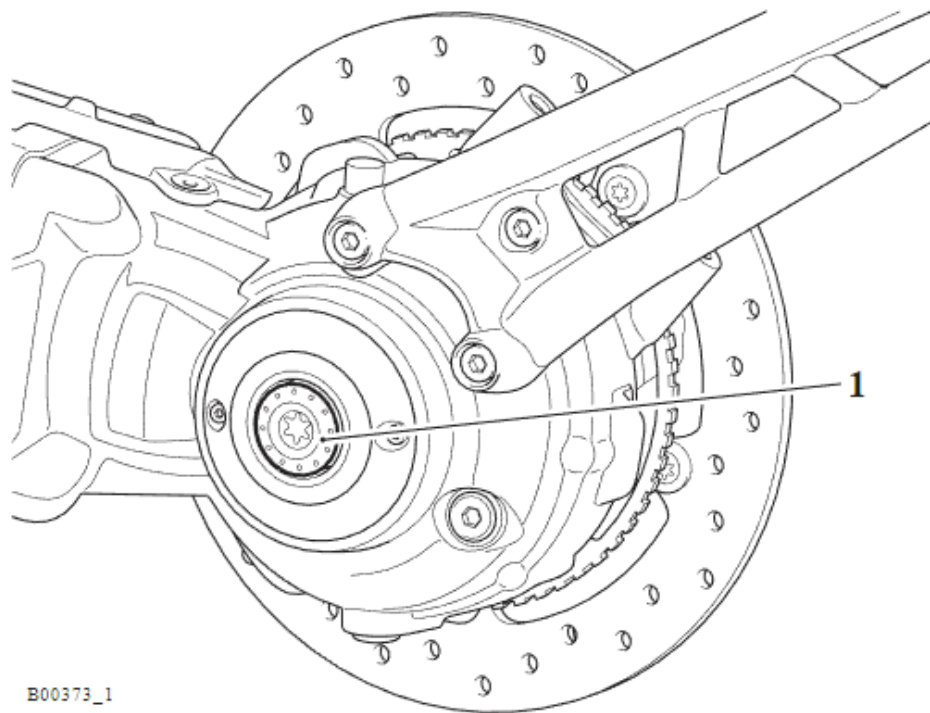


Bearing check

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

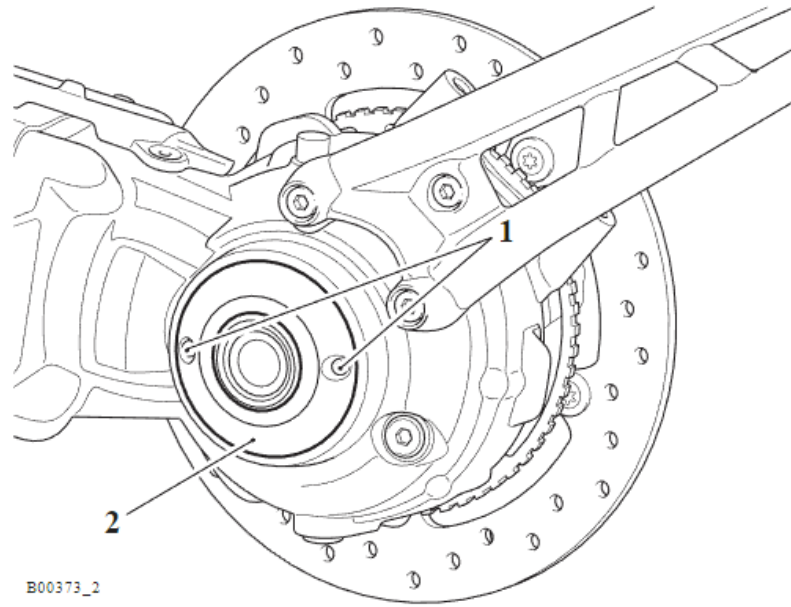
1. Loosen the rear wheel spindle bolt.
2. Raise and support the rear of the motorcycle until the rear wheel is off the ground.
3. Remove the rear wheel spindle bolt.



B00373\_1

1. Bolt

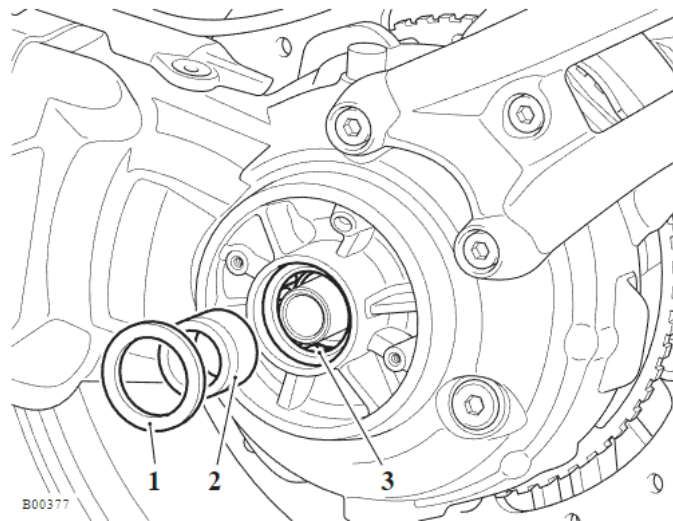
4. Release the fixings and remove the rear bevel box badge. Discard the fixings.



- 1. Fixings
- 2. Badge

5. Remove the bearing sleeve and oil seal.

6. Coat the needle rollers with Castrol grease. Make sure the needle rollers turn so that the grease is distributed over the entire circumference of the internal parts.



- 1. Oil seal
- 2. Bearing sleeve
- 3. Needle roller bearing



7. Fit the bearing sleeve.
8. Check the condition of the oil seal, replace if necessary, and fit to the rear bevel box.
9. Fit the rear bevel box finisher and tighten its new fixings to 4 Nm.
10. Fit the rear wheel spindle bolt.
11. Lower the motorcycle to the ground.
12. Tighten the rear wheel spindle bolt to 70 Nm.

#### Tyres - Check For Wear/Damage

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

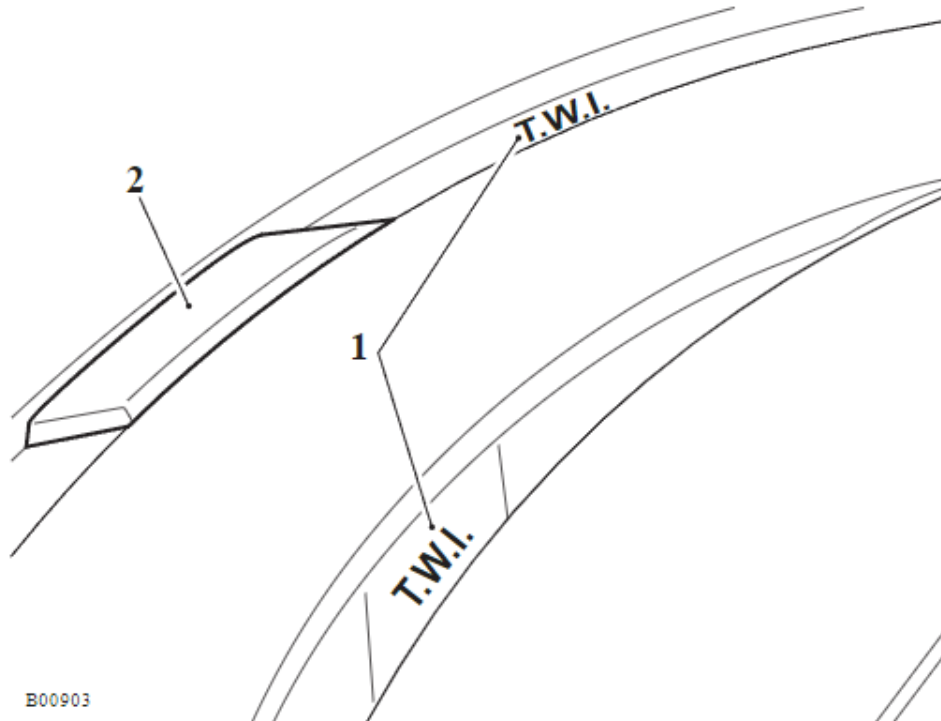
Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control and an accident.  
When tubeless tyres, used without a tube, become punctured, leakage is often very slow. Always inspect tyres very closely for punctures. Check the tyres for cuts, embedded nails or other sharp objects. Operation with punctured or damaged tyres will adversely affect motorcycle stability and handling which may lead to loss of control or an accident.  
Check the rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.  
Always consult your authorised Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

As the tyre tread wears down, the tyre becomes more susceptible to puncture and failure. It is estimated that 90% of all tyre failures occur during the last 10% of tread life (90% worn). It is false economy and unsafe to use tyres until they are worn to their minimum.

### NOTICE

Triumph recommends the use of a tyre depth gauge to measure the depth of the tread.

For this model the part of the rear tyre tread pattern looks like a tyre wear indicator. The actual tyre wear indicator has the letters T.W.I. on it, see illustration below.



1. Tyre wear indicator (TWI)
2. Tread pattern

Attention must also be paid to the legal limits for tread wear, which differ from country to country. Tyres that have worn to the legal limit in the country or region in which the motorcycle is operated must be replaced, even if tread wear has not yet reached the level of the tread wear indicators.

Measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum allowable tread depth.

Inspect tyres for cracks, splits and kerb damage. Always replace tyres that are suspected of having become damaged.

Damaged tyres must be replaced.

### Tyre Pressures - Check/Adjust

#### **WARNING**

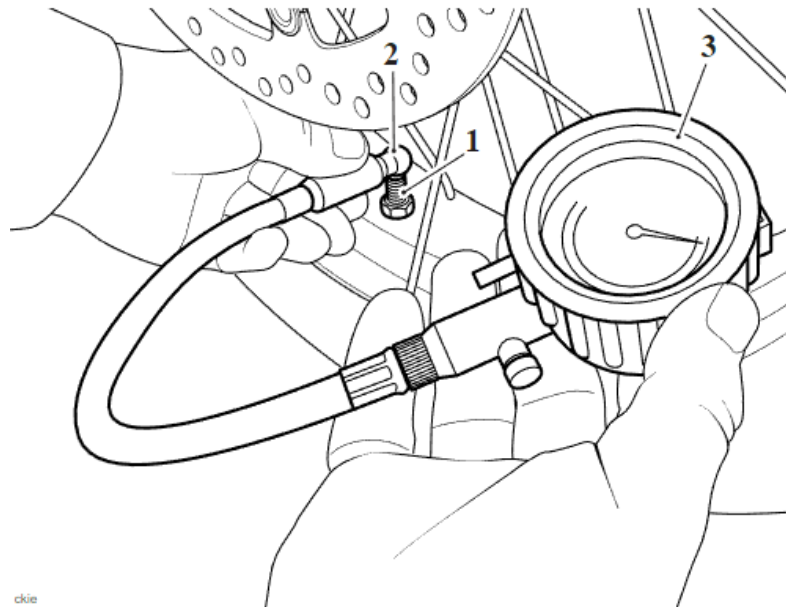
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

#### **NOTICE**

Always check the tyre pressures when they are cold.  
Checking tyre pressures when they are cold will achieve a more accurate reading on the tyre pressure gauge.

1. Remove the caps from the tyre valves.
2. Position the tyre pressure gauge onto the end of the valve body making sure the tyre valve is in contact with the tyre inflator.
3. Momentarily deflate the tyre to equalise the pressure in the tyre and the gauge.
4. Check that the correct pressure is displayed on the gauge.
5. If the air pressure is below the recommended setting, inflate the tyre until the correct pressure is achieved.

- If it is greater than the recommended setting, slowly deflate the tyre checking the gauge regularly until the correct reading is achieved.



- Tyre Valve
- Tyre gauge (valve connector)
- Tyre gauge

- Repeat the process for the remaining tyre.
- Refit the caps to the tyre valves.

## Steering Check

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported. A correctly supported motorcycle will help prevent it from falling. An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

- Move the handlebars to left and right full lock while checking that the brake hose, clutch cable and electrical harnesses do not bind or that the steering feels tight or difficult to turn. Rectify as necessary.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

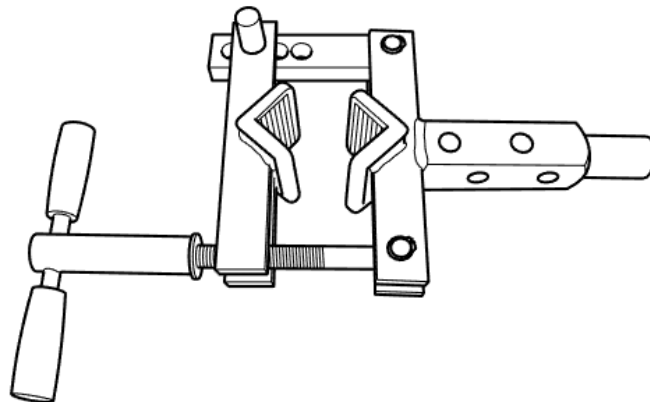
Do not change the fork adjustment settings. If they are changed, this will change the handling of the motorcycle from those which the rider is used to. Riding with unfamiliar fork settings may cause unexpected handling characteristics leading to loss of control and an accident.

1. Remove the fork (see [Front Forks - Removal](#)).

**⚠ CAUTION**

Never tightly clamp the outer tube as this will cause the tube to permanently distort. A distorted tube is not serviceable and must be replaced.

2. With the top cap facing upwards, using service tool T3880171 clamp the fork outer tube, then unscrew the top cap from the outer tube.



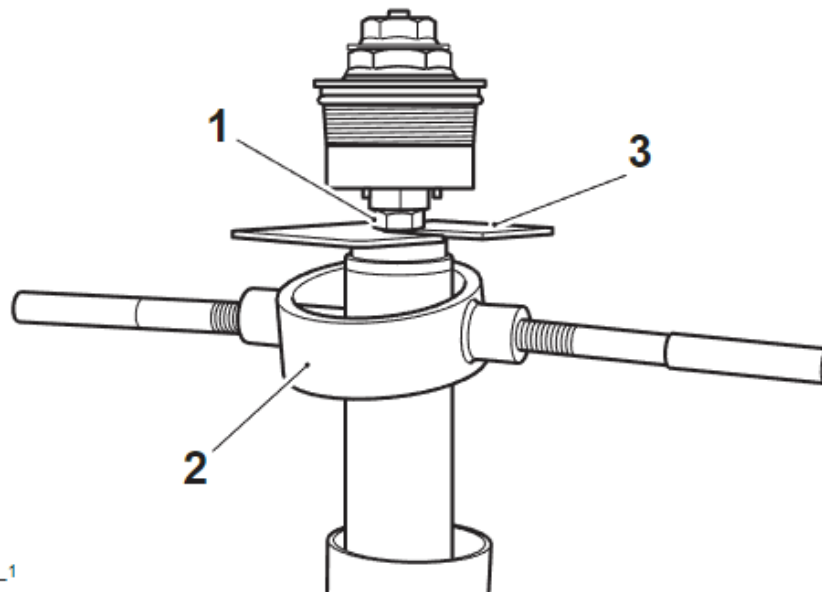
T3880171 - Fork Holding Tool

3. Holding the inner and outer tubes together, invert the fork and pour out the fork oil into a suitable container.
4. Return the fork to service tool T3880171.
5. Allow the outer tube to slide down the inner to allow access to the spring spacer.

## **⚠ WARNING**

While compressing the fork spring and while the spring holder is in place always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor or holder should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

6. Fit service tool T3880067 over the top cap. Position the two adjustable arms to the holes in the spring spacer. Screw in the arms until they positively engage in the spring spacer holes.
7. Using service tool T3880067, manually compress the fork spring and insert the spring holder as shown, below the damper locknut.



1. Damper locknut
2. T3880067 - Fork Spring Compressor
3. Spring holder (part of T3880067 - Fork Spring Compressor)

### **NOTICE**

During the step that follows, measure the length of the threads above the locknut for the installation procedure.

8. Loosen the damper locknut a small amount, then unscrew and remove the top cap and the rebound adjuster rod, taking care not to bend the rod. The top cap assembly cannot be dismantled.
9. Measure the length of threads from the lock nut to the damper rod end.
10. Compress the fork spring again and remove the spring holder and service tool T3880067.
11. Pump the damper rod to remove all the oil.

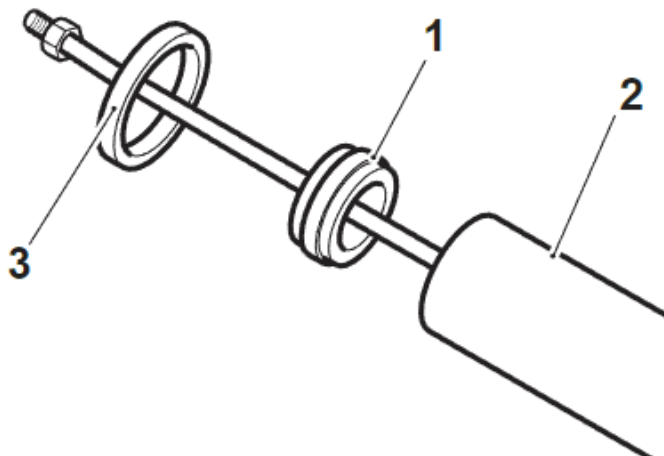
### **WARNING**

While compressing the fork spring and while the spring holder is in place always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor or holder should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

### **NOTICE**

Note the orientation of the spring spacer for installation.

12. Remove the bump rubber (if not attached), nylon spacer, spring spacer and spring.



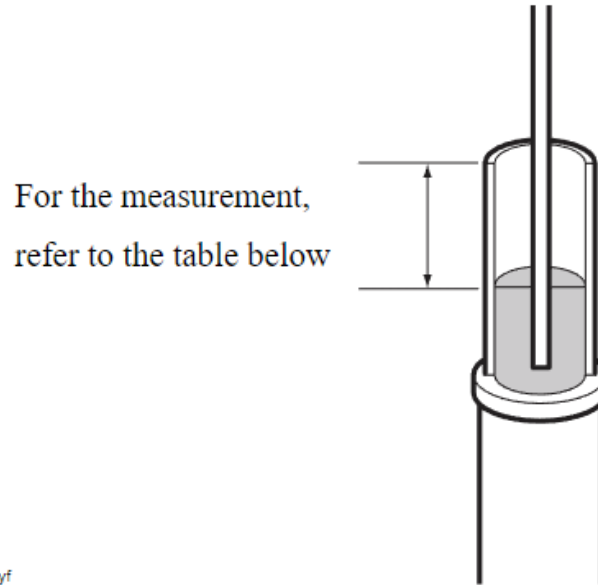
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Nylon spacer</li><li>2. Spring spacer</li><li>3. Bump rubber</li></ol> |
|---|

13. Invert the fork and pour out the remaining fork oil into a suitable container.



## Fork Oil Renew – Refilling

The oil level is measured from the upper surface of the fork outer tube, with the fork fully compressed and the spring and spring spacer removed.



Fork Oil Level (spring, spring seat and spacer removed, and the fork fully compressed)

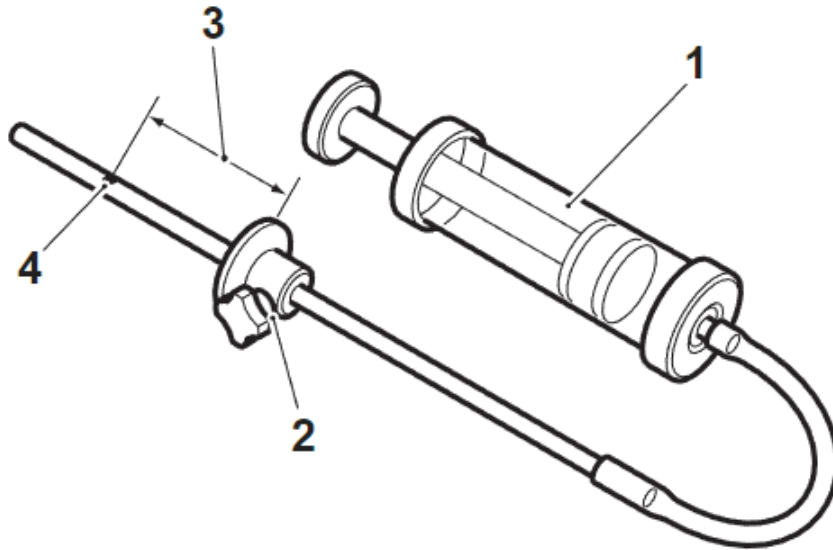
### Fork Oil Level Chart

| Oil Level | Oil Volume | Oil Grade   | Fork Pull Through   |
|-----------|------------|-------------|---|
| 94 mm     | 669 ml     | Showa SS47G | upper surface of the fork top cap flange is 55.7 mm above the lower surface of the upper yoke |

### Fork Oil Level

1. Fill the fork with the grade of oil specified in the fork oil level chart, to a level above that which will finally be required.
2. Pump the fork assembly and damper several times to expel any trapped air then fully compress the fork and support it in an upright position. Leave the fork for a few minutes to allow the oil to stabilise.

3. Set the scale on service tool T3880160 to the level specified (see the fork oil table or illustration below for the correct level setting).



- |   |
|---|
| <ol style="list-style-type: none"><li>1. T3880160 - Fork Oil Filler/Evacuator</li><li>2. Adjustment plate</li><li>3. Scale area</li><li>4. Hole (zero position)</li></ol> |
|---|

#### **NOTICE**

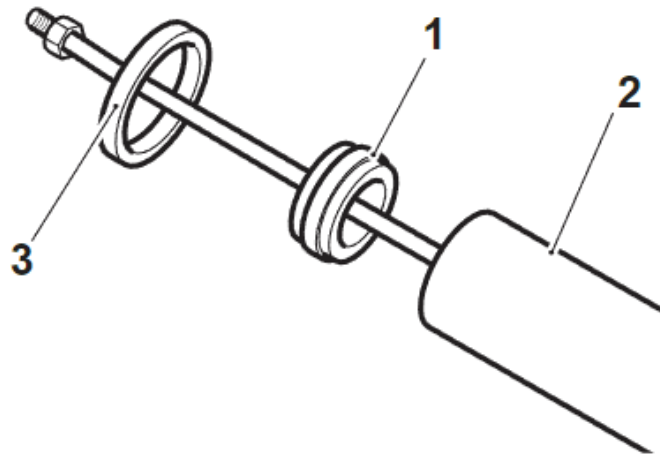
Zero level on the tool is set at the small exit hole in the side of the scale tube, NOT AT THE END TIP. Do not attempt to block this side hole as this will cause the final fluid level to be incorrect.

4. Insert the scale end of the tool into the fork inner tube.
5. Hold the tool adjuster plate level with the upper surface of the fork inner tube and draw fluid into the syringe until fluid flow ceases (empty the syringe if the body becomes full before fluid flow stops).
6. The fluid level in the fork is now set to the height set on the tool scale. Check the tool scale setting and repeat the process if incorrectly set.

## **⚠ WARNING**

Incorrect fork oil levels could result in an unsafe riding condition leading to loss of motorcycle control and an accident.

7. Position the fork assembly as for compression of the fork spring during disassembly.
8. Fit the fork spring in the orientation noted for disassembly.
9. Fit the spring spacer, nylon spacer and the bump rubber.

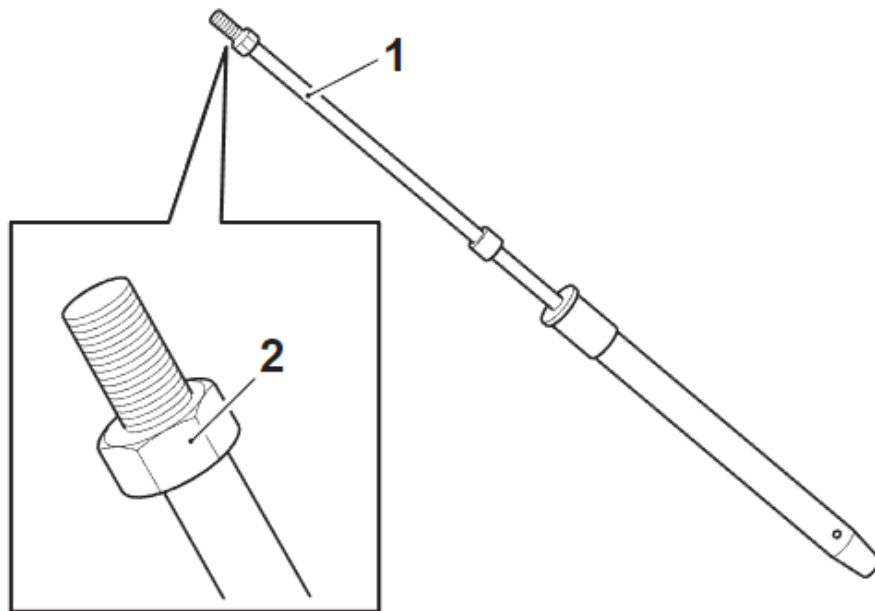


1. Nylon spacer
2. Spring spacer
3. Bump rubber

## **⚠ CAUTION**

If removed, the damping rod lock nut must be fitted with the flat face facing to the top of the fork. The slightly tapered face must face the fork spring. Incorrect orientation may lead to a loosening of the lock nut.

10. Turn the damper rod lock nut until the length of threads to the end of the rod is equal to the length measured during disassembly.



1. Damper rod
2. Locknut

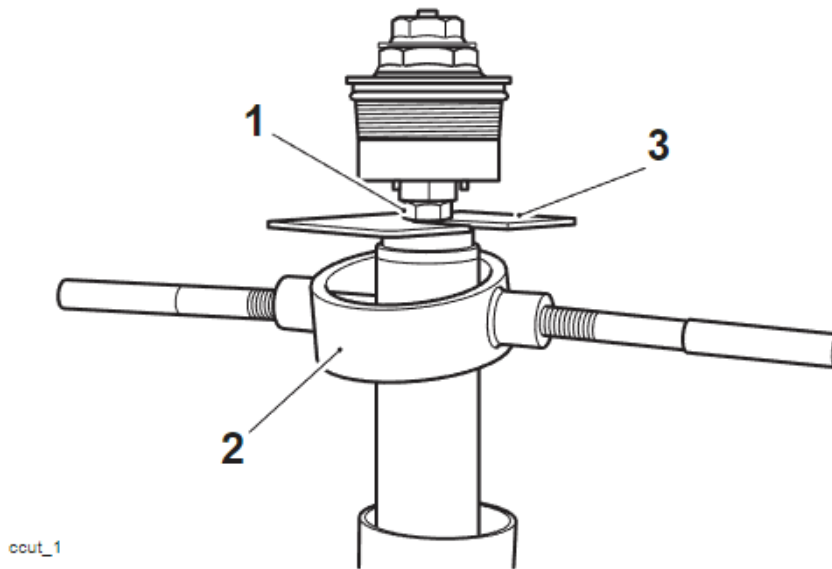
11. Attach service tool T3880085 to the threads of the damper rod and pull the damper upwards.

### **⚠ WARNING**

While compressing the fork spring and while the spring holder is in place always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor or holder should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

12. Fit service tool T3880067 as previously described. Compress the fork spring and refit the spring holder.
13. Inspect the O-ring for the top cap for any damage, replace if necessary.
14. Carefully install the top cap and rebound adjuster rod. Slowly turn the cap until it touches the locknut.

15. Hold the top cap with service tool T3880342 and tighten the damper rod locknut to 20 Nm.



- 1. Damper lock nut
- 2. T3880067 - Fork Spring Compressor
- 3. Spring holder (part of T3880067 - Fork Spring Compressor)

**⚠ WARNING**

While compressing the fork spring and while the spring holder is in place always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor or holder should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

- 16. Compress the spring to remove the spring holder.
- 17. Lubricate the O-ring on the top cap with a smear of fork oil then screw the top cap fully into the outer tube.

**NOTICE**

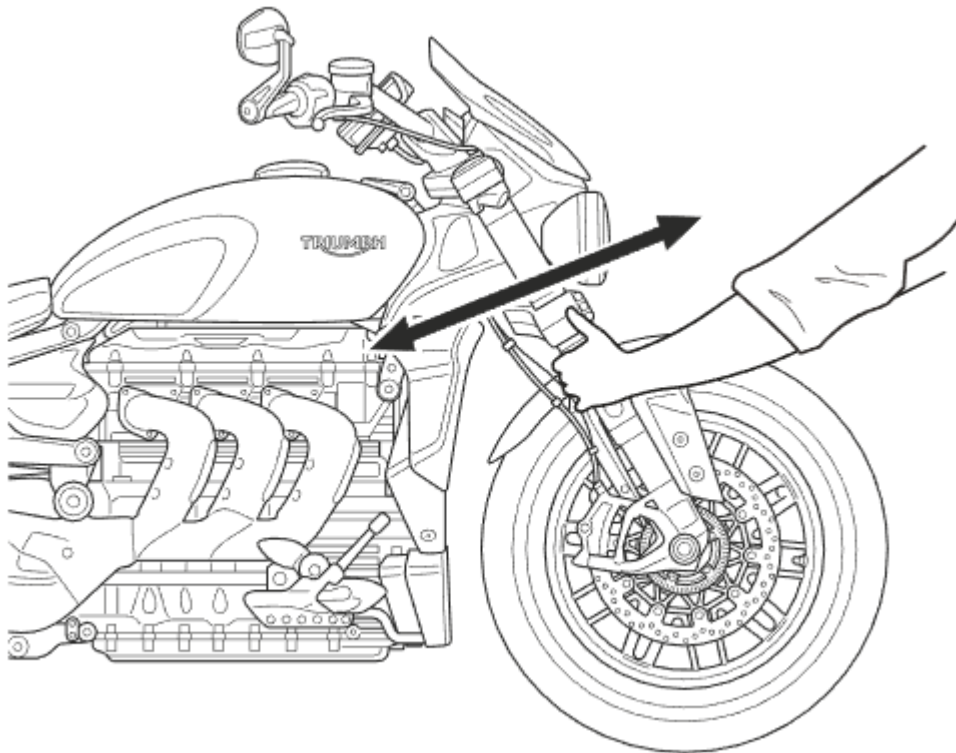
It is much easier to tighten the top cap when the fork has been refitted.

18. Fit the fork (see [Front Forks - Installation](#)).

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

12. Raise and support the motorcycle so that the front wheel is clear of the ground.
13. Move the handlebars from lock-to-lock whilst checking for signs of tight spots or notchiness (bearings overtightened).
14. Hold the lower end of the front forks and try to move them forward and backward to check for signs of free play in the bearings (bearings insufficiently tightened or worn).



15. Adjust as described in [Steering Head Bearing - Adjustment](#) then lower the motorcycle to the ground.

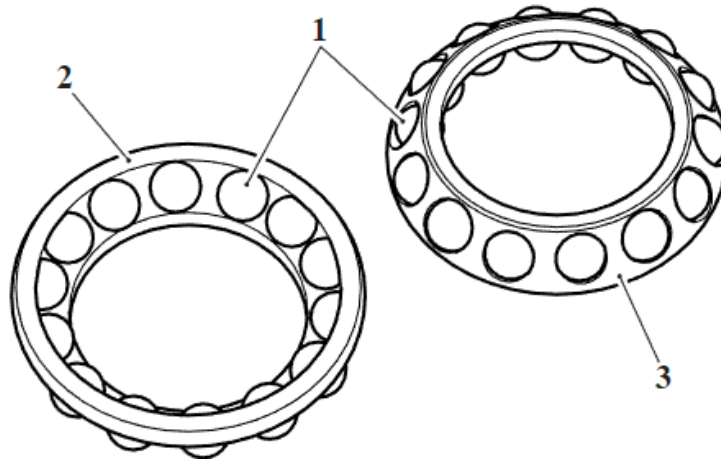
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

• **Lower Yoke and Headstock Bearings - Removal**

1. Inspect the headstock bearings for damage/wear, (see Headstock Bearing - Inspection).
2. Lubricate the headstock bearings, using finger pressure, force five grammes of Castrol LCX 222 or an equivalent heavy duty lithium based grease between the inner race and the carrier.
3. Rotate the ball bearing to make sure that the grease is distributed over the entire circumference of the internal parts.
4. Any excess grease should be smeared on the outside of the rollers.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Roller bearing</li><li>2. Inner carrier face</li><li>3. Outer carrier face</li></ol> |
|---|

Perform the following operations:

**Lower Yoke and Headstock Bearings - Installation**

## Swinging Arm Spindle – Lubricate

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Swinging Arm - Removal**

Clean all components and inspect the swinging arm bearings and seals for damage/wear. renew if necessary.

Pack the bearings with fresh grease (NLGI 2 specification grease).

## Rear Suspension Linkage – Lubricate

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Swinging Arm Linkage - Removal**

Clean all components and inspect the swinging arm bearings and seals for damage/wear. renew if necessary.

Pack the bearings with fresh grease (NLGI 2 specification grease).



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Examine each fork for any sign of damage or scratching of the slider surface or for oil leaks.

If any damage or oil leakage is found, strip and repair as described in this section or consult an authorised Triumph dealer.

Check for smooth operation of the forks as follows:

- Place the motorcycle on level ground.
- While holding the handlebars and applying the front brake, pump the forks up and down several times.

If roughness or excessive stiffness is detected, repair as described in the Front suspension section of this service manual or consult an authorised Triumph dealer.

**⚠ WARNING**

Riding the motorcycle with defective or damaged suspension can cause loss of motorcycle control and an accident. Never ride with damaged or defective suspension.

## Brake Calipers – Inspection

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.  
A dangerous riding condition leading to loss of control of the motorcycle or an accident could result if this warning is ignored.

1. Check for correct brake operation and that the caliper pistons are not seized. Rectify as necessary.
2. Inspect the brake calipers for fluid leaks. Rectify as necessary.

## Brake Pad Wear Inspection

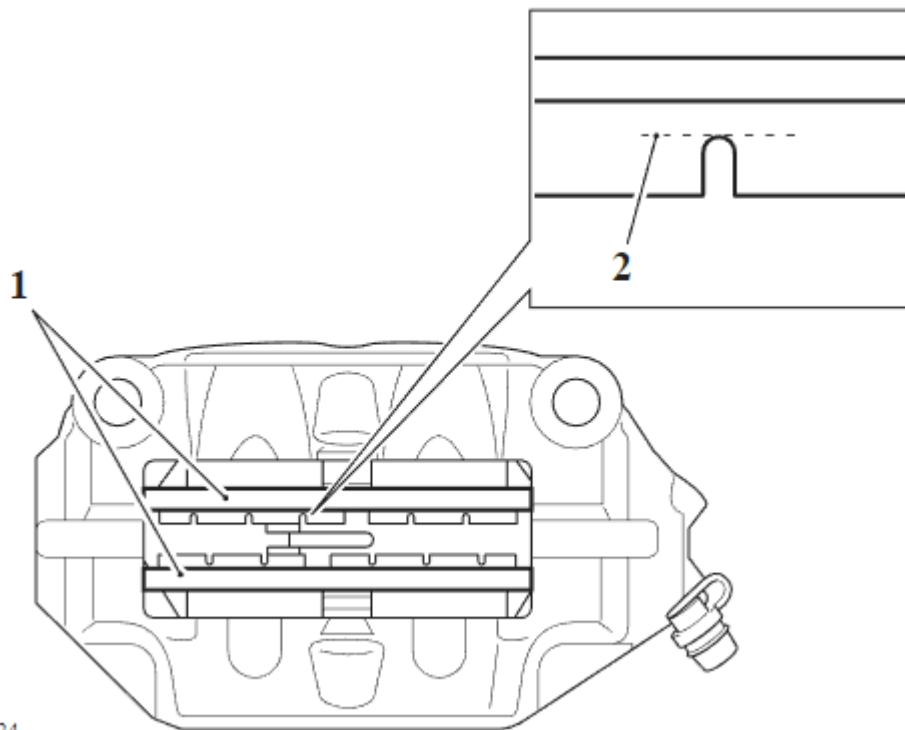
### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **⚠ WARNING**

Do not replace individual brake pads; replace both pads in the brake caliper. On the front where two calipers are mounted on the same wheel, all the pads in both calipers must be replaced simultaneously. Replacing individual pads will reduce braking efficiency and may cause loss of motorcycle control and an accident.

In accordance with the Scheduled Maintenance chart, inspect the brake pads for wear. The minimum thickness of lining material for any front or rear brake pad is 1.5 mm. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



B00124

1. Brake pads
2. Minimum thickness line

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Make sure absolute cleanliness when adding brake fluid to the brake fluid reservoir. Do not allow moisture or debris to enter the cylinder, as this will adversely affect the fluid properties. Always use fluid from a sealed container and do not use fluid from a container that has been opened for any period of time. Always check for fluid leakage around hydraulic fittings and for damage to hoses. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

**⚠ CAUTION**

Do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

**⚠ CAUTION**

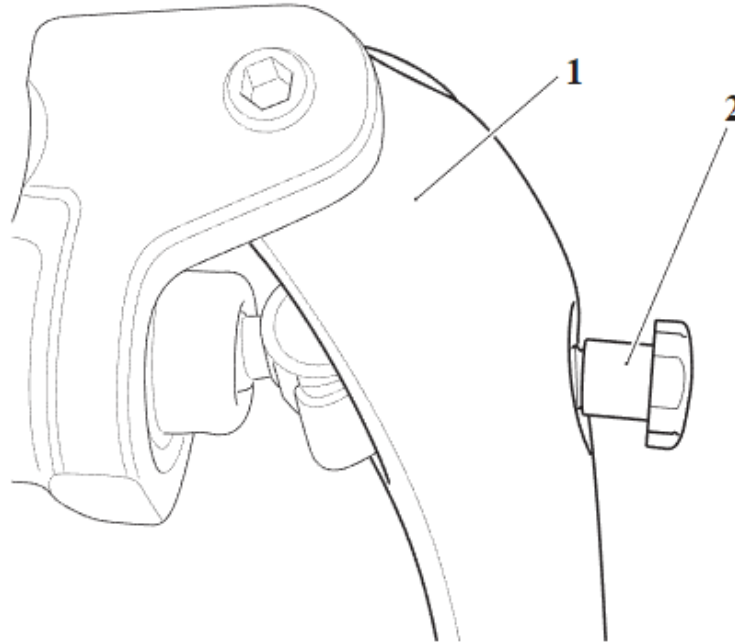
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

Front Brake Lever Setting

**NOTICE**

Note the original setting of the brake lever adjuster in order that it can be returned to the same position when the bleeding operation is complete.

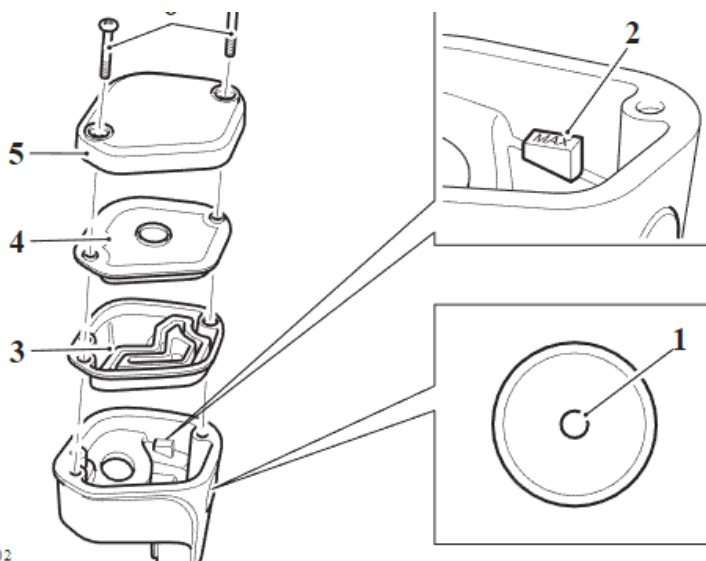
12. Turn the brake lever adjuster fully in to give maximum lever span.



- 1. Brake lever
- 2. Adjusting screw

### Front Brake Fluid

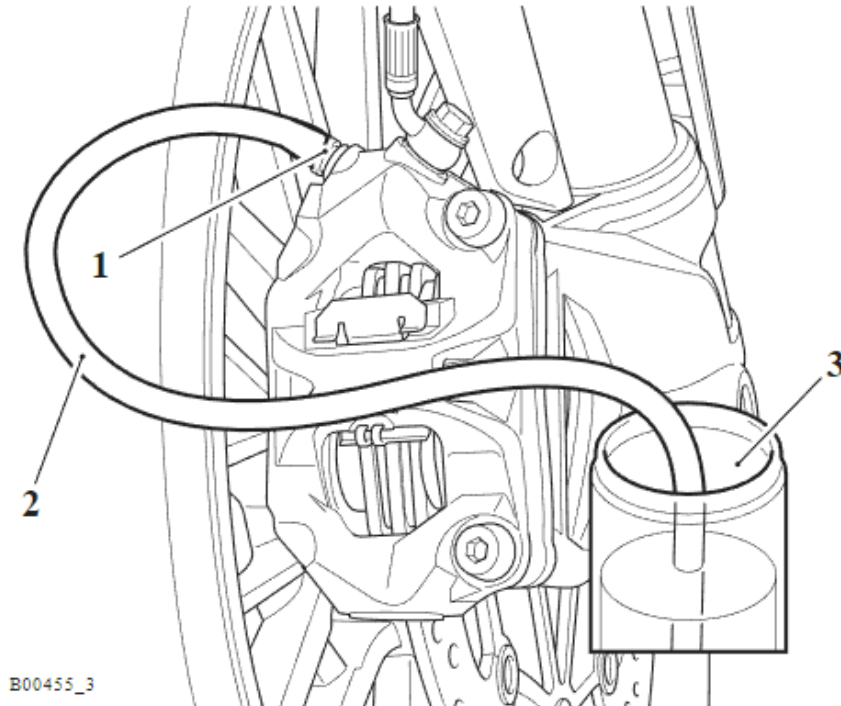
1. Turn the handlebars to bring the fluid reservoir to a level position.
2. Release the fixings and remove the reservoir cap.



- 1. MIN mark
- 2. MAX mark
- 3. Diaphragm seal
- 4. Reservoir cover
- 5. Reservoir cap
- 6. 6. Fixings

B00102

3. Check the condition of the reservoir sealing diaphragm. Replace if necessary.
4. Remove the rubber cap from the bleed screw on the caliper.
5. Attach a transparent tube to the bleed screw and place the other end of the tube in a suitable receptacle containing new brake fluid. Keep the tube end below the level of fluid.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Bleed screw</li><li>2. Bleed tube</li><li>3. Container</li></ol> |
|---|

**NOTICE**

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

6. Partially open the bleed screw.

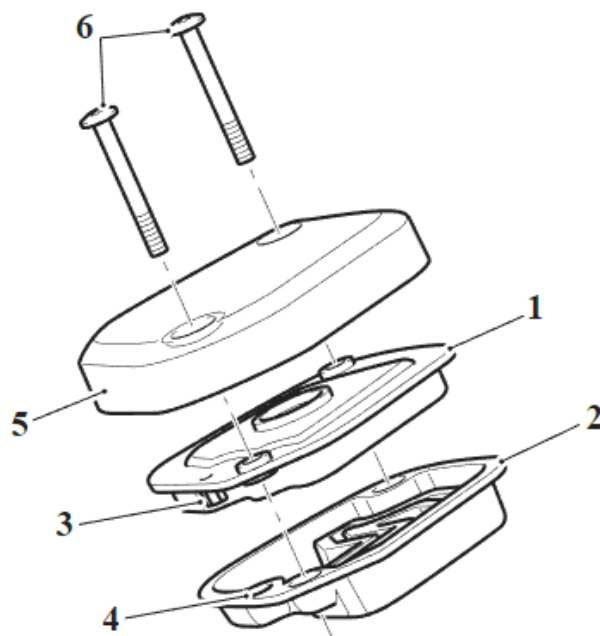
### **NOTICE**

Pressure applied to the brake lever during the brake fluid renew process must be applied and removed smoothly and slowly. It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to do this slowly can allow air to be drawn in to the system through the bleed screw threads.

7. Get an assistant to slowly pull the brake lever to the handlebar and then slowly release the brake lever.
8. Repeat step 7 until fresh brake fluid appears in the bleed tube.
9. When fresh brake fluid is in the system, apply pressure to the brake lever, close the bleed screw and tighten it to 8 Nm.
10. Remove the bleed tube.
11. Replace the bleed screw cap.
12. Fill the reservoir to the upper level with new DOT 4 fluid.
13. Repeat steps 4 to 12 for the other front brake caliper.
14. When the brake fluid has been renewed, make sure the brake lever operation has a firm resistive feel to it, does not feel spongy and that the lever cannot be pulled directly back to the handlebar. Take remedial action as necessary.
15. Fit the insert to the diaphragm seal. Make sure the locating lug on the insert fits into its hole in the diaphragm.
16. Fit the diaphragm and insert assembly to the reservoir cap. Make sure the holes for the fixings are correctly aligned.

17. Fit the fixings into the cap and diaphragm seal assembly.



1. Insert
2. Diaphragm seal
3. Locating lug
4. Hole for locating lug
5. Reservoir cap
6. Fixings

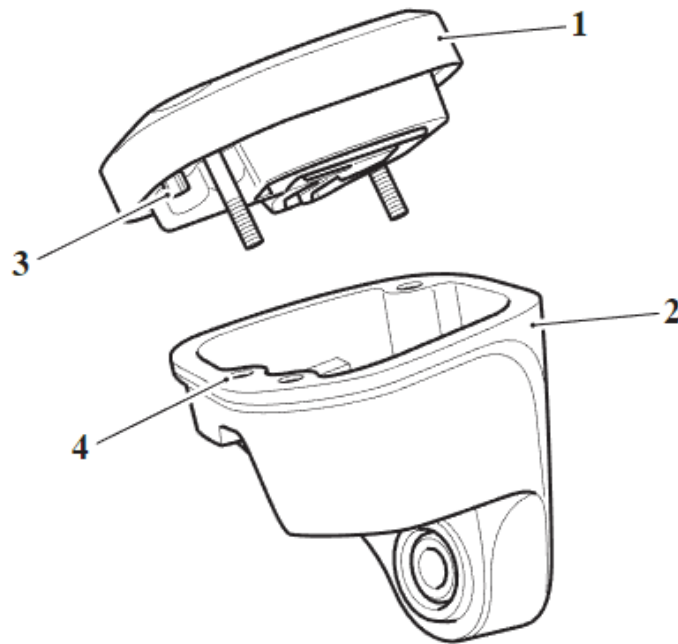
### **⚠ WARNING**

If the master cylinder reservoir cap screws are over tightened this can result in a brake fluid leak.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.



18. Hold the assembly together and position the cap and diaphragm seal assembly onto the reservoir. Make sure the locating lug on the insert fits into its hole in the reservoir. Tighten the fixings to 1.5 Nm.



1. Reservoir cap
2. Reservoir
3. Locating lug
4. Hole for locating lug

**⚠ WARNING**

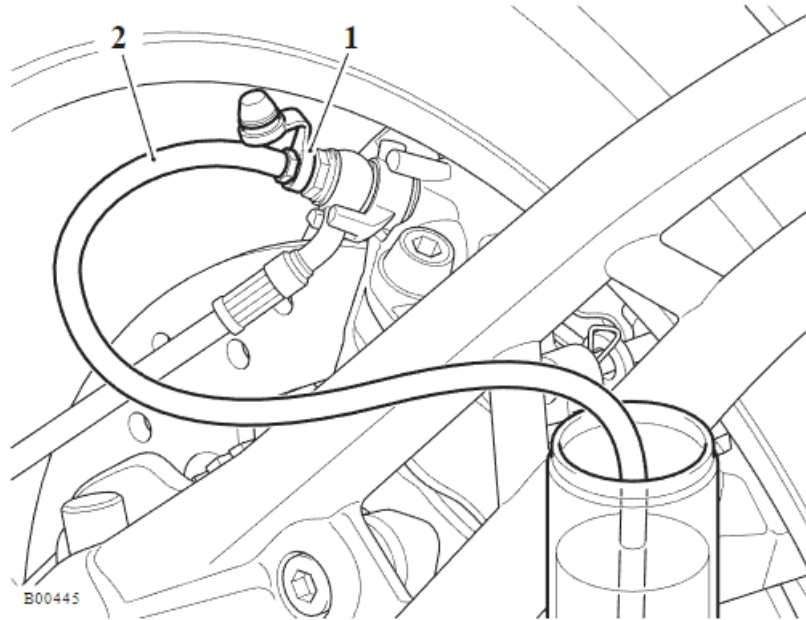
Always return the lever adjuster to the original setting as noted in paragraph 1. Operating the motorcycle with lever settings that are unfamiliar may lead to loss of control or an accident.

**⚠ WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

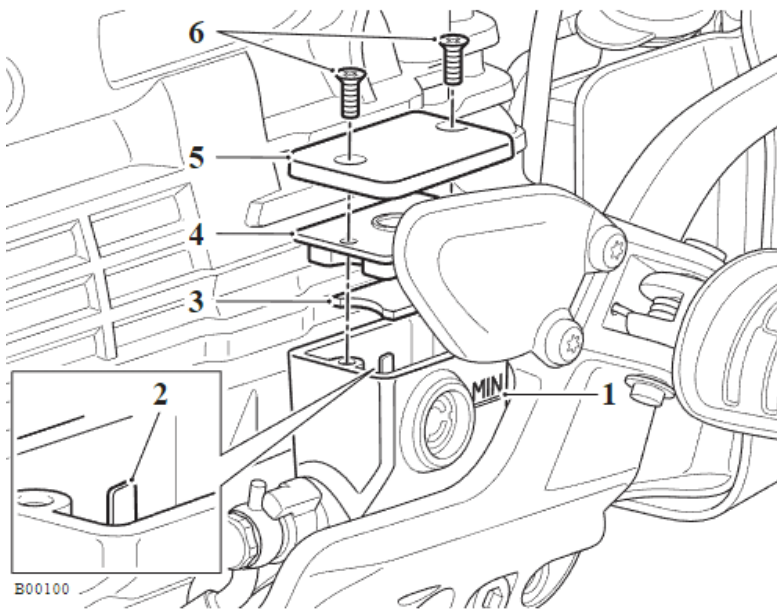
## Rear Brake Fluid

1. Remove the cap from the rear bleed screw.
2. Attach a transparent tube to the bleed screw.
3. Place the other end of the tube in a suitable receptacle containing new brake fluid.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Bleed screw</li><li>2. Bleed tube</li></ol> |
|--|

4. Release the cap screws and remove the reservoir cover noting the position of the sealing diaphragm.



1. MIN mark
2. MAX mark
3. Float
4. Seal
5. Reservoir cap
6. Fixings

5. Check the condition of the reservoir sealing diaphragm. Replace if necessary.

#### **NOTICE**

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

6. Counter hold the brake hose union bolt and open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake pedal.

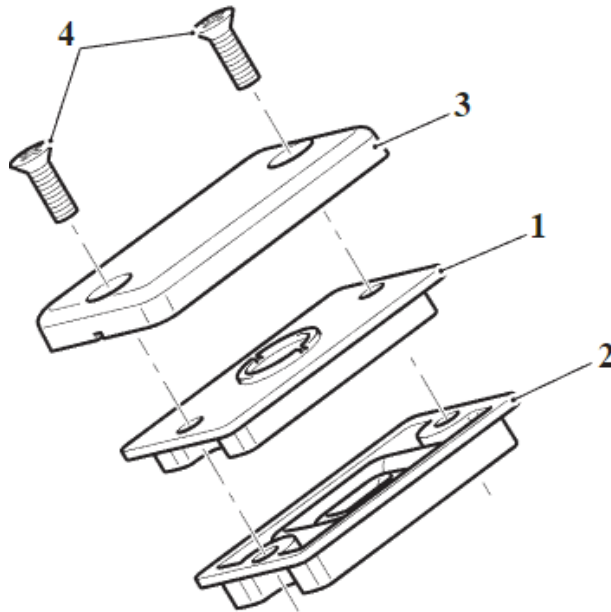
#### **NOTICE**

Pressure applied to the brake pedal during the brake fluid renew process must be applied and removed smoothly and slowly. It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to do this slowly can allow air to be drawn in to the system through the bleed screw threads.

7. Get an assistant to slowly depress the brake pedal and then slowly release the brake pedal.
8. Repeat step 7 until fresh brake fluid appears in the bleed tube.
9. When fresh brake fluid is in the system, apply pressure to the brake pedal, close the bleed screw and tighten it to 6 Nm. 10.

10. Remove the bleed tube.
11. Replace the bleed screw cap.
12. Make sure the float for the brake fluid reservoir is in the reservoir.
13. Fit the insert to the diaphragm seal.
14. Fit the diaphragm and insert assembly to the reservoir cap. Make sure the holes for the fixings are correctly aligned.
15. Fit the fixings into the cap and diaphragm seal assembly.



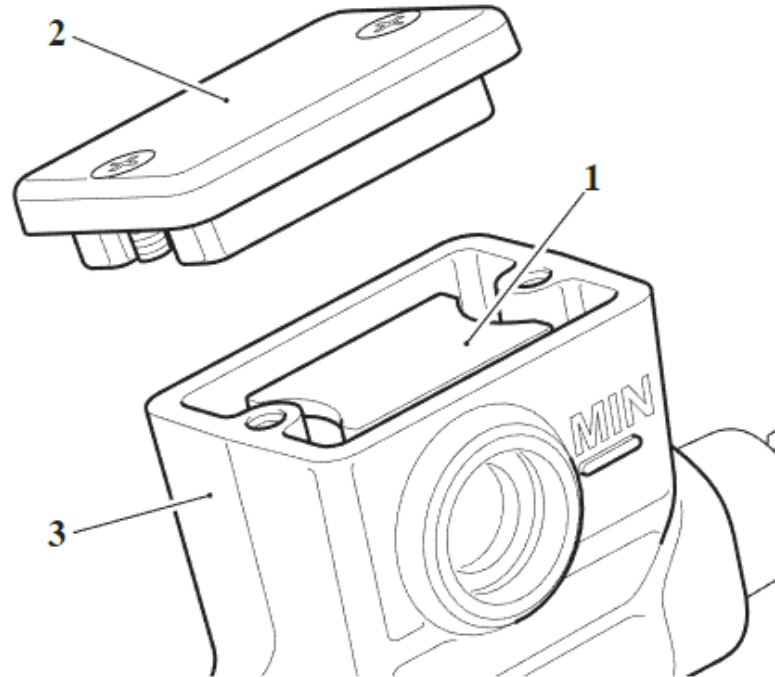
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Insert</li><li>2. Diaphragm seal</li><li>3. Reservoir cap</li><li>4. Fixings</li></ol> |
|---|

**⚠ WARNING**

If the master cylinder reservoir cap screws are over tightened this can result in a brake fluid leak.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

16. Hold the assembly together and position the cap and diaphragm seal assembly onto the reservoir. Tighten the fixings to 1.5 Nm.



- 1. Float
- 2. Reservoir cap assembly
- 3. Reservoir

17. Check the operation of the rear brake. Rectify as necessary.

**⚠ WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

## Brake Fluid Level Inspection

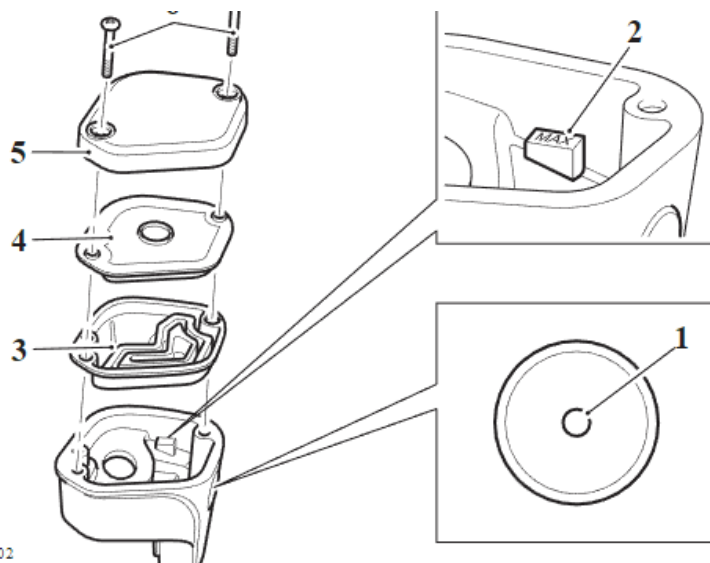
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

In accordance with the Scheduled Maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

#### Front Brake Fluid Reservoir

1. The brake fluid level must be kept between the upper and lower level lines (reservoir held horizontal).

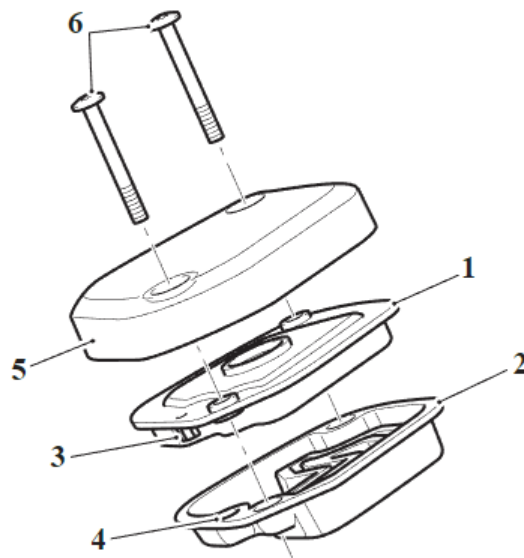


1. MIN mark
2. MAX mark
3. Diaphragm seal
4. Reservoir cover
5. Reservoir cap
6. Fixings

B00102

## Front Brake Fluid Level Adjustment

1. Remove the two fixings.
2. Remove the reservoir cap and the diaphragm seal.
3. Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
4. Fit the insert to the diaphragm seal. Make sure the locating lug on the insert fits into its hole in the diaphragm.
5. Fit the diaphragm and insert assembly to the reservoir cap. Make sure the holes for the fixings are correctly aligned.
6. Fit the fixings into the cap and diaphragm seal assembly.



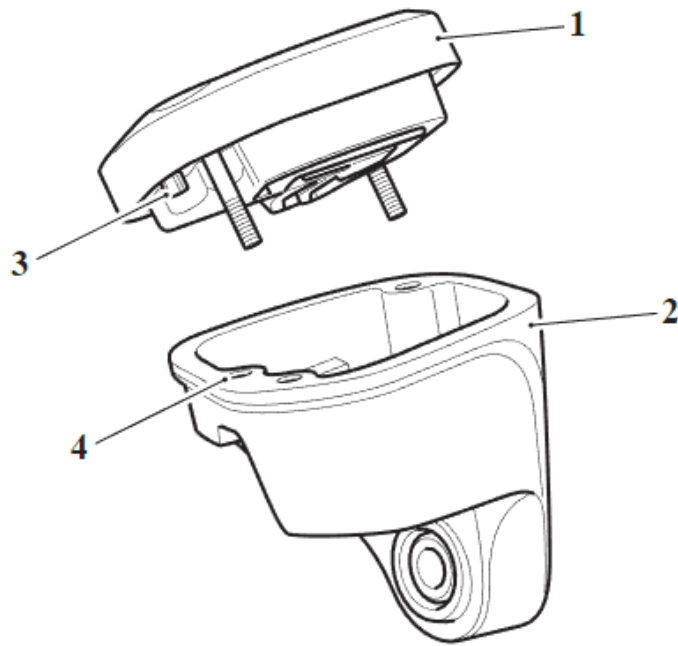
1. Insert
2. Diaphragm seal
3. Locating lug
4. Hole for locating lug
5. Reservoir cap
6. Fixings

### **WARNING**

If the master cylinder reservoir cap screws are over tightened this can result in a brake fluid leak.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

7. Hold the assembly together and position the cap and diaphragm seal assembly onto the reservoir. Make sure the locating lug on the insert fits into its hole in the reservoir. Tighten the fixings to 1.5 Nm.

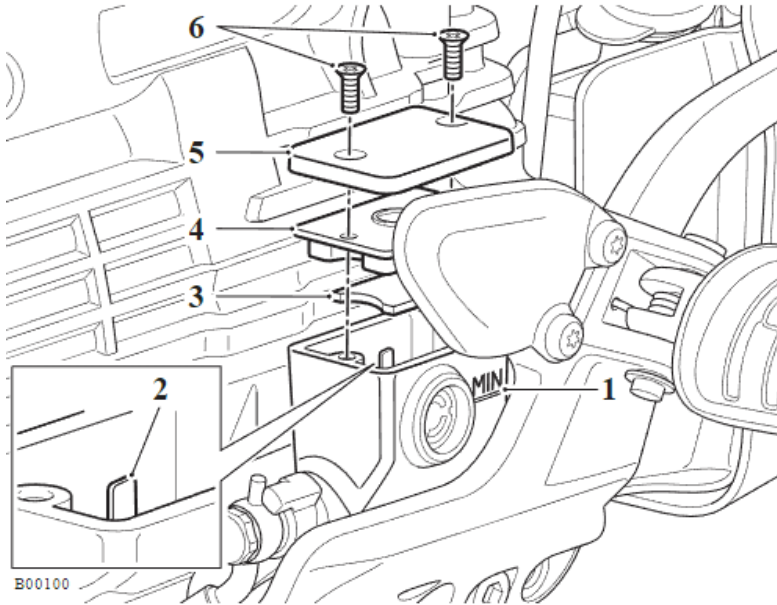


- |                          |
|--------------------------|
| 1. Reservoir cap         |
| 2. Reservoir             |
| 3. Locating lug          |
| 4. Hole for locating lug |



## Rear Brake Fluid Reservoir

1. The brake fluid level must be kept between the upper and lower level lines (reservoir held horizontal).



1. MIN mark
2. MAX mark
3. Float
4. Seal
5. Reservoir cap
6. Fixings

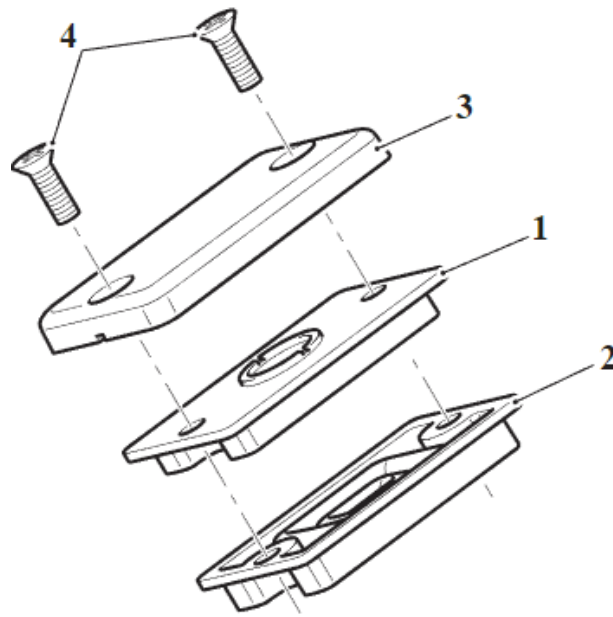
## Rear Brake Fluid Level Adjustment

### **NOTICE**

It is not necessary to remove the float when adding brake fluid to the rear brake master cylinder.

1. Remove the two fixings.
2. Remove the reservoir cap and the diaphragm seal.
3. Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
4. Make sure the float for the brake fluid reservoir is in the reservoir.
5. Fit the reservoir cover to the diaphragm seal.
6. Fit the diaphragm and cover assembly to the reservoir cap. Make sure the holes for the fixings are correctly aligned.

7. Fit the fixings into the cap and diaphragm seal assembly.



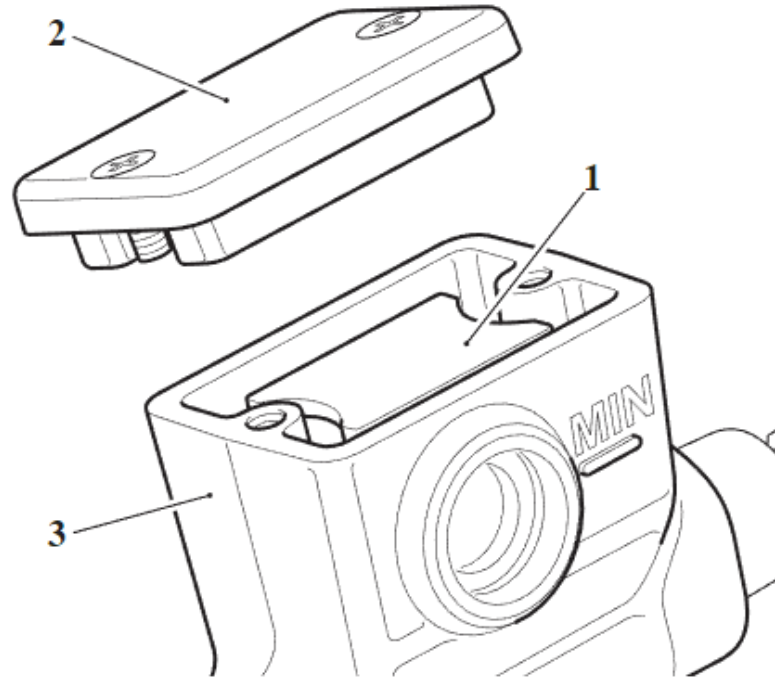
- 1. Insert
- 2. Diaphragm seal
- 3. Reservoir cap
- 4. Fixings

**⚠ WARNING**

If the master cylinder reservoir cap screws are over tightened this can result in a brake fluid leak.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

8. Hold the assembly together and position the cap and diaphragm seal assembly onto the reservoir. Tighten the fixings to 1.5 Nm.



1. Float
2. Reservoir cap assembly
3. Reservoir

#### Rear Bevel Box Oil Specification

### **⚠ WARNING**

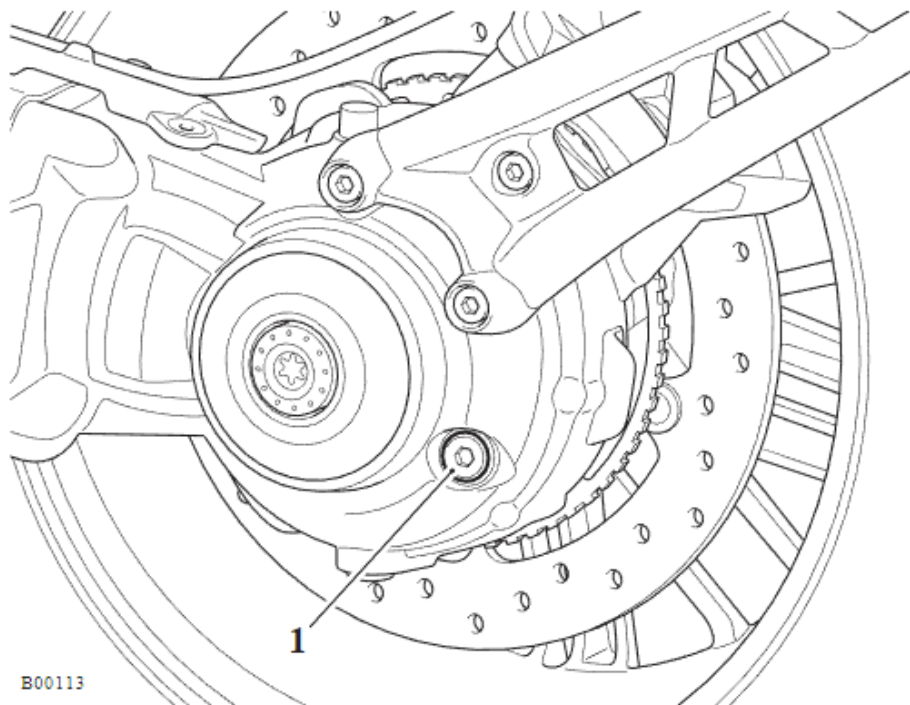
Use of incorrect bevel box lubricant could result in a malfunction of the final drive unit causing lock-up of the rear wheel leading to loss of motorcycle control and an accident.

The rear bevel box must be filled and topped up with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Have an assistant stand the motorcycle upright.
2. Clean the area around the filler then remove the filler level plug. Discard the washer.



1. Filler/level plug

3. Fill with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil, until the level of oil inside the unit is level with the bottom of the filler.
4. Incorporating a new washer, refit the plug and tighten to 25 Nm.

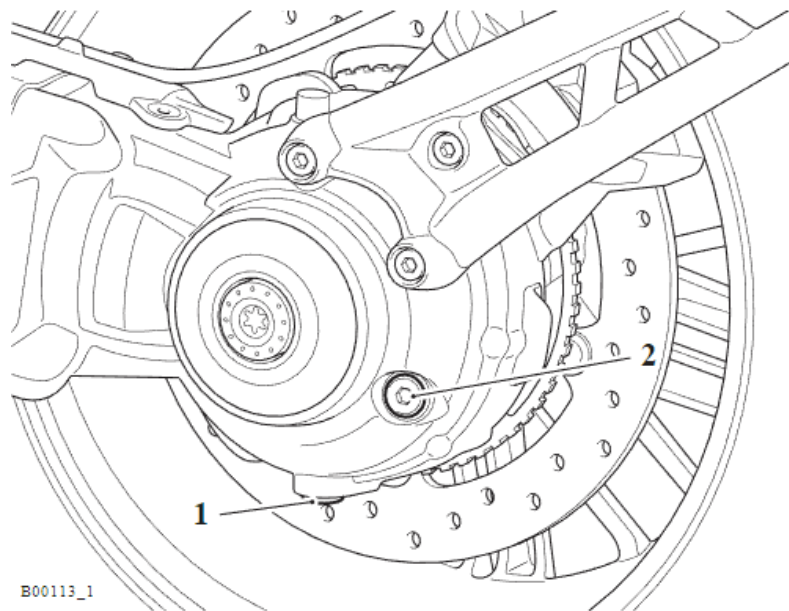
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

Change the rear bevel box oil at the 600 mile (1,000 km) and 20,000 mile (32,000 km) services only. At subsequent services check the oil level and top up if necessary.

1. Position a container beneath the rear bevel box oil drain plug.
2. Remove the drain and filler plugs and allow all the oil to fully drain out. Discard the sealing washers.



1. Drain plug
2. Filler/level plug

### NOTICE

The drain plug is magnetic. It is normal for metallic deposits to be attached to the drain plug magnet.

3. Wipe the drain plug clean, fit a new sealing washer then refit to the final drive and tighten to 25 Nm.
4. Have an assistant stand the motorcycle upright.
5. Fill with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil, until the level of oil inside the unit is level with the bottom of the filler.
6. Incorporating a new washer, refit the plug and tighten to 25 Nm.

### Check Lights, Instruments and Electrical Systems

### WARNING

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Check the instruments, lights and electrical systems for functionality. Rectify if necessary.

 **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

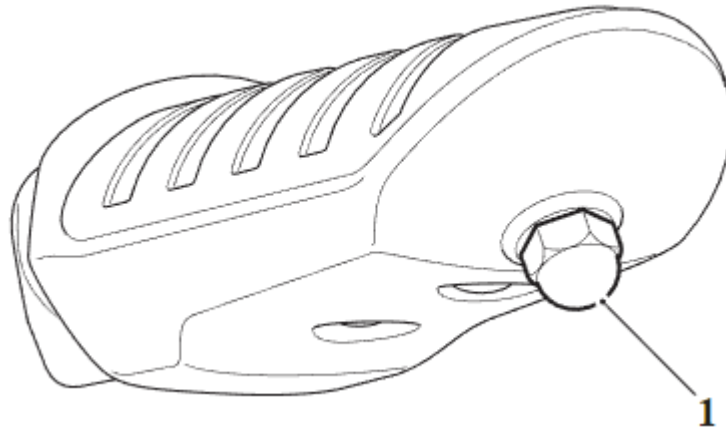
Check for the latest calibration download for the following using the Triumph Diagnostic Tool:

- Instruments (if applicable)
- Chassis ECM (if fitted)
- Keyless ECM (if fitted)
- Engine ECM
- Suspension ECM (if fitted)

See the Triumph Diagnostic Tool User Guide for more information.

## Bank Angle Indicators

1. Inspect the bank angle indicators on the rider's footrests for wear. The bank angle indicators are worn out when 5 mm of the bank angle peg remains.
2. Bank angle indicators must be replaced when they have reached the maximum wear limit of 5.0 mm (service limit) in length.



### **⚠ WARNING**

Use of a motorcycle with bank angle indicators worn beyond the maximum limit (when the bank angle indicator is worn to a minimum 5 mm in length) will allow the motorcycle to be banked to an unsafe angle. Therefore, always replace the bank angle indicator pegs when they are worn to 5.0 mm (service limit) in length.

Banking to an unsafe angle may cause instability, loss of motorcycle control and an accident.

## Side Stand – Clean

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



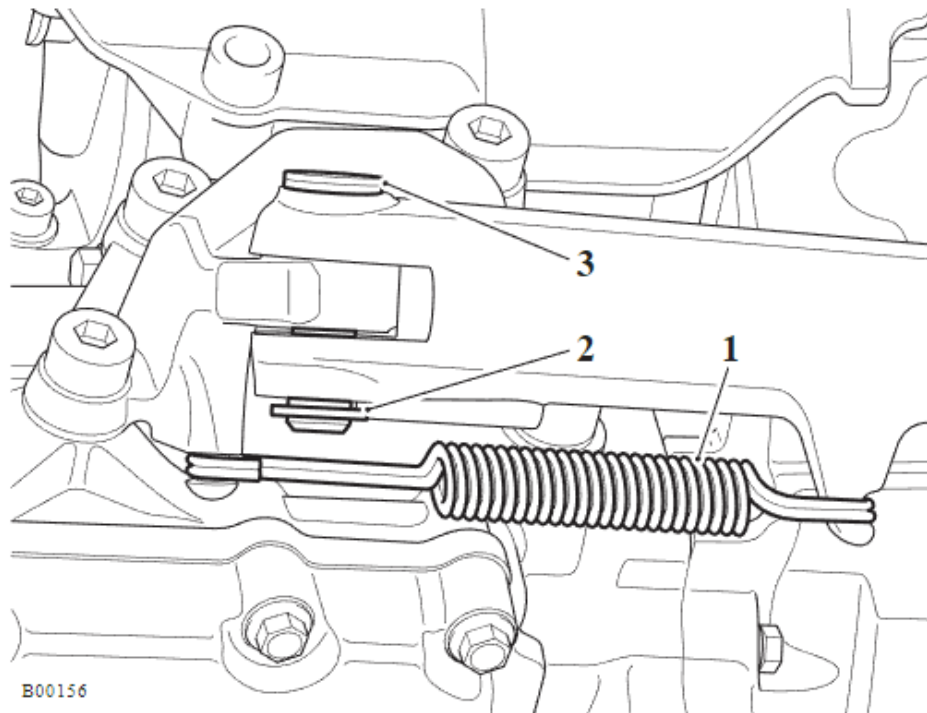
## Removal

1. Raise and support the motorcycle.

### **WARNING**

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

2. With the side stand in the up position, unhook the spring from the side stand and remove it from the motorcycle.
3. Remove and discard the E-clip securing the pivot pin.
4. Remove the pivot pin and remove the side stand.



1. Spring
2. E-clip
3. Pivot pin

## Inspection

Inspect the surfaces of the pivot pin, side stand carrier bracket and side stand for corrosion or damage and replace if required.

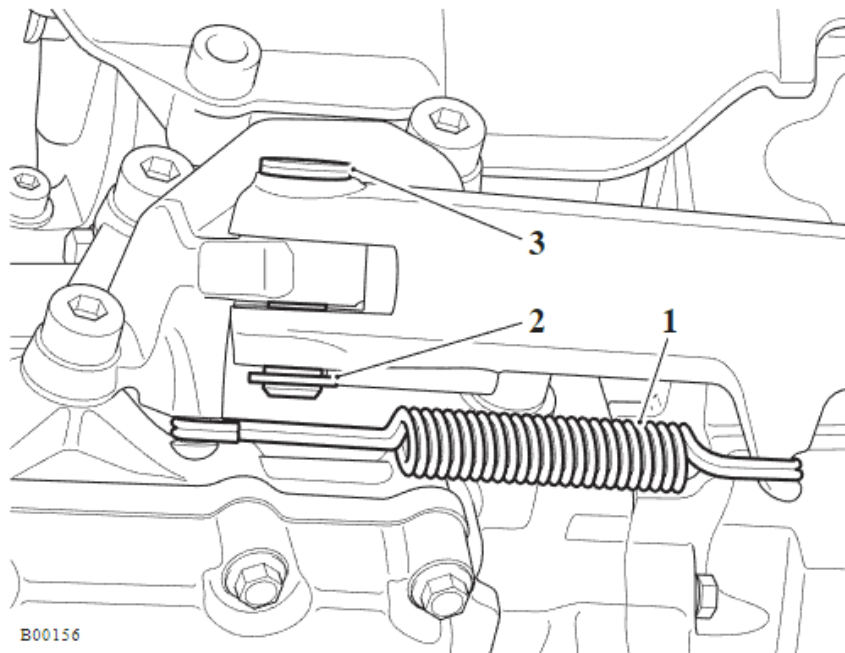
## Installation

1. Prior to fitting the side stand clean the pivot pin and the bushes in the side stand with a lint free cloth. Make sure the pivot pin and bushes are free from grease.
2. Fit the side stand to the motorcycle and insert the pivot pin.
3. Fit a new E-clip to secure the pivot pin.

### **⚠ WARNING**

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

4. Hook the spring onto its frame lug then carefully hook it onto the side stand lug.



1. Spring
2. E-clip
3. Pivot pin

5. Check the operation of the side stand before riding the motorcycle. Make sure the spring holds the stand securely in the retracted position.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Check all visible fasteners for security. Make sure any encapsulated fasteners that have been loosened or removed are replaced.

Road Test

**⚠ WARNING**

When riding the motorcycle the rider must always wear a safety helmet, eye protection, gloves, boots, trousers (close fitting around the knee and ankle) and a brightly coloured jacket. Brightly coloured clothing will considerably increase a rider's visibility to other operators of road vehicles. Although full protection is not possible, wearing correct protective clothing can reduce the risk of injury when riding.

**⚠ WARNING**

A safety helmet is one of the most important pieces of riding gear as it offers protection against head injuries. Your safety helmet should be carefully chosen and should fit your head comfortably and securely. A brightly coloured safety helmet will increase a rider's visibility to other operators of road vehicles. An open face helmet offers some protection in an accident though a full face helmet will offer more. Always wear a visor or approved goggles to help vision and to protect your eyes.

**NOTICE**

For the first 1,000 miles, the motorcycle should be ridden within the running in procedure (see Owner's Handbook), checking for abnormalities, unusual noises and for satisfactory operation.

When checking the brakes on road test, a suitable safe place should be found to carry out the test.

## **WARNING**

Do not attempt to test the ABS function of the motorcycle's braking system during road test. The ABS function is for use in emergency situations only. Any attempt to artificially create an emergency situation is extremely hazardous and could lead to a collision with a following vehicle or loss of motorcycle control and an accident.

## **NOTICE**

Faults detected during road test or post road test inspection, must be rectified before the motorcycle is released to the customer.

The distance covered on the road test should be long enough to allow a satisfactory check to be made in the following areas:

### Engine Cold Start Performance

Standard required:

The engine must start quickly and idle smoothly.

## **NOTICE**

This check is to be carried out when the engine is cold.

Action:

Turn the ignition switch to the ON position.

Start the engine and allow to idle.

ABS (anti-lock brake system) indicator light (models fitted with ABS only)

Standard required:

Refer to the Owner's Handbook for further information regarding the ABS indicator light illumination sequence for the relevant model.

The ABS indicator light should flash on and off and continue to flash after engine start up until the motorcycle first reaches a speed exceeding 6 mph (10 km/h).

## Clutch

Standard required:

The clutch should engage smoothly, without judder, slipping or noise.

## Gear Change

Standard required:

Changing between gears must be smooth and easily accomplished.

## Throttle Response

Standard required:

The engine should be quick to respond to any movement of the throttle.

There should be no pronounced misfires.

The idle speed must not change when the handlebars are turned from lock to lock.

## Brakes

Standard required:

The brakes should have a firm, responsive feel.

The brakes should act smoothly and silently without judder.

Upon activation of the brakes, the motorcycle should come to rest without deviating from a straight line.

## Instrument Panel

### Standard required:

All instruments must operate correctly.

### Check:

Check that the warning lights on the instruments operate correctly.

## Steering and Suspension

### Standard required:

The motorcycle should be easy to steer and should not pull to one side.

Cornering should be precise with the motorcycle leaning naturally into the corner and returning to the upright position upon exiting the corner.

The front and rear suspension operation should be smooth with no excessive stiffness, roughness or tight spots.

### Check:

Check the correct action of the front suspension, including the damper action.

Check the correct action of the rear suspension, including the damper action.

## Cruise Control (if fitted)

### Standard required:

All cruise control switches must operate correctly. All functions and displays must operate as described in the Owner's Handbook.

### Check:

Once the relevant conditions have been met as described in the Owner's Handbook, turn the cruise control ON and OFF.

Check the functionality of all following actions:

- SET the speed
- Resume the SET speed
- Increase the SET speed
- Decrease the SET speed
- Throttle cancel - twist the throttle fully forward to cancel the cruise control
- Brake cancel - make sure the cruise control is cancelled by use of the front brake, then the rear brake
- Clutch cancel - make sure the cruise control is cancelled by pulling the clutch lever in
- Gear change cancel - make sure the cruise control is cancelled when changing gear
- Sixty second overtake cancel - make sure the cruise control is cancelled after increasing the speed with the throttle for more than sixty seconds.<

#### [Service Indicator and Service Maintenance Book](#)

Reset the service indicator using the Triumph Diagnostic Tool.

See the Triumph Diagnostic Tool User Guide for more information.

Stamp and date the relevant section of the Service Record.

#### [Post Road Test](#)

### **NOTICE**

The following tests should be carried out immediately after the motorcycle returns from the road test.

Faults detected during road test or post road test inspection, must be rectified before the motorcycle is released to the customer.

## **WARNING**

Certain components of the motorcycle will be hot immediately after road test. Care must be taken to avoid burn injuries caused by contact with hot components.

### Cooling Fan Operation (liquid cooled engines only)

Standard required:

## **NOTICE**

Some models are fitted with a cooling fan variable speed controller. This controls the speed of the cooling fan(s) at various speeds depending on the temperature of the coolant.

The fan(s) may come on earlier and at a slower speed. Depending on the ambient temperature, it is possible the fan(s) may not reach 100% speed.

The fan should operate when the coolant temperature rises above normal operating temperature. It will stop automatically.

The blades of the cooling fan must not come into contact with the radiator or the guard which surrounds the cooling fan blades.

There must be no abnormal noises when the cooling fan is operating.

## **WARNING**

The cooling fan operates automatically, even with the ignition switched off. To prevent injury, keep hands and clothing away from the fan blades at all times.

Action:

With the engine idling, allow the engine temperature to rise to above normal operating temperature.



**⚠ CAUTION**

Do not allow the engine temperature to rise too high. Serious damage may result if the engine is allowed to overheat.

Check:

Check the cooling fan for correct operation.

Action:

Switch off the engine.

Hot Start

**NOTICE**

This test should be carried out when the engine is at normal operating temperature.

Standard required:

The engine should start easily when at normal operating temperature and run smoothly at idle.

Action:

Switch off the engine (if running) and wait thirty seconds.

Start the engine and allow to idle.

Switch off the engine.

Engine

Standard required:

The engine must be free from fluid leaks.

Fuel System

Standard required:

The fuel system must be free from leaks.

Tyres

Standard required:

Front and rear tyres must be free from damage.

 **WARNING**

Check the tyres for cuts, embedded nails or other sharp objects.

Check the wheel rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.

Bodywork

Standard required:

The motorcycle bodywork must be clean and free from damage.

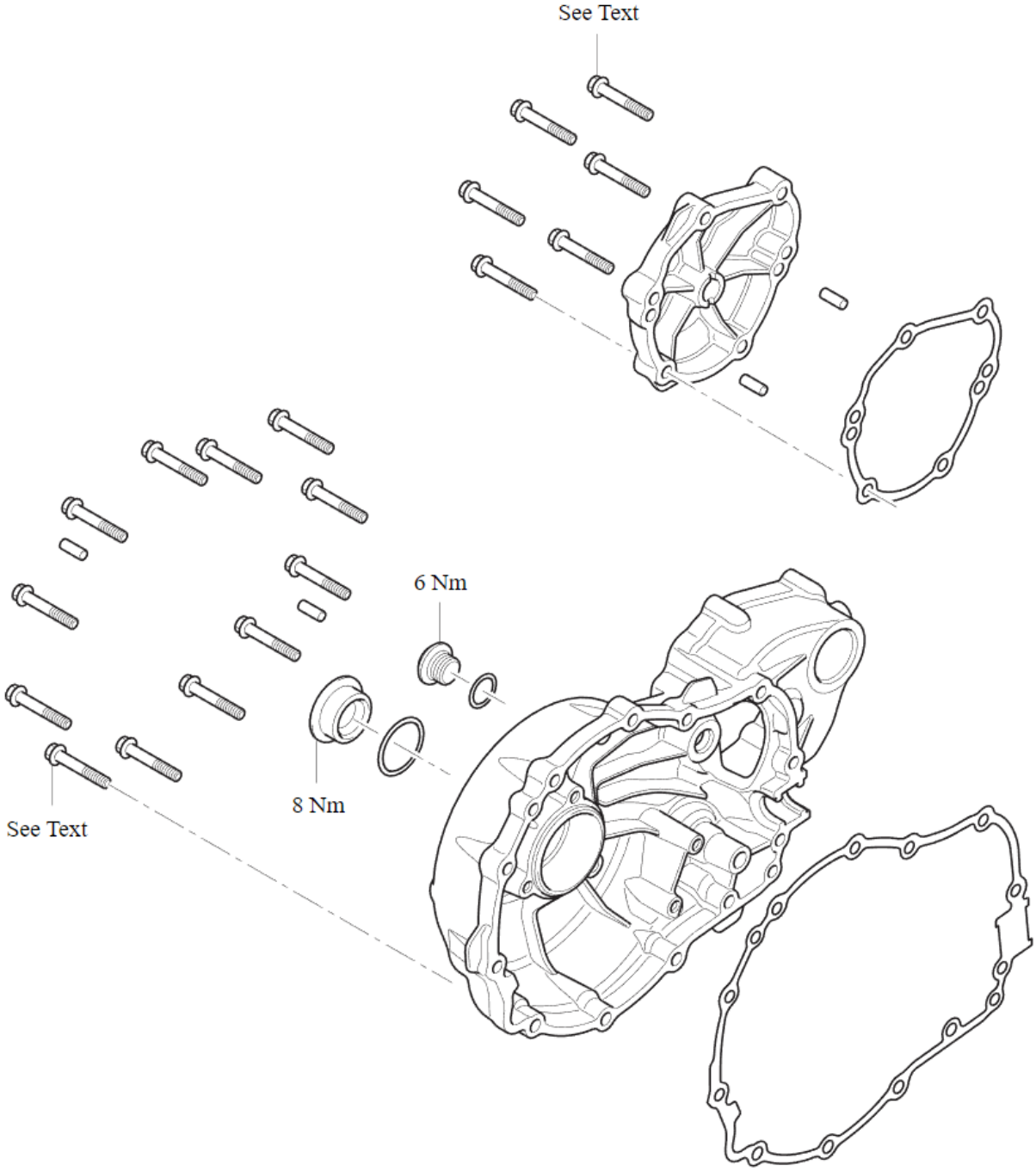
Check:

Check the motorcycle bodywork for new damage.

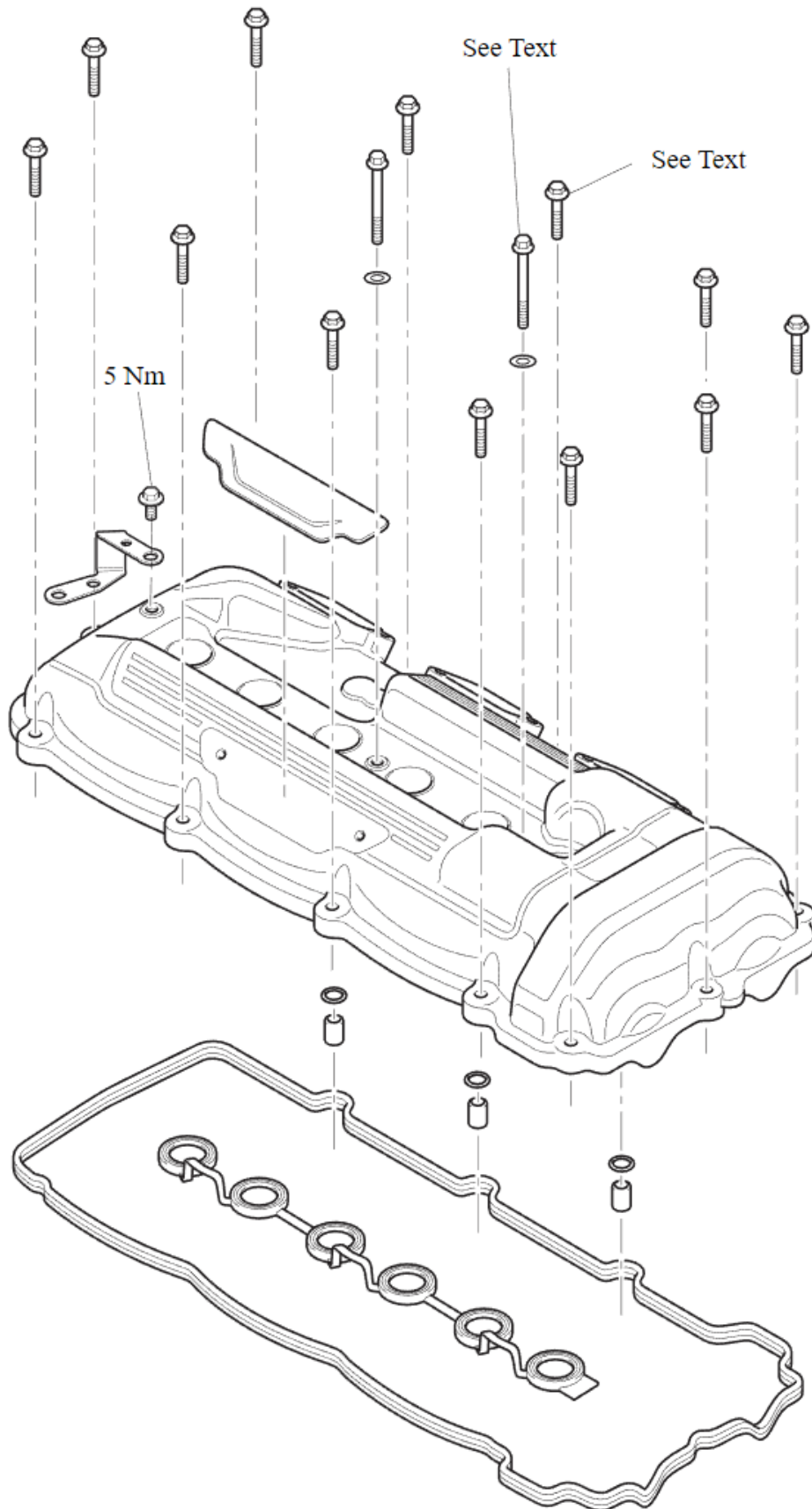
Check the motorcycle bodywork for cleanliness.

# Engine Covers

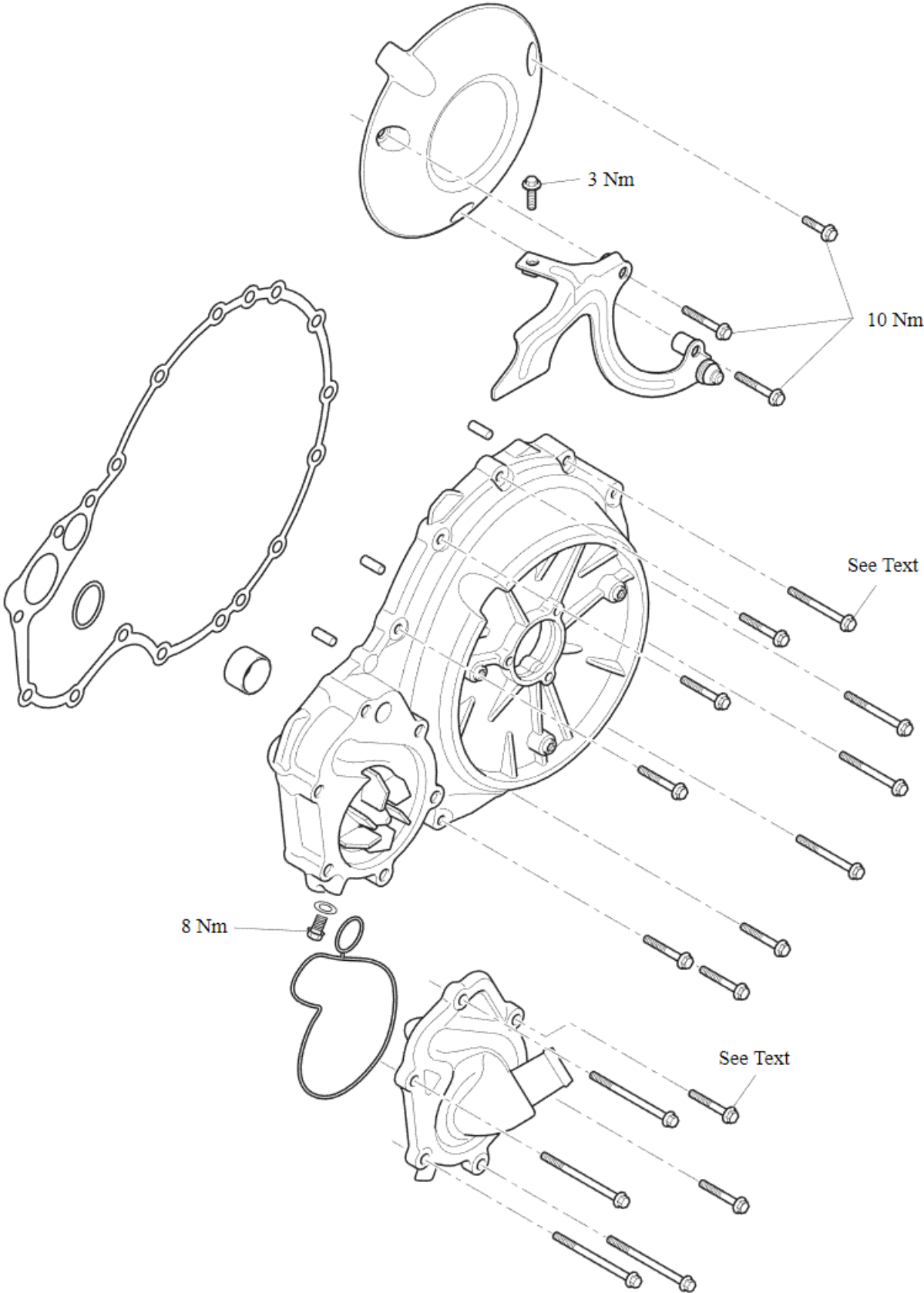
## Exploded View - Alternator Cover



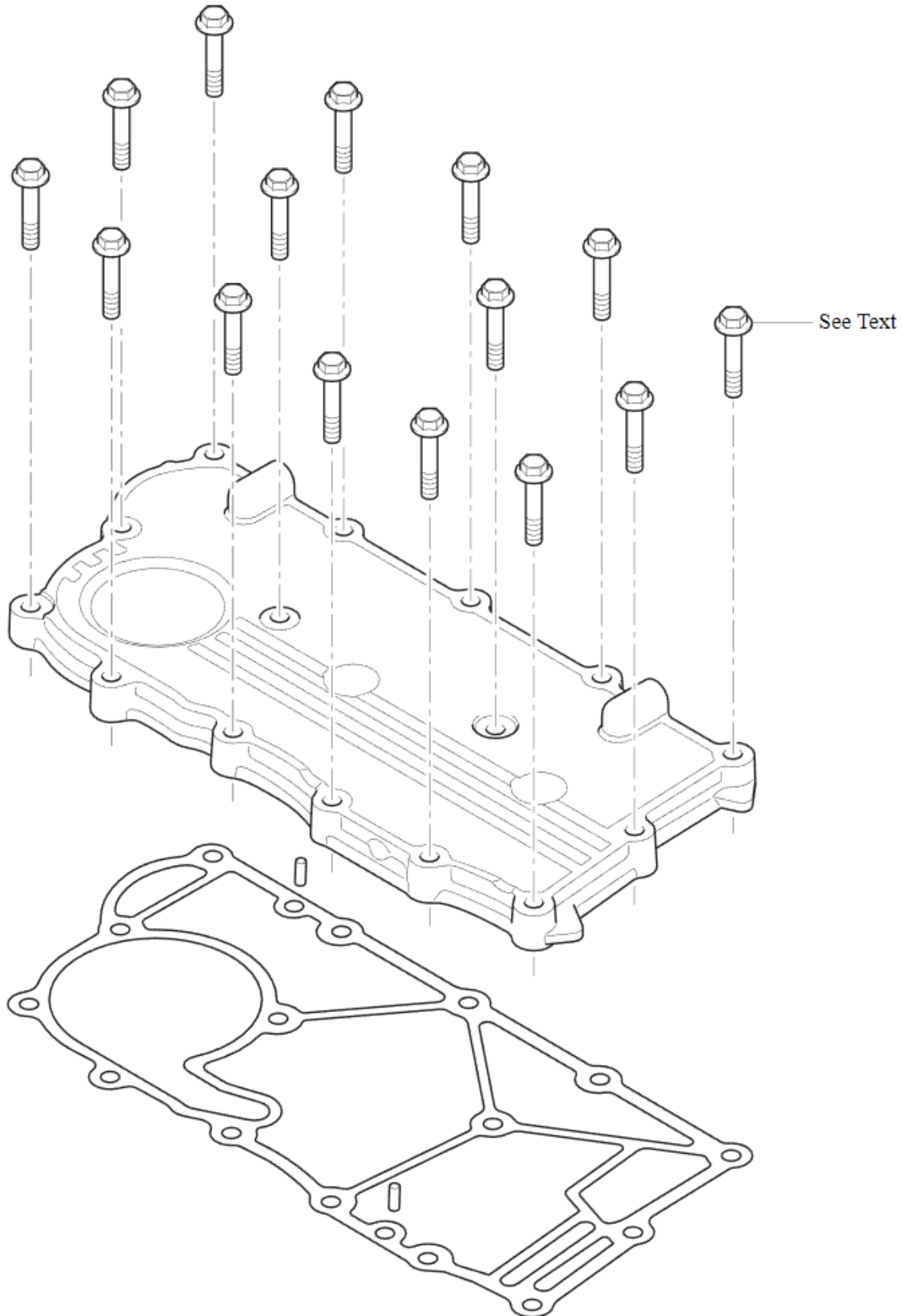
# Exploded View - Camshaft Cover



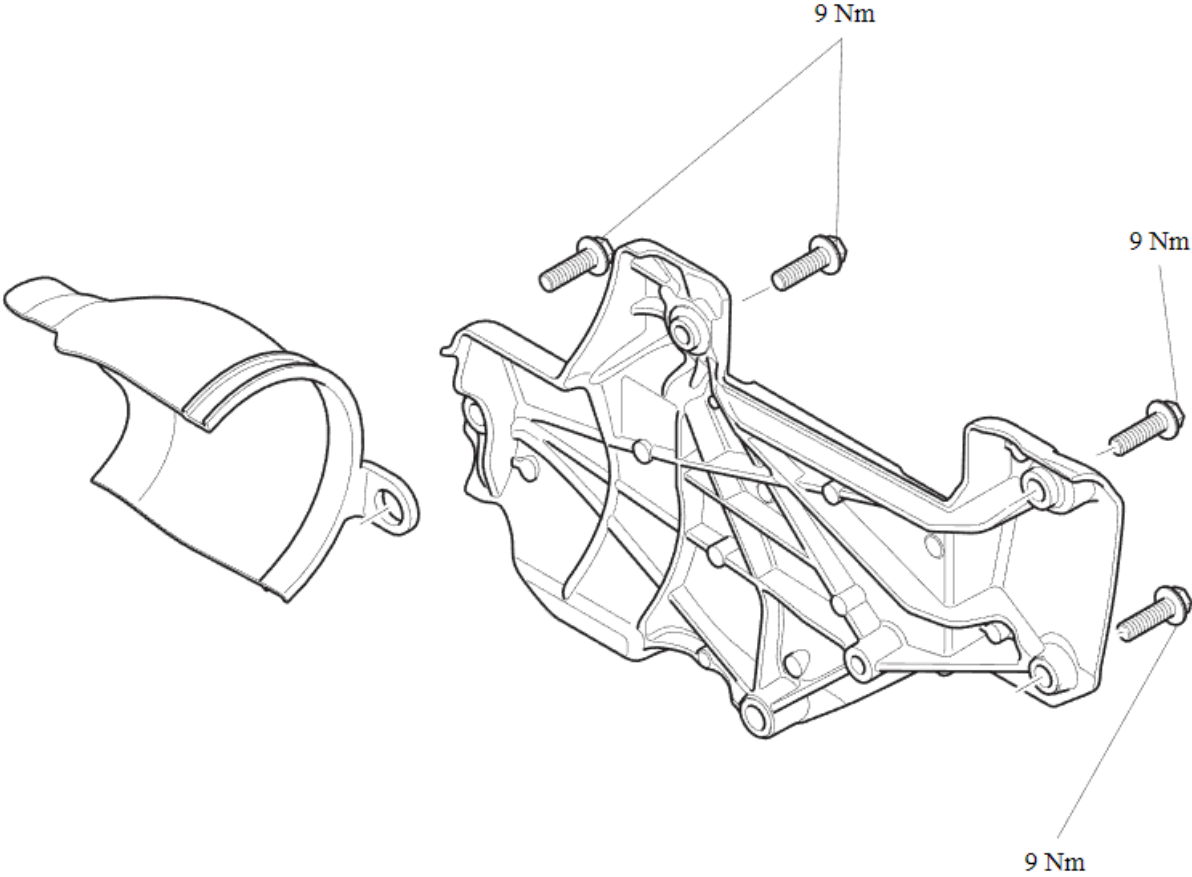
Exploded View - Clutch Cover



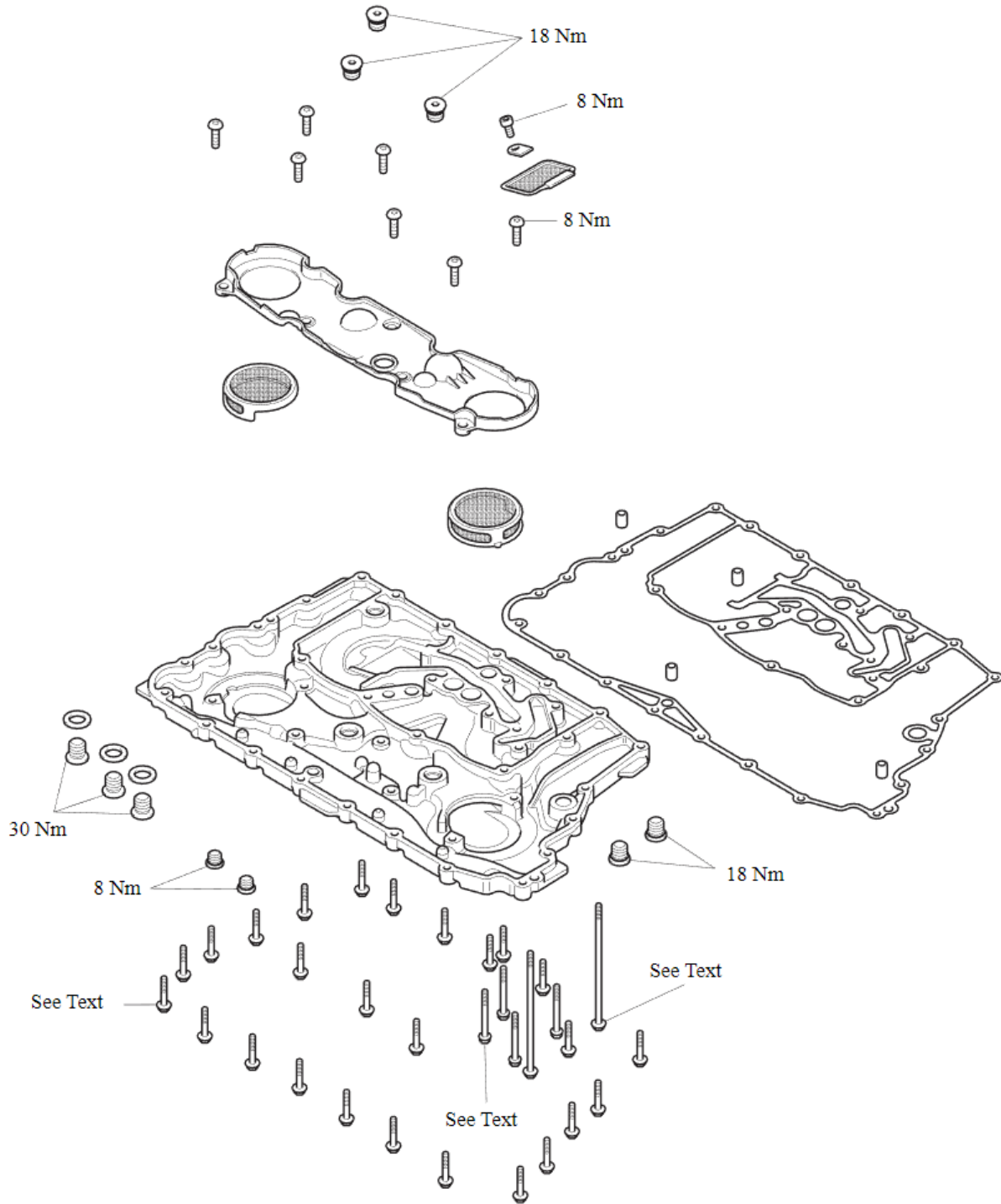
Exploded View - Oil Tank Cover



Exploded View - Starter Motor Cover



# Exploded View – Sump





**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

The rotor magnets are very strong. When handling the alternator cover the magnets may 'grab' the stator, causing injury to the hands or fingers. When handling the alternator cover wear suitable gloves and only grip the alternator cover by the outside surfaces; always keep hands and fingers clear when handling the alternator cover.

Perform the following operations:

- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)
- [Swinging Arm - Removal](#)
- [Rear Suspension Linkage - Removal](#)
- [Battery Box - Removal](#)
- [Starter Motor - Removal](#)
- [Starter Drive Cover - Removal](#)

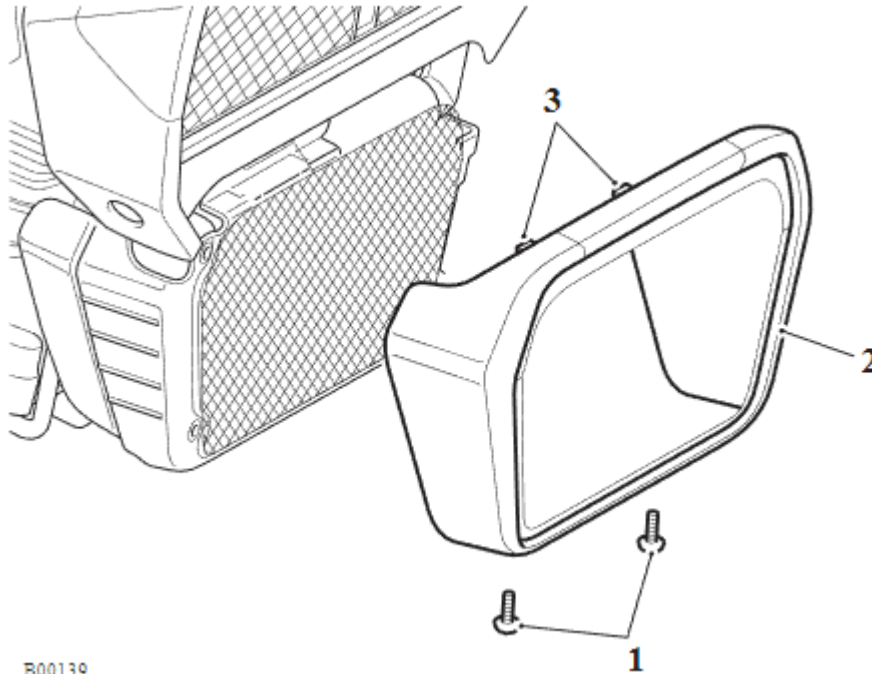
**NOTICE**

The alternator and crankshaft position sensor share the same harness.  
Note the routing of the alternator harness for installation.

## NOTICE

To access the regulator/rectifier connectors, the radiator lower surround will need to be pivoted slightly forward.

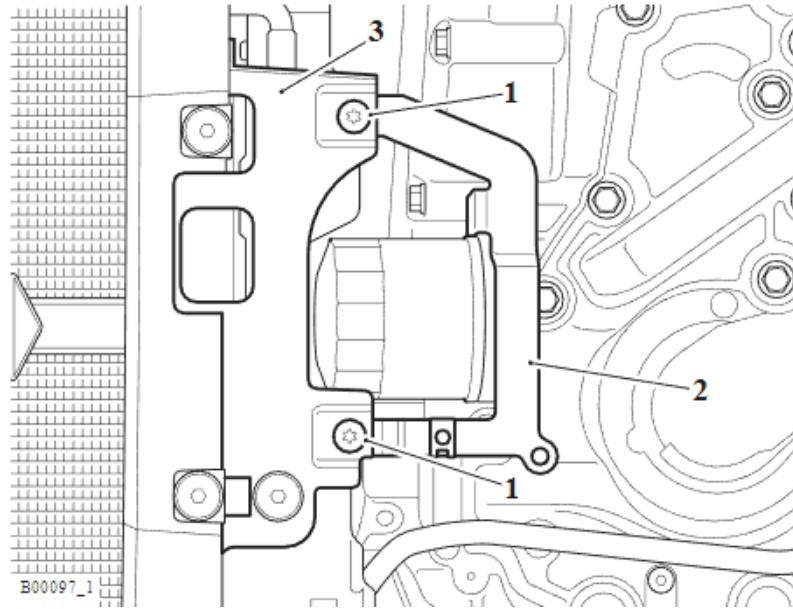
1. Release the fixings, move the radiator lower cowl forward to disengage the upper retaining clips and remove the lower cowl.



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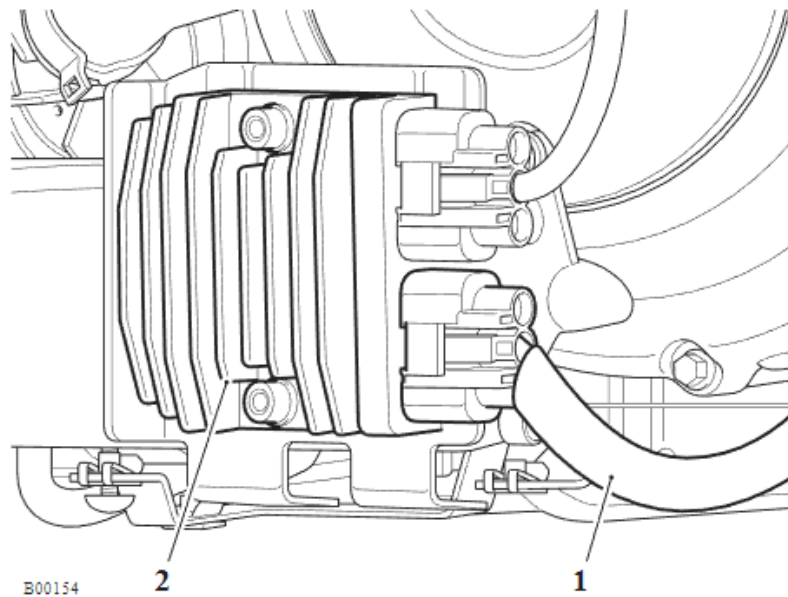
1. Fixings
2. Lower cowl
3. Retaining clips

2. Release the two fixings securing the radiator lower surround to its bracket.



- 1. Fixings
- 2. Bracket
- 3. Radiator lower surround

3. Pivot the radiator lower surround forward and disconnect the alternator harness from the regulator/rectifier.



- 1. Alternator connector
- 2. Regulator/rectifier

### NOTICE

Note the routing and retaining clips/clamps of the alternator and crankshaft position sensor harnesses for installation.

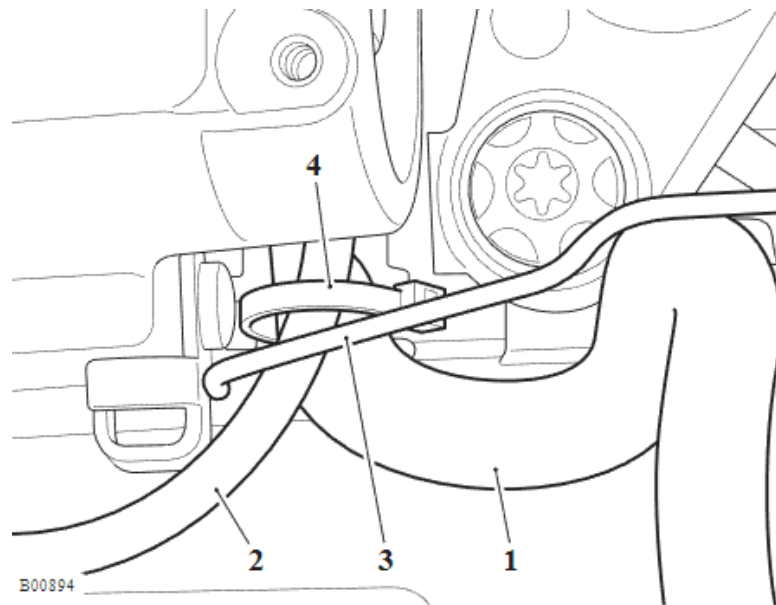
4. Route the alternator harness to the rear of the engine.

### NOTICE

Note the routing of the alternator, Triumph shift assist, side stand and gear position sensor harnesses around the wire guide and the location of the cable tie for installation.

The wire guide keeps the harnesses away from the drive shaft.

5. Cut the cable tie securing the harnesses to the wire guide.



1. Alternator harness
2. Starter motor, Triumph shift assist, side stand and gear position sensor harnesses
3. Wire guide
4. Cable tie

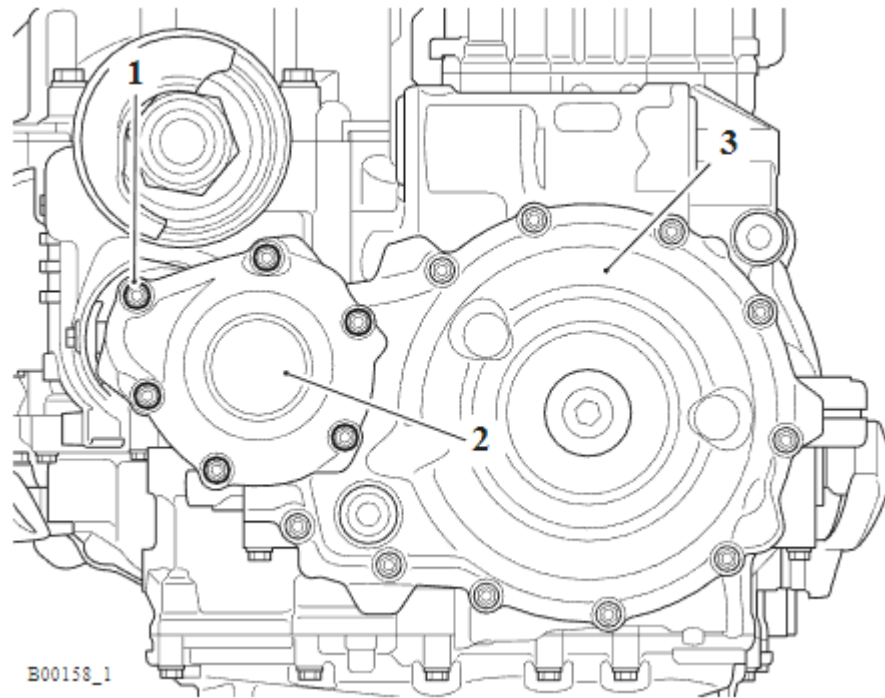
6. Detach the crankshaft position sensor connector from the battery box outer moulding.

7. Disconnect the crankshaft position sensor from the main harness.

## NOTICE

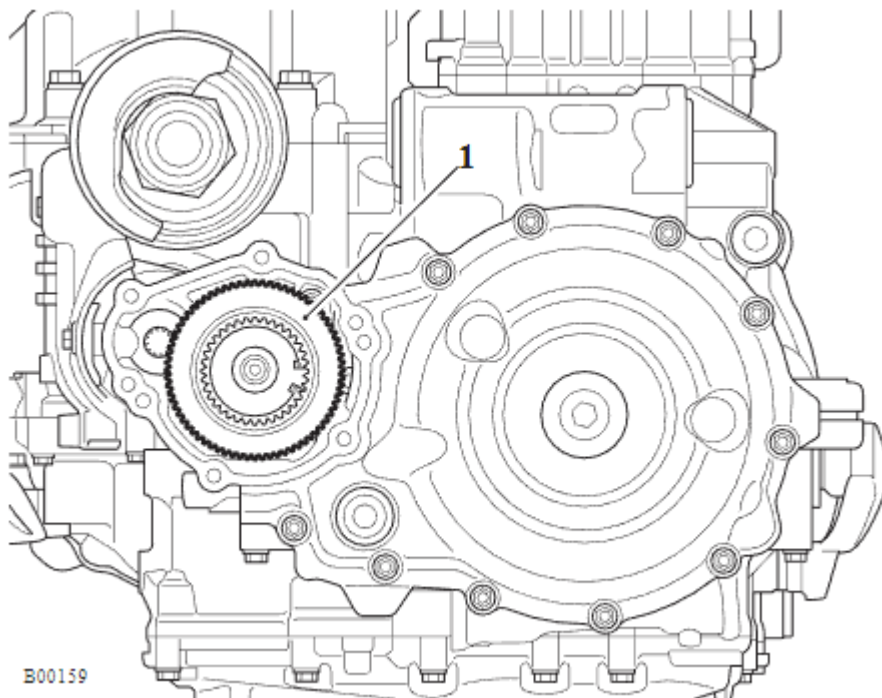
The bushes for the torque limiter assembly may remain in the starter motor drive cover and in the alternator cover.

8. Place an oil catch tray beneath the alternator cover to collect any oil that may spill out on removal.
9. Release the fixings and remove the starter drive cover. Discard the gasket.



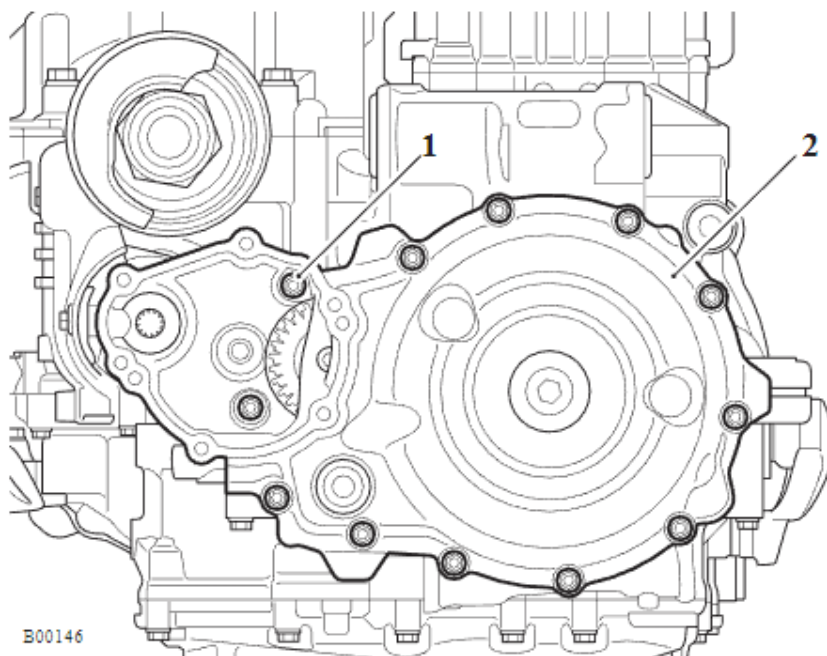
1. Fixings
2. Starter drive cover
3. Alternator cover

10. Remove the starter drive torque limiter assembly and collect its two washers.



1. Torque limiter assembly

11. Release the fixings securing the alternator cover to the crankcases.



1. Fixings  
2. Alternator cover

12. Carefully withdraw the cover. Discard the gasket
13. Clean the surfaces of the crankcase and the alternator cover using a lint free cloth.

**⚠ WARNING**

The rotor magnets are very strong. When handling the alternator cover the magnets may 'grab' the stator, causing injury to the hands or fingers. When handling the alternator cover wear suitable gloves and only grip the alternator cover by the outside surfaces; always keep hands and fingers clear when handling the alternator cover.

#### Alternator Cover – Installation

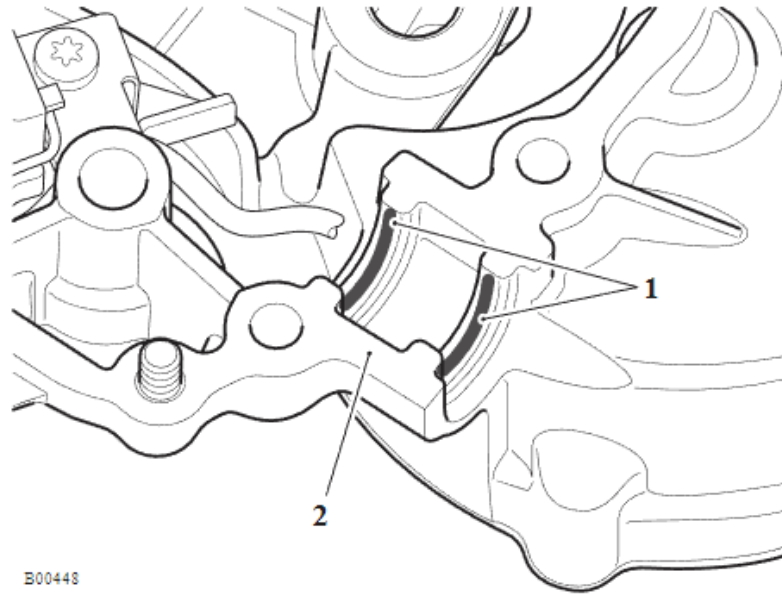
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

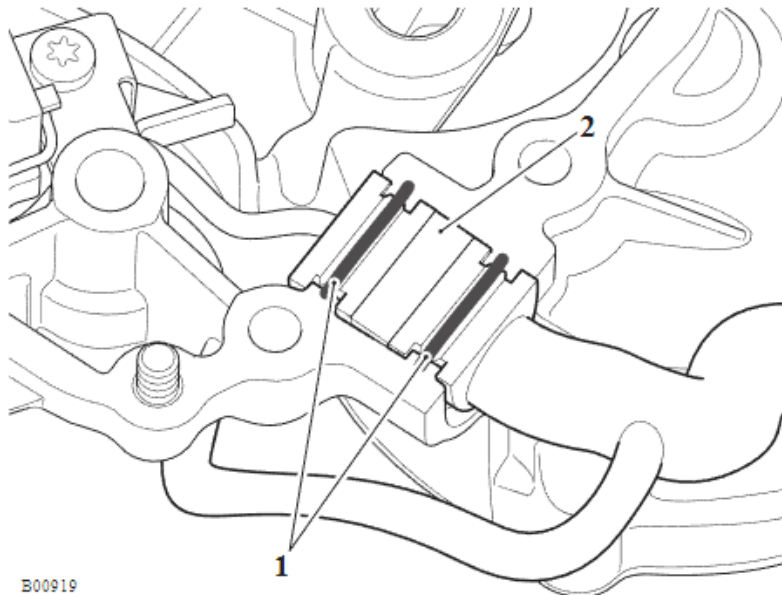
The rotor magnets are very strong. When handling the alternator cover the magnets may 'grab' the stator, causing injury to the hands or fingers. When handling the alternator cover wear suitable gloves and only grip the alternator cover by the outside surfaces; always keep hands and fingers clear when handling the alternator cover.

1. Thoroughly clean the crankcase, harness grommet and alternator cover mating faces.
2. With the harness grommet detached from the alternator cover, apply two beads of silicone sealant, 2 mm (+/-0.5 mm), to the alternator cover at the location of the harness rubber grommet, as shown in the diagram below. Make sure the sealant is a minimum of 2 mm away from any bolt holes. During manufacture ThreeBond 1216E is used.



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Silicone sealant</li> <li>2. Grommet location</li> </ol> |
|--|

3. Fit the harness grommet to the alternator cover and apply two beads of silicone sealant, 2 mm (+/-0.5 mm), to the alternator cover to the harness rubber grommet, as shown in the diagram below. Make sure the sealant is a minimum of 2 mm away from any bolt holes. During manufacture ThreeBond 1216E is used.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Silicone sealant</li> <li>2. Grommet</li> </ol> |
|---|



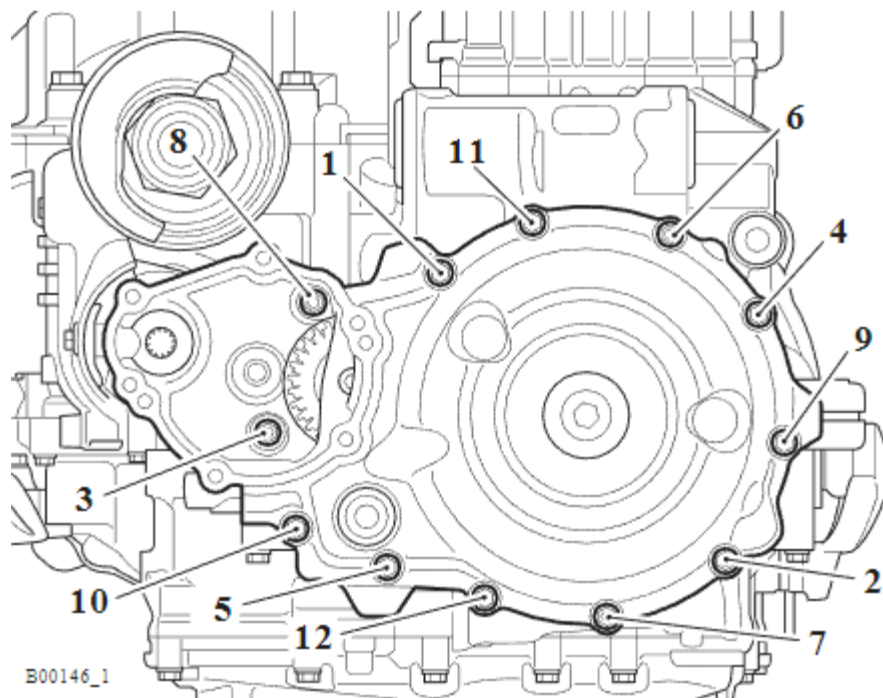
4. Position a new gasket to the crankcase dowels.
5. Fit the alternator cover and tighten the fixings in the following two stages:

**Stage 1**

6. Tighten the fixings one to twelve in the sequence shown to 10 Nm.

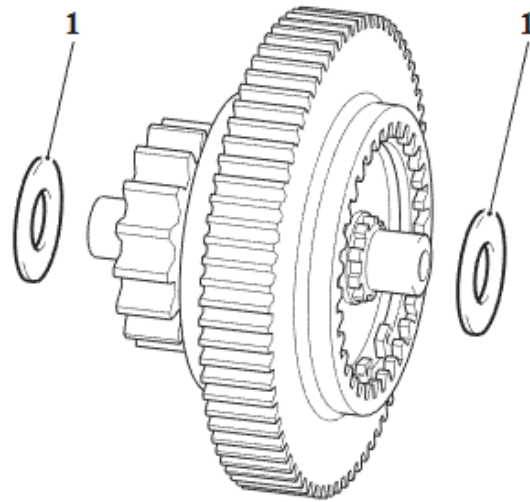
**Stage 2**

7. Retighten fixings one and two to 10 Nm.



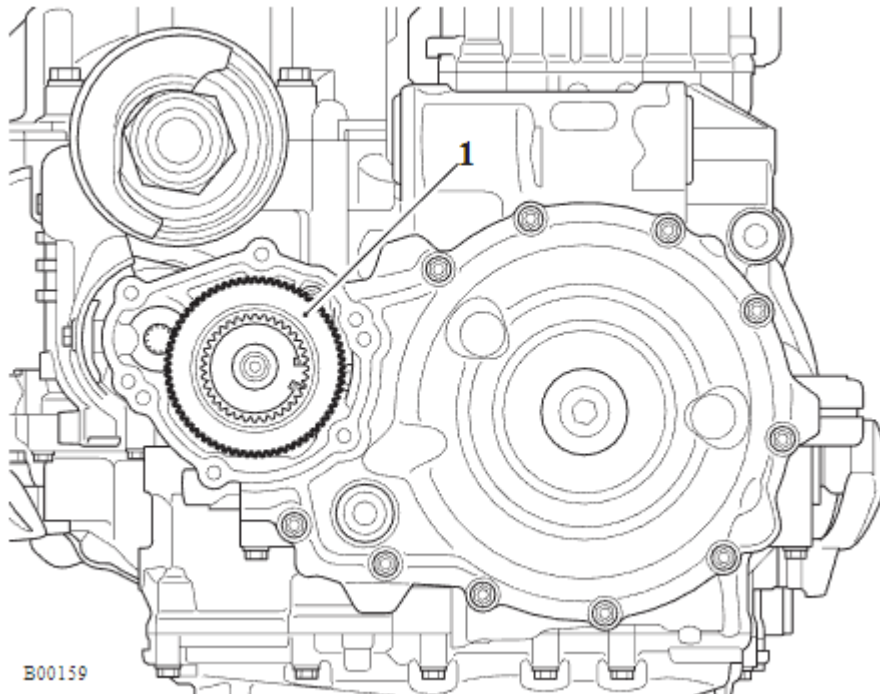
**Alternator Cover Tightening Sequence**

8. Make sure the two washers are fitted one each on both ends of the starter drive torque limiter assembly.



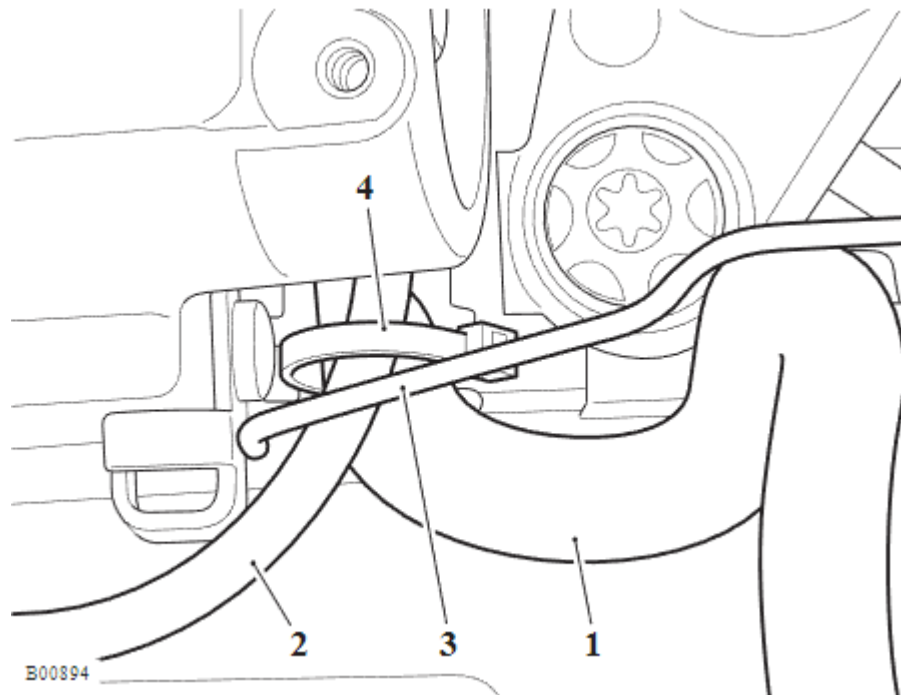
1. Washers

9. Fit the torque limiter assembly to the starter motor drive gear.



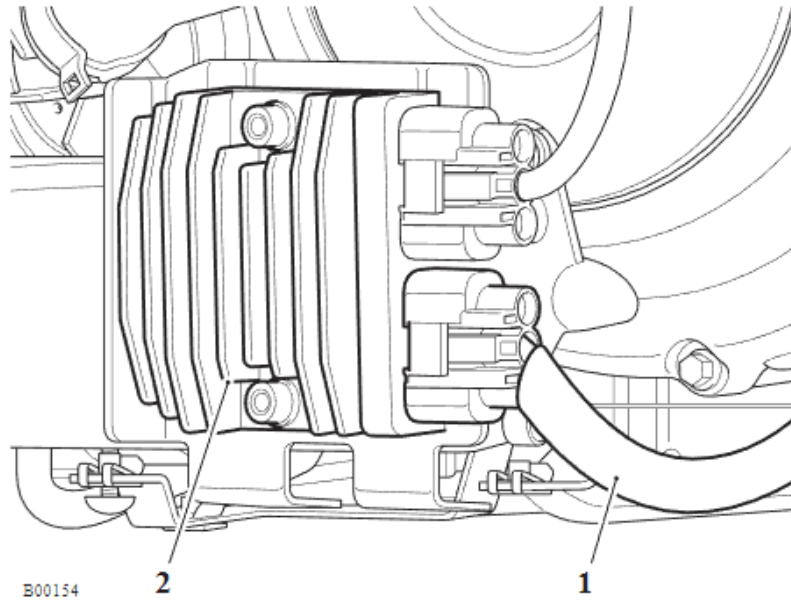
1. Torque limiter assembly

10. Connect the crankshaft position sensor the main harness and attach the connector to the battery box outer moulding.
11. Route the alternator harness to the regulator/rectifier as noted for removal. Make sure the harness is tight around the starter motor housing to avoid contact with the exhaust heat shield.
12. Secure the harnesses to the wire guide as noted for removal.



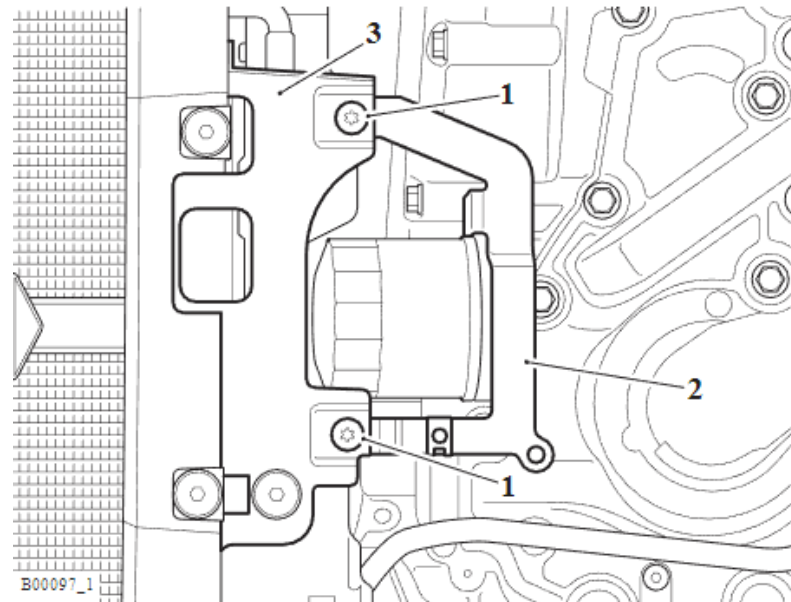
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Alternator harness</li><li>2. Starter motor, Triumph shift assist, side stand and gear position sensor harnesses</li><li>3. Wire guide</li><li>4. Cable tie</li></ol> |
|--|

13. Pivot the radiator lower surround forward and connect the alternator harness to the regulator/rectifier.



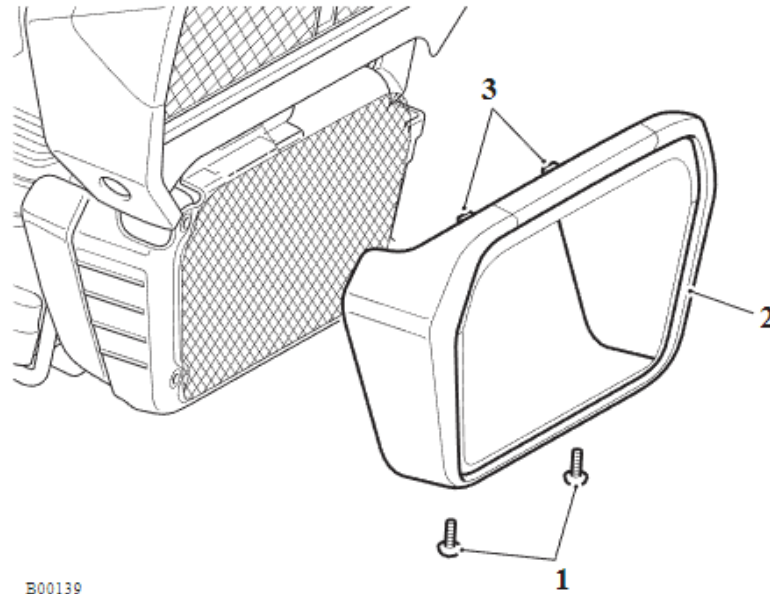
- 1. Alternator connector
- 2. Regulator/rectifier

14. Secure the radiator lower surround to its bracket and tighten the fixings to 4 Nm.



- 1. Fixings
- 2. Bracket
- 3. Radiator lower surround

15. Engage the upper retaining clips of the radiator cowl into their slots, fit the fixings and tighten to 4 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Lower cowl</li><li>3. Retaining clips</li></ol> |
|---|

Perform the following operations:

- [Starter Drive Cover - Installation](#)
- [Starter Motor - Installation](#)
- [Battery Box - Installation](#)
- [Rear Suspension Linkage - Installation](#)
- [Swinging Arm – Installation](#)
- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

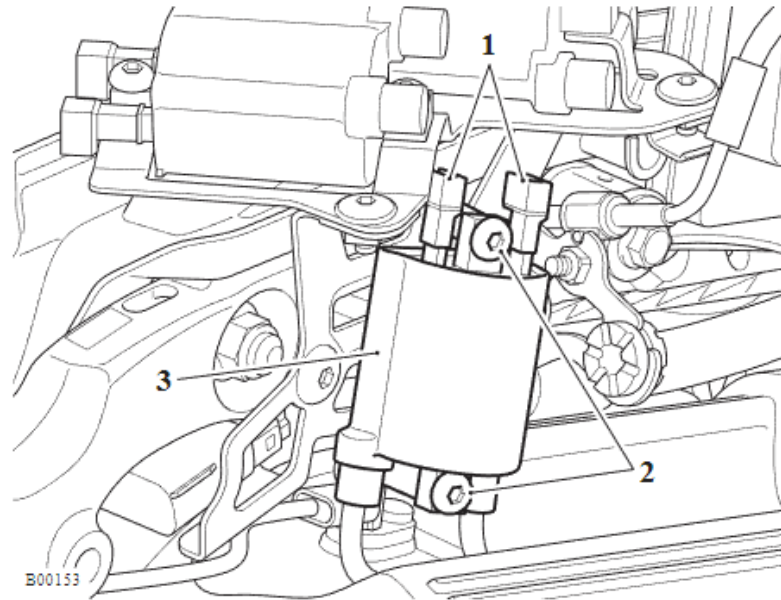
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- Remove the left hand [Side Panels - Removal](#)
- [Evaporative Canister - Removal](#)
- Remove the air filter, see [Air Filter - Renew](#)

**NOTICE**

Note the routing of the high tension cables to the spark plugs for installation.  
Note the position and routing of the wires connected to the ignition coils for installation.

1. Disconnect the high tension cables from the spark plugs.
2. Disconnect the two wires from the number one cylinder ignition coil.

3. Release the two fixings and remove the number one cylinder ignition coil.



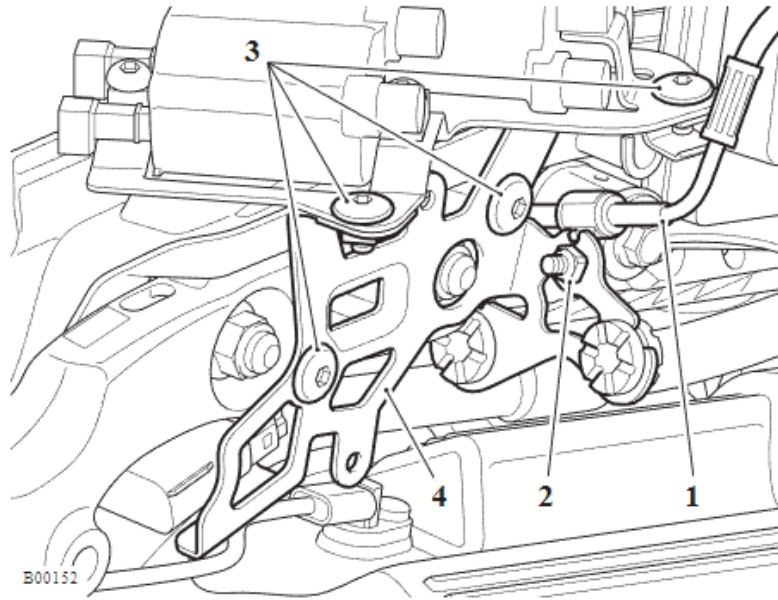
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|--|
| <ol style="list-style-type: none"><li>1. Ignition coil connections</li><li>2. Fixings</li><li>3. Number one cylinder ignition coil</li></ol> |
|--|

4. Detach the rear caliper brake line from the ignition coil bracket. Discard the fir tree clip.

**NOTICE**

Note the orientation of the number one cylinder ignition coil bracket for installation.

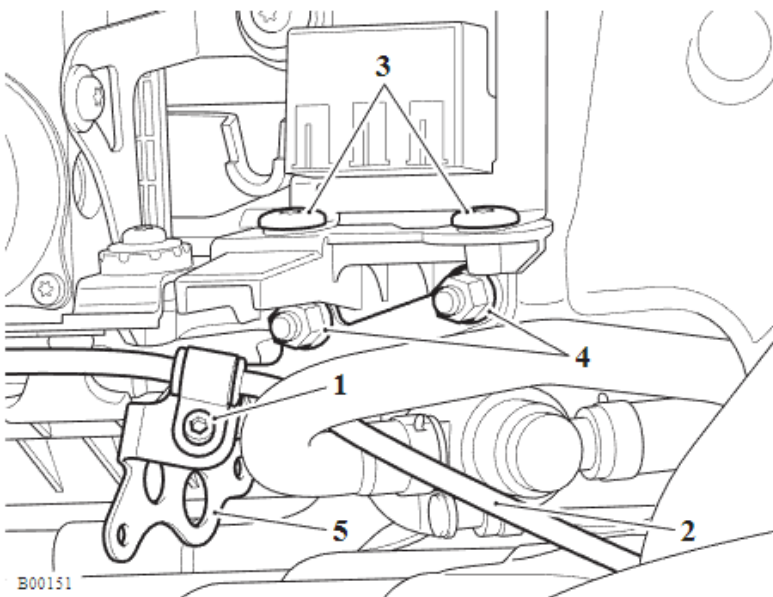
5. Release the four fixings and remove the ignition coil bracket. Discard the fixings.



1. Rear caliper brake line
2. Retaining fir tree clip
3. Fixings
4. Ignition coil bracket

6. Release the fixing and detach the rear brake master cylinder line from the evaporative canister bracket. discard the fixing.

7. Release the fixings and detach the evaporative canister bracket from the fuel tank front mounting bracket. Discard the fixings.



1. Fixing
2. Rear brake master cylinder line
3. Fixings
4. Evaporative canister bracket
5. Fuel tank bracket



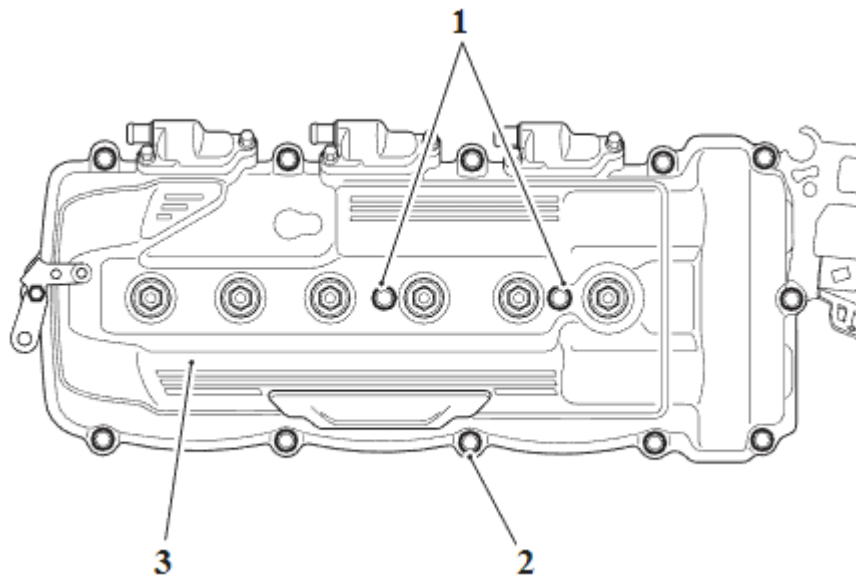
## NOTICE

Note there are two M6 x 55 mm fixings with copper washers and are located between cylinders one and two spark plugs for installation. The remaining twelve fixings are M6 x 30mm.

Note the position of the right hand side panel for installation.

Note the position of the brackets on the front and rear of camshaft cover for installation.

8. Progressively release the camshaft cover fixings.



1. M6 x 55 mm fixings
2. M6 x 30 mm fixings
3. Camshaft cover

## CAUTION

Never use a lever to remove the camshaft cover from the cylinder head.

Using a lever will cause damage to the cylinder head and camshaft cover, which could lead to an oil leak.

9. Raise the camshaft cover and manoeuvre it towards the left hand side of the engine, where it can be removed.

### NOTICE

Note the orientation of the camshaft cover and spark plug tower gaskets for installation.

10. Remove and discard the camshaft cover gasket and the spark plug tower gasket.
11. Remove any residual oil from the mating face of the cylinder head using a lint free cloth.

### Camshaft Cover – Installation

### WARNING

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new camshaft cover seal to the camshaft cover as noted for removal.
2. Fit a new spark plug tower seal to the cylinder head as noted for removal.
3. Check to make sure the secondary air injection dowels and their O-rings are fitted to the cylinder head not the camshaft cover.
4. Position the camshaft cover to the cylinder head. Make sure that the gasket remains in position.

### NOTICE

Fit the brackets to the front and rear of the camshaft cover as noted for removal.  
Make sure the two M6 x 55 mm fixings and their washers are fitted between cylinders one and two spark plugs.

5. Fit the fixings as noted for removal and tighten the camshaft cover fixings in the following three stages:

### Stage 1

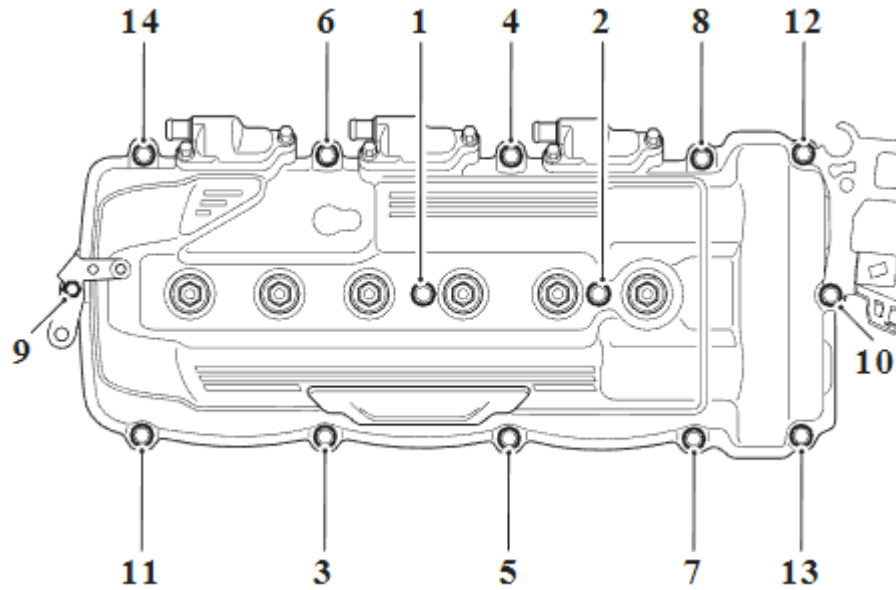
6. Tighten the fixings in the sequence shown to 2 Nm.

### Stage 2

7. Tighten the fixings in the sequence shown to 10 Nm.

### Stage 3

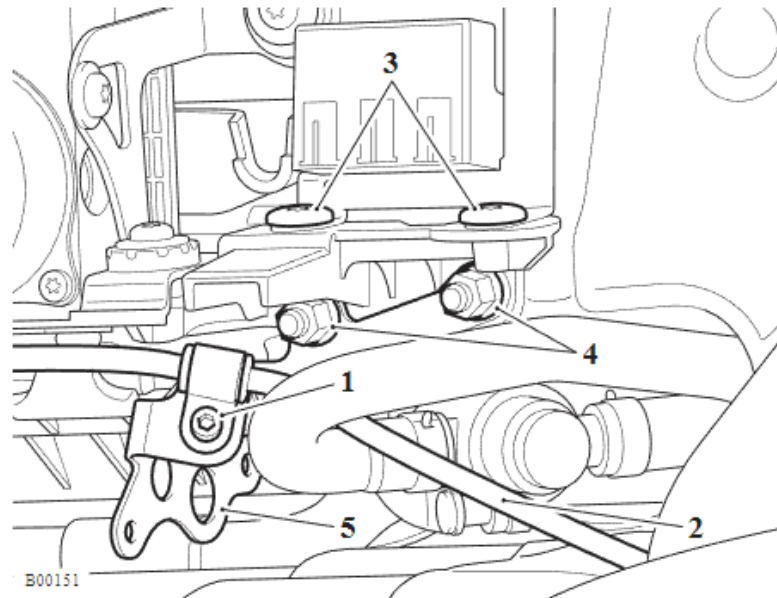
8. Retighten fixings one and two to 10 Nm.



### Camshaft Cover Tightening Sequence

9. Fit the evaporative canister bracket to the fuel tank front mounting bracket and tighten the two new fixings to 22 Nm.

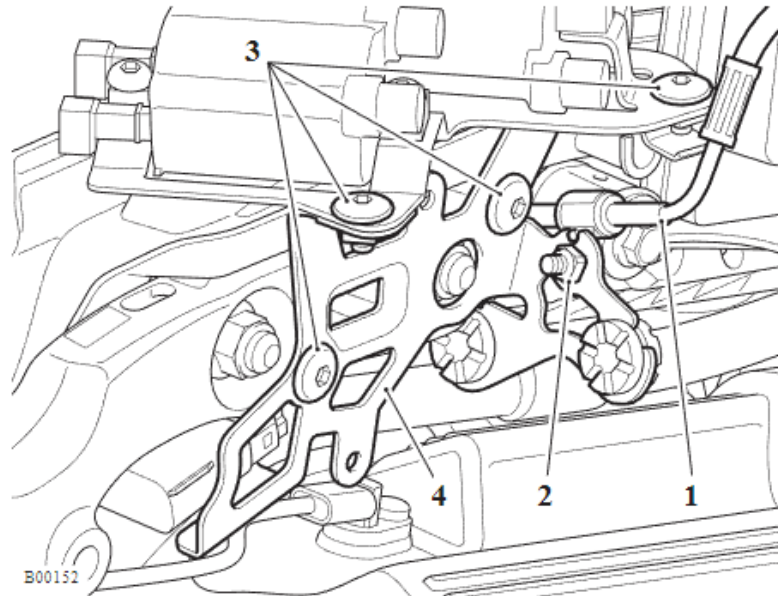
10. Attach the rear brake master cylinder line to the evaporative canister bracket and tighten the new fixing to 5 Nm.



1. Fixing
2. Rear brake master cylinder line
3. Fixings
4. Evaporative canister bracket
5. Fuel tank bracket

11. Position the number one cylinder bracket as noted for removal and tighten the new fixings to 9 Nm.

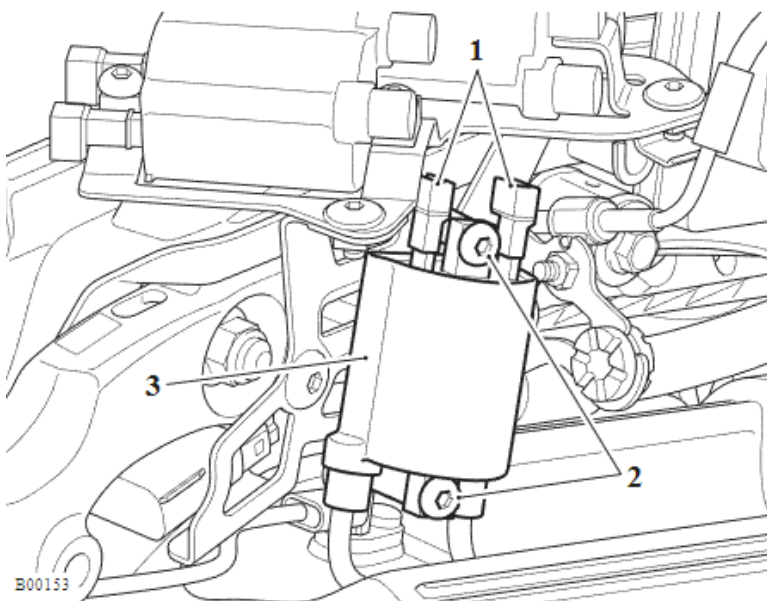
12. Attach the rear caliper brake line to the ignition coil bracket and secure with a new fir tree clip.



- 1. Rear caliper brake line
- 2. Retaining fir tree clip
- 3. Fixings
- 4. Ignition coil bracket

13. Fit the number one cylinder ignition coil to its bracket and tighten the new fixings to 5 Nm.

14. Connect the two wires to the number one cylinder ignition coil as noted for removal.



- 1. Ignition coil connections
- 2. Fixings
- 3. Number one cylinder ignition coil

15. Route and connect the high tension cables to the spark plugs as noted for removal.  
Perform the following operations:

- Fit the air filter [Air Filter - Renew](#)
- [Evaporative Canister - Installation](#)
- Fit the left hand [Side Panels - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Clutch Cover – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

The water pump is an integral part of the clutch cover. If the water pump requires replacing, a new clutch cover with a water pump must be fitted.

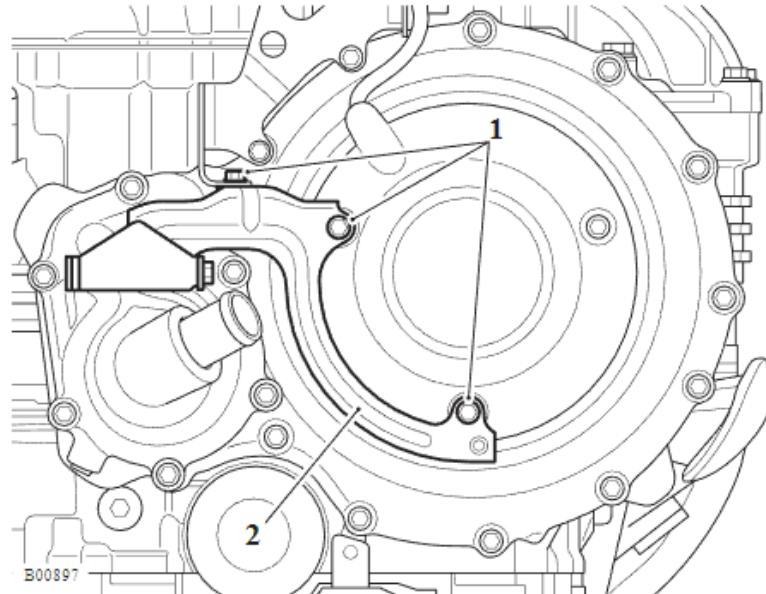
Perform the following operations:

- [Seat – Removal](#)
- [Battery – Removal](#)
- [Coolant Expansion Tank – Removal](#)
- [Radiator – Removal](#)

## NOTICE

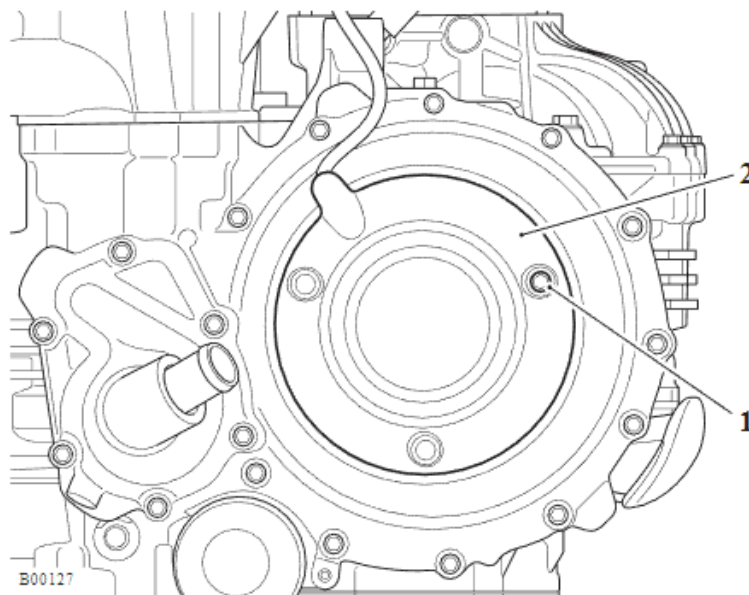
Note the position of the single fixing of the clutch cover finisher for installation.

1. Release the three fixings and remove the lower radiator cowl bracket.



1. Fixings
2. Bracket

2. Release the fixing and remove the clutch cover finisher.

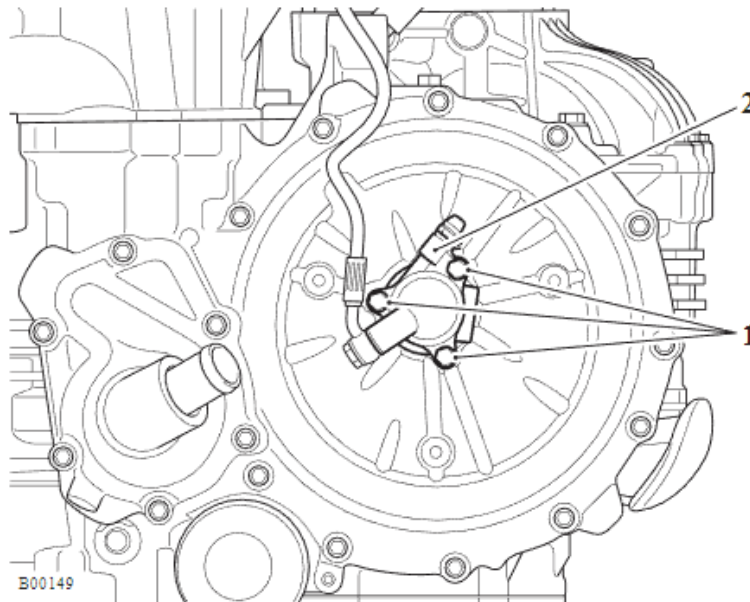


1. Fixings
2. Clutch cover finisher

## **⚠ WARNING**

Do not allow the clutch slave cylinder to hang on the clutch hose as this may damage the hose and could impair clutch operation leading to loss of motorcycle control and an accident.

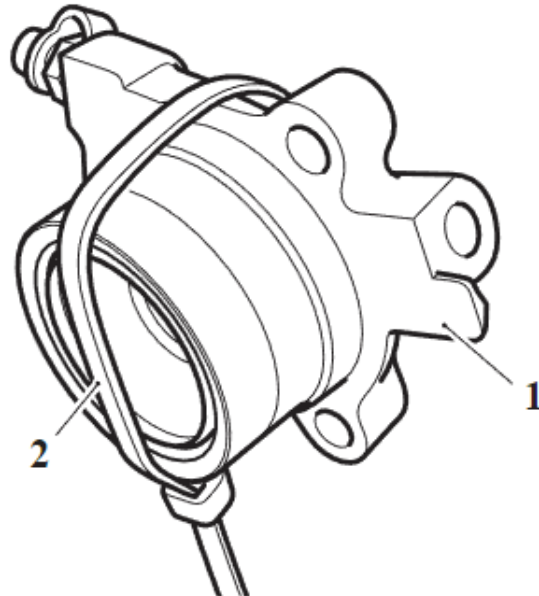
3. Release the three fixings and detach the slave cylinder from the clutch cover. Make sure the piston remains in its cylinder. Discard the slave cylinder gasket.



1. Fixings
2. Clutch slave cylinder



4. Retain the piston to the slave cylinder using a retaining tie such as a rubber band or cable tie.



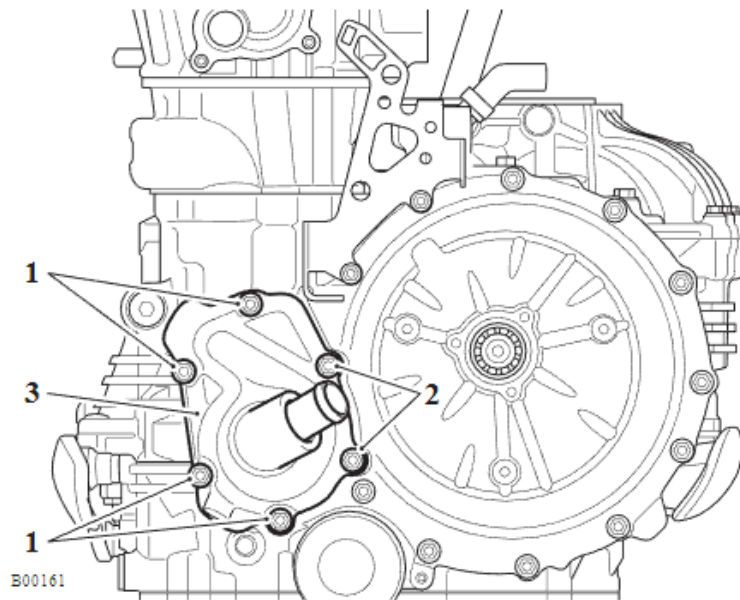
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Clutch slave cylinder</li><li>2. Retaining tie</li></ol> |
|---|

5. Tie the clutch slave cylinder aside.
6. Place an oil catch tray beneath the clutch cover to collect coolant that may spill out on removal.

**NOTICE**

For the water pump cover there are, four M6 x 70 mm and two M6 x 35 mm fixings. Note the position of the fixings for installation.

7. Release the fixings and remove the water pump cover. Discard the seal.



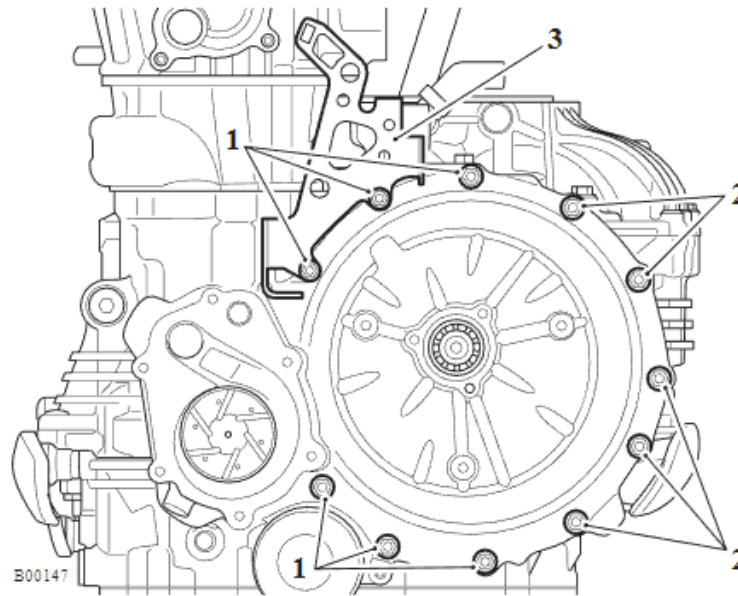
- 1. M6 x 70 mm fixings
- 2. M6 x 35 mm fixings
- 3. Water pump cover

#### **NOTICE**

For the clutch cover there are, five M6 x 50 mm and six M6 x 35 mm fixings.  
Note the position of the fixings for installation.  
Note the position of the radiator lower bracket for installation.  
Note the position of the dowels for installation.

8. Place an oil catch tray beneath the clutch cover to collect engine oil that may spill out on removal.

9. Release the fixings and remove the clutch cover. Discard the gasket.



1. M6 x 35 mm fixings
2. M6 x 50 mm fixings
3. Radiator lower bracket

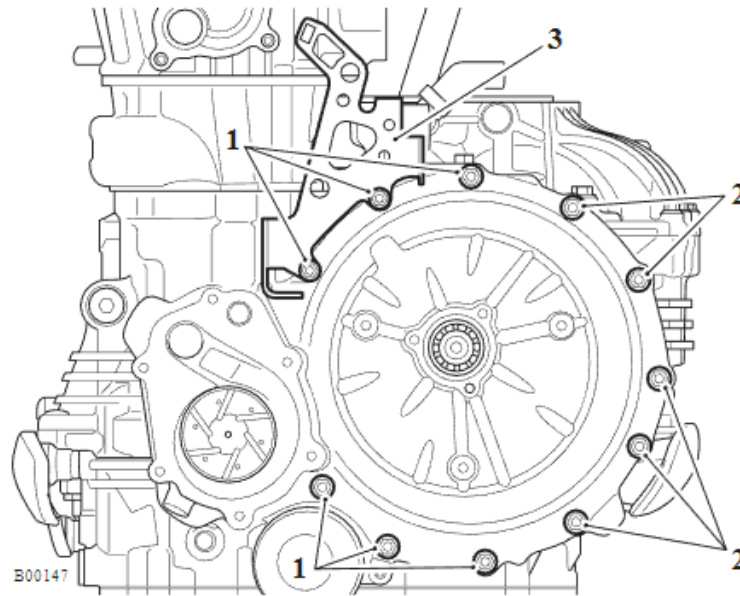
#### Clutch Cover – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the cover and crankcase mating faces.
2. Make sure the dowels are fitted as noted for removal.
3. Position a new gasket to the crankcase.
4. With the water pump drive tang is aligned with the slot in the crankshaft nut, refit the cover ensuring that the gasket does not become dislodged.
5. Position the radiator lower bracket to the clutch cover as noted for removal.

6. Fit the six M6 x 35 mm and five M6 x 50 mm fixings as noted for removal.

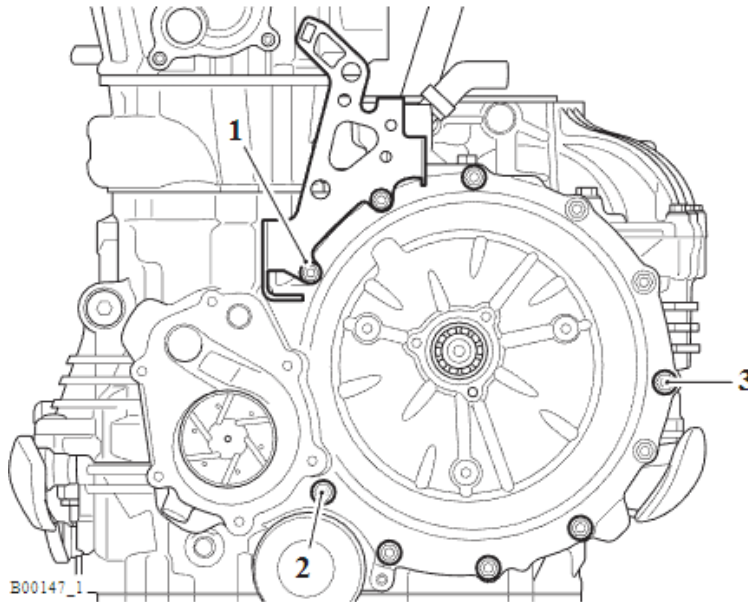


- 1. M6 x 35 mm fixings
- 2. M6 x 50 mm fixings
- 3. Radiator lower bracket

7. Tighten the clutch cover fixings in the following three stages:

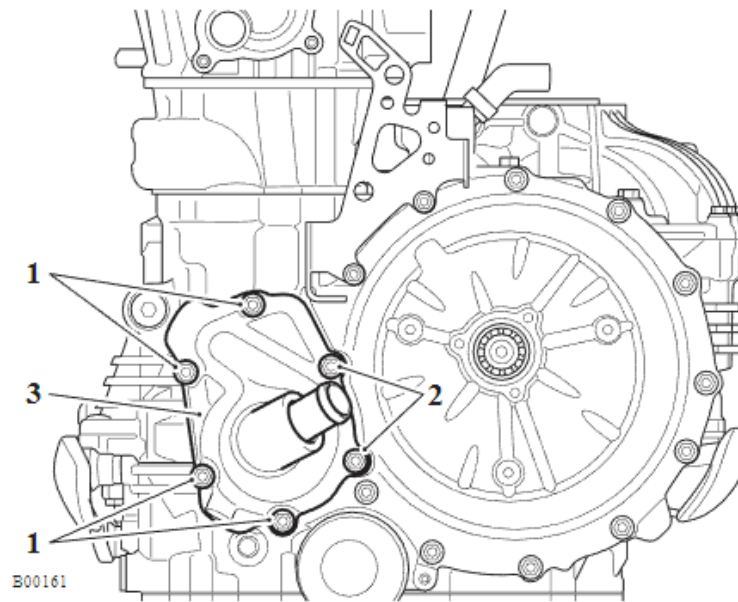
**Stage 1**

8. Tighten the fixings one to three in the sequence shown to 10 Nm.



**Clutch Cover Tightening Sequence Stage 1**

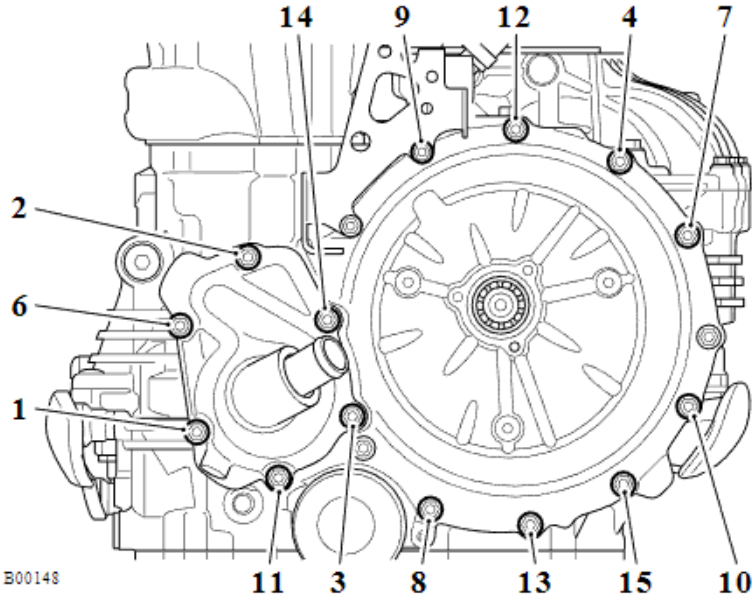
9. Fit a new water pump cover seal to the water pump cover.
10. Fit the water pump cover and its four M6 x 70 mm and two M6 x 35 mm fixings as noted for removal.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. M6 x 70 mm fixings</li><li>2. M6 x 35 mm fixings</li><li>3. Water pump cover</li></ol> |
|---|

**Stage 2**

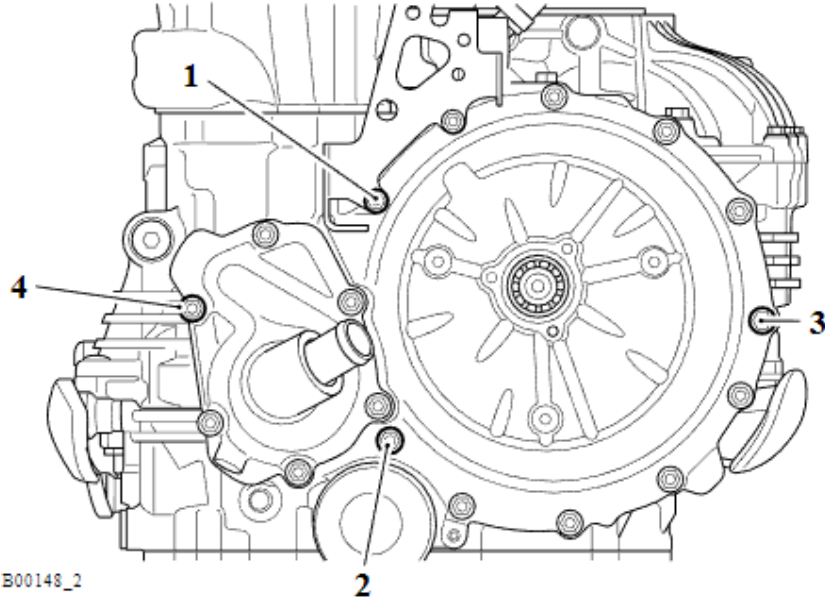
11. Tighten the fixings one to fourteen in the sequence shown to 10 Nm.



Clutch Cover Tightening Sequence Stage 2

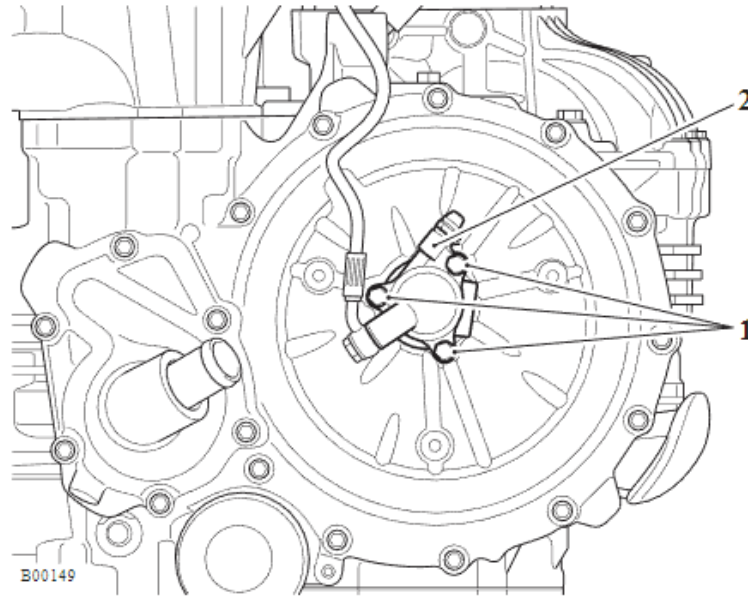
**Stage 3**

12. Retighten fixings one to four to 10 Nm.



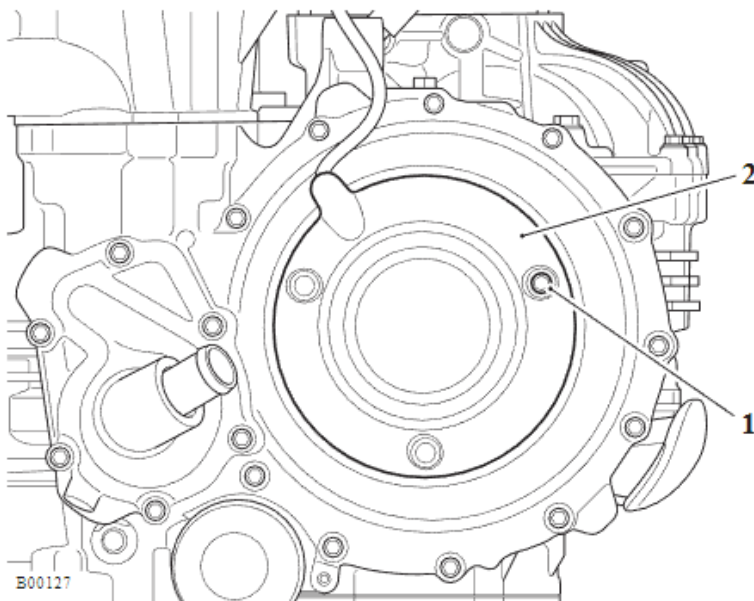
Clutch Cover Tightening Sequence Stage 3

13. Remove the cable tie or rubber band from the slave cylinder.
14. Fit a new gasket to the clutch slave cylinder.
15. Fit the slave cylinder to the clutch cover ensuring that the lifter piece locates correctly in the cylinder. Tighten the cylinder to clutch cover bolts to 10 Nm.



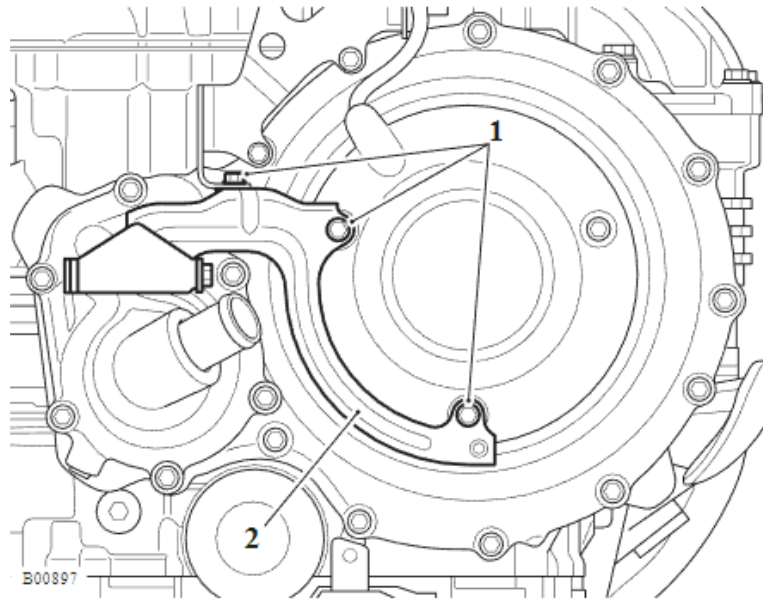
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clutch slave cylinder</li></ol> |
|---|

16. Check the clutch for correct operation and fluid leaks. Rectify as necessary.
17. Fit the clutch cover finisher and secure with the single fixing as noted for removal. Do not fully tighten the fixing at this stage.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clutch cover finisher</li></ol> |
|---|

18. Fit the lower radiator cowl bracket and tighten the clutch cover fixings to 10 Nm.
19. Secure the radiator lower bracket to the lower radiator cowl bracket and tighten the fixing to 5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Bracket</li></ol> |
|---|

Perform the following operations:

- [Radiator – Installation](#)
- [Coolant Expansion Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)



## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

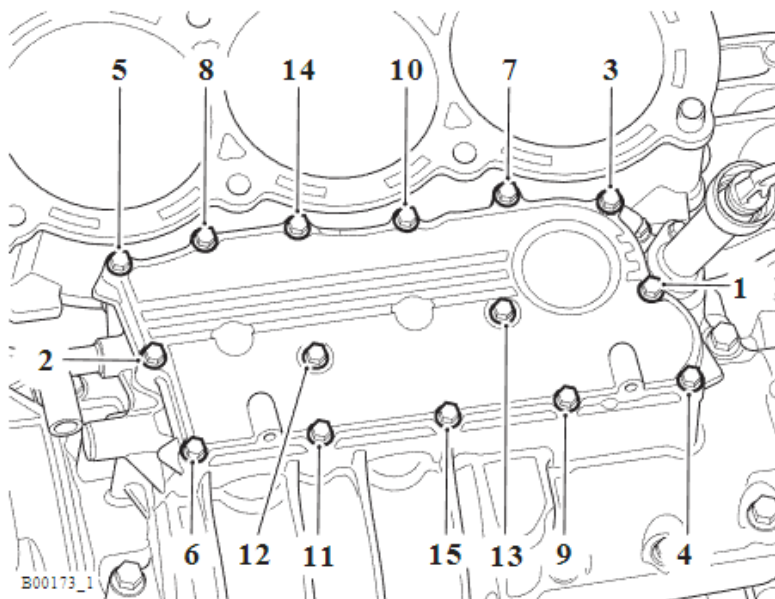
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine – Removal](#)
- [Throttle Body – Removal](#)
- [Cylinder Head – Removal](#)

## NOTICE

Note the position of the dowels for installation

1. Release the fixings in the sequence shown and remove the oil tank cover. Discard the gasket.



Oil Tank Cover Release Sequence

2. Clean the surfaces of the crankcase and the oil tank cover using a lint free cloth.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

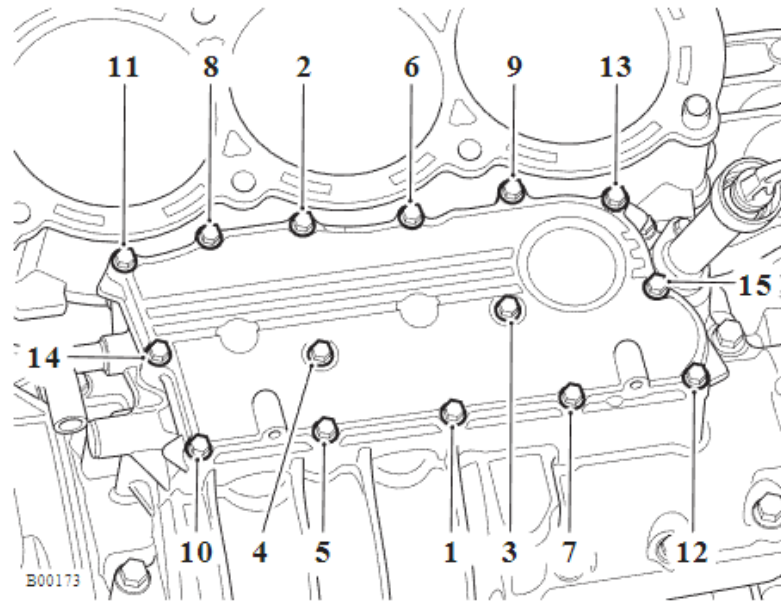
1. Thoroughly clean the cover and crankcase mating faces.
2. Make sure the dowels are fitted as noted for removal.
3. Position a new gasket to the crankcase.
4. Refit the cover ensuring that the gasket does not become dislodged.
5. Fit the fixings and tighten in the following two stages:

Stage 1

6. Tighten the fixings one to fifteen in the sequence shown to 10 Nm.

Stage 2

7. Tighten the fixings one and two to 10 Nm.



Oil Tank Cover Tightening Sequence

Perform the following operations:

- [Cylinder Head – Installation](#)
- [Throttle Body – Installation](#)
- [Engine – Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

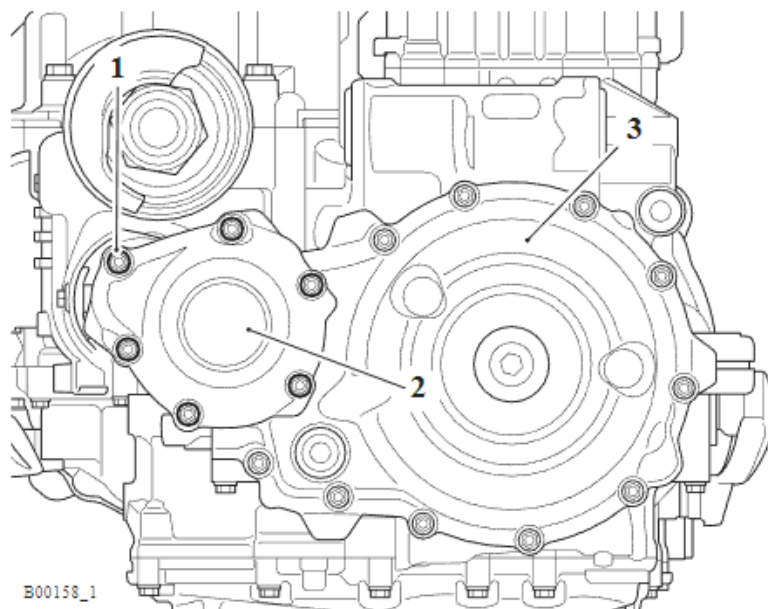
- **Swinging Arm - Removal**

1. Place an oil catch tray beneath the starter drive cover to collect engine oil that may spill out on removal.

**NOTICE**

Note the position of the dowels for installation.

2. Release the fixings and remove the starter drive cover. Discard the gasket.



1. Fixings
2. Starter drive cover
3. Alternator cover

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

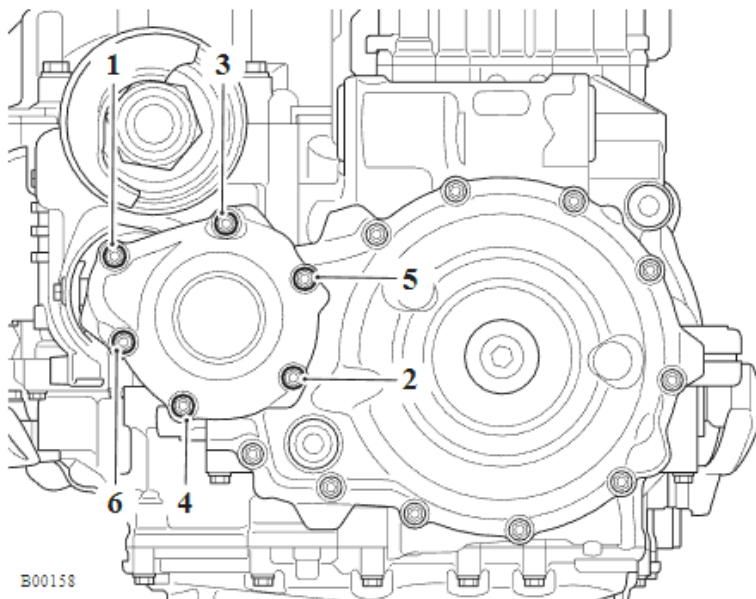
1. Thoroughly clean the cover and alternator cover mating faces.
2. Make sure the dowels are fitted as noted for removal.
3. Position a new gasket to the alternator cover.
4. Fit the starter drive cover to the alternator cover and tighten the fixings in the following two stages:

**Stage 1**

5. Tighten the fixings in the sequence shown to 10 Nm.

**Stage 2**

6. Retighten fixings one and two to 10 Nm.



Starter Drive Cover  
Tightening Sequence

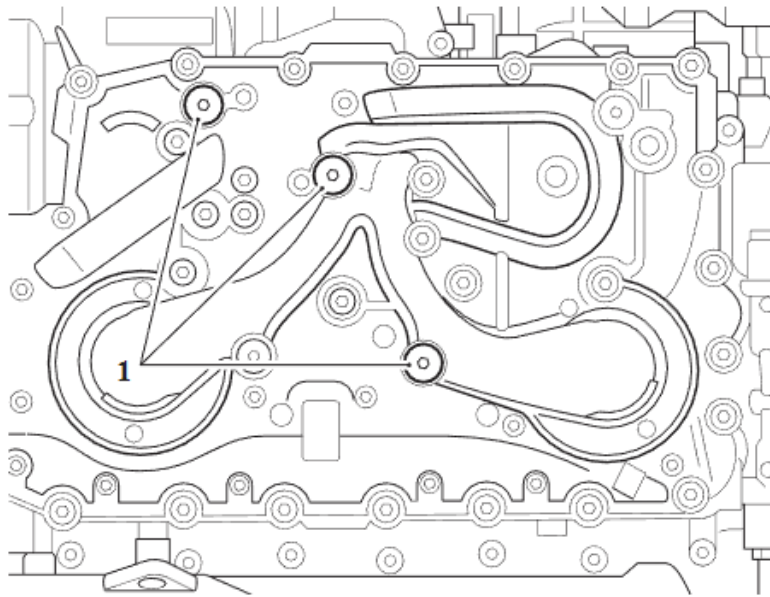
Perform the following operations:

- [Swinging Arm - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

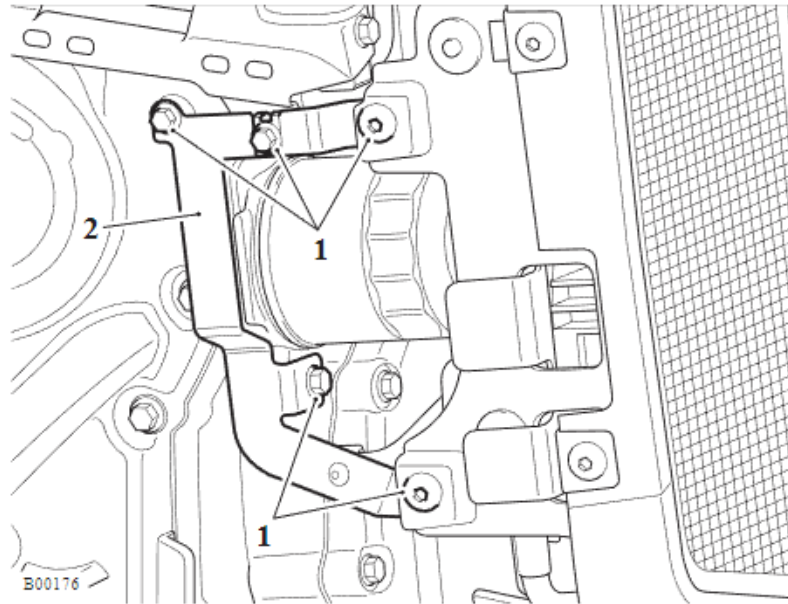
1. Support the motorcycle on its side stand with access to the sump.
2. Place an oil drain pan beneath the engine.
3. Remove the three sump plugs from the bottom of the sump and allow the engine oil to drain. Discard the washers.



1. Engine oil drain plugs

4. Support the motorcycle in an up right position with access to the sump.

5. Release the five fixings and position the radiator lower surround bracket to one side.

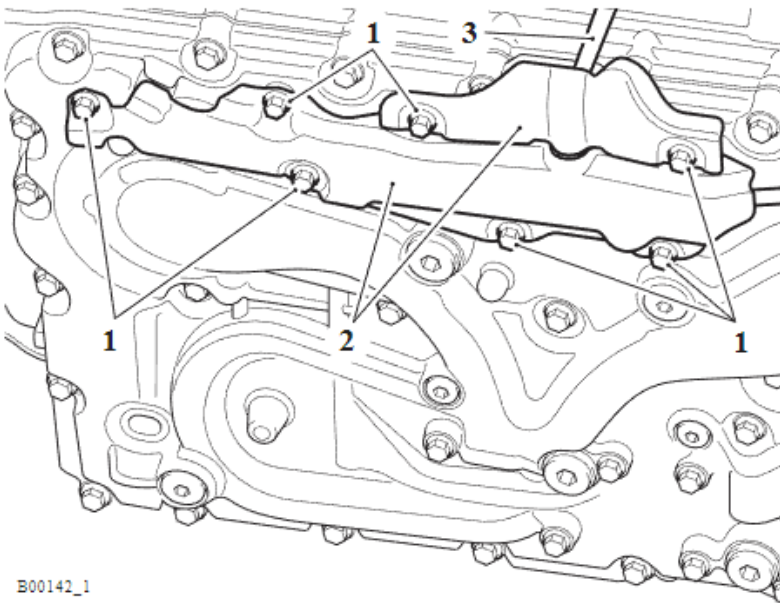


- 1. Fixings
- 2. Radiator lower surround bracket

**NOTICE**

Note the routing of the brake line and the coolant expansion tank drain hose for installation.

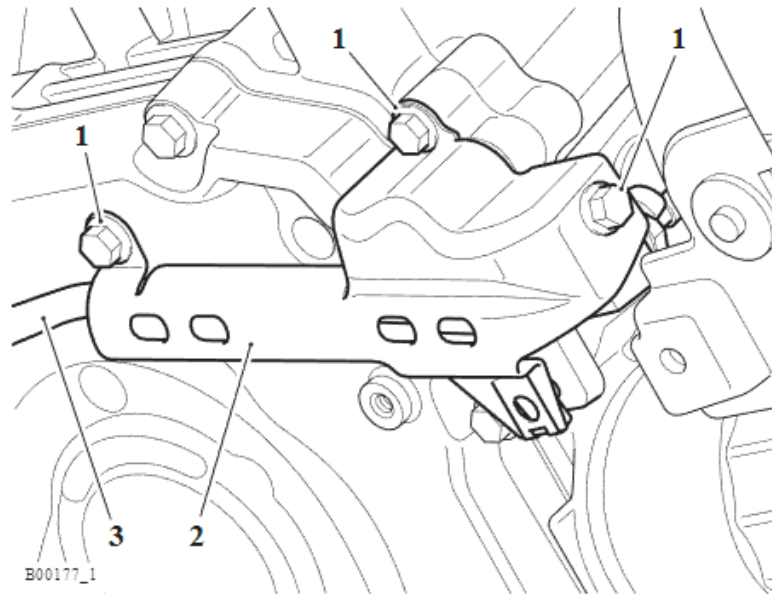
6. Release the fixings and remove the rear brake line two rear brackets.



- 1. Fixings
- 2. Brake line bracket
- 3. Brake line

B00142\_1

7. Release the fixings and remove the rear brake line front bracket.



- 1. Fixings
- 2. Brake line front bracket
- 3. Brake line

**⚠ WARNING**

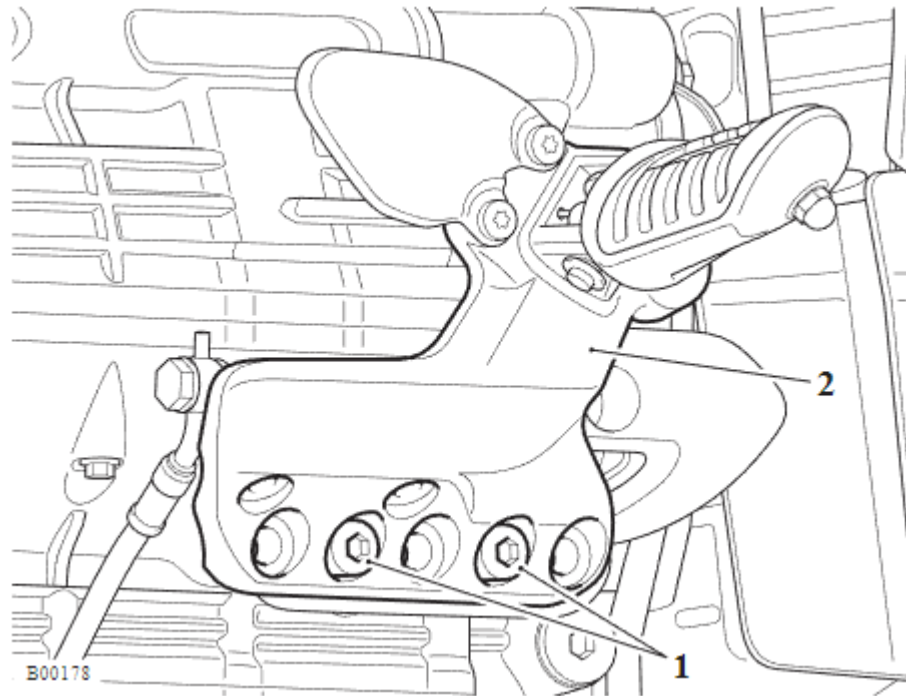
Do not allow a brake component to hang unsupported on the brake hose or line. Brake hoses or lines that are not supported may become damaged or bent. Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

**⚠ WARNING**

Note the position of the rider's right hand control plate for installation. Always return the rider control plates to their original positions. Operating the motorcycle with the control plates in a position which is unfamiliar may lead to loss of control or an accident.



8. Release the fixings and detach the rider right hand control plate from the engine.  
support the the control plate to prevent damage to the brake lines.



1. Fixings
2. Right hand control plate

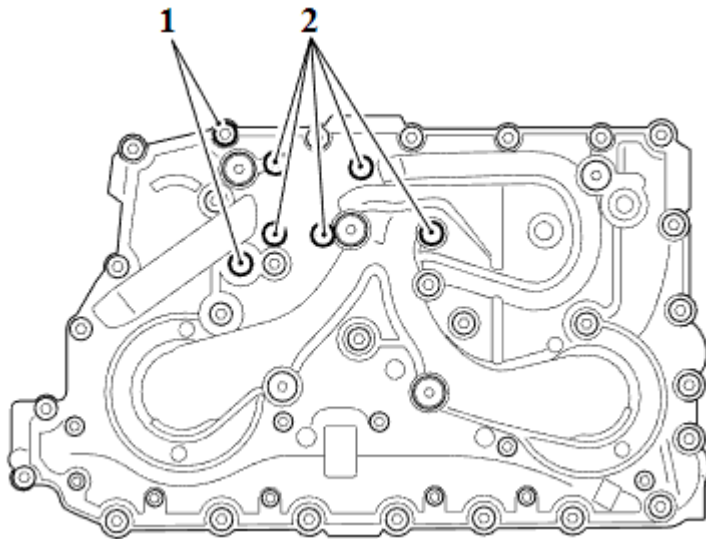
### **NOTICE**

For the sump there are, twenty six M6 x30 mm, two M6 x 130 mm and five M6 x 50 mm fixings.

The M6 x 50 mm fixings are encapsulated and must be replaced if loosened or removed.

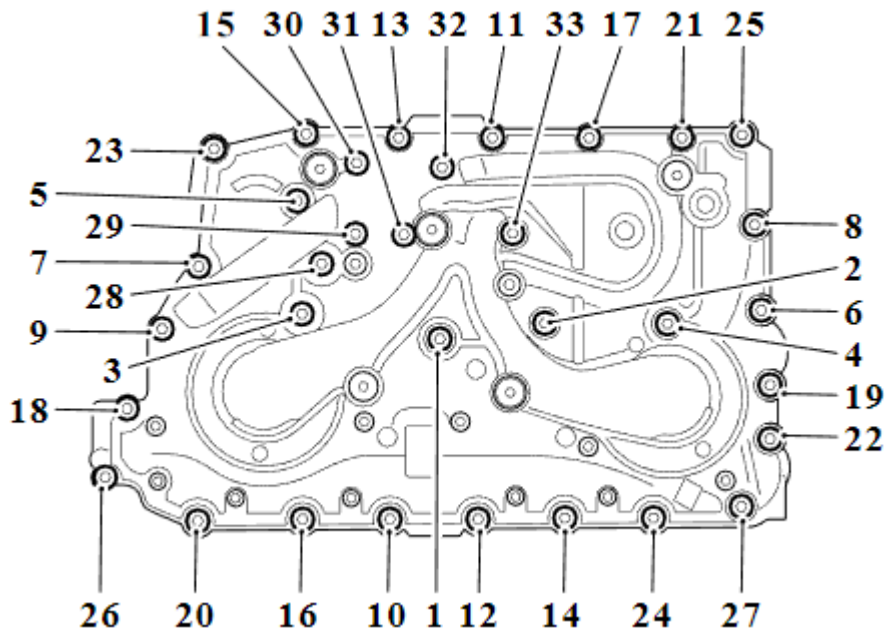
Note the position of the fixings for installation.

Note the positions of the dowels for installation.



- |   |
|---|
| 1. M6 x 130 mm fixings<br>2. M6 x 50 mm fixings |
|---|

9. Release the fixings in the sequence shown and remove the sump. Remove and discard the sump gasket and the five M6 x 50mm fixings.



|                       |
|-----------------------|
| Sump Release Sequence |
|-----------------------|

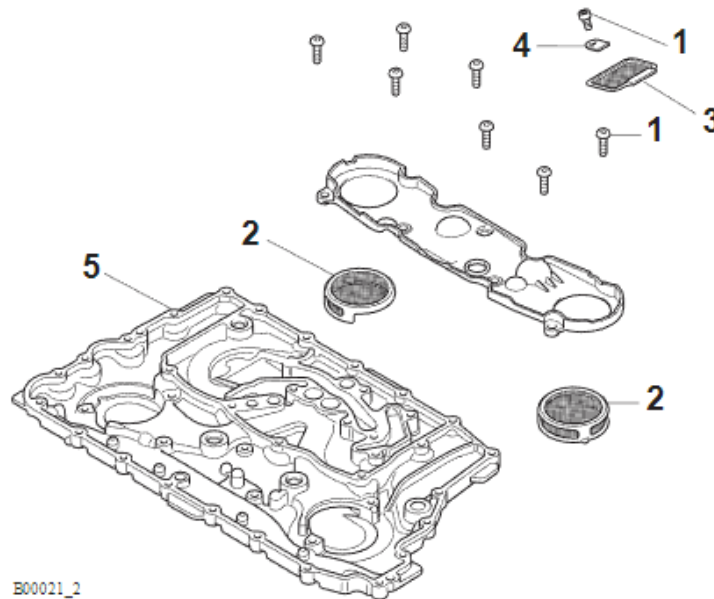
10. If required, release the fixings securing the baffle plate and the retaining plate for the pick up filter. Discard the fixings.

## NOTICE

Note the orientation of the baffle plate, the two oil strainers and their O-rings for installation.

Note the orientation of the oil pick-up and its retaining plate filter for installation.

11. Remove the baffle plate and the filters for cleaning.



B00021\_2

1. Fixings
2. Oil strainers
3. Pick-up filter
4. Retaining plate
5. Sump

12. Clean the surfaces of the crankcase and the sump cover using a lint free cloth.

## Sump – Inspection

### **WARNING**

Make sure the oil pick-up is clean and free of blockages or restrictions. If the oil flow is restricted, oil pressure will be reduced and may cause severe engine damage.

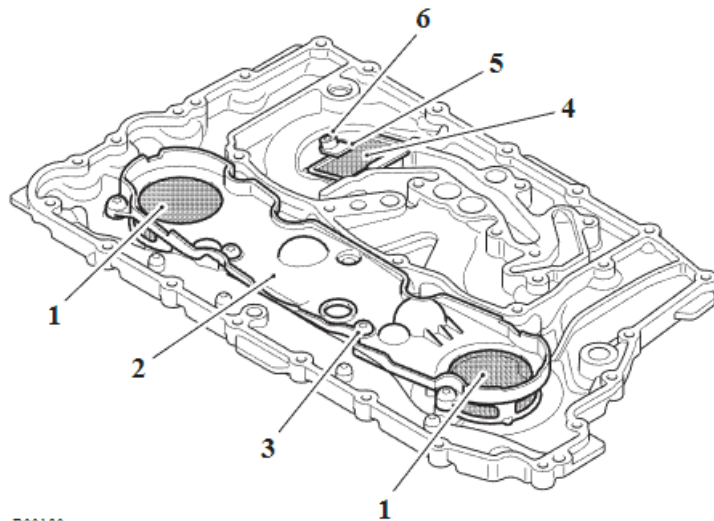
1. Check the oil pick-up for blockages or restrictions. Remove and clean if found to be blocked or restricted.

## Sump – Installation

### **WARNING**

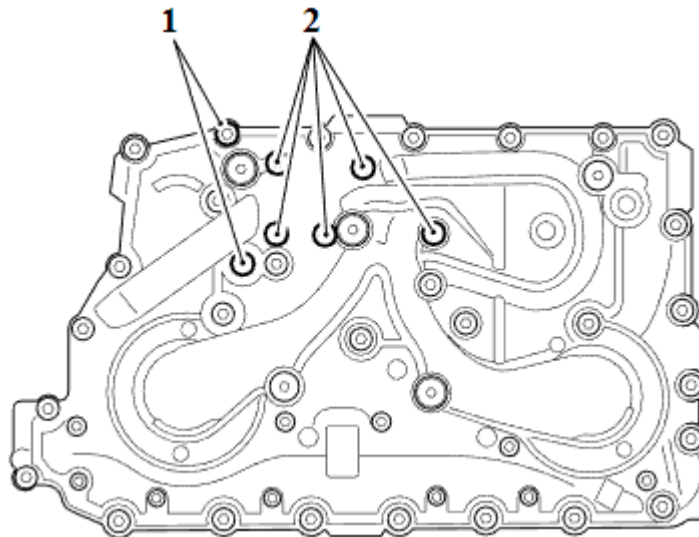
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, fit the two oil strainers, their new O-rings and the baffle plate as noted for removal and evenly tighten the new fixings to 8 Nm.
2. Fit the oil pick up filter and its retaining plate as noted for removal and tighten its new fixing to 8 Nm.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Oil strainers</li> <li>2. Baffle plate</li> <li>3. Fixings</li> <li>4. Pick up filter</li> <li>5. Retaining plate</li> <li>6. Fixing</li> </ol> |
|---|

3. Position a new gasket to the sump.
4. Make sure the four locating dowels are fitted to the sump as noted for removal.
5. Refit the cover ensuring that the gasket does not become dislodged.
6. Fit the sump cover with five new M6 x 50 mm fixings and the two M6 x 130 mm positioned as noted for removal.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. M6 x 130 mm fixings</li> <li>2. M6 x 50 mm fixings</li> </ol> |
|---|

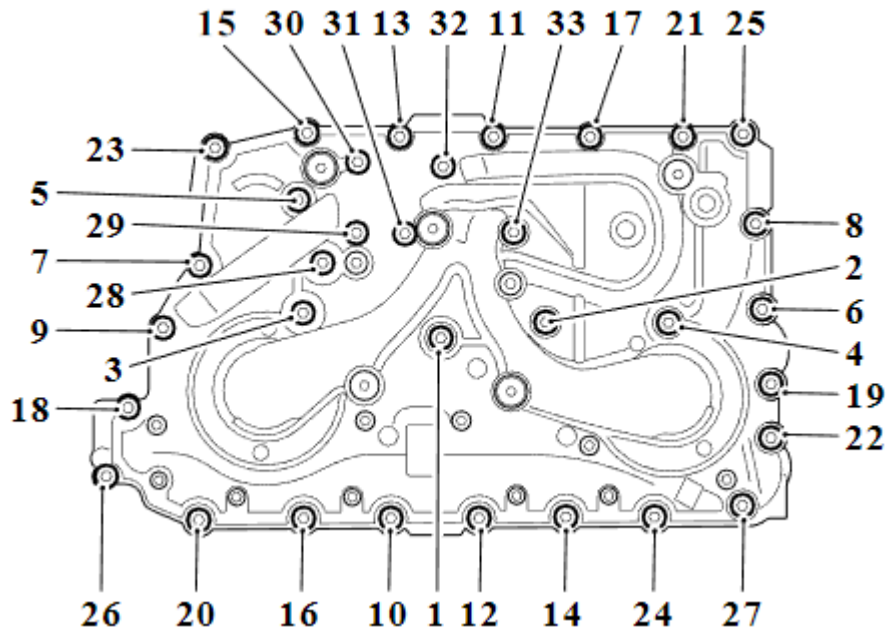
7. Fit new sealing washers to the three sump plugs. Fit and tighten the plugs to 30 Nm.
8. Fit the remaining M6 x 30 mm fixings and tighten all the sump fixings in the following two stages:

**Stage 1**

9. Tighten the fixings one to thirty three in the sequence shown to 10 Nm.

**Stage 2**

10. Retighten fixings one and two to 10 Nm.

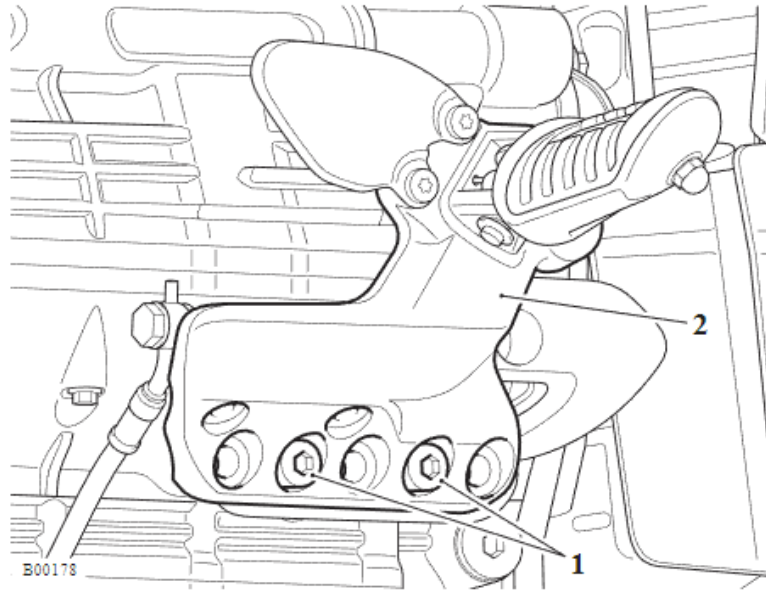


Sump Tightening Sequence

**⚠ WARNING**

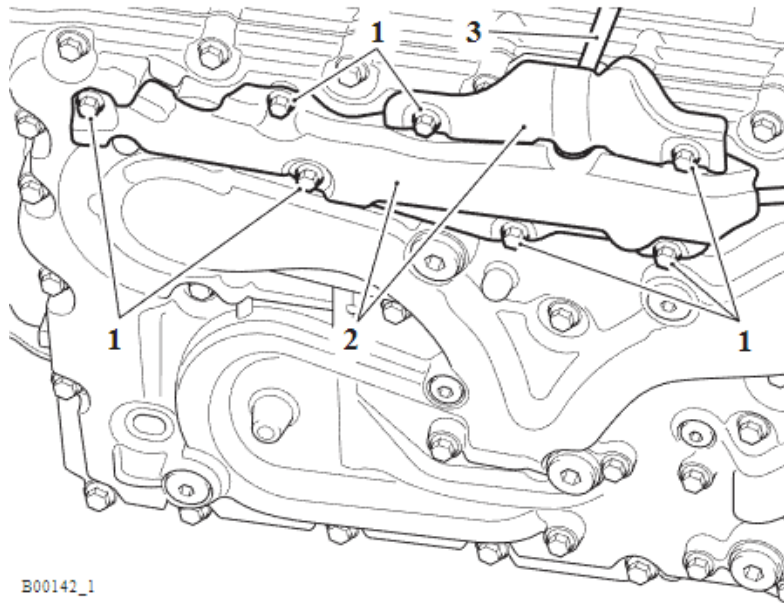
Always return the rider control plates to their original positions. Operating the motorcycle with the control plates in a position which is unfamiliar may lead to loss of control or an accident.

11. Fit the rider's right hand control plate to the engine as noted for removal and tighten the fixings to 36 Nm.



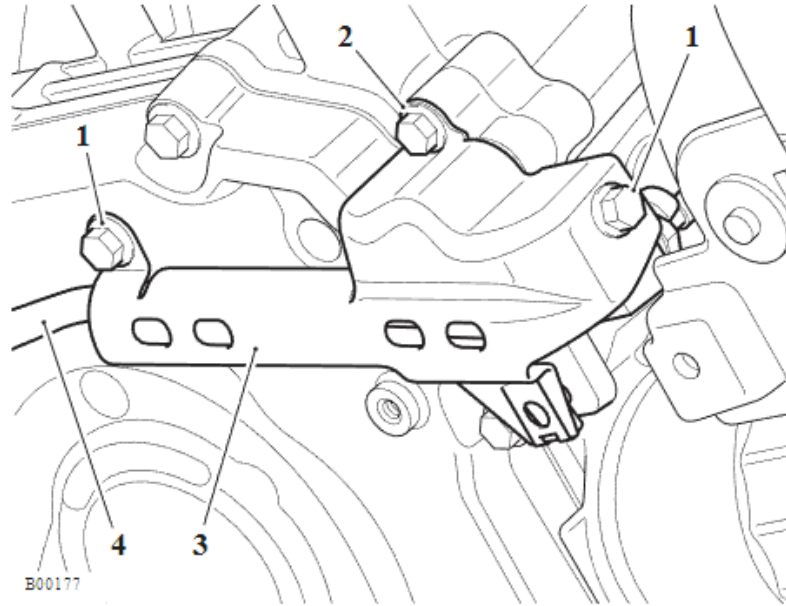
- 1. Fixings
- 2. Right hand control plate

12. Route the brake line and the coolant expansion tank hose as noted for removal. Fit the brake line two rear brackets and tighten the fixings to 5 Nm.



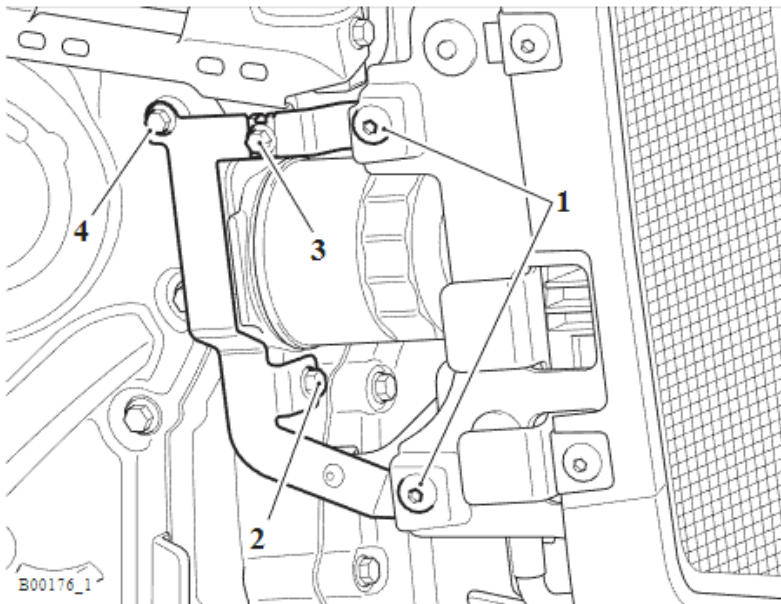
- 1. Fixings
- 2. Brake line bracket
- 3. Brake line

13. Fit the rear brake line front bracket and tighten its fixings as shown in the illustration.



- 1. Fixings - tighten to 5 Nm
- 2. Fixing - tighten to 8 Nm
- 3. Brake line bracket
- 4. Rear brake line

14. Fit the radiator lower surround bracket to the radiator lower surround and the sump and tighten its fixings as shown in the illustration below.



- 1. Fixings - tighten to 4 Nm
- 2. Fixing - tighten to 5 Nm
- 3. Fixing - tighten to 4 Nm
- 4. Fixing - tighten to 5 Nm



15. Fill the engine with the correct grade of engine oil (see Lubrication).

**⚠ CAUTION**

Raising the engine speed above idle, before the oil reaches all parts of the engine can cause engine damage or seizure. Only raise engine speed after running the engine for 30 seconds to allow the oil to circulate fully.

**⚠ CAUTION**

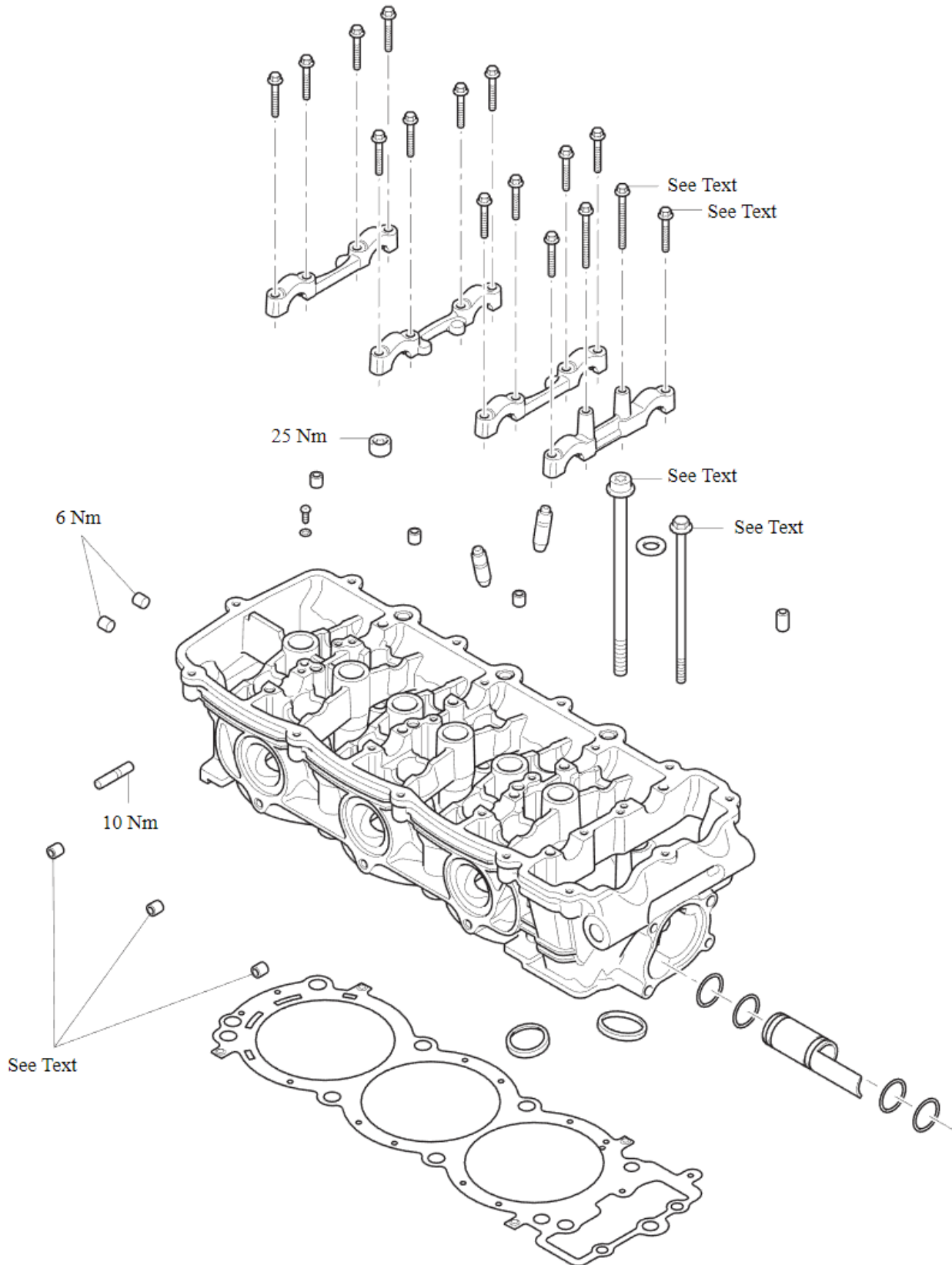
If the engine oil pressure is too low, the low oil pressure warning light will illuminate. If this light stays on when the engine is running, stop the engine immediately and investigate the cause. Running the engine with low oil pressure will cause engine damage.

16. Start the engine and make sure that the low oil pressure warning light goes out shortly after starting.

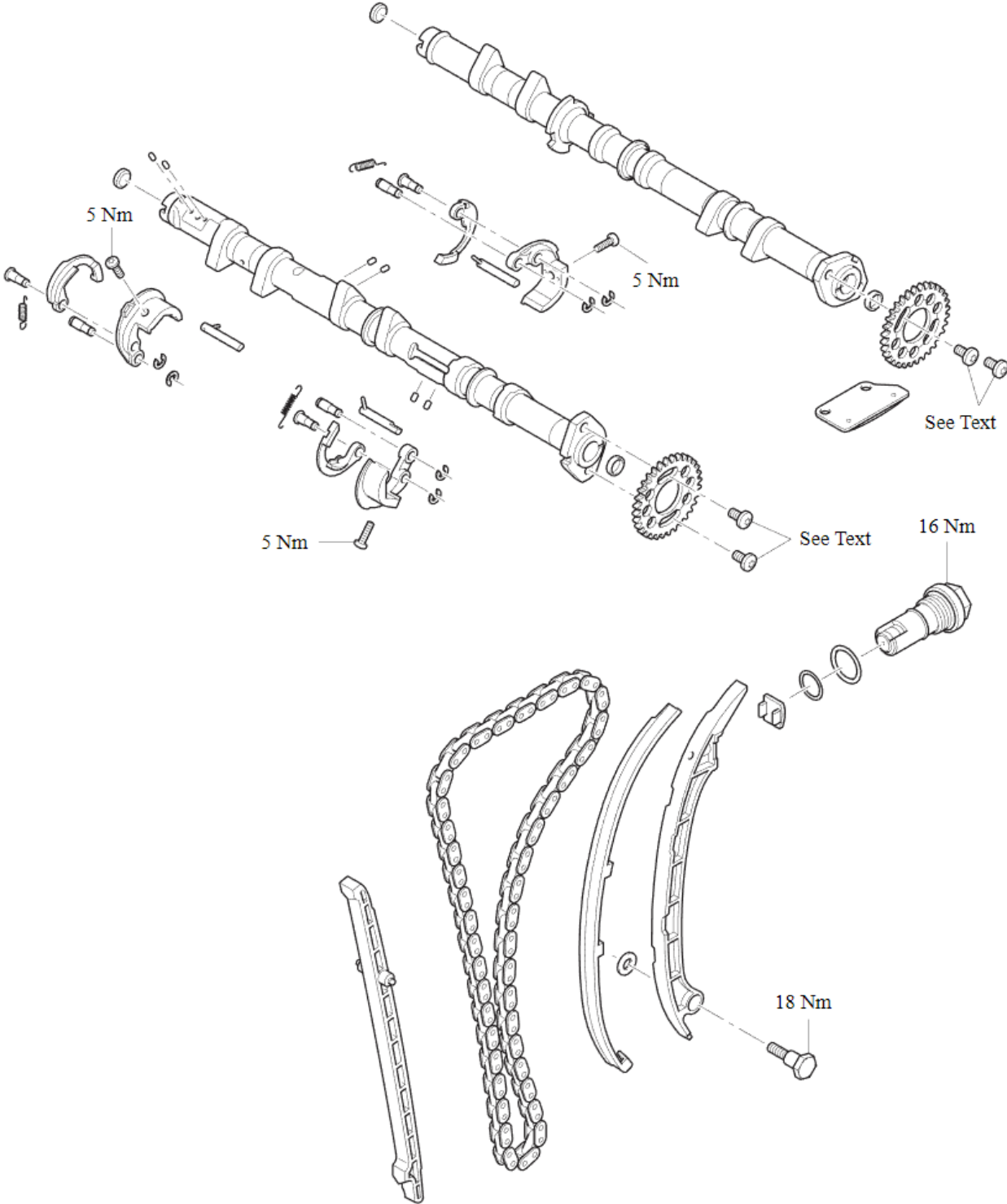
17. Stop the engine and check the engine oil level. Adjust if necessary (see [Engine Oil - Level Inspection](#)).

# Cylinder Head

## Exploded View - Cylinder Head



Exploded View - Camshaft and Camshaft Drive



## Cylinder Head – Description

The engine is fitted with an aluminium alloy cylinder head, which carries the camshafts, valves and spark plugs. The cylinder head is cast as a single entity and various components are permanently added after machining.

The camshafts run directly in the cylinder head without separate bearings. Valve clearances are adjusted by changing variable thickness shims which sit between the valve tappet bucket and the valves.

The camshafts are driven by a silent-type chain. The chain is guided by two blades and is tensioned by a hydraulic tensioner.

The hydraulic tensioner is fed oil via a gallery in the cylinder head. The combination of oil pressure and spring pressure pushes the plunger against the tensioner blade which tensions the camshaft drive chain. The hydraulic tensioner has an oil pressure relief valve located in the plunger. It is set to open between 19 and 23 bar. When open it sprays oil through a drilling in the tensioner blade onto the camshaft drive chain.

Oil is supplied to the cylinder head by an internal gallery. Once supplied to the cylinder head, the oil is distributed along internal drilling's within the head casting and camshaft.

Single valve springs are used to close both the inlet and exhaust valves. These valve springs have close wound coils at one end to assist in the prevention of valve bounce at high engine speed and to give a smooth valve actuation. When assembling the cylinder head it is important that the close wound, colour coded ends of the springs are fitted downwards (towards the piston). The tip of the inlet and exhaust valves are hardened to give a long service life.

Due to the methods used to assemble the valve seat and valve guides to the head, these parts cannot be replaced.

### CAUTION

In any of the following operations which necessitate the removal or disconnection of the camshaft drive chain, NEVER turn the engine without the camshaft drive chain and tensioner correctly fitted and adjusted. In the disassembled condition, the pistons will contact the valves if the crankshaft is turned, causing severe engine damage.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

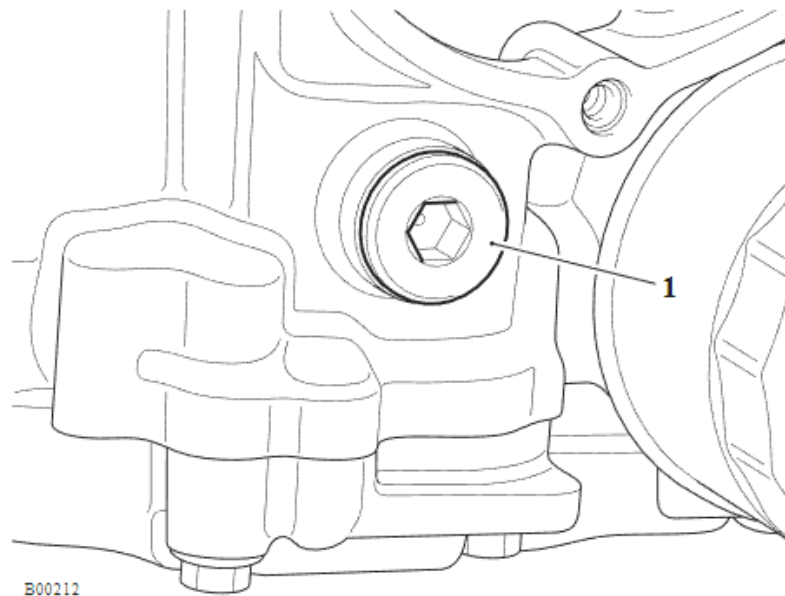
**⚠ CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.  
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.  
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operation:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Camshaft Cover - Removal](#)
- [Clutch Cover - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)

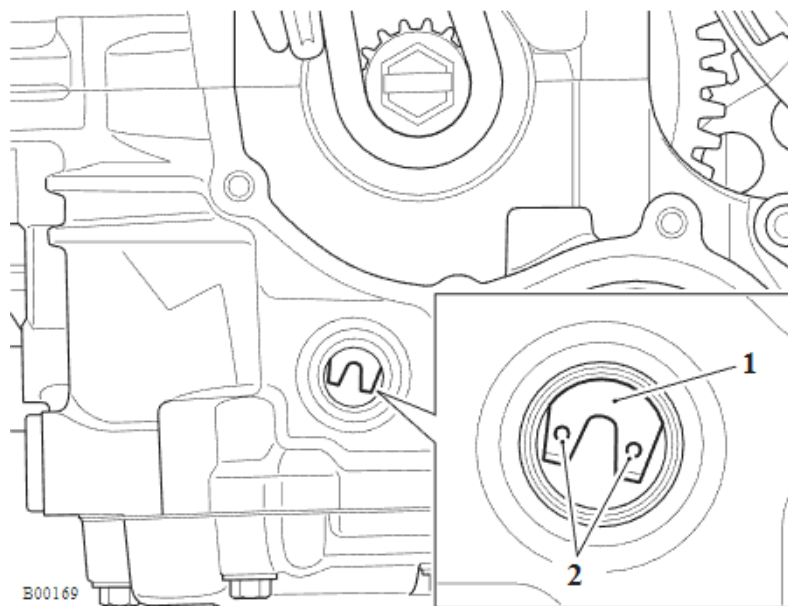
15. Remove the crankshaft locking pin plug from the crankcase.



B00212

1. Locking pin plug

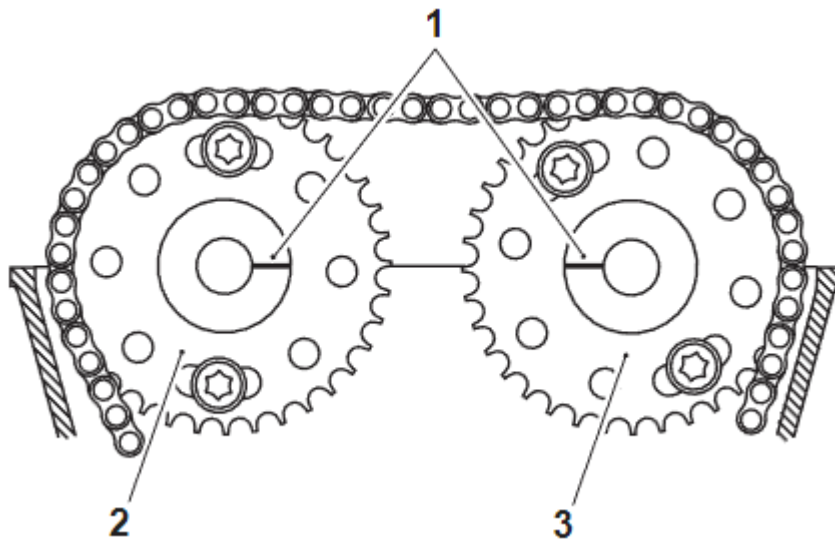
2. At the front of the engine, rotate the crankshaft anticlockwise using the bolt fitted to the end of the crankshaft until the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin.



B00169

2. Crankshaft primary gear  
3. Alignment marks

3. Check the alignment marks on the front end of the camshaft journals are pointing inwards. If they are pointing outwards, rotate the crankshaft anticlockwise one complete turn.

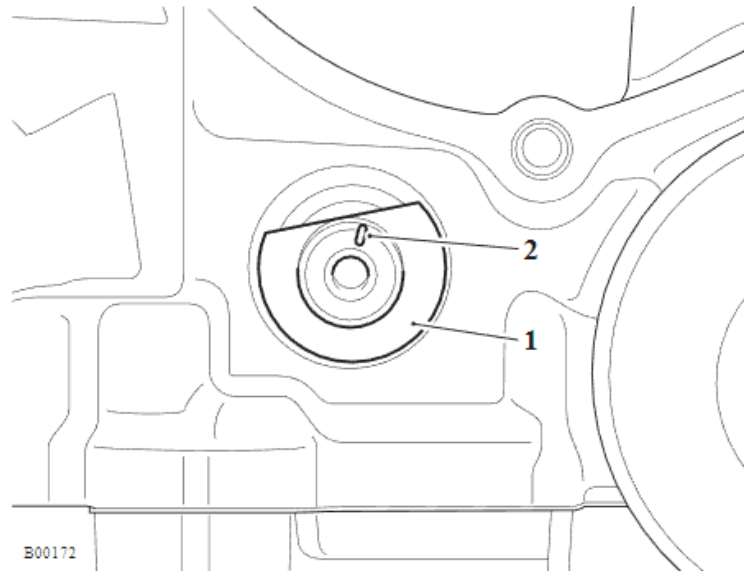


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Camshaft alignment marks</li><li>2. Exhaust camshaft</li><li>3. Inlet camshaft</li></ol> |
|---|

#### **NOTICE**

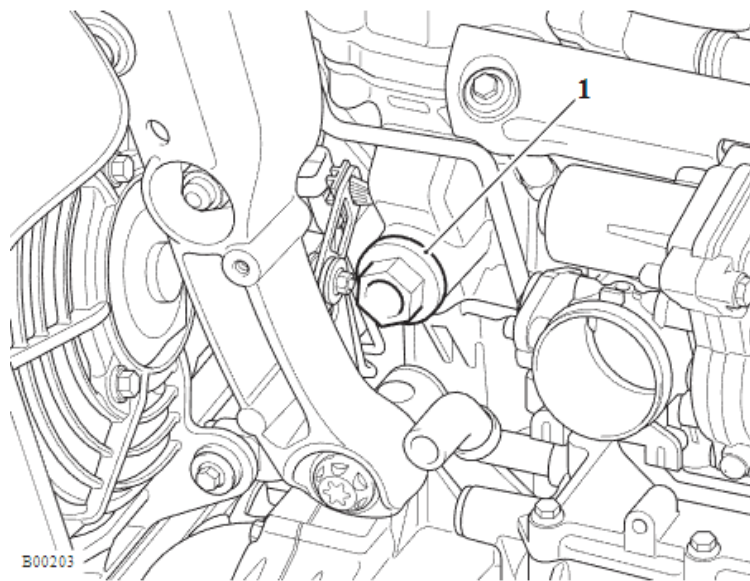
The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

4. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



- |  |
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| <ol style="list-style-type: none"><li>1. T3880501 - Crankshaft Locking Pin</li><li>2. Alignment mark</li></ol> |
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5. Place suitable wedges between the camshaft sprockets and the crankcase, to hold the camshaft drive chain taut during removal of the tensioner.
6. Using service tool T3880649, unscrew the hydraulic tensioner body until the plunger spring tension has been released.



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| <ol style="list-style-type: none"><li>1. Tensioner</li></ol> |
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7. Remove the hydraulic tensioner and discard the O-rings.

#### Camshaft Drive Chain Tensioner – Inspection

1. Inspect the camshaft drive chain tensioner spring for damage and deformation.  
Renew as necessary.
2. Inspect the tip of the camshaft drive chain tensioner plunger for wear and damage.  
Renew as necessary.

#### Camshaft Drive Chain Tensioner – Installation

### **WARNING**

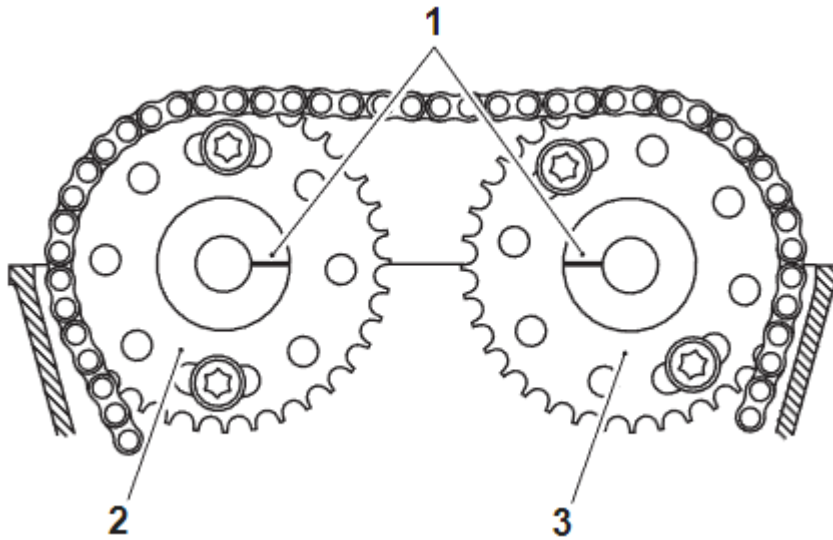
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.  
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.  
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

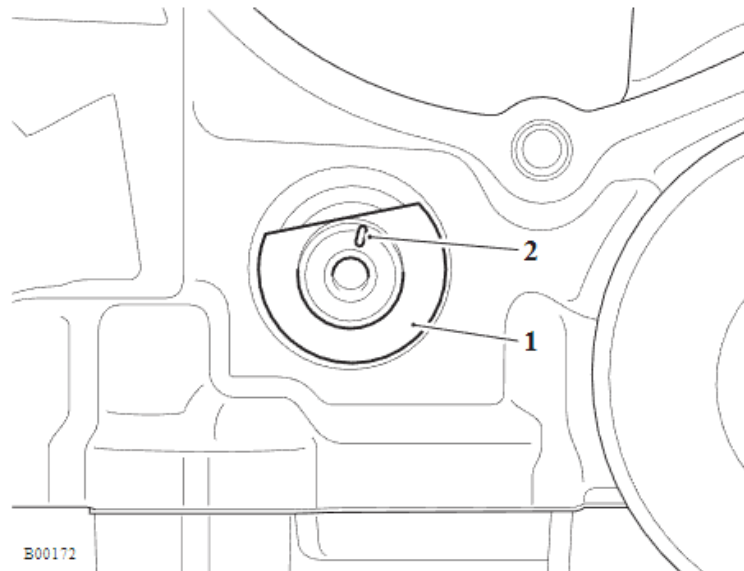
1. Make sure that the camshaft drive chain tensioner blade is in contact with the camshaft drive chain.
2. Check that the wedges are between the camshaft sprockets and the crankcase.

3. Check the alignment marks on the front end of the camshaft journals are pointing inwards.



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| <ol style="list-style-type: none"><li>1. Camshaft alignment marks</li><li>2. Exhaust camshaft</li><li>3. Inlet camshaft</li></ol> |
|---|

4. Check that service toll T3880501 is through the hole in the crankcase.



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| <ol style="list-style-type: none"><li>1. T3880501 - Crankshaft Locking Pin</li><li>2. Alignment mark</li></ol> |
|--|

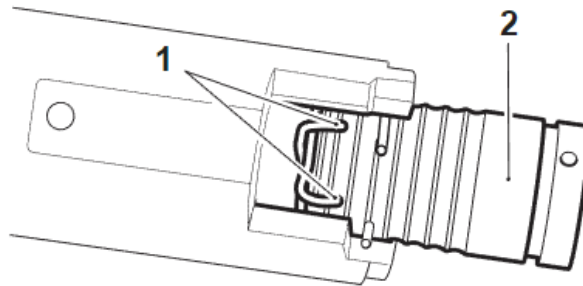
## **⚠ WARNING**

The plunger of the camshaft drive chain tensioner is under spring tension. Always wear hand, eye and facial protection when removing the tensioner as unprotected areas of the body can be injured if the spring tension is released in an unexpected or uncontrolled way.

## **NOTICE**

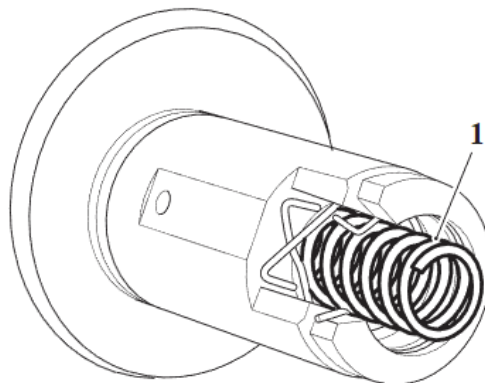
If installing a new hydraulic tensioner, do not release the plunger before fitting.  
If installing the original hydraulic tensioner, the engine oil must be drained out of the tensioner to enable the plunger to be set onto the first tooth of the ratchet.

5. Hold the resister ring ends together and pull out the plunger.



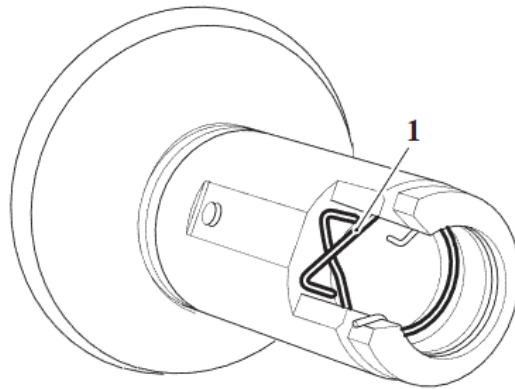
- 1. Resister ring ends
- 2. Plunger

6. Remove the spring.



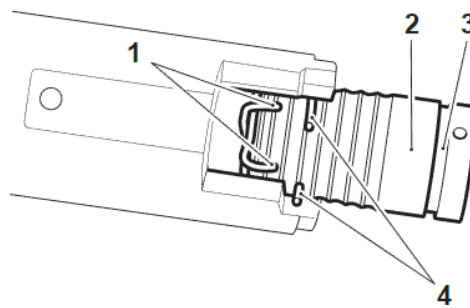
- 1. Spring

7. While holding the resister ring in place, drain the engine oil into a suitable container.
8. Make sure the resister ring is correctly located as shown below.



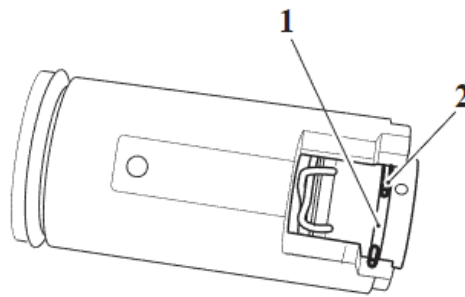
1. Resister ring

9. Refit the spring.
10. Support the tensioner in a soft jawed vice.
11. Hold the resister ends together, close the vice allowing the plunger to be pushed through the resister ring until the snap ring aligns with the snap ring groove.



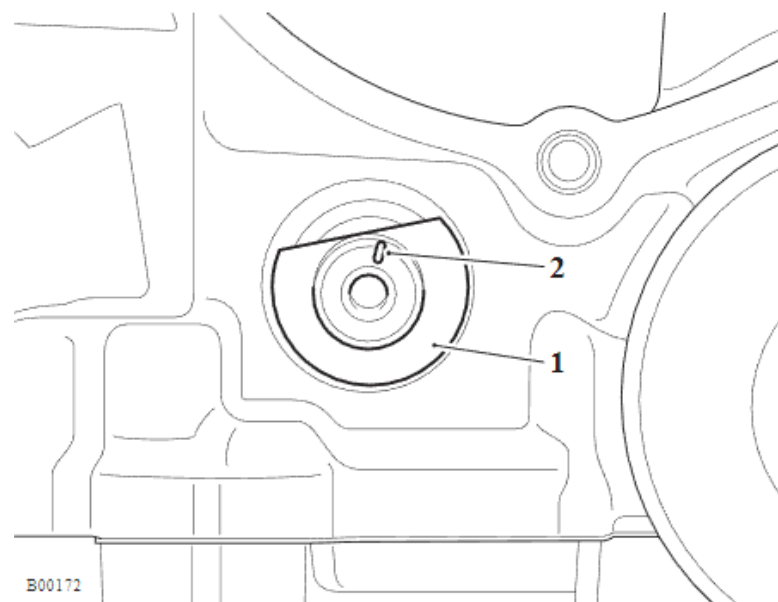
1. Resister ring  
2. Plunger  
3. Snap ring groove  
4. Snap ring

12. When the snap ring aligns with the snap ring groove, release the vice and move one end of the snap ring into the groove. Slowly release the plunger to make sure it is held in place.



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| <ol style="list-style-type: none"><li>1. Snap ring groove</li><li>2. Snap ring</li></ol> |
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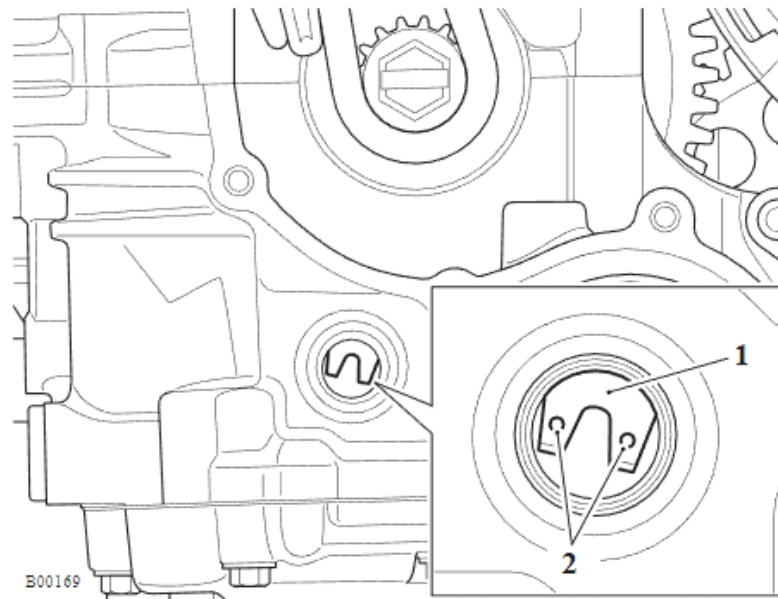
13. Fit two new O-rings to the camshaft drive chain tensioner body.  
14. Fit the tensioner to the cylinder head as noted for removal. Using service tool T3880649, tighten the tensioner to 16 Nm.  
15. Remove the two wedges that are between the camshaft sprockets and the crankcase.  
16. Remove service tool T3880501.



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| <ol style="list-style-type: none"><li>1. T3880501 - Crankshaft Locking Pin</li><li>2. Alignment mark</li></ol> |
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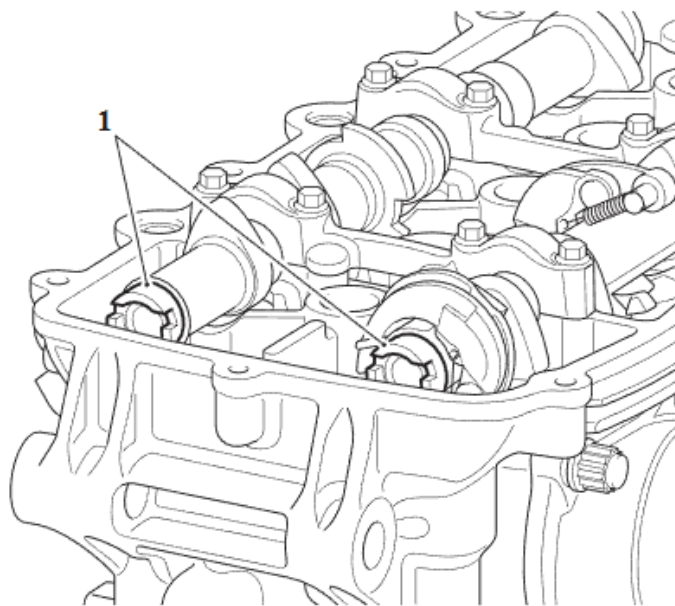
17. To release the plunger from the snap ring holding the hydraulic tensioner, rotate the crankshaft anticlockwise until the plunger is released.

18. Continue to rotate the crankshaft anticlockwise to complete two revolutions and the two gear teeth with an alignment marks are visible and central in the hole for the crankshaft locking pin.



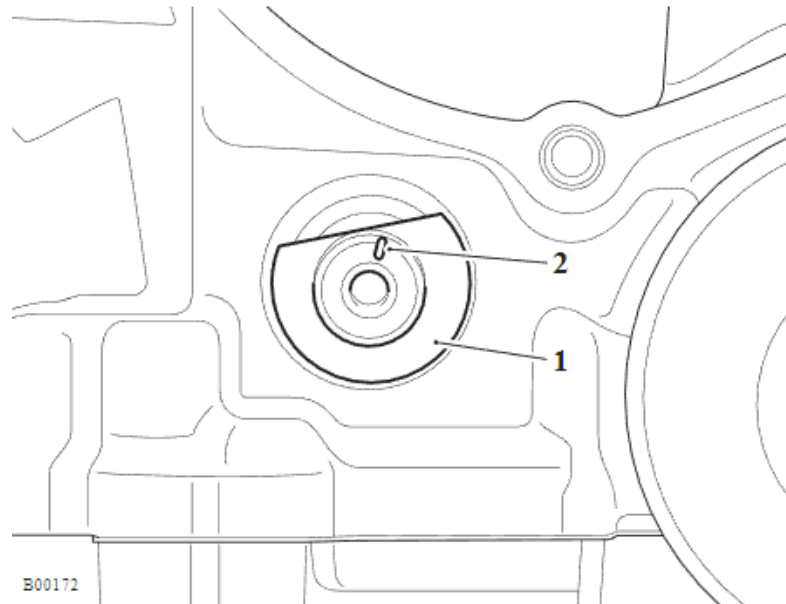
- 1. Crankshaft primary gear
- 2. Alignment marks

19. Check that there is tension in the camshaft drive chain and the slot at the camshafts end are correctly aligned.



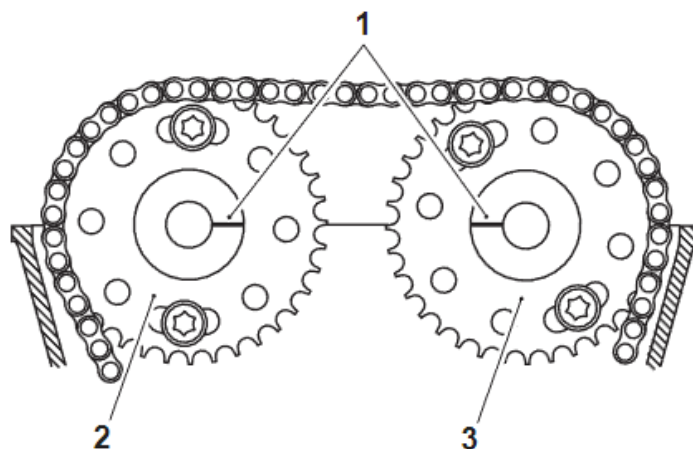
- 1. Camshaft timing slots

20. Check that the tensioner plunger is correctly located in the middle of the camshaft drive chain tensioner blade when viewed from above.
21. Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC.  
Make sure that the two gear teeth with an alignment marks are visible in the hole for the crankshaft locking pin.
22. Fit service tool T3880501 through the hole in the crankcase.



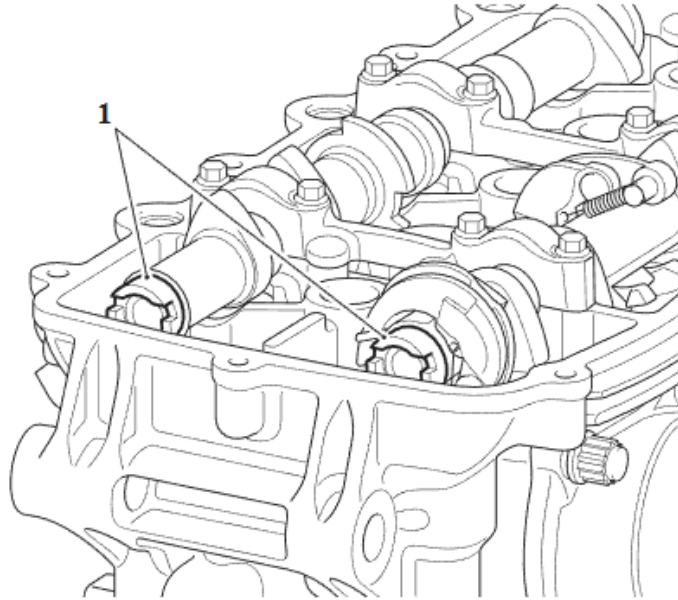
- |   |
|---|
| <ol style="list-style-type: none"> <li>1. T3880501 - Crankshaft Locking Pin</li> <li>2. Alignment mark</li> </ol> |
|---|

23. Check the alignment marks on the front end of the camshaft journals are pointing inwards.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Camshaft alignment marks</li> <li>2. Exhaust camshaft</li> <li>3. Inlet camshaft</li> </ol> |
|---|

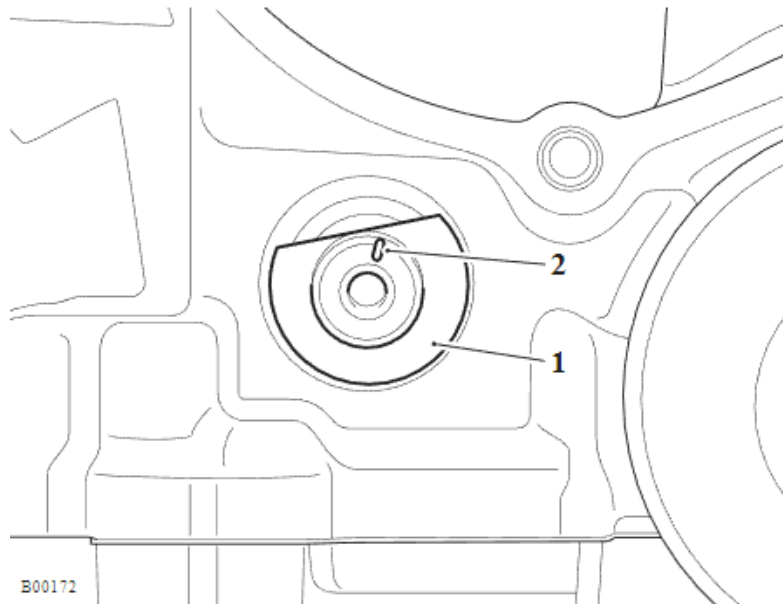
24. Recheck that there is tension in the camshaft drive chain and the slot at the camshafts end are correctly aligned.



1. Camshaft timing slots

25. Recheck the tensioner plunger location against the camshaft drive chain tensioner blade.

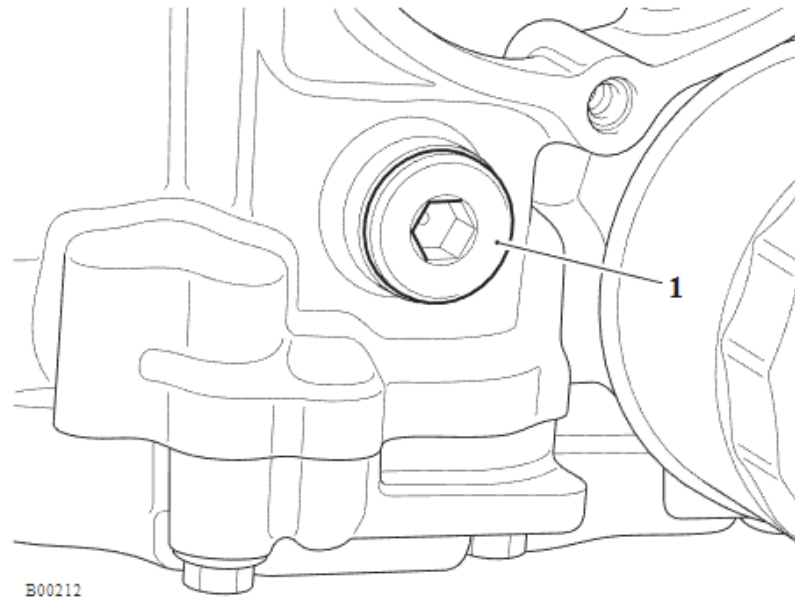
26. Remove service tool T3880501.



1. T3880501 - Crankshaft Locking Pin  
2. Alignment mark



27. Fit the crankshaft locking pin plug and tighten to 33 Nm.



1. Locking pin plug

#### **NOTICE**

After fitting to the engine, the hydraulic tensioner will be empty of engine oil. After starting the engine, the camshaft drive chain and tensioner blade will be noisy until full pressure is felt at the tensioner plunger. This could take up to 5 seconds.

Perform the following operations:

- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Clutch Cover - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

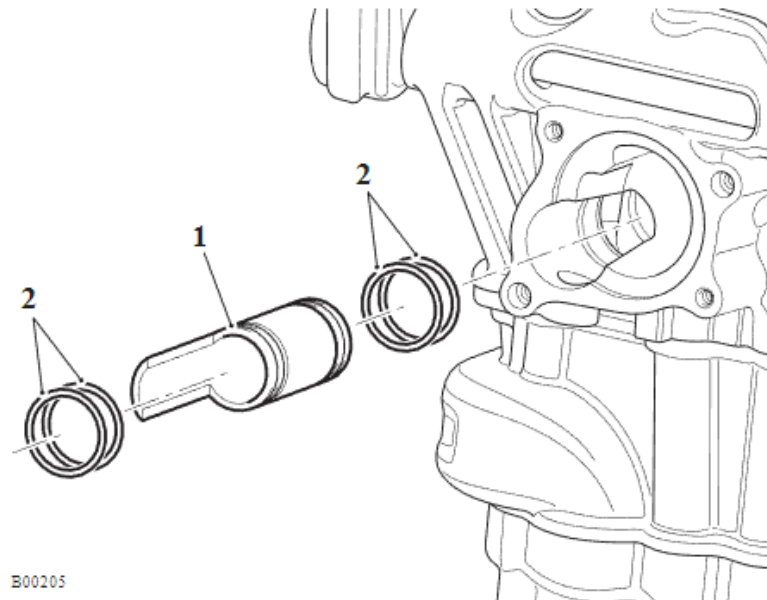
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Radiator – Removal](#)
- [Thermostat – Removal](#)
- [Clutch Cover - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)
- [Camshaft - Removal](#)
- [Coolant Temperature Sensor - Removal](#)

**NOTICE**

Note the camshaft drive chain is routed both sides of the coolant exit pipe.  
Note the orientation of the coolant exit pipe in cylinder head for installation.

1. Remove the coolant exit pipe from the cylinder head. Discard the pipe and its four O-rings.



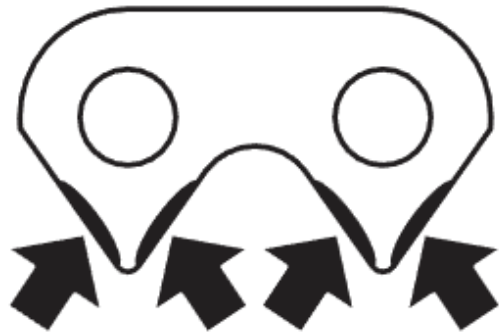
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Coolant exit pipe</li><li>2. O-rings</li></ol> |
|---|

2. The camshaft drive chain is removed from inside the camshaft drive chain chest, after first detaching the drive chain from the crankshaft gear.

### Camshaft Drive Chain – Inspection

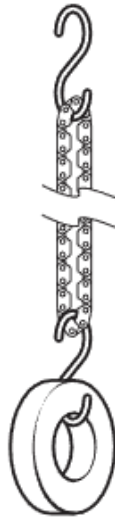
Visual in situ checks can also be made as follows:

1. Check for significant blue discolouration of the drive chain plates indicating excessive heat build-up.
2. Examine all of the pins for signs of rotation.
3. Check for cracking or deep scratching of the drive chain plates.
4. Check for severe wear of the inner plates as indicated in the diagram below.

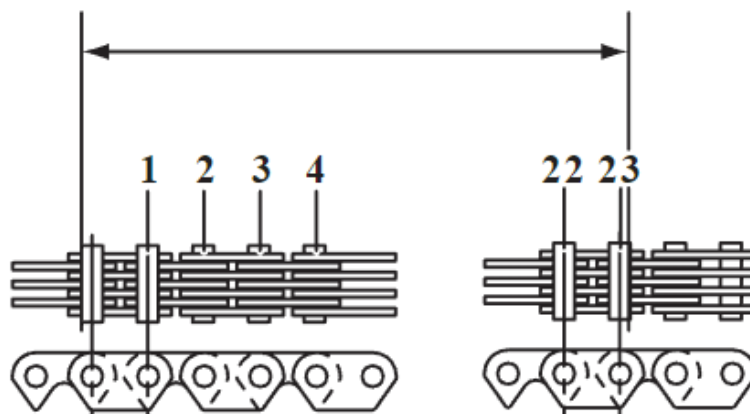


For a more thorough check, proceed as follows:

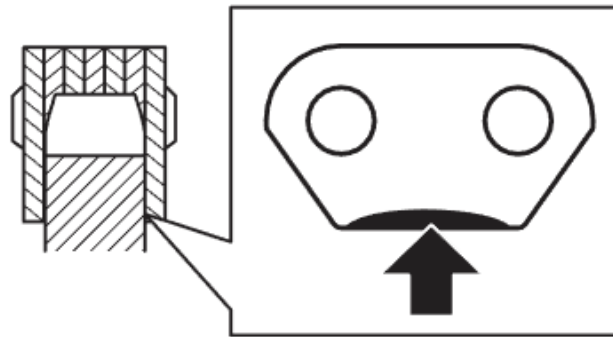
1. Remove the drive chain from the engine.
2. Suspend the drive chain from a pin or hook with a 13 kg weight attached at the lower end.



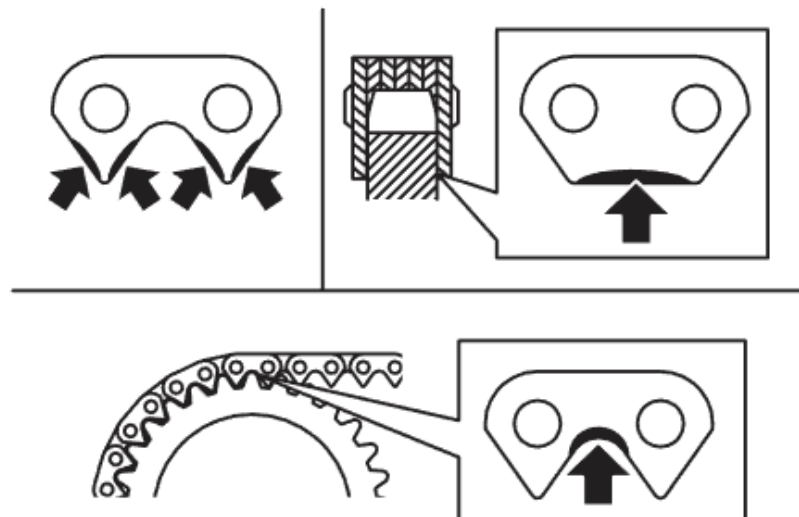
3. Measure across 23 links as shown in the diagram below. If the drive chain is within limits, the measurement should be no longer than 147.14 mm. Measurements beyond 147.14 mm indicate that the drive chain must be replaced.



4. Check for severe wear of the inner surface of the outer plates at the side-contact points with the sprocket teeth.



5. Check for signs of stiffness or kinking.
6. Check for severe wear of the plates in the area shown below.

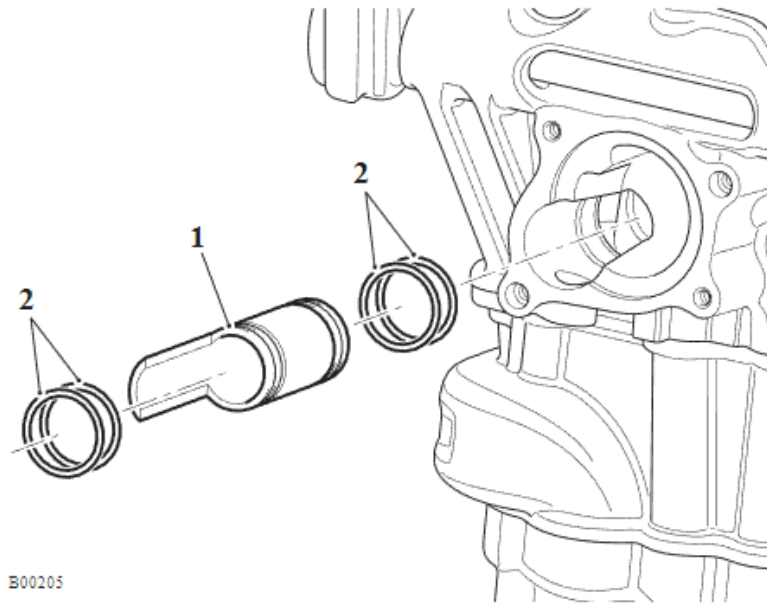


7. If any of these symptoms are evident, the camshaft drive chain must be replaced.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit four new O-rings to the new coolant exit pipe.

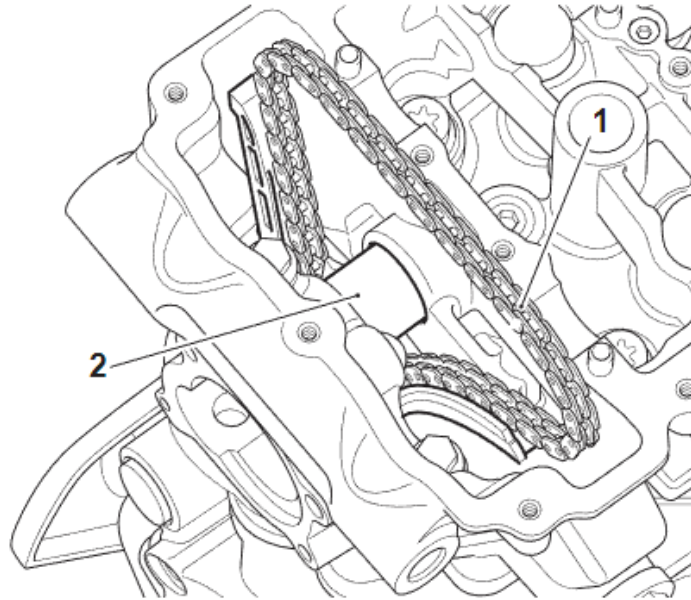


B00205

1. Coolant exit pipe
2. O-rings

2. Position the camshaft drive chain into the camshaft drive chain chest and locate the lower end around the crankshaft gear.

3. Fit the coolant exit pipe as noted for removal with the camshaft drive chain links on both sides of the pipe.



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| <ol style="list-style-type: none"><li>1. Coolant exit pipe</li><li>2. Camshaft drive chain</li></ol> |
|--|

Perform the following operations:

- [Coolant Temperature Sensor – Installation](#)
- [Camshaft - Installation](#)
- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Clutch Cover - Installation](#)
- [Thermostat - Installation](#)
- [Radiator - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

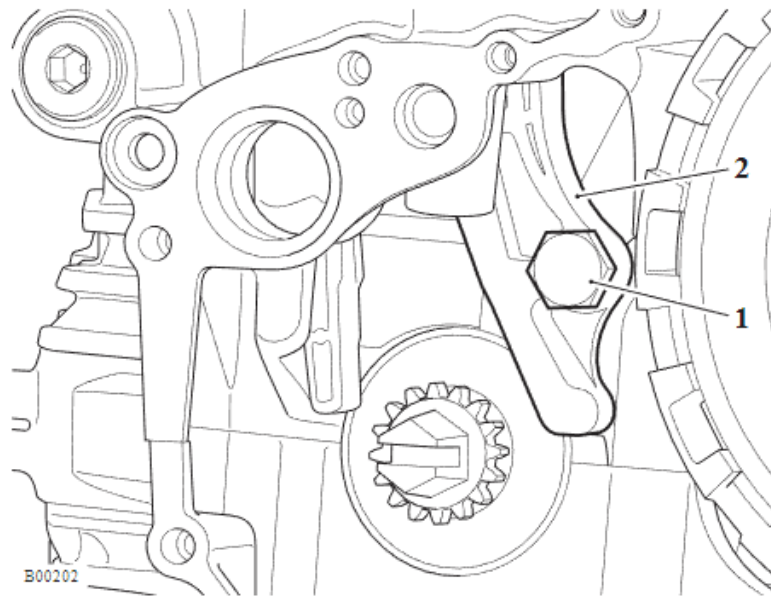
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Radiator – Removal](#)
- [Thermostat – Removal](#)
- [Clutch Cover - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)
- [Camshaft - Removal](#)
- [Camshaft Drive Chain - Removal](#)

**NOTICE**

Note the position of the hardened washer between the tensioner blade and crankcase for installation.



2. Remove the fixing and raise the camshaft drive chain tensioner blade to remove it.  
Collect the hardened washer.

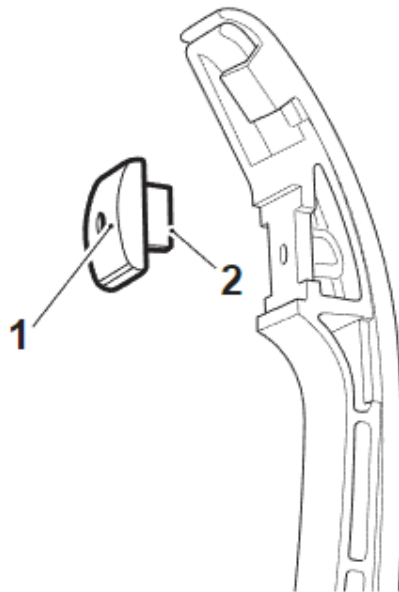


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| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Tensioner blade</li></ol> |
|--|

**NOTICE**

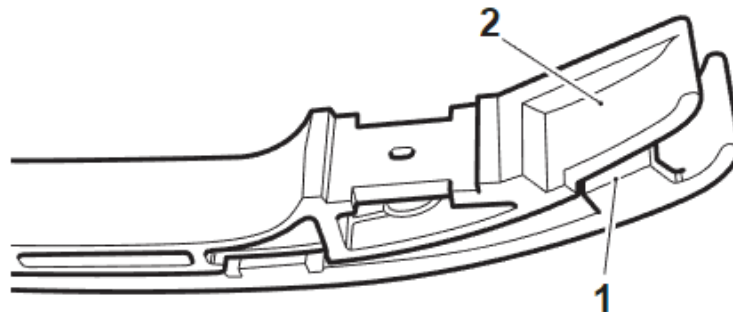
For the purpose of this instruction, the top of the tensioner blade is where the pad is located.

2. Release the clips and remove the pad.



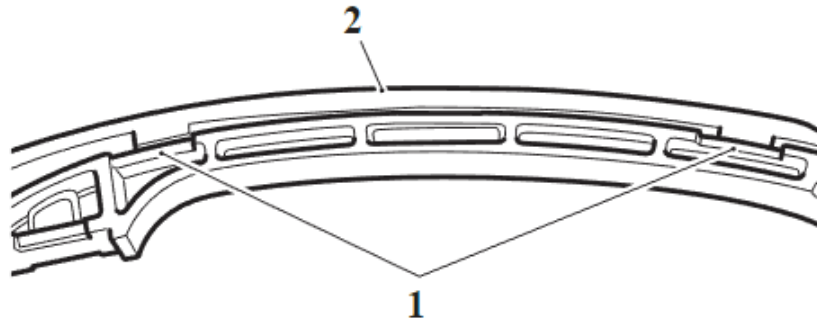
2. Pad
3. Clip (one side shown)

2. Detach the top hook from the tensioner blade.



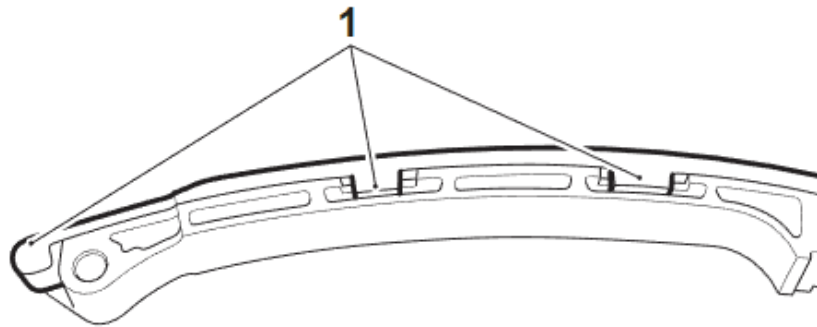
1. Top hook
2. Tensioner blade

3. Release the two side locating devices.



- 1. Locating devices
- 2. Facing blade

4. Release the three hooks and remove the facing blade.

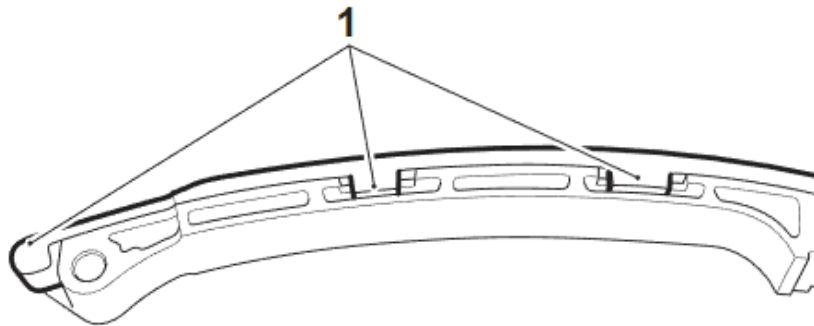


- 1. Hooks

**NOTICE**

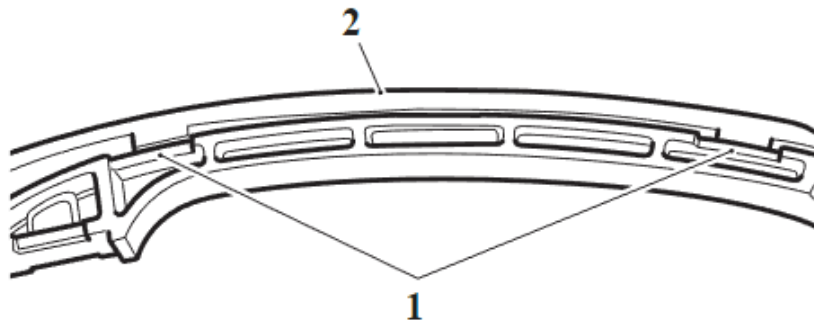
For the purpose of this instruction, the top of the tensioner blade is where the pad is located.

1. Align the three hooks and fit the facing blade.



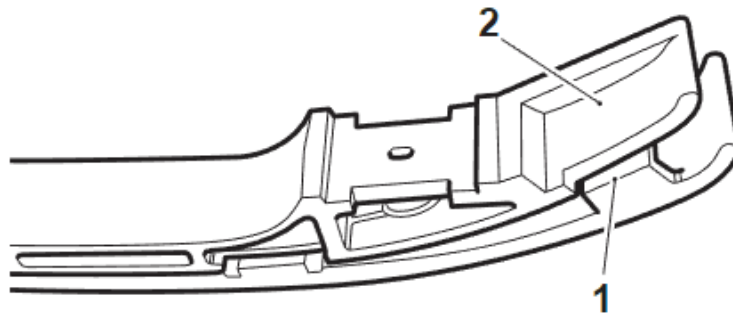
1. Hooks

2. Align the two side locating devices.



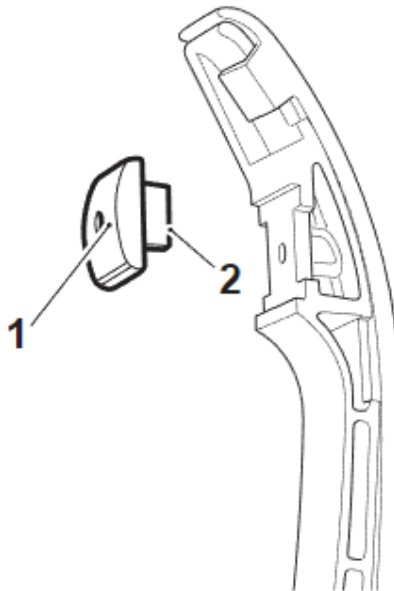
1. Locating devices
2. Facing blade

3. Attach the top hook to the tensioner blade.



- 1. Top hook
- 2. Tensioner blade

4. Fit the pad and secure the clips.

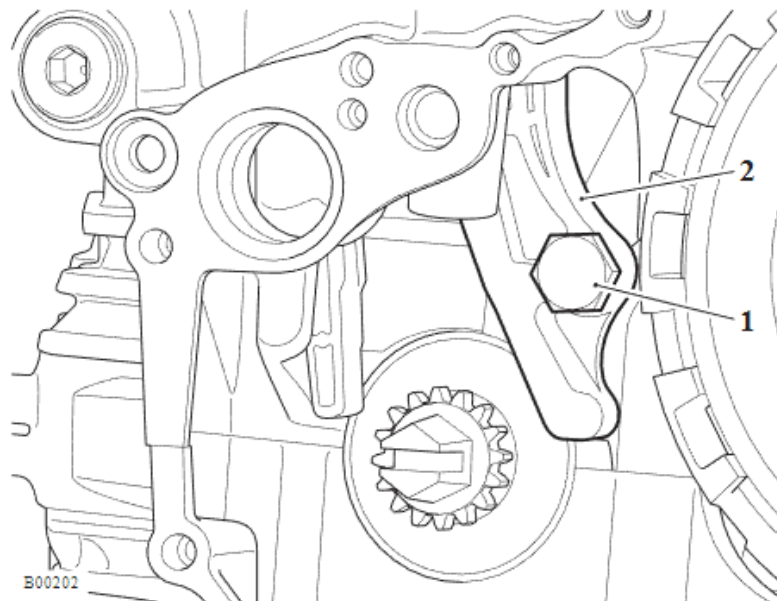


- 1. Pad
- 2. Clip (one side shown)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the camshaft drive chain tensioner blade with the hardened washer as noted for removal. Tighten the fixing to 18 Nm.



1. Fixing
2. Tensioner blade

Perform the following operations:

- [Camshaft Drive Chain - Installation](#)
- [Camshaft - Installation](#)
- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Clutch Cover - Installation](#)
- [Thermostat - Installation](#)

- [Radiator - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Camshaft – Removal

### WARNING

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

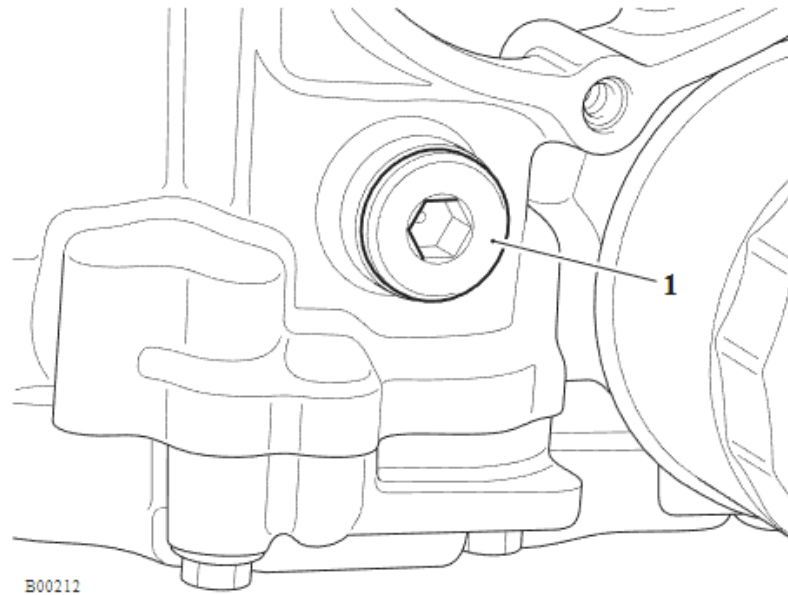
### CAUTION

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.  
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.  
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Clutch Cover - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)
- [Camshaft Cover - Removal](#)

1. Remove the spark plugs to reduce compression resistance when turning the engine (see Spark Plugs - Check/Renew).
2. Remove the crankshaft locking pin plug from the crankcase.



1. Locking pin plug

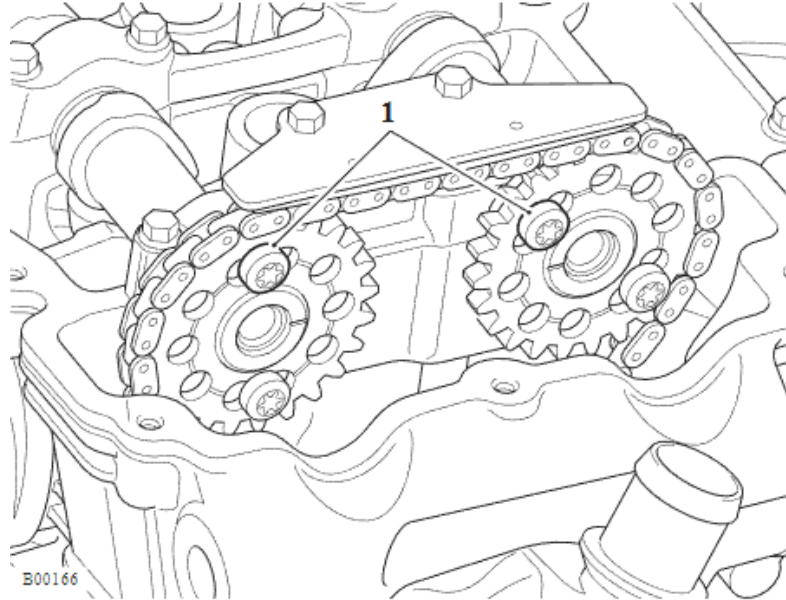
3. At the front of the engine, rotate the crankshaft anticlockwise using the bolt fitted to the end of the crankshaft so any two camshaft sprocket fixings are accessible.

**NOTICE**

The camshaft sprocket fixings need only be loosened sufficiently to allow the sprockets to rotate on the camshafts.



4. Loosen the two accessible camshaft sprocket fixings. Do not remove the fixings at this stage.



1. Fixings

5. Rotate the crankshaft until the remaining two fixings are accessible.

### **⚠ CAUTION**

Do not rotate the crankshaft further once the four camshaft sprocket bolts have been loosened. Rotation of the crankshaft with the four sprocket bolts loose will result in valve to piston contact and serious engine damage.

6. Loosen the two remaining camshaft sprocket fixings.
7. Remove the camshaft drive tensioner (see [Camshaft Drive Chain Tensioner - Removal](#)).

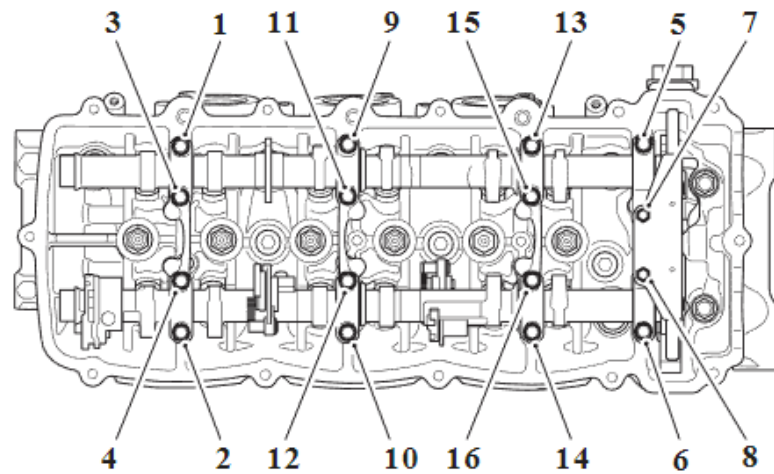
### **NOTICE**

Note the orientation and position of the camshafts caps for installation.

Number the camshafts caps to make sure they are fitted to their original position and orientation.

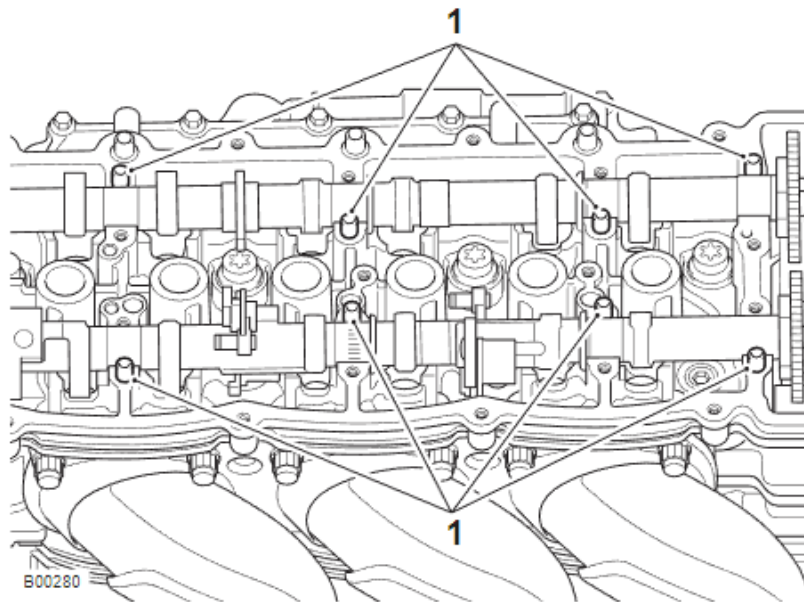
Each camshaft cap has two hollow dowels fitted to them. Note their positions for installation.

8. Evenly and progressively release the bolts securing the camshaft caps to the cylinder head in the sequence shown below.



Camshaft Caps Release Sequence

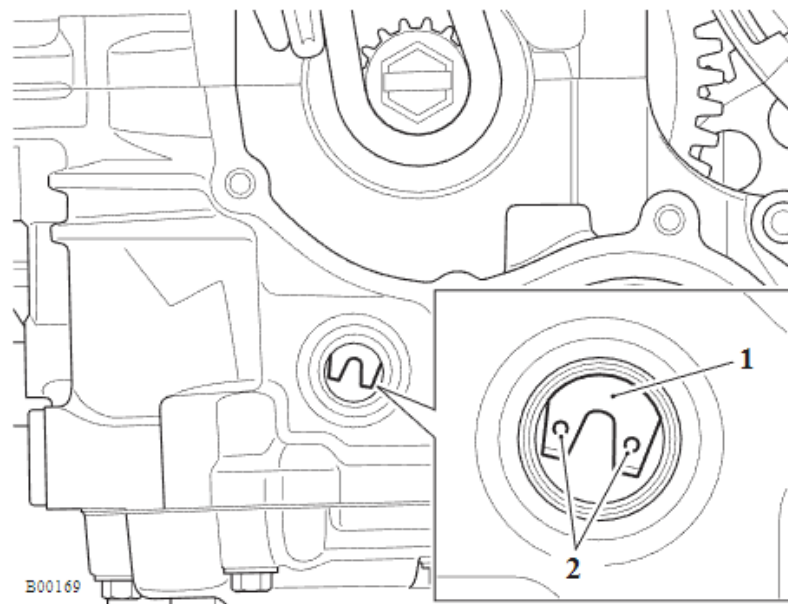
9. Remove the camshaft caps. Collect the dowels (if loose),



1. Dowel locations

10. Lift the camshaft drive chain from the exhaust camshaft sprocket and remove the exhaust camshaft.  
11. Repeat the procedure for the inlet camshaft.  
12. Noting its orientation for installation remove the camshaft drive chain.  
13. Remove the crankshaft locking pin plug from the crankcase.

14. At the front of the engine, rotate the crankshaft anticlockwise using the bolt fitted to the end of the crankshaft until the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin.

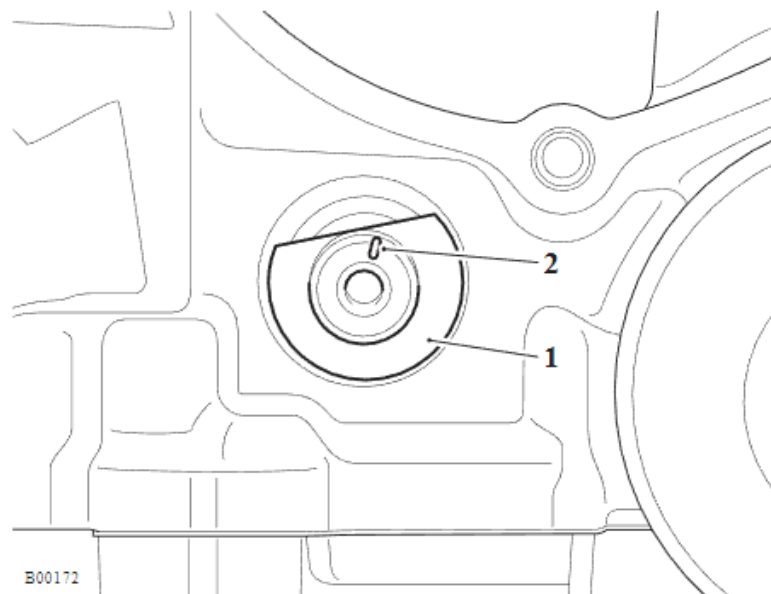


1. Crankshaft primary gear
2. Alignment marks

#### **NOTICE**

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

15. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. T3880501 - Crankshaft Locking Pin</li><li>2. Alignment mark</li></ol> |
|--|

**NOTICE**

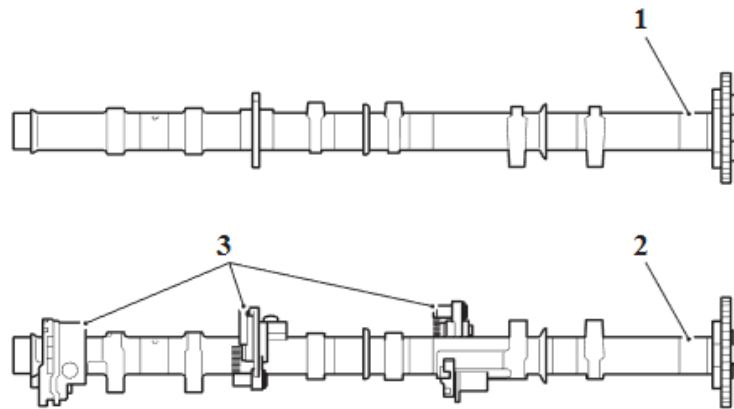
Note the orientation for each camshaft sprockets for installation.

16. Remove and discard the camshaft sprocket fixings.  
17. Separate the camshafts from the sprockets.

## Camshaft – Identification

The inlet and exhaust camshafts are different. The exhaust camshaft has three decompressors fitted to it.

The mark on the camshaft boss is not a timing mark, it is used as a visual aid during the timing adjustment procedure.



1. Inlet camshaft
2. Exhaust camshaft
3. Decompressors

## Camshaft – Installation

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## ⚠ CAUTION

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.

When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.

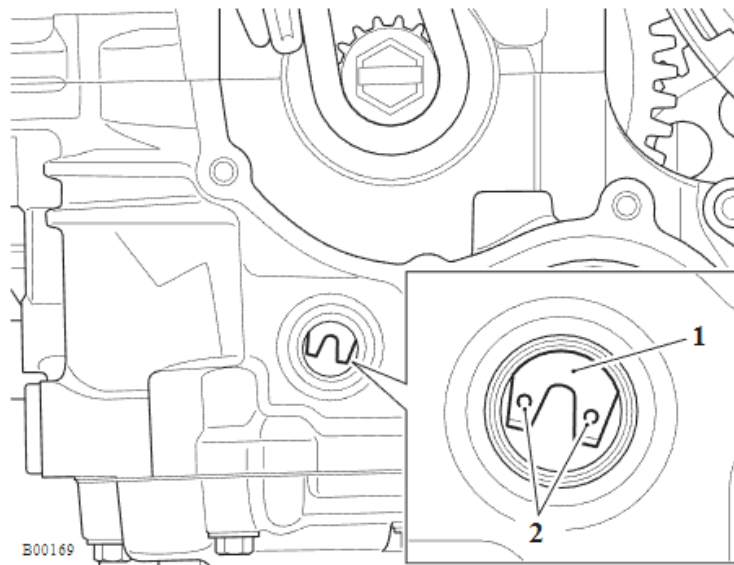
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Accurate camshaft timing can only be obtained using the correct timing method and service tools as described below.

## ⚠ CAUTION

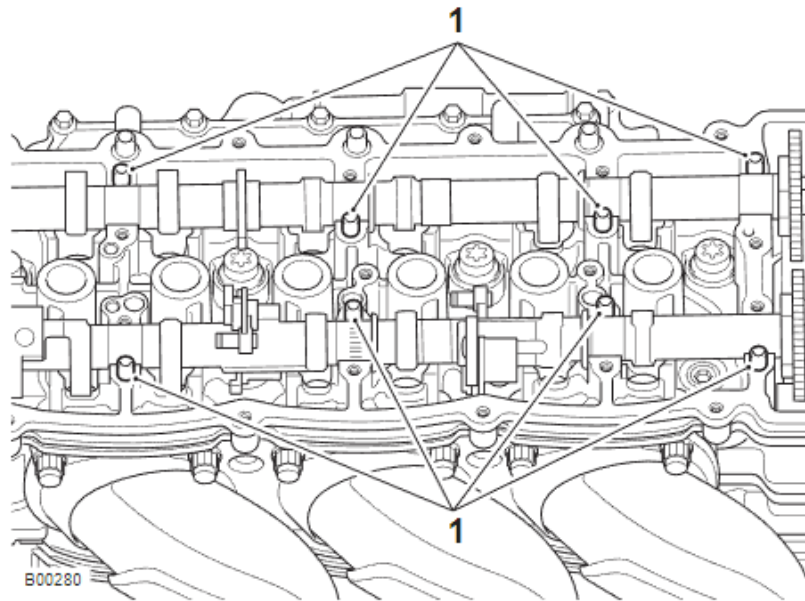
The camshaft sprockets are attached to the camshafts using slotted bolt holes. This allows for very accurate valve timing and therefore improved performance and fuel economy. Never fit the camshaft sprockets without correctly setting the camshaft timing using the service tools and timing procedure described below. Severe engine damage will result from incorrect valve timing adjustment.

1. If not already installed, make sure the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin and install the service tool T3880501.



1. Crankshaft primary gear
2. Alignment marks

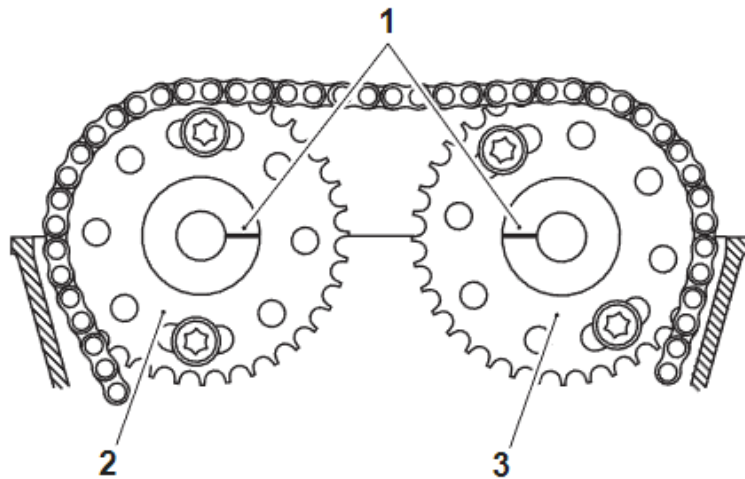
2. If removed, refit the camshaft sprockets in their noted orientation and secure using the new fixings. DO NOT tighten the bolts at this stage; the sprockets must be free to rotate.
3. If removed, refit the camshaft caps dowels.



1. Dowel locations

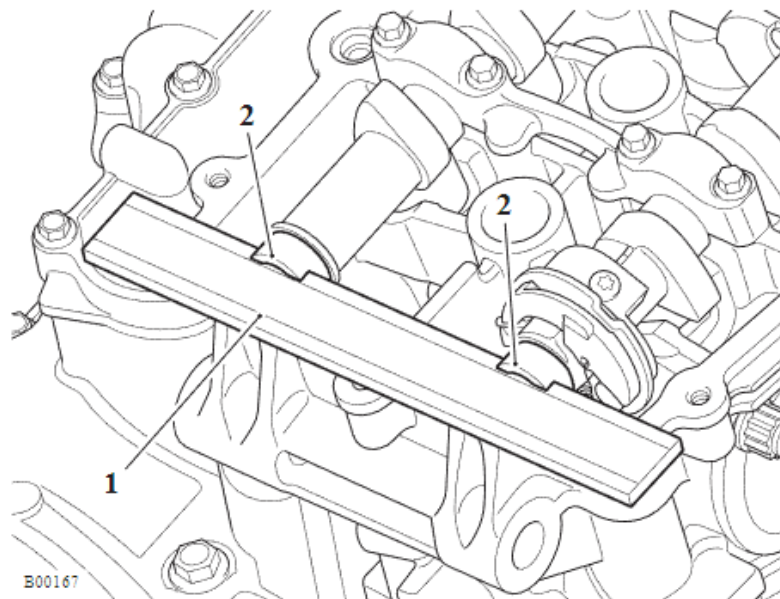
4. Thoroughly clean the camshafts and journals. Lubricate the camshafts with clean engine oil before fitting to the cylinder head.
5. Locate each camshaft to the cylinder head ensuring the camshafts are correctly identified (inlet and exhaust) and they are also correctly located over their respective valve banks.
6. With the camshaft alignment mark pointing inwards, fit the camshaft drive chain over the exhaust sprocket.
7. Make sure there is no slack between the crankshaft and the exhaust sprocket when the sprocket bolts are centrally located within the slotted holes. Make sure the alignment marks on the end of the camshaft journals are pointing inwards.
8. With the camshaft alignment mark pointing inwards, fit the camshaft drive chain over the inlet sprocket.
9. Make sure the bolts on the inlet sprocket are also centrally located within the slotted holes when there is no slack between the exhaust and inlet sprockets.
10. Check that the camshaft drive chain is correctly located around the crankshaft and both camshaft sprockets.

11. Check the alignment marks on the front end of the camshaft journals are pointing inwards.



- 1. Camshaft alignment marks
- 2. Exhaust camshaft
- 3. Inlet camshaft

12. Fit service tool service tool T3880502 into the camshaft timing slots.



- 1. T3880502 - Camshaft timing bar
- 2. Camshaft slots



## **⚠ CAUTION**

If the camshafts and camshaft caps are fitted without first aligning the timing marks on both the crankshaft and camshaft sprockets, the inlet and exhaust valves will contact each other causing damage to both the cylinder head and the valves.

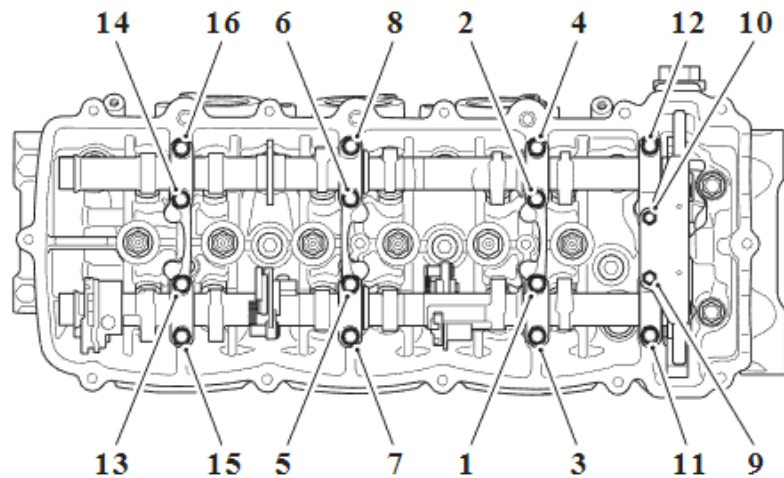
13. Lubricate the camshaft bearing areas of the camshaft caps with a 50/50 solution of engine oil and molybdenum disulphide grease.
14. Assemble the dowels, camshaft caps and top pad in the same location and orientation as noted for removal.
15. Tighten the camshaft caps 16 fixings in the following two stages:

### **Stage 1**

16. Tighten the fixings in the sequence shown to 5 Nm.

### **Stage 2**

17. Tighten the fixings in the sequence shown to 10 Nm.

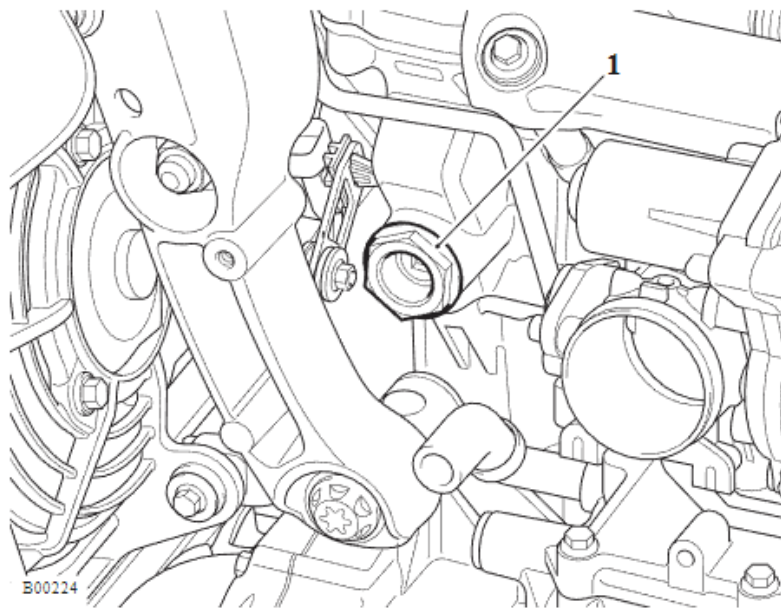


**Camshaft Caps Tightening Sequence**

## **⚠ CAUTION**

If any components have been renewed, the valve clearances must be checked and adjusted. Running with incorrectly adjusted valve clearances may cause excess engine noise, rough running and engine damage.

18. Check that the camshaft drive chain is engaged around the camshaft drive sprocket on the crankshaft, the camshaft sprockets and the camshaft drive chain is positioned against the tensioner blade.
19. Fit the service tool T3880651 and tighten to 16 Nm.



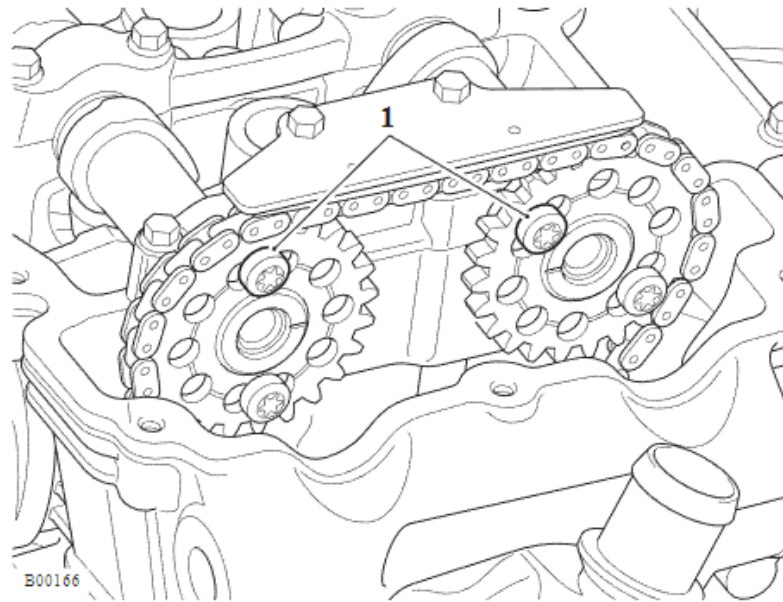
1. T3880651 - Timing Chain Tensioner

## **⚠ CAUTION**

The torque value stated is very important to accurate timing. Always use the correct value of 0.6 Nm, as set using T3880609 - Timing Torque Limiter. Using an incorrect torque value will result in incorrect valve timing being set, or damage to the tensioner blade or other valve train components. Either condition may result in serious damage to the engine, reduced engine performance, or reduced fuel economy.

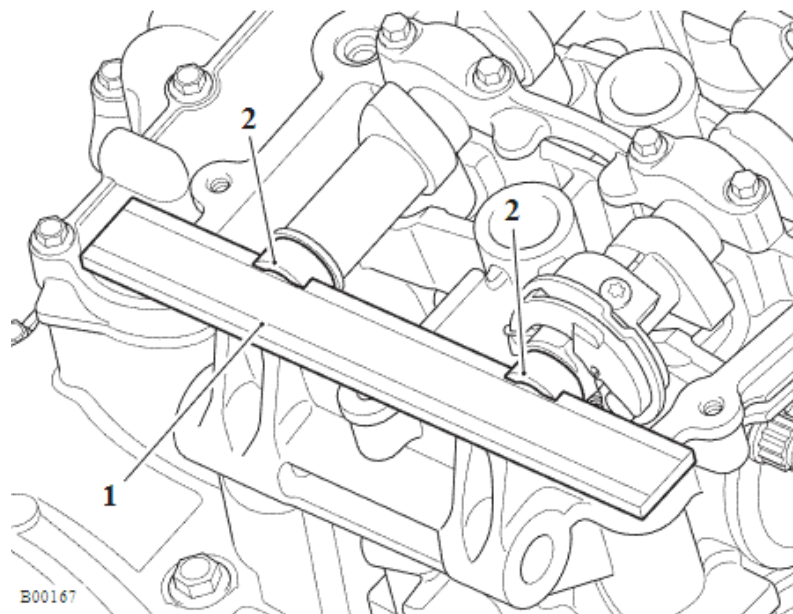
20. Using the service tool T3880609, tighten the internal screw thread to 0.6 Nm.

21. Tighten the two accessible camshaft sprocket bolts to 16 Nm.



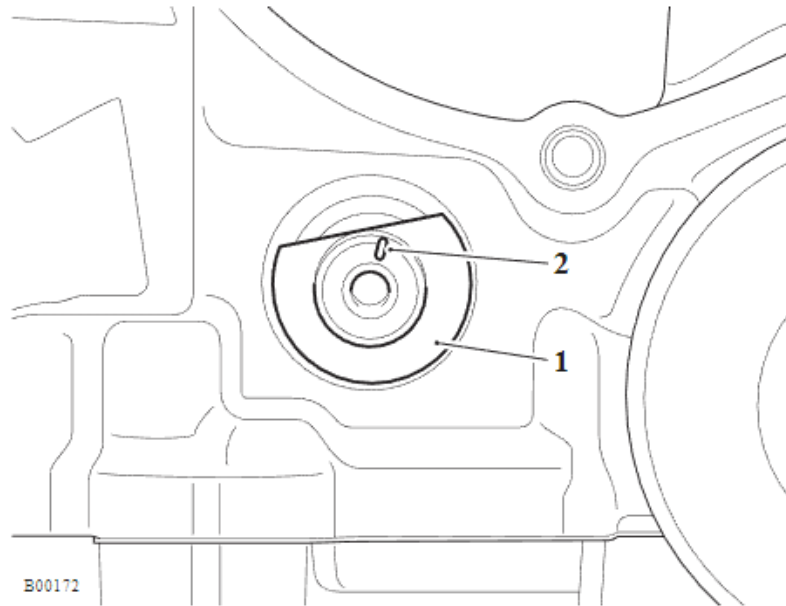
1. Fixings

22. Remove service tool T3880502 from the camshaft slots.



1. T3880502 - Camshaft timing bar  
2. Camshaft slots

23. Remove service tool T3880501 from the crankcase.



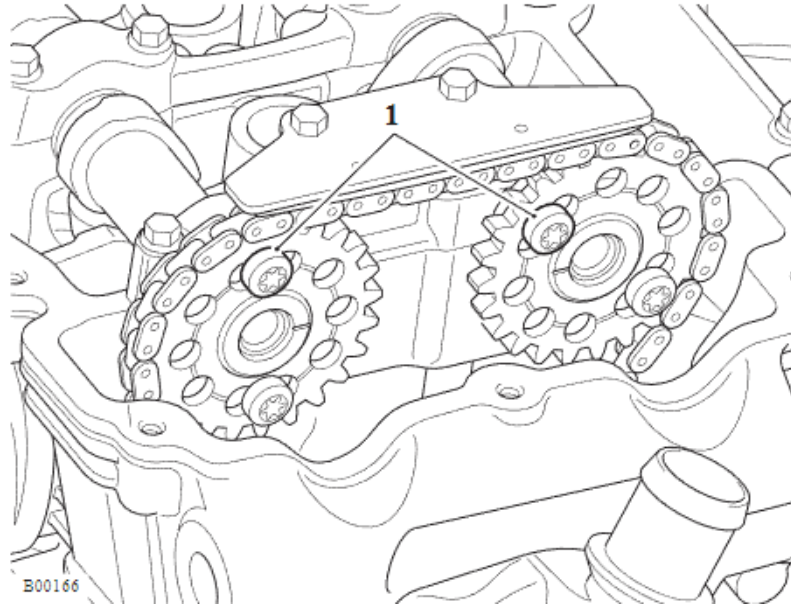
1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

**⚠ CAUTION**

Always check that service tool T3880502 has been removed before rotating the engine. Severe damage will result to the camshafts or service tool T3880502 if engine rotation is attempted with the tool installed.

24. Rotate the engine until the remaining two sprocket bolts are accessible.

25. Tighten the two accessible camshaft sprocket bolts to 16 Nm.



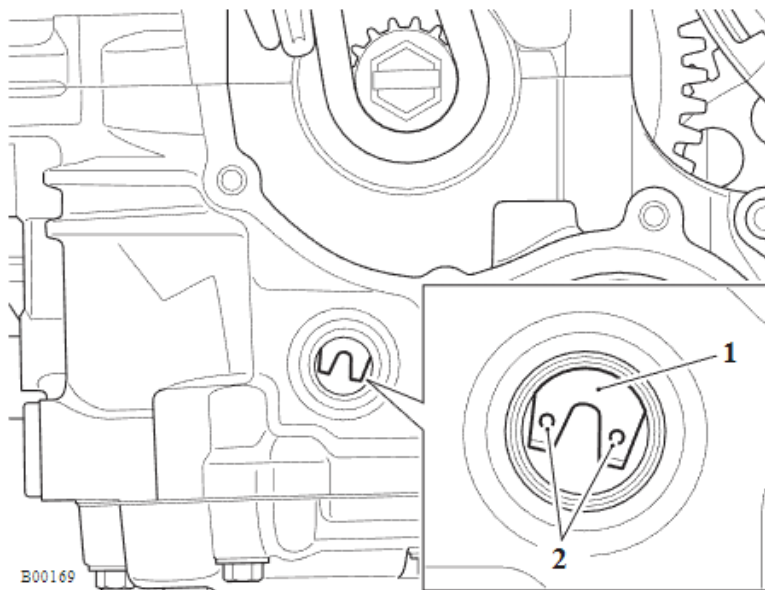
1. Fixings

26. Place suitable wedges between the camshaft sprockets and the crankcase, to hold the camshaft drive chain taut during removal of service tool T3880651.

27. Release the tension on service tool T3880651 and remove it.

28. Refit the timing chain tensioner, incorporating a new O-ring (see [Camshaft Drive Chain Tensioner - Installation](#)).

29. Rotate the crankshaft anticlockwise one complete turn, using the bolt fitted to the end of the crankshaft. Stop rotation when the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin.

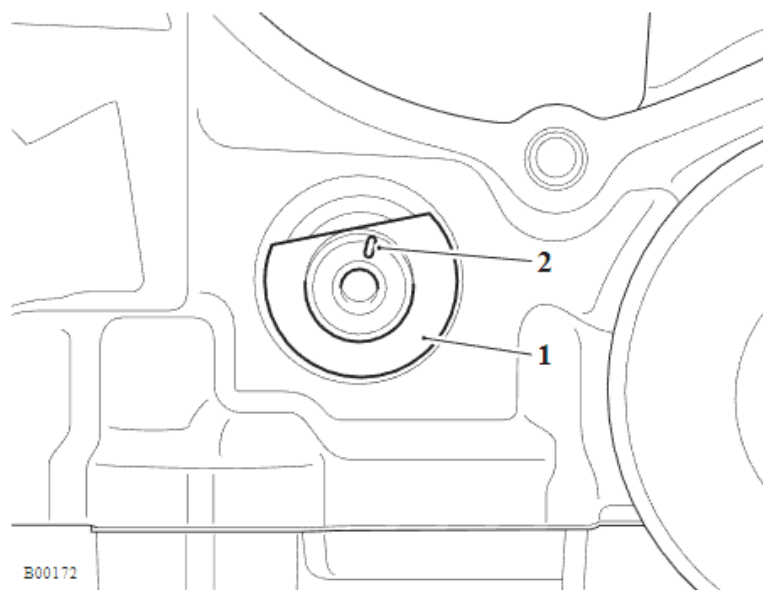


1. Crankshaft primary gear  
2. Alignment marks

### NOTICE

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

30. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.

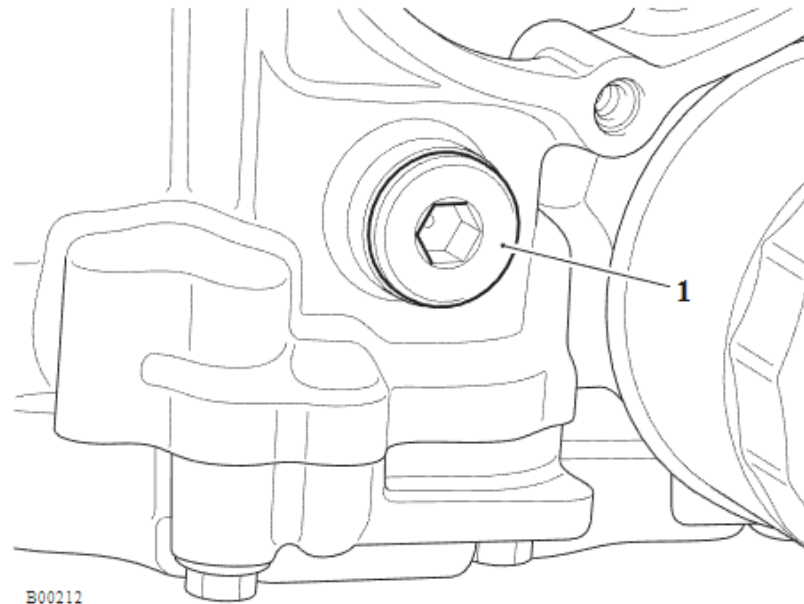


1. T3880501-Crankshaft Locking Pin
2. Alignment mark

31. Check that the timing marks are still approximately aligned (to check that the camshaft timing has not moved during service tool T3880651 removal).

32. Remove service tool T3880501

33. Fit the crankshaft locking pin plug and tighten to 33 Nm.



1. Locking pin plug

Perform the following operations:

- [Valve Clearance Measurement](#)
- [Camshaft Cover - Installation](#)
- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Clutch Cover - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Valve Clearances

Camshaft, valve, valve shim and valve seat wear affects the valve clearances. The effect of this wear is to change the gap between the camshaft and tappet bucket, causing engine noise and improper running. If the valve clearances become too small, permanent

damage to the valve and valve seat will take place. If the valve clearance becomes too great, the engine will become noisy and will not run correctly.

#### Cylinder Head – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise. When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.

Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

### **NOTICE**

If the camshaft drive chain is not to be replaced, the drive chain will be with the cylinder head when removing the cylinder head.

If the cylinder head is to be replaced, the camshaft drive chain must be removed (see [Camshaft Drive Chain - Removal](#)).

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Fuel Injectors and Fuel Rail - Removal](#)
- [Throttle Body - Removal](#)
- [Engine - Removal](#)

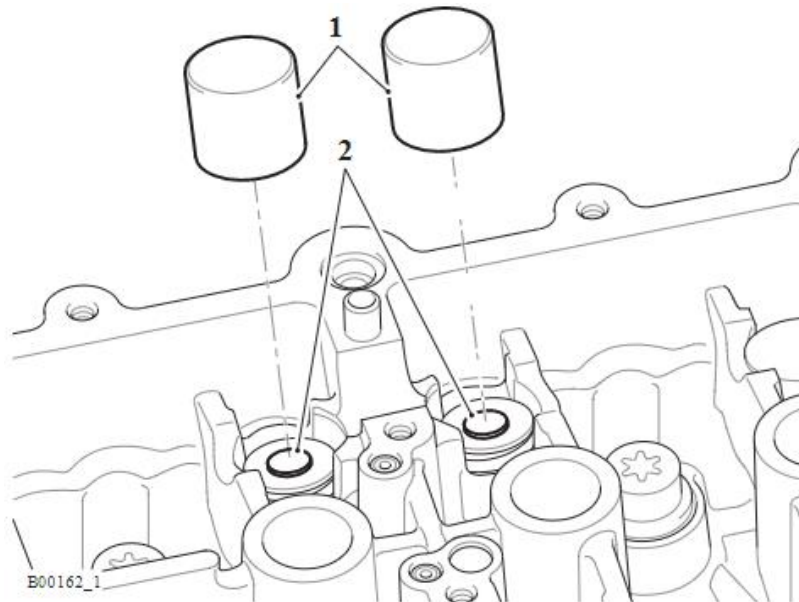


- [Clutch Cover - Removal](#)
- [Camshaft - Removal](#)

### NOTICE

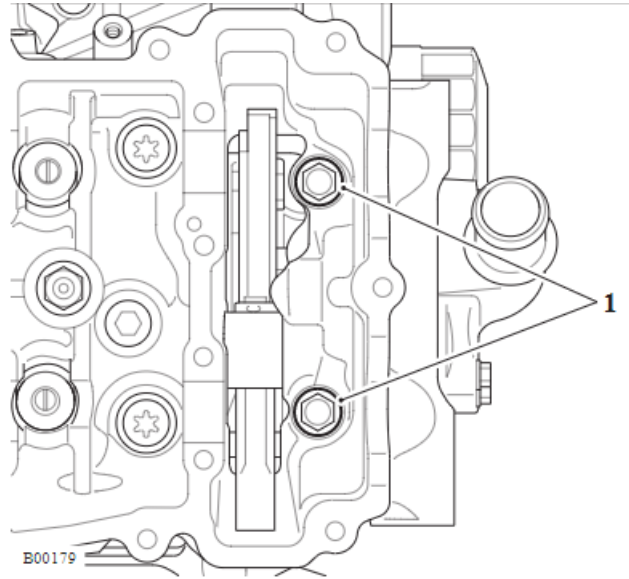
To prevent the tappet buckets and shims from becoming mixed, place the shim and tappet together in a marked container. The components must be refitted in their original positions.

1. Note the position of all the tappet buckets and shims so that they can be refitted in the same positions. Remove all the tappet buckets and shims.



1. Tappet bucket
2. Shim

2. Remove the two fixings within the camshaft drive chain chest.

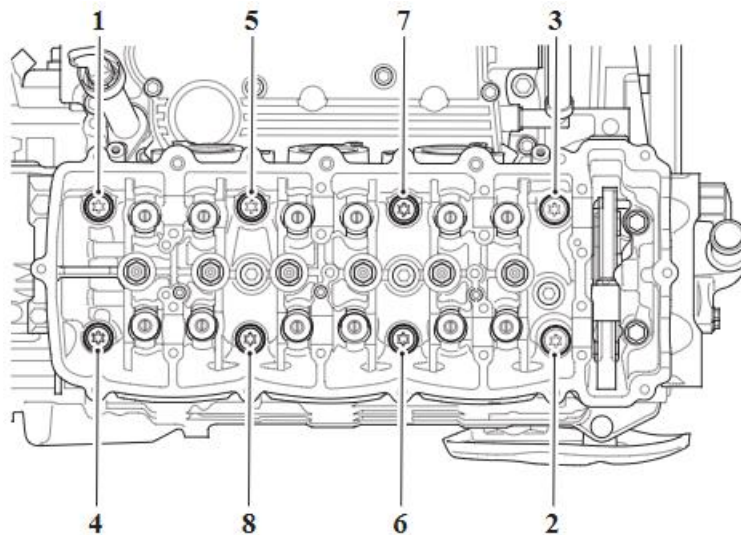


1. Fixings

**NOTICE**

Two of the cylinder head bolts are to be used with service tool T3880518 to secure the barrel.

3. Progressively release the cylinder head bolts in the sequence shown below.



Cylinder Head Bolt Release Sequence

4. Lightly tap the cylinder head with a rubber mallet to break the seal of the gasket.
5. Remove the cylinder head and the camshaft drive chain assembly. Discard the cylinder head gasket.

### CAUTION

The gasket between the barrel and the crankcase must also be replaced if the cylinder head has been removed.

Failure to replace the gasket may result in an engine oil leak between the barrel and crankcase.

5. To hold the barrel in position, fit service tool T3880518 to the cylinder head and secure using two of the original bolts for the cylinder head
6. Remove the barrel (see [Barrels - Removal](#)) and discard the gasket.

## Cylinder Head – Installation

### WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### CAUTION

Make sure all traces of fluid (coolant, oil etc.) are removed from the threaded holes in the crankcase. Should any fluid remain in any of the threaded holes, severe crankcase damage could result from hydraulic locking of head bolts on assembly of the engine.

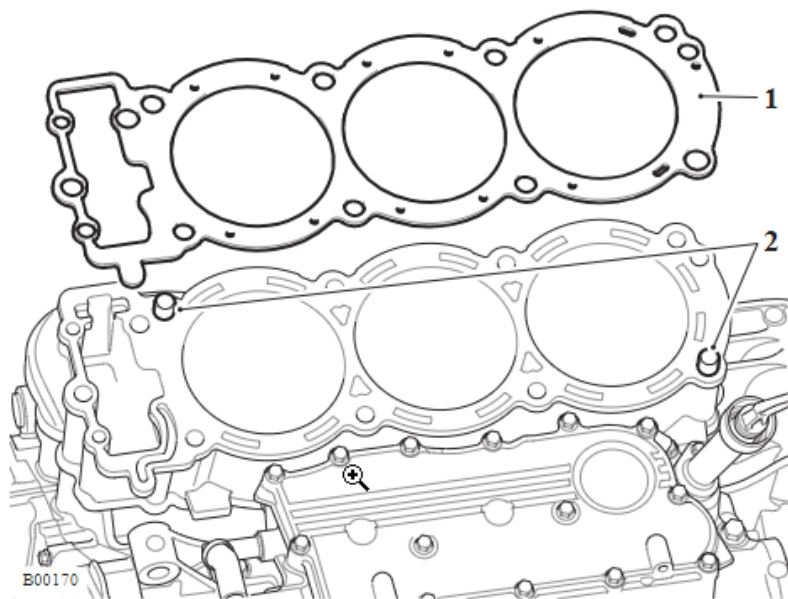
## **⚠ CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.

When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.

Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

1. Fit a new gasket to the barrel and refit it to the crankcase (see [Barrels - Installation](#)).
2. Thoroughly clean the upper faces of the barrel, taking care not to damage the mating surfaces.
3. Fit a new cylinder head gasket ensuring that the head to crankcase location dowels are correctly in place.



1. Gasket
2. Dowels

4. Make sure that the cylinder head face is completely clean.
5. Carefully lower the cylinder head onto the barrels. Make sure the camshaft drive chain is guided down to its drive sprocket on the crankshaft.

## CAUTION

Tighten the cylinder head bolts in the steps and the correct sequence that follows. If you do not use the correct procedure or replace all of the bolts, engine damage can occur or the life of the cylinder head gasket can be reduced.

6. Lubricate the under head surface of the bolt head with clean engine oil.
7. Fit the bolts and washers to the cylinder head as noted for removal and tighten until finger tight.
8. Tighten the cylinder head bolts in the following four stages:

### Stage 1

9. Tighten the bolts in the sequence shown to 25 Nm.
10. Retighten the bolts in the sequence shown to 25 Nm.

### Stage 2

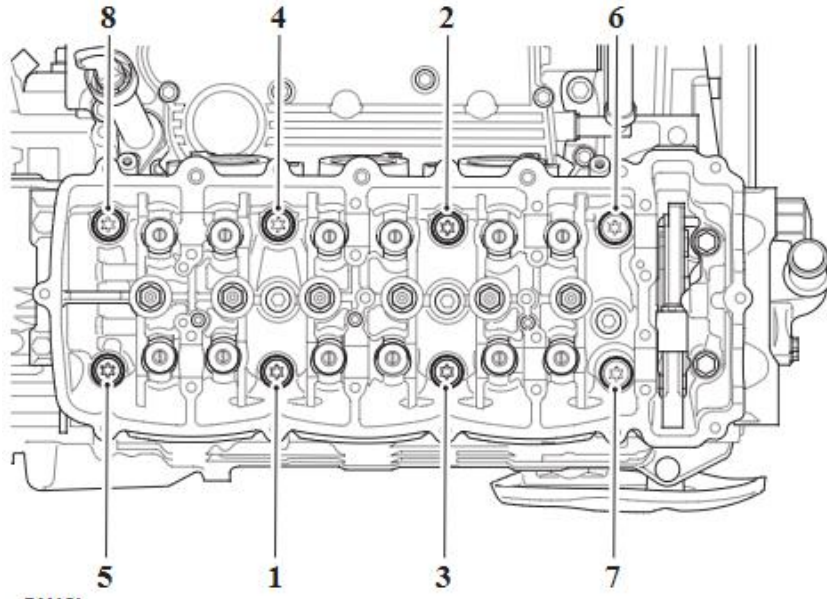
11. Tighten the bolts in the sequence shown to 39 Nm.
12. Retighten the bolts in the sequence shown to 39 Nm.

### Stage 3

13. Tighten the bolts to 140°.

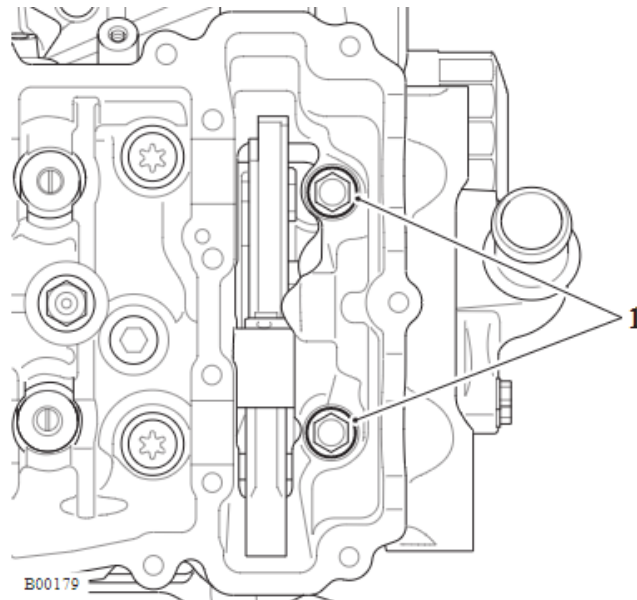
#### Stage 4

14. Carry out a torque over check of the bolts to 80 Nm Overcheck.



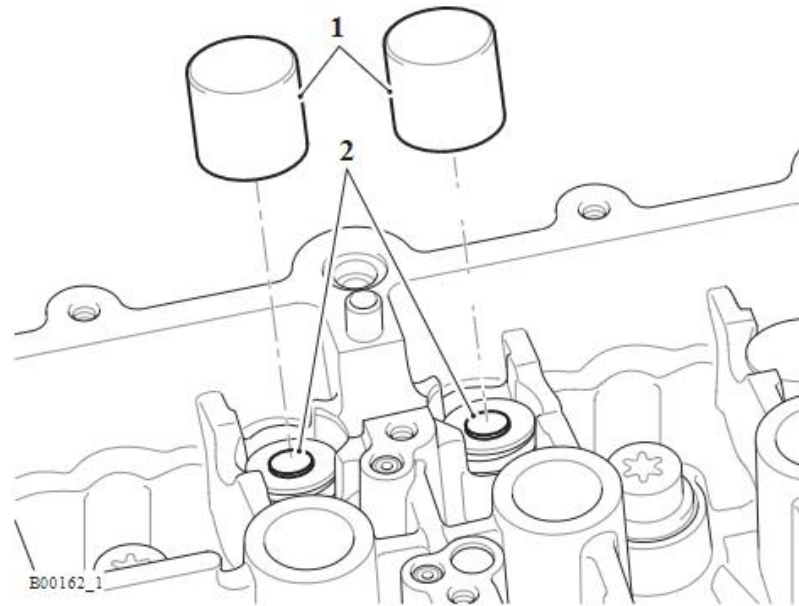
#### Cylinder Head Bolt Tightening Sequence

15. Fit the two fixings within the camshaft drive chain chest and tighten to 25 Nm.



#### 1. Fixings

16. Refit the tappet shims and buckets to their positions as noted for removal.



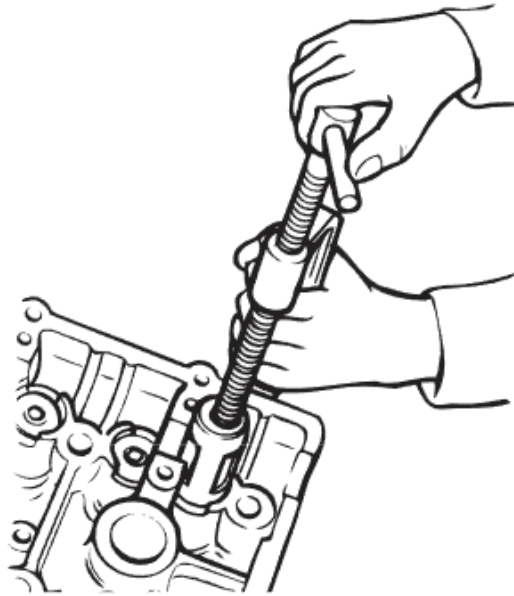
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Tappet bucket</li><li>2. Shim</li></ol> |
|--|

Perform the following operations:

- [Camshaft - Installation](#)
- [Clutch Cover - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Valves and Valve Stem Seals - Removal from the Cylinder Head

1. Remove each valve from the cylinder head using a valve spring compressor. The compressor must act on the top cup to allow removal of the valve collets.



Valve Removal

2. Once the collets are released, remove the following items:

- collets;
- valve spring cap;
- valve spring;
- valve stem oil seal;
- spring platform;
- valve (de-burr before removal).

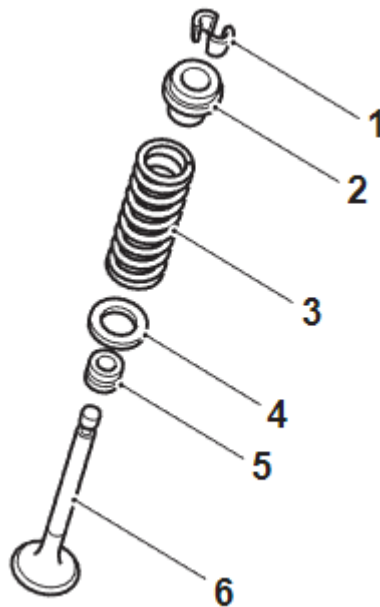




1. Valve stem oil seal

**NOTICE**

Make sure inlet and exhaust valve components do not become mixed.



- 1. Collets
- 2. Valve spring retainer
- 3. Valve spring
- 4. Valve spring platform
- 5. Valve stem oil seal
- 6. Valve

## Valves and Valve Stem Seals – Inspection

### Valve to Valve Guide Clearance

If the valve guides are worn beyond the service limit given below, the cylinder head must be replaced.

| <b>Valve Stem to Guide Clearance</b> |                            |                          |
|--------------------------------------|----------------------------|--------------------------|
| Inlet                                | 0.010 -0.037 mm (standard) | 0.075 mm (service limit) |
| Exhaust                              | 0.020 -0.042 mm (standard) | 0.080 mm (service limit) |

### Valve Face Inspection

1. Remove any carbon build-up from the valve head area. Examine the valve seat face, checking in particular for signs of cracking or pitting.

## Valves and Valve Stem Seals – Installation

1. Apply a thin coat of engine oil to the valve stem.
2. Install the valve into the valve guide and refit the spring platform to the valve spring recess in the head.
3. Fit the valve stem seal over the valve stem and, using a suitable tool, press down fully until the seal is correctly seated over the valve guide.

### **NOTICE**

Firstly, press the seal down the valve stem until the lower side of the seal comes into contact with the valve guide. Further gentle pressure is then required to locate the seal over the top end of the valve guide.

Once correctly positioned, the seal cannot be pushed down any further.

### **⚠ CAUTION**

Incorrect fitment of the valve stem oil seals could lead to high oil consumption and blue smoke emissions from the exhaust system. Do not use excessive force in fitting the seal as this may break the seal ring.

4. Install the valve spring over the valve stem.
5. Compress the valve spring ensuring that the spring is compressed squarely to prevent damage to the valve stem and cylinder head.

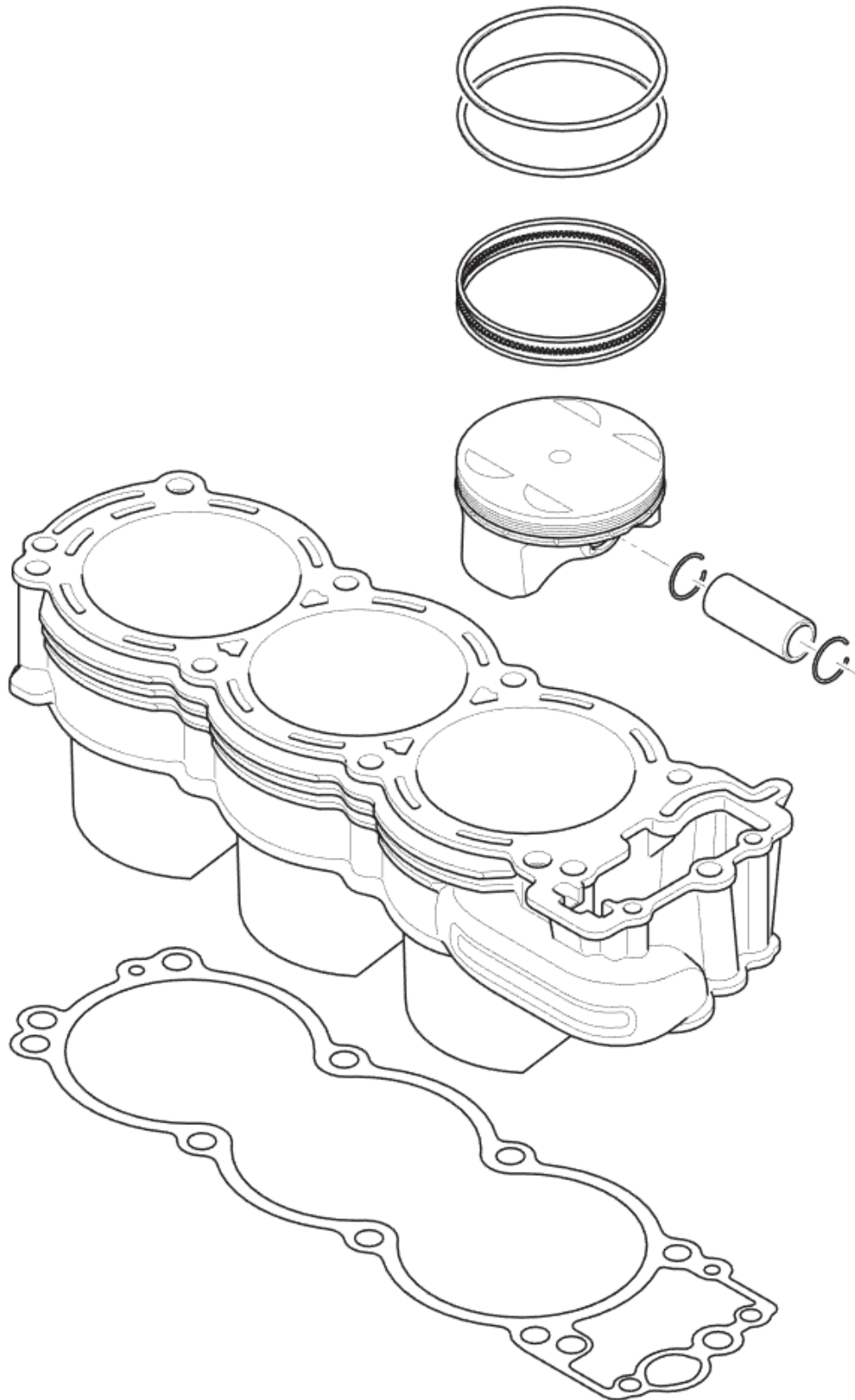
6. Fit the valve collets ensuring correct collet location in the spring cap and valve as the spring compressor is released.

** CAUTION**

Always check for correct location of the valve collets during and after assembly. If not fitted correctly, the collets may become dislodged when the engine is running allowing the valves to contact the pistons. Any such valve to piston contact will cause severe engine damage.

# Cylinders and Pistons

Exploded View - Barrels and Piston



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

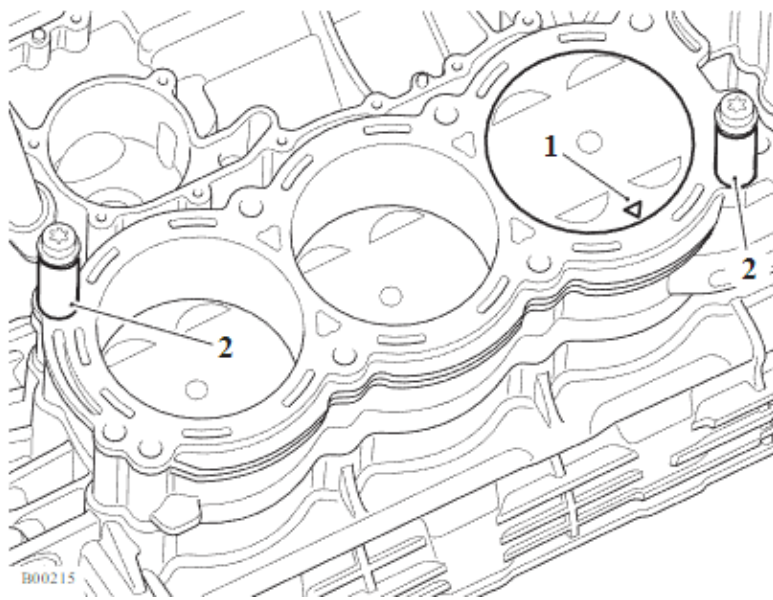
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Clutch Cover - Removal](#)
- [Cylinder Head - Removal](#)
- [Camshaft - Removal](#)

1. Invert the engine and clean the area around the barrel base gasket joint to prevent dirt falling into the crankcase when the barrels are removed.

**NOTICE**

Note the position of the piston alignment mark on the pistons for installation.



1. Piston alignment mark
2. T3880518-Spacer

2. Remove the spacers.
3. Lightly tap the barrels with a rubber mallet to break the seal of the gasket.

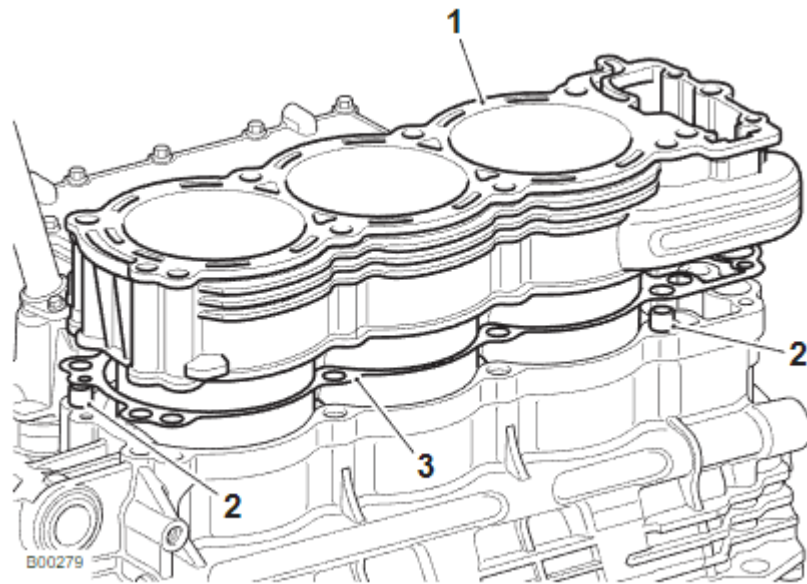
### **⚠ CAUTION**

Support the pistons as the barrels are removed to prevent piston damage.

Note the position of the locating dowels for installation.

4. Mark each piston and cylinder bore with a number to make sure that the pistons are fitted into their original cylinders on installation.
5. Carefully remove the barrel and piston assembly. Take care to make sure that the connecting rods are not allowed to fall against the inside of the crankcase.

6. Discard the gasket.

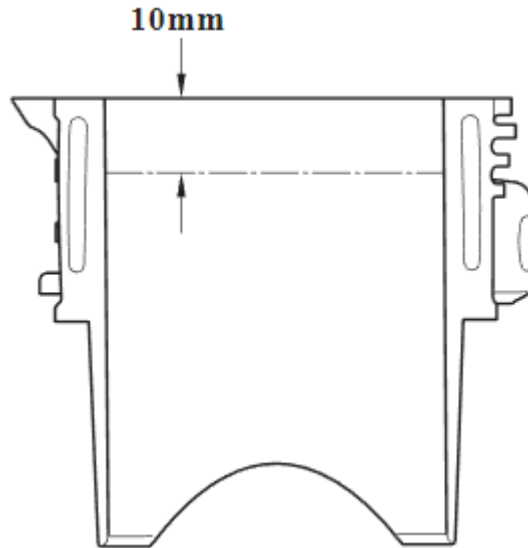


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Barrels</li><li>2. Locating dowels</li><li>3. Gasket</li></ol> |
|---|

7. Pull the piston and connecting rod assemblies out of the barrels.

## Barrels – Inspection

1. Measure the diameter of each cylinder bore using an internal micrometer or similar accurate measuring equipment.
2. Measure the inside diameter 10 mm from the top of the bore as shown below.



Cylinder Bore Diameter Measurement Points

3. If the reading is outside the specified limits, replace the barrel and pistons as an assembly.
4. When measuring the cylinder barrels internal diameter always refer to the specification table (see [Pistons](#)).

## Barrels – Installation

### **⚠ WARNING**

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



Perform the following operations:

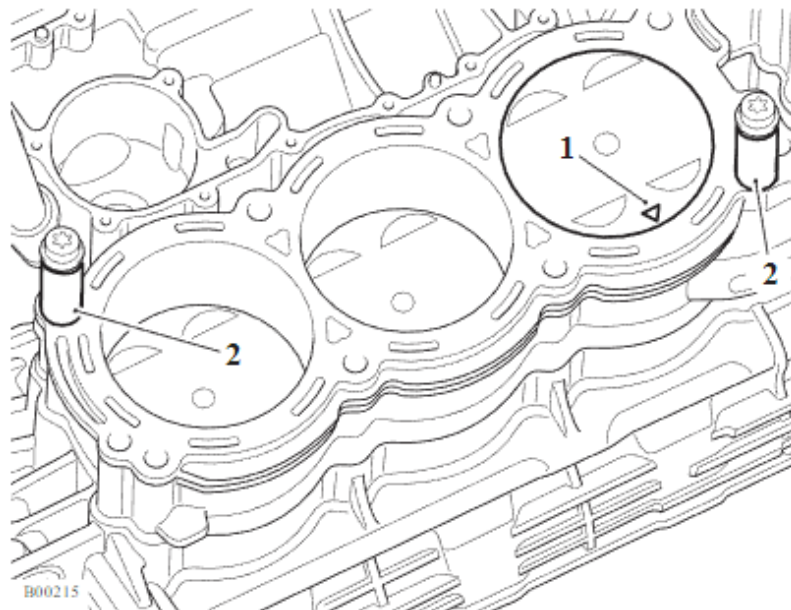
- Check that the three oil spray jets are fitted and the three oil jet protectors from service tool T3880504 are also fitted.

1. Thoroughly clean the mating surfaces of the crankcase and barrels taking care not to damage the mating surfaces.

### NOTICE

To make sure that the piston rings do not get damaged, the piston/connecting rod assemblies must be fitted into the barrel before fitting the barrel to the engine. Damaged piston rings may result in engine failure.

2. Fit the three piston and connecting rod assemblies into the barrel from the bottom as noted for removal. Make sure that the piston alignment mark on the piston faces the right hand side of the engine (away from the transmission cover).
3. Fit a new base gasket and refit the locating dowels as noted during removal.
4. With the aid of an assistant, carefully fit the barrel to the crankcase ensuring that the connecting rods fit through the crankcase without contacting any of the three oil jets.
5. To hold the barrel in position, fit service tool T3880518 to the cylinder head and secure using two of the original bolts for the cylinder head.



1. Piston alignment mark
2. T3880518 - Spacer

6. Invert the engine and fit the crankshaft (see [Crankshaft - Installation](#)).

Perform the following operations:

- [Cylinder Head - Installation](#)
- [Clutch Cover - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Piston – Disassembly

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

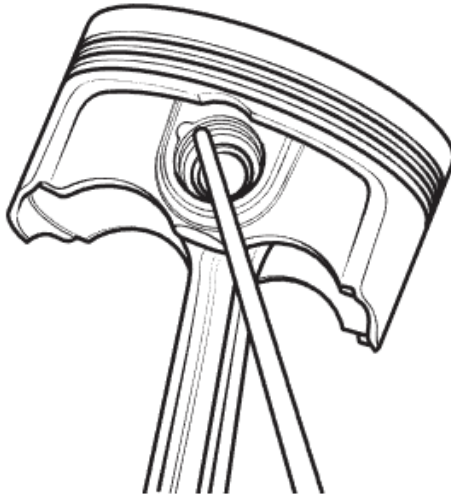
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Barrels - Removal](#)

## **⚠ CAUTION**

If a circlip is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.

1. Remove and discard the gudgeon pin circlip from one side of the piston.



Removing the Gudgeon Pin Circlip

## **⚠ CAUTION**

Never force the gudgeon pin through the piston. This may cause damage to the piston which may also damage the cylinder barrel when assembled.

## **NOTICE**

If the gudgeon pin is found to be tight in the piston, check the piston for a witness mark caused by the circlip. Carefully remove the mark to allow the pin to be removed.

2. Remove the gudgeon pin by pushing the pin through the piston and connecting rod toward the side from which the circlip was removed.
3. Remove the remaining circlip from the piston and discard it.

## **NOTICE**

The rings may be removed using a proprietary piston ring expander tool or, if a tool is not available, carefully spread the ring opening using thumb pressure then push up on the opposite side of the ring to remove it from the piston.

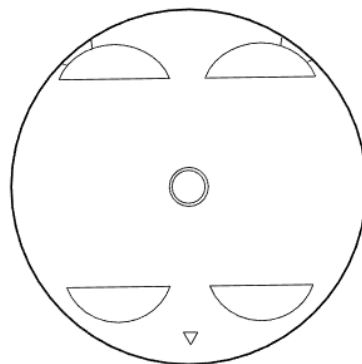
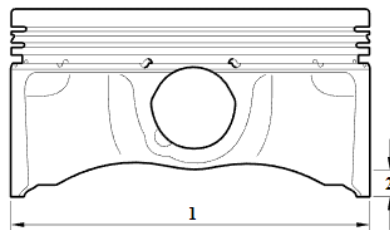
## NOTICE

If the piston rings are to be reused, note the orientation of the oil control rings prior to removal.

4. Remove the piston rings (see [Piston rings - Removal](#)).

### Piston - Wear Check

1. Remove any carbon build-up from the piston crown. Inspect the piston crown for signs of pitting and check the piston skirt and ring grooves for signs of wear or scuffing. If any sign of damage is found, renew the piston.
2. Measure the piston outside diameter 9 mm from the bottom of the piston and at 90° to the direction of the gudgeon pin.



1. Piston outside diameter
2. Measurement point

3. Always refer to the specifications table (see [Pistons](#)).
4. Replace the piston and rings if outside the specified limit.

**⚠ CAUTION**

Do not expand the piston rings any more than is necessary to allow them to be removed from the piston. The rings are brittle and will break if expanded too much.

**NOTICE**

Prior to removing the rings, check the ring-to-groove clearance of each compression ring (see [Piston Ring to Groove - Clearance](#)).

The top and second compression rings are different and are not interchangeable (see [Piston - Assembly](#)).

Piston rings must be removed from the piston using hand pressure only. Do not overextend the piston rings during removal.

If the piston rings are to be reused, note the orientation of the oil control rings prior to removal.

If the piston rings are to be reused, keep them with their respective piston to make sure they are refitted in their original locations.

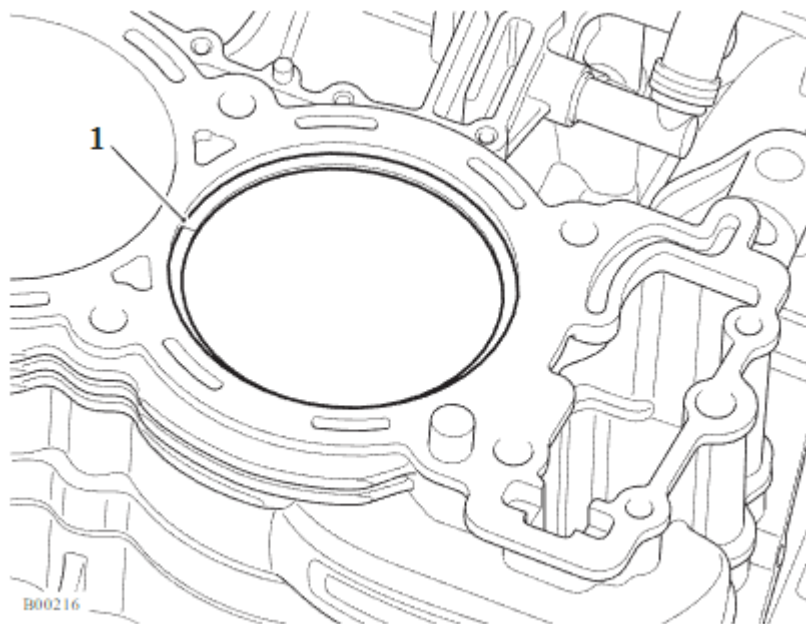
1. Ease the top compression ring out of its groove and remove it from the top of the piston.
2. Remove the second compression ring in the same way.
3. Remove the oil control rings and expanders.

**NOTICE**

The piston ring end gap must be measured in the cylinder bore to which the piston ring will be fitted to on installation.

Make sure all piston rings are fitted in their original locations (if original rings are being reused) or to the piston/bore which the end gaps were checked (if new rings are being installed).

1. Check each piston ring end gap as follows.
  - Position the piston ring into the top of the cylinder bore.
  - Using the piston crown, push the piston ring down into the bore (the piston will keep the piston ring square) until the third groove of the piston is level with the top of the bore.
  - Remove the piston and measure the gap between the ends of the piston ring, using a feeler gauge.



1. Checking piston ring end gap

2. When checking the piston ring end gap, always refer to the specifications table (see Pistons).

***NOTICE***

If the end gap is too large, replace the piston rings with a new set.

If the gap remains too large with new piston rings, both the pistons and barrels must be replaced.

If the gap is too small, check the cylinder bore for distortion, replacing as necessary.

Do not file the piston rings.

3. Repeat the procedure for the remaining piston rings.

## Piston Ring to Groove – Clearance

1. Prior to removing the rings, check the ring-to-groove clearance of each compression ring.



Piston Ring-to-Groove Clearance Check

2. When checking the piston ring to groove clearance, always refer to the specifications table (see Pistons).

### **NOTICE**

If the ring-to-groove clearance is too large, replace the piston rings with a new set. If the gap remains too large with new piston rings, the piston must also be replaced. If the gap is too small, check the piston ring grooves closely for distortion, replacing the piston as necessary. Do not file the ring grooves.



**⚠ CAUTION**

Do not expand the piston rings any more than is necessary to allow them to be installed on the piston. The rings are brittle and will break if expanded too much.

**NOTICE**

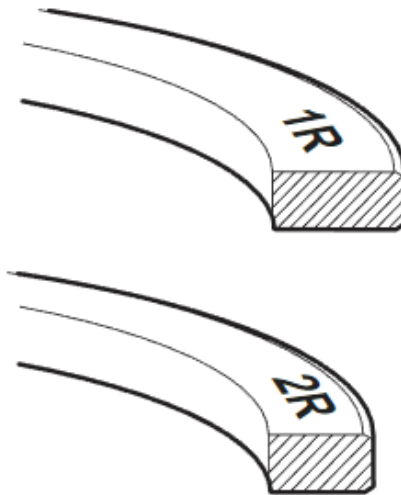
Make sure all piston rings are fitted in their original locations (if original rings are being reused) or to the piston/bore which the end gaps were checked (if new rings are being fitted).

1. Make sure the piston ring grooves are clean.
2. Fit the oil control ring expander to the piston then install the upper and lower control rings (the oil control rings are both the same and can be fitted either way up).

**NOTICE**

The second and top compression rings are different and are not interchangeable. Make sure the second and top compression rings are correctly installed.

3. Fit the second compression ring carefully to the piston, ensuring its 2R mark is facing upwards.
4. Fit the top compression ring to the piston ensuring its 1R mark is facing upwards.



Piston Ring Identification

## NOTICE

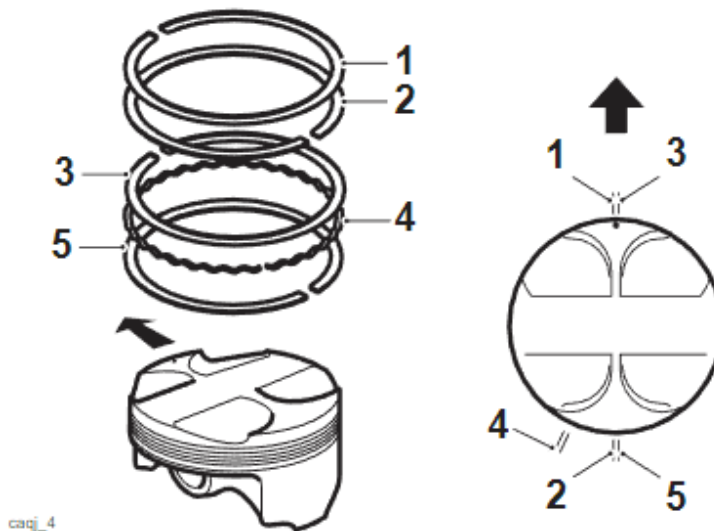
Connecting rods may be fitted either way around. However, make sure all three are fitted the same way.

5. Lubricate the piston, small end and gudgeon pin with a 50/50 solution of engine oil and molybdenum disulphide grease.
6. Align the small end in the connecting rod with the gudgeon pin hole in the piston and fit the gudgeon pin.

## ⚠ WARNING

Failure to use new gudgeon pin circlips could allow the pin to detach from the piston. This could seize the engine, resulting in loss of motorcycle control and an accident.

7. Fit new circlips on both sides of the gudgeon pin ensuring the circlips are correctly fitted in the grooves.
8. Position the piston ring end gaps as follows (piston viewed from above, triangular mark facing forwards).



### Piston Ring End Gap Locations

1. Top ring
2. Second ring
3. First steel oil control ring
4. Oil control ring expander
5. Second steel oil control ring

### ***NOTICE***

The top compression ring gap should be in the 12 o'clock position.

The second compression ring gap should be in the 6 o'clock position.

The first oil control ring gap should be in the 12 o'clock position.

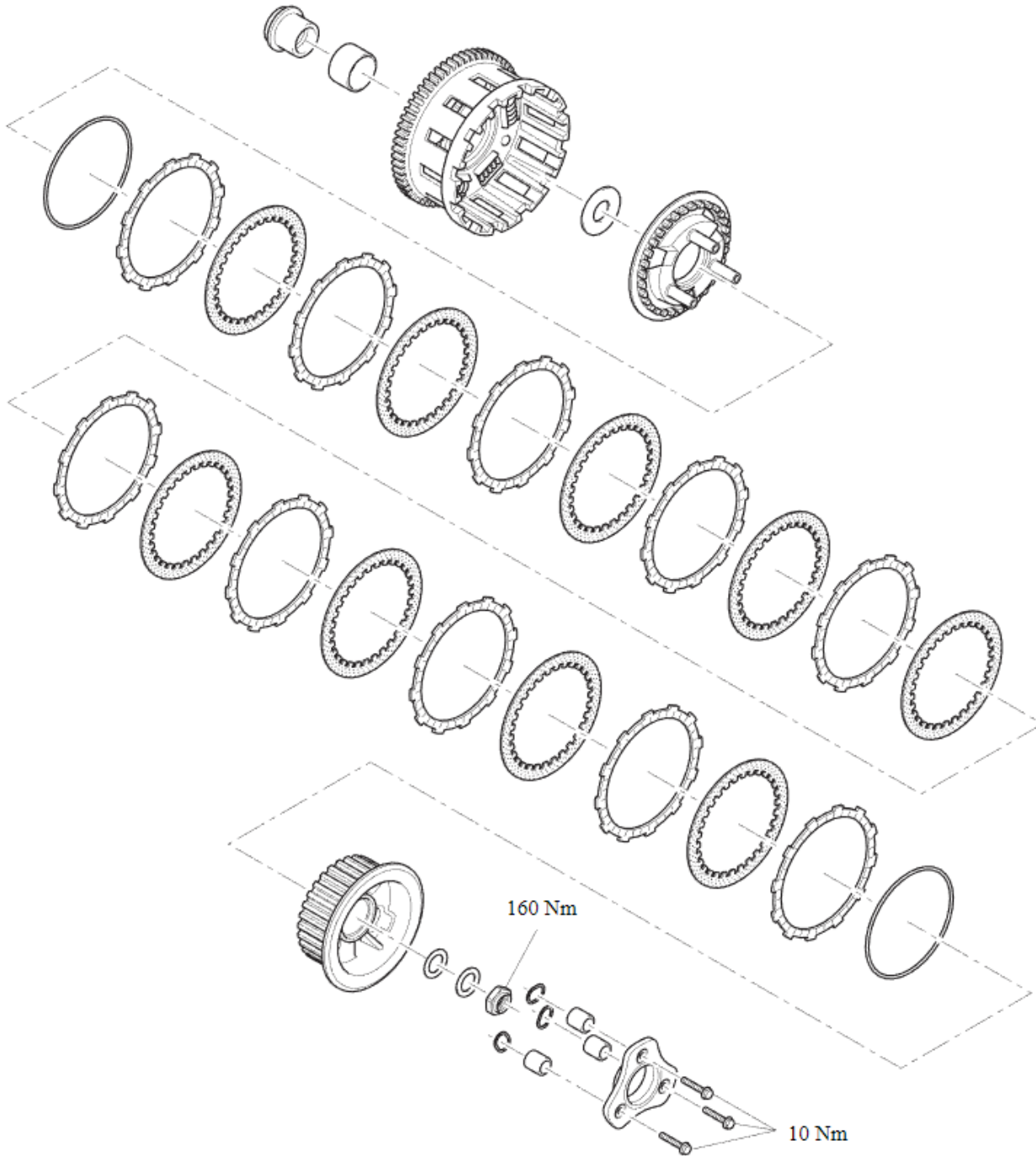
The second oil control ring gap should be in the 6 o'clock position.

The oil control ring expander gap should be in the 7 o'clock position.

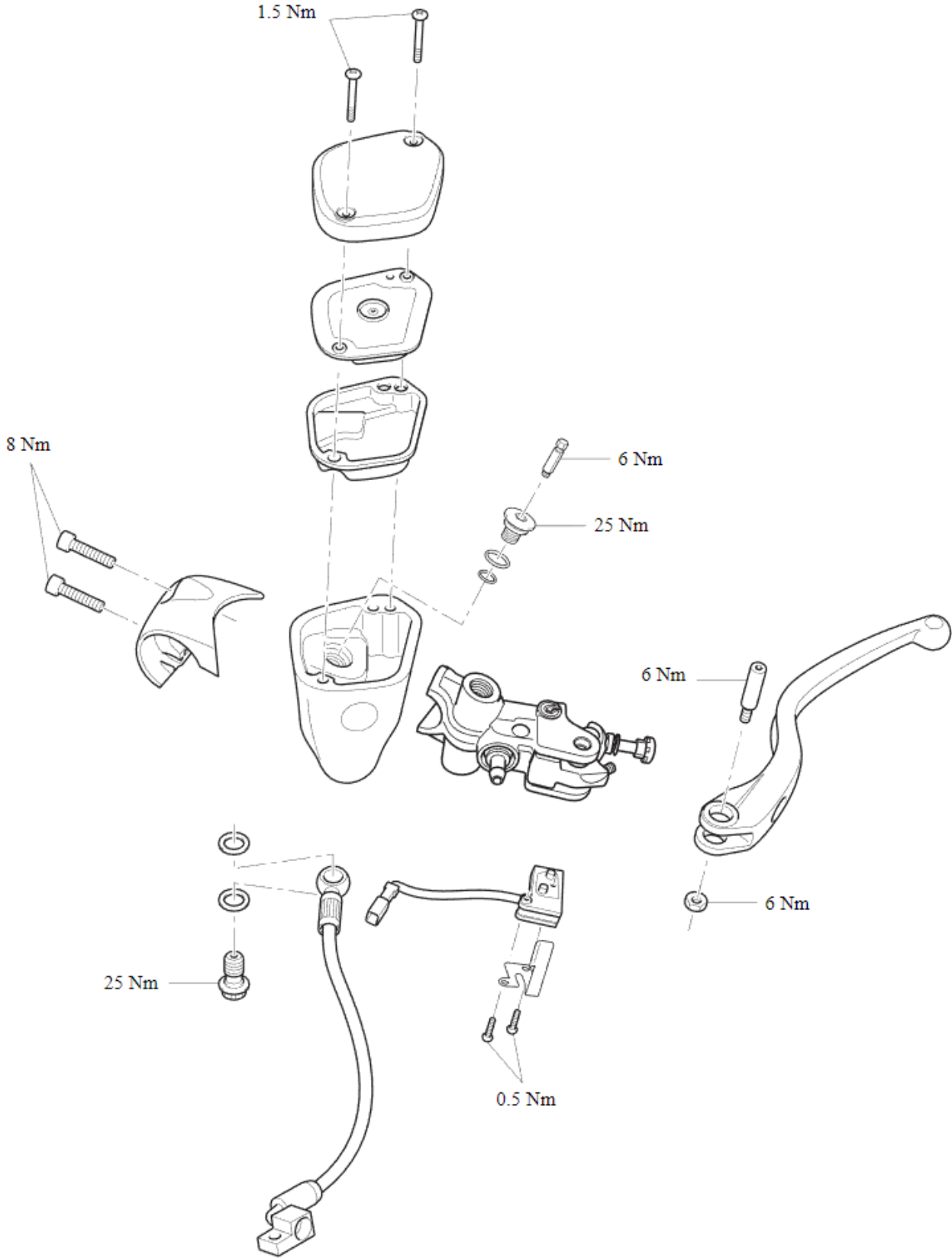
9. Fit the piston and connecting rods to the barrel then to the crankcase (see Connecting Rod - Installation).

# Clutch

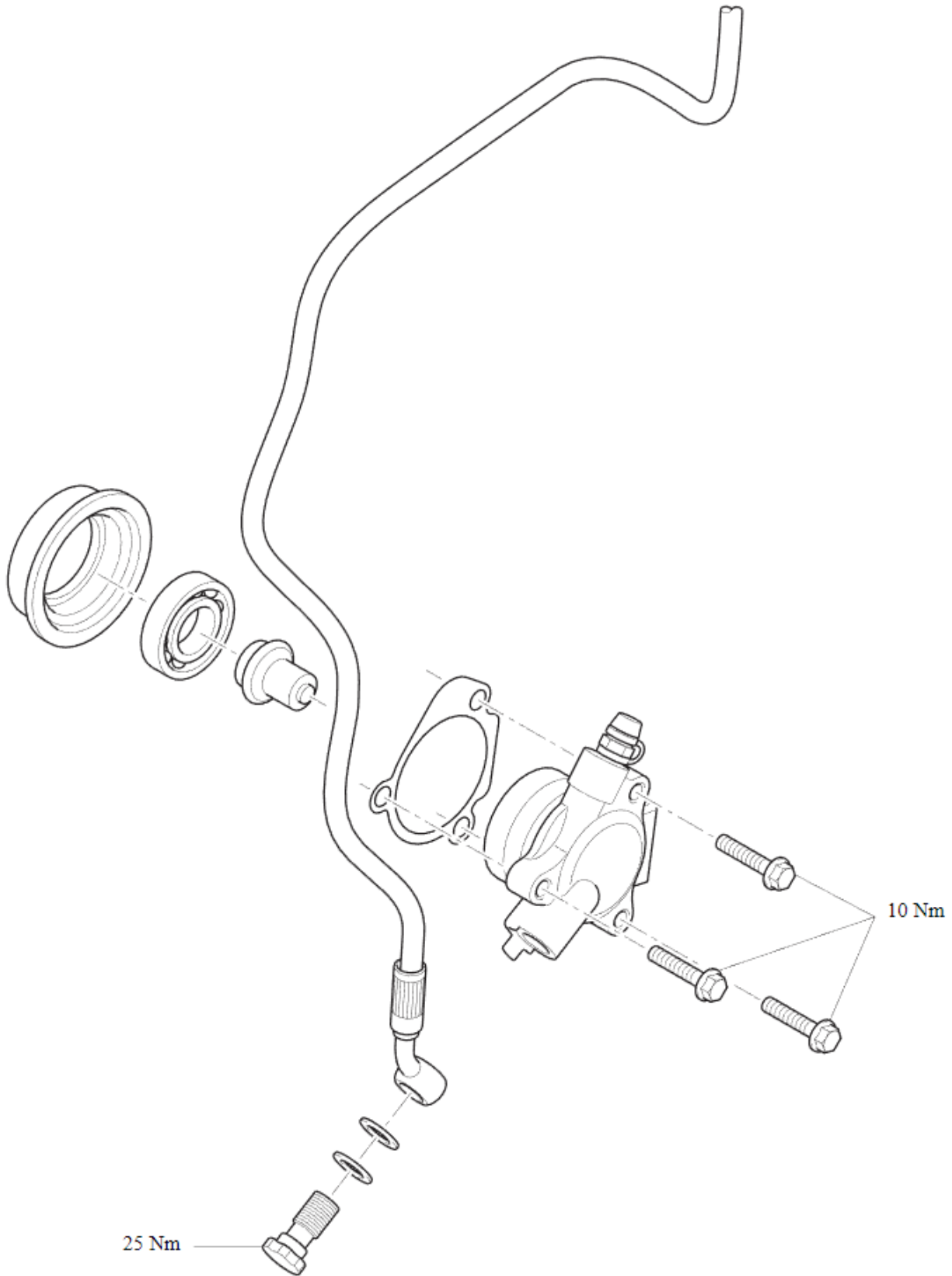
## Exploded View - Clutch



Exploded View - Clutch Controls



Exploded View - Clutch Slave Cylinder



## Clutch Description

This model is fitted with a hydraulically operated, wet plate, torque assist clutch. The clutch is operated by a hydraulic master cylinder, which in turn operates a slave cylinder mounted on the clutch cover.

The clutch has ten friction plates and nine steel plates located between the inner and outer drums.

## Clutch System Maintenance Safety Precautions

### **WARNING**

Brake and clutch fluid is hygroscopic which means it will absorb moisture from the air. The absorbed moisture will greatly reduce the boiling point of the brake and clutch fluid causing a reduction in clutch efficiency.

Replace brake and clutch fluid in line with the scheduled maintenance chart. A dangerous riding condition could result if this important maintenance item is neglected.

Do not spill brake and clutch fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake and clutch fluid from a sealed container and never use fluid from an unsealed container or from one which has been previously opened.

Do not mix different brands of brake and clutch fluid. Check for fluid leakage around clutch fittings, seals and joints.

Check regularly for clutch hose damage.

**FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY IMPAIR CLUTCH OPERATION LEADING TO LOSS OF MOTORCYCLE CONTROL AND AN ACCIDENT.**

## **WARNING**

If there has been an appreciable drop in the level of the fluid in the clutch fluid reservoir, consult your authorised Triumph dealer for advice before riding. If the clutch lever feels soft when it is applied, there may be air in the clutch line or the clutch may be defective.

It is dangerous to operate the motorcycle under such conditions and remedial action must be taken by your authorised Triumph dealer before riding the motorcycle. Failure to take remedial action may impair clutch operation leading to loss of motorcycle control and an accident.

## **WARNING**

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of brake and clutch fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the clutch operation.

Failure to change the brake and clutch fluid at the interval specified in the scheduled maintenance chart may affect clutch operation resulting in an accident.

## **WARNING**

Never use mineral based grease (such as lithium or copper based grease) in any area where contact with the clutch system hydraulic seals and dust seals is possible. Mineral based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders. Damage caused by contact with mineral based grease may affect clutch operation resulting in an accident.



## Clutch Master Cylinder – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ CAUTION**

To prevent body damage, do not spill brake and clutch fluid onto any area of the bodywork or the brake and clutch reservoirs.

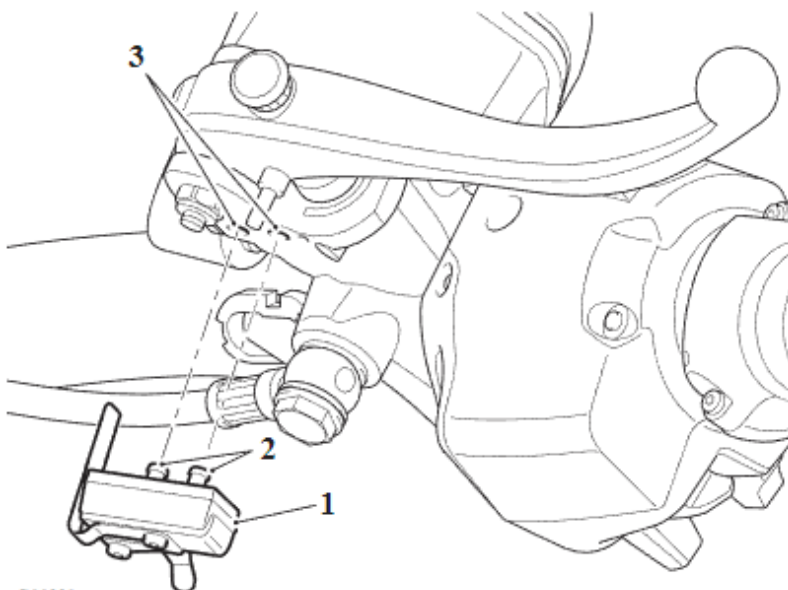
1. Drain the brake and clutch fluid from the clutch master cylinder using the bleed process (see Bleeding the Clutch).
2. If the master cylinder is to be disassembled, remove the nut and pivot bolt and remove the clutch lever assembly from the master cylinder.

### **NOTICE**

The clutch switch is secured to its housing by two fixings. The clutch switch housing is a press fit to the clutch master cylinder.

Note the orientation of the clutch switch for installation.

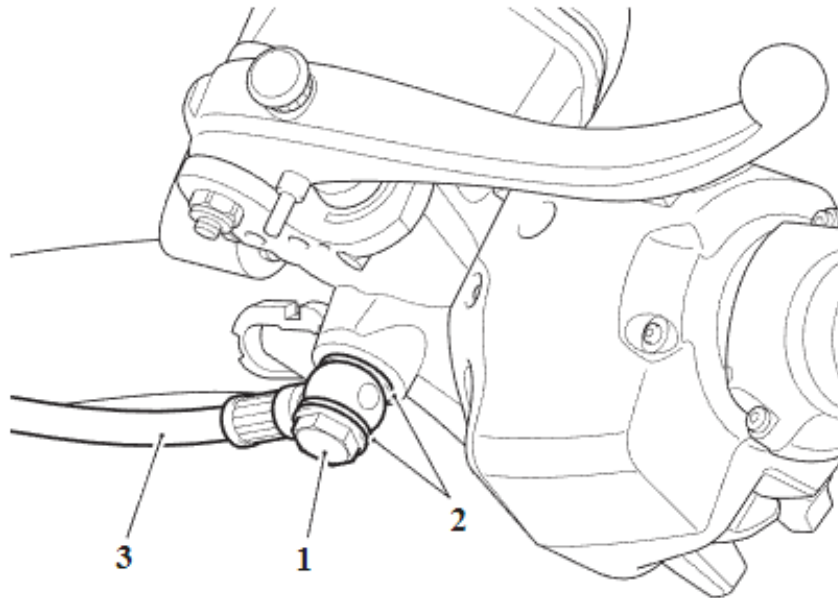
3. Carefully detach the clutch switch assembly from the master cylinder.



1. Clutch switch
2. Securing lugs
3. Location holes

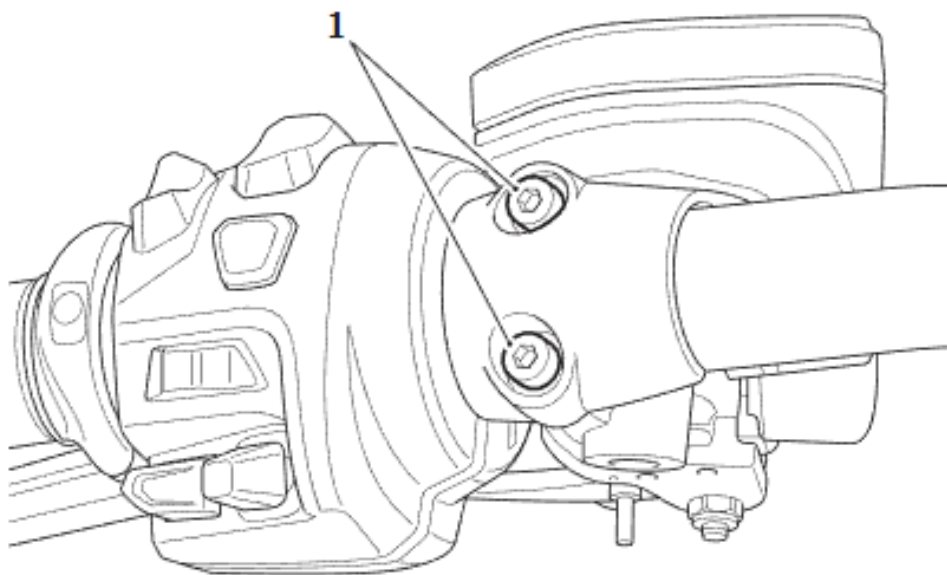
B00230

4. Disconnect the clutch hose from the master cylinder and discard the two sealing washers.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Union bolt</li><li>2. Sealing washers</li><li>3. Clutch hose</li></ol> |
|---|

5. Release the fixings, remove the clamp and remove the master cylinder.



## Clutch Master Cylinder – Disassembly

### NOTICE

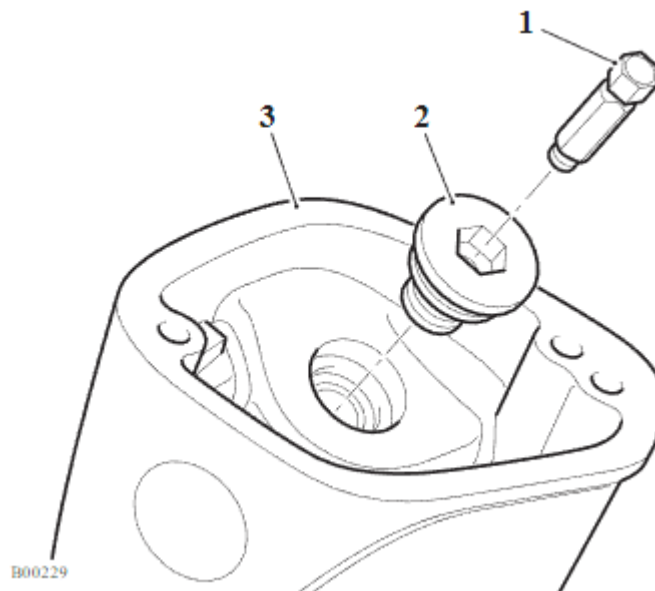
Note the order and orientation of each component as it is removed. It is essential for correct clutch operation that each component is installed in the correct order and orientation during reassembly.

The following items can be replaced on the clutch master cylinder.

- Clutch fluid reservoir
- Lever

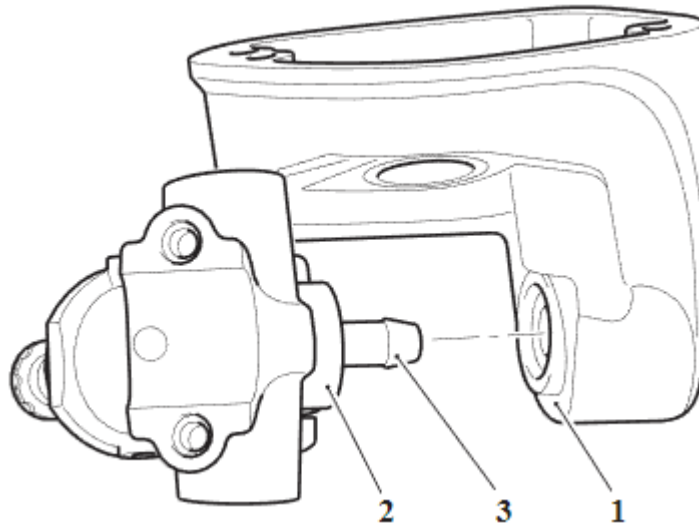
### Clutch Fluid Reservoir

1. Remove the master cylinder (see [Clutch Master Cylinder - Removal](#)).
2. Release the fixings and remove the reservoir cap, sealing plate and diaphragm seal.
3. Remove the sealing screw from the reservoir mounting fixing.
4. Remove the mounting fixing with its two O-rings.



1. Sealing screw
2. Fixing
3. Clutch fluid reservoir

5. Carefully detach the fluid reservoir from the master cylinder spigot.



- 1. Reservoir
- 2. Master cylinder
- 3. Spigot

### Clutch lever

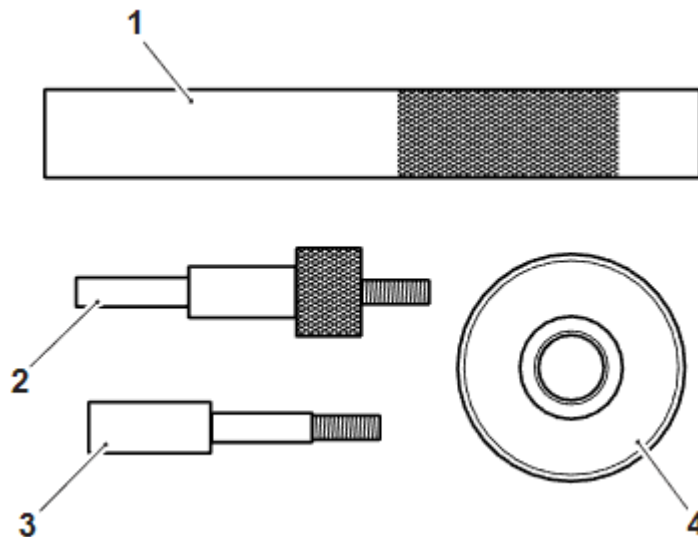
**NOTICE**

Only disassemble the lever if it is to be replaced.  
If the lever is to be replaced, The pivot assembly and push rod for the master cylinder must be removed from the original lever and fitted to the new lever.  
Note the setting of the lever adjuster to ensure it is returned to the same position on installation.

1. Remove the lock nut from the lever pivot bolt.
2. Remove the lever pivot bolt.
3. Release the lever from the master cylinder assembly and remove the dust seal.

**NOTICE**

The service tool T3880636 is required to remove the lever pivot sleeve.



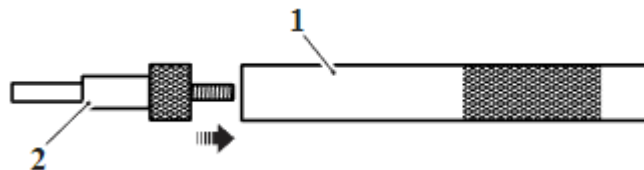
T3880636 - Kit, Brake Lever Pivot Sleeve

1. Mandrel
2. Extractor
3. Installer piece
4. Support piece

**⚠ WARNING**

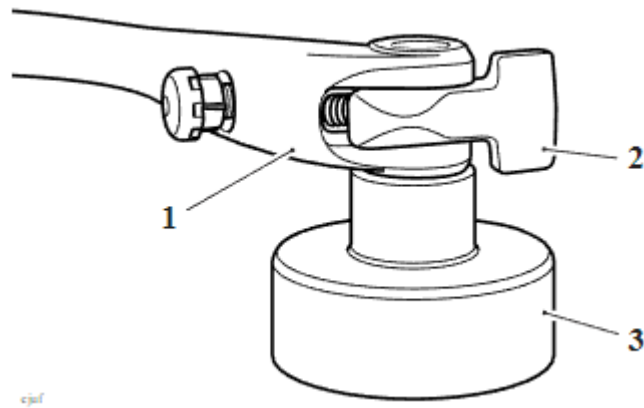
When removing the lever pivot sleeve, always wear overalls, eye, face and hand protection. The lever sleeve is hardened and liable to splinter if broken. Debris from broken components could cause injury to eyes, face and any unprotected parts of the body.

4. Fit the extractor to the mandrel as shown.



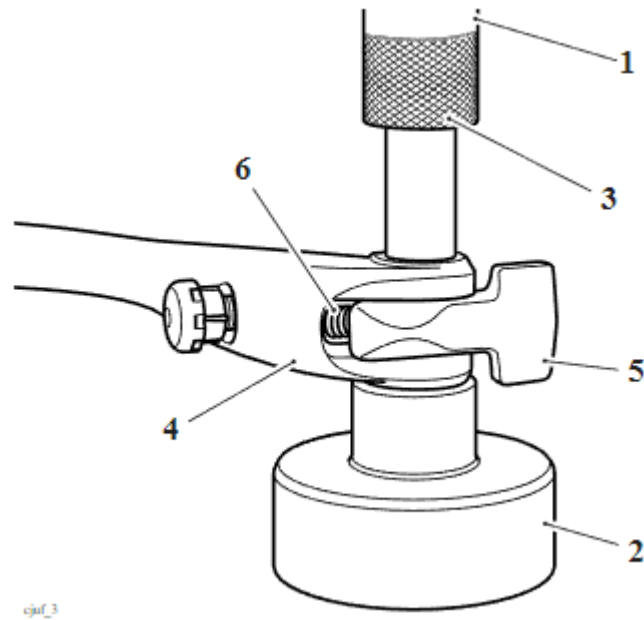
1. Mandrel
2. Extractor

5. Position the lever assembly to the support piece as shown.



1. Brake lever
2. Pivot
3. Support piece

6. Position the mandrel and extractor to the lever and press out the pivot sleeve from the lever assembly.



1. Mandrel
2. Support piece
3. Extractor
4. Lever
5. Pivot
6. Return spring

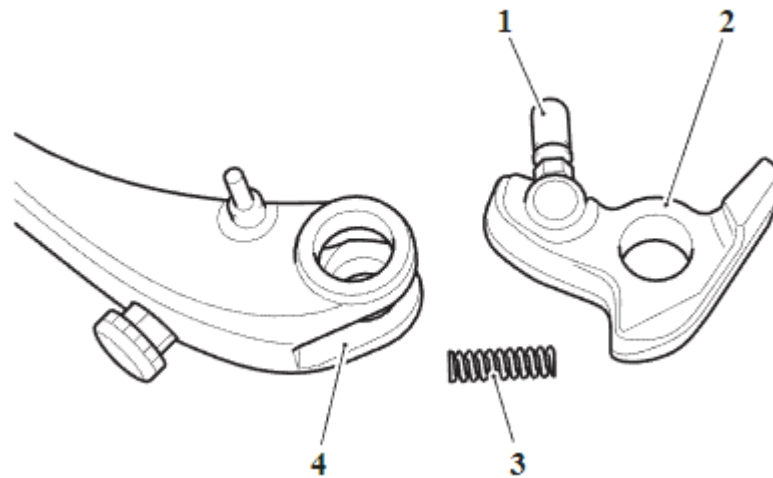
## **⚠ WARNING**

Always wear eye, hand and face protection when separating the lever components. Uncontrolled release of the lever components may cause the spring to become detached during dismantling. Flying springs may cause injury to eyes, face and any unprotected parts of the body.

## **NOTICE**

Note the orientation of the return spring, push rod and pivot bush for installation.

7. Carefully remove the extractor from the lever assembly.
8. Collect the lever pivot sleeve from the support piece.
9. Carefully detach the lever from the pivot assembly. Discard the spring and pivot bush.



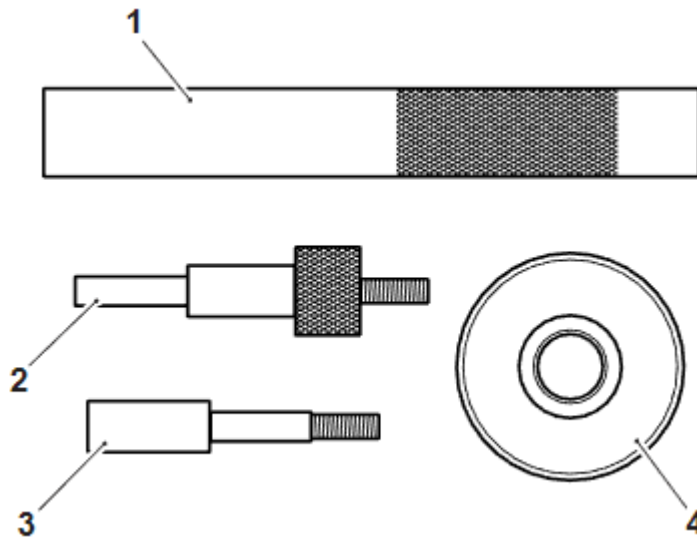
1. Push rod
2. Pivot assembly
3. Spring
4. Lever

## Clutch Master Cylinder – Assembly

### Clutch Lever

#### NOTICE

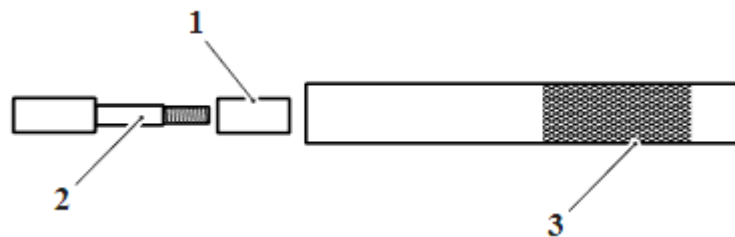
The service tool T3880636 is required to fit the lever pivot sleeve.



T3880636 - Kit, Brake Lever Pivot Sleeve

1. Mandrel
2. Extractor
3. Installer piece
4. Support piece

1. Locate the pivot sleeve over the shank of the installer piece.



1. Pivot sleeve
2. Installer piece
3. Mandrel

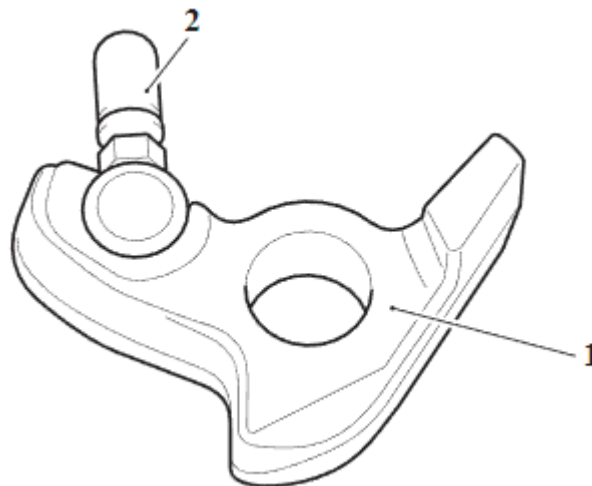


2. Screw the installer piece into the mandrel.



- 1. Mandrel
- 2. Pivot sleeve
- 3. Installer piece

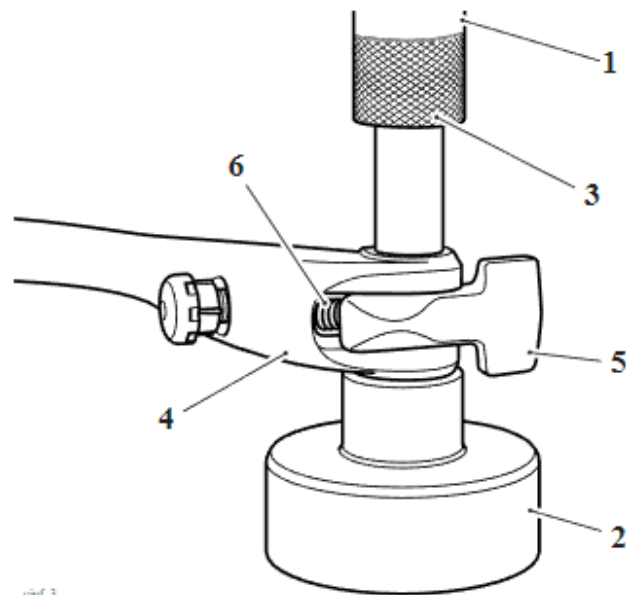
3. Make sure the push rod is fitted to the pivot.



- 1. Pivot
- 2. Push rod

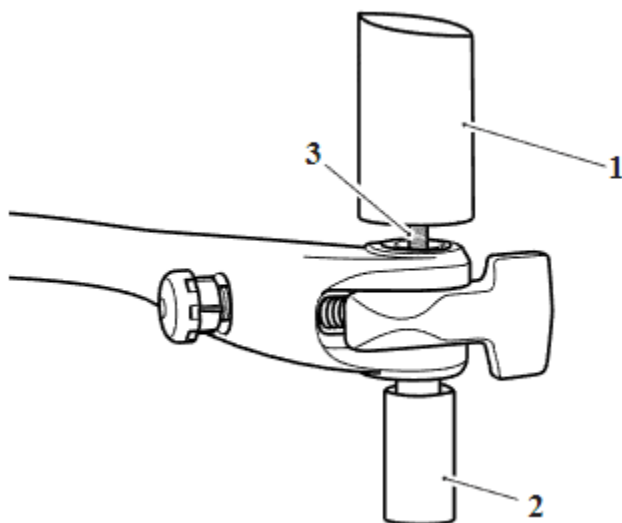
- 4. Align the lever to the pivot and push rod assembly ensuring the return spring is located as noted during removal.
- 5. Using the service tool, align the installer piece to the lever and gently push down on the mandrel locating the installer piece, through the lever and pivot.

6. Place the lower surface of the lever onto the support piece, and then using a press push the pivot sleeve through the lever pivot until the mandrel touches the upper brake lever surface.



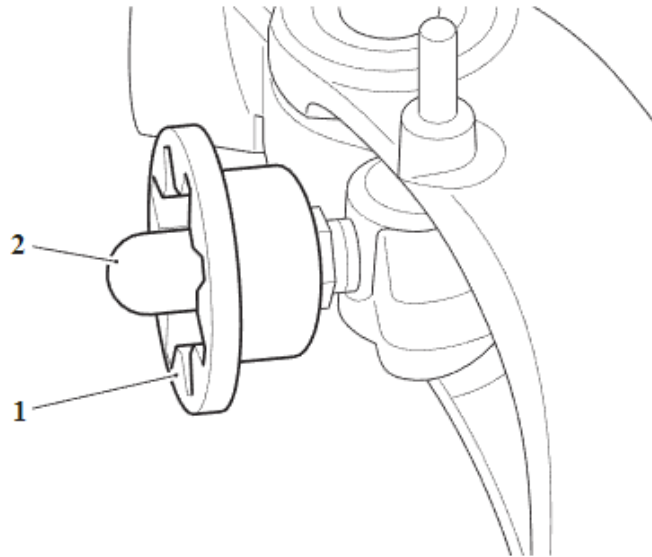
- |                  |
|------------------|
| 1. Mandrel       |
| 2. Support piece |
| 3. Extractor     |
| 4. Lever         |
| 5. Pivot         |
| 6. Return spring |

7. Support the brake lever, hold the mandrel and turn the installer piece anticlockwise to release it from the mandrel.



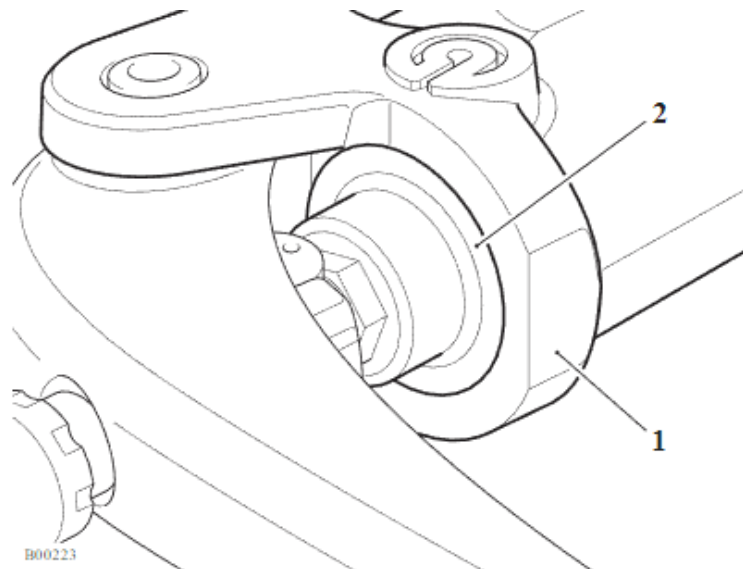
- |                    |
|--------------------|
| 1. Mandrel         |
| 2. Installer piece |
| 3. Thread          |

8. Visually check the pivot sleeve, return spring, brake lever pivot and push rod are installed as noted during removal.
9. Fit the dust cover to the push rod on the clutch lever.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Dust cover</li><li>2. Push rod</li></ol> |
|---|

10. Line up the holes of the brake lever and master cylinder, and insert the pivot bolt. Tighten the pivot bolt to 6 Nm.
11. Fit the pivot bolt lock nut and tighten to 6 Nm.
12. Fit the dust seal into its recess in the master cylinder.

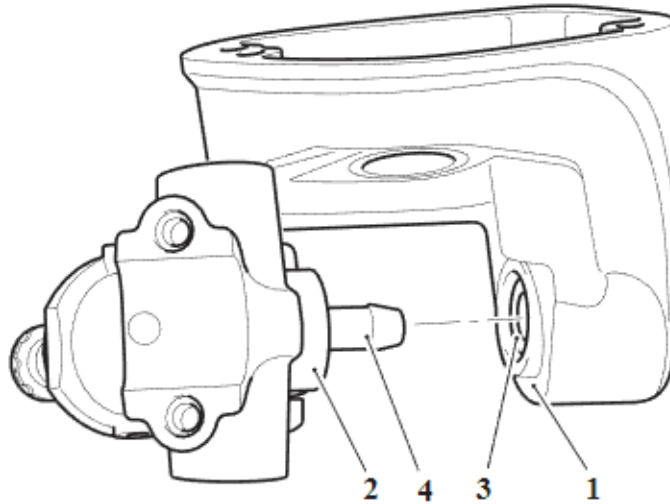


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Dust cover</li><li>2. Master cylinder</li></ol> |
|--|

13. Check lever operation and make sure the rubber seal is still correctly seated.

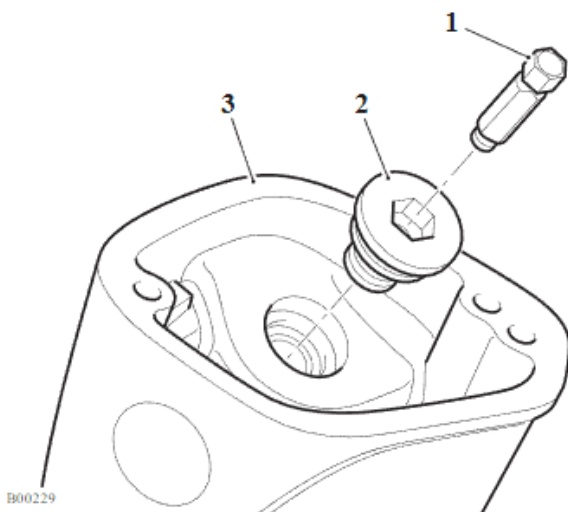
### Brake Fluid Reservoir

1. Check the condition of the spigot seal in the reservoir. Replace if damaged.
2. Fit the reservoir onto the master cylinder spigot.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Reservoir</li><li>2. Master cylinder</li><li>3. Seal</li><li>4. Spigot</li></ol> |
|---|

3. Check the two O-rings on the reservoir fixing. Replace if damaged.
4. Fit the reservoir fixing and tighten to 25 Nm.
5. Fit the sealing screw to the reservoir mounting fixing and tighten to 6 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Sealing screw</li><li>2. Fixing</li><li>3. Clutch fluid reservoir</li></ol> |
|--|

6. Fit the clutch lever to the master cylinder. Tighten the pivot bolt to 6 Nm and tighten the lock nut to 6 Nm.
7. Fit the master cylinder (see [Clutch Master Cylinder – Installation](#))
8. Bleed the clutch (see [Bleeding the Clutch](#)).

#### Clutch Master Cylinder – Installation

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **CAUTION**

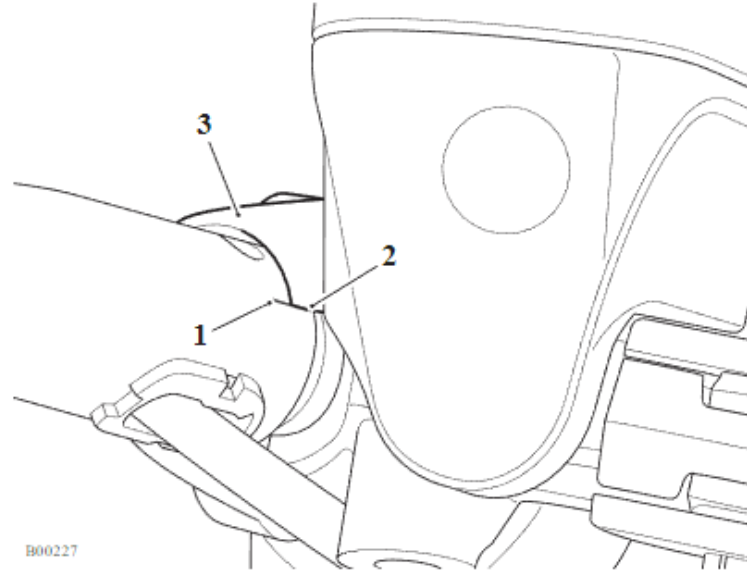
To prevent body damage, do not spill brake and clutch fluid onto any area of the bodywork or the brake and clutch reservoirs.

1. Locate the clutch master cylinder to the handlebars and fit the clamp, do not fully tighten at this stage.

### **NOTICE**

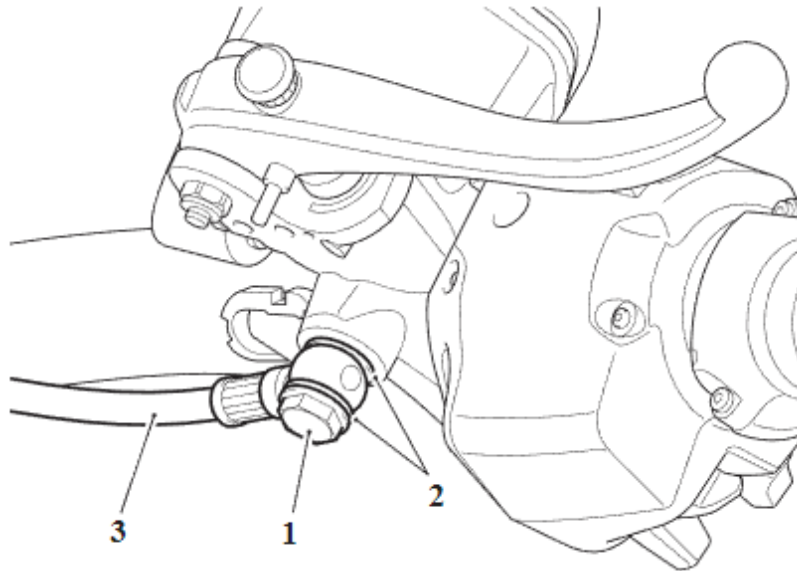
When fitting the clutch master cylinder, care must be taken to avoid trapping switch housing harness between handlebar and reservoir clamp.

2. Align the straight edge on the clamp to the alignment mark on the handlebar (as shown in the illustration below) and tighten the fixings (upper one first) to 8 Nm.



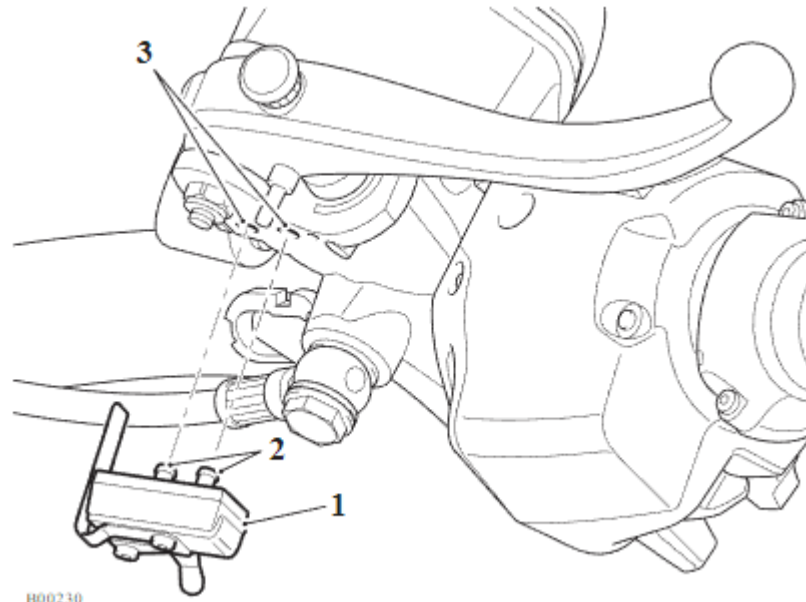
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Alignment mark</li><li>2. Straight edge</li><li>3. Clamp</li></ol> |
|---|

3. Connect the clutch hose to the master cylinder incorporating new sealing washers to each side of the union. Tighten the union bolt to 25 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Union bolt</li><li>2. Sealing washers</li><li>3. Clutch hose</li></ol> |
|---|

4. Attach the clutch switch assembly to the master cylinder as noted for removal.



1. Clutch switch
2. Securing lugs
3. Location holes

5. If removed, refit the clutch lever. Tighten the pivot bolt to 6 Nm and the nut to 6 Nm.
6. Bleed the clutch (see [Bleeding the Clutch](#)).
7. Check the clutch for correct operation and fluid leaks. Rectify as necessary.

#### Clutch Slave Cylinder – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## ⚠ CAUTION

If the clutch slave cylinder is found to be leaking, the engine oil must be replaced after repairs to the clutch slave cylinder have been carried out. Contamination of the engine oil with brake and clutch fluid may result in damage to engine and clutch components.

## ⚠ CAUTION

To prevent body damage, do not spill brake and clutch fluid onto any area of the bodywork or the brake and clutch reservoirs.

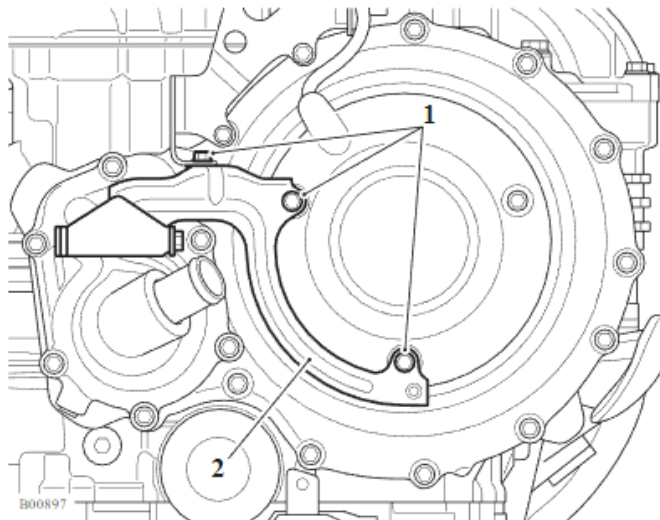
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Coolant Expansion Tank - Removal](#)
- [Radiator - Removal](#)

## NOTICE

Note the position of the single fixing of the clutch cover finisher for installation.

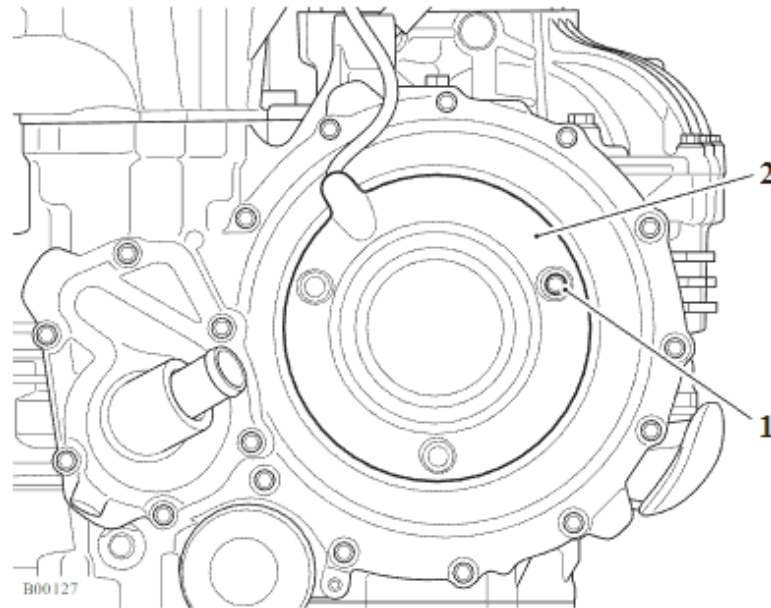
1. Release the three fixings and remove the lower radiator cowl bracket.



1. Fixings
2. Bracket



2. Release the fixing and remove the clutch cover finisher.



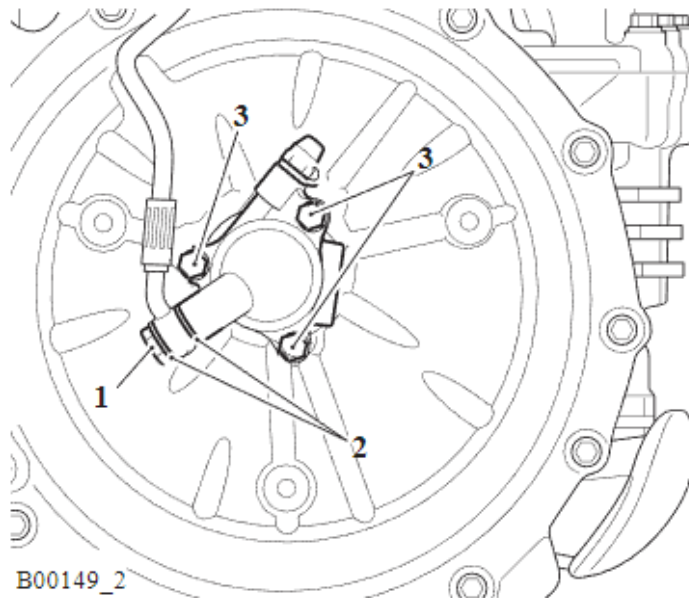
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clutch cover finisher</li></ol> |
|---|

3. Position a suitable container for the collection of brake and clutch fluid.
4. Release the union bolt from the clutch slave cylinder. Place the hose fitting into the container to collect the fluid. Discard the two sealing washers.

**NOTICE**

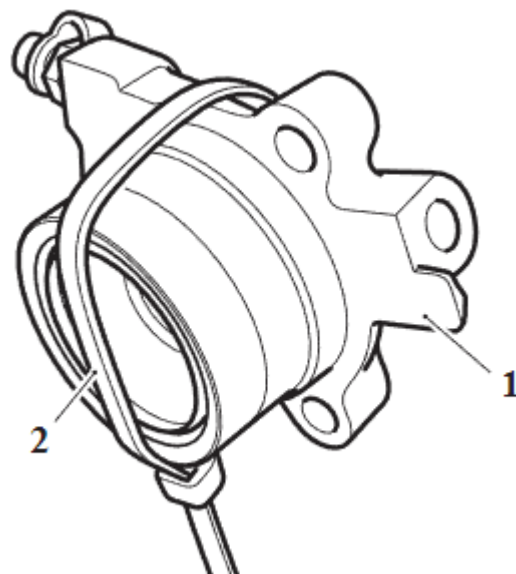
Note the orientation of the clutch slave cylinder for installation.

5. Release the three fixings and remove the slave cylinder from the clutch cover. Make sure the piston remains in its cylinder. Discard the slave cylinder gasket.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Union bolt</li><li>2. Sealing washers</li><li>3. Fixings</li></ol> |
|---|

6. If the cylinder is not to be disassembled, retain the piston to the slave cylinder using a retaining tie such as a rubber band or cable tie.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Clutch slave cylinder</li><li>2. Retaining tie</li></ol> |
|---|

## Clutch Slave Cylinder – Inspection

### **WARNING**

The clutch slave cylinder contains no user serviceable parts and replacement piston and dust seals are not available.

If disassembled, never attempt to reassemble the clutch slave cylinder using the original seals as this could cause a fluid leak. The clutch slave cylinder must be replaced if disassembled for any reason.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Inspect the clutch slave cylinder carefully for fluid leaks, wear, damage, cracks or deterioration.
2. Replace the clutch slave cylinder if any of the above are evident.

## Clutch Slave Cylinder – Installation

### **WARNING**

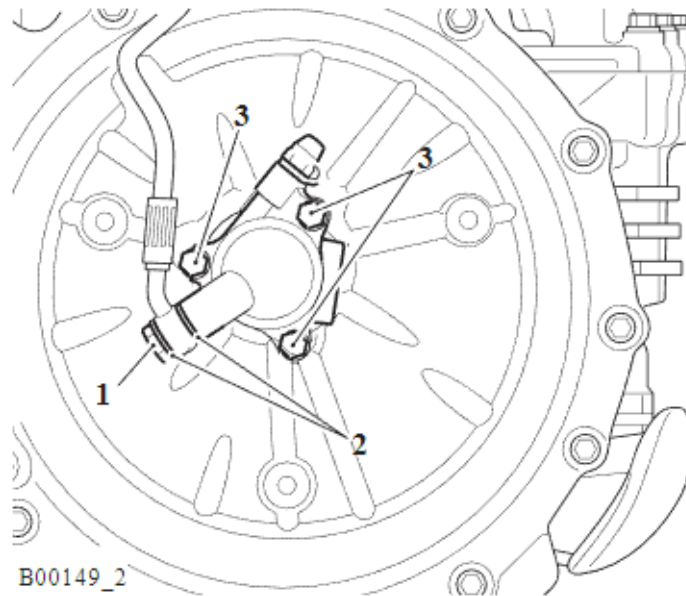
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new clutch slave cylinder gasket.
2. If fitted remove the rubber band or cable tie securing the piston to the slave cylinder.
3. Fit the clutch slave cylinder as noted for removal and tighten its fixings to 10 Nm.
4. Fit two new sealing and tighten the clutch hose union bolt to 25 Nm.

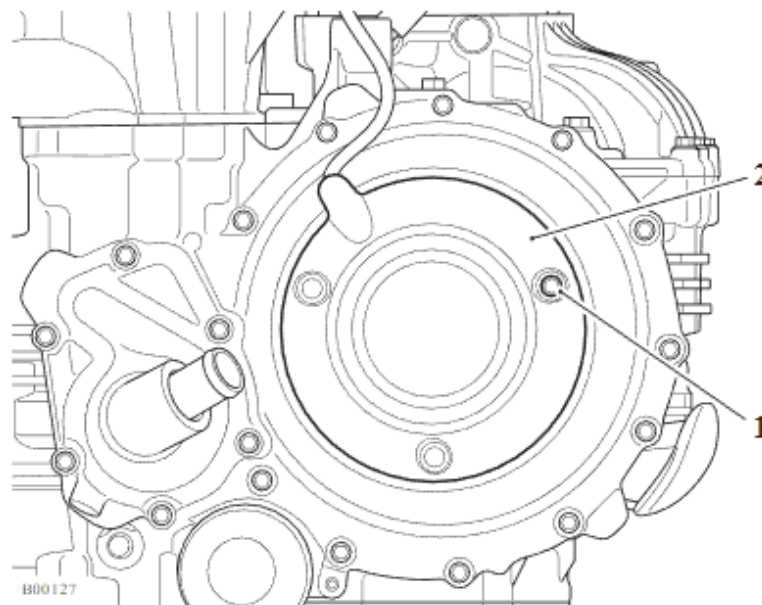
5. Bleed the clutch (see [Bleeding the Clutch](#)).



- 1. Union bolt
- 2. Sealing washers
- 3. Fixings

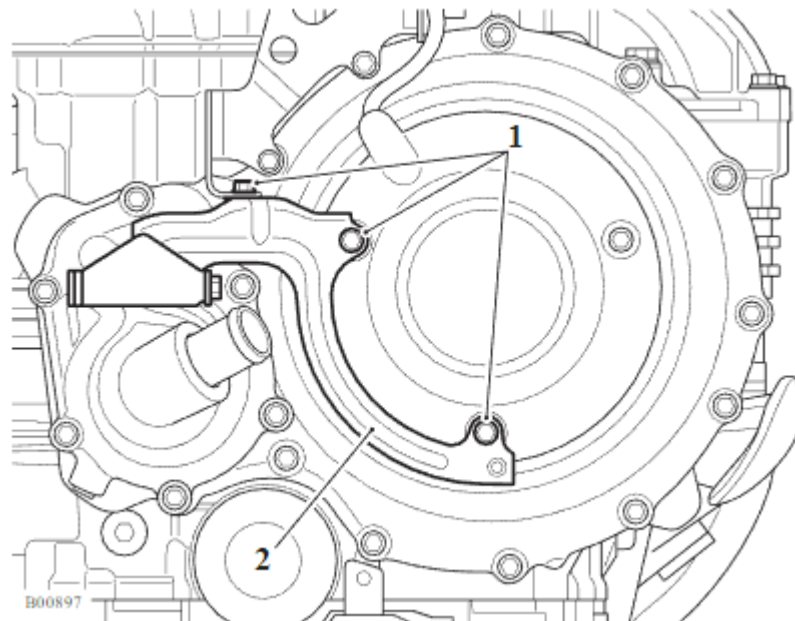
6. Check the clutch for correct operation and fluid leaks. Rectify as necessary.

7. Fit the clutch cover finisher and secure with the single fixing as noted for removal. Do not fully tighten the fixing at this stage.



- 1. Fixings
- 2. Clutch cover finisher

8. Fit the lower radiator cowl bracket and tighten the clutch cover fixings to 10 Nm.
9. Secure the radiator lower bracket to the lower radiator cowl bracket and tighten the fixing to 5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clutch cover finisher</li></ol> |
|---|

Perform the following operations:

- [Radiator – Installation](#)
- [Coolant Expansion Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ CAUTION**

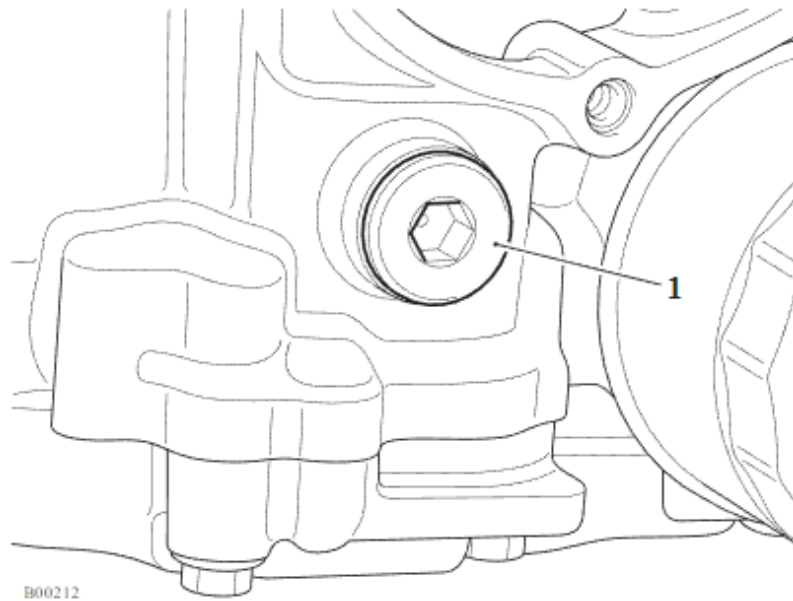
When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.  
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.  
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Clutch Cover - Removal](#)

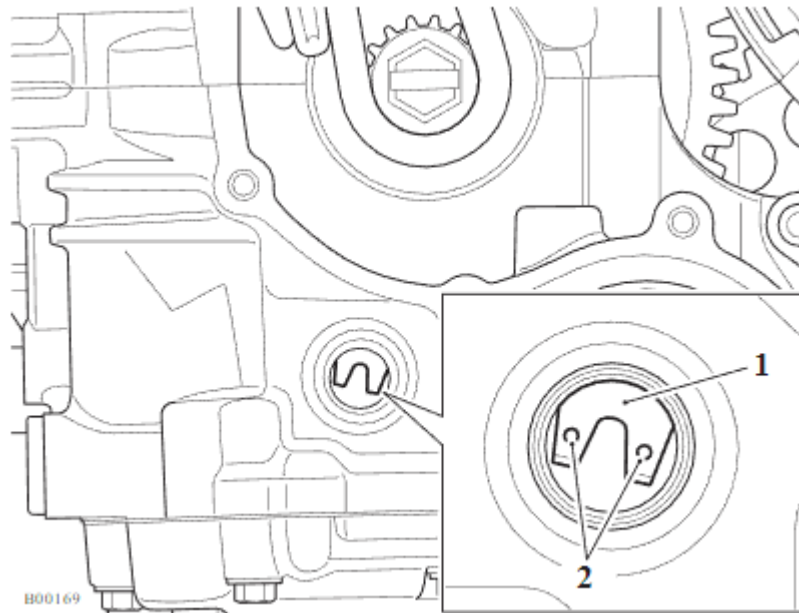
1. Remove the spark plugs to reduce compression resistance when turning the engine (see Spark Plugs - Check/Renew).

2. Remove the crankshaft locking pin plug from the crankcase.



1. Locking pin plug

3. Turn the crankshaft anticlockwise until the two gear teeth with an alignment mark on each is visible in the hole for the crankshaft locking pin.

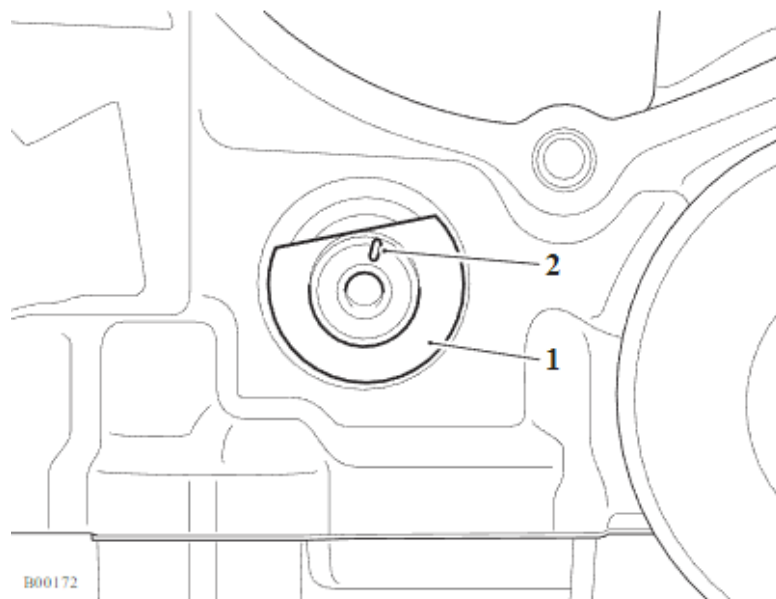


1. Crankshaft primary gear  
2. Alignment marks

### NOTICE

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

4. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



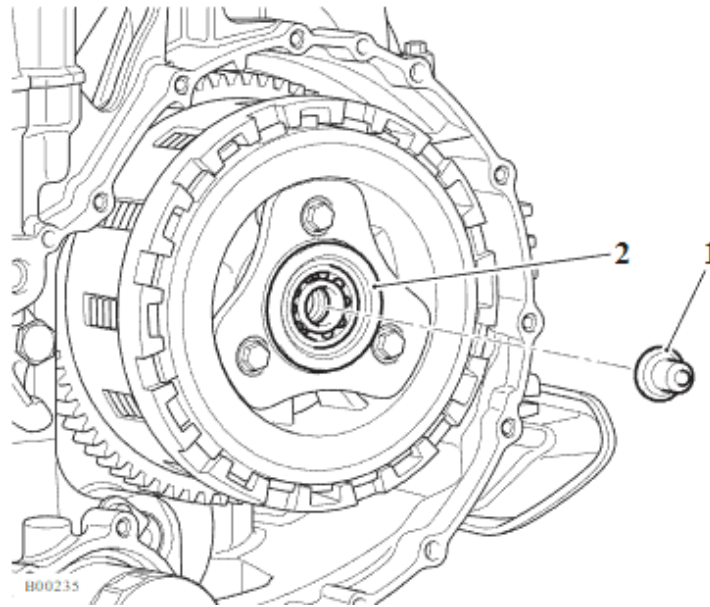
1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

### NOTICE

The lifter piece and bearing carrier can be removed by hand.

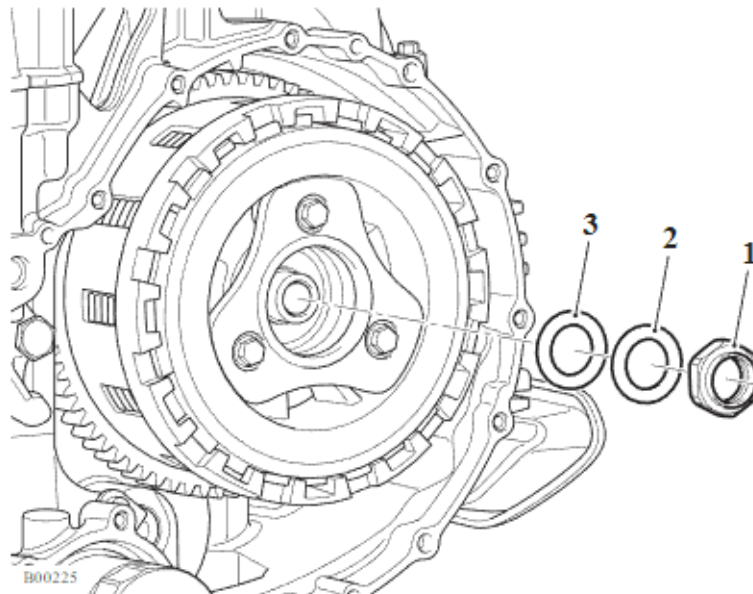


5. Remove the lifter piece and bearing carrier.



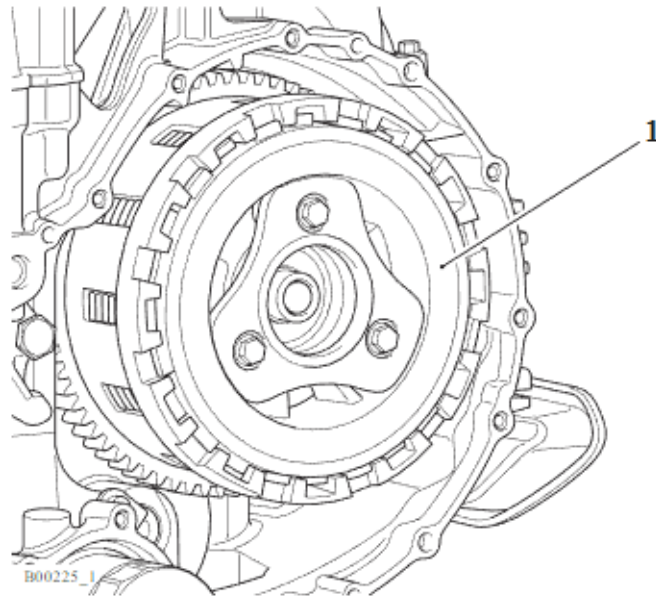
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Lifter piece</li><li>2. Bearing carrier</li></ol> |
|--|

6. Carefully de-stake the clutch centre nut.
7. Remove the centre nut, Belleville washer and a plain washer. Discard the nut and Belleville washer.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Centre nut</li><li>2. Belleville washer</li><li>3. Washer</li></ol> |
|--|

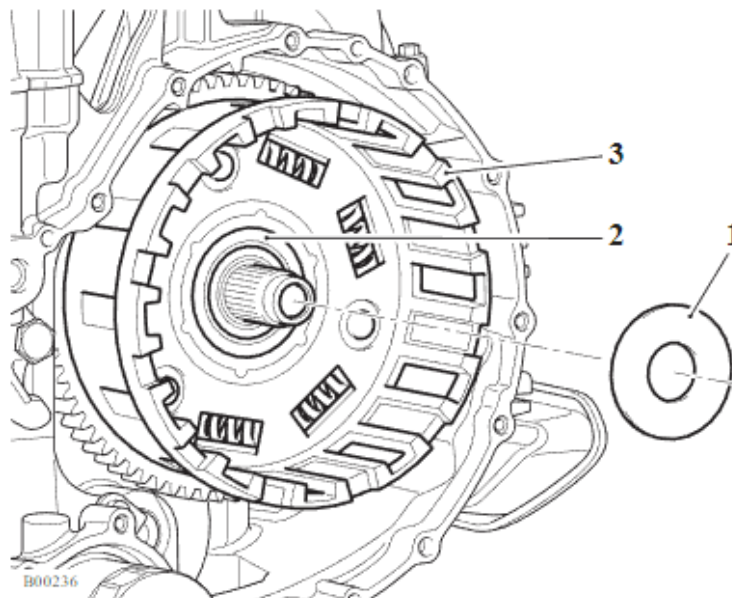
8. Remove the clutch centre and pressure plate.



1. Clutch centre and pressure plate assembly

9. Remove the thrust washer from the input shaft.

10. Slide the clutch outer drum assembly gently backwards and forwards to dislodge the inner bearing. Carefully remove the bearing while supporting the clutch drum.

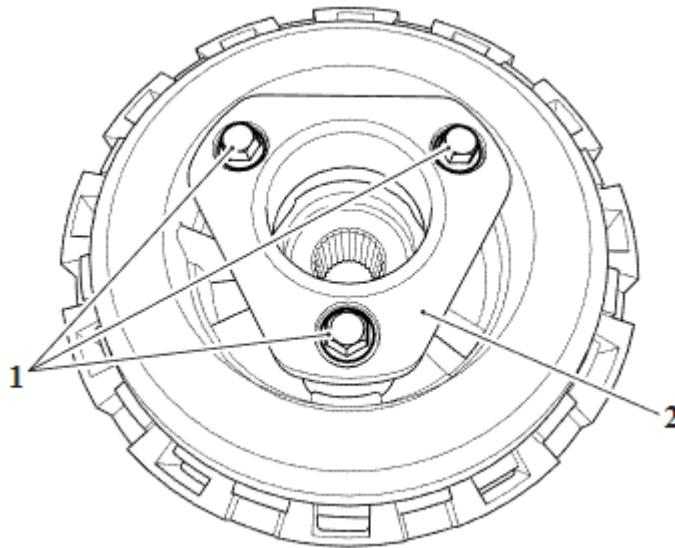


1. Thrust washer  
2. Bearing  
3. Outer drum

11. Remove the clutch outer drum.

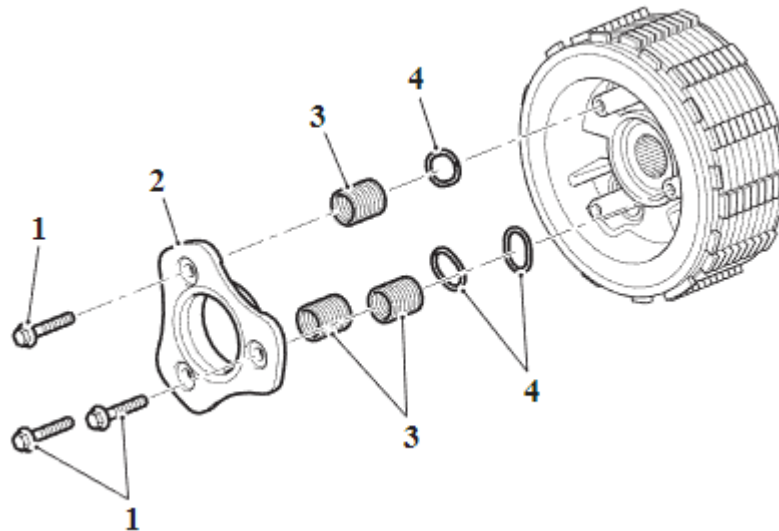
## Clutch – Disassembly

1. Evenly and progressively loosen the three fixings securing the release plate to the clutch centre and pressure plate assembly.



- |                  |
|------------------|
| 1. Fixings       |
| 2. Release plate |

2. Remove the fixings and lift off the release plate. Collect the springs and their seats.



- |                  |
|------------------|
| 1. Fixings       |
| 2. Release plate |
| 3. Springs       |
| 4. Spring seats  |

3. Remove the clutch centre.

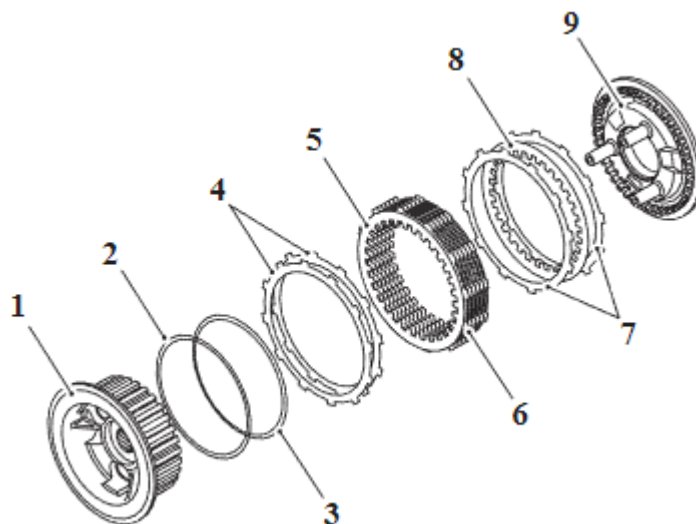
**NOTICE**

The one outermost and two innermost friction plates differ from the seven centre plates and must not be fitted in any other positions. The innermost steel plate differs from the eight other steel plates and cannot be fitted in any other position.

4. Noting their orientation, remove all the clutch friction plates and steel plates together with the anti-judder spring and anti-judder seat washer.

**NOTICE**

Record the orientation of all components as they are removed. The plates must be assembled in the same order.



1. Clutch Centre
2. Anti-judder seat washer
3. Anti-judder spring
4. Outer friction plate
5. 8 x centre steel plates
6. 7 x centre friction plates
7. 2 x Inner friction plates
8. Inner steel plate
9. Pressure plate

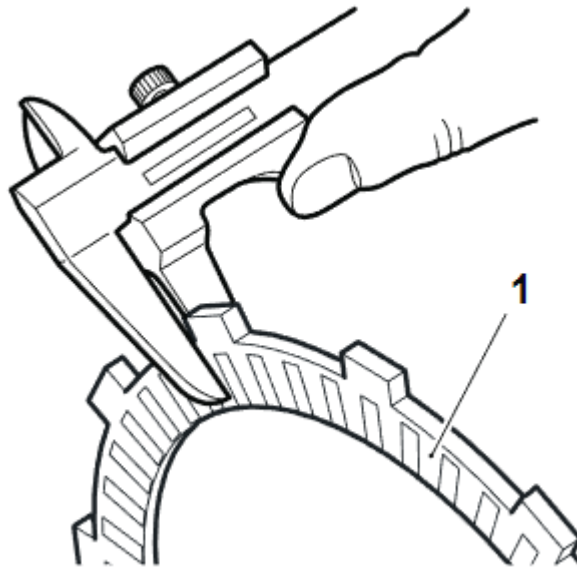
## Friction Plate Inspection

### Thickness

#### **NOTICE**

If any friction plate thickness is outside the service limit, replace the friction plates as a set.

1. Measure the thickness of the friction plate.



2. Clutch friction plate

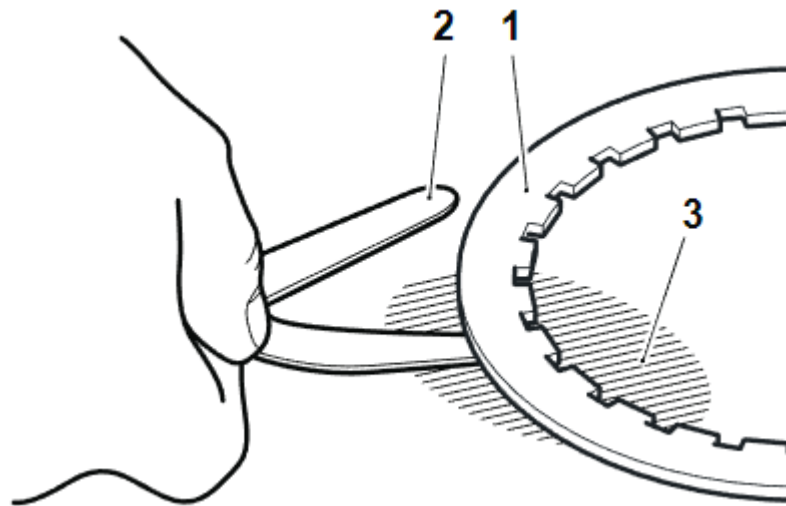
2. For the clutch friction plate thickness, refer to [Clutch and Primary Drive](#).

## Steel Plate Inspection

### Bend/warp

Check all plates for bend and warp as follows:

1. Place the plate being checked on a clean surface plate and attempt to pass a feeler gauge of the maximum service limit thickness between the steel plate and surface plate. If the feeler gauge can be passed beneath the steel plate at any point, renew the plates as a



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Steel plate</li><li>2. Feeler gauge</li><li>3. Surface plate</li></ol> |
|---|

2. For specifications refer to [Clutch and Primary Drive](#).

## Clutch – Assembly

The outermost and two innermost friction plates differ from the seven centre friction plates. Identification is as follows:

- The outermost and two innermost friction plates have a larger internal diameter to accommodate the anti-judder spring and pressure plate splines respectively.
- The outermost and two innermost friction plates also have more friction pads (60 pads) than the other plates (50 pads).
- The outermost and two innermost friction plates can also be identified by pink paint markings on the outer tabs.

The innermost steel plate differs from the other eight steel plates and can be identified by a larger internal diameter.

### CAUTION

Do not use brake cleaner or any other similar cleaning fluids to clean the clutch plates. The use of brake cleaner or other similar cleaning fluids may adversely affect the operation of the clutch.

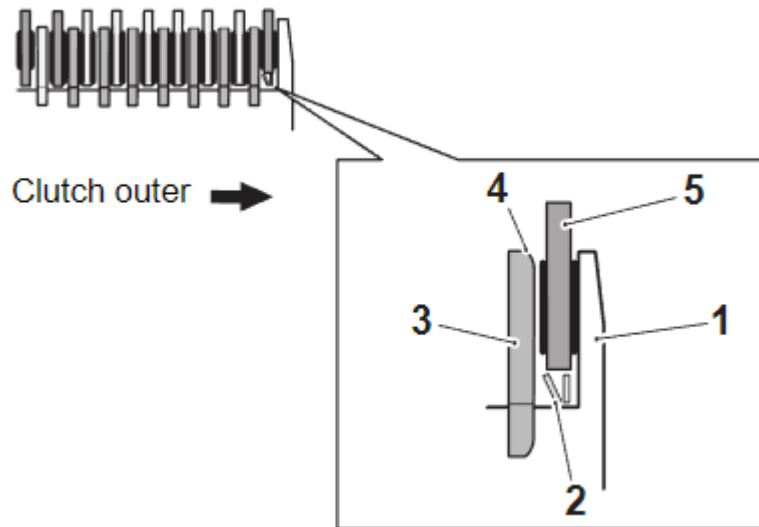
1. Remove any contamination or debris from the clutch plates using a soft dry cloth.
2. Coat all friction and steel plates in clean engine oil.

### CAUTION

Make sure the clutch plates are all installed in the correct locations. Failure to do so will adversely affect the operation of the clutch.

### NOTICE

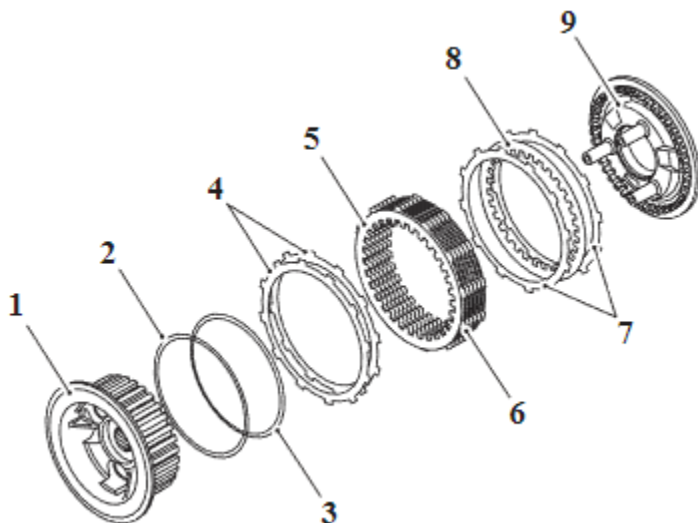
During installation, make sure that the anti-judder spring is installed with its smaller (internal) diameter facing outwards towards the clutch centre.  
Also make sure that the steel plates are installed so that the face with the curved edges is facing outwards towards the clutch centre.



1. Clutch centre
2. Anti-judder spring
3. Steel plate
4. Curved edge
5. Outer friction plate

3. Assemble the following to the clutch centre in the same order and orientation as noted for removal:

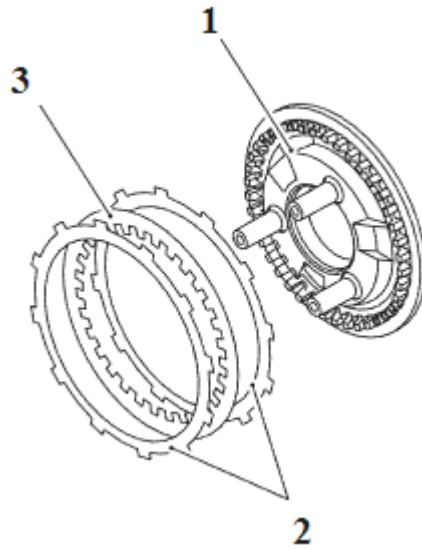
- Anti-judder washer
- Anti-judder spring
- 2 x Outer friction plate
- 8 x steel plates
- 7 x friction plates.



1. Clutch Centre
2. Anti-judder seat washer
3. Anti-judder spring
4. Outer friction plate
5. 8 x centre steel plates
6. 7 x centre friction plates
7. 2 x Inner friction plates
8. Inner steel plate
9. Pressure plate

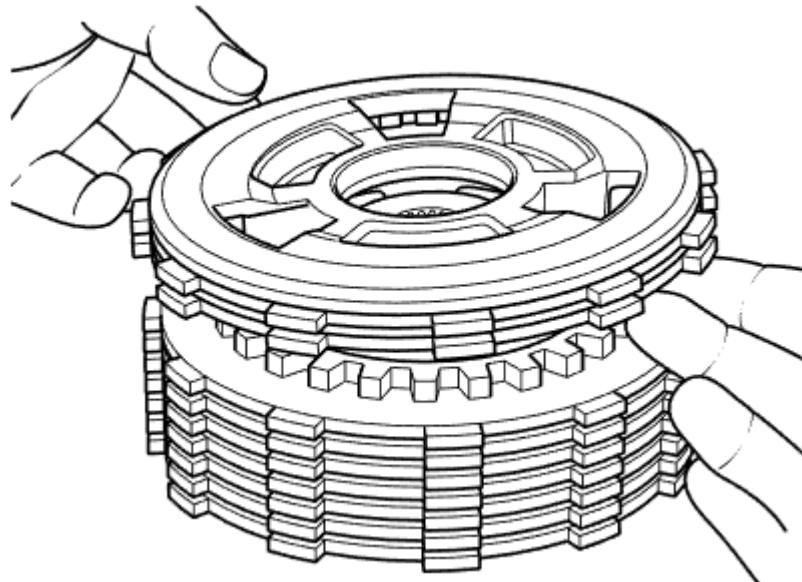


4. Assemble the innermost friction and steel plates to the pressure plate in the same order and orientation as noted for removal.



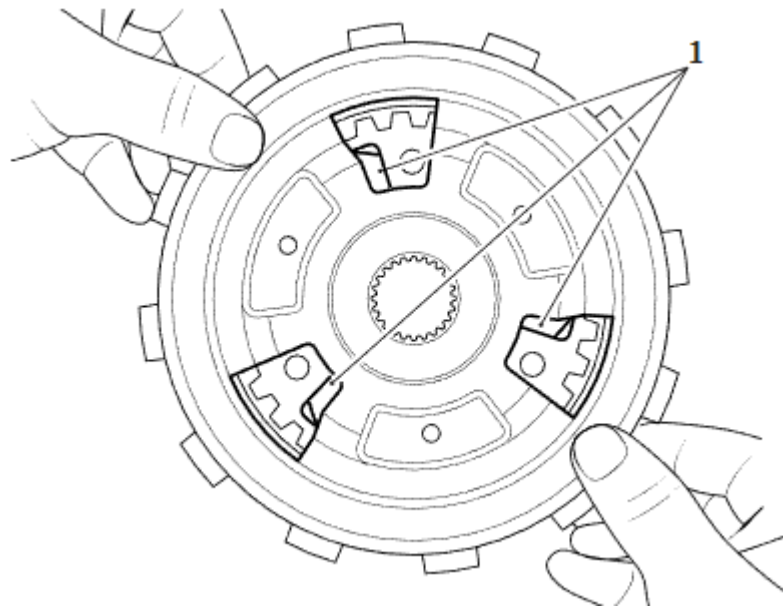
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Pressure plate</li><li>2. Inner friction plates</li><li>3. Inner steel plate</li></ol> |
|---|

5. While holding the innermost friction and steel plates in position, invert the pressure plate and locate it onto the clutch centre.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Locating the Pressure Plate</li></ol> |
|--|

6. Make sure the pressure plate ramps engage correctly with the clutch centre.

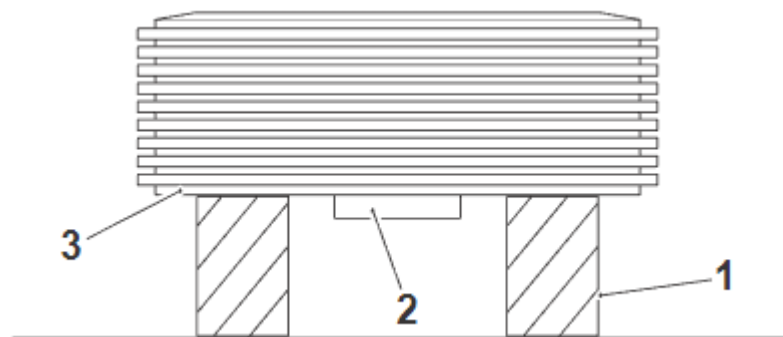


1. Pressure plate ramps

**NOTICE**

Do not allow the clutch centre and pressure plate to separate at this point as this may cause the innermost steel plate to disengage from the pressure plate splines.

7. Holding the clutch centre and pressure plate assembly together, invert the assembly and place on a suitable support. Make sure the assembly rests on the pressure plate and not on the under side of the clutch centre.

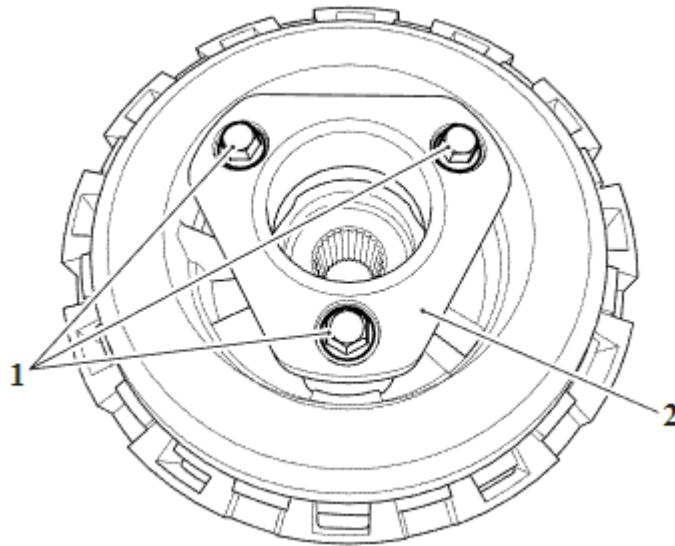


1. Support  
2. Clutch centre (underside)  
3. Pressure plate

### NOTICE

During the next instruction step, the release plate fixings should be tightened until a small amount of preload is applied to the springs. The amount of preload applied should be sufficient to prevent the clutch centre and pressure plate from separating, while allowing movement/rotation of the friction plates.

8. Fit the spring seats, springs and release plate to the clutch centre and pressure plate assembly and secure with the three fixings. Evenly and progressively tighten the release plate fixings until a small amount of spring preload is applied. Do not fully tighten the fixings.



1. Fixings
2. Release plate

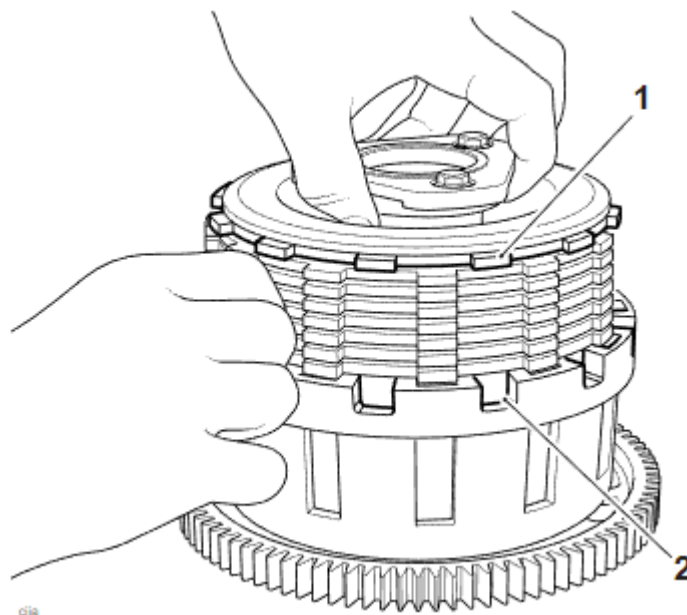
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

To aid installation, the clutch centre and pressure plate assembly should be temporarily fitted to the clutch outer drum while it is removed from the motorcycle. This allows alignment of the friction plate outer tabs prior to installation to the motorcycle.

1. With the clutch outer drum assembly removed from the motorcycle, fit the clutch centre and pressure plate assembly to the outer drum assembly. Align the friction plate tabs noting that the outermost friction plate engages in its own (shallow) slot.



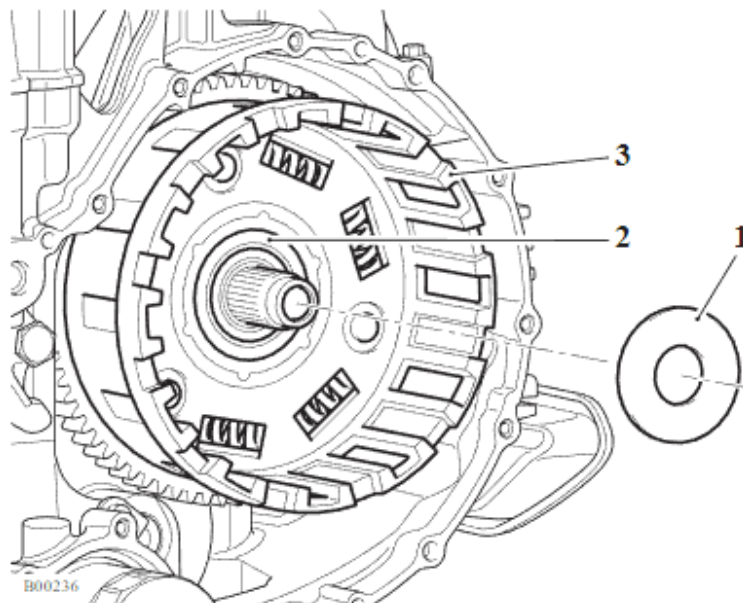
1. Outer most friction plate
2. Shallow slot

2. Remove the clutch centre and pressure plate assembly from the outer drum assembly. Take care not to disturb the friction plate tabs.
3. Position the clutch outer drum assembly to the input shaft.

### NOTICE

When the bearing sleeve is correctly fitted, it will be a flush fit with the clutch drum face.

4. While holding the clutch outer drum in position, refit the bearing and the thrust washer.

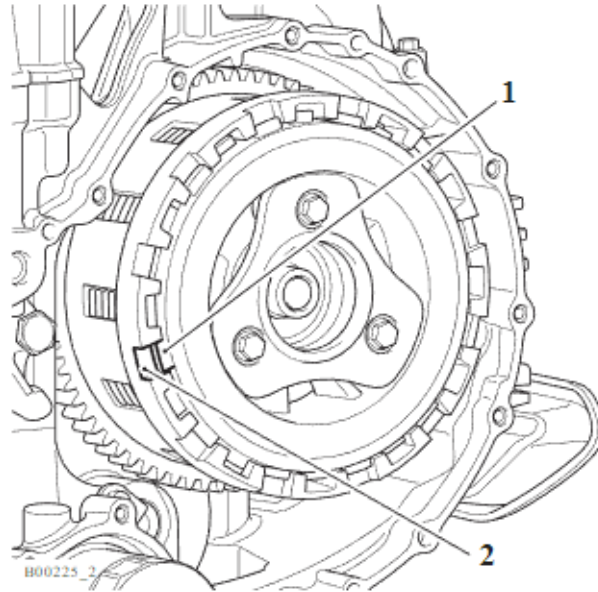


1. Thrust washer
2. Bearing
3. Outer drum

### NOTICE

To align the clutch centre splines with the input shaft splines, it may be necessary to rotate the input shaft.

5. Fit the clutch centre and pressure plate assembly, aligning the friction plate tabs with the clutch drum slots, noting that the outermost friction plate engages in its own (shallow) slot. Align the clutch centre splines with those of the input shaft and slide the assembly fully into position.



1. Outer friction plate
2. Outer friction plate slot

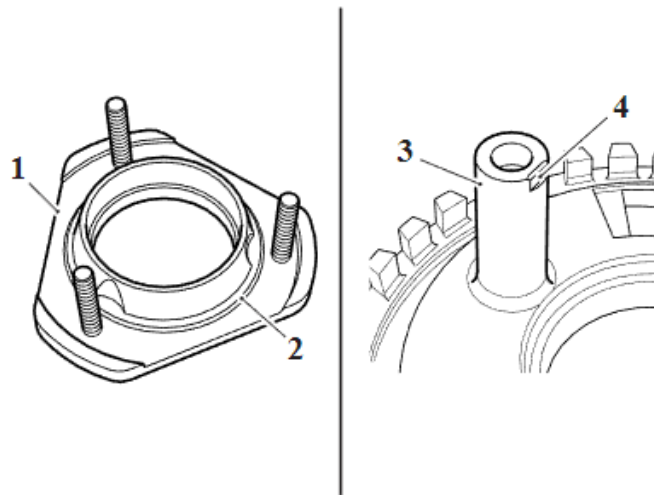
### **⚠ CAUTION**

Make sure that the clutch spring plates and springs are all installed correctly under the release plate. Failure to do so will adversely affect the operation of the clutch.

### **NOTICE**

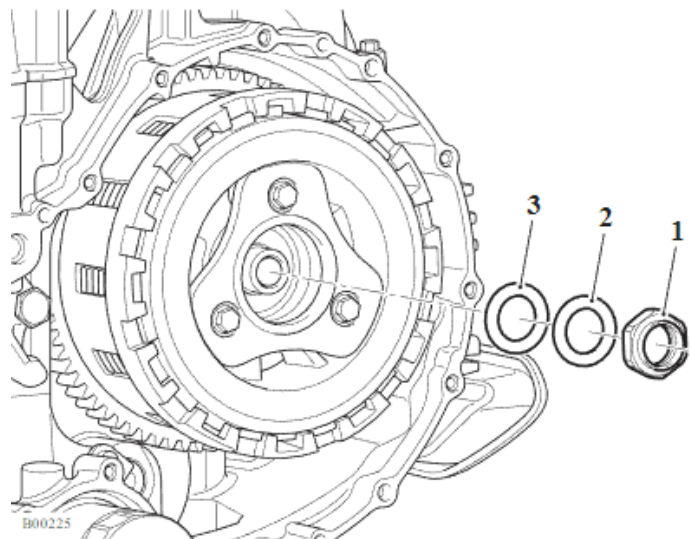
When tightening the three release plate fixings, care must be taken to tighten the fixings evenly and progressively. This is to make sure that the chamfer edge on the underside of the release plate is correctly seated into the machined face on the inside edge of the pressure plate fixing towers.

Failure to make sure that the release plate is correctly seated will cause the clutch friction plates to release and re-engage at an angle, resulting in severe clutch judder.



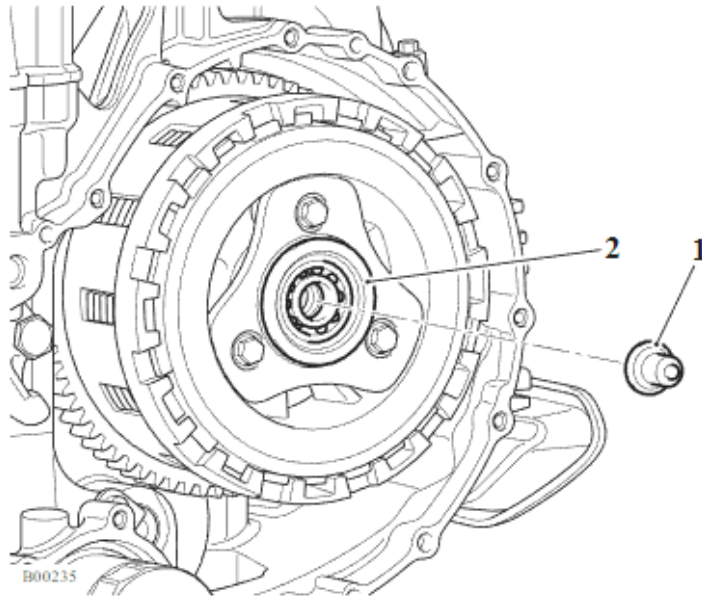
- 1. Release plate
- 2. Chamfer edge
- 3. Fixing tower
- 4. Machined face

6. Evenly and progressively tighten the release plate bolts to 10 Nm, ensuring that the springs remain correctly located and that the release plate is correctly seated to the pressure plate fixing towers.
7. Fit the original plain washer and a new Belleville washer with its OUT marking facing outwards.
8. Fit a new centre nut.



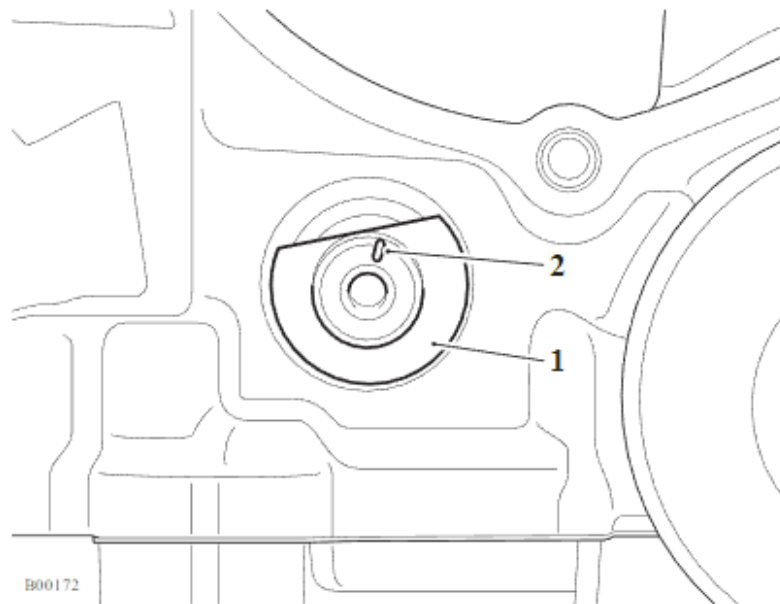
- 1. Centre nut
- 2. Belleville washer
- 3. Washer

9. Tighten the centre nut to 160 Nm.
10. Using a suitable pin punch, stake the nut to the shaft.
11. Fit the lifter piece and bearing carrier, ensuring they are correctly installed in the release plate.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Lifter piece</li><li>2. Bearing carrier</li></ol> |
|--|

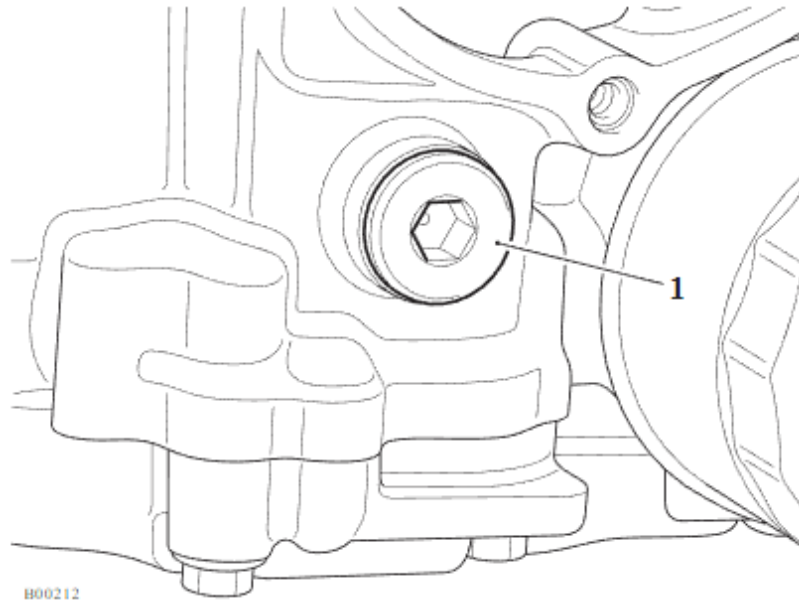
12. Remove service tool T3880501



- |  |
|--|
| <ol style="list-style-type: none"><li>1. T3880501 - Crankshaft Locking Pin</li><li>2. Alignment mark</li></ol> |
|--|



13. Fit the crankshaft locking pin plug and tighten to 33 Nm.



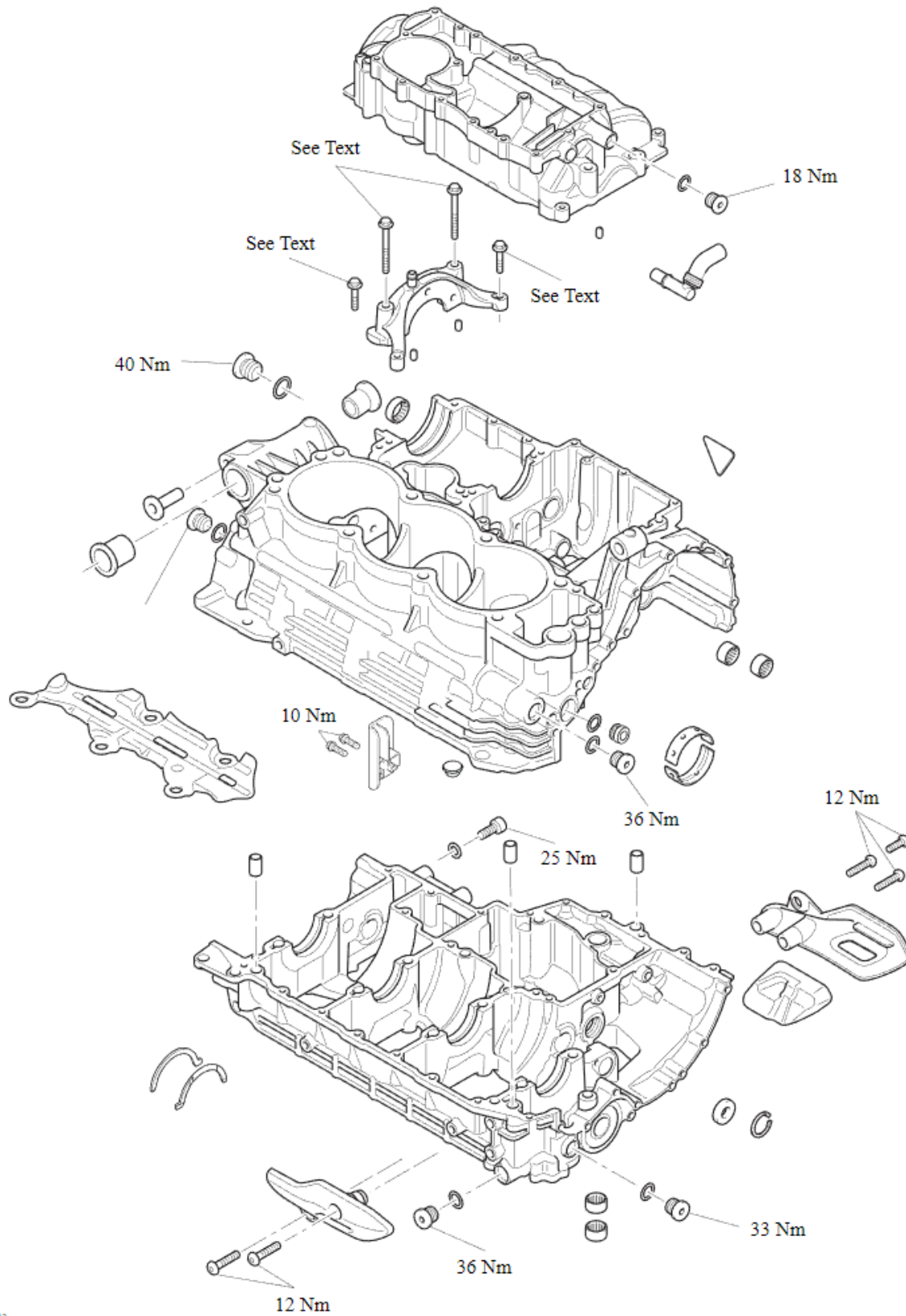
1. Locking pin plug

Perform the following operations:

- [Clutch Cover - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

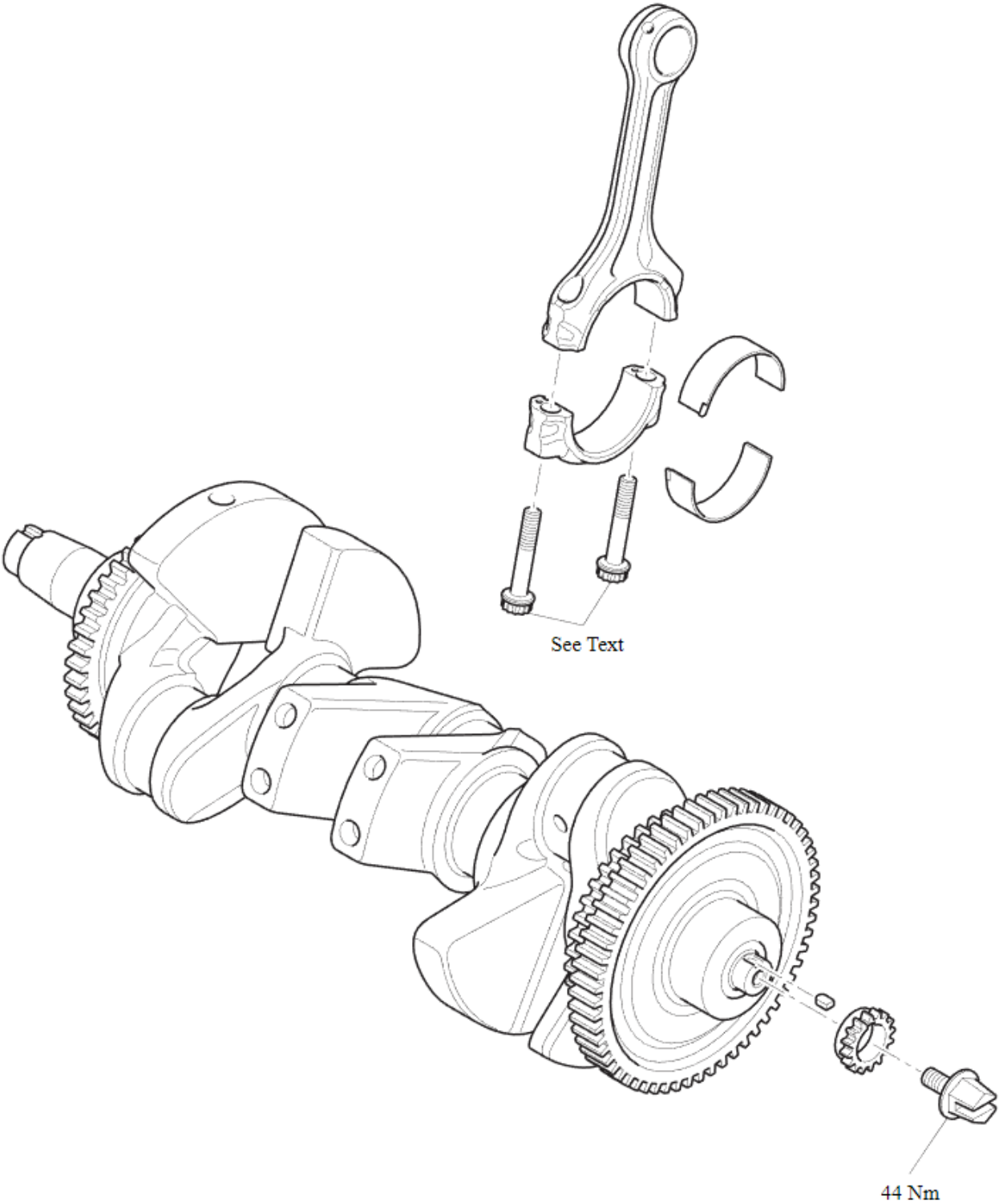
# Crankcase, Crankshaft and Connecting Rods

## Exploded View – Crankcase



H00042

Exploded View - Crankshaft and Connection Rod



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

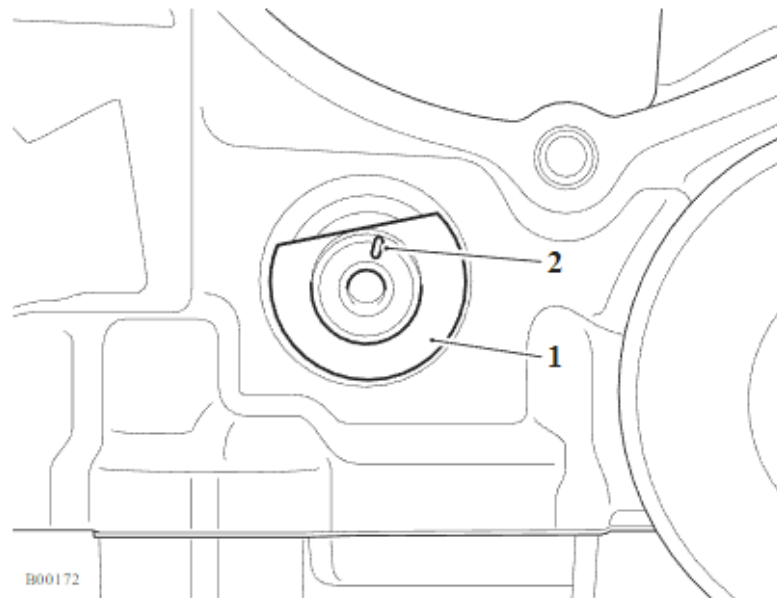
Perform the following operations:

**NOTICE**

Before removing the lower crankcase, make sure that the transmission is in neutral and remains in neutral until the lower crankcase is refitted.

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Sump - Removal](#)
- [Front Balancer - Removal](#)
- [Rear Balancer - Removal](#)

1. If fitted, remove service tool T3880501

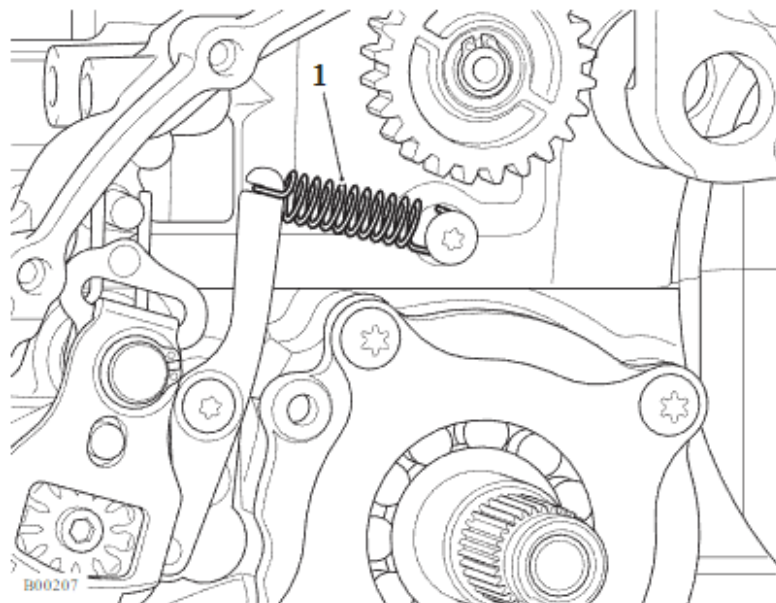


1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

### NOTICE

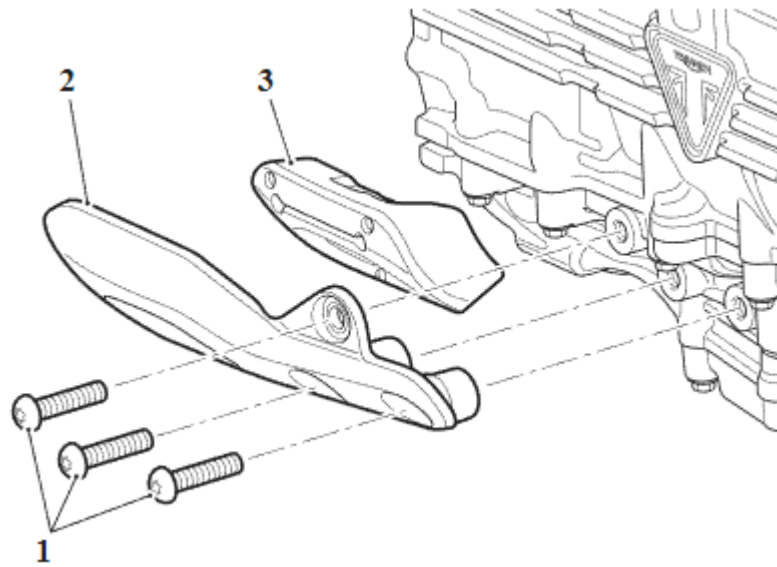
Note the orientation of the detent arm spring for installation.

2. Remove the detent arm spring.



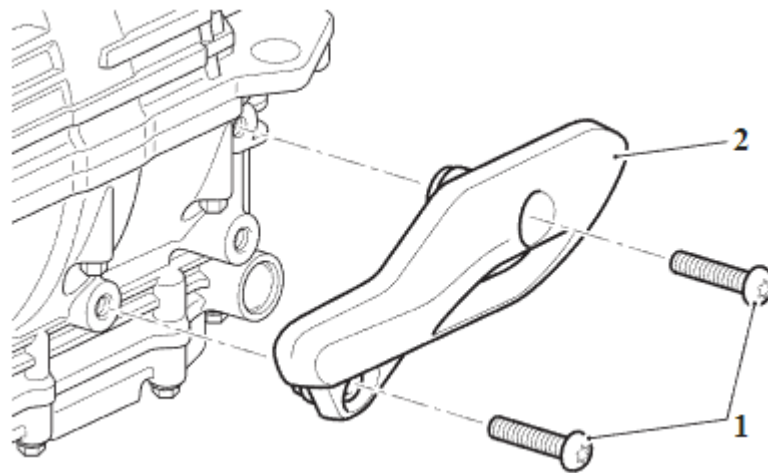
1. Springs

3. If fitted, release the three fixings and remove the crankcase left hand protector with the rubber protector.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Protector</li><li>3. Rubber protector</li></ol> |
|---|

4. If fitted, release the fixings and remove the crankcase right hand protector.



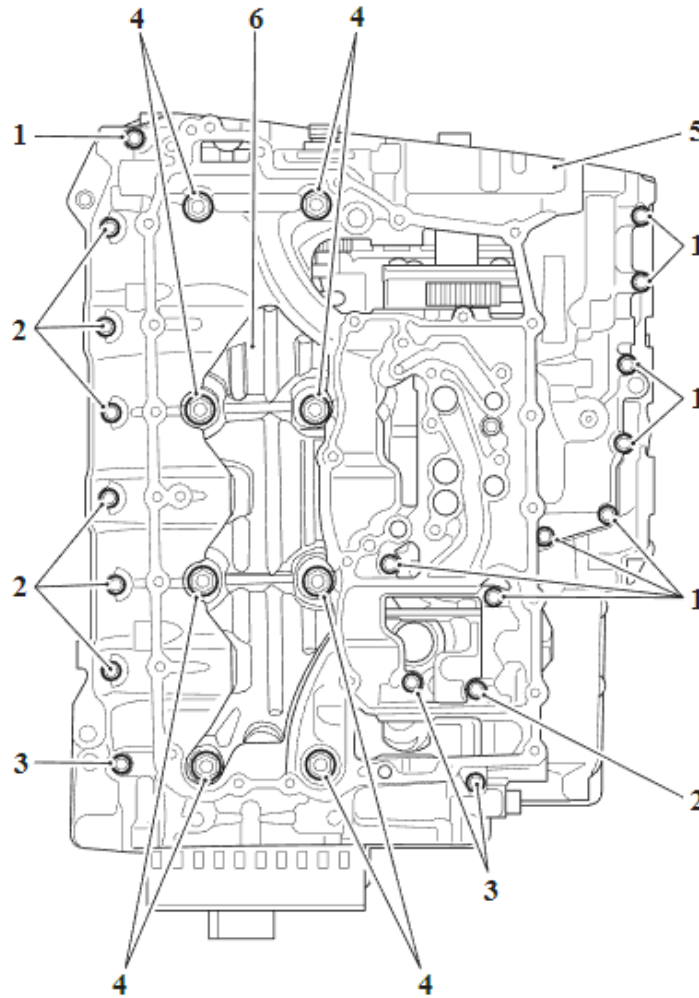
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Protector</li></ol> |
|---|

## NOTICE

For the lower crankcase there are, eight M11 x 128 mm, nine M6 x 30 mm, seven M6 x 55 mm and three M6 x 75 mm fixings.

Note the position of the fixings for installation.

Note the orientation of the crankshaft scraper for installation.

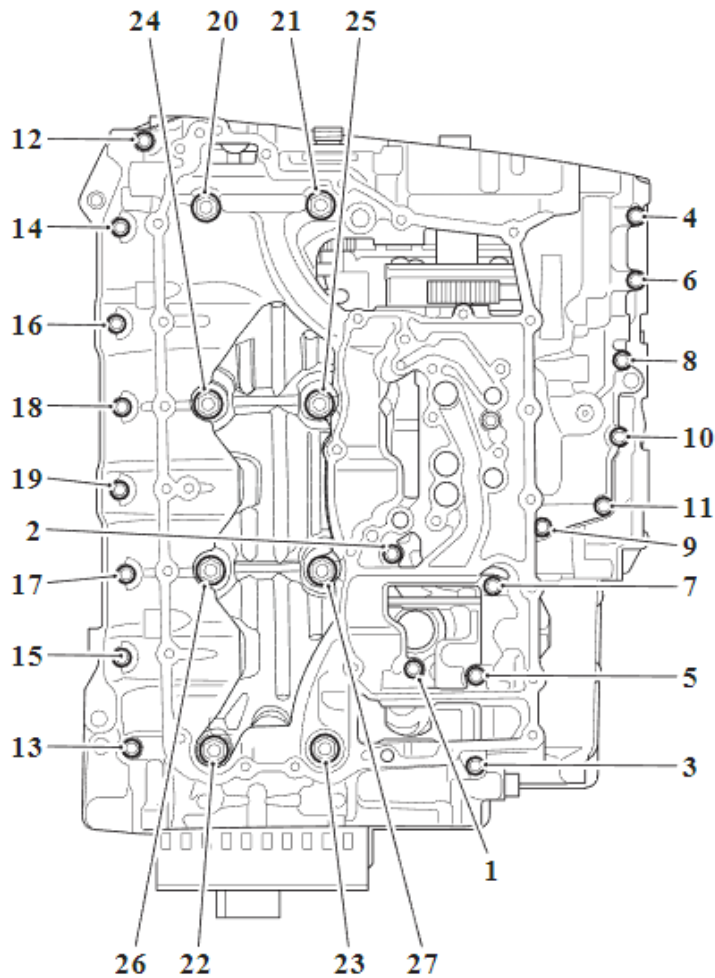


1. M6 x 30 mm fixings
2. M6 x 55 mm fixings
3. M6 x 75 mm fixings
4. M11 x 128 mm fixings
5. Lower crankcase
6. Crankshaft scraper

## NOTICE

Note the position of the hardened washers under bolts 20 to 27.

5. Progressively release the lower crankcase fixings in the sequence shown below.



Lower Crankcase Release Sequence

## CAUTION

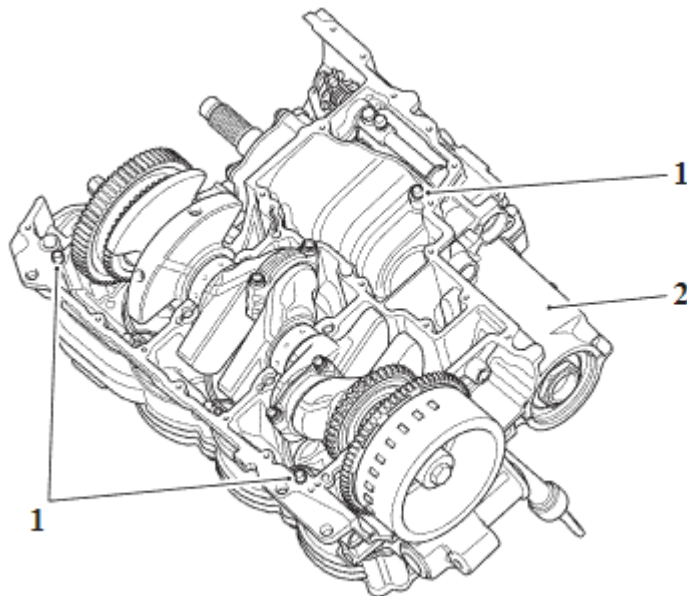
Do not use levers to separate the upper and lower sections of the crankcase as damage to the crankcases could result.



## NOTICE

Always check that all fixings have been released before attempting to separate the lower crankcase.

6. Remove the crankshaft scraper.
7. Separate the lower crankcase from the upper crankcase noting the position of the three location dowels. Make sure that the crankshaft main bearing shells remain in their original location on the lower crankcase.



1. Dowels
2. Upper crankcase

8. Remove any residual oil and sealant from the mating face of the lower and upper crankcases using a lint free cloth.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

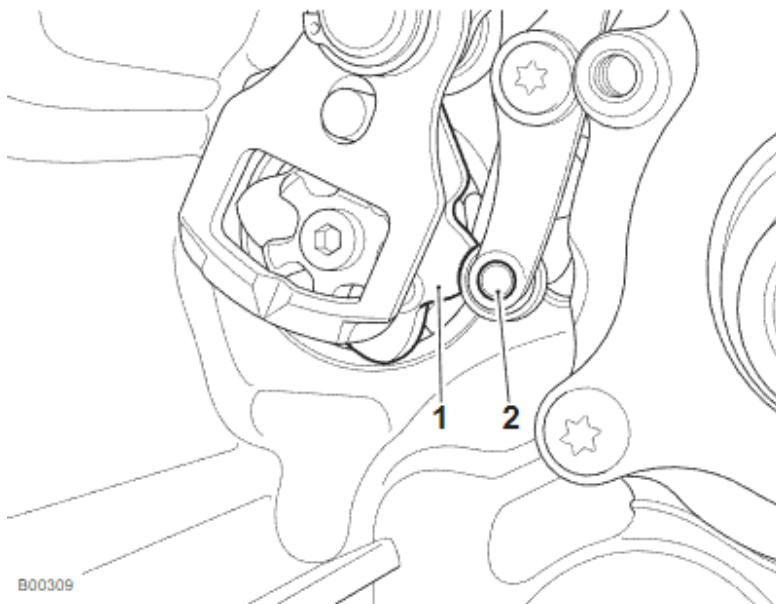
Perform the following operations:

- Check, measure and, if necessary, select new crankshaft main bearing shells (see [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#))

**⚠ CAUTION**

Make sure the three piston oil spray jets are installed. If the piston cooling jets are omitted, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

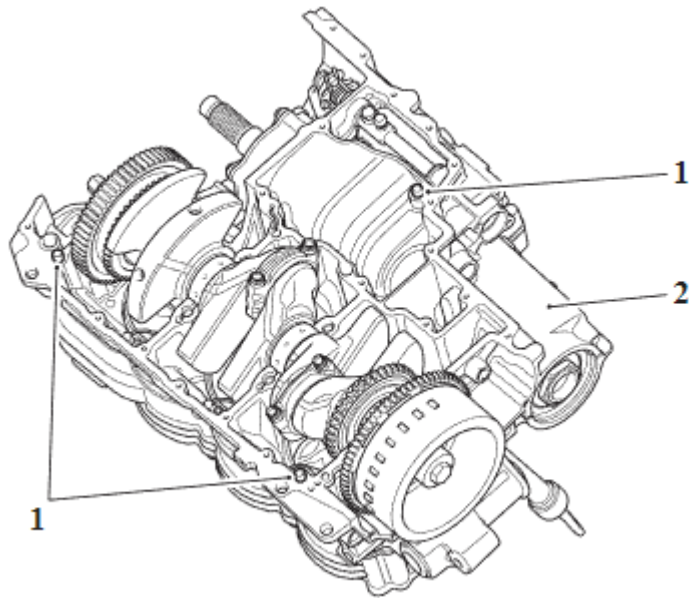
1. If removed, refit the three oil spray jets and tighten their fixings to 4 Nm.
2. Use high flash-point solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.
3. Make sure that the transmission is in neutral.



1. Detent wheel (in neutral position)
2. Detent arm

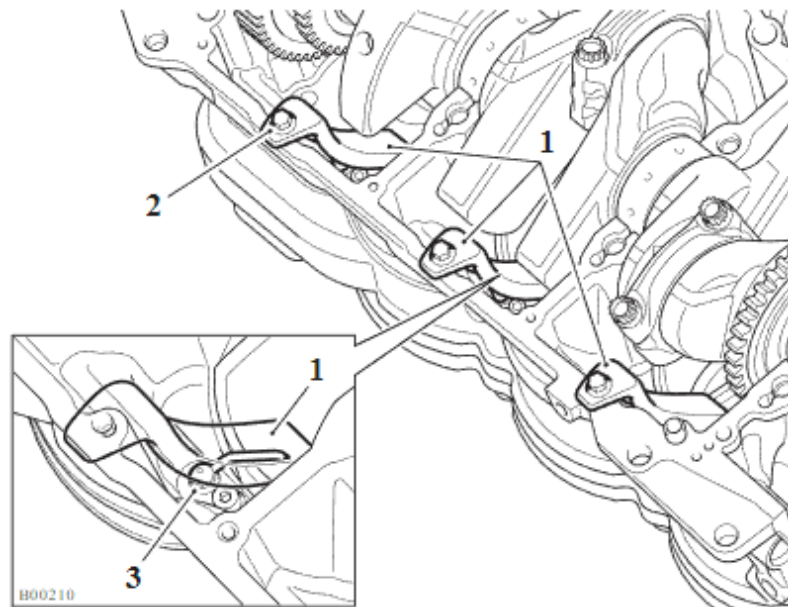
B00309

4. Make sure that the three locating dowels are in position in the upper crankcase.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Dowels</li><li>2. Upper crankcase</li></ol> |
|--|

5. If fitted, remove service tool T3880504 retain the three fixings for the lower crankcase.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. T3880504 - Oil spray jet protectors</li><li>2. M6 x 15 mm fixings</li><li>3. Oil spray jet</li></ol> |
|---|

## **⚠ CAUTION**

Do not use excessive amounts of sealer. The extra sealer may become dislodged and could block the oil passages in the crankcases causing severe engine damage.

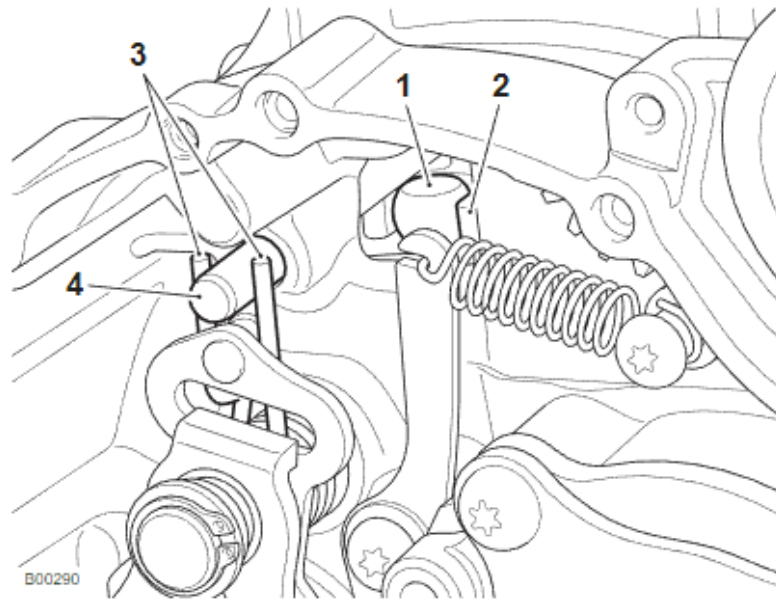
6. Apply a 2 mm diameter bead of silicone sealant (at the factory, ThreeBond 1216E is used) to the lower crankcase mating faces. The sealant is to be 2.5 mm inside of the external edges.



B00282

Sealer Areas

7. Install and lubricate the crankshaft bearing shells with a 50/50 solution of engine oil and molybdenum disulphide grease.
8. Position the lower crankcase to the upper crankcase. An assistant may be required to support the crankcase during alignment. Make sure the following:
  - the gear change actuator shaft locates onto the gear change actuator knuckle correctly.
  - the two ends of the gear change return spring has its dowel in the lower crankcase between them.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Actuator knuckle</li> <li>2. Actuator shaft</li> <li>3. Return spring ends</li> <li>4. Dowel</li> </ol> |
|---|

9. Position the crankshaft scraper as noted for removal.
10. Fit the bolts into the lower crankcase as noted for removal and hand tighten until the bolt heads are near contact with the crankcase. Hardened washers to be fitted to bolts 1 to 8.
11. Tighten the lower crankcase fixings in the following three stages:

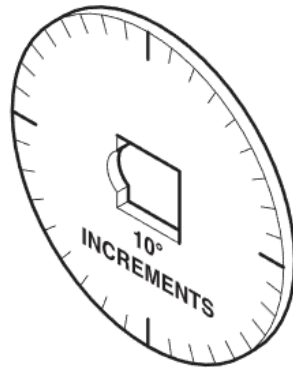
|                |
|----------------|
| <b>Stage 1</b> |
|----------------|

12. Tighten the fixings 1 to 27 in the sequence shown to 10 Nm.

|                |
|----------------|
| <b>Stage 2</b> |
|----------------|

13. Release the fixings 1 to 8 in the sequence shown by 140°.
14. Retighten the fixings 1 to 8 in the sequence shown to 10 Nm.

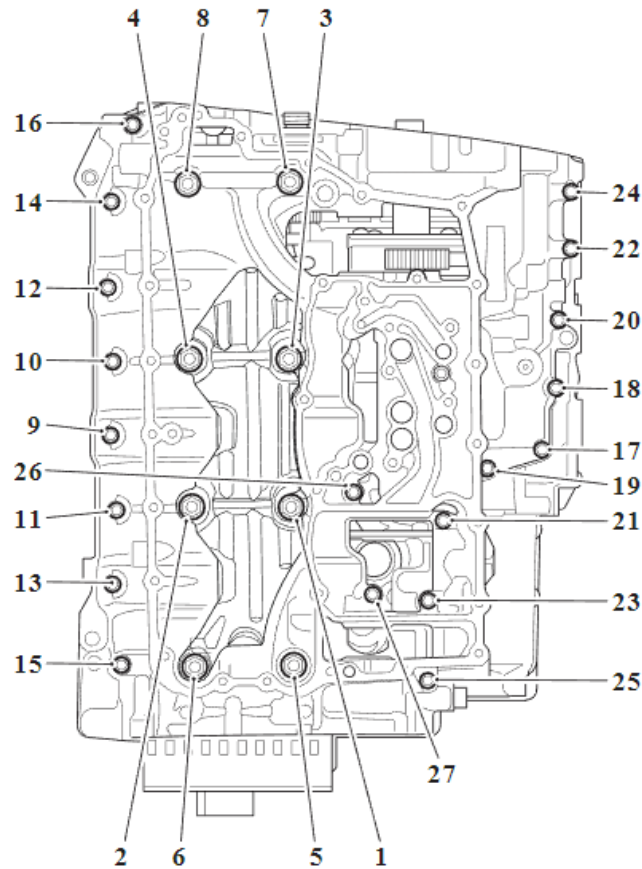
15. In the sequence shown below, tighten the crankcase bolts 1 to 8 to 85° of bolt rotation using service tool T3880105.



T3880105 - Torque Angle Gauge

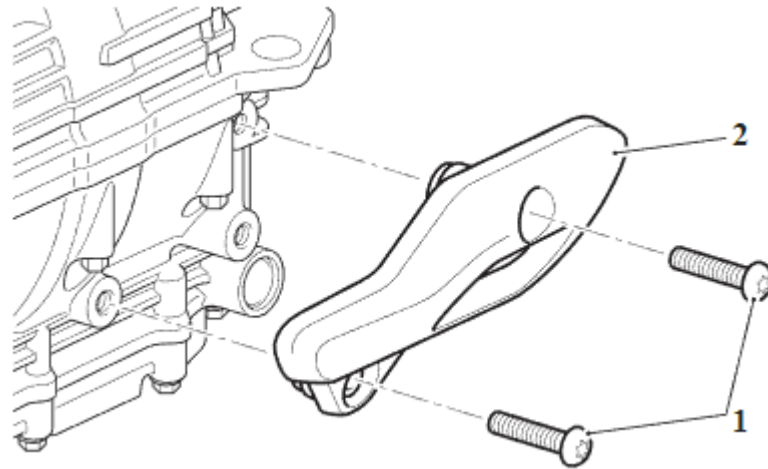
**Stage 3**

16. Tighten the fixings 9 to 27 in the sequence shown to 12 Nm.



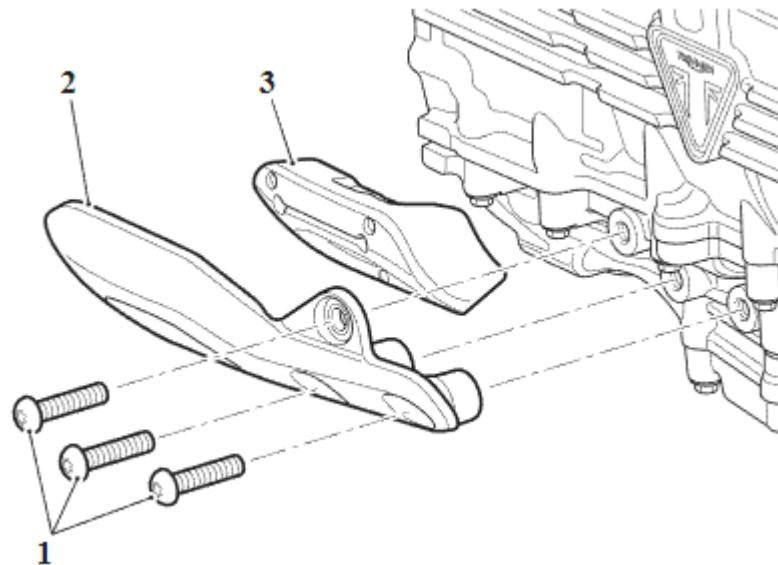
Lower Crankcase Tightening Sequence

17. If removed, fit the crankcase right hand protector and tighten its fixings to 12 Nm.



- |              |
|--------------|
| 1. Fixings   |
| 2. Protector |

18. If removed, fit the crankcase left hand protector with the rubber protector and tighten its fixings to 12 Nm.



- |                     |
|---------------------|
| 1. Fixings          |
| 2. Protector        |
| 3. Rubber protector |

Perform the following operations:

- [Rear Balancer - Installation](#)
- [Front Balancer - Installation](#)
- [Sump – Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Transmission Cover – Removal

 **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Cylinder Head - Removal](#)
- [Oil Tank Cover – Removal](#)

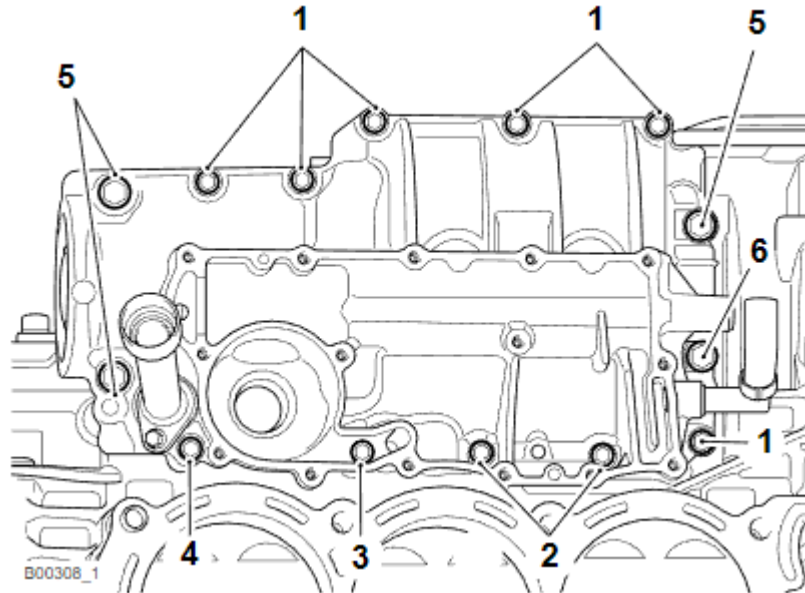


## NOTICE

For the transmission cover there are, six M6 x 30 mm, two M6 x 40 mm, one M6 x 75 mm, one M6 x 90 mm, three M8 x 45 mm and one M8 x 65 mm fixings.

Note that the M8 x 65 mm fixing has a copper washer for installation.

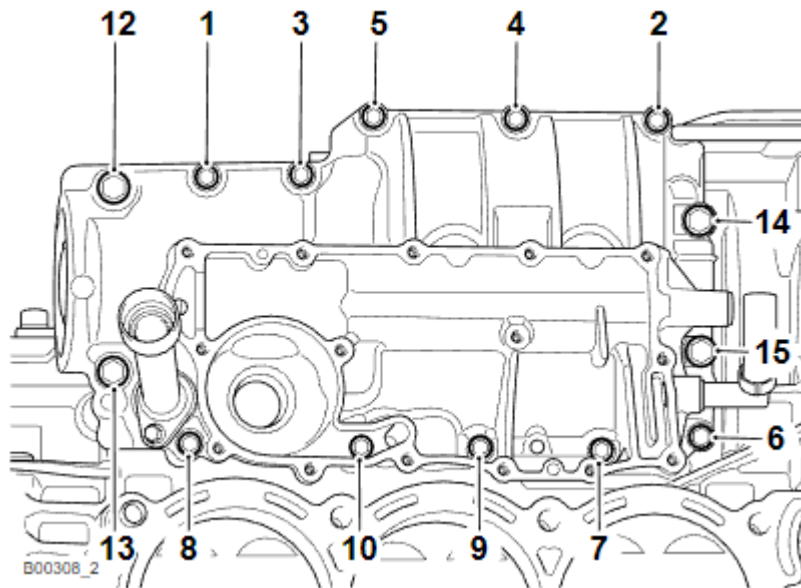
Note the position of the fixings for installation.



1. M6 x 30 mm fixings
2. M6 x 40 mm fixings
3. M6 x 75 mm fixing
4. M6 x 90 mm fixing
5. M8 x 45 mm fixings
6. M8 x 65 mm fixing with a copper washer

1. Remove the oil dipstick from the oil filler tube.

2. Progressively release the transmission cover bolts in the sequence shown below.



Transmission Cover Bolts Release Sequence

**⚠ CAUTION**

Do not use levers to separate the upper and lower sections of the crankcase as damage to the crankcases could result.

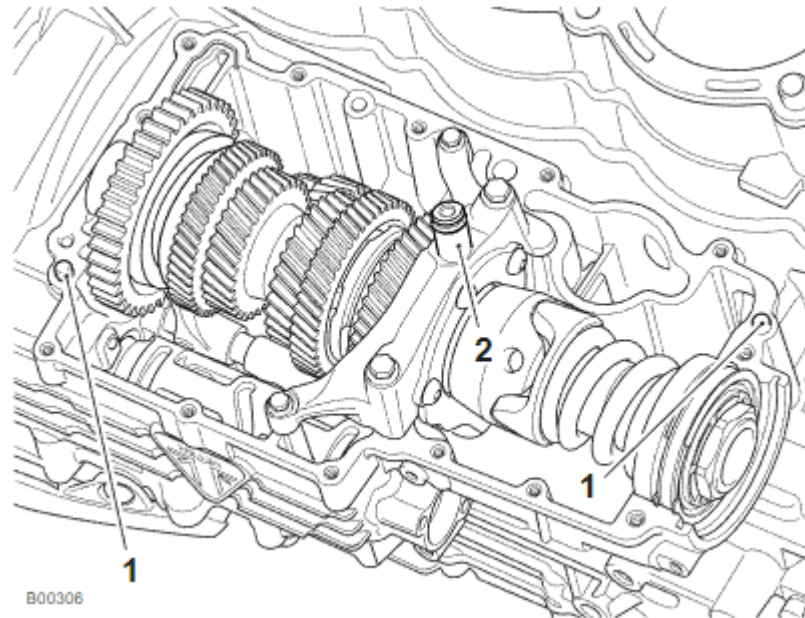
**NOTICE**

Always check that all fixings have been released before attempting to separate transmission cover from the crankcase.

It is possible that the oil dowel and O-ring for the bearing cap may remain with transmission cover.

3. Separate the transmission cover from the upper crankcase noting the position of the two location dowels.

4. If the oil dowel and O-ring is in the transmission cover, remove it and fit it to the bearing cap with the O-ring uppermost.



1. Dowels
2. Oil dowel

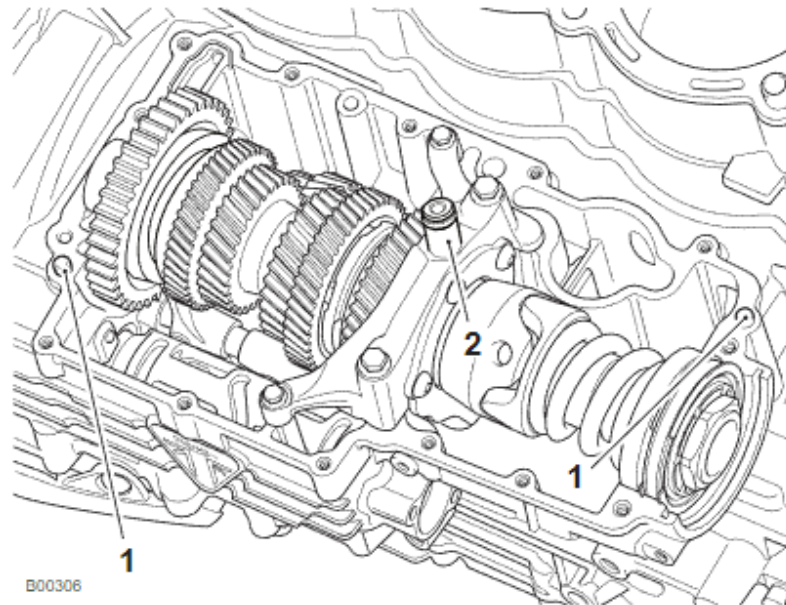
5. Remove any residual oil and sealant from the mating face of the transmission cover and the upper crankcase using a lint free cloth.

#### Transmission Cover – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Use high flash-point solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.
2. Make sure that the two locating dowels are in position in the upper crankcase and the oil dowel is fitted to the bearing cap with the O- ring uppermost.

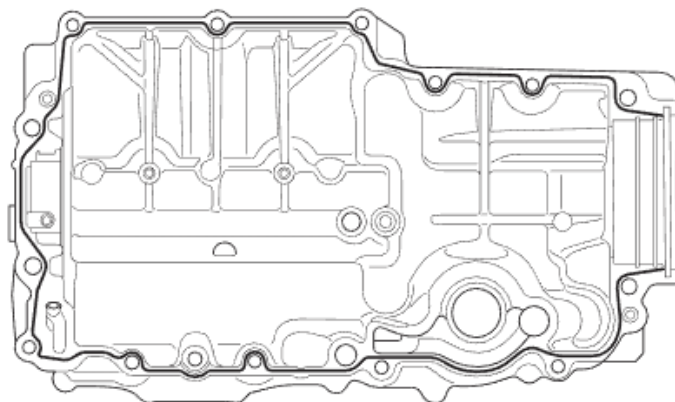


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Dowels</li><li>2. Oil dowel</li></ol> |
|--|

**⚠ CAUTION**

Do not use excessive amounts of sealer. The extra sealer may become dislodged and could block the oil passages in the crankcases causing severe engine damage.

3. Apply a 2 mm diameter bead of silicone sealant (at the factory, ThreeBond 1216E is used) to the transmission cover mating faces. The sealant is to be 2.5 mm inside of the external edges.



### Sealer Areas

4. Position the transmission cover to the upper crankcase.
5. Fit a new copper washer to the M8 x 65 mm fixing (item 1 in the tightening sequence).
6. Fit the bolts into the transmission cover as noted for removal and hand tighten until the bolt heads are near contact with the crankcase.
7. Tighten the transmission cover fixings in the following three stages:

### Stage 1

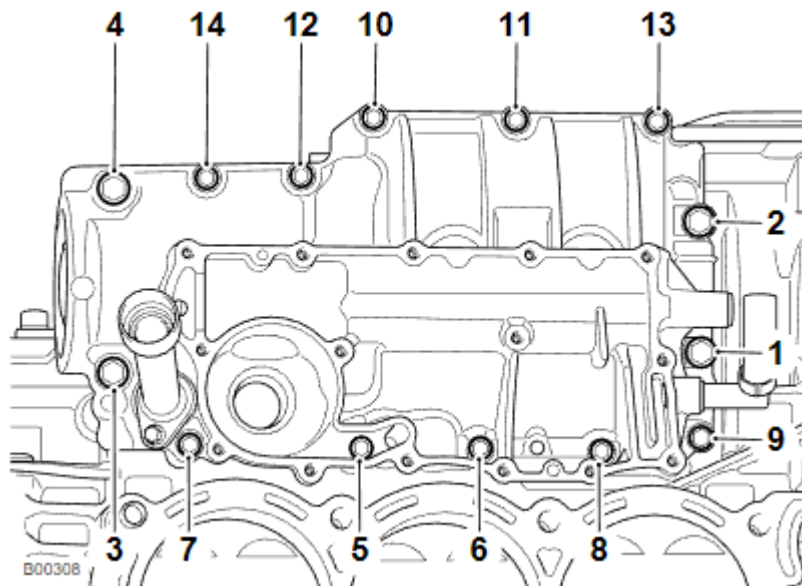
8. Tighten the fixings 1 to 14 in the sequence shown to 10 Nm.

### Stage 2

9. Tighten the fixings 1 to 4 in the sequence shown to 32 Nm.

### Stage 3

10. Tighten the fixings 5 to 14 in the sequence shown to 12 Nm.



### Transmission Cover Tightening Sequence

Perform the following operations:

- [Oil Tank Cover - Installation](#)
- [Throttle Body - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Crankcase – Disassembly

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

This procedure is for the removal of the components from the original crankcase to be fitted to the new crankcase.  
Note the positions of the items removed from the crankcase for installation to the new crankcase.

The new crankcase assembly will be supplied with the following:

- Lower crankcase
- Upper crankcase
- Transmission cover
- Transmission bearing cap

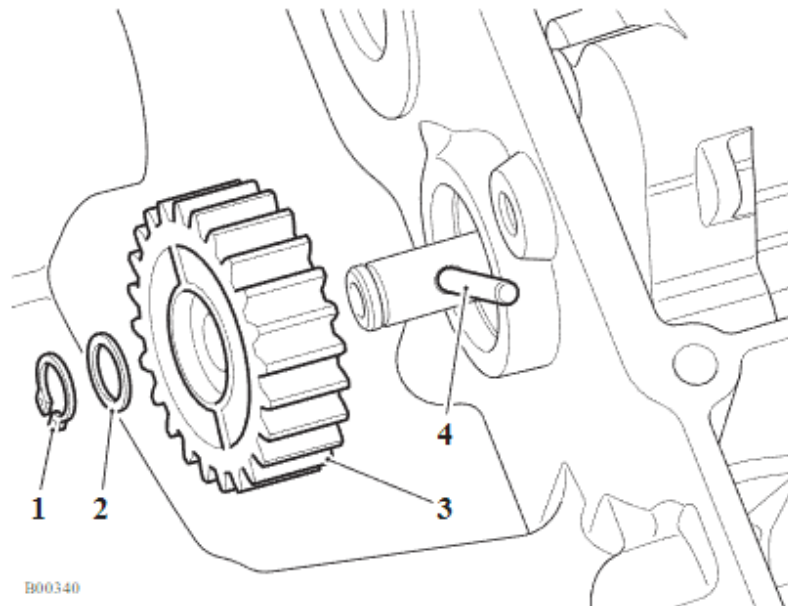
Remove the components from the original crankcase as described in the procedure below.

Perform the following operations:

- [Engine - Removal](#)
- [Clutch - Removal](#)
- [Alternator Rotor - Removal](#)
- [Output Shaft - Removal](#)
- [Input shaft - Removal](#)
- [Gear Change Shaft and Selector Drum - Removal](#)
- [Barrels - Removal](#)

Lower Crankcase

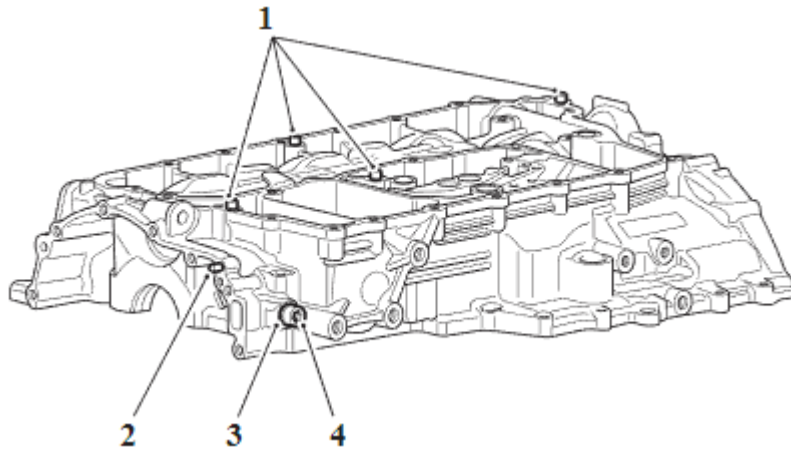
1. Remove the oil pump (see [Oil Pump - Removal](#)).
2. Remove the two solid dowels for the oil pump.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Dowels</li><li>2. Lower crankcase</li></ol> |
|--|

3. Remove the four hollow dowels for the sump.
4. Remove the solid dowel for the alternator cover.

5. Remove the dead shaft clamp blanking plug. Discard the washer.

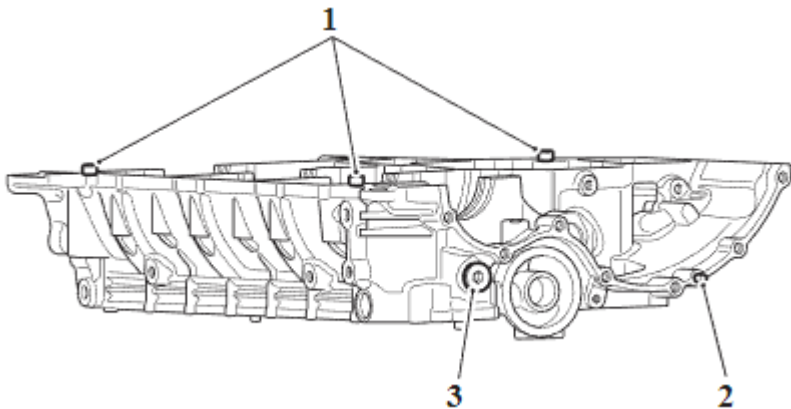


- 1. Hollow dowels
- 2. Solid dowel
- 3. Washer
- 4. Plug

6. Remove the three hollow dowels for the upper crankcase.

7. Remove the solid dowel for the clutch cover.

8. Remove the crankshaft locking pin plug from the crankcase.

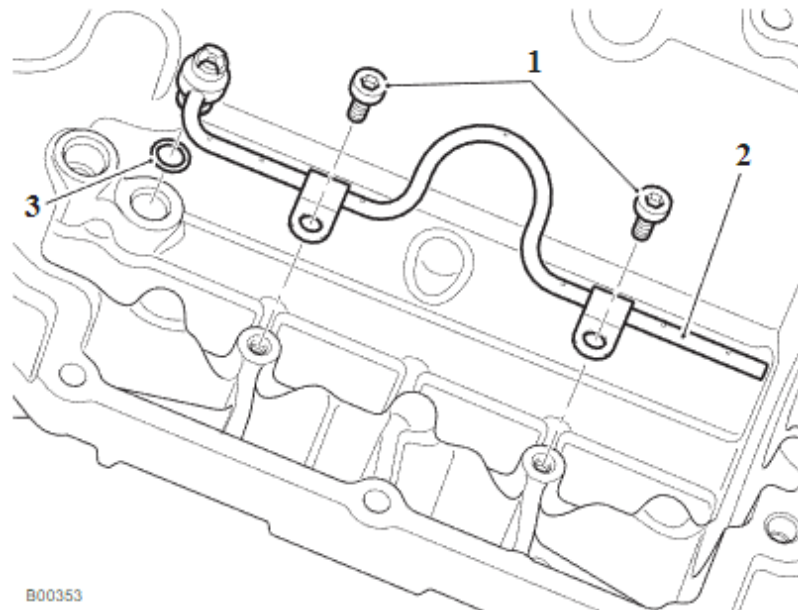


- 1. Hollow dowels
- 2. Solid dowel
- 3. Locking pin plug



## Transmission Cover

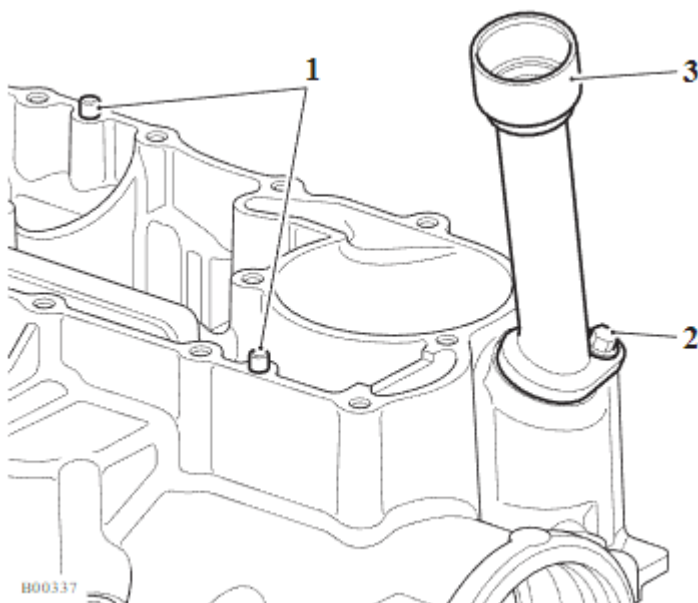
1. Remove and discard the two fixings securing the transmission oil spray bar.
2. Remove the spray bar from the transmission cover and discard its O-ring.



B00353

1. Fixings
2. Oil spray bar
3. O-ring (oil spray bar)

3. Remove the two solid dowels for the oil tank cover.
4. Release the fixing and remove the oil filler tube.



B00337

1. Solid dowel
2. Fixing
3. Oil filler tube

### NOTICE

Note the orientation of the crankcase breather hose for installation.

5. Release the clamp and remove the crankcase breather hose.

#### Crankcase – Assembly

### WARNING

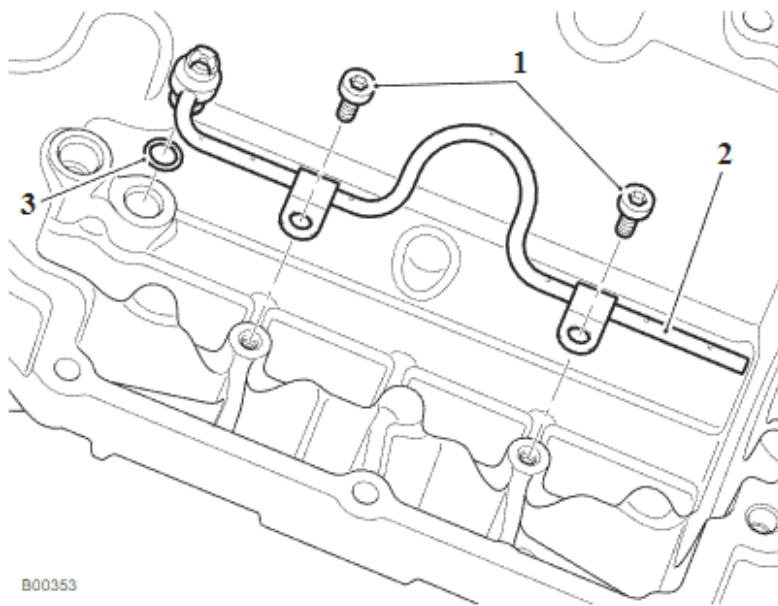
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

#### Transmission Bearing Cap

3. Fit a new O-ring to the oil dowel on the transmission bearing cap.

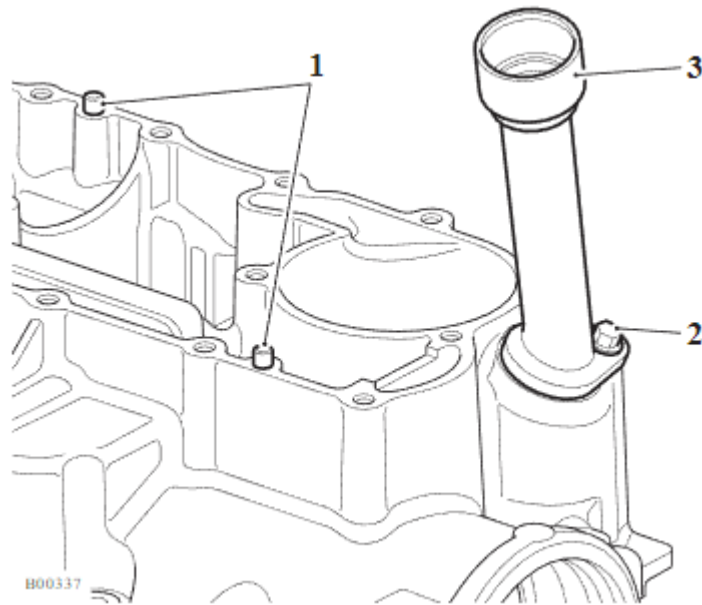
#### Transmission Cover

3. Fit a new O-ring to the original oil spray bar.
4. Fit the spray bar to the transmission cover. Secure with two new fixings and tighten to 4 Nm.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Fixings</li> <li>2. Oil spray bar</li> <li>3. O-ring (oil spray bar)</li> </ol> |
|---|

5. Fit the two original solid dowels for the oil tank cover to the transmission cover.
6. Fit the oil filler tube and tighten its fixing to 10 Nm.

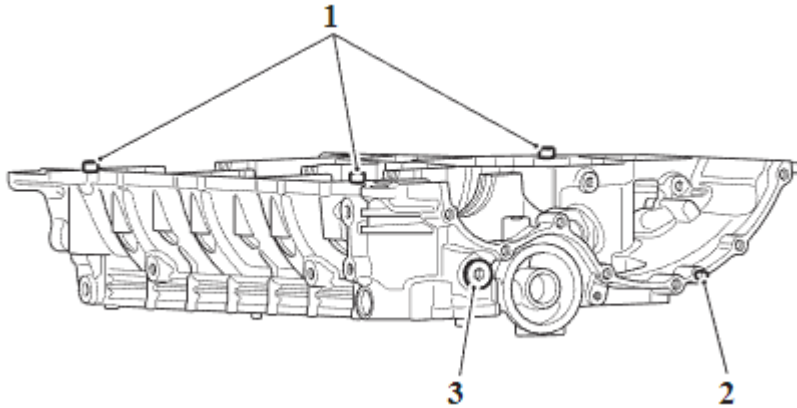


- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Solid dowel</li> <li>2. Fixing</li> <li>3. Oil filler tube</li> </ol> |
|---|

7. Fit the original crankcase breather hose as noted for removal to the transmission cover. Secure with its clamp.

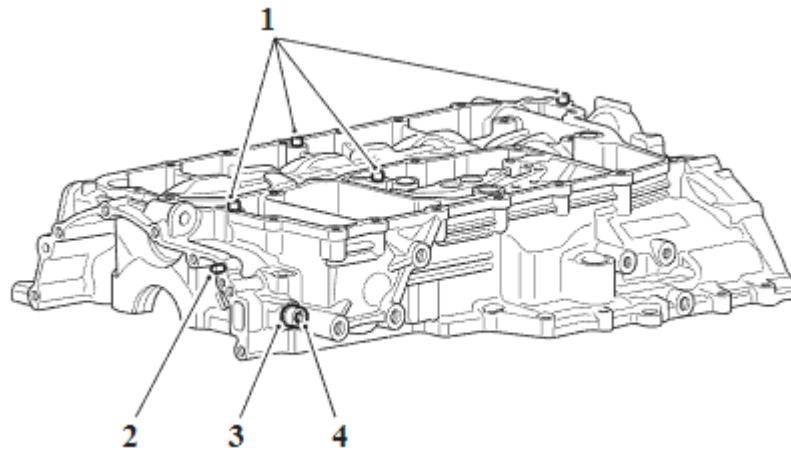
## Lower Crankcase

3. Fit the three hollow dowels for the upper crankcase.
4. Fit the solid dowel for the clutch cover.
5. Fit the crankshaft locking pin plug to the crankcase.



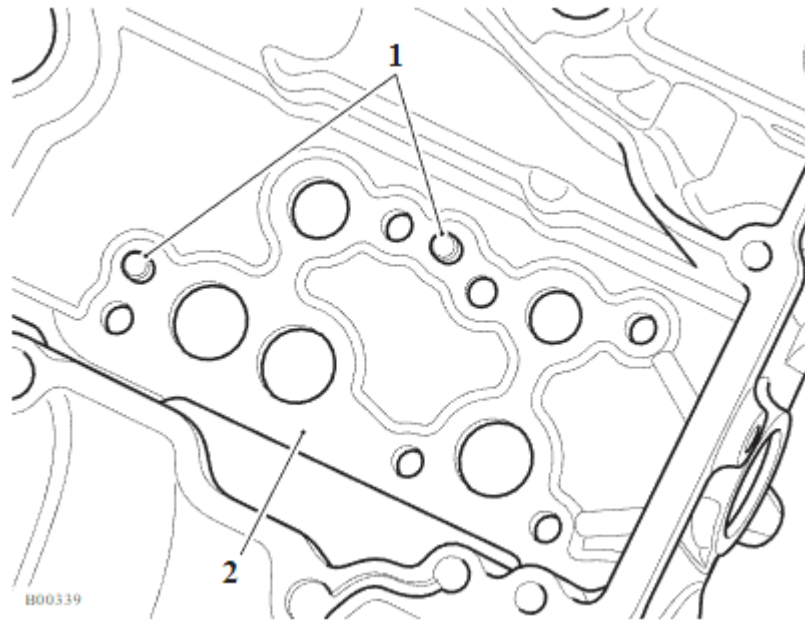
- |                     |
|---------------------|
| 1. Hollow dowels    |
| 2. Solid dowel      |
| 3. Locking pin plug |

6. Fit the four hollow dowels for the sump.
7. Fit the solid dowel for the alternator cover.
8. Fit a new washer and fit the dead shaft clamping plug.



- |                  |
|------------------|
| 1. Hollow dowels |
| 2. Solid dowel   |
| 3. Washer        |
| 4. Plug          |

9. Fit the two solid dowels for the oil pump.



1. Dowels
2. Lower crankcase

8. Fit the oil pump to the lower crankcase (see [Oil Pump - Installation](#)).

Perform the following operations:

- [Barrels - Installation](#)
- [Gear Change Shaft and Selector Drum - Installation](#)
- [Input Shaft - Installation](#)
- [Output Shaft - Removal](#)
- [Lower Crankcase - Installation](#)
- [Gear Selector Forks - Installation](#)
- [Output shaft - Installation](#)
- [Alternator Rotor - Installation](#)
- [Clutch - Installation](#)
- [Engine - Installation](#)

Crankshaft – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)

- [Alternator Rotor - Removal](#)
- [Lower Crankcase - Removal](#)

## **⚠ CAUTION**

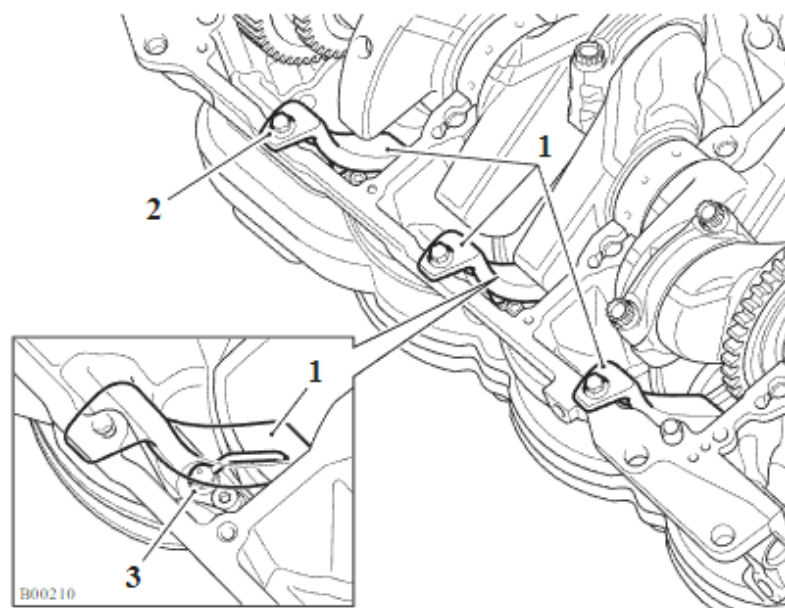
Due to the weight and size of the crankshaft, the three protectors in service tool T3880504 must be fitted to the crankcase to protect the oil spray jets.

If service tool T3880504 is not used, the oil spray jets may get damaged and require replacing.

## **NOTICE**

When fitting service tool T3880504, make sure it sits on the oil spray jet and covers the pipe.

1. To protect the three oil spray jets from damage, use three of the M6 x 30 mm crankcase fixings to fit service tool T3880504 as shown in the illustration below.



1. T3880504 - Oil spray jet protectors
2. M6 x 30 mm fixings
3. Oil spray jet

### NOTICE

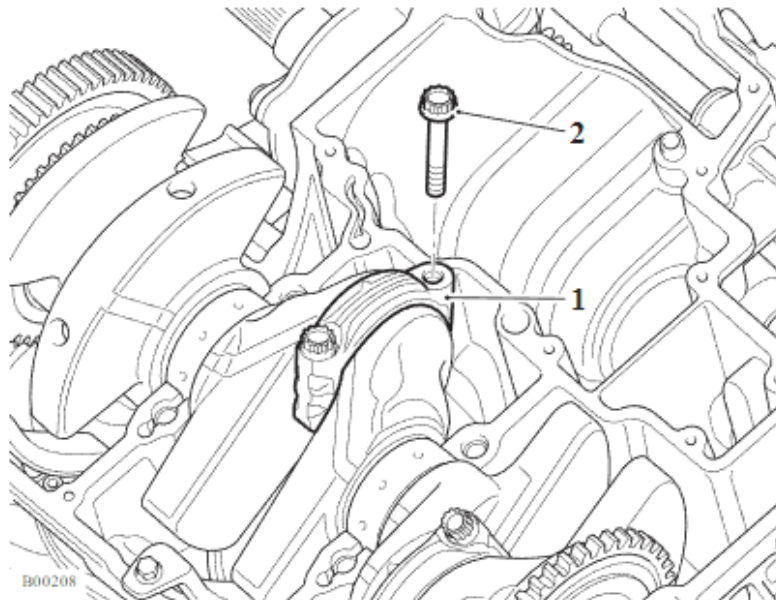
The big end cap will only fit one way, note the orientation of the bearing cap for installation.

2. Mark each big end cap and connecting rod to identify both items as a matched pair and to identify the correct orientation of the bearing cap to the connecting rod.

### NOTICE

It may be necessary to gently tap the big end cap with a rubber mallet to release the cap.

3. Release the connecting rod bolts and remove the big end cap. Make sure the bearing shell remains in place in the big end cap. Discard the connecting rod bolts.



1. Big end cap
2. Connecting rod bolt

4. Detach the connecting rod from the crankshaft. Make sure the bearing shell remains in place with the connecting rod.
5. Carefully remove the crankshaft from the upper crankcase.

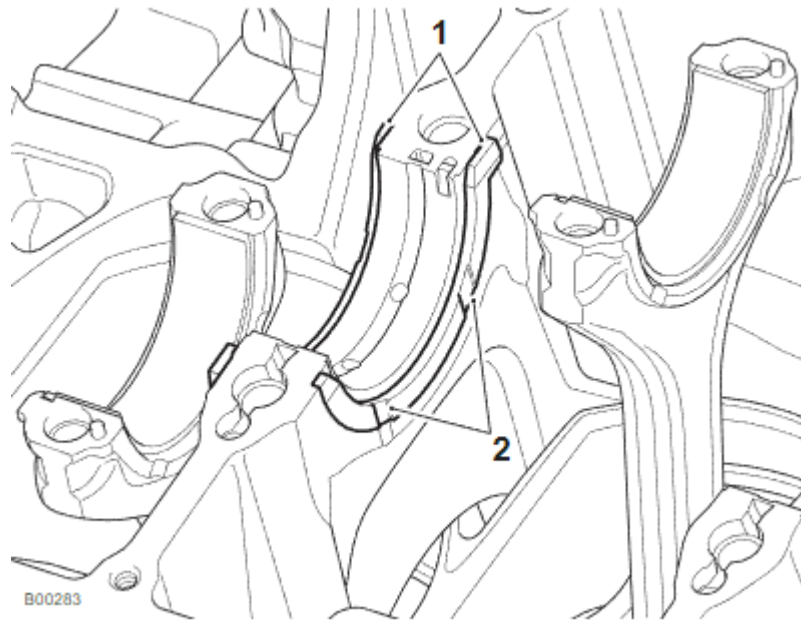


## NOTICE

Between cylinders one and two the crankshaft has two thrust bearings fitted to the upper crankcase. Note their position and orientation for installation.

Note the two cut outs on one face of the thrust bearings must face the crankshaft when fitted.

6. Collect the two thrust bearings from the upper crankcase.



1. Thrust bearings
2. Cut outs

Perform the following operations:

## NOTICE

Do not mark any bearing shells with marker paint or anything similar.

To prevent the bearing shells from becoming mixed, place the bearing shells into a individually marked containers. The bearing shells must be refitted in their original positions.

- Identify the location of each bearing shell
- Remove all bearings and inspect for damage, wear, overheating (blue discolouration) and any other signs of deterioration. Replace the bearings as a set if necessary (see [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#)).

## ⚠ CAUTION

Make sure the three piston cooling jets are installed and are protected by service tool T3880504. If the piston cooling jets are omitted or get damaged, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

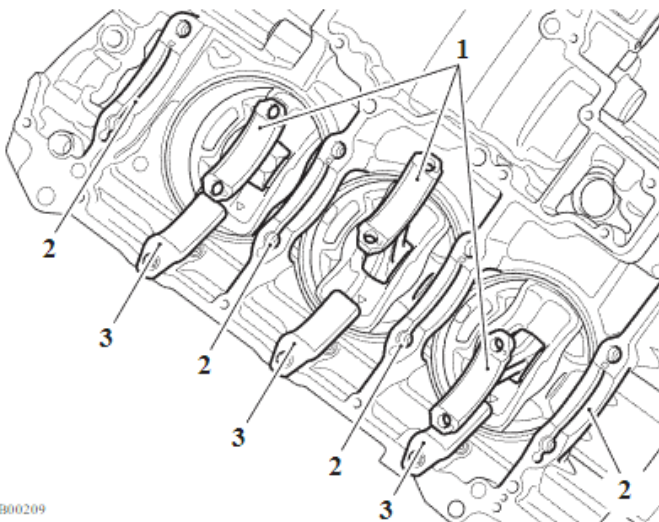
## ⚠ CAUTION

Always check the bearing journal clearance (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#) and [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#)), before final assembly of the crankshaft. Failure to correctly select bearing journal shells will result in severe engine damage.

Perform the following operations:

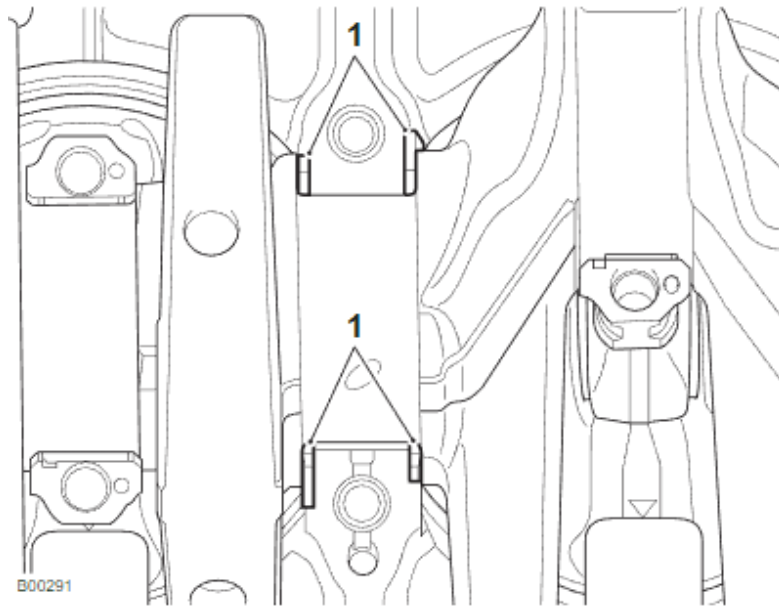
- Check that the three oil spray jets are fitted and service tool T3880504 is also fitted.
- Check, measure and, if necessary, select new connecting rod big end bearing shells (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#))
- Check, measure and, if necessary, select new crankshaft main bearing shells (see [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#))

1. Fit new bearing journal shells to the crankcase and big ends.



1. Big end bearing shells
2. Crankshaft bearing shells
3. T3880504 - Oil spray jet protectors

2. Lubricate all bearings with a 50/50 solution of engine oil and molybdenum disulphide grease.
3. Make sure that the crankshaft is clean, and that the oil ways within the crankshaft are clean and free from blockages and debris.
4. Fit crankshaft main bearing shells to the upper crankcase.
5. Fit the big end bearings to the connecting rod.
6. Install the crankshaft ensuring that the crankshaft journals align with the big ends.
7. Fit the crankshaft thrust bearings as noted for removal. Make sure the cut outs on the thrust bearings face the crankshaft.



1. Crankshaft thrust bearings

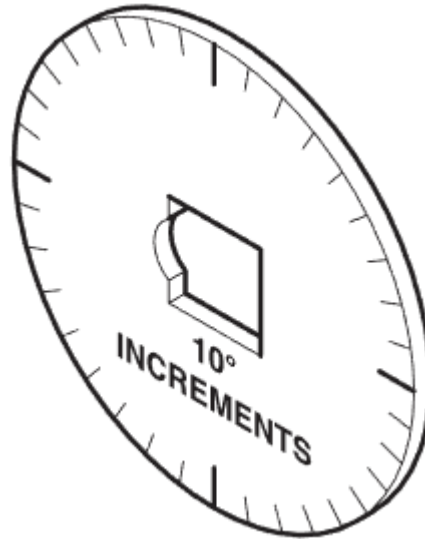
8. Fit the big end bearing shells to the big end cap and fit the caps to the connecting rod as noted for removal.
9. Fit new big end bolts and tighten in the following two stages:

**Stage 1**

10. Tighten the big end cap fixings to 50 Nm.

## Stage 2

11. Tighten the big end cap fixings to 120° of bolt rotation using service tool T3880105.



T3880105 - Torque Angle Gauge

Perform the following operations:

- [Lower Crankcase - Installation](#)
- [Alternator Rotor - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Barrels - Removal](#)

**NOTICE**

Note the position of the piston alignment mark on the pistons for installation.

1. Mark each piston and cylinder bore with a number to ensure the pistons are fitted into their original cylinders on installation.
2. Pull the piston and connecting rod assemblies out of the barrel.
3. Remove the piston (see [Piston - Disassembly](#)).

**⚠ WARNING**

Connecting rod bolts MUST only be used once. If the bolts are removed or undone for any reason, new bolts MUST always be used. Reusing bolts can cause connecting rods and their caps to detach from the crankshaft causing severe engine damage, loss of motorcycle control and an accident.

**⚠ CAUTION**

Make sure the three piston cooling jets are installed and are protected by service tool T3880504. If the piston cooling jets are omitted or get damaged, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

**⚠ CAUTION**

Always check the bearing journal clearance (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#) and [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#)), before final assembly of the crankshaft. Failure to correctly select bearing journal shells will result in severe engine damage.

Perform the following operations:

- Check that the three oil spray jets are fitted and service tool T3880504 is also fitted.
  - Check, measure and, if necessary, select new connecting rod big end bearing shells (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#))
  - Check, measure and, if necessary, select new crankshaft main bearing shells (see [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#))
1. Fit the three piston and connecting rod assemblies into the barrel from the bottom as noted for removal. Make sure that the piston alignment mark on the piston faces the same direction as noted for removal.
  2. Fit the barrels to the crankcase (see [Barrels - Installation](#)).

## Connecting Rod Big End Journal Checking, Measuring and Bearing Selection

1. Measure the bearing to crankshaft journal clearance as follows:

### **NOTICE**

Do not turn the connecting rods and crankshaft during the clearance measurement as this will damage the Plastigauge. The crankshaft journal clearances are measured using Plastigauge (Triumph part number 3880150-T0301).

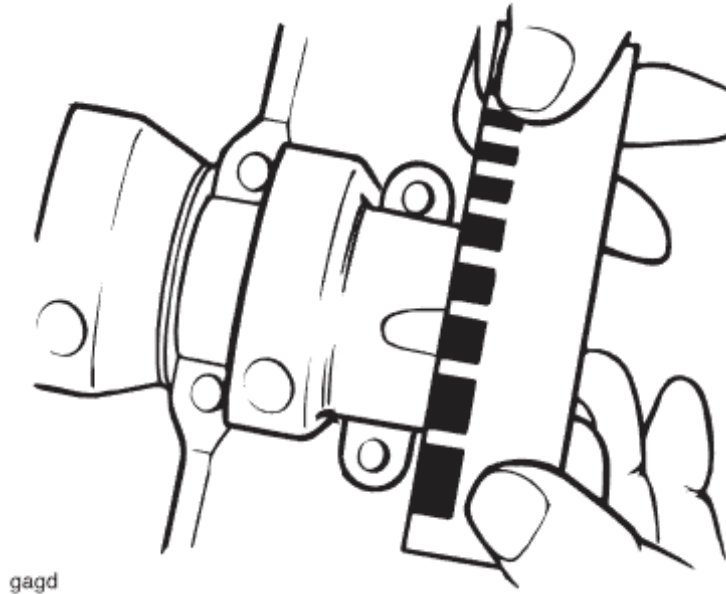
2. Remove the lower crankcase (see [Lower Crankcase - Removal](#)).
3. Ensure service tool T3880504 is fitted to protect the oil spray jets.
4. Remove the bearing cap from the journal to be checked.
5. Wipe the exposed areas of the crankshaft journals, and the bearing face inside the cap.
6. Apply a thin smear of grease to the journals and a small quantity of silicone release agent to the bearings.
7. Trim a length of the Plastigauge to fit across each journal. Fit the strip to the journal using the grease to hold the Plastigauge in position.

### **NOTICE**

The original fixings may be reused for bearing selection. Do not use new fixings as they may only be used once, even if the single use is related to bearing selection.

8. Lubricate the threads of the fixing and the face of the fixing with molybdenum disulphide grease. Refit the bearing cap (see [Crankshaft - Installation](#)).
9. Release the fixings and remove the cap being measured.

10. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Checking the Measured Clearance

11. For specifications refer to Crankshaft.  
12. If the clearance exceeds the service limit, measure the diameter of the crankshaft bearing journal.

#### **NOTICE**

If any journal has worn beyond the service limit, the crankshaft must be replaced. Due to the techniques used during manufacture, the crankshaft cannot be reground and oversize bearings are not available.

#### Connecting Rod Bearing Selection

#### **NOTICE**

Minor differences in dimensions are compensated for by using selective bearings. For further information on bearing part number to colour cross-references, refer to the EPC.



1. Select the correct bearing shell as follows:
2. Measure and record the diameter of each crankshaft bearing journal.
3. Measure and record each bearing bore diameter (bearings removed, journal caps fitted and all fixings fully torqued) (for torque sequence see [Crankshaft - Installation](#)).
4. Select the correct bearings by matching the information found in the bearing selection chart.
5. Install the new bearings.

### **WARNING**

Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance resulting in loss of motorcycle control and an accident.

### **NOTICE**

Repeat the measurements for all respective journals.  
 It is normal for the bearings selected to differ from one journal to another.  
 It is also normal for there to be two options of bearing shell colour. In such cases, pick the shell size that gives the greater running clearance.

Big End Bearing Selection Chart

| Shell Colour | Connecting Rod Bore Diameter | Big End Bearing Journal Diameter | Running Clearance                    |
|--------------|------------------------------|----------------------------------|--------------------------------------|
| WHITE        | 55.500 to 55.509 mm          | 52.465 to 52.472 mm              | Minimum 0.040 mm<br>Maximum 0.066 mm |
| GREEN        | 55.500 to 55.509 mm          | 52.458 to 52.465 mm              | Minimum 0.037 mm<br>Maximum 0.061 mm |
| GREEN        | 55.509 to 55.518 mm          | 52.465 to 52.472 mm              | Minimum 0.039 mm<br>Maximum 0.063 mm |
| RED          | 55.509 to 55.518 mm          | 52.458 to 53.465 mm              | Minimum 0.034 mm<br>Maximum 0.060 mm |

| For instance:                |        |
|------------------------------|--------|
| Connecting Rod Bore Diameter | 55.507 |
| Crankshaft Journal Diameter  | 52.463 |
| Required Bearing             | Green  |

## Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection

1. Measure the bearing to crankshaft journal clearance as follows:

### NOTICE

Do not turn the connecting rods and crankshaft during the clearance measurement as this will damage the Plastigauge. The crankshaft journal clearances are measured using Plastigauge (Triumph part number 3880150-T0301).

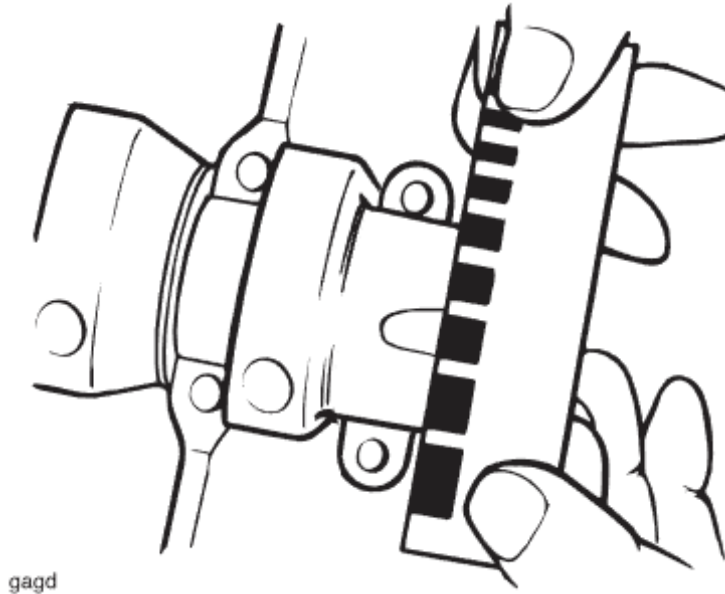
2. Remove the lower crankcase (see [Lower Crankcase - Removal](#)).
3. Make sure service tool T3880504 is fitted to protect the oil spray jets.
4. Wipe the exposed areas of the crankshaft journals, and the bearing face inside the cap.
5. Apply a thin smear of grease to the journals and a small quantity of silicone release agent to the bearings.
6. Trim a length of the Plastigauge to fit across each journal. Fit the strip to the journal using the grease to hold the Plastigauge in position.

### NOTICE

The original fixings may be reused for bearing selection. Do not use new fixings as they may only be used once, even if the single use is related to bearing selection.

7. Lubricate the threads and the face of the fixings with molybdenum disulphide grease. Refit the crankcase and tighten the original fixings (see [Lower Crankcase - Installation](#)).
8. Release the fixings and remove the crankcase.

- Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Checking the Measured Clearance

- For specifications refer to Crankshaft.
- If the clearance exceeds the service limit, measure the diameter of the crankshaft bearing journal.

#### **NOTICE**

If any journal has worn beyond the service limit, the crankshaft must be replaced. Due to the techniques used during manufacture, the crankshaft cannot be reground and oversize bearings are not available.

## Main Bearing Selection

### **NOTICE**

Minor differences in dimensions are compensated for by using selective bearings. For further information on bearing part number to colour cross-references, see the latest parts information.

Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance resulting in loss of motorcycle control and an accident.

Repeat the measurements for all respective journals.

It is normal for the bearings selected to differ from one journal to another.

1. Select the correct bearings as follows:
2. Measure and record the diameter of each crankshaft bearing journal.
3. Measure and record each bearing bore diameter in the crankcase (bearings removed, journal caps fitted and all fixings fully torqued).
4. Select and install the correct bearings by matching the information found in the main bearing selection chart.
5. Install the new bearings.
6. For bearing selection refer to [Main Bearing Selection Chart](#).

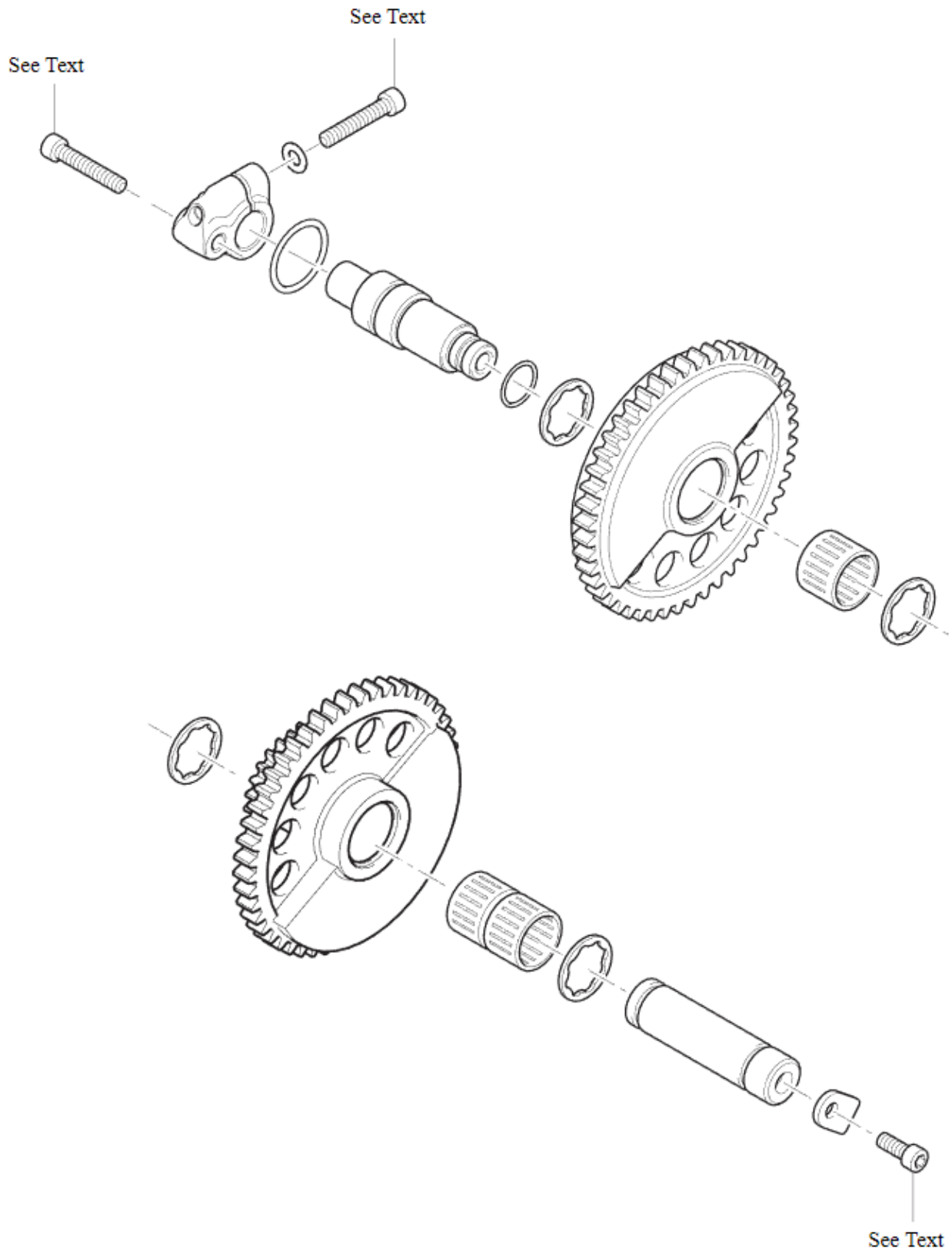
## Main Bearing Selection Chart

| Crankcase Bore Diameter | Crankshaft Main Journal Diameter |        |       |        |        |        |        |        |        |        |        |        |       |        |        |
|-------------------------|----------------------------------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|
|                         | 52,468                           | 52,469 | 52,47 | 52,471 | 52,472 | 52,473 | 52,474 | 52,475 | 52,476 | 52,477 | 52,478 | 52,479 | 52,48 | 52,481 | 52,482 |
| 50,510                  | Blue                             | Blue   | Red   | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,511                  | Blue                             | Blue   | Blue  | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,512                  | Blue                             | Blue   | Blue  | Blue   | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,513                  | Blue                             | Blue   | Blue  | Blue   | Blue   | Red    | Red    | Red    | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,514                  | Blue                             | Blue   | Blue  | Blue   | Blue   | Blue   | Red    | Red    | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,515                  | Blue                             | Blue   | Blue  | Blue   | Blue   | Blue   | Blue   | Red    | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,516                  | Green                            | Blue   | Blue  | Blue   | Blue   | Blue   | Blue   | Blue   | Red    | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,517                  | Green                            | Green  | Blue  | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Red    | Red    | Red    | Red   | Red    | Red    |
| 50,518                  | Green                            | Green  | Green | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Red    | Red    | Red   | Red    | Red    |
| 50,519                  | Green                            | Green  | Green | Green  | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Red    | Red   | Red    | Red    |
| 50,520                  | Green                            | Green  | Green | Green  | Green  | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Red   | Red    | Red    |
| 50,521                  | Green                            | Green  | Green | Green  | Green  | Green  | Blue   | Blue   | Blue   | Blue   | Blue   | Blue   | Blue  | Red    | Red    |
| 50,522                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Blue   | Blue   | Blue   | Blue   | Blue   | Blue  | Blue   | Red    |
| 50,523                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Green  | Blue   | Blue   | Blue   | Blue   | Blue  | Blue   | Blue   |
| 50,524                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Green  | Green  | Blue   | Blue   | Blue   | Blue  | Blue   | Blue   |
| 50,525                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Blue   | Blue   | Blue  | Blue   | Blue   |
| 50,526                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Blue   | Blue  | Blue   | Blue   |
| 50,527                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Blue  | Blue   | Blue   |
| 50,528                  | Green                            | Green  | Green | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Green  | Green | Blue   | Blue   |

|                             |        |
|-----------------------------|--------|
| For instance:               |        |
| Crankcase Bore              | 55.520 |
| Crankshaft Journal Diameter | 52.472 |
| Required Bearing            | Green  |

# Balancer

## Exploded View – Balancers

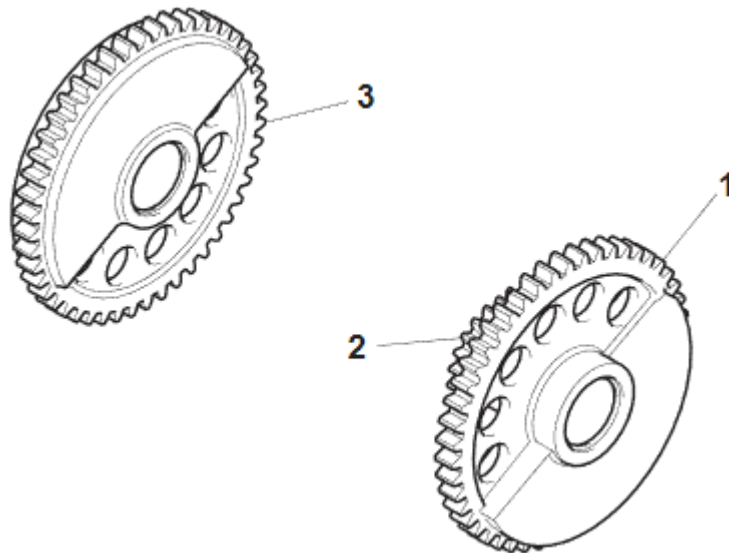


## Balancer Introduction

Two balancers are fitted to the engine, one in front of the crankshaft and one behind it in the lower crankcase.

Both balancers are driven by the crankshaft and the front balancer has an extra gear to drive the oil pump.

It is only the rear balancer that can be adjusted.



1. Front balancer
2. Oil pump drive gear
3. Rear balancer

## Front Balancer – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **⚠ CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.

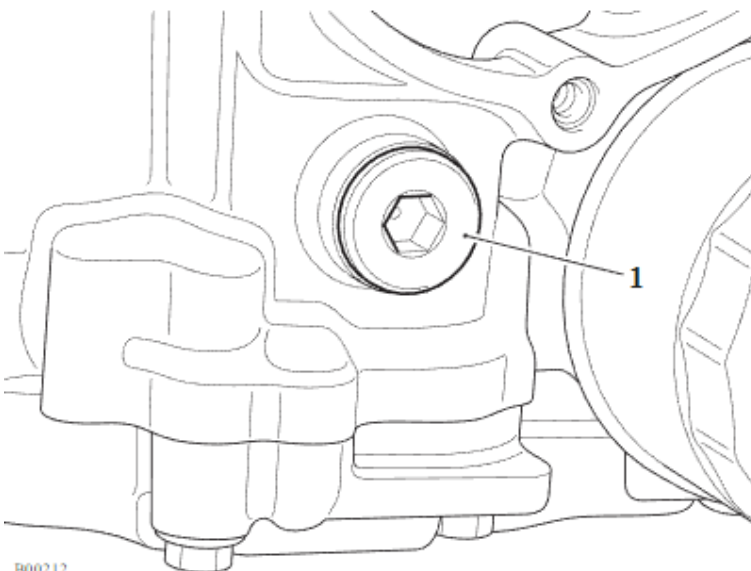
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.

Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Sump - Removal](#)
- [Clutch Cover - Removal](#)

1. Remove the spark plugs to reduce compression resistance when turning the engine (see Spark Plugs - Check/Renew).
2. Remove the crankshaft locking pin plug from the crankcase.

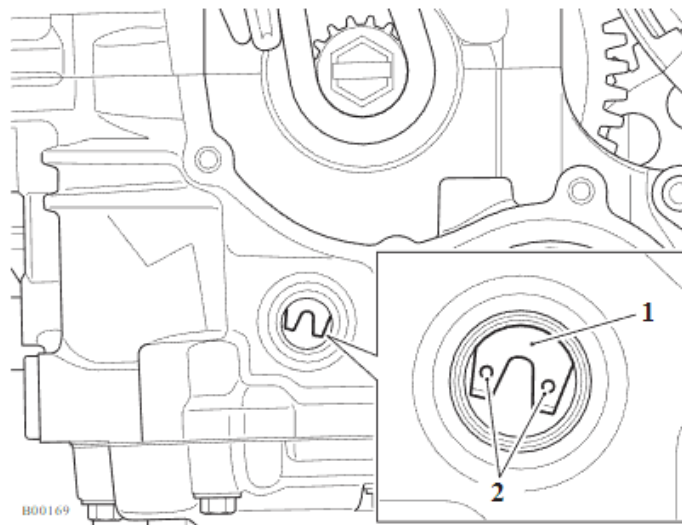


1. Locking pin plug

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3. At the front of the engine, rotate the crankshaft anticlockwise using the bolt fitted to the end of the crankshaft until the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin.

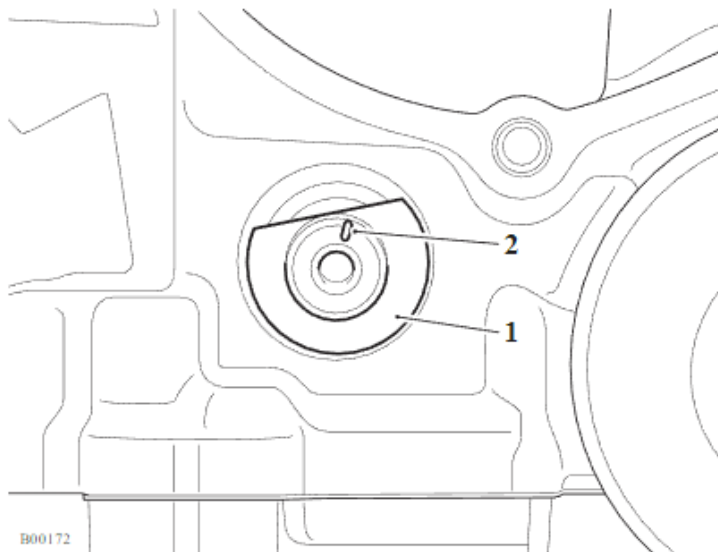


1. Crankshaft primary gear
2. Alignment marks

#### NOTICE

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

4. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.

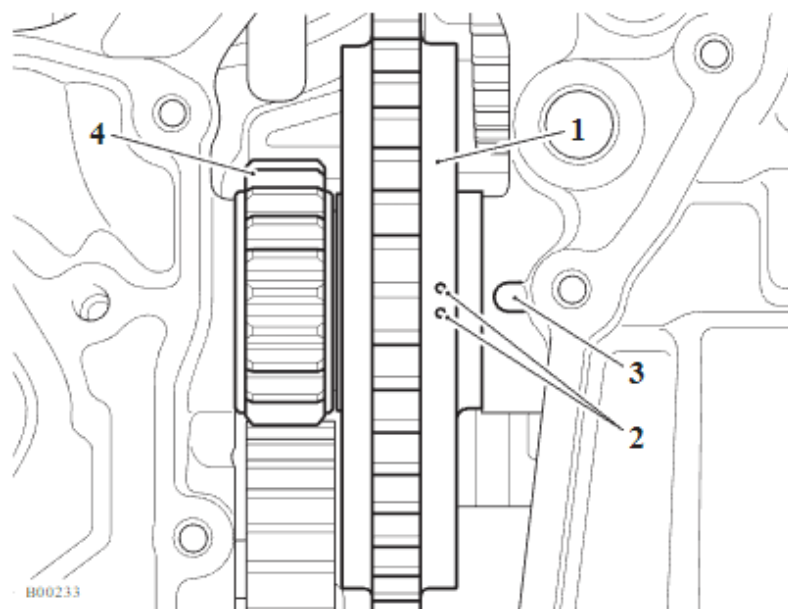


1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

## NOTICE

The oil pump drive gear is an integral part of the front balancer gear.

5. The two dot alignment marks on the front balancer gear should be aligned with the protruding rib on the crankcase.

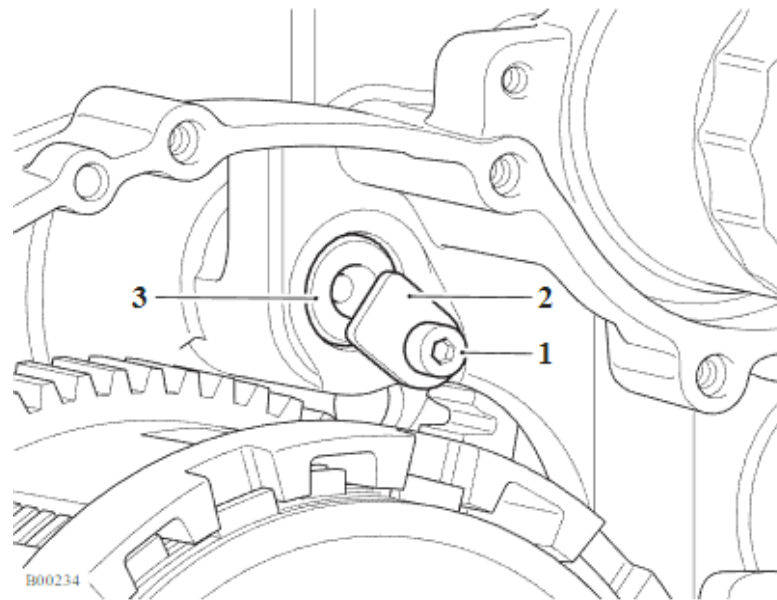


1. Front balancer
2. Alignment marks
3. Protruding rib
4. Oil pump drive gear

## NOTICE

Note the position and orientation of the balancer for installation.

6. Release the fixing and remove the dead shaft keeper plate. Discard the fixing.



1. Fixing
2. Keeper plate
3. Dead shaft

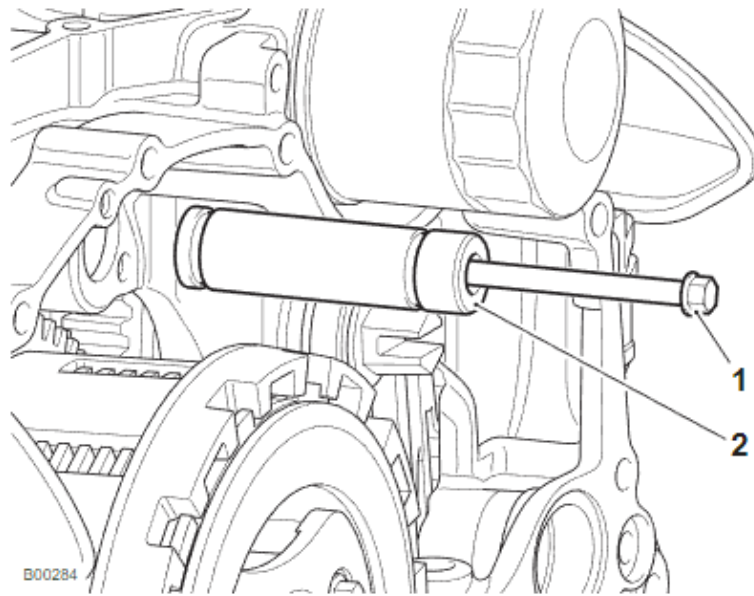
#### **NOTICE**

The keeper plate end of the dead shaft has a M6 thread within it. Use a M6 bolt to assist the removal of the dead shaft.

Note that at the front of the balancer gear and the rear of the oil pump drive gear there are washers that sit in a recess of the gears.

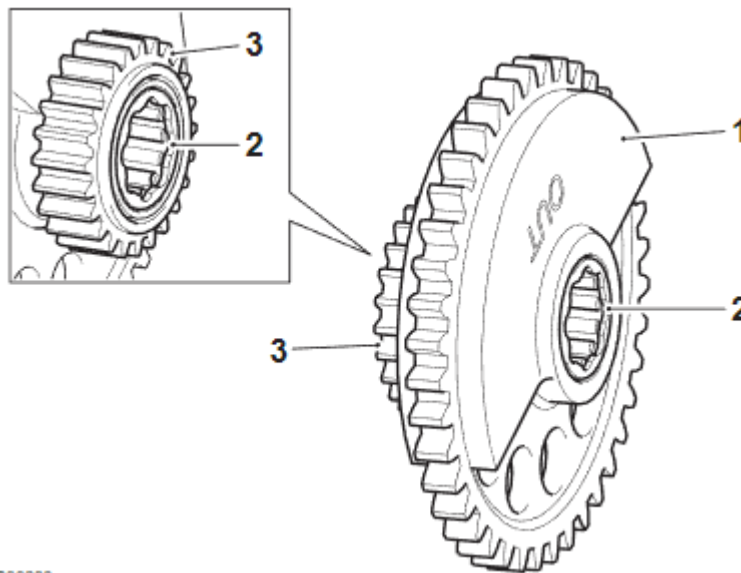
7. Fit a M6 bolt to the front dead shaft.

8. Hold the front balancer in position and remove the dead shaft.



- 1. M6 bolt
- 2. Dead shaft

9. Carefully raise the front balancer out. While raising the balancer, hold the two washers in their recess.



- 1. Front balancer
- 2. Washers
- 3. Oil pump drive gear

## Rear Balancer – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

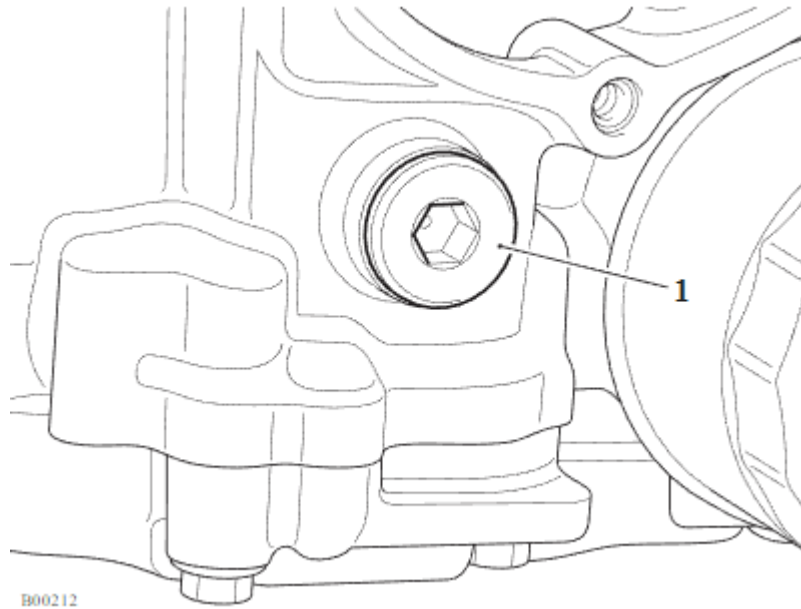
### **CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.  
When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.  
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operations:

- [Seat - Removal](#)
  - [Battery - Removal](#)
  - [Fuel Tank - Removal](#)
  - [Engine - Removal](#)
  - [Sump - Removal](#)
  - [Alternator Cover - Removal](#)
6. Remove the spark plugs to reduce compression resistance when turning the engine (see Spark Plugs - Check/Renew).

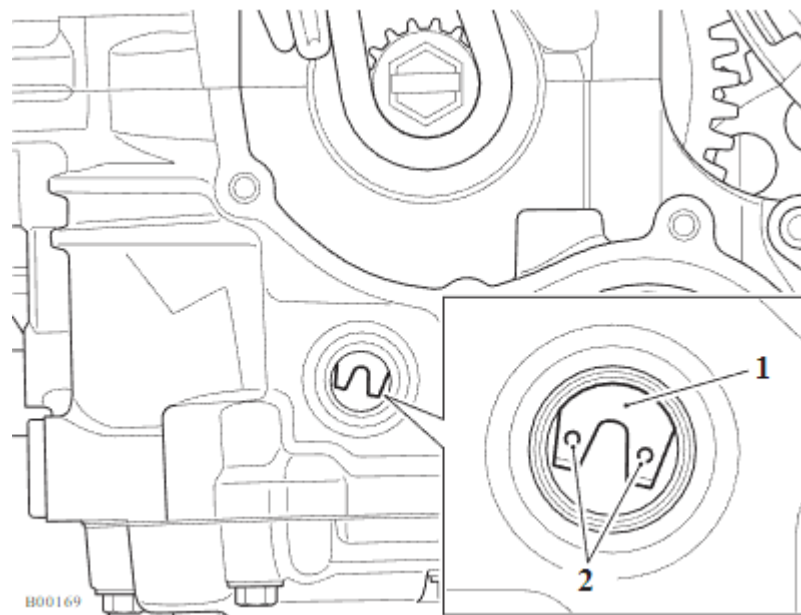
7. Remove the crankshaft locking pin plug from the crankcase.



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1. Locking pin plug

8. At the front of the engine, rotate the crankshaft anticlockwise using the bolt fitted to the end of the crankshaft until the two gear teeth with an alignment mark on each is visible and central in the hole for the crankshaft locking pin.



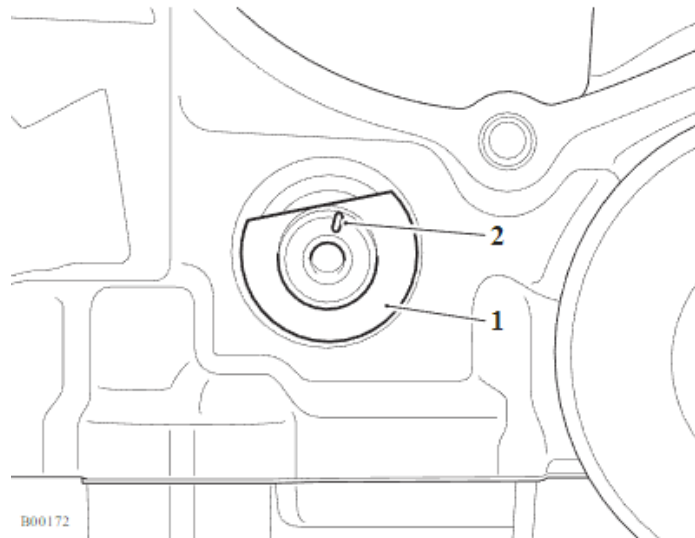
B00169

1. Crankshaft primary gear  
2. Alignment marks

## NOTICE

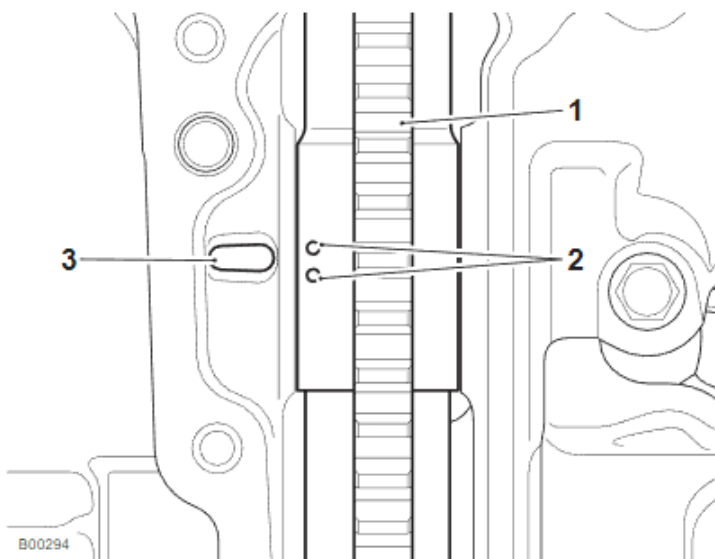
The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

4. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

5. Check that the rear balancer two alignment marks are aligned with the protruding rib on the crankcase.

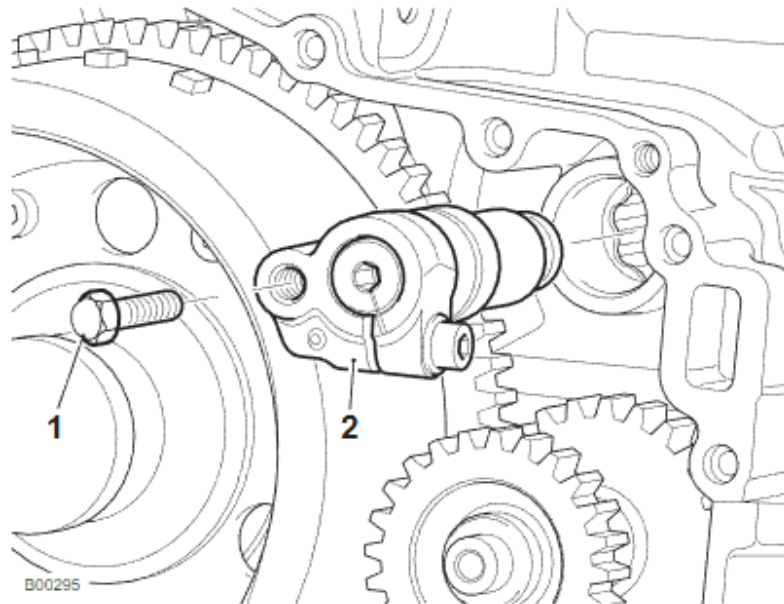


1. Rear balancer
2. Alignment marks
3. Protruding rib

## NOTICE

Note that the rear balancer have washers that sit in the recess on both side of the gear.

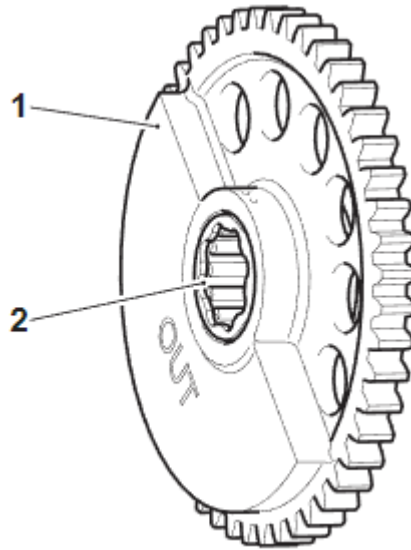
6. Remove the fixing securing the clamp to the crankcase. Discard the fixing.
7. Hold the rear balancer in position and remove the dead shaft and clamp assembly.



4. Fixing
5. Dead shaft and clamp assembly

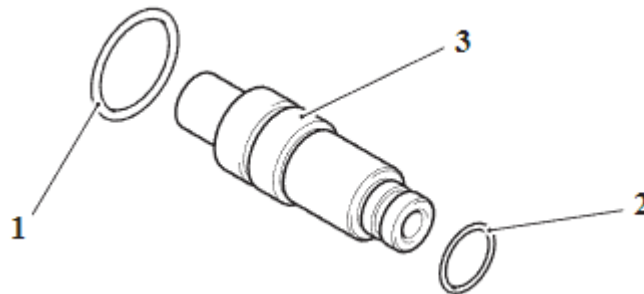


- Carefully manoeuvre the rear balancer out. While raising the balancer, hold the two washers in their recess.



- |   |
|---|
| <ol style="list-style-type: none"><li>Rear balancer</li><li>Washer (one of two shown)</li></ol> |
|---|

- Check the condition of the two O-rings on the dead shaft, replace if necessary.



- |  |
|--|
| <ol style="list-style-type: none"><li>Large O-ring</li><li>Small O-ring</li><li>Dead shaft</li></ol> |
|--|

### Balancer – Inspection

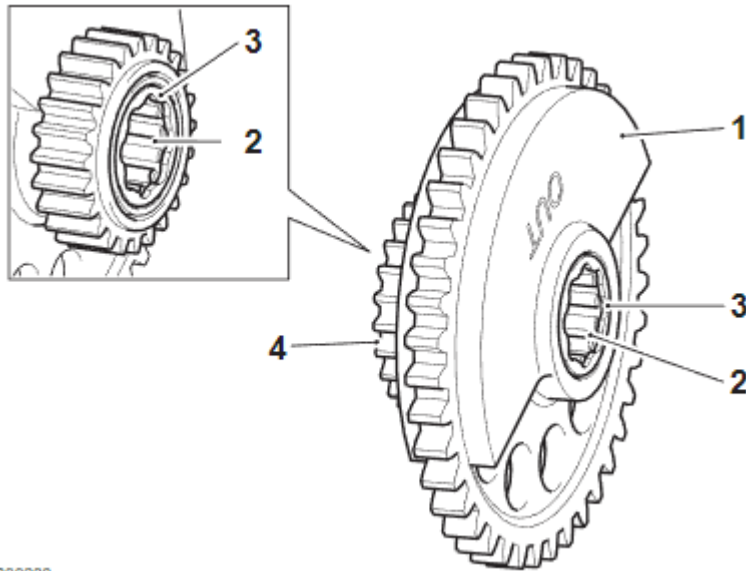
- Inspect all gears for chipped or missing teeth.
- Inspect all bearings for signs of seizure and any other damage. Check that all bearings rotate smoothly and without tight spots.

## Front Balancer – Installation

### NOTICE

When fitting the balancer make sure the word OUT is facing outwards.

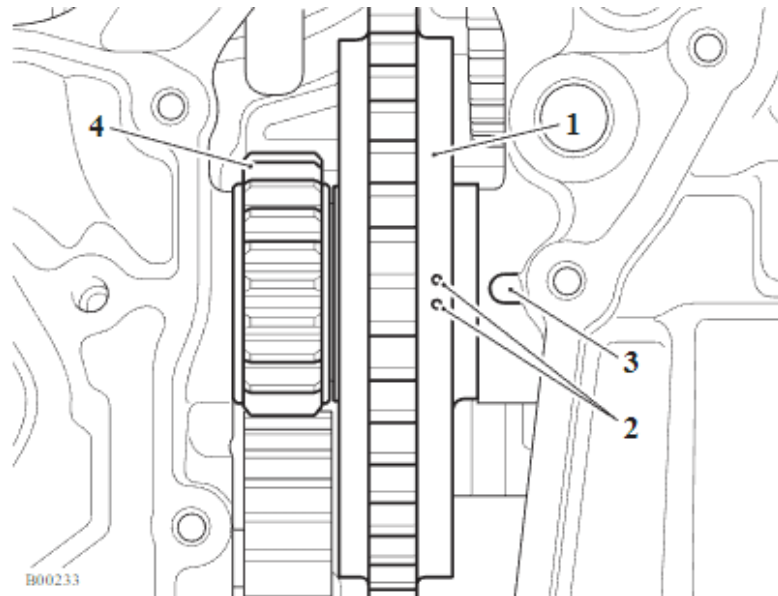
1. Make sure the needle bearing is fitted to the balancer and the two washers are in their recess.



1. Front balancer
2. Needle roller bearing
3. Washers
4. Oil pump drive gear

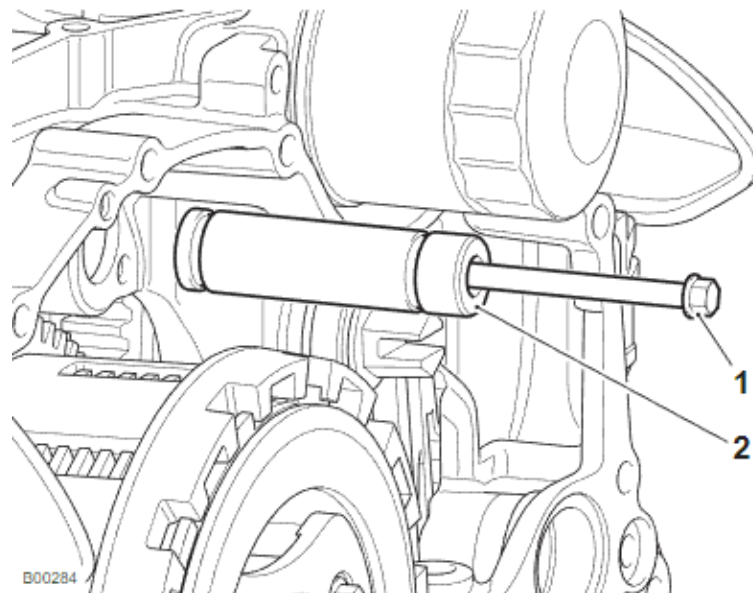
2. While holding the washers in position, lower the balancer into the crankcase, with the word OUT facing outwards, as noted for removal.

3. Align the two dot alignment marks on the balancer to the protruding rib on the crankcase.



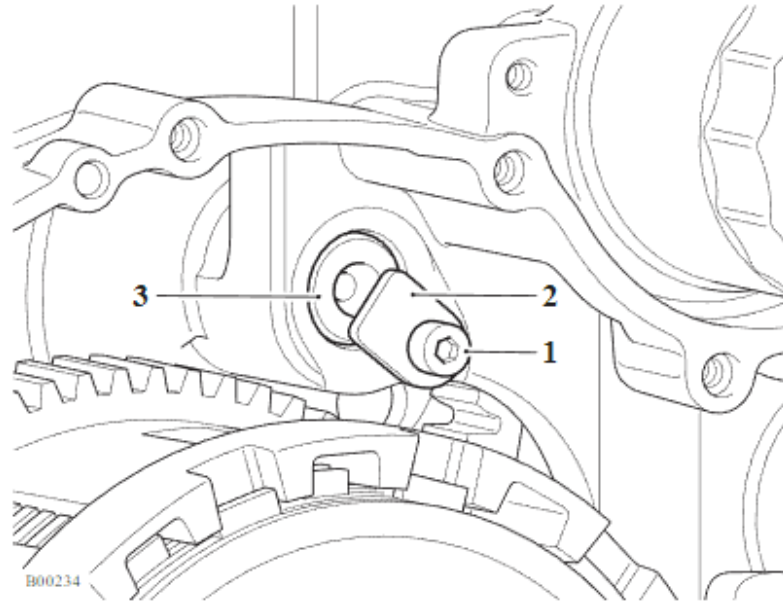
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Front balancer</li><li>2. Alignment marks</li><li>3. Protruding rib</li><li>4. Oil pump drive gear</li></ol> |
|---|

4. While holding the balancer in position, fit the dead shaft.
5. Remove the M6 bolt from the dead shaft.



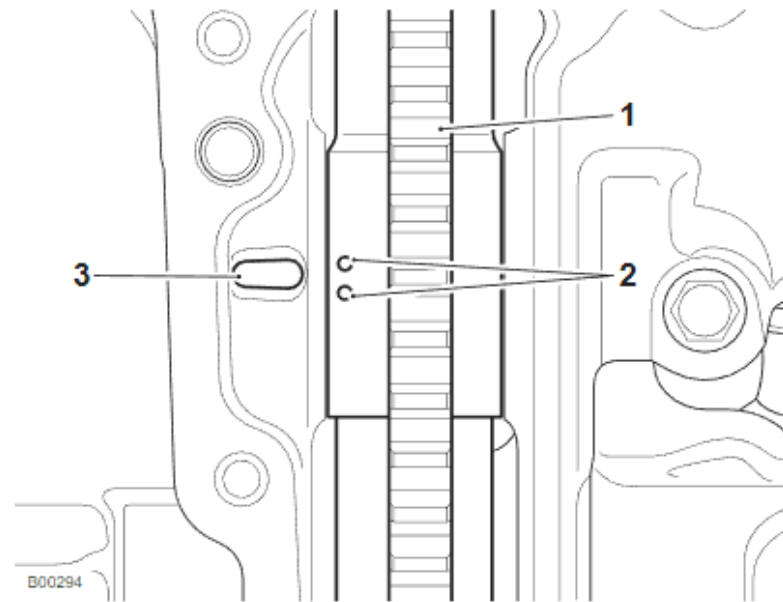
- |  |
|--|
| <ol style="list-style-type: none"><li>1. M6 bolt</li><li>2. Dead shaft</li></ol> |
|--|

6. Fit the keeper plate and tighten the new fixing to 10 Nm.



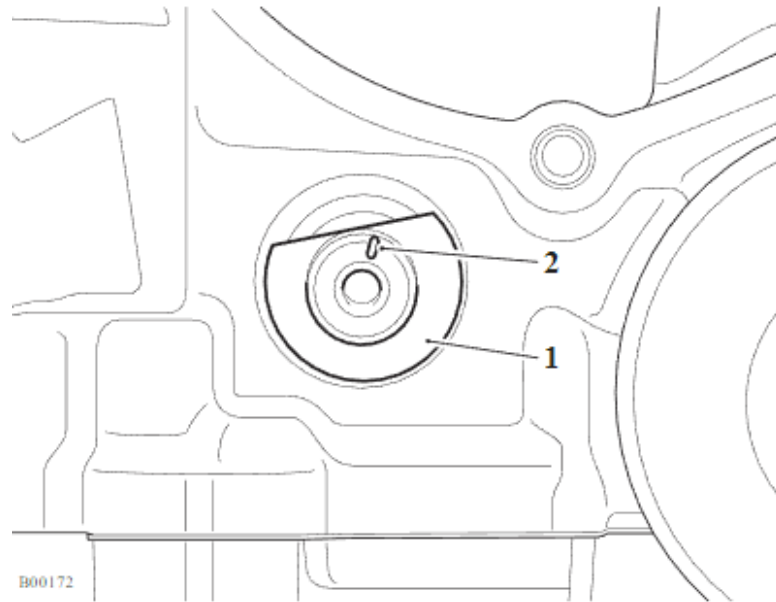
- 1. Fixing
- 2. Keeper plate
- 3. Dead shaft

7. Check that the rear balancer two alignment marks are aligned with the protruding rib on the crankcase.



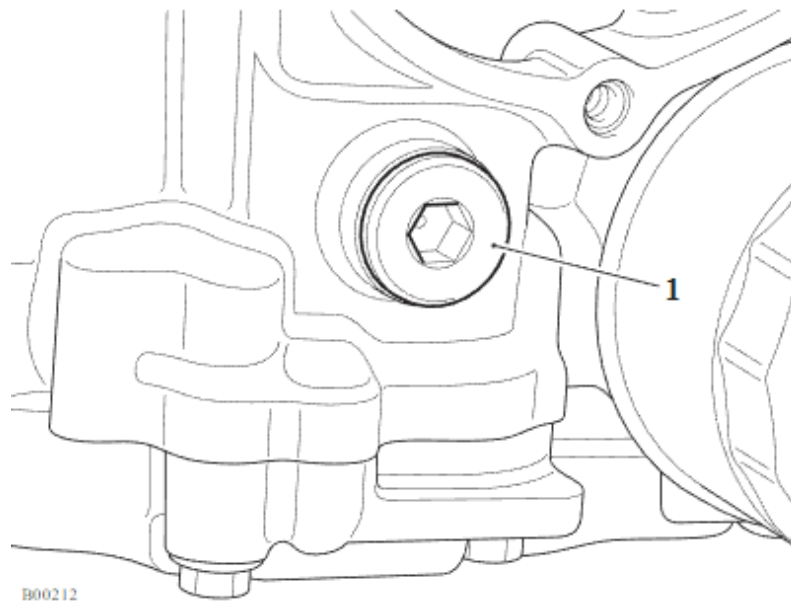
- 1. Rear balancer
- 2. Alignment marks
- 3. Protruding rib

8. Remove service tool T3880501



- 1. T3880501 - Crankshaft Locking Pin
- 2. Alignment mark

9. Fit the crankshaft locking pin plug and tighten to 33 Nm.



- 1. Locking pin plug

10. Refit the spark plugs (see Spark Plugs - Check/Renew).

Perform the following operations:

- [Clutch Cover - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

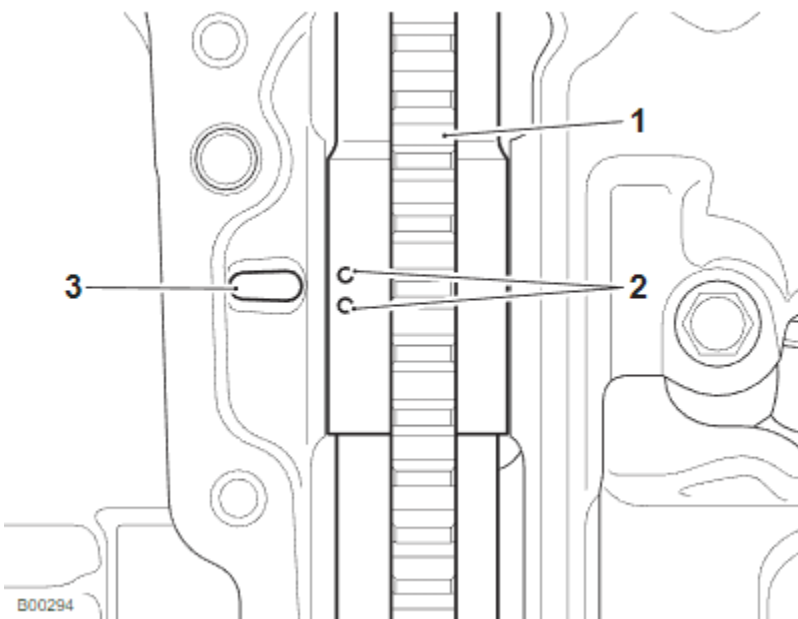
#### Rear Balancer – Installation

1. Make sure the needle bearing to the balancer and the two washers are their recess on both ends of the balancer.

#### **NOTICE**

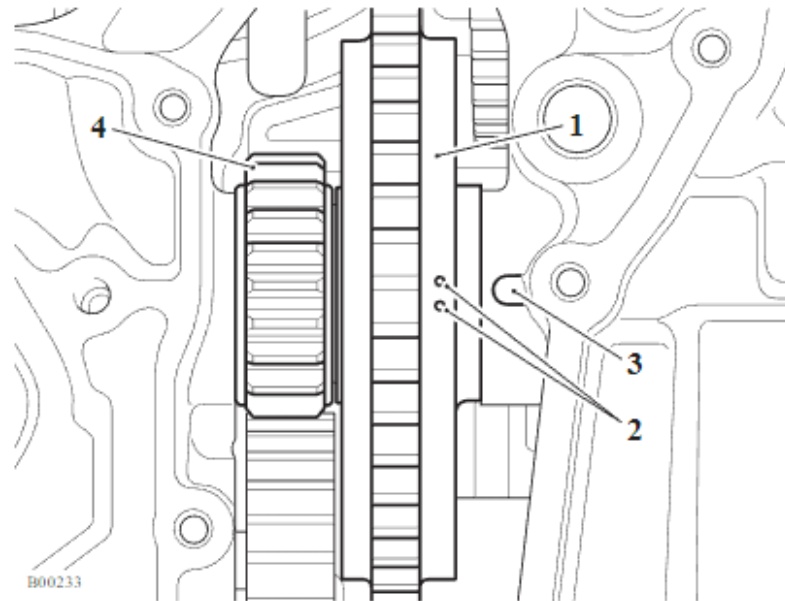
When fitting the balancer make sure the word OUT is facing outwards.

2. While holding the washers in position, lower the balancer into the crankcase, with the word OUT facing outwards, as noted for removal.
3. Align the two dot alignment marks on the balancer to the protruding rib on the crankcase.



1. Rear balancer
2. Alignment marks
3. Protruding rib

4. While holding the balancer in position, fit the dead shaft and clamp assembly.
5. Fit the clamp new fixing and tighten to 10 Nm.
6. Check that the front balancer two alignment marks are aligned with the protruding rib on the crankcase.



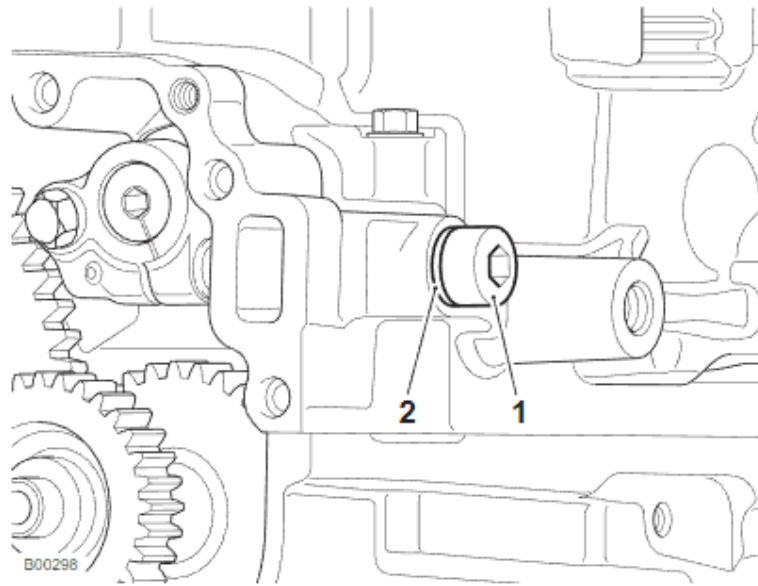
1. Front balancer
2. Alignment marks
3. Protruding rib
4. Oil pump drive gear

#### **NOTICE**

If fitting a new rear balancer, continue from step 7.

If fitting the original rear balancer, omit steps 7 to 12

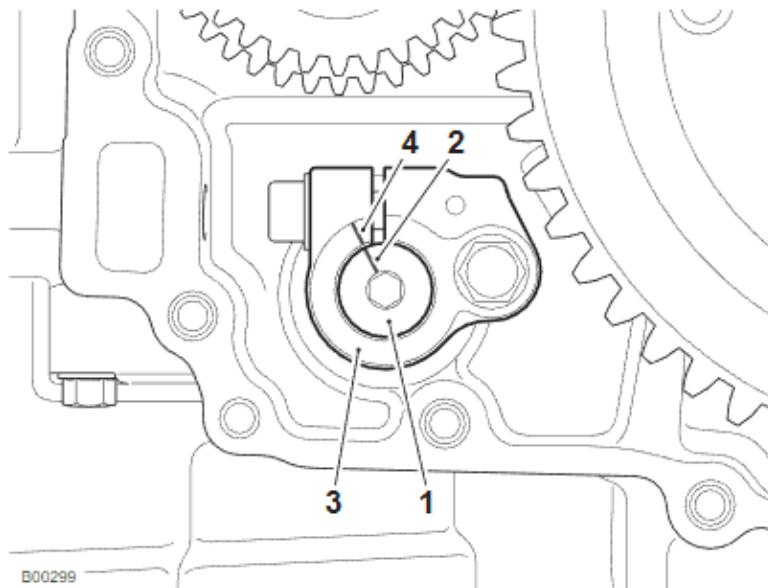
7. Remove the dead shaft clamp blanking plug and discard the washer.



- 1. Blanking plug
- 2. Washer

8. Loosen the dead shaft pinch bolt a maximum of two complete turns to allow smooth rotation of the balancer dead shaft in the clamp.

9. Align the dead shaft alignment mark to the mark on its clamp.

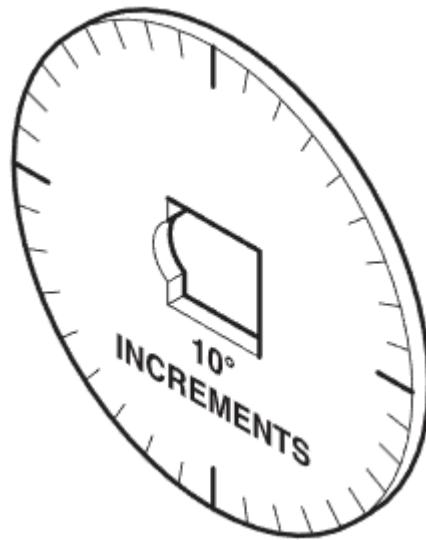


- 1. Dead shaft
- 2. Alignment mark
- 3. Clamp
- 4. Alignment mark



10. Rotate the dead shaft clockwise to 5 Nm.

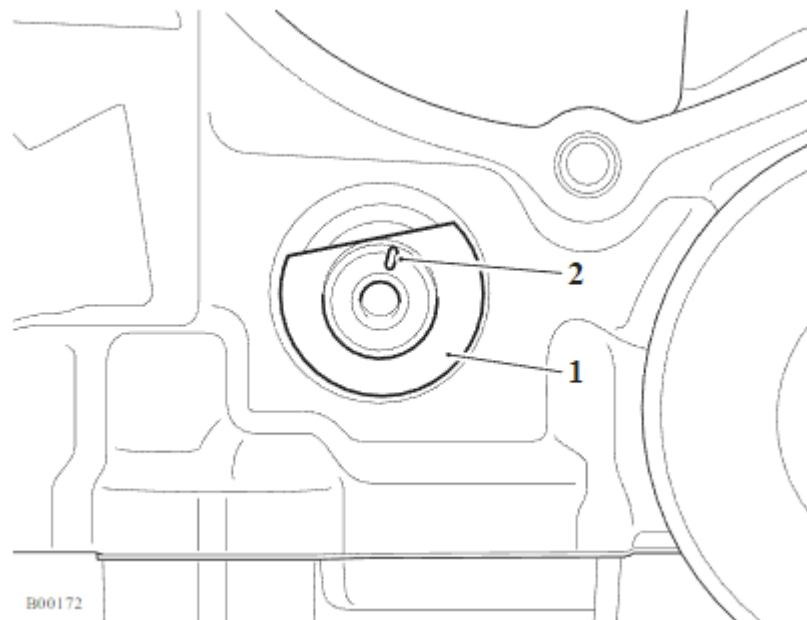
11. Rotate the dead shaft anticlockwise 21.5° using service tool T3880105.



T3880105 - Torque Angle Gauge

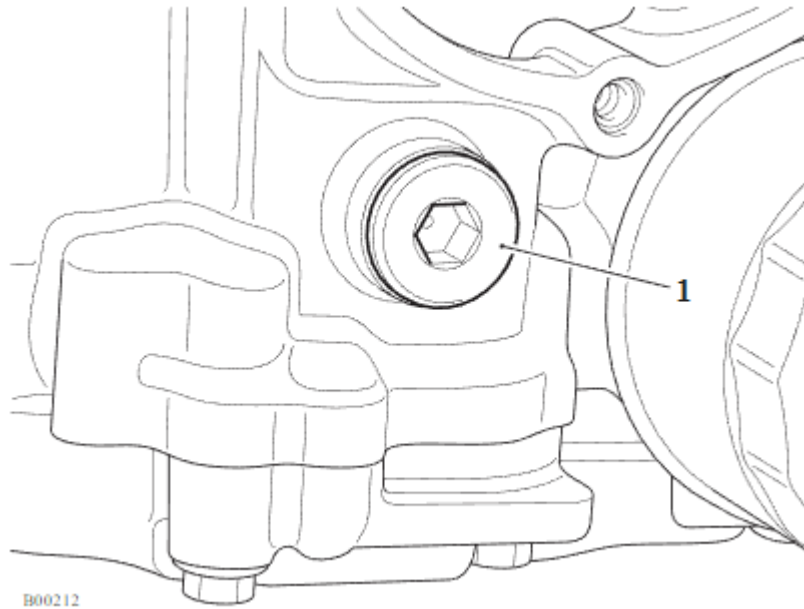
12. Tighten the dead shaft pinch bolt to 7 Nm.

13. Remove service tool T3880501



1. T3880501 - Crankshaft Locking Pin  
2. Alignment mark

14. Fit the crankshaft locking pin plug and tighten to 33 Nm.



1. Locking pin plug

15. Refit the spark plugs (see [Spark Plugs - Check/Renew](#)).

Perform the following operations:

- [Alternator Cover - Installation](#)
- [Sump - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)
- Start the engine and listen for a whine or rattle from the engine. If a whine or rattle can be heard, adjust the rear balancer (see [Rear Balancer Adjustment](#)).

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

If the engine has recently been running, the engine oil will be hot to the touch.  
Contact with the hot oils may cause damage to exposed skin. To avoid skin damage, do not touch hot oil.

### **WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

### **WARNING**

The cooling fan is switched on and off by the Engine Control Module in response to a signal received from the coolant temperature sensor. To prevent injury, never place loose clothing, fingers or hands near the cooling fan, until the engine is stopped. Loose clothing, fingers or the hands could become trapped during cooling fan operation and cause crushing injury to the fingers, hands or other parts of the anatomy.

## NOTICE

Before dynamically adjusting rear balancer the engine coolant fan must have cycled once and the coolant temperature must be at least 103°C.

1. Start the motorcycle's engine and allow to run to operating temperature.

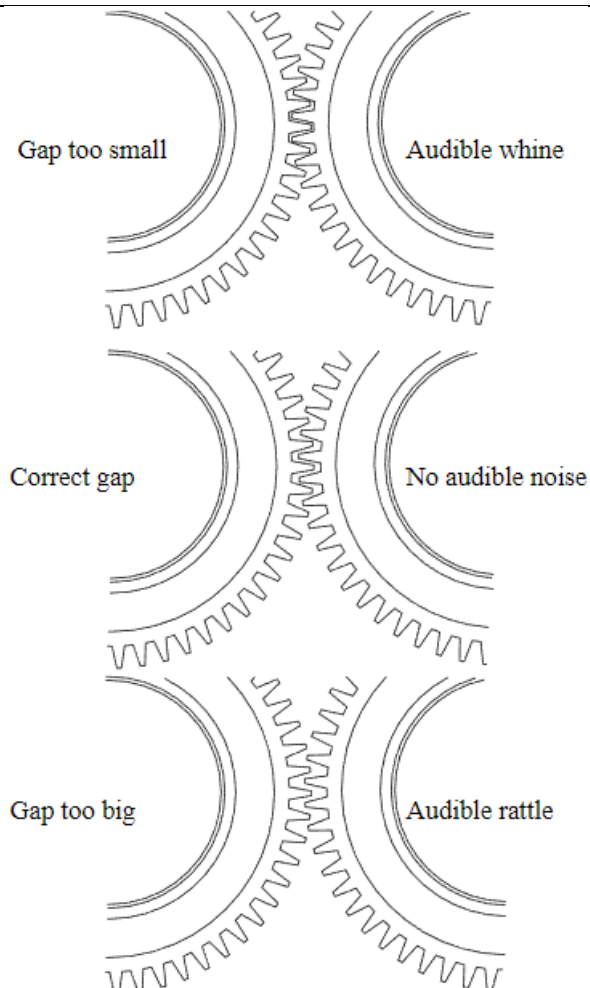
## CAUTION

The dead shaft is an eccentric shaft which runs inside the balancer shaft. When rotated the dead shaft therefore closes or opens the gap between the teeth of the balancer gear and the teeth of the crankshaft gear.

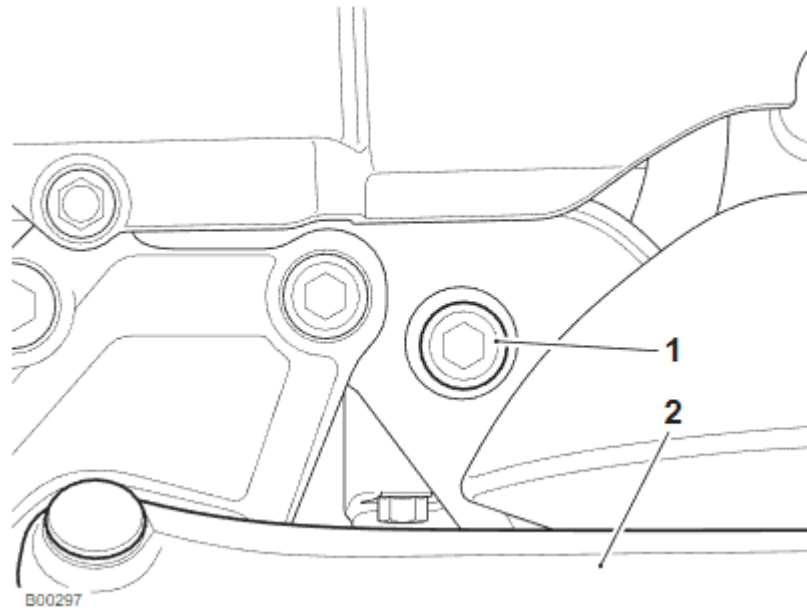
If the gap between the balancer gear and crankshaft gear is too small a whine is audible due to the increased load on the gear teeth and bearings.

If the gap between the balancer gear and crankshaft gear is too large a rattle is audible due to the increased gap between the gear teeth.

Unsatisfactory adjustment of the balancer shaft may cause severe engine damage.

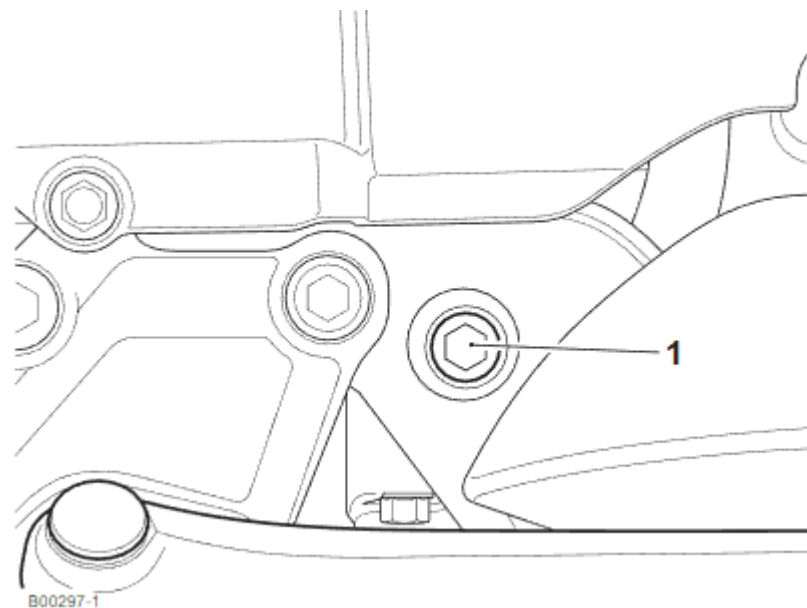


2. Stop the engine.
3. Remove the dead shaft clamp blanking plug located on the lower crankcase above the side stand. Discard the washer.



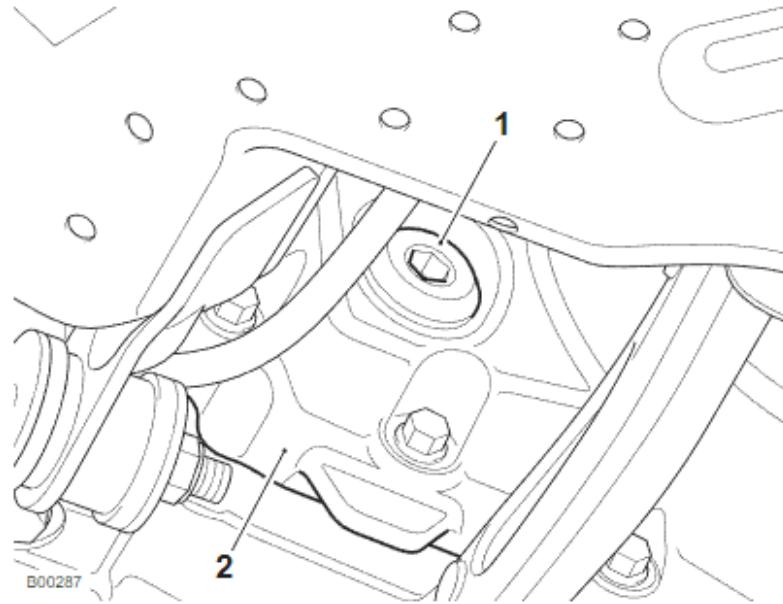
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Blanking plug</li><li>2. Side stand</li></ol> |
|--|

4. Loosen the dead shaft pinch bolt a maximum of two complete turns to allow smooth rotation of the balancer dead shaft in the clamp.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Pinch bolt</li></ol> |
|---|

4. Remove the face seal plug from the alternator cover.



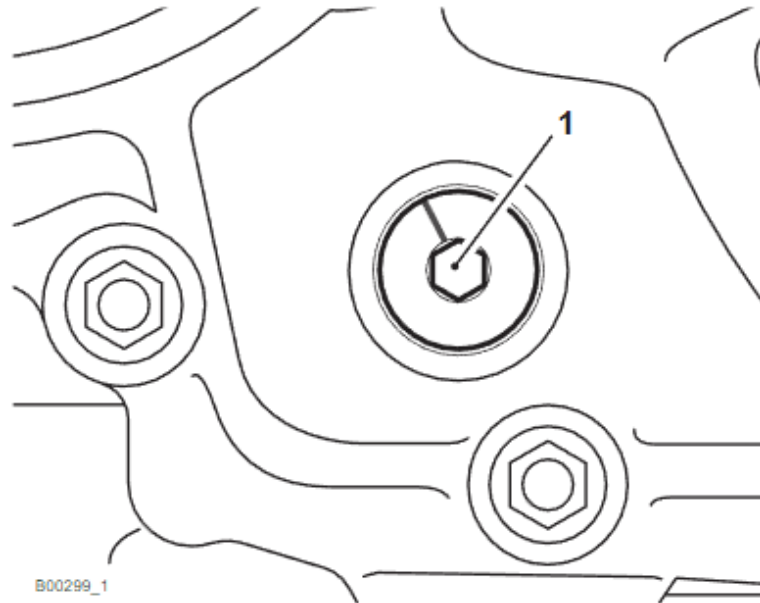
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Face seal plug</li><li>2. Alternator cover</li></ol> |
|---|

**⚠ CAUTION**

When adjusting the balancer shaft do not allow the gears to whine or rattle for a prolonged period.  
Allowing the gears to mesh incorrectly for extended periods may cause damage to the gears and or bearings.

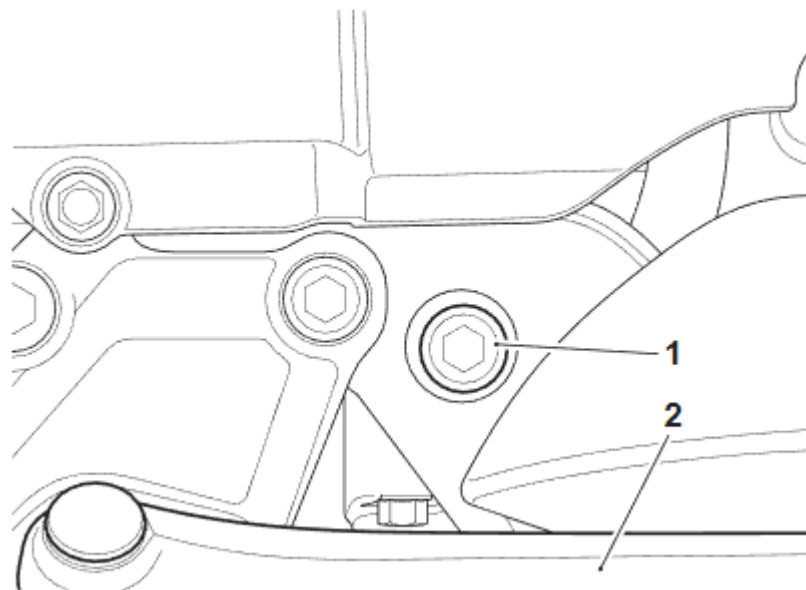
5. Start the engine and allow to idle.
6. If a rattle can be heard, rotate the rear balancer dead shaft clockwise until the rattle has stopped.

7. If a whining can be heard, rotate the rear balancer dead shaft anticlockwise until the whining has stopped.



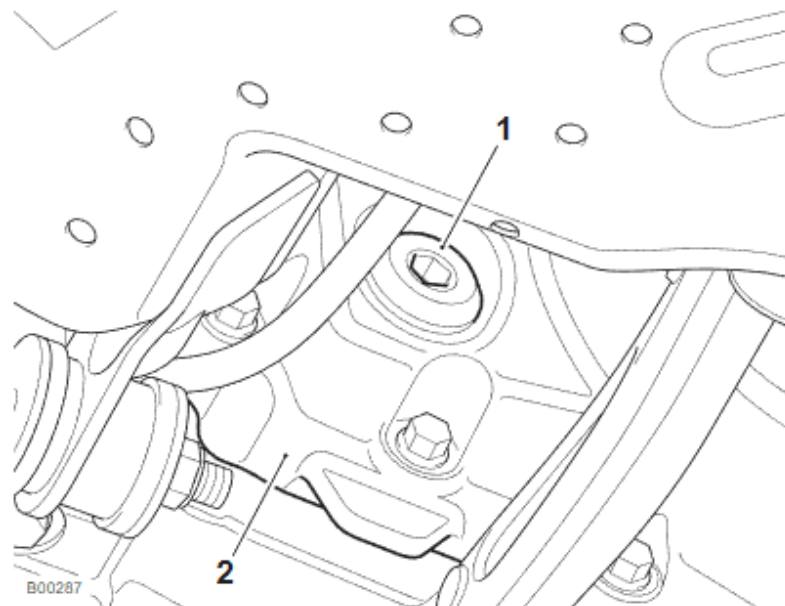
1. Dead shaft

8. Tighten the dead shaft pinch bolt to 7 Nm.
9. Stop the engine.
10. Fit a new washer and tighten the dead shaft clamp blanking plug to 25 Nm.



1. Blanking plug  
2. Side stand

11. Fit the face seal plug to the alternator cover and tighten to 6 Nm.



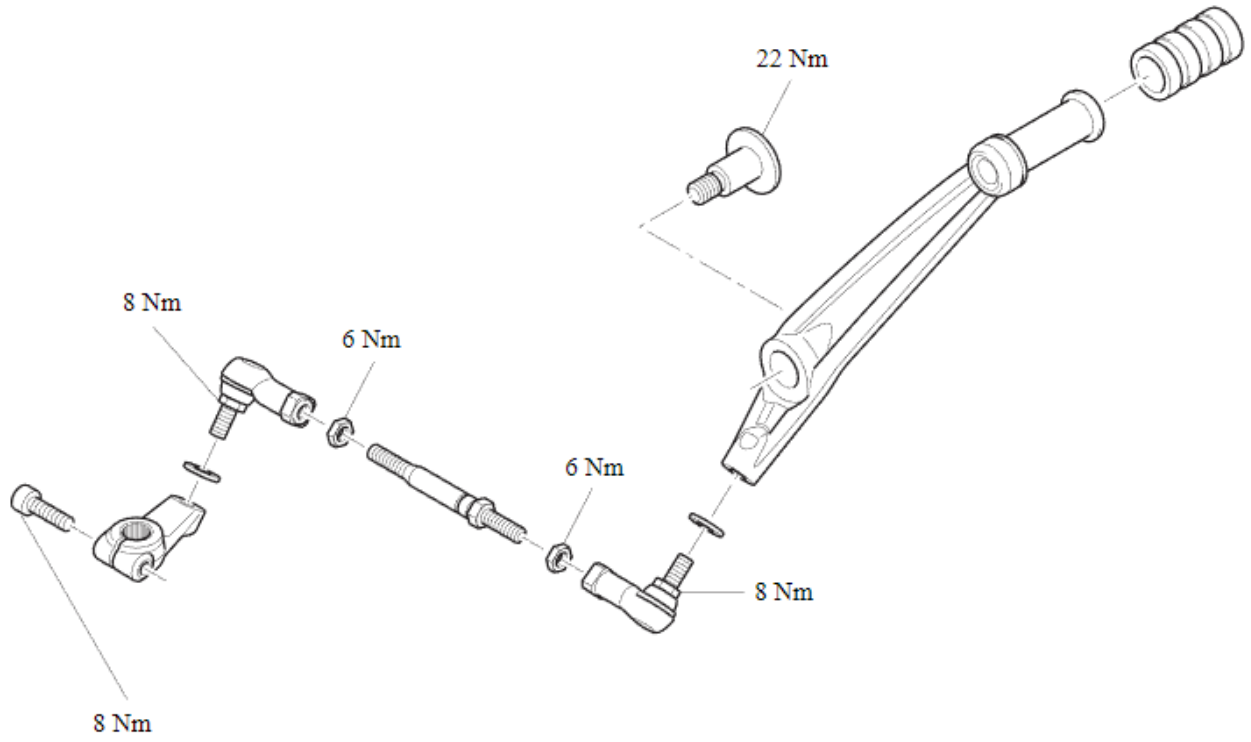
- 1. Face seal plug
- 2. Alternator cover

12. Inspect the engine oil level (see [Engine Oil - Level Inspection](#)).

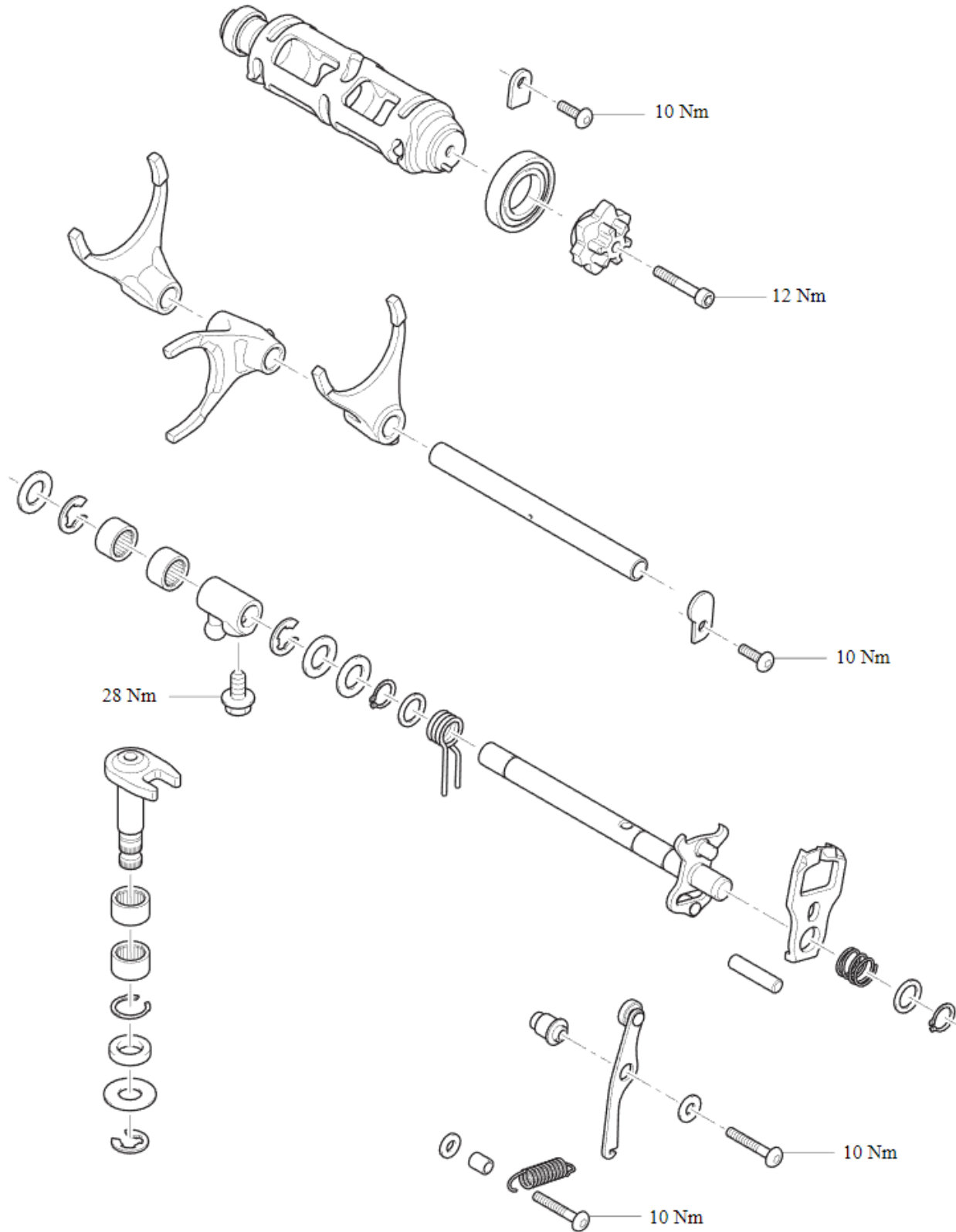


# Transmission

## Exploded View - Gear Change Pedal

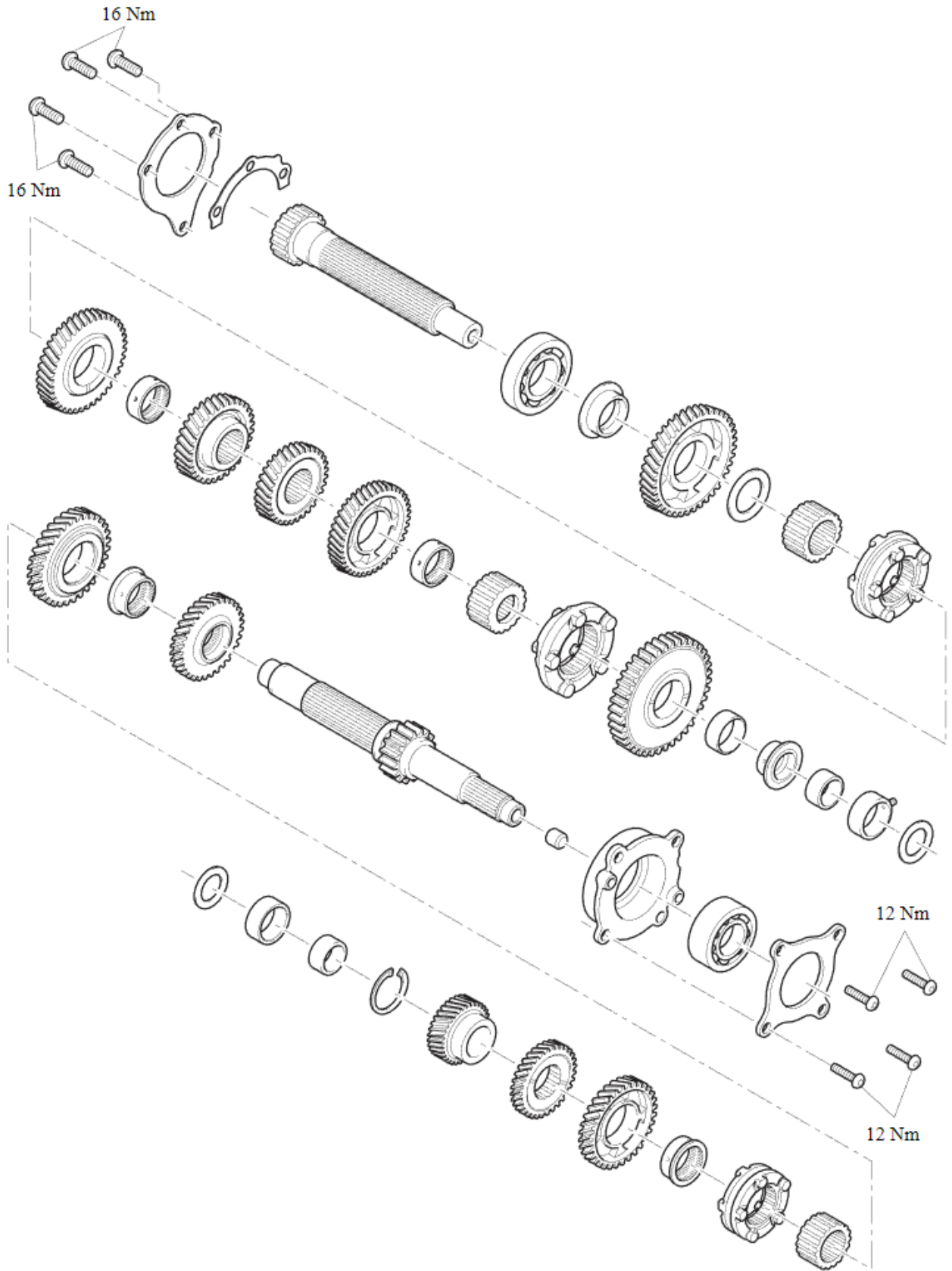


# Exploded View - Gear Selector



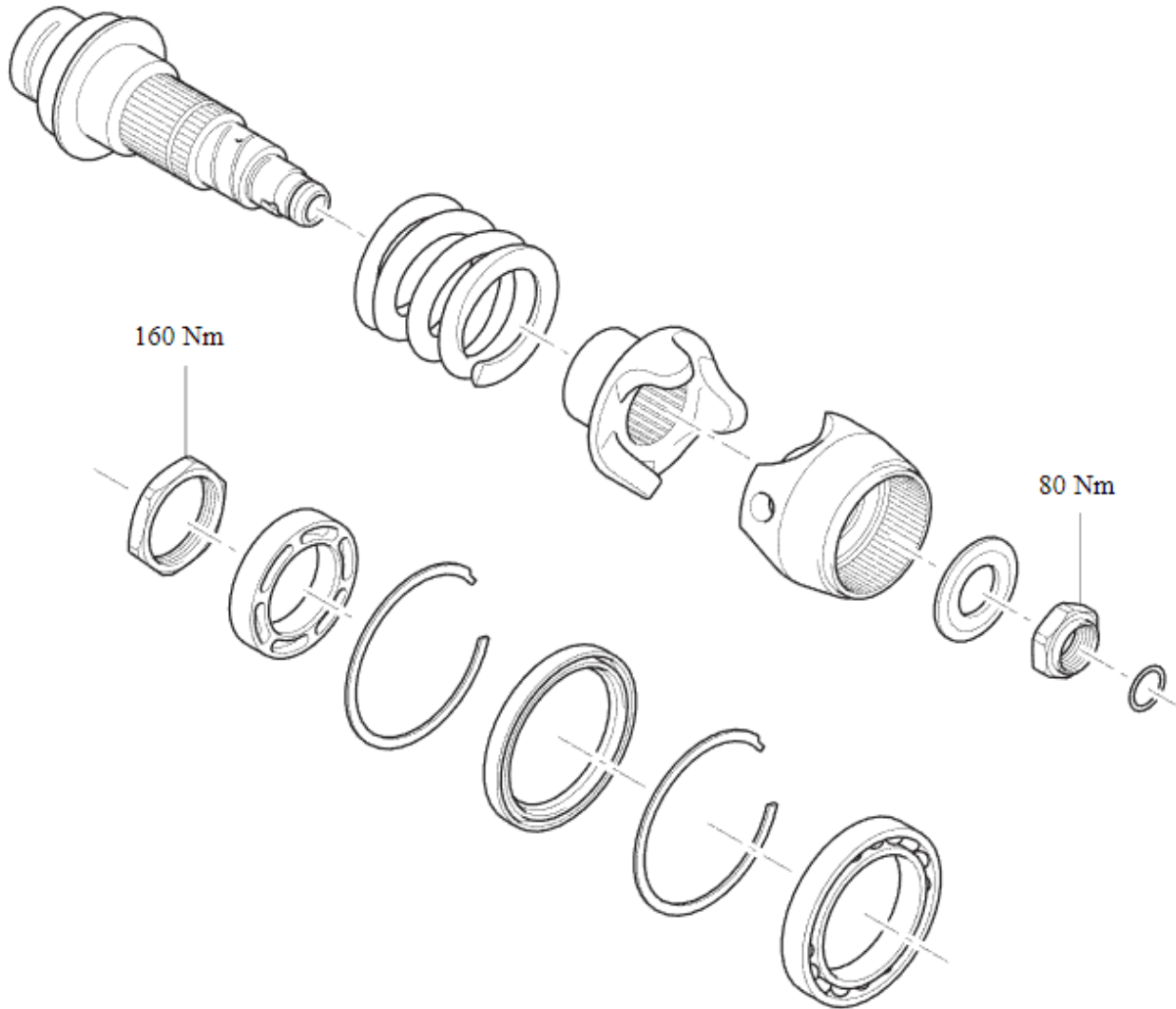
800018

# Exploded View - Input and Output Shafts



00019

## Exploded View - Torsional Damper



## Torsional Damper – Removal

### **⚠ WARNING**

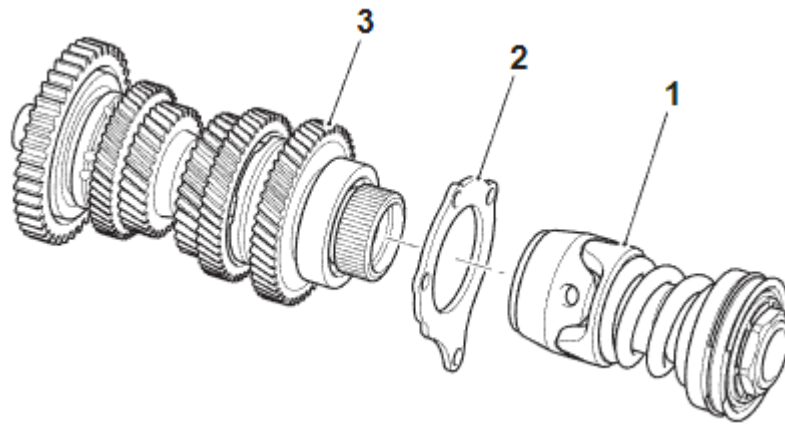
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## NOTICE

The torsional damper assembly is not to be disassembled. If an item of the torsional damper requires replacing, the complete torsional damper must be replaced.

Perform the following operations:

- [Seat - Removal](#)
  - [Battery - Removal](#)
  - [Fuel Tank - Removal](#)
  - [Engine - Removal](#)
  - [Throttle Body - Removal](#)
  - [Output Shaft - Removal](#)
1. Remove the torsional damper and the retaining plate from the output shaft. If necessary, use a soft faced mallet to gently tap the torsional damper off the output shaft.



1. Torsional damper
2. Retaining plate
3. Output shaft

## Torsional Damper – Installation

### **⚠ WARNING**

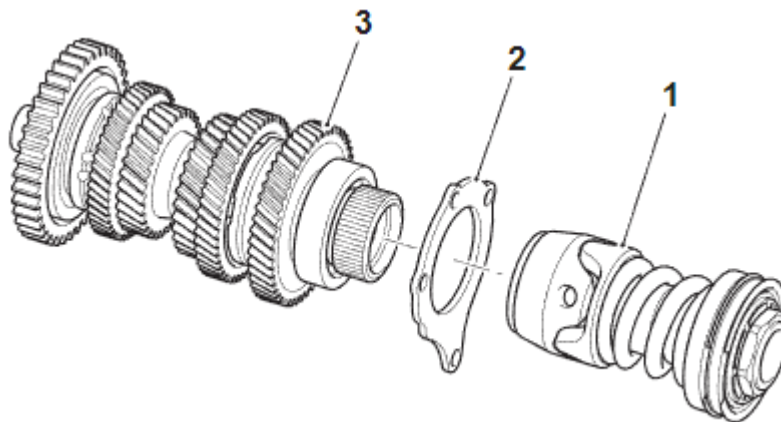
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

4. Fit the retaining plate Make sure the OUT marking on the retaining plate is facing towards the torsional damper.

### **NOTICE**

When fitting the torsional damper to the output shaft, care must be taken to prevent damage to the O-ring in the damper.

2. Fit the torsional damper to the output shaft as noted for removal.
3. Make sure the oil seal is fitted to the damper and there is a snap ring on either side of it.



1. Torsional damper
2. Retaining plate
3. Output shaft

Perform the following operations:

- [Output shaft - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Output Shaft – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

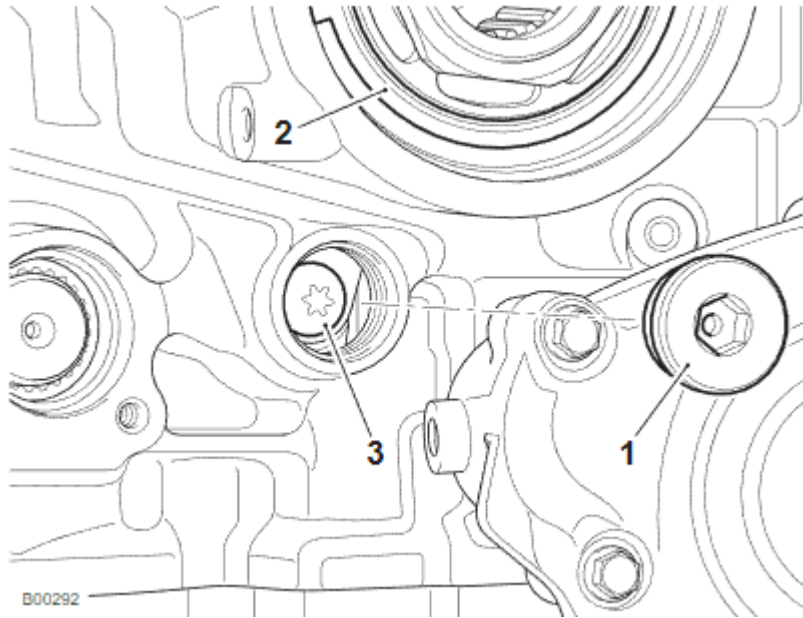
### **NOTICE**

Only the torsional damper and the retaining plate is to be removed from the output shaft.  
The output shaft assembly is not to be disassembled. If an item of the output shaft requires replacing, the complete output shaft assembly must be replaced.  
Make sure the gear selection is in neutral before removing the output shaft.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Throttle Body - Removal](#)
- [Transmission Cover - Removal](#)

1. Remove the M22 sealing plug and its O-ring located below the torsional damper housing.
2. Carefully remove the fixing securing the output retaining plate to the upper crankcase.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. M22 sealing plug</li><li>2. Torsional damper housing</li><li>3. Fixing</li></ol> |
|---|

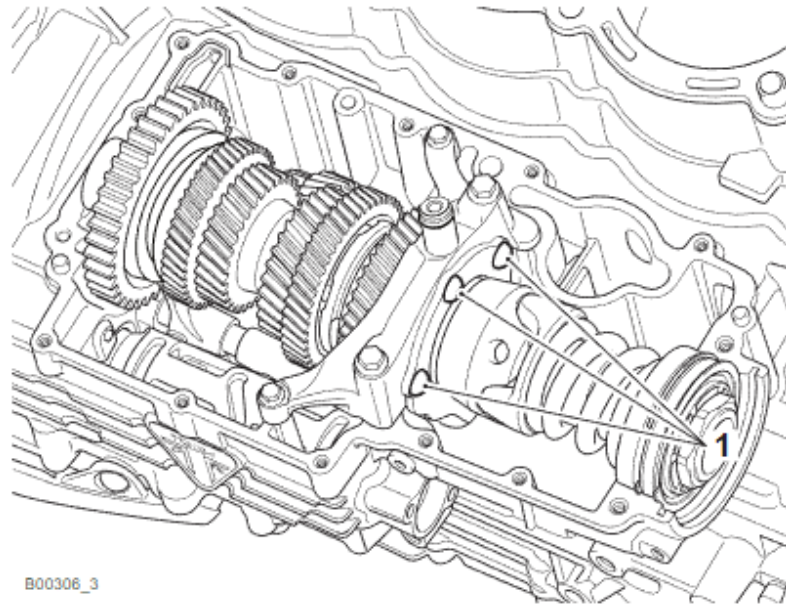
**NOTICE**

There could be one or more shims between the bearing cap and the output shaft retaining plate.

Note the position of the shims for installation.



3. Remove the fixings securing the output shaft retaining plate to the transmission bearing cap. Discard the fixings.



1. Fixings

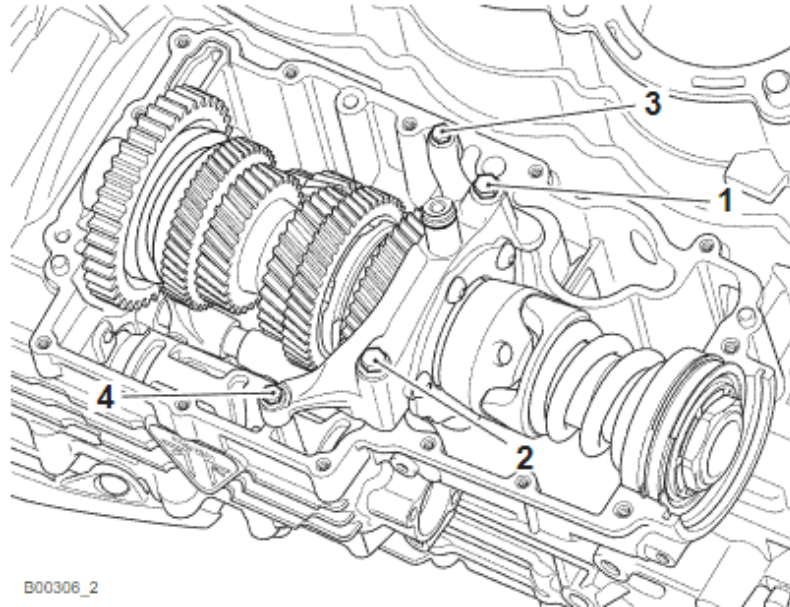
4. If fitted, remove the shim(s) and retain for installation.

#### **NOTICE**

For the transmission bearing cap there are two M6 x 30 mm and two M8 x 65 mm fixings.

Note the position of the fixings for installation.

5. Progressively release the transmission bearing cap fixings in the sequence shown below.



Transmission Bearing Cap Release Sequence

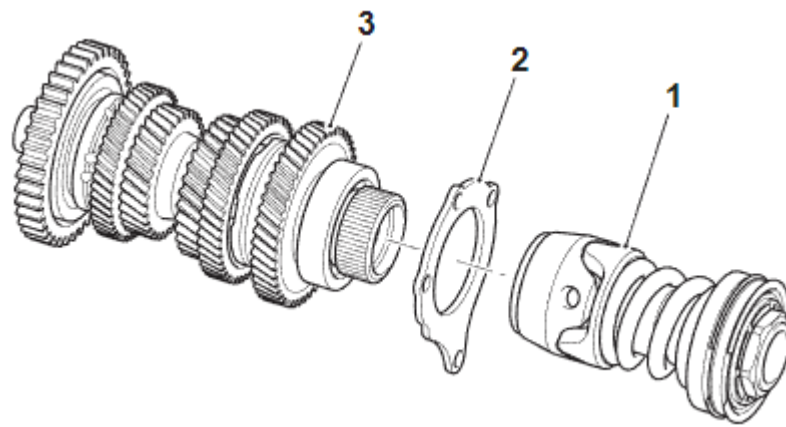
6. Remove the transmission bearing cap.

| <b>NOTICE</b>   |
|---|
| Note there is a washer between the output shaft and the upper crankcase for installation.<br>Note the position of the two gear selector forks for installation. |

7. Carefully lift out the output shaft, torsional damper and output retaining plate from the upper crankcase.

| <b>NOTICE</b>  |
|--|
| Note that the retaining plate has an OUT marking and it is facing towards the torsional damper for installation. |

8. Remove the torsional damper and the retaining plate from the output shaft. If necessary, use a soft faced mallet to gently tap the torsional damper off the output shaft.



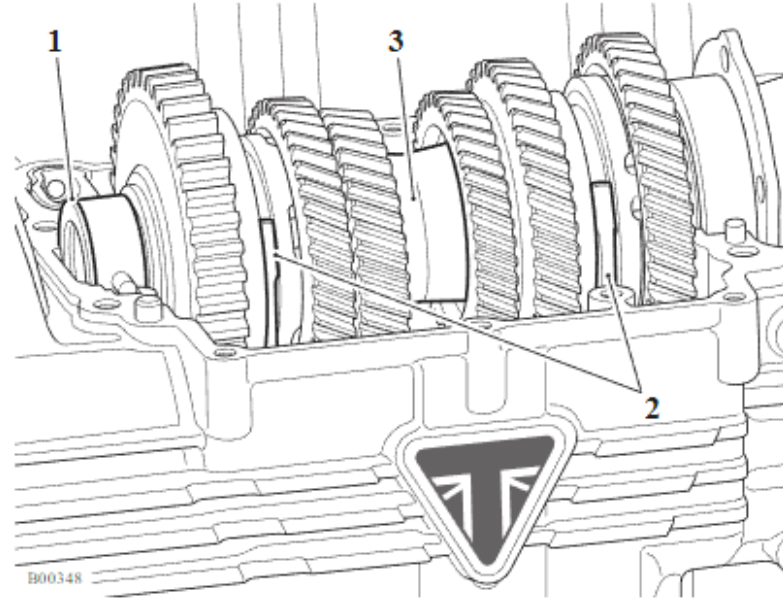
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Torsional damper</li><li>2. Retaining plate</li><li>3. Output shaft</li></ol> |
|--|

#### Output Shaft Bearing Measuring and Shim Selection

The shim selection for the output shaft is only required if one of the following conditions are met:

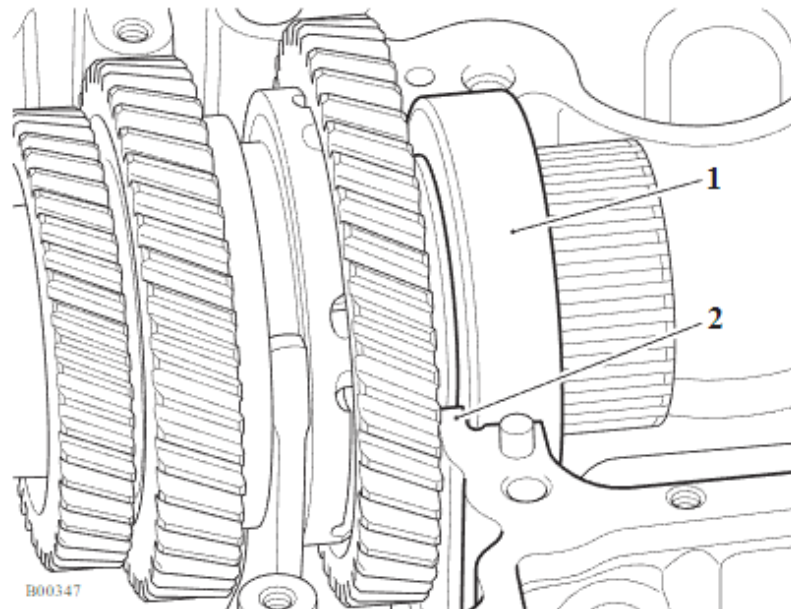
- New output shaft being fitted to the original crankcase.
  - Original output shaft being fitted to a new crankcase.
  - New output shaft and crankcase.
1. Fit the output shaft to the crankcase (without the torsional damper). Make sure the two selector forks are positioned as noted for removal.

2. Fit the washer between the output shaft and the upper crankcase as noted for removal.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Washer</li><li>2. Selector forks</li><li>3. Output shaft</li></ol> |
|---|

3. Make sure the output shaft bearing is flush against its stop in the crankcase.



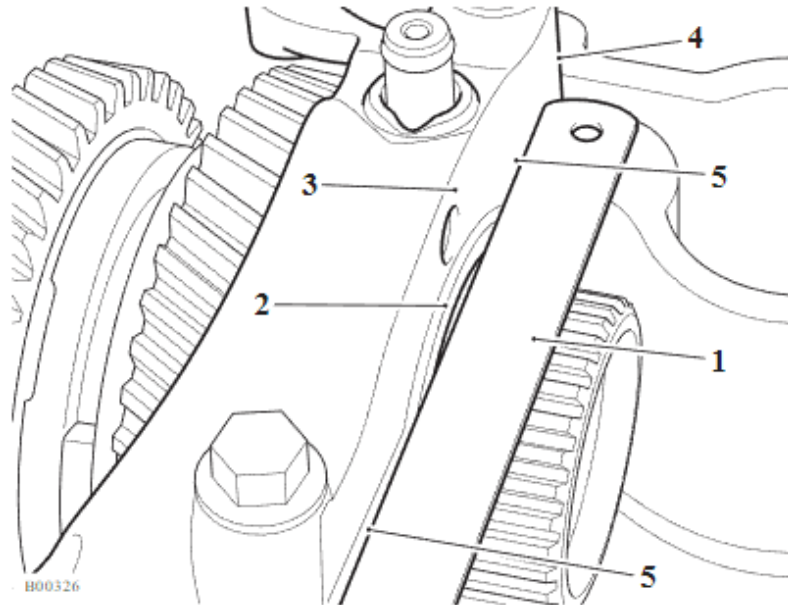
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Bearing</li><li>2. Bearing stop</li></ol> |
|--|

- Fit the transmission bearing cap and tighten its fixings.

**NOTICE**

There is a raised edge on one side of the transmission cap. Make sure the straight edge is clear of the raised edge.

- With a straight edge against the bearing face, use feeler gauges to measure the gap between the straight edge and the transmission bearing cap on both sides of the bearing. Use the average of these two measurements when selecting the shim.



- Straight edge
- Bearing
- Transmission bearing cap
- Raised edge
- Measuring points

|                                 |         |
|---------------------------------|---------|
| For instance:                   |         |
| Gap left hand side of bearing   | 0.71 mm |
| Gap right hand side of bearing  | 0.69 mm |
| Average of the two measurements | 0.70 mm |
| Shim(s) required                | Shim 3  |

- For shim selection, refer to the shim chart below.

7. Remove the transmission cap and the output shaft.

#### Shim Chart

| Shim  | Shim Thickness (mm) | Measured Range |
|-------|---------------------|----------------|
| 1     | 0.30                | 0.50 to 0.59   |
| 2     | 0.40                | 0.60 to 0.69   |
| 3     | 0.50                | 0.70 to 0.79   |
| 1 + 1 | 0.60                | 0.80 to 0.89   |
| 1 + 2 | 0.70                | 0.90 to 0.99   |
| 2 + 2 | 0.80                | 1.00 to 1.09   |
| 2 + 3 | 0.90                | 1.10 to 1.19   |

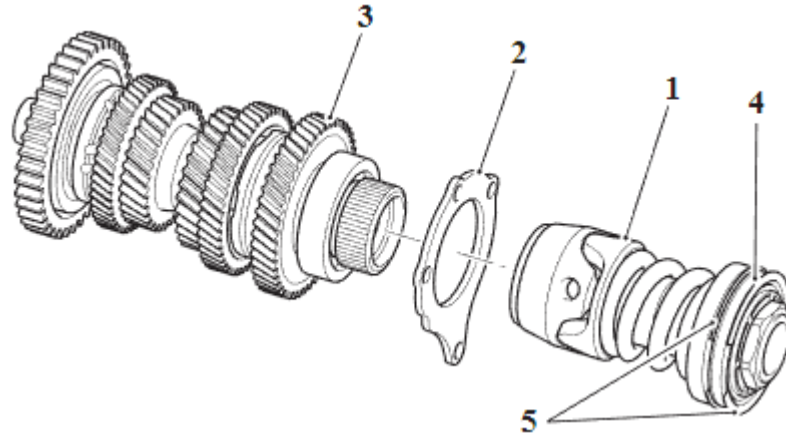
#### Output shaft – Installation

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

If fitting a new output shaft and/or a new crankcase, refer to [Output Shaft Bearing Measuring and Shim Selection](#) to select the correct shim prior to fitting to the output shaft.

1. Assemble the retaining plate and torsional damper to the output shaft as noted for removal. Make sure the OUT marking on the retaining plate is facing towards the torsional damper. Make sure the oil seal is fitted and there is a snap ring on either side of it.

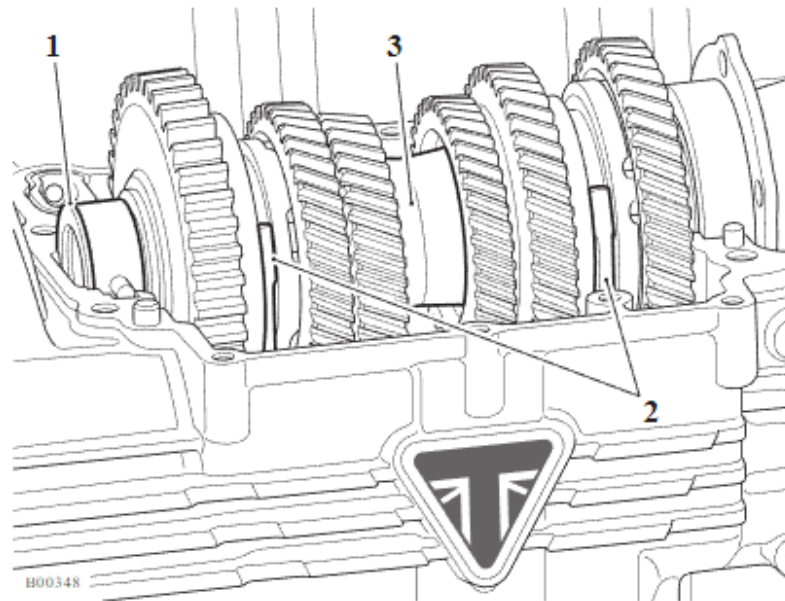


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Torsional damper</li><li>2. Retaining plate</li><li>3. Output shaft</li><li>4. Oil seal</li><li>5. Snap rings</li></ol> |
|--|

### **NOTICE**

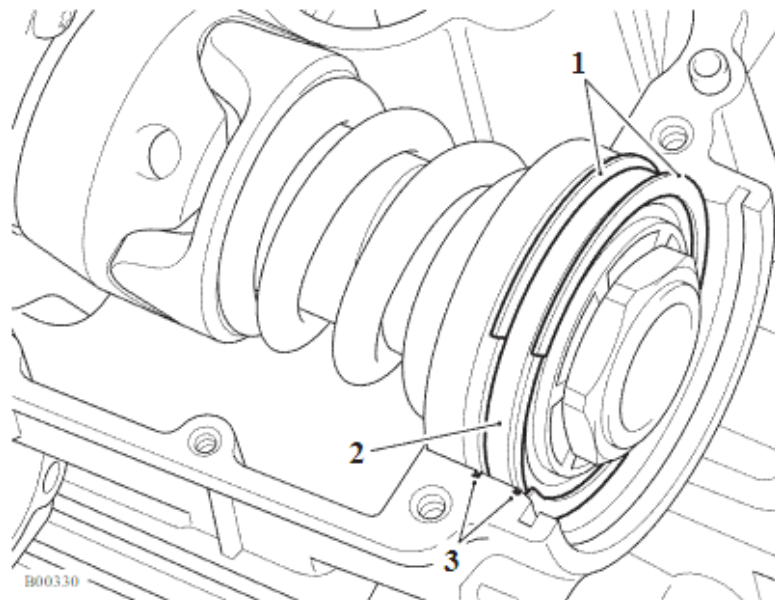
Before fitting the output shaft, make sure the selector drum and the input shaft are in neutral.

2. Place the output shaft and torsional damper assembly in position in the crankcase. Make sure the two selector forks are positioned as noted for removal.
3. Fit the washer between the output shaft and the upper crankcase as noted for removal.



- 1. Washer
- 2. Selector forks
- 3. Output shaft

4. Make sure the snap rings on either side of the damper oil seal are located into the crankcase grooves.



- 1. Snap rings
- 2. Oil seals
- 3. Grooves



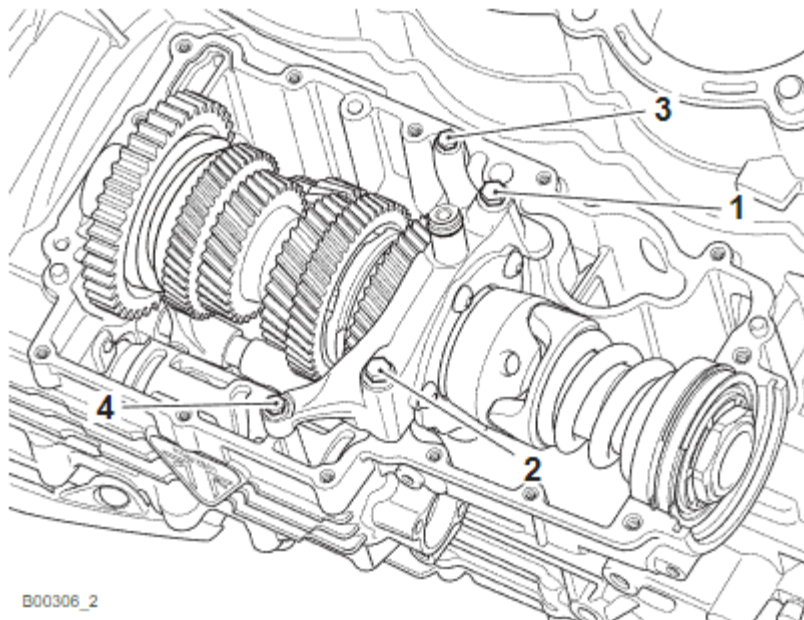
5. Fit the transmission bearing cap and tighten the fixings in the following two stages:

**Stage 1**

6. Tighten the fixings 1 to 4 in the sequence shown to 10 Nm.

**Stage 2**

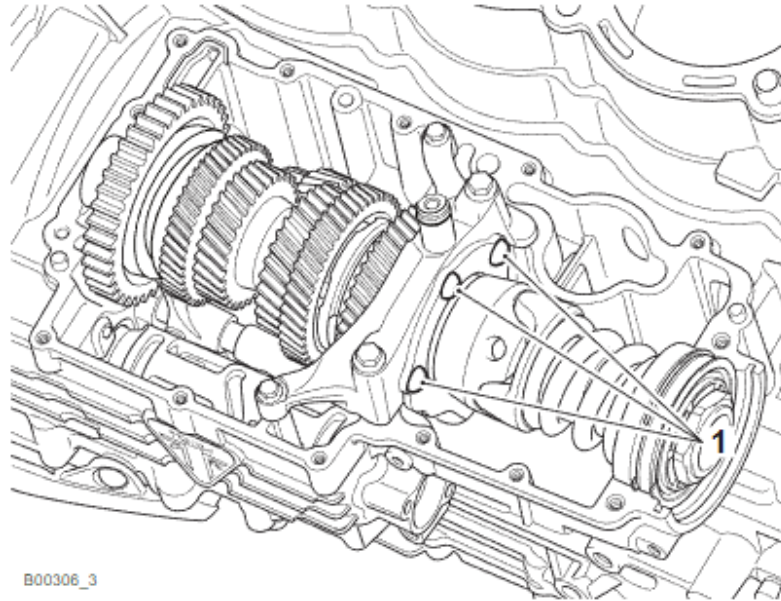
7. Tighten the fixings 1 to 2 in the sequence shown to 32 Nm.
8. Tighten the fixings 3 to 4 in the sequence shown to 12 Nm.



**Transmission Bearing Cap Tightening Sequence**

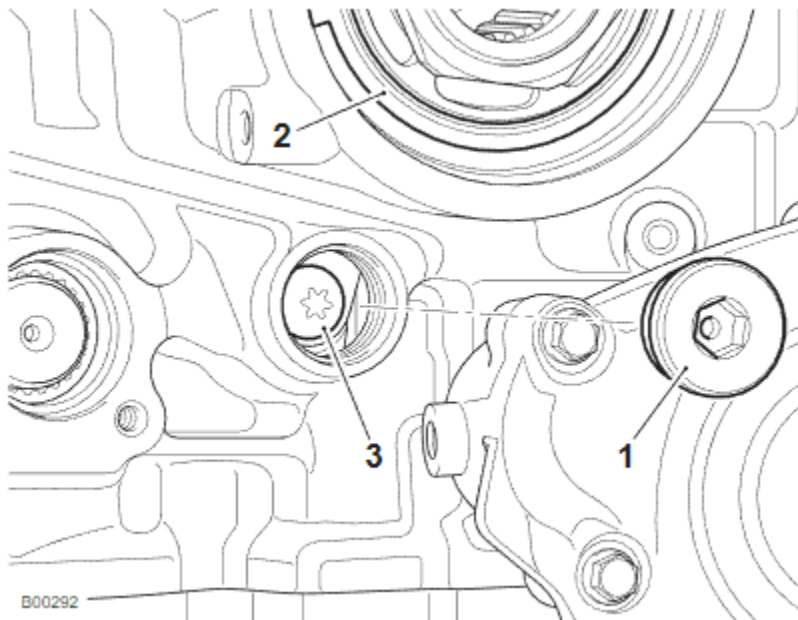
9. Fit the shim(s) between the transmission bearing cap and retaining plate.

10. Secure the output retaining plate to the transmission bearing cap with new fixings and tighten to 16 Nm.



1. Fixings

11. Fit a new fixing to secure the retaining plate to the upper crankcase and tighten to 16 Nm.
12. Fit the M22 sealing plug and its O-ring to the crankcase and tighten to 40 Nm.



1. M22 sealing plug  
2. Torsional damper housing  
3. Fixing

Perform the following operations:

- [Transmission Cover - Installation](#)
- [Throttle Body - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Input shaft – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

The input shaft assembly is not to be disassembled. If an item of the input shaft requires replacing, the complete input shaft must be replaced.

Perform the following operations:

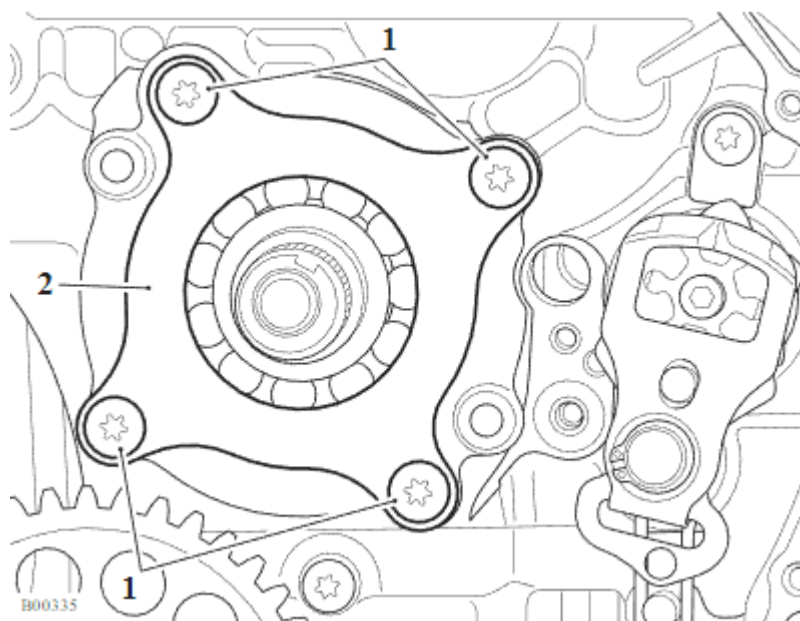
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Throttle Body - Removal](#)
- [Gear Selector Forks - Removal](#)

## NOTICE

The input shaft bearing housing fixings may not be reused but should be retained for use during the removal and installation of the input shaft.

The bearing housing and retaining plate fixing holes will only align in one position. Note the orientation of the bearing housing and retaining plate for installation.

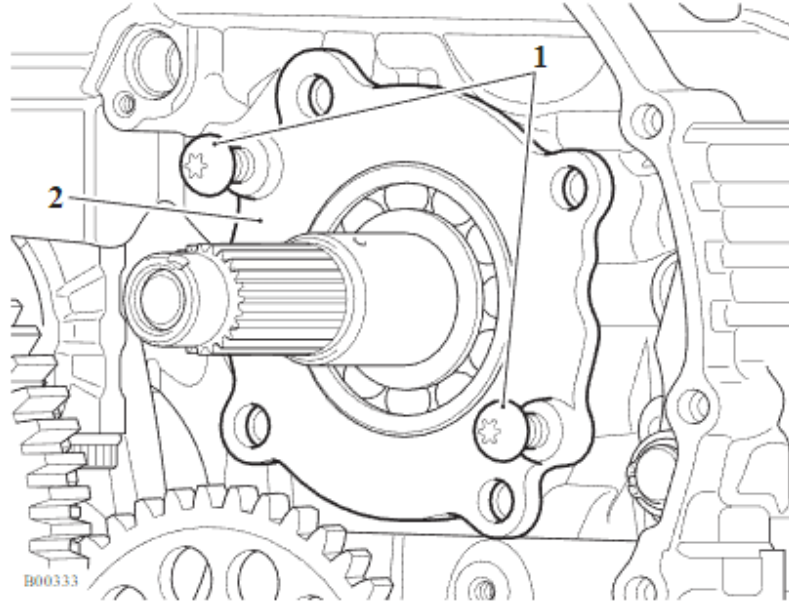
1. Release the four fixings and remove the retaining plate.



1. Fixings
2. Retaining plate

2. Insert two of the retaining plate bolts into the two threaded holes of the bearing housing.

3. While supporting the input shaft, evenly and progressively tighten both bolts to draw the bearing housing and input shaft from the crankcase.

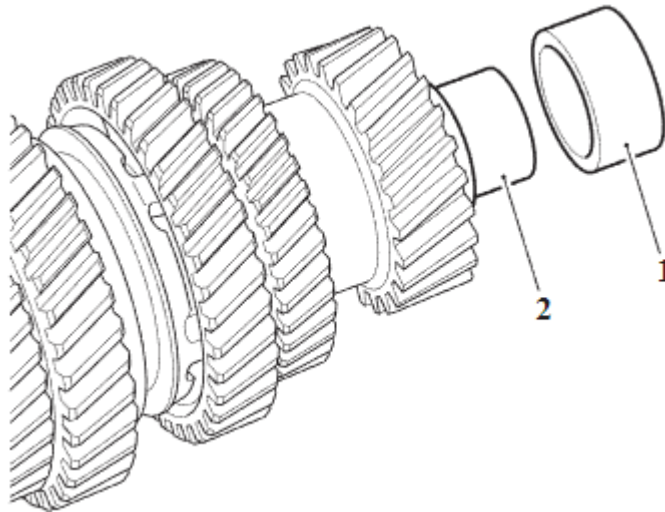


1. Fixings
2. Bearing housing

#### **NOTICE**

There is a needle roller bearing at the back end of the input shaft that may come out with the shaft or remain in the crankcase.

4. When the bearing housing is released from the crankcase, carefully pull the input shaft out of the crankcase. Collect the needle roller bearing.



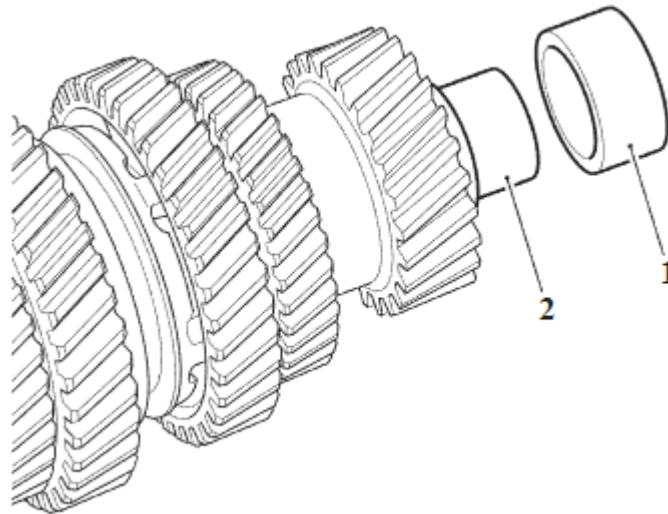
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Needle roller bearing</li><li>2. Input shaft</li></ol> |
|---|

#### Input Shaft – Installation

### **⚠ WARNING**

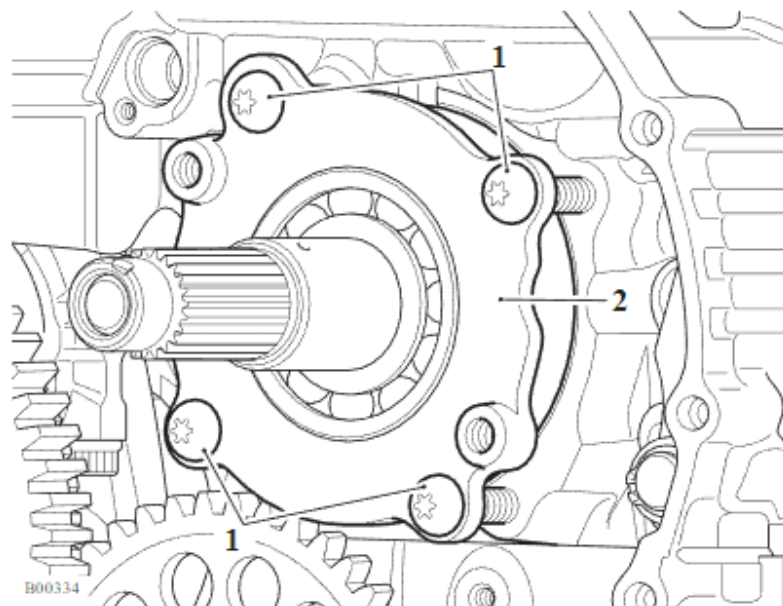
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Make sure the needle roller bearing is fitted to the back of the input shaft.



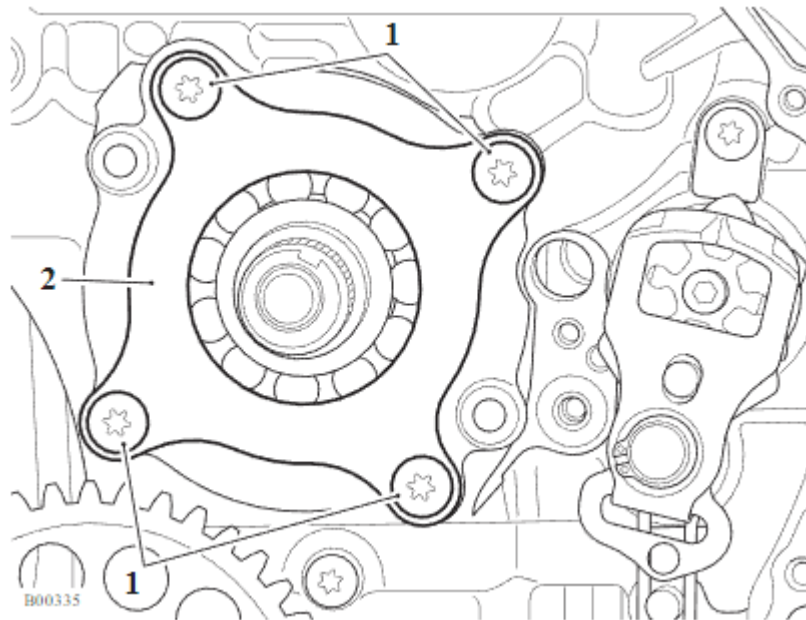
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Needle roller bearing</li><li>2. Input shaft</li></ol> |
|---|

2. Carefully fit the input shaft into the crankcase, make sure the back of the input shaft and needle roller bearing align to its recess in the crankcase.
3. Align the bearing housing as noted for removal, fit the original fixings to the bearing housing.
4. While supporting the input shaft, evenly and progressively tighten the fixings to fit the bearing housing and input shaft into the crankcase.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Bearing housing</li></ol> |
|---|

5. When the bearing housing is fully fitted to the crankcase, remove and discard the fixings.
6. Fit the retaining plate as noted for removal, make sure the OUT marking on the retaining plate is facing outwards, and tighten the new fixings to 12 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Retaining plate</li></ol> |
|---|

Perform the following operations:

- [\*\*Gear Selector Forks - Installation\*\*](#)
- [\*\*Throttle Body - Installation\*\*](#)
- [\*\*Engine - Installation\*\*](#)
- [\*\*Fuel Tank - Installation\*\*](#)
- [\*\*Battery - Installation\*\*](#)
- [\*\*Seat - Installation\*\*](#)



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

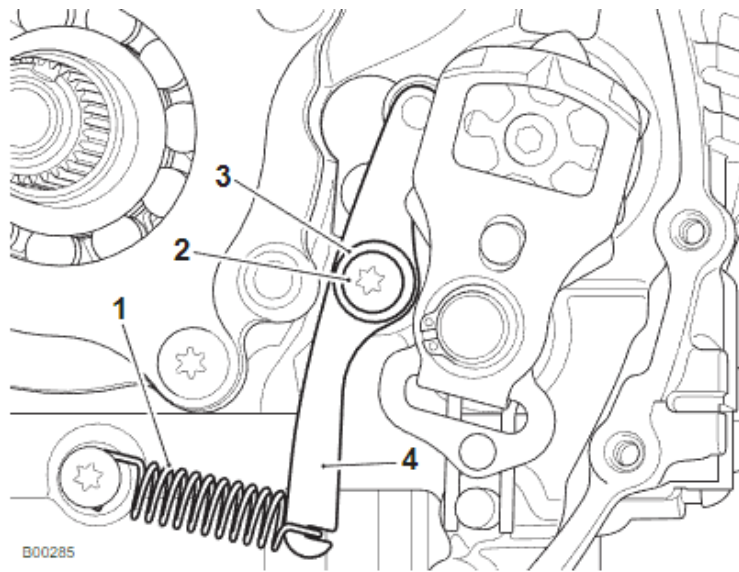
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Clutch - Removal](#)
- [Output Shaft - Removal](#)

**NOTICE**

Note the orientation of the detent arm spring for orientation.

1. Remove the detent arm spring.
2. Release the detent arm fixing, its hardened washer and remove the detent arm.  
Discard the fixing.

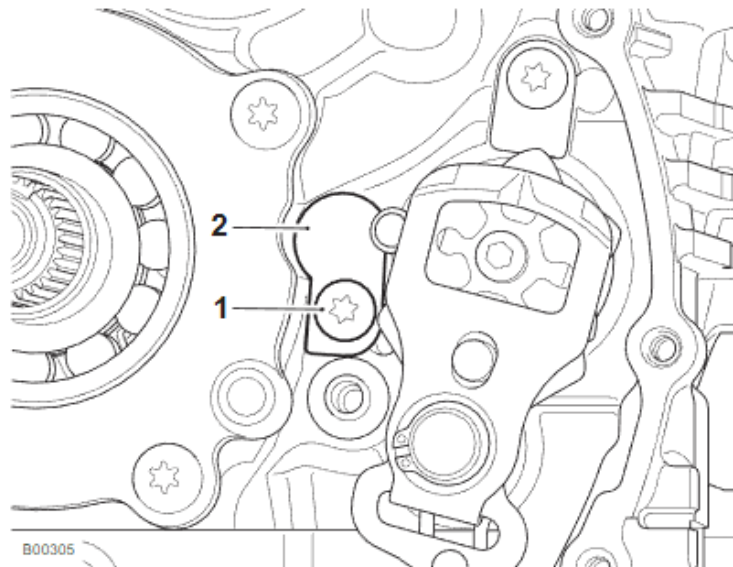


- 1. Spring
- 2. Fixing
- 3. Hardened washer
- 4. Detent arm

**NOTICE**

Note the orientation of the retaining plate for installation.

- 3. Release the fixing and remove the selector fork shaft retaining plate. Discard the fixing.

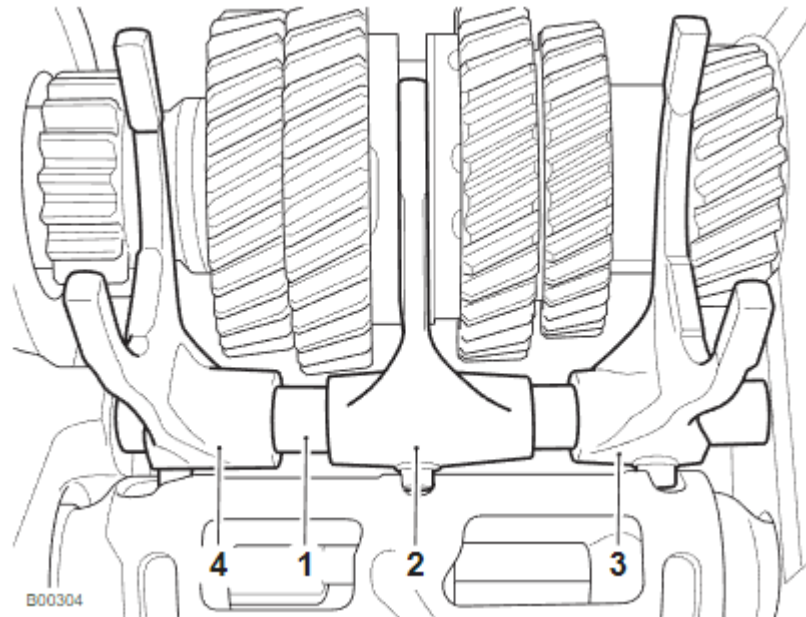


- 1. Fixing
- 2. Retaining plate

**NOTICE**

Prior to removal, mark, or make a note of the relative positions and orientation of each selector fork in the selector drum.

4. Withdraw the selector fork shaft and noting their position and orientation, collect the three selector forks.



1. Selector fork shaft
2. Selector fork (input shaft)
3. Selector fork (output shaft)
4. Selector fork (output shaft)

### Selector Forks and Drum Inspection

Inspect all bearings for damage or wear. Renew as necessary.

Inspect the selector forks and selector grooves for wear beyond the service limits. Renew the components as necessary.

For specifications refer to [Transmission](#).

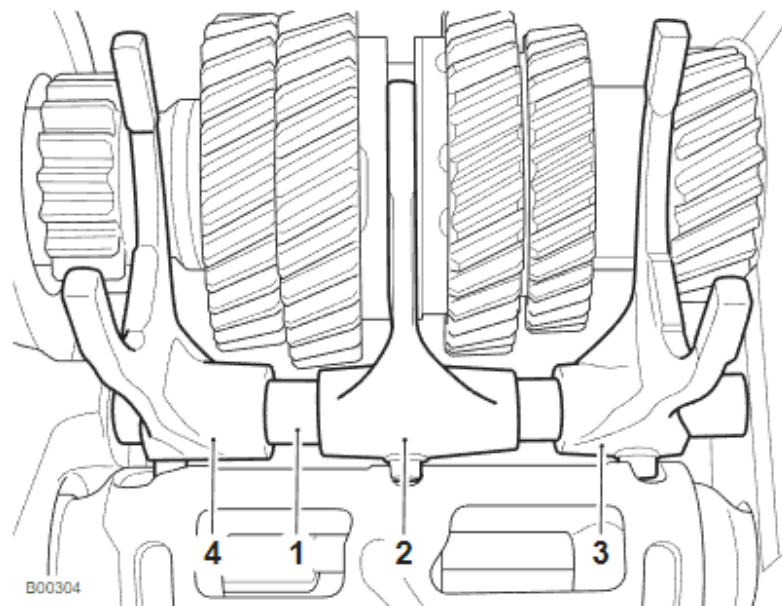
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

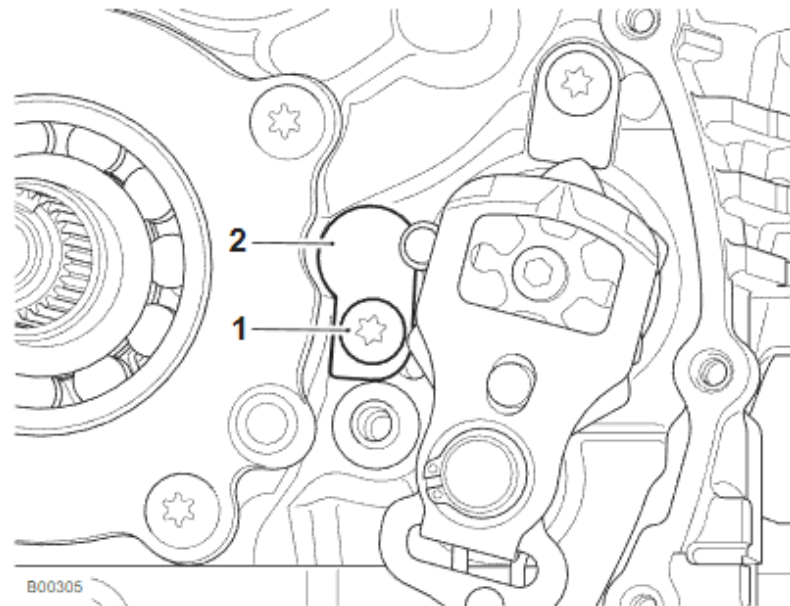
Make sure the input shaft is in neutral, as shown in the illustration below.

1. Fit the selector fork shaft and the three selector forks as noted for removal.



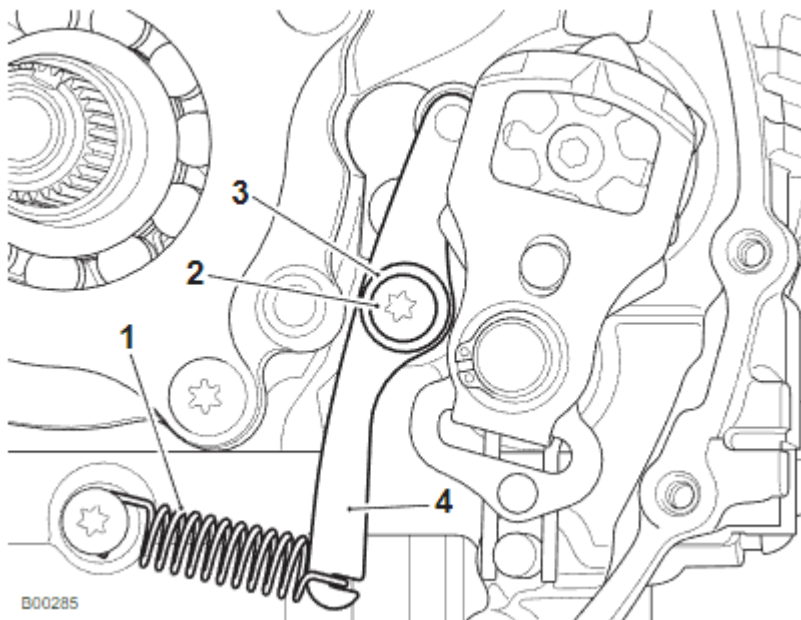
1. Selector fork shaft
2. Selector fork (input shaft)
3. Selector fork (output shaft)
4. Selector fork (output shaft)

2. Fit the selector fork shaft retaining plate, as noted for removal, and tighten the new fixing to 10 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Retaining plate</li></ol> |
|--|

3. Fit the detent arm, the hardened washer and tighten the new fixing to 10 Nm.
4. Fit the detent arm spring as noted for removal.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Spring</li><li>2. Fixing</li><li>3. Hardened washer</li><li>4. Detent arm</li></ol> |
|--|

5. Check to make sure that the selector drum is in the neutral position.

Perform the following operations:

- [Output shaft - Installation](#)
- [Clutch - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Gear Change Shaft and Selector Drum – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

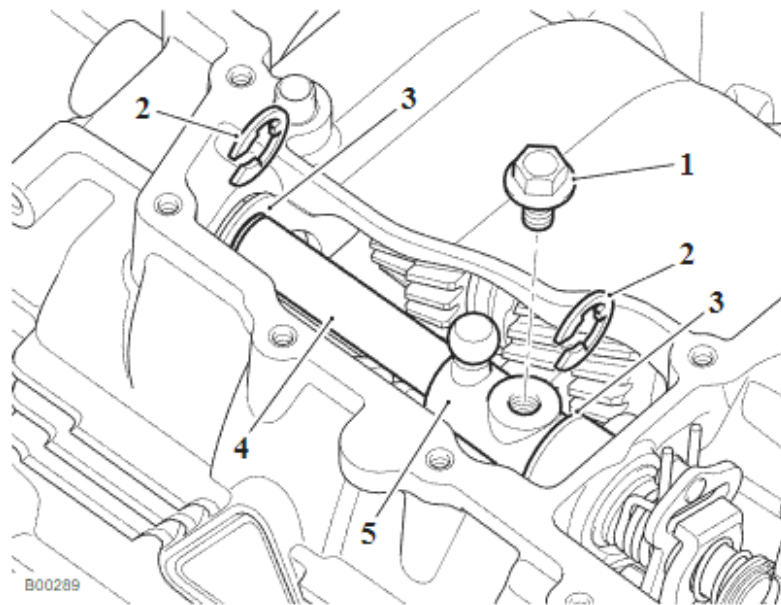
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Gear Selector Forks - Removal](#)
- [Lower Crankcase - Removal](#)

## NOTICE

Note the position and orientation of the gear change knuckle for installation.

Note the position of the E-clips and washers for installation.

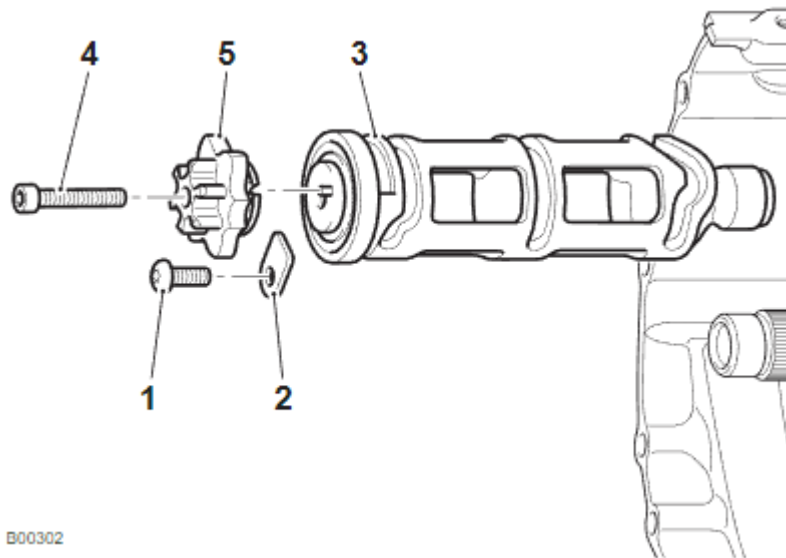
1. Remove the fixing securing the gear change knuckle to the gear change shaft.  
Discard the fixing.
2. Remove the E-clips at either end of the gear change shaft. Discard the E-clips.
3. Withdraw the gear change shaft and noting their position and orientation, collect the two washers and the gear change knuckle.



1. Fixing
2. E-clips
3. Washers
4. Gear change shaft
5. Gear change knuckle

4. Release the fixing and remove the selector drum bearing retaining plate. Discard the fixing.
5. Withdraw the selector drum.

6. If required, release the fixing and remove the detent wheel from the selector drum. Discard the fixing.

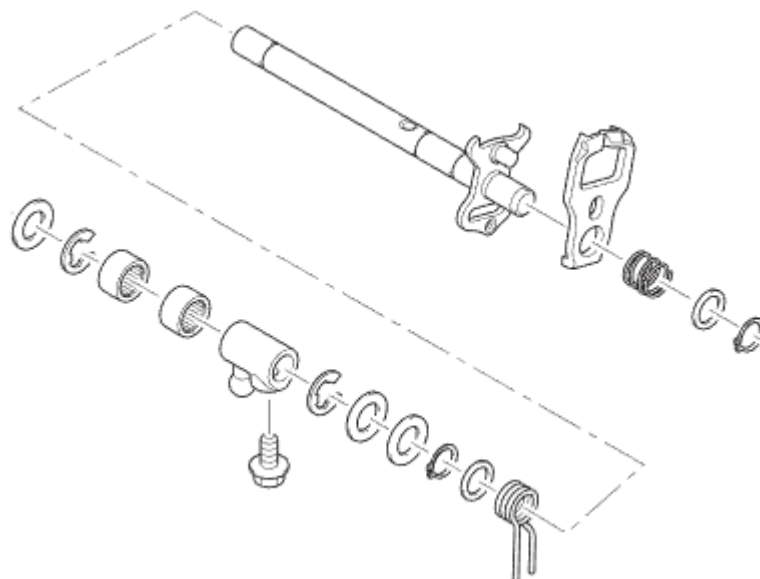


B00302

1. Fixing
2. Retaining plate
3. Selector drum
4. Fixing
5. Detent wheel

### Gear Change Shaft Inspection

Inspect the gear change shaft assembly and spring for damage or wear, the springs for overextension (i.e. abnormal gaps between coils). Renew the components as necessary.



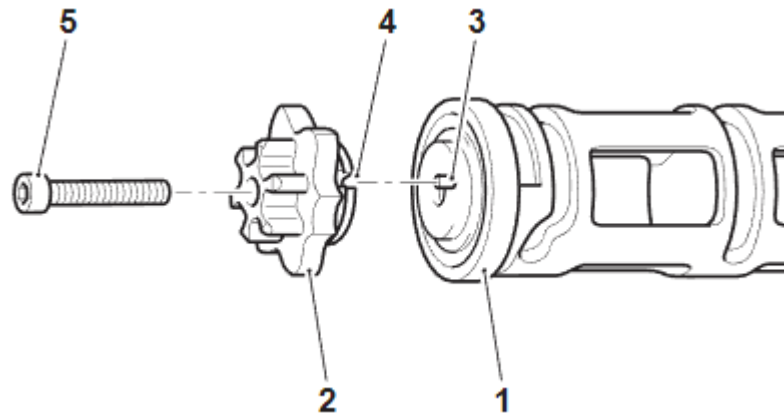


## Gear Change Shaft and Selector Drum – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
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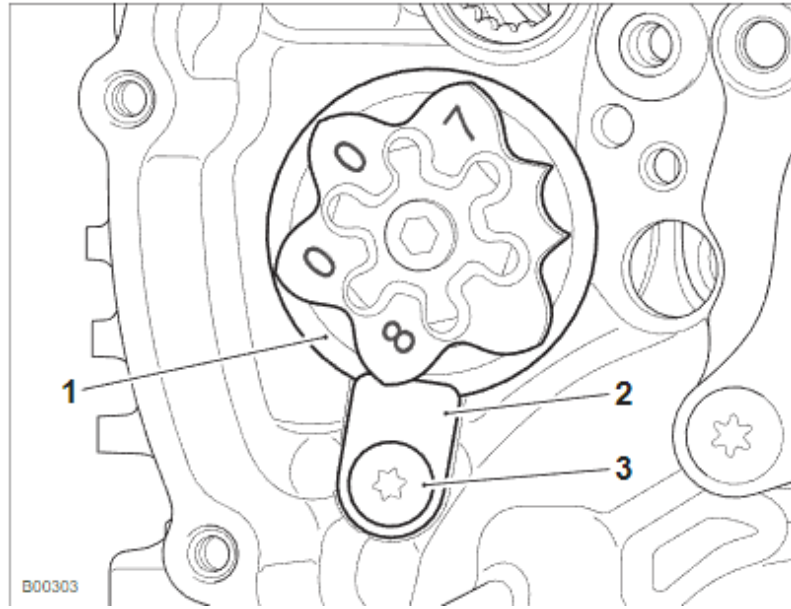
1. If removed, refit the detent wheel to the selector drum, ensuring the pin on the drum locates in the slot in the detent wheel. Prevent the drum from turning and tighten the new fixing to 12 Nm.



1. Selector drum
2. Detent wheel
3. Pin
4. Slot
5. Fixing

2. Fit the selector drum, ensuring it is pushed fully into the crankcase.

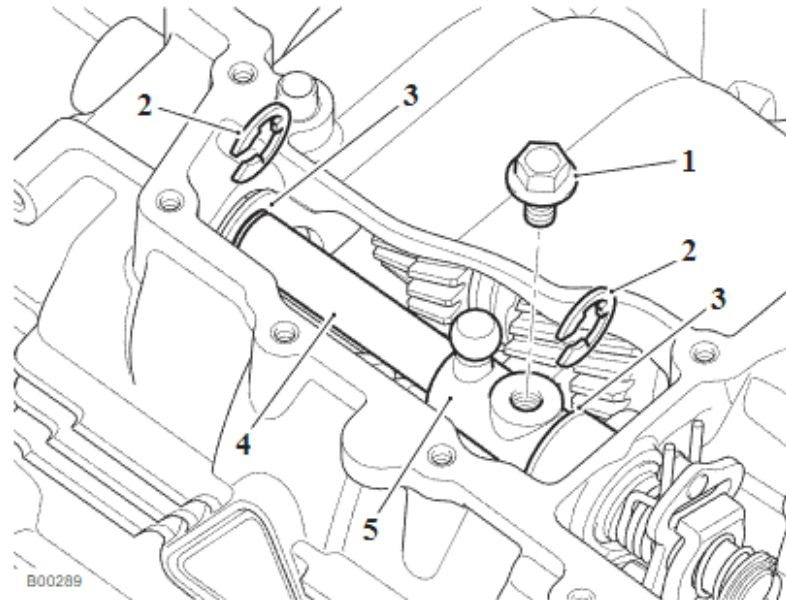
3. Fit the bearing retaining plate and tighten the new fixing to 10 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Selector drum</li><li>2. Retaining plate</li><li>3. Fixing</li></ol> |
|---|

4. Fit the gear change shaft, two washers and the gear change knuckle to the upper crankcase as noted for removal.
5. With the washers next to the crankcase, fit new E-clips to the gear change shaft, as noted for removal.

6. Position the gear change knuckle as noted for removal, fit a new fixing and tighten to 28 Nm.



1. Fixing
2. E-clips
3. Washers
4. Gear change shaft
5. Gear change knuckle

Perform the following operations:

- [Lower Crankcase - Installation](#)
- [Gear Selector Forks - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Gear Change Actuator Shaft – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

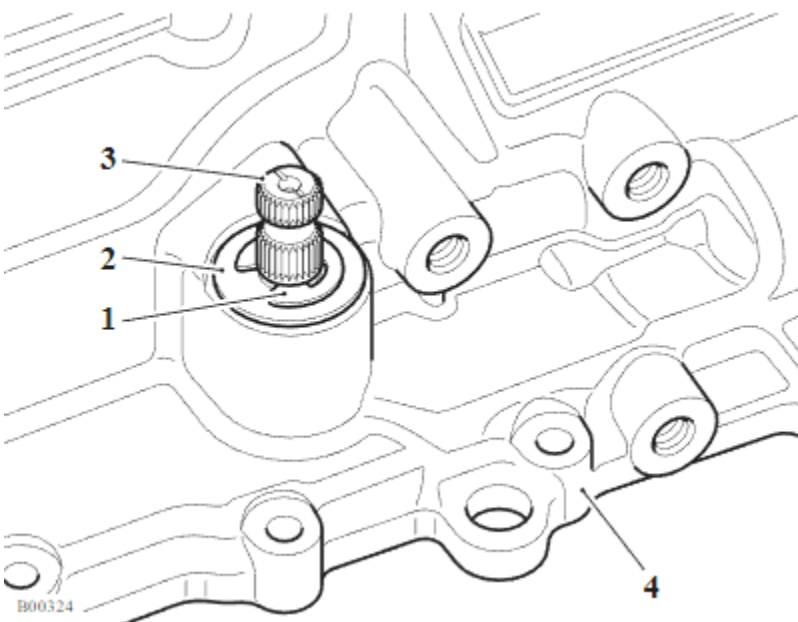
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Lower Crankcase - Removal](#)

### **NOTICE**

Note the orientation of the gear change actuator shaft for installation.

1. Remove the E-clip and washer from the gear change actuator shaft. Discard the E-clip.



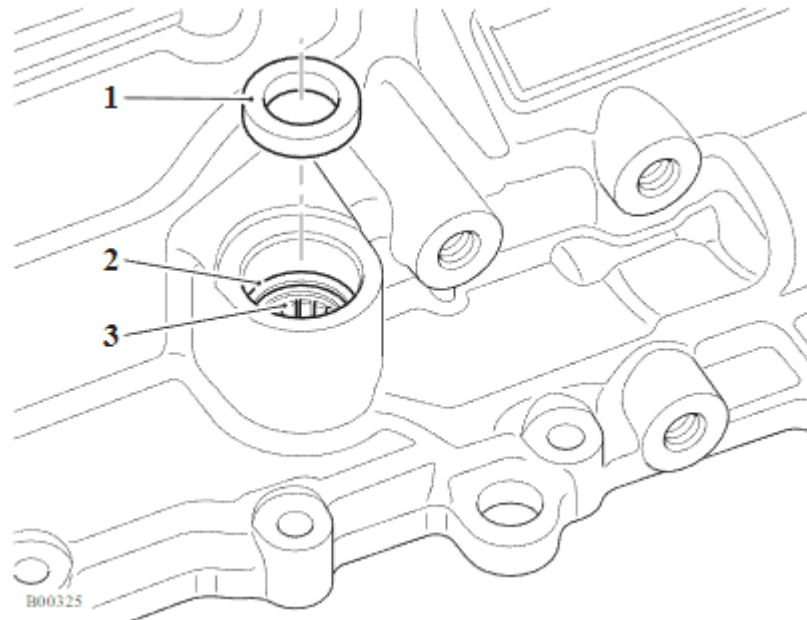
1. E-clip
2. Washer
3. Actuator shaft
4. Lower crankcase

2. Pull the gear change actuator shaft from the lower crankcase.

### NOTICE

Note the position of the oil seal for installation.

3. Using a suitable tool, carefully remove the oil seal in the lower crankcase without damaging the lower crankcase.
4. Check the condition of the needle roller bearings and the actuator shaft for damage. If necessary renew the needle roller bearings and actuator shaft.



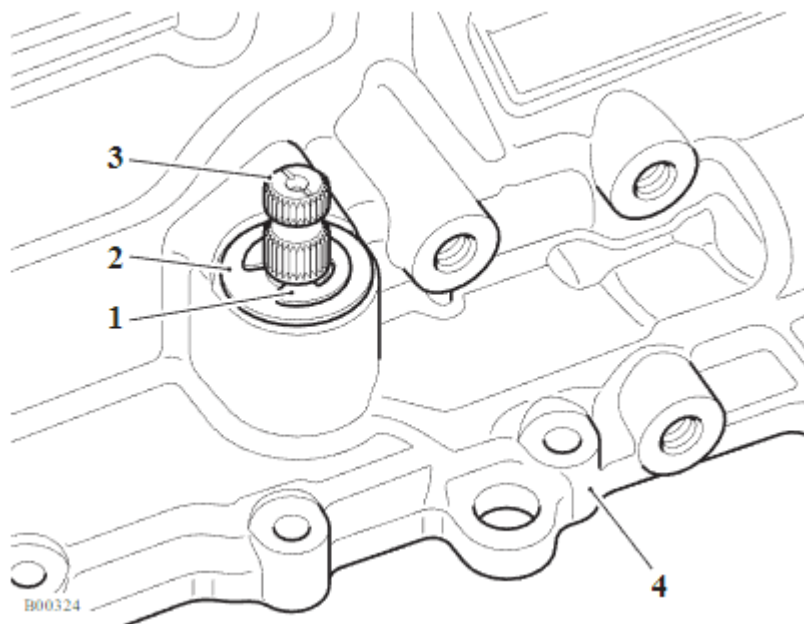
1. Oil seal
2. Circlip
3. Needle roller bearing (1 of 2)

### Gear Change Actuator Shaft – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported. A correctly supported motorcycle will help prevent it from falling. An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Press a new actuator shaft oil seal to the lower crankcase as noted for removal, make sure the sealing lip is facing inwards.
2. Lubricate the seal lip with molybdenum disulphide grease and fit the actuator shaft into the lower crankcase as noted for removal.
3. Fit the washer and a new E-clip to the gear change actuator shaft.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. E-clip</li><li>2. Washer</li><li>3. Actuator shaft</li><li>4. Lower crankcase</li></ol> |
|--|

4. Check the operation of the actuator shaft and its orientation before installing the lower crankcase.

Perform the following operations:

- [Lower Crankcase - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Gear Change Linkage – Removal

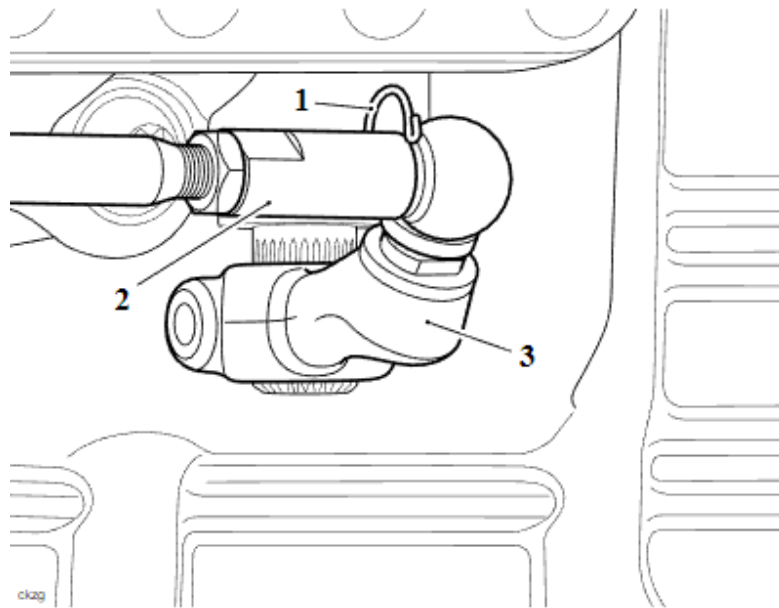
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

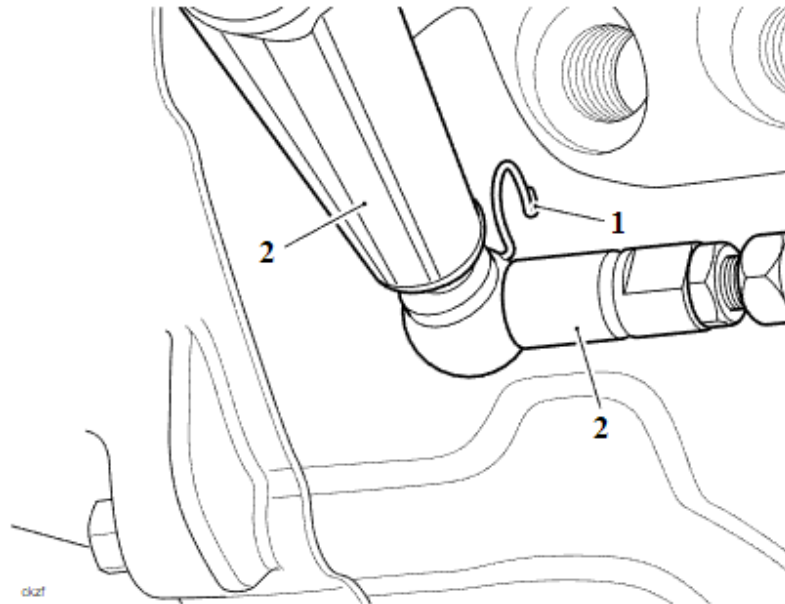
Note the orientation of the gear change linkage for installation.

1. Remove the wire clip and detach the gear change link from the gear change knuckle.



1. Wire clip
2. Gear change link
3. Gear change knuckle

2. Remove the wire clip retaining the gear change link to the gear change pedal ball joint and remove the gear change link.



1. Wire clip
2. Gear change link

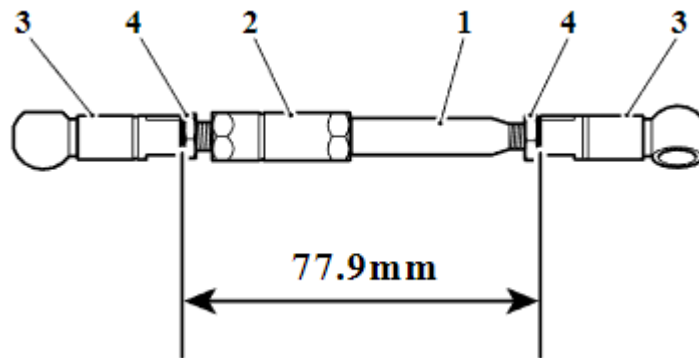
### Gear Change Linkage – Installation

#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



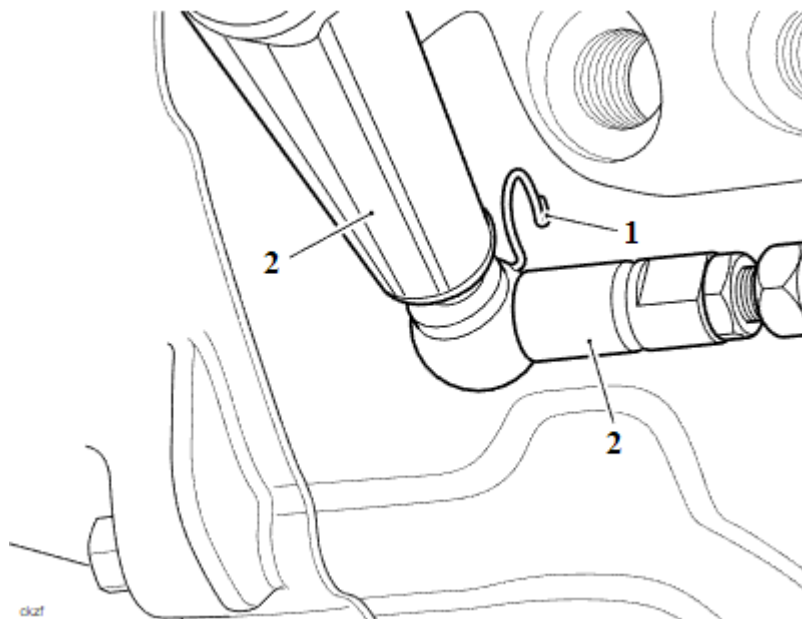
1. If the gear change linkage has been disassembled, make sure the length between the two ball joints (not the lock nuts) has been set to 77.9 mm before tightening the lock nuts to 6 Nm.



Gear change rod setting dimension

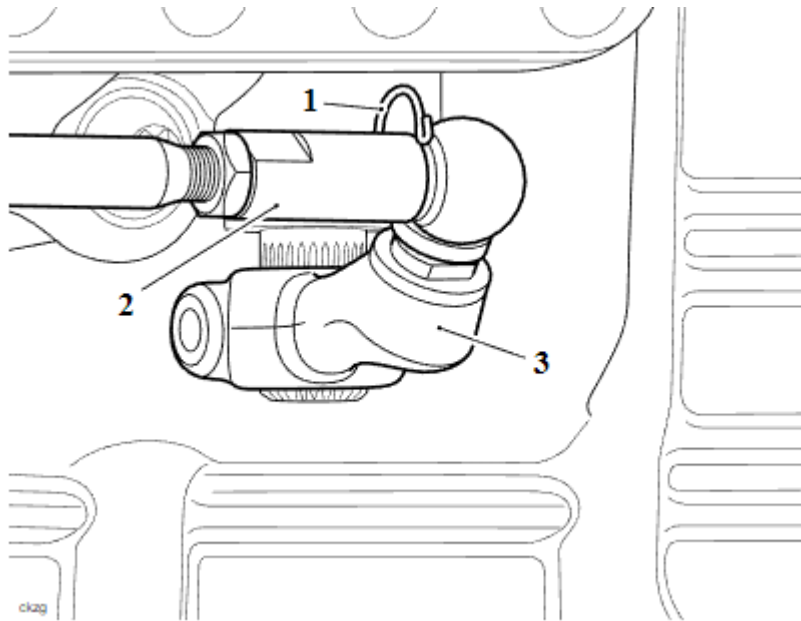
1. Gear change link
2. Gear change extension
3. Ball joints
4. Lock nuts

2. Fit the gear change link to the gear change pedal ball joint as noted for removal and secure with the wire clip.



1. Wire clip
2. Gear change link

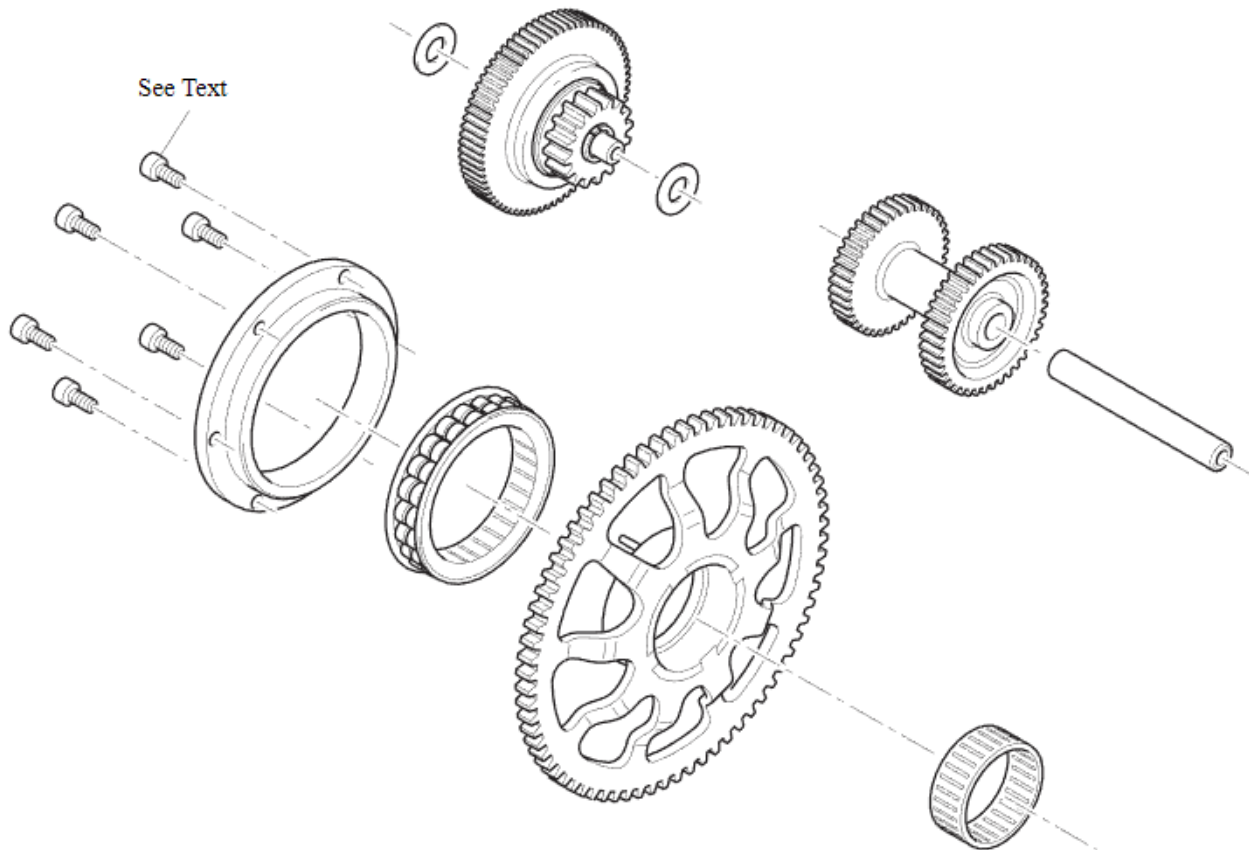
3. Fit the gear change link to the gear change knuckle ball joint and secure with the wire clip.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Wire clip</li><li>2. Gear change link</li><li>3. Gear change knuckle</li></ol> |
|---|

## Starter Drive and Sprag Clutch

### Exploded View - Starter and Sprag



### Starter Drive/Sprag Clutch – Removal

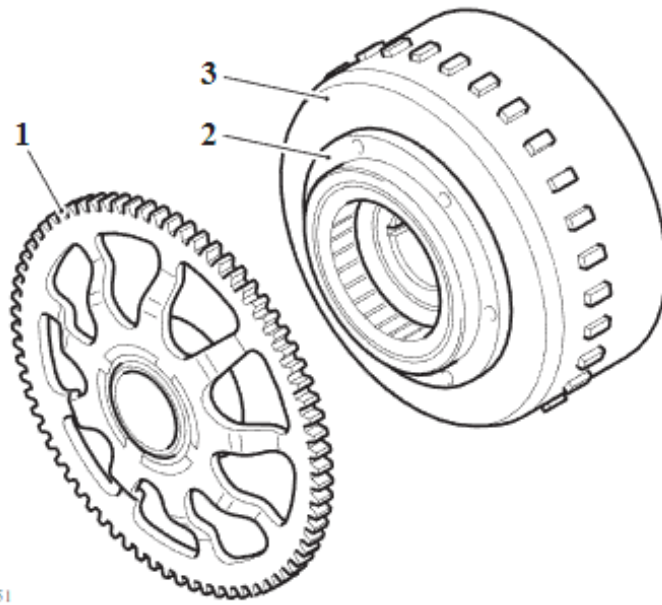
#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Alternator Rotor - Removal](#)

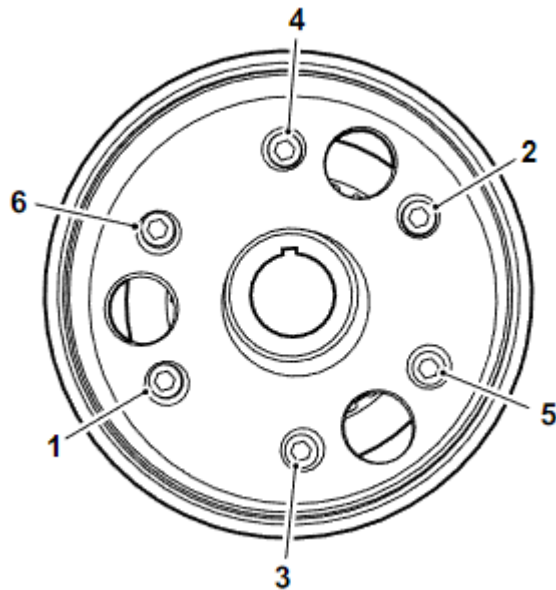
1. Withdraw the starter drive gear from the sprag clutch.



B00351

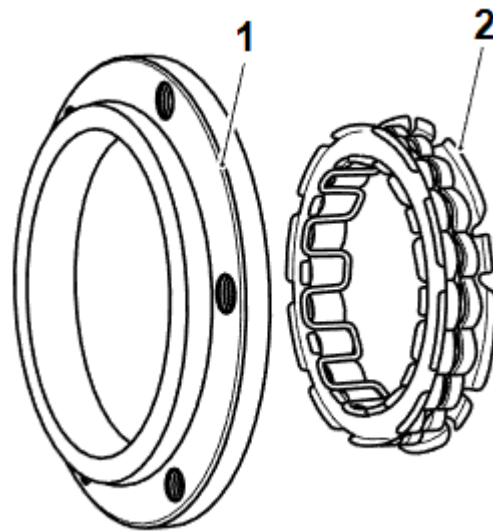
- 1. Starter drive gear
- 2. Sprag housing
- 3. Alternator rotor

2. Remove and discard the fixings in the sequence shown below.



Alternator Rotor Tightening Sequence

3. Withdraw the sprag clutch housing and remove the sprag clutch from the housing.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Sprag clutch housing</li><li>2. Sprag clutch assembly</li></ol> |
|--|

#### Starter Drive/Sprag Clutch – Inspection

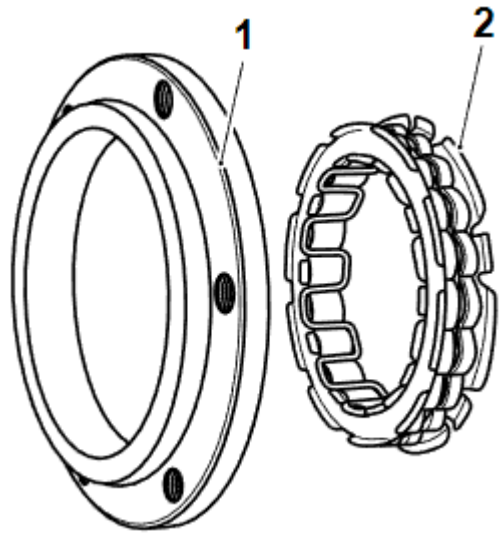
1. Check the sprag clutch bearings for overheating, wear and/or non-smooth operation. Replace the sprag clutch if overheating, wear and/or non-smooth operation is found.
2. Examine all gears for chipped teeth and for any other damage.
3. With the sprag clutch mounted in the housing, check the sprag clutch for smooth, free movement in one direction only (as indicated by the arrow marked on the sprag clutch body).

#### Starter Drive/Sprag Clutch – Installation

### **⚠ WARNING**

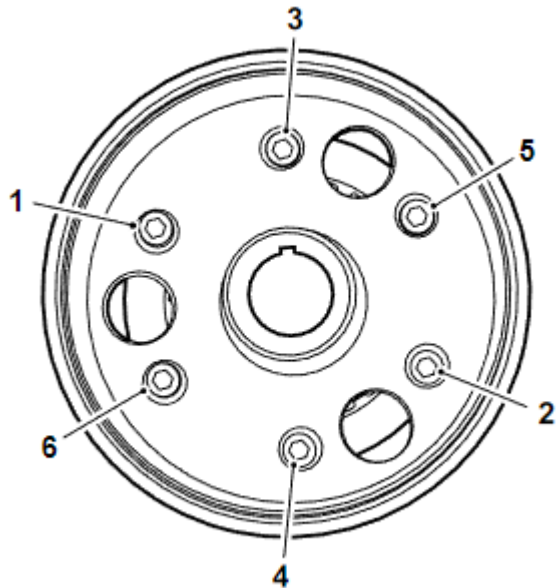
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the sprag clutch to the sprag clutch housing as shown below. Push firmly until the lip seats in the recess provided in the housing.



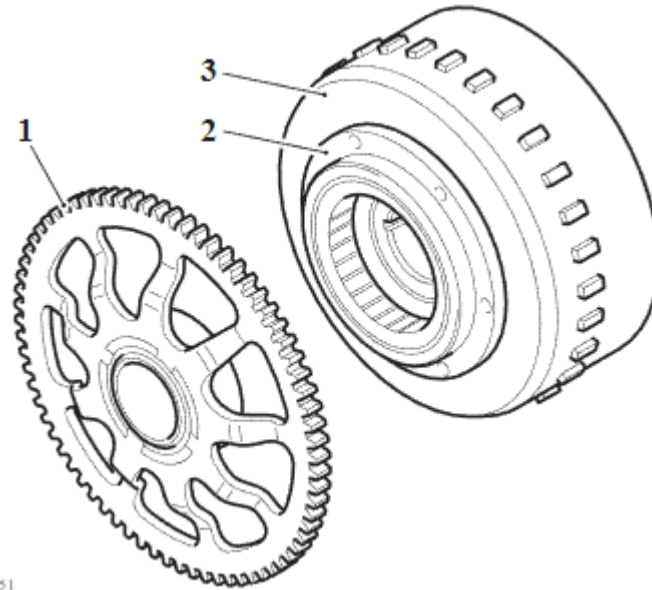
|  |
|--|
| <ol style="list-style-type: none"><li>1. Sprag clutch housing</li><li>2. Sprag clutch assembly</li></ol> |
|--|

2. Fit the sprag clutch housing to the alternator rotor.
3. Make sure that the housing is squarely seated and is not on the rotor. Install new fixings.
4. Tighten the sprag clutch housing in the sequence shown below to 16 Nm.



|                     |
|---------------------|
| Tightening Sequence |
|---------------------|

5. Once all six bolts have been tightened, go around again in sequence and recheck each bolt is correctly torqued, if any bolt moves, go around again. Repeatedly check the bolts in sequence until all are correctly torqued and do not move when checked, this will ensure the sprag clutch housing is correctly seated on the rotor.
6. Fit the starter drive gear to the sprag clutch.
7. Withdraw the starter drive gear from the sprag clutch.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Starter drive gear</li><li>2. Sprag housing</li><li>3. Alternator rotor</li></ol> |
|--|

Perform the following operations:

- [Alternator Rotor - Installation](#)

## Starter Motor Drive Torque Limiter – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

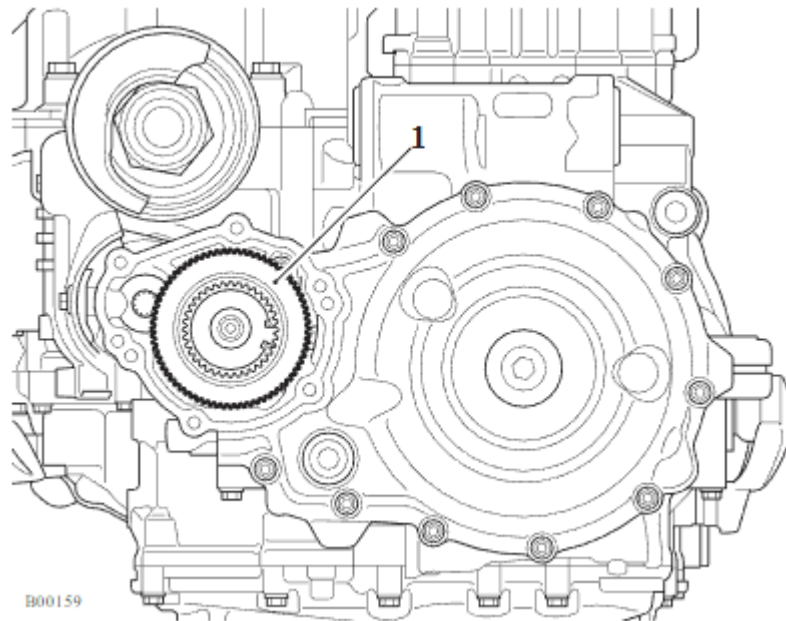
Perform the following operations:

- [Starter Motor - Removal](#)
- [Starter Drive Cover - Removal](#)

### **NOTICE**

The bushes for the torque limiter assembly may remain in the starter motor drive cover and in the alternator cover.

1. Remove the starter motor drive torque limiter assembly and collect its two washers and bushes.



1. Torque limiter assembly

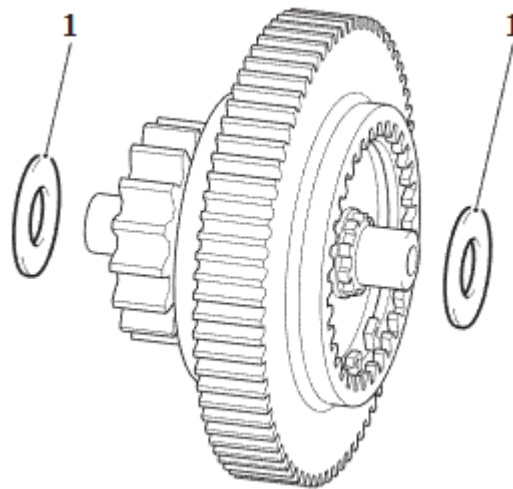


## Starter Motor Drive Torque Limiter - Installation

### **⚠ WARNING**

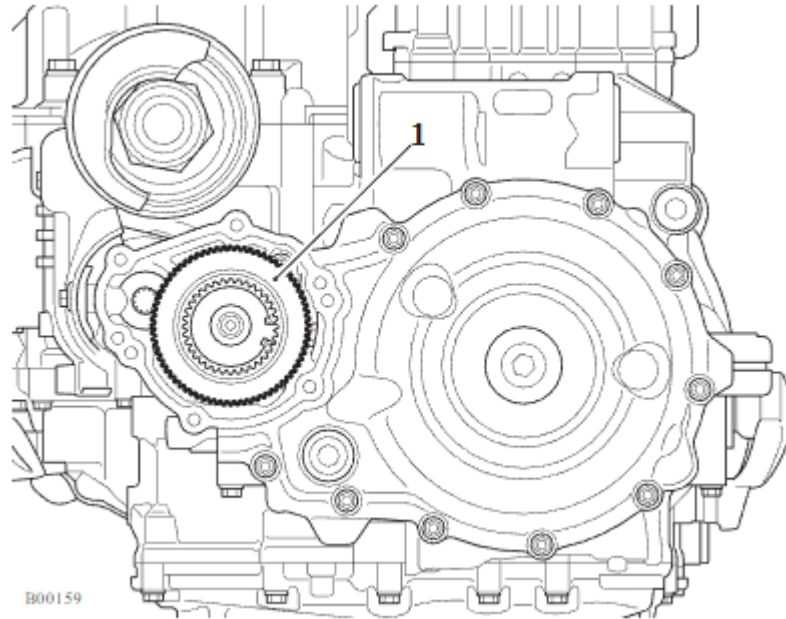
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Make sure the two washers and bushes are fitted one each on both ends of the starter motor drive torque limiter assembly.



1. Washers

2. Fit the torque limiter assembly to the starter motor drive gear.



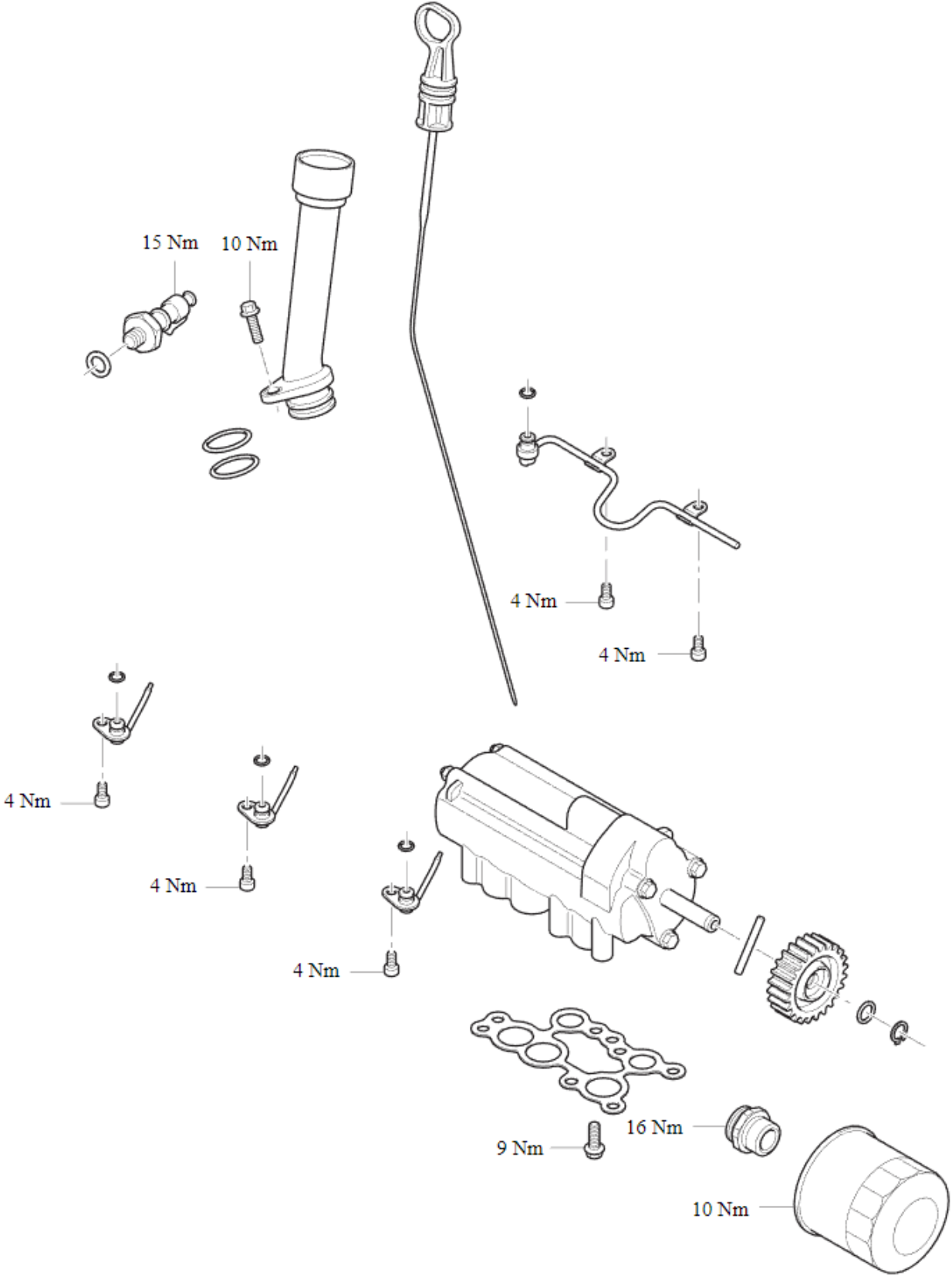
1. Torque limiter assembly

Perform the following operations:

- [Starter Motor - Installation](#)
- [Starter Drive Cover - Installation](#)

# Lubrication

## Exploded View - Oil filter and Pump

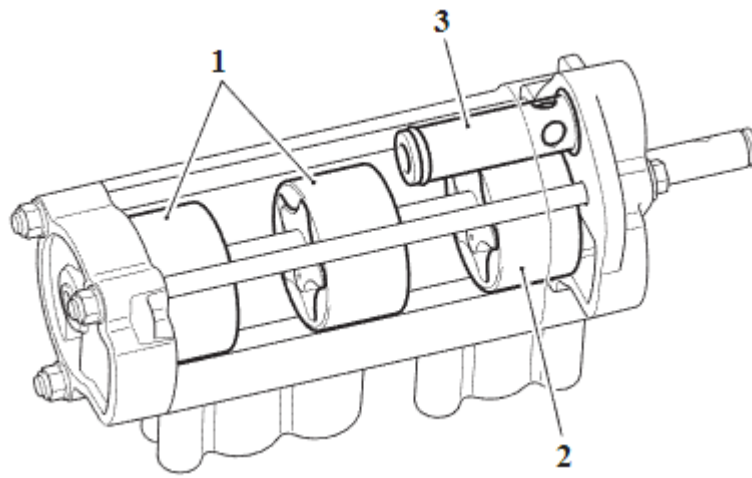


## Oil Circuit

### General Description

The oil pump fitted to this model has three pumping rotors. Two of the rotors are for the scavenge system and the third is for the pressure system. The oil pressure relief valve is located inside the oil pump. If the oil pressure valve requires replacement, the oil pump and oil pressure valve assembly is to be replaced.

The oil pressure relief valve is set to open at 5.2 bar (75 lb/in<sup>2</sup>) and when open, returns the oil to the inlet of the oil pump.

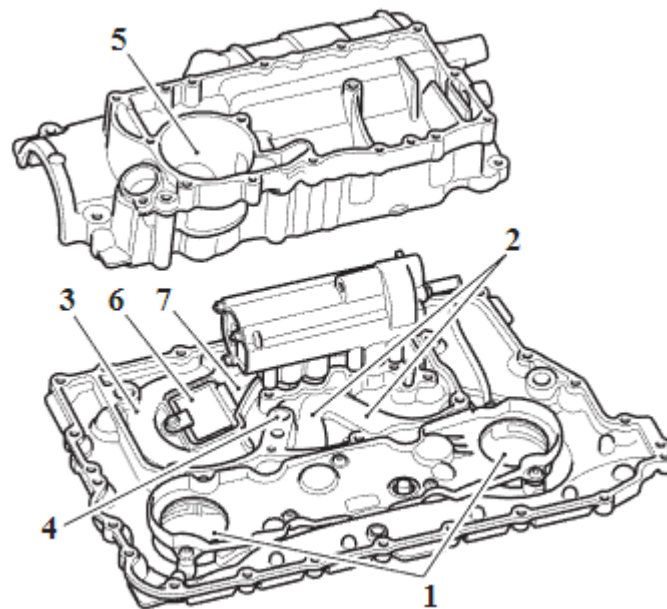


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| <ol style="list-style-type: none"><li>1. Scavenge rotors</li><li>2. Pressure rotor</li><li>3. Pressure relief valve</li></ol> |
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## Scavenge System

The scavenge rotors collect oil from the front and rear of the sump and return it to the oil tank through oil ways within the sump then through a drilling in the lower and upper crankcases up to the oil tank.

The oil pump pressure rotor gets its oil supply from the oil tank.



1. Scavenge pick up filters
2. Scavenge oil ways to oil pump
3. Oil way from pump to oil tank
4. Drilling to oil tank
5. Outlet to the oil tank
6. Filter for oil supply to pressure rotor
7. Oil way to pressure rotor

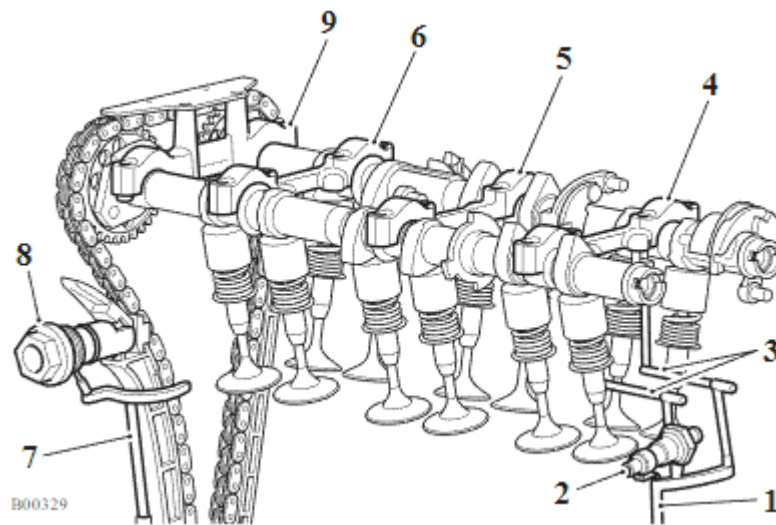
Three drain plugs are fitted to the sump to drain the oil from the engine.

## Pressure System - Cylinder Head

Filtered oil is fed to the rear of the cylinder head from the crankshaft number four main bearing to supply oil to the low oil pressure warning switch and the camshafts. After the oil pressure switch, the oil is divided into two drillings in the cylinder head to supply oil to both camshafts at the number four camshaft cap. Through drillings within the camshafts oil is fed to numbers three and two camshaft caps. Oil lubricates the camshaft bearings and spills out onto the valve buckets and valve springs.

Filtered oil is fed to the front of the cylinder head from the crankshaft number one main bearing to supply oil to the camshaft drive chain tensioner and the number one camshaft cap. Oil lubricates the camshaft bearings and spills out onto the camshaft sprockets.

Oil returns to the sump through the camshaft drive chain area, lubricating the camshaft drive chain. Oil also returns through a drilling in the rear of the cylinder head.

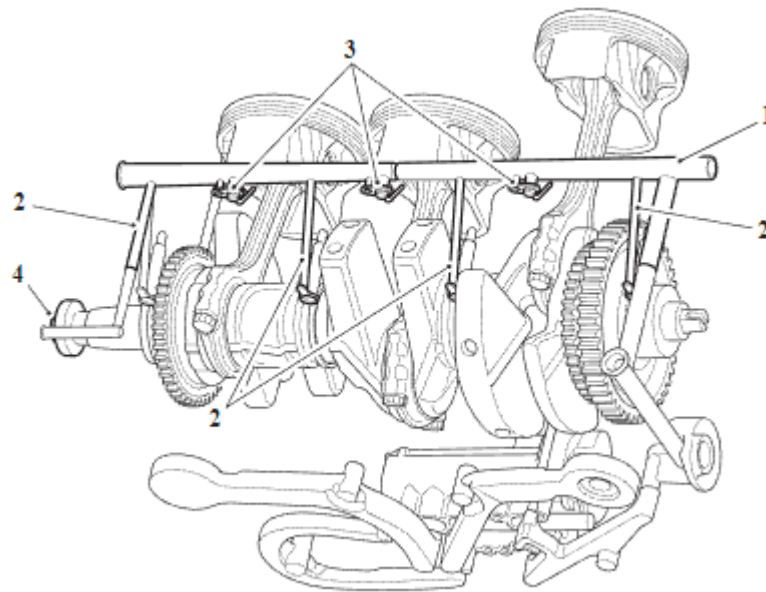


1. From number four main bearing
2. Low oil pressure warning switch
3. Drillings
4. Number four cap
5. Number three cap
6. From number one main bearing
7. Camshaft drive chain tensioner
8. Number one cap

## Pressure System - Crankshaft and Pistons

Filtered oil is fed to the main gallery located in the upper crankcase. Here it is delivered to the crankshaft main bearings and, through drillings in the crankshaft, to the big end bearings. Spray jets located in the upper crankcase, under the barrels, lubricate the pistons and connecting rod small ends. These jets are fed oil from the main gallery oil feed.

Oil is fed to the alternator from the crankshaft through the drilling in the bolt securing the alternator rotor to the crankshaft.



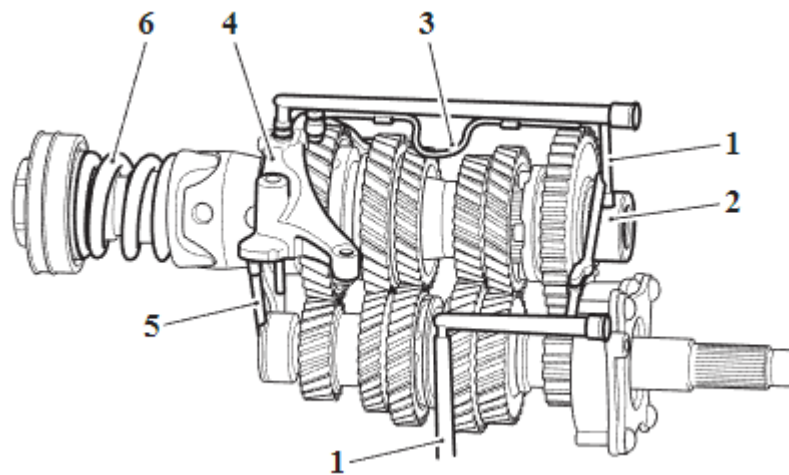
1. Main oil galler
2. Feed to crankshaft main bearings
3. Oil jets
4. Alternator rotor bolt

## Pressure System - Transmission

Oil is fed to the transmission through drillings to the transmission cover. At the transmission cover, oil is fed to the output shaft and its front bearing, spray bar and the transmission bearing cap. From the bearing cap, oil is fed to the input shaft rear bearing, input shaft and the selector fork shaft. The torsional damper is fed oil from the output shaft.

The input shaft also supplies oil to the clutch assembly.

Oil is circulated along the transmission gear shafts and the torsional damper to exit holes that feed directly to the bearings, gears and selector forks. The spray bar also lubricates the gears and the selector forks.



1. Oil supply
2. Output shaft front bearing
3. Spray bar
4. Bearing cap
5. Oil supply to input shaft
6. Torsional damper



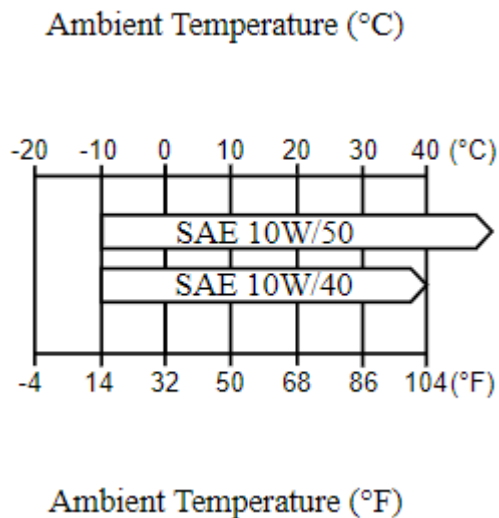
## Engine Oil – Specification

Triumph's high performance fuel injected engines are designed to use 10W/40 or 10W/50 fully or semi synthetic motorcycle engine oil that meets specification API SH (or higher) and JASO MA.

Triumph Performance fully synthetic engine oil is recommended.

The oil viscosity may need to be changed to accommodate the ambient temperatures in your riding area.

Refer to the chart below for the correct oil viscosity (10W/40 or 10W/50) to be used in your riding area.



### Oil Viscosity Temperature Range

#### **⚠ CAUTION**

Triumph's high performance fuel injected engines are designed to use 10W/40 or 10W/50 fully or semi synthetic motorcycle engine oil that meets specification API SH (or higher) and JASO MA.

Do not add any chemical additives to the engine oil. The engine oil also lubricates the clutch and any additives could cause the clutch to slip.

Do not use mineral, vegetable, non-detergent oil, castor based oils or any oil not conforming to the required specification. The use of these oils may cause instant, severe engine damage.

Ensure no foreign matter enters the crankcase during an oil change or top up.

## Disposal of Used Engine Oil and Oil Filters

To protect the environment, do not pour oil on the ground, down sewers or drains, or into watercourses.

Do not place used oil filters in with general waste. If in doubt contact your local authority.

## Oil Pump – Removal

### **WARNING**

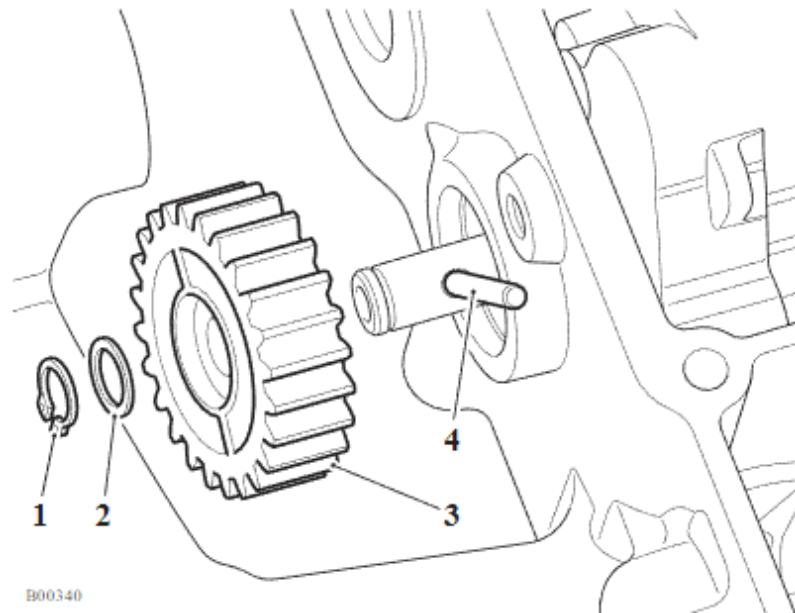
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Engine - Removal](#)
- [Lower Crankcase - Removal](#)

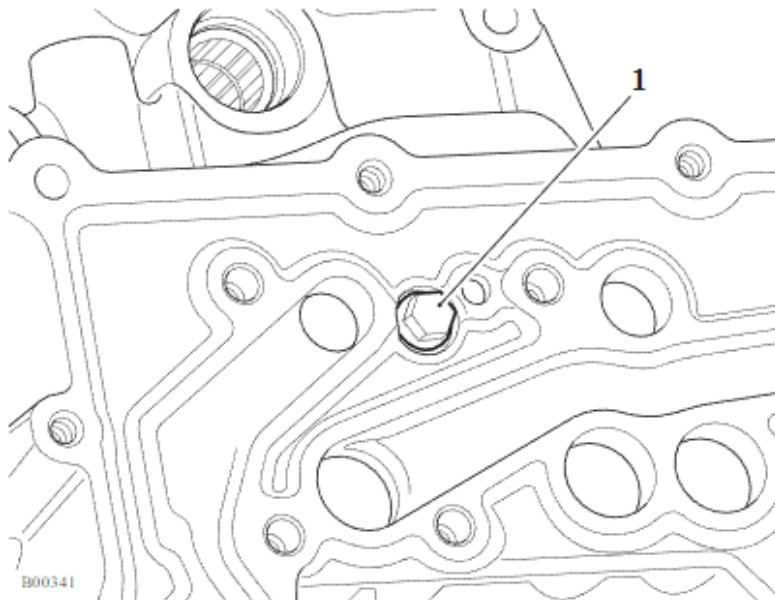
1. Remove and discard the circlip.
2. Remove the hardened washer and the oil pump drive gear.

3. Remove the oil pump drive dowel.



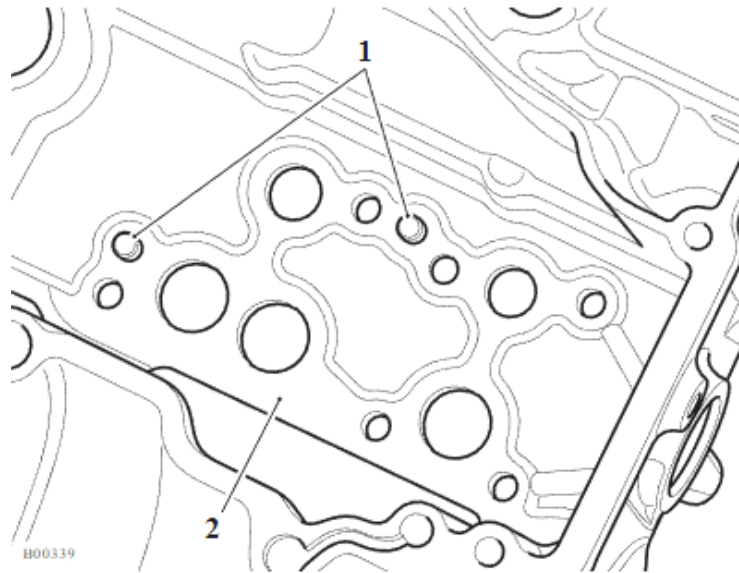
- 1. Circlip
- 2. Hardened washer
- 3. Oil pump drive gear
- 4. Dowel

4. Invert the lower crankcase. While supporting the oil pump, remove its fixing and then manouevre the oil pump out of the crankcase. Discard the fixing and the oil pump gasket.



1. Fixing

5. Note the position of the location dowels for the oil pump.



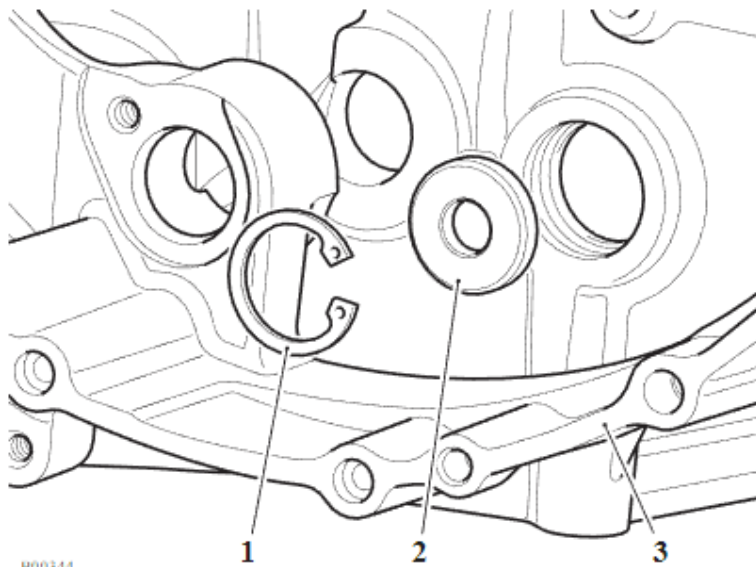
- 1. Dowels
- 2. Lower crankcase

6. Remove the circlip for the oil pump seal in the lower case. Discard the circlip.

**NOTICE**

Note the position of the oil seal, just behind groove for circlip, for installation.

7. Using a suitable tool, carefully remove the oil seal without damaging the lower crankcase. Discard the seal.



- 1. Circlip
- 2. Oil seal
- 3. Lower crankcase

8. Remove any residual oil and gasket from the mating face of the lower crankcase and the oil pump using a lint free cloth.

### Oil Pump – Disassembly

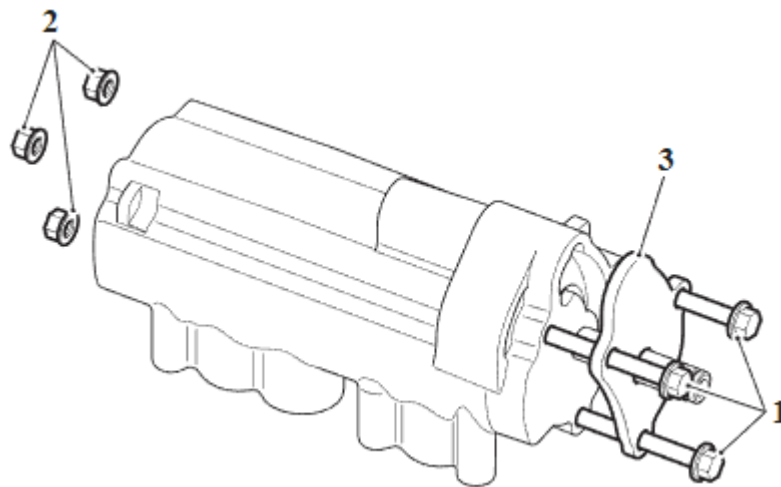
#### NOTICE

The oil pump assembly consists of two scavenge pump assemblies at the rear and one pressure pump rotor assembly at the front.

To prevent the oil pump inner and outer rotors from becoming mixed, place the inner and outer rotors together in a marked container. The components must be refitted in their original positions.

Note the orientation and position of all components for assembly.

1. Remove the three fixings and the front end cap from the oil pump. Retain the three lock nuts for installation.



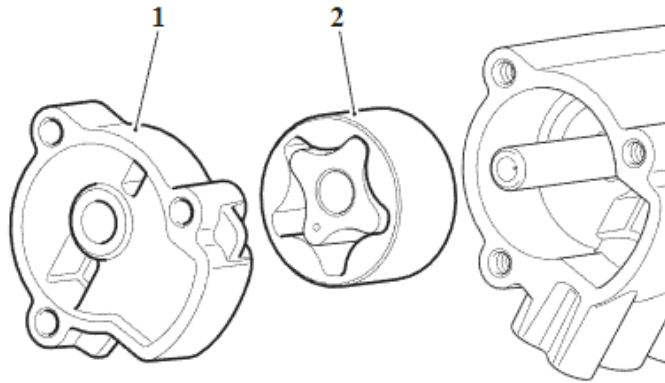
1. Fixings
2. Lock nuts
3. Front end cap

2. Remove the oil pump rear end cap.

## NOTICE

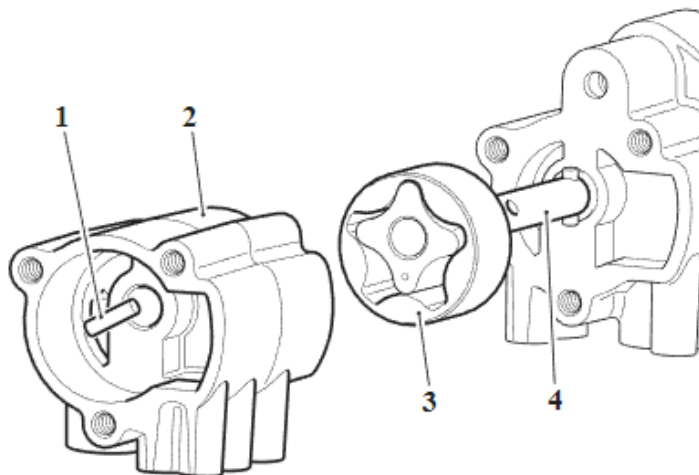
There is a recess in one end of the two scavenge pump rotors and the pressure pump rotor, the recess is to hold a dowel in position on the oil pump drive shaft.

3. Withdraw the rear scavenge pump rotor assembly. Keep the components of the rotor assembly together for assembly.



1. Rear end cap
2. Rear rotor assembly

4. Remove the rear scavenge pump dowel from the oil pump drive shaft.
5. Remove the scavenge pump housing and the front scavenge pump rotor assembly. Keep the components of the rotor assembly together for assembly.



1. Rear scavenge pump dowel
2. Scavenge pump housing
3. Front rotor assembly
4. Oil pump drive shaft

### NOTICE

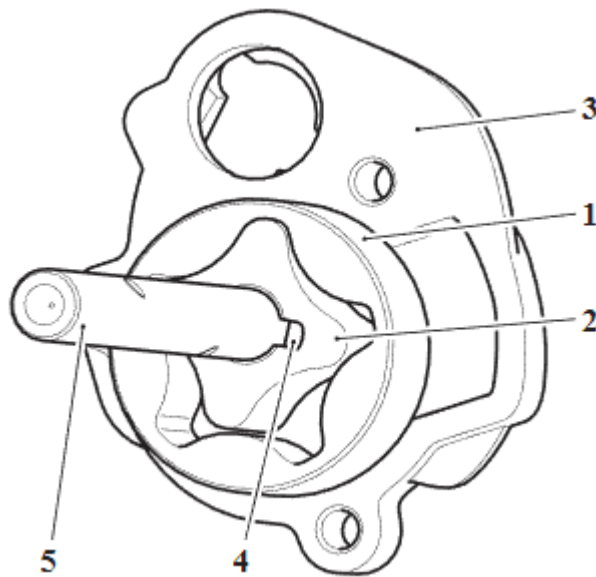
Note there is a washer between the front scavenge pump dowel and the scavenge pump housing for installation.

6. Remove the front scavenge pump dowel and the washer from the oil pump drive shaft.
7. Remove the oil pump pressure housing from the oil pump drive shaft.

### NOTICE

Note that the oil pressure outer and inner rotors have a dot mark on one face for identification as they are slightly narrower when compared to the two scavenge rotors. The oil pressure pump has the oil pressure valve fitted to it. Note its orientation for installation.

8. Remove the oil pressure pump rotor assembly and pressure pump end plate from the oil pump drive shaft. Collect the dowel and keep the components of the rotor assembly together for assembly.



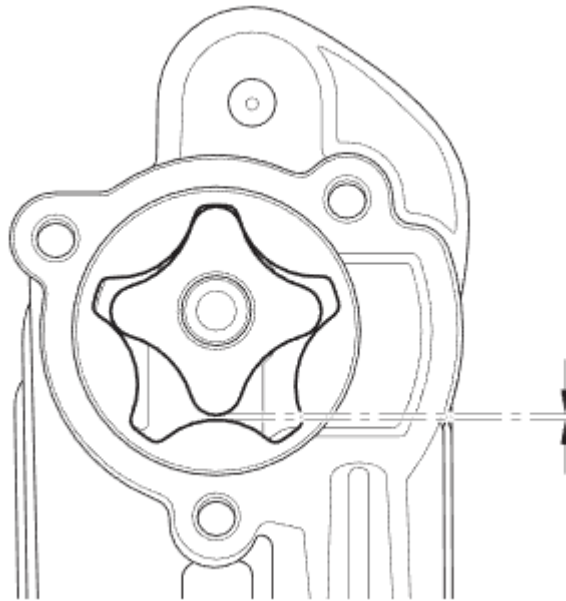
1. Outer rotor
2. Inner rotor
3. Oil pump housing
4. Dowel
5. Oil pump drive shaft

## Oil Pump Rotor Tip Clearance

### **NOTICE**

When measuring the rotor tip clearance, make sure the scavenge rotors are fitted to their housing and the pressure rotors are fitted to their pressure housing.

1. Measure the rotor tip clearance using feeler gauges.
2. For specifications refer to [Lubrication](#).



Rotor Tip Clearance

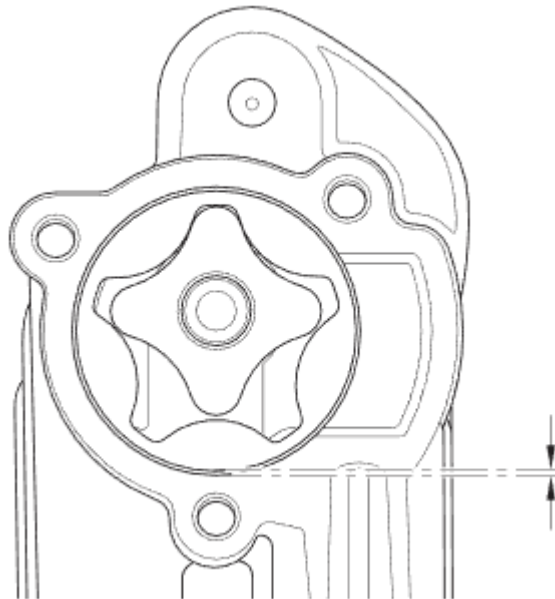


## Oil Pump Body Clearance

### NOTICE

When measuring the oil pump body clearance, make sure the scavenge rotors are fitted to their housing and the pressure rotors are fitted to their pressure housing.

1. Measure the oil pump body clearance using feeler gauges.
2. For specifications refer to [Lubrication](#).



Pump Body Clearance

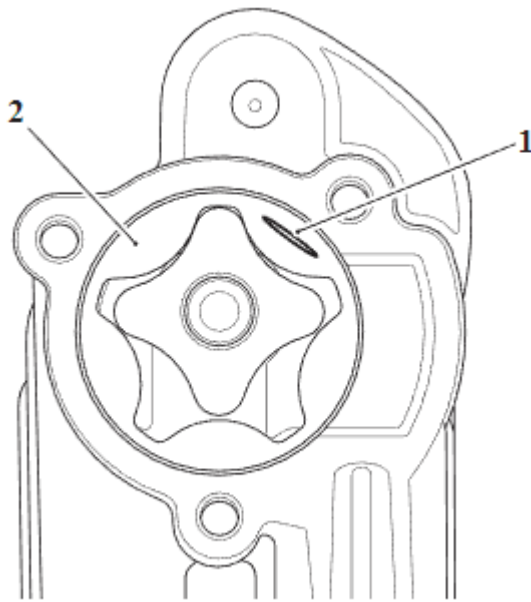
## Oil Pump End Clearance

6. Remove the end plate from the pump.
7. Using a lint free cloth, wipe the exposed areas of the rotors and the machined face of the end plate with a lint free cloth.

### NOTICE

The oil pump end clearance is measured using Plastigauge (Triumph part number 3880150-T0301). Do not turn the oil pump during the clearance measurement as this will damage the 'Plastigauge.

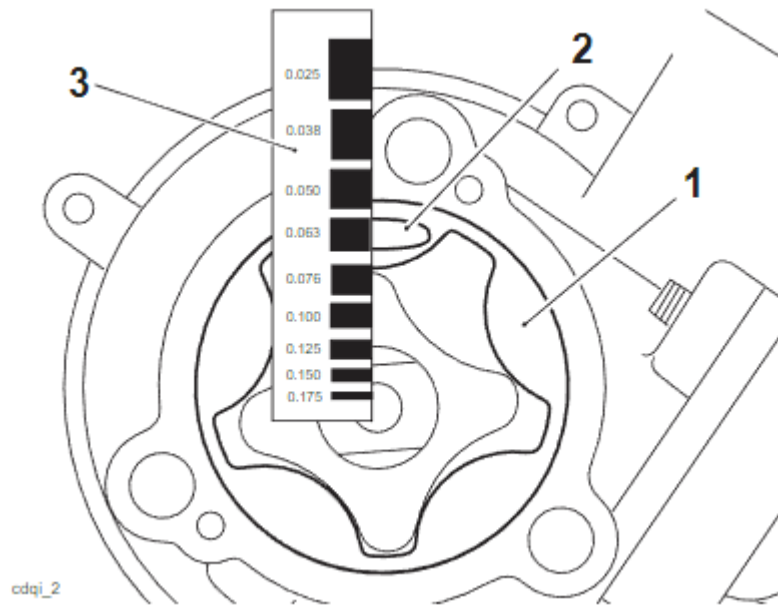
8. Apply a thin smear of grease to the outer rotor and a small quantity of silicone release agent to the face of the end plate.
9. Cut a length of the Plastigauge to fit across the outer rotor. Fit the strip to the rotor using the grease to hold the Plastigauge in place.



1. Plastigauge
2. Outer rotor

10. Without any twisting action, refit the oil pump cover and tighten its fixings to 5 Nm.
11. Release the bolts and carefully remove the end plate.
12. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.

13. For specifications refer to [Lubrication](#).



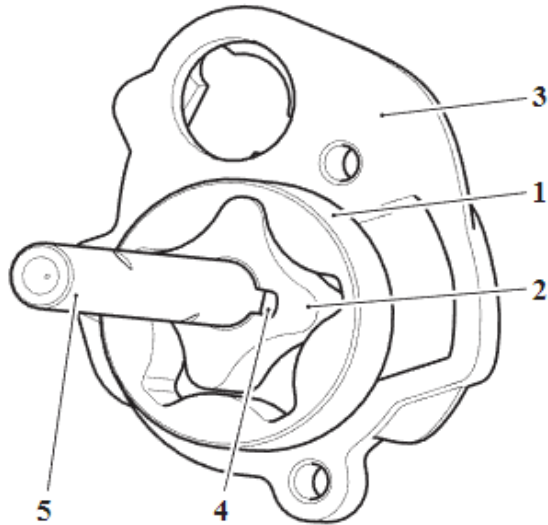
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| <ol style="list-style-type: none"><li>1. Rotor (outer)</li><li>2. Plastigauge</li><li>3. Gauge, in millimetres</li></ol> |
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14. If the clearance measured is within the specified tolerance, clean off all traces of Plastigauge from the outer rotor and oil pump cover.

10. If any clearance measured is outside the service limits, renew the complete pump.

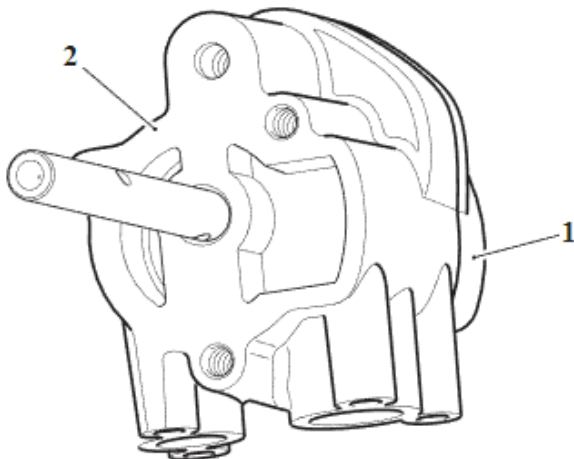
### Oil Pump – Assembly

1. Fit the pressure rotor dowel to the second hole away from the E-clip recess in the oil pump drive shaft.
2. Fit the pressure inner rotor to the drive shaft from E-clip recess end, make sure the recess in the rotor fits over the dowel.
3. Fit the rotor outer and oil pump housing to the drive shaft as noted for removal.



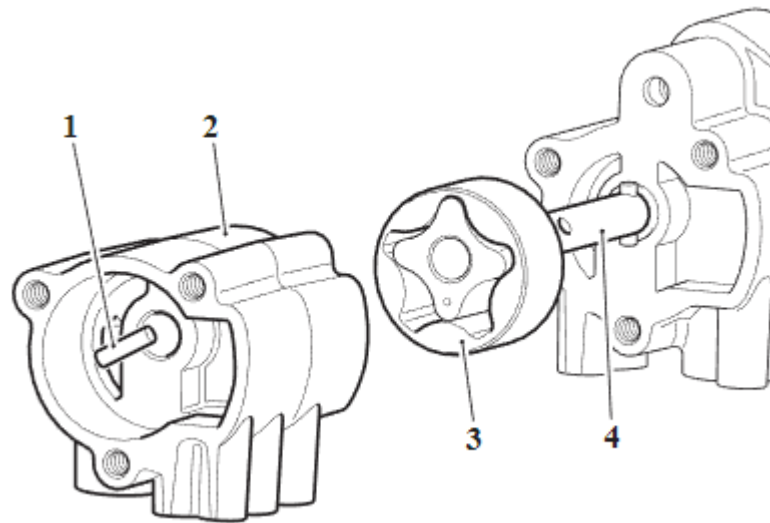
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| <ol style="list-style-type: none"><li>1. Outer rotor</li><li>2. Inner rotor</li><li>3. Oil pump housing</li><li>4. Dowel</li><li>5. Oil pump drive shaft</li></ol> |
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4. Fit the oil pump pressure housing to the pressure rotors. Make sure the pressure relief valve is correctly aligned and the pressure end plate is fitted as noted for removal.



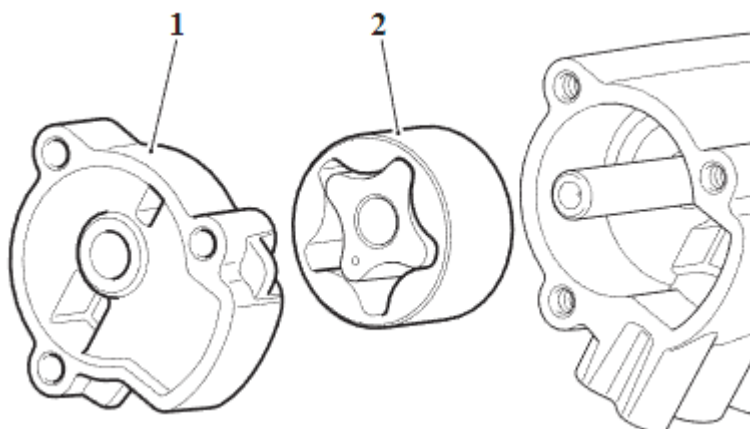
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| <ol style="list-style-type: none"><li>1. Pressure pump end plate</li><li>2. Pressure pump housing</li></ol> |
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5. Fit the washer and the front scavenge pump dowel to the drive shaft as noted for removal.
6. Fit the front scavenge pump inner rotor to the drive shaft, make sure the recess in the rotor fits over the dowel.
7. Fit the front scavenge pump outer rotor and fit the scavenge pump housing as noted for removal.
8. Fit the rear scavenge rotor dowel to the drive shaft.



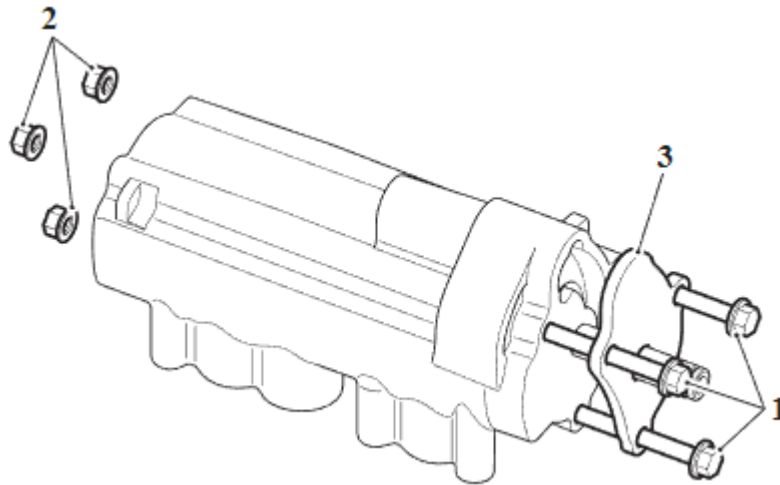
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| <ol style="list-style-type: none"> <li>1. Rear scavenge pump dowel</li> <li>2. Scavenge pump housing</li> <li>3. Front rotor assembly</li> <li>4. Oil pump drive shaft</li> </ol> |
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9. Fit the rear scavenge pump inner rotor to the drive shaft, make sure the recess in the rotor fits over the dowel.
10. Fit the rear scavenge pump outer rotor and fit the oil pump rear end plate as noted for removal.



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| <ol style="list-style-type: none"> <li>1. Rear end cap</li> <li>2. Rear rotor assembly</li> </ol> |
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11. Fit the oil pump front end cap and the three bolts as noted for removal.
12. fit the locknuts and tighten to 5 Nm.



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| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Lock nuts</li><li>3. Front end cap</li></ol> |
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## Oil Pump – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

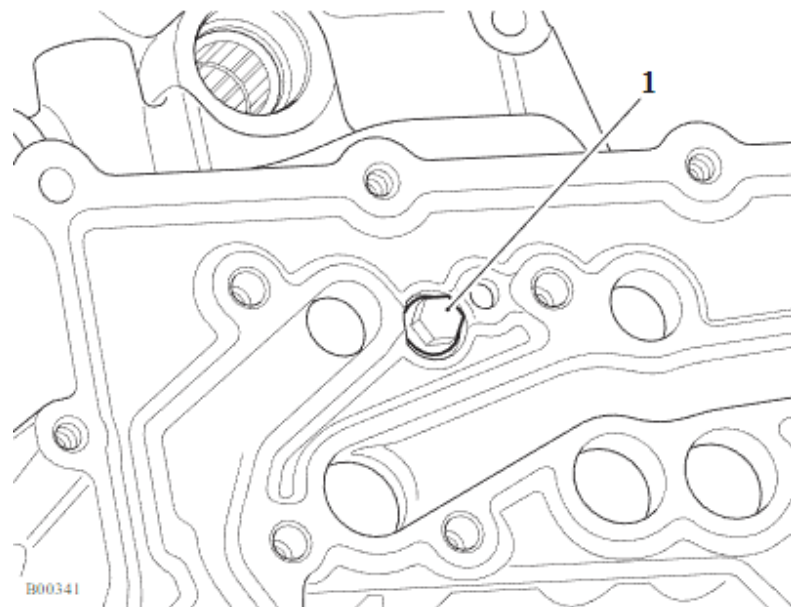
1. Use high flash-point solvent to clean the crankcase and oil pump mating faces. Wipe the surfaces clean with a lint-free cloth.

2. Make sure that the two locating dowels are in position in the lower crankcase.



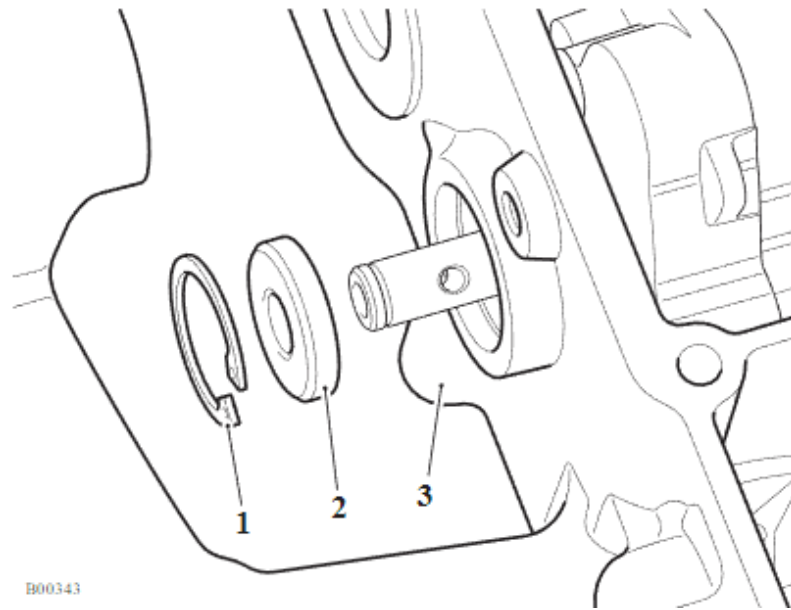
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| <ol style="list-style-type: none"><li>1. Dowels</li><li>2. Lower crankcase</li></ol> |
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3. Fit a new oil pump gasket to the lower crankcase.
4. Fit the oil pump to the lower crankcase, make sure the oil pump fits onto the two locating dowels.
5. While holding the oil pump in position, invert the lower crankcase, fit a new oil pump fixing and tighten to 9 Nm.



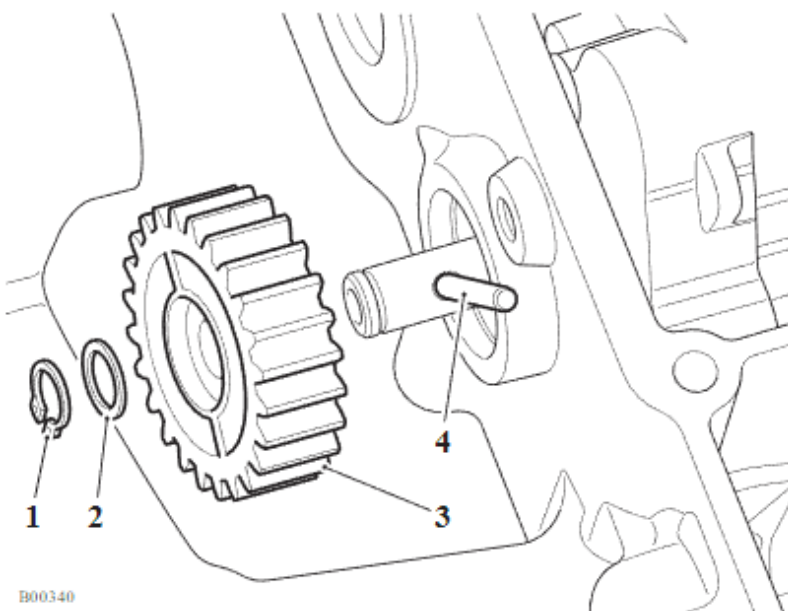
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| <ol style="list-style-type: none"><li>1. Fixing</li></ol> |
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6. Using a suitable tool, carefully fit a new oil seal without damaging the lower crankcase.
7. Secure the oil seal with a new circlip.



1. Circlip
2. Oil seal
3. Lower crankcase

8. Fit the oil pump drive dowel.
9. Fit the oil pump drive gear and the hardened washer.
10. Secure the washer and the drive gear with a new the circlip.



1. Circlip
2. Hardened washer
3. Oil pump drive gear
4. Dowel



Perform the following operations:

- [Lower Crankcase - Installation](#)
- [Engine - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Oil Pressure Relief Valve

The oil pressure relief valve is located inside the oil pump. If the oil pressure valve requires replacement, the oil pump and oil pressure valve assembly is to be replaced.

- [Oil Pump - Removal](#)
- [Oil Pump - Installation](#)

## Low Oil Pressure Warning Light Switch – Removal

### **⚠ WARNING**

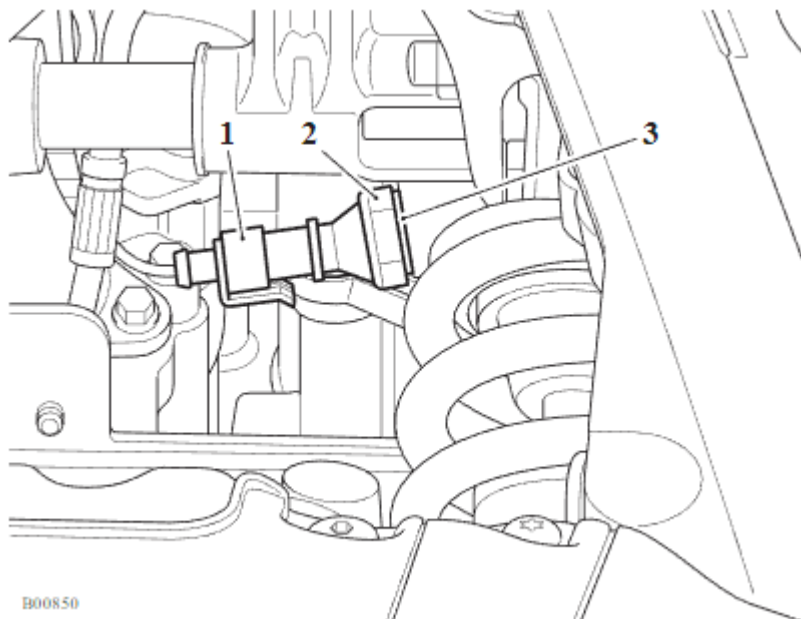
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Battery Box - Removal](#)

The low oil pressure warning light switch is located at the rear of the cylinder head.

1. Disconnect the electrical connection to the switch.
2. Remove the switch. Discard the copper washer.



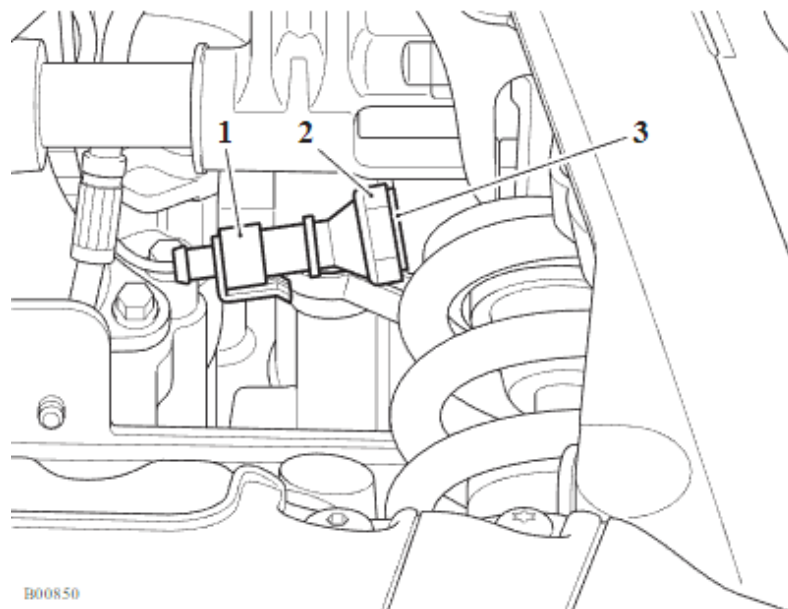
1. Electrical connection
2. Low oil pressure warning light switch
3. Copper washer

## Low Oil Pressure Warning Light Switch - Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Incorporating a new copper washer, fit the switch and tighten to 15 Nm.
2. Refit the electrical connection.



1. Electrical connection
2. Low oil pressure warning light switch
3. Copper washer

Perform the following operations:

- [Battery Box - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Engine Remove and Install

### Engine – Removal

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

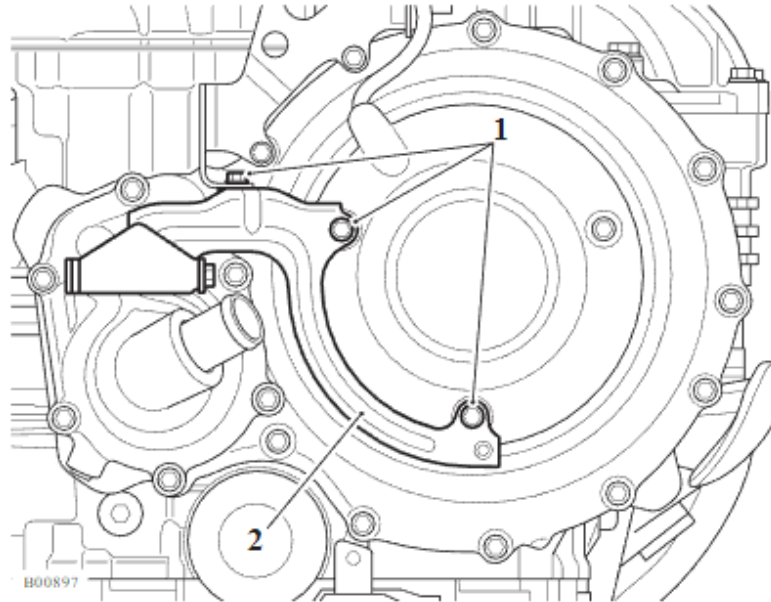
Perform the following operations:

- [Battery - Removal](#)
- If required, drain the engine oil [Engine Oil and Filter Renew](#)
- [Coolant Replacement - Drainage](#)
- [Fuel Tank - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)
- [Radiator - Removal](#)
- [Evaporative Canister - Removal](#)
- [Ignition Coils - Removal](#)
- [Secondary Air Injection Solenoid - Removal](#)
- [Catalytic Converter - Removal](#)
- [Exhaust Headers - Removal](#)
- [Side Panels - Removal](#)
- [Starter Motor - Removal](#)
- [Left Hand Control Plate - Removal](#)
- [Swinging Arm - Removal](#)

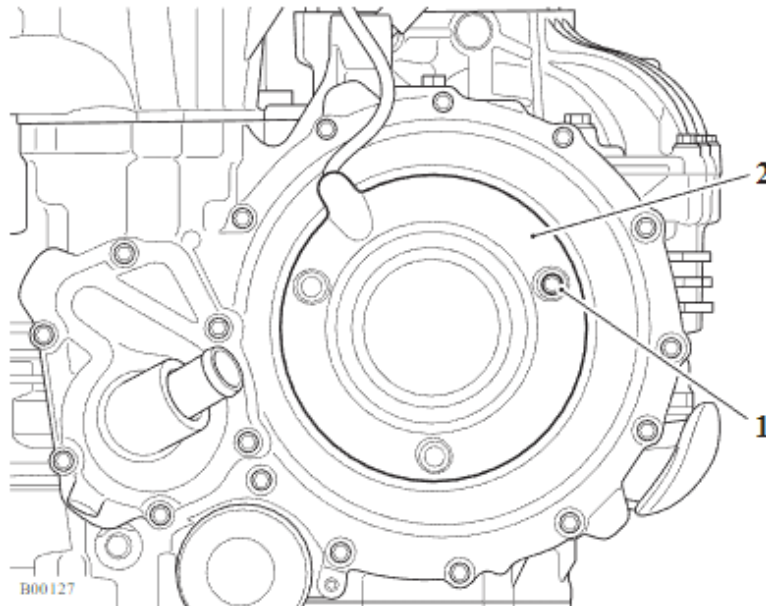
#### **NOTICE**

Note the position of the single fixing of the clutch cover finisher for installation.

1. Release the three fixings and remove the lower radiator cowl bracket.

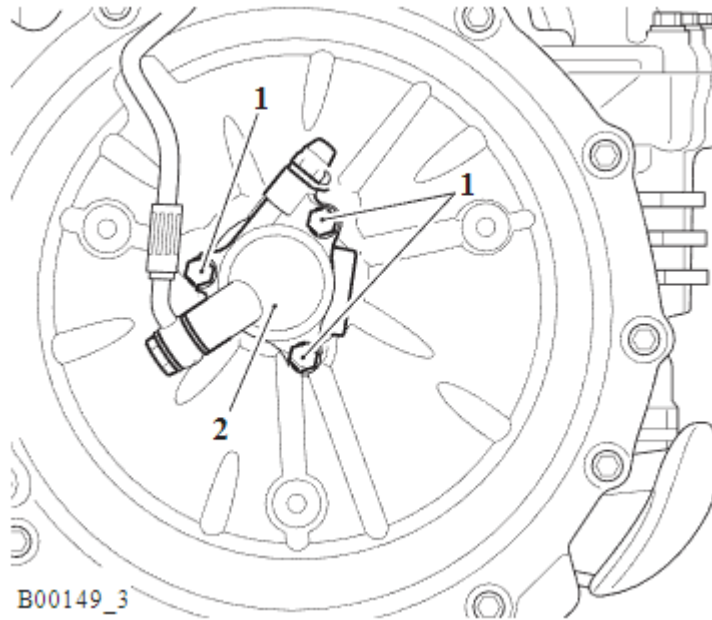


2. Release the fixing and remove the clutch cover finisher.



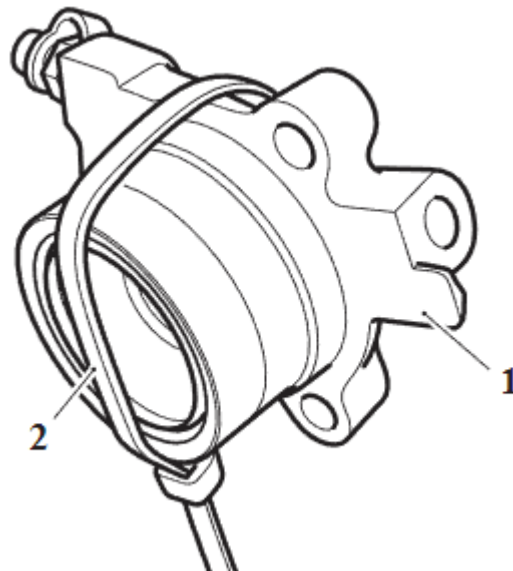
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| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clutch cover finisher</li></ol> |
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3. Release the three fixings and detach the slave cylinder from the clutch cover. Make sure the piston remains in its cylinder. Discard the slave cylinder gasket.



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| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clutch slave cylinder</li></ol> |
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4. Retain the piston to the slave cylinder using a retaining tie such as a rubber band or cable tie. Position the slave cylinder to one side.



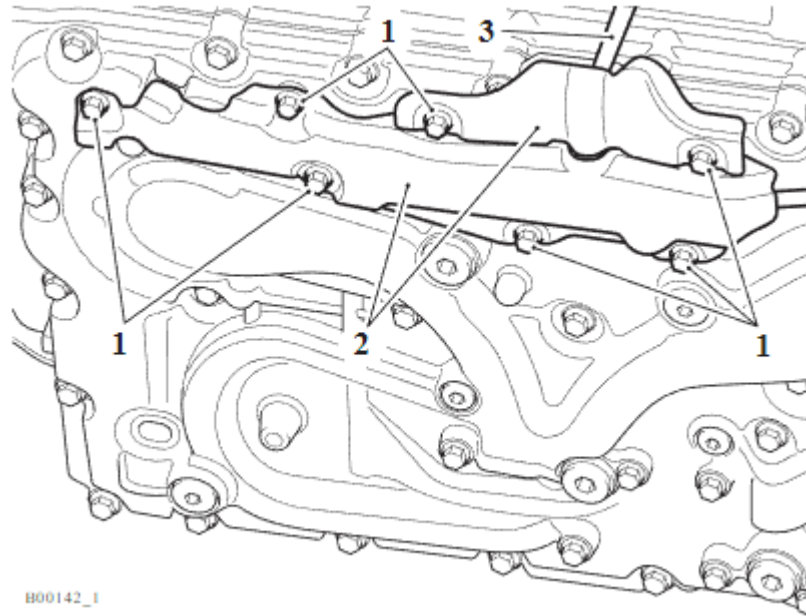
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| <ol style="list-style-type: none"><li>1. Clutch slave cylinder</li><li>2. Retaining tie</li></ol> |
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- To drain the fluid from the master cylinder, attach a tube to the rear brake caliper bleed screw, loosen the screw and allow the fluid to drain into a suitable container. Operate the brake pedal until all fluid has been expelled (see [Bleeding the Rear Brake](#)).

**NOTICE**

Note the routing of the brake line and the coolant expansion tank drain hose for installation.

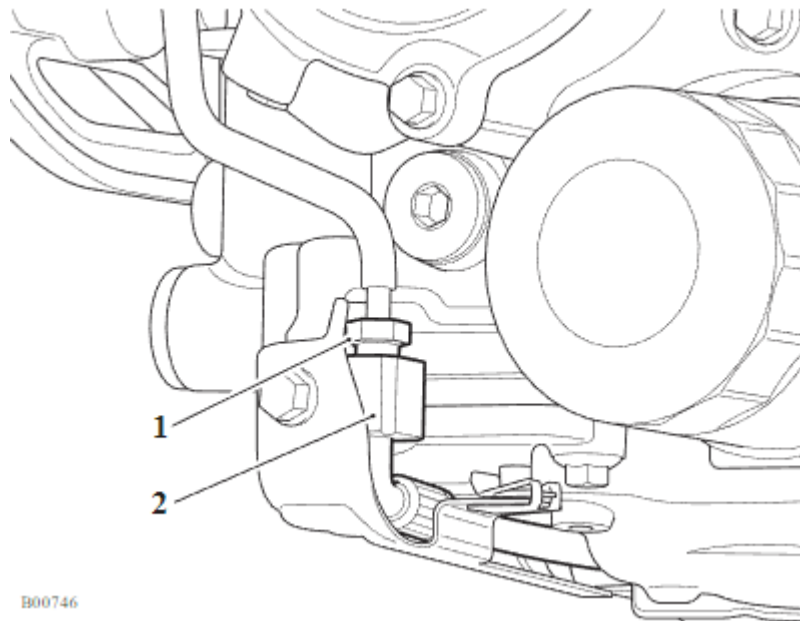
- Release the fixings and remove the rear brake line two rear brackets.



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1. Fixings
2. Brake line bracket
3. Brake line

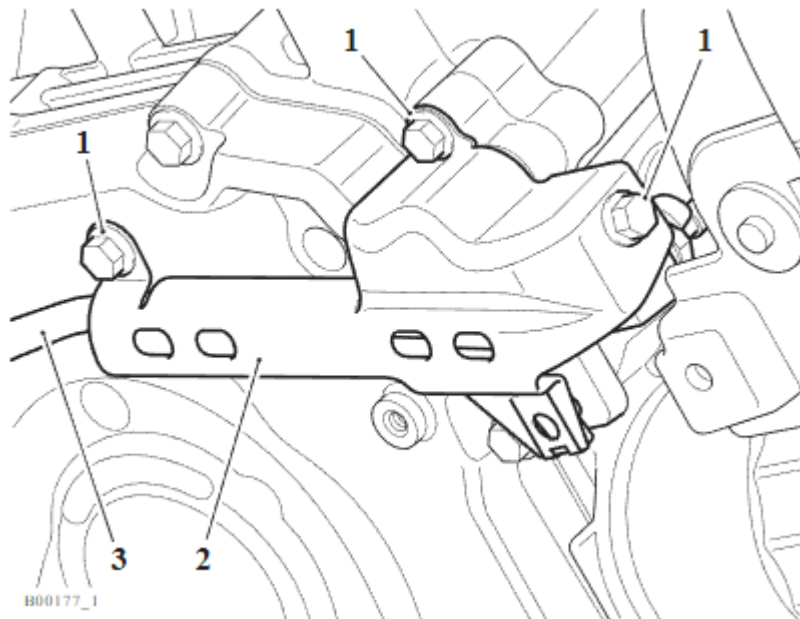
7. Detach the rear brake line from the union block at the front of the sump.



B00746

- 1. Rear brake line
- 2. Union block

8. Release the fixings and remove the rear brake line front bracket.

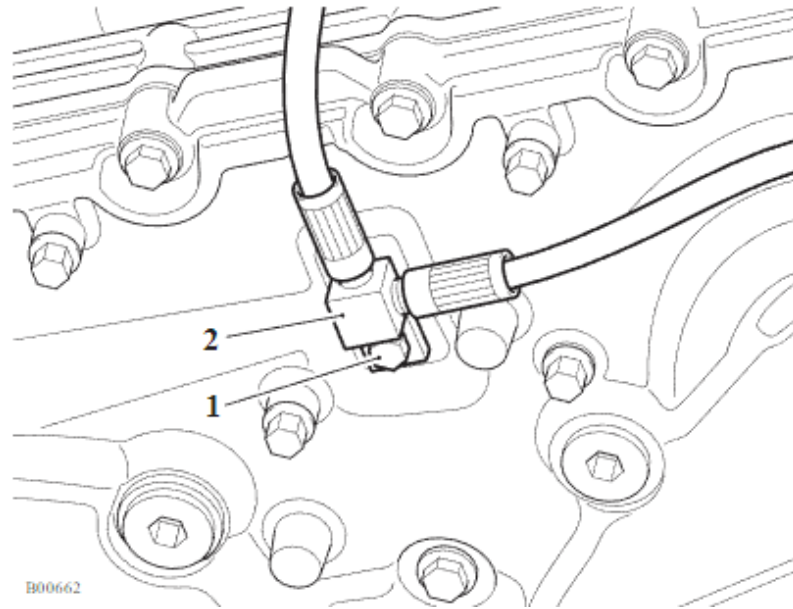


B00177\_1

- 1. Fixings
- 2. Brake line front bracket
- 3. Brake line

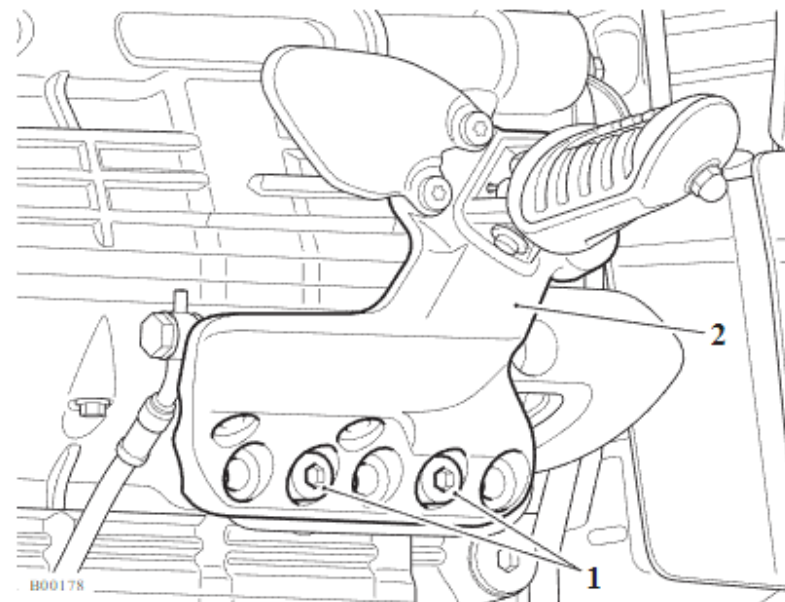


9. Release the fixing and detach the brake line from the sump.



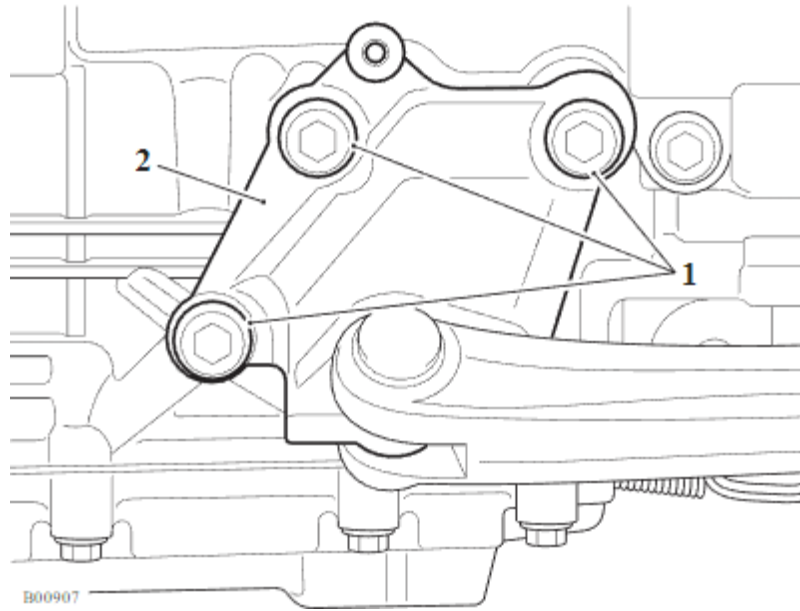
- 1. Fixing
- 2. Brake line

10. Release the fixings and remove the rider right hand control plate from the engine.



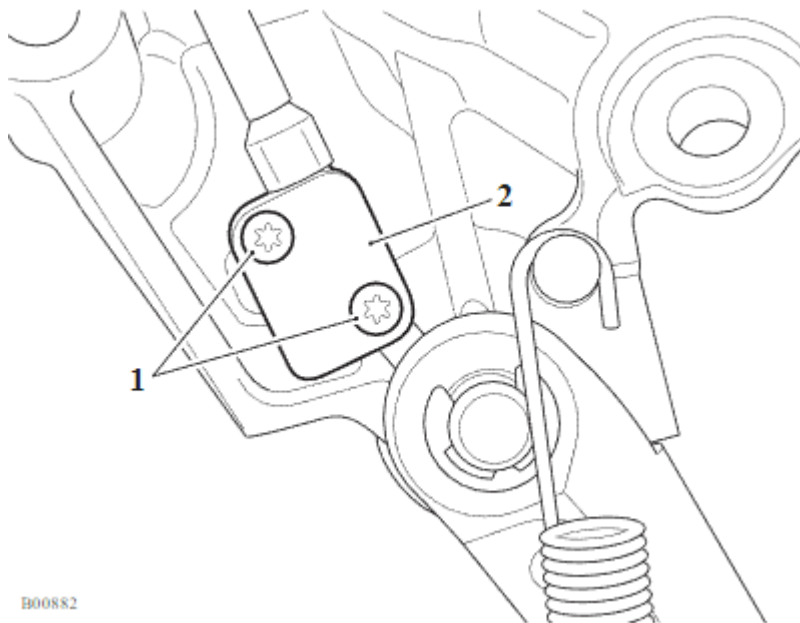
- 1. Fixings
- 2. Right hand control plate

11. Release the fixings and detach the side stand assembly from the crankcase.



- 1. Fixings
- 2. Side stand assembly

12. Release the fixings, detach the side stand switch and remove the side stand assembly. Discard the fixings.

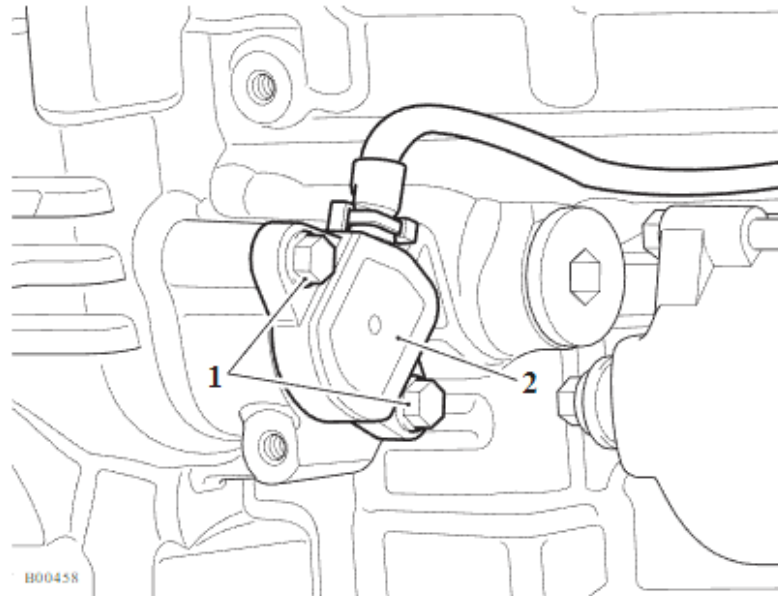


- 1. Fixings
- 2. Side stand switch

**NOTICE**

Note the routing of the gear position sensor harness for installation.

13. Release the fixings and detach the gear position sensor from the crankcase.



1. Fixings
2. Gear position sensor

14. Route the gear position sensor to the rear of the engine.

**NOTICE**

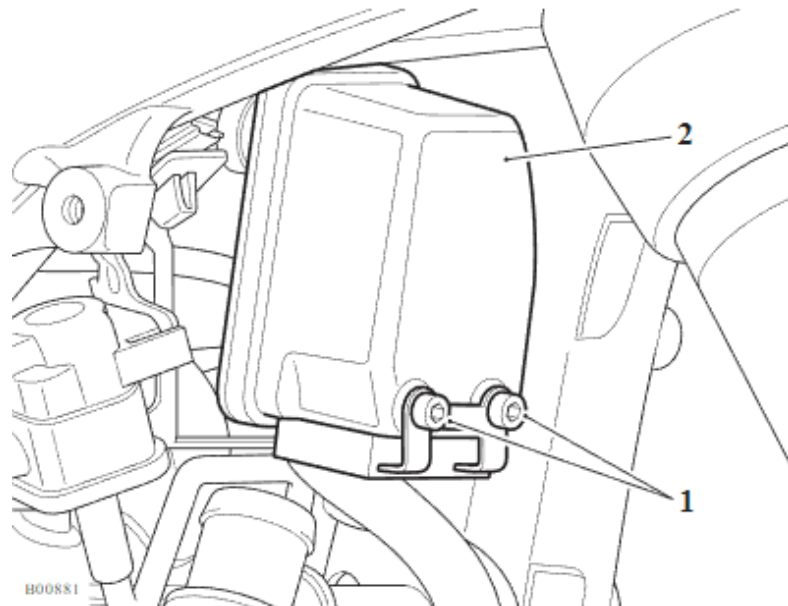
Note the routing of the alternator and regulator/rectifier harnesses for installation.

15. Route the alternator and regulator/rectifier harnesses to the rear of the engine.

**NOTICE**

Note the routing of the secondary air injection hoses for installation.

16. Release the fixings and remove the secondary air injection silencer box.



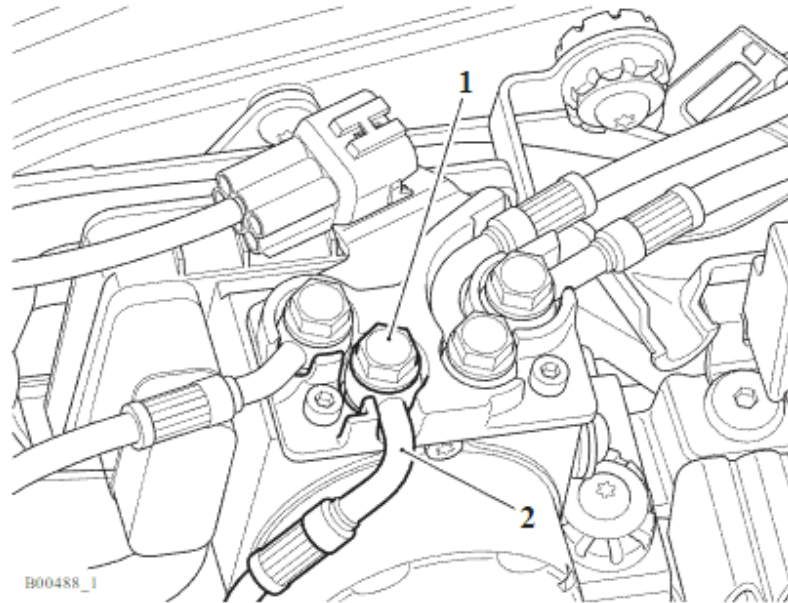
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| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Secondary air injection silencer box</li></ol> |
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17. Disconnect the ABS modulator multiplug (see ABS Electrical Connectors).

**NOTICE**

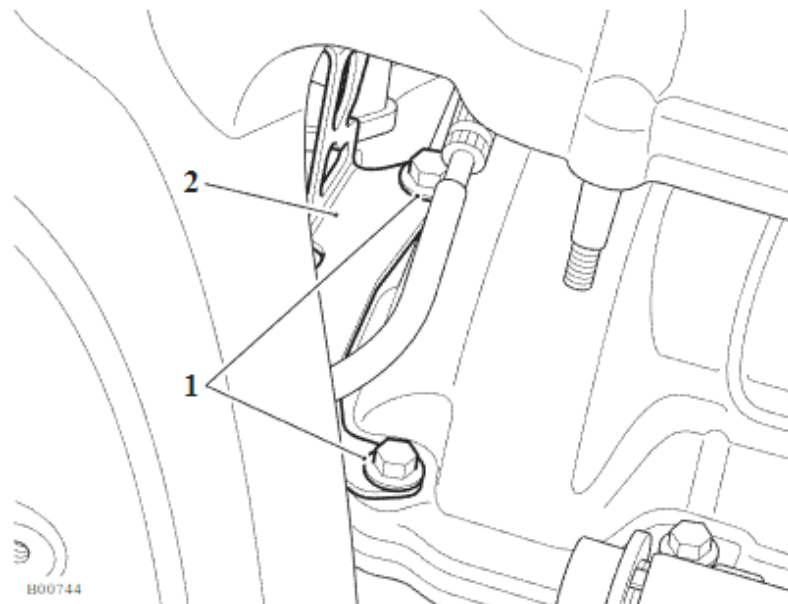
Note the routing of the brake line of the rear brake master cylinder for installation.

18. Release the brake line union for the rear brake master cylinder at the ABS hydraulic modulator. Discard the sealing washers.



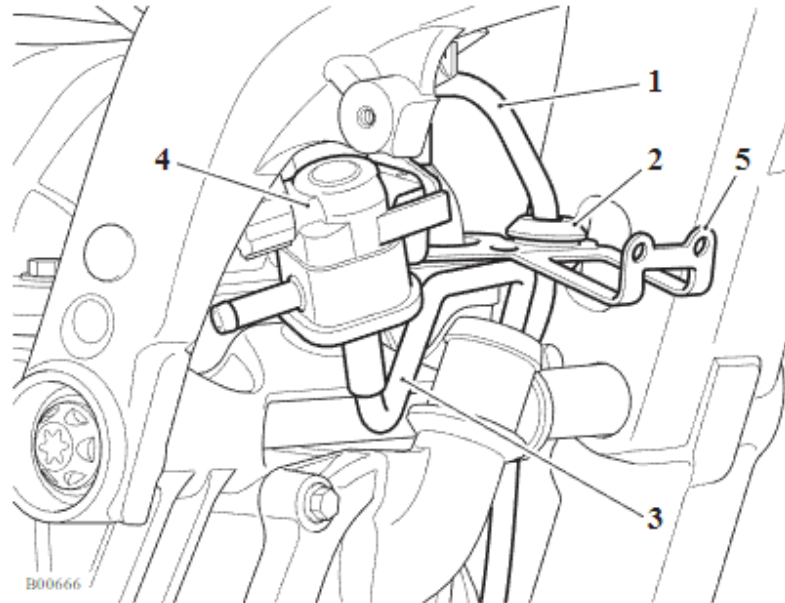
- 1. Brake line union
- 2. Brake line (rear master cylinder)

19. Release the fixings and detach the purge valve bracket from the camshaft cover.



- 1. Fixings
- 2. Purge valve bracket

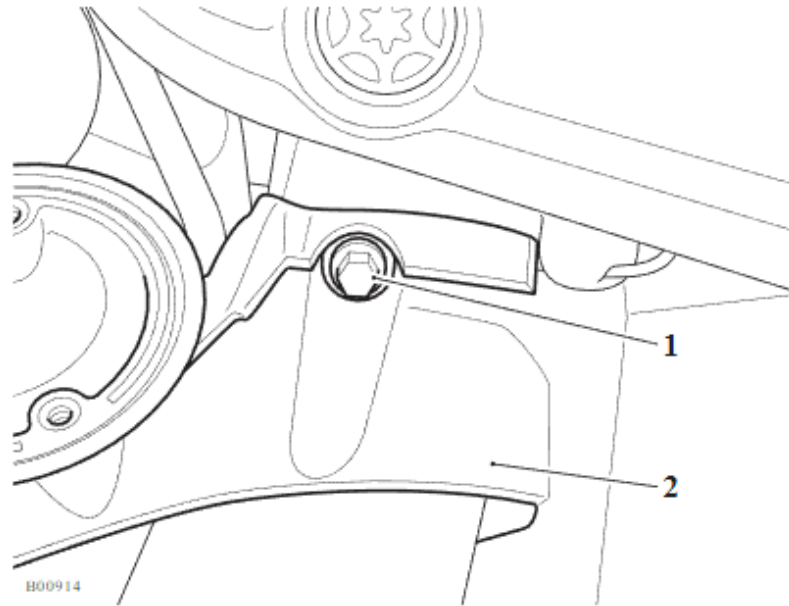
20. Detach the brake line and its grommet from the purge valve bracket. Remove the brake line.
21. Disconnect the front ABS sensor connector.
22. Detach the hose from the purge valve, remove the purge valve and bracket assembly.



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| <ol style="list-style-type: none"><li>1. Brake line</li><li>2. Grommet</li><li>3. Hose</li><li>4. Purge valve</li><li>5. Purge valve bracket</li></ol> |
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23. Disconnect the coolant temperature sensor from the main harness.
24. Disconnect the cooling fan speed controller from the main harness.
25. Remove the engine oil dipstick.

26. Remove the fixing securing the left hand side panel moulding to the frame.



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| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Side panel moulding</li></ol> |
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**⚠ WARNING**

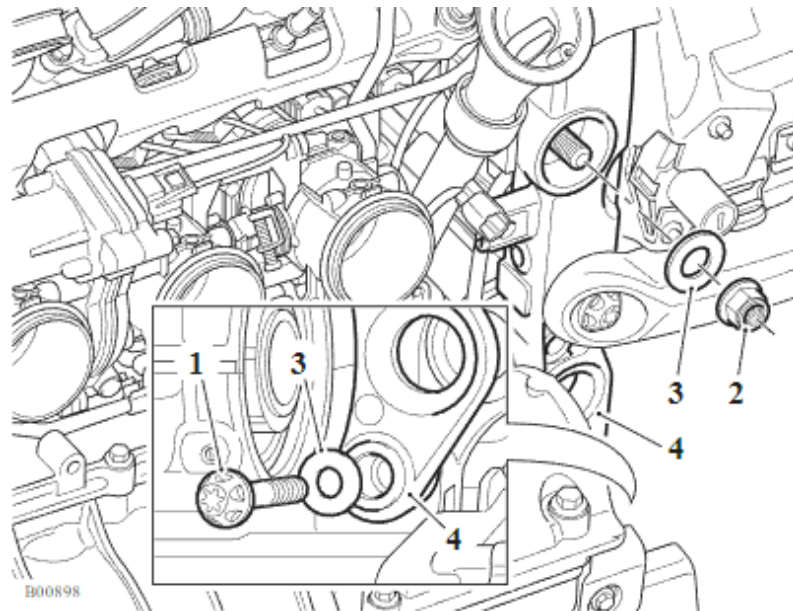
Make sure the engine and the motorcycle frame are stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

27. Place support beneath the engine and make sure that the frame is still adequately and securely supported.

28. Open the passenger left and right hand footrests. Using a suitable hoist, support the rear frame and outrigger assembly.

29. Remove the bolt and washer securing the left hand outrigger to the upper crankcase.

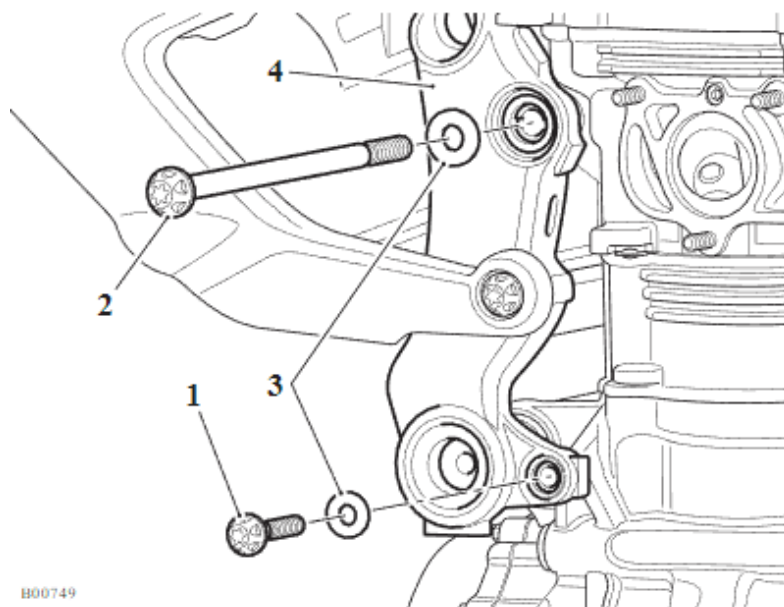
30. Remove the lock nut and washer securing the left hand outrigger to the rear of the cylinder head.



- 1. Bolt
- 2. Lock nut
- 3. Washers
- 4. Left hand outrigger

31. Remove the bolt and washer securing the right hand outrigger to the upper crankcase.

32. Remove the bolt and washer from the right hand outrigger to cylinder head.

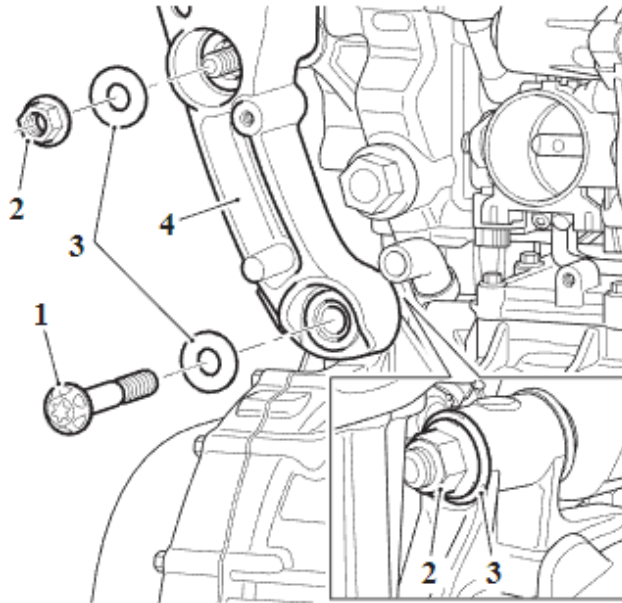


- 1. Bolt (to lower crankcase)
- 2. Bolt (to cylinder head)
- 3. Washers
- 4. Right hand outrigger



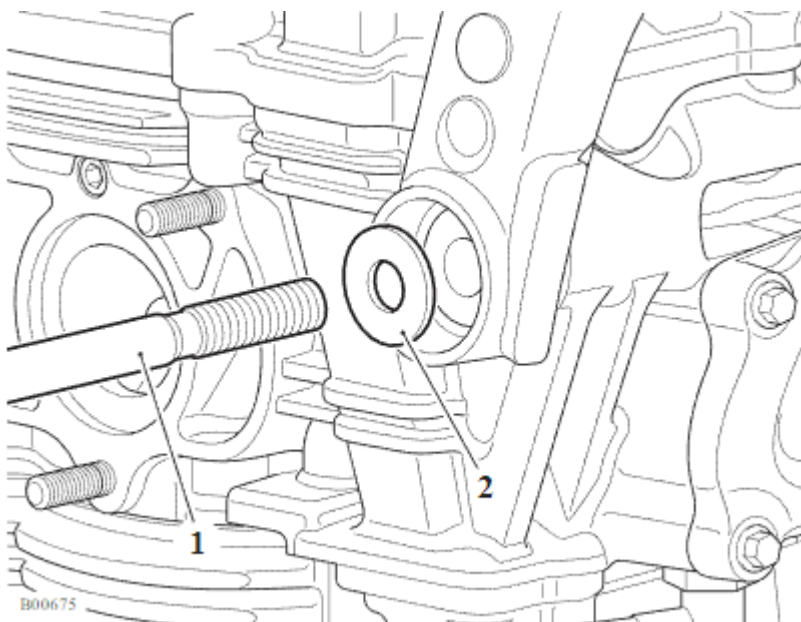
33. Remove the bolt, lock nut and washer securing the frame to the left hand side of the crankcase. Discard the lock nut.

34. Remove the lock nut and washer securing the frame to the left hand side of the cylinder head. Discard the lock nut.



- 1. Bolt
- 2. Lock nut
- 3. Washers
- 4. Frame (left hand side)

35. Remove the front cylinder head mounting bolt and washer from the right hand side.



- 1. Bolt
- 2. Washers

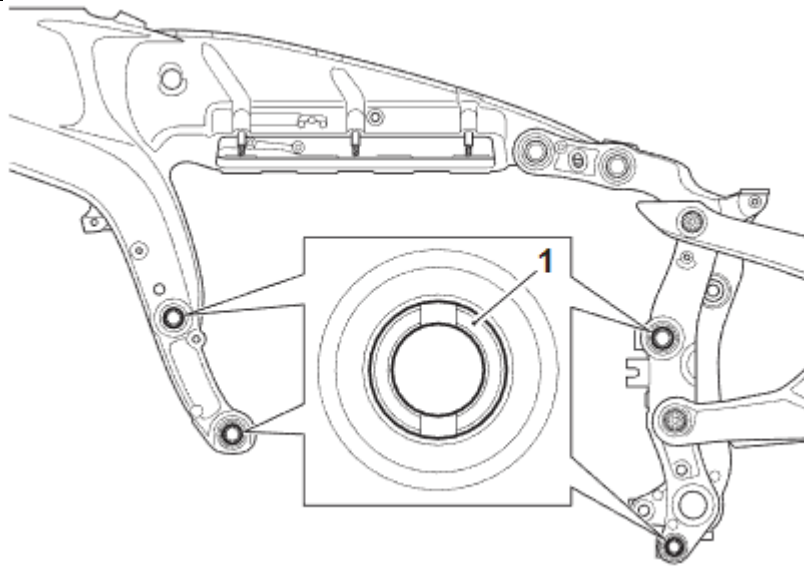
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## NOTICE

There are six frame adjusters for this model. Four are on the left hand side and two on the right hand side.

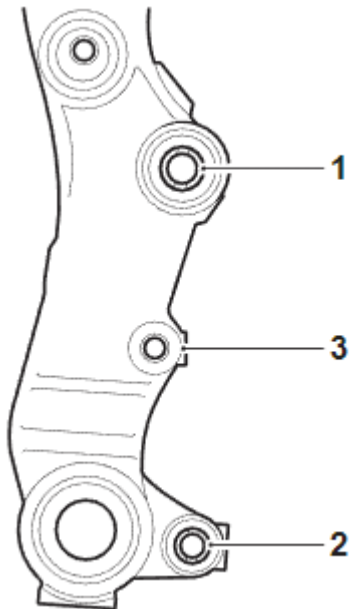
For the four adjusters on the left hand side and the cylinder head adjuster on the right hand side use T3880181 - Wrench Frame Adjuster.

For the crankcase adjuster on the right hand side use T3880103 - Engine Mounting Adjuster.



### Left Hand Frame Adjusters

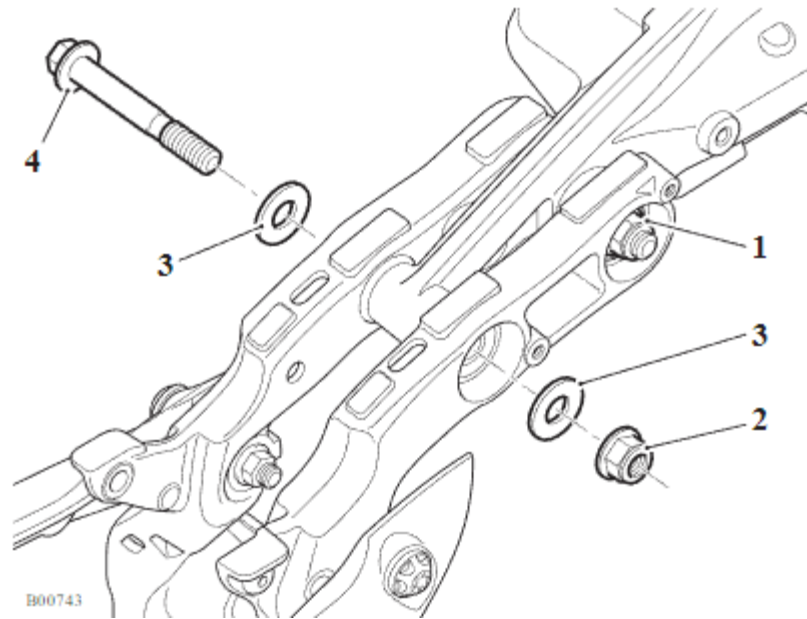
1. Frame adjuster



### Right Hand Frame Adjuster

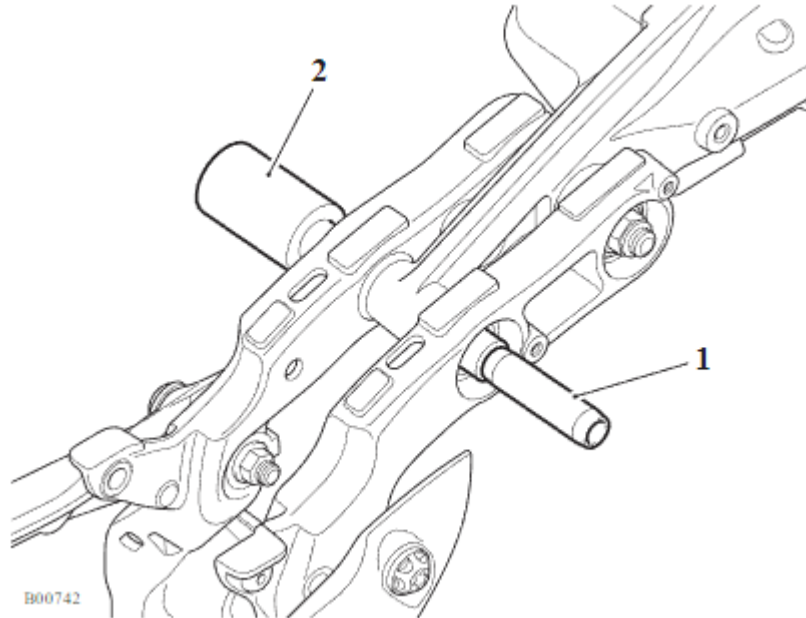
1. Cylinder head frame adjuster
2. Crankcase frame adjuster
3. Outrigger

36. Engage service tool T3880181 into the slots of the left hand frame adjusters and rotate anticlockwise to fully loosen the frame adjusters.
37. Engage service tool T3880181 into the slots of the right hand cylinder head frame adjuster and rotate anticlockwise to fully loosen the frame adjuster.
38. Engage service tool T3880103 into the slot of the right hand crankcase frame adjuster and rotate anticlockwise to fully loosen the frame adjusters.
39. Loosen the outrigger to frame front fixing.
40. Remove the outrigger to frame rear fixing and washers. Discard the lock nut.



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| <ol style="list-style-type: none"><li>1. Front fixing</li><li>2. Lock nut</li><li>3. Washers</li><li>4. Fixing</li></ol> |
|--|

41. Using service tool T3880506 remove the outrigger rear dowel. Leave service tool T3880506 in to support the outrigger.



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| <ol style="list-style-type: none"><li>1. Dowel</li><li>2. T3880506 - Outrigger dowel removal</li></ol> |
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42. With the aid of an assistant, remove service tool T3880506 and pivot the outriggers rearwards. Lower the engine to access the harness connectors at the rear of the engine.

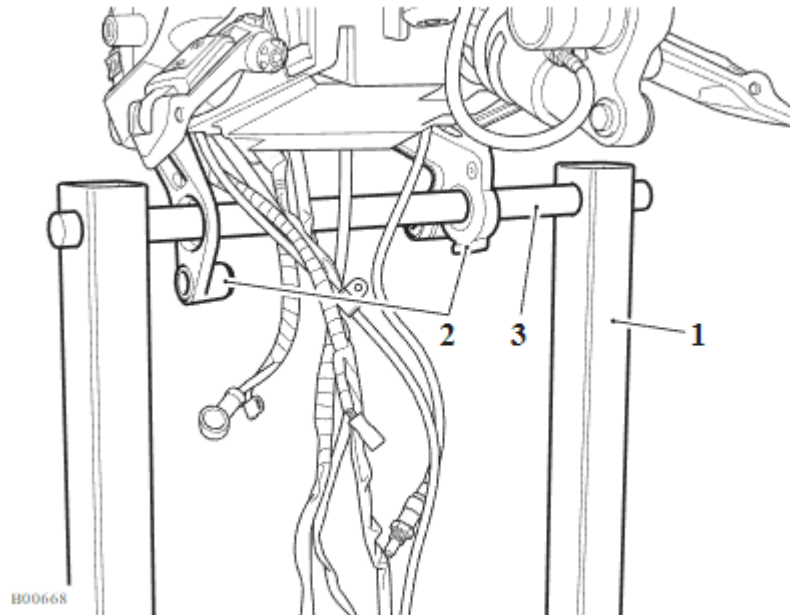
43. Disconnect the following harness connectors:

- Engine subharness

44. Lower the engine down.

45. Fit service tool T3880506 in to support the outrigger.

46. Fit the support bar of service tool T3880505 to the frame through the swinging arm pivot mounting holes, as shown below.



1. T3880505 - Main frame support
2. Swinging arm mountings
3. Support bar

47. Remove the hoist supporting the rear of the motorcycle and remove the engine.

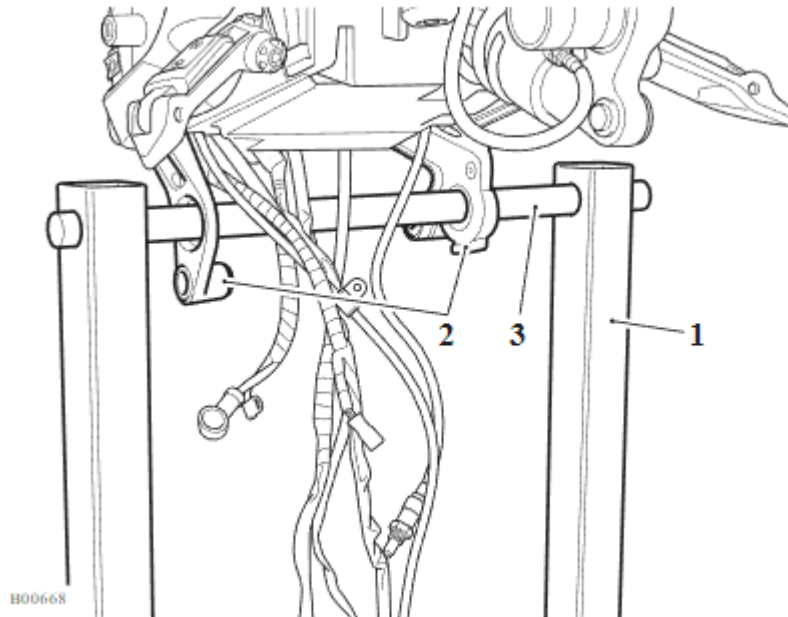
#### Engine - Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. With the engine on a suitable support, position the engine under the frame.
2. Raise the engine and connect the following harness connectors at the rear of the engine. • Engine subharness

3. Using a suitable hoist, support the rear frame and outrigger assembly.
4. With the aid of an assistant, remove service tool T3880505 from the frame.

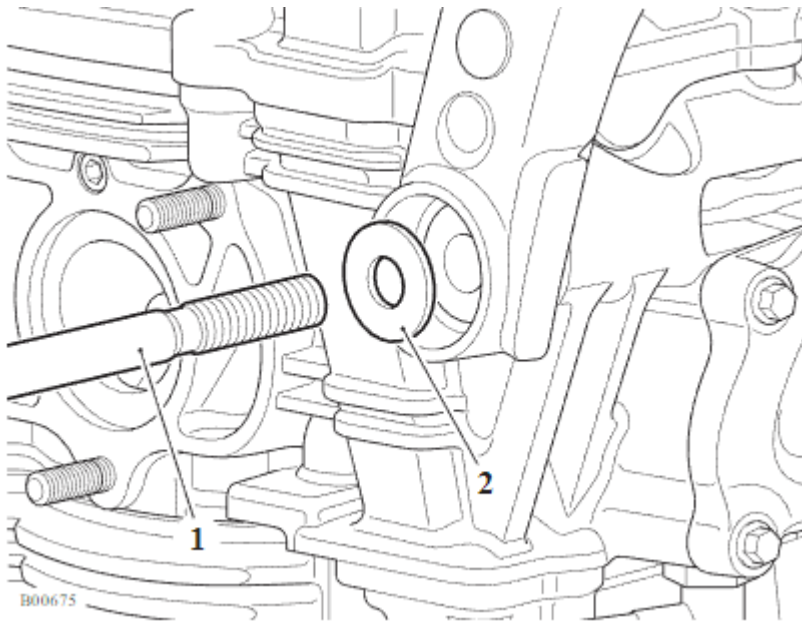


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| <ol style="list-style-type: none"><li>1. T3880505 - Main frame support</li><li>2. Swinging arm mountings</li><li>3. Support bar</li></ol> |
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5. With the aid of an assistant, remove service tool T3880506 and pivot the outriggers rearwards. Align the engine mounting points with the corresponding positions on the frame.
6. Tighten the engine mounting bolts in the following two stages:

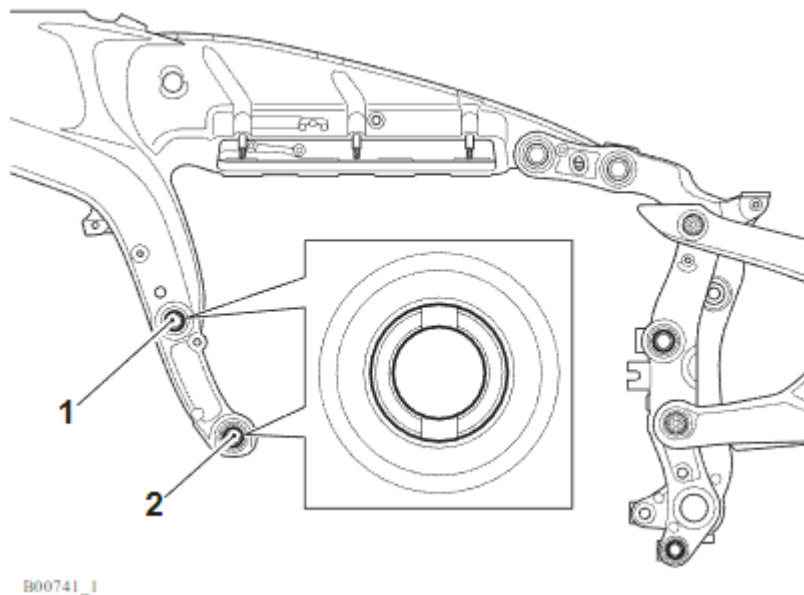
## Stage 1

7. Insert the cylinder head front mounting bolt from the right hand side with a washer between the bolt and the frame.



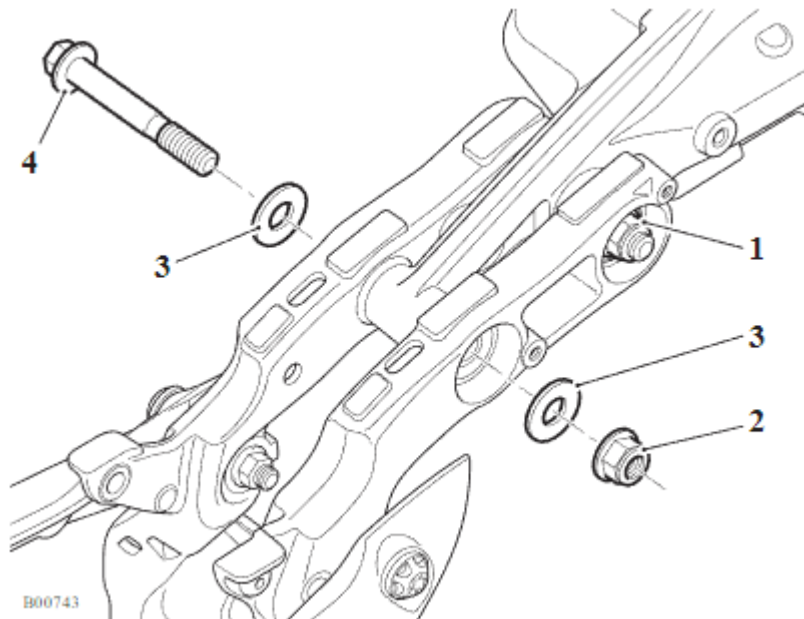
1. Bolt
2. Washers

8. Using service tool T3880181 tighten the cylinder head front frame adjuster to 3 Nm.
9. Fit the washer and new lock nut to the cylinder head front mounting bolt. Do not fully tighten at this stage.
10. Using service tool T3880181 tighten the crankcase front frame adjuster to 3 Nm.



1. Cylinder head front frame adjuster
2. Crankcase front frame adjuster

11. Insert the crankcase front mounting bolt from the left hand side with a washer between the bolt and the frame.
12. Fit the washer and new lock nut to the crankcase front mounting bolt. Do not fully tighten at this stage.
13. Using service tool T3880506 fit the outrigger rear dowel.
14. Insert the outrigger rear mounting bolt from the left hand side with a washer between the bolt and the frame.
15. Fit the washer and new lock nut to the outrigger rear mounting bolt. Do not fully tighten at this stage.

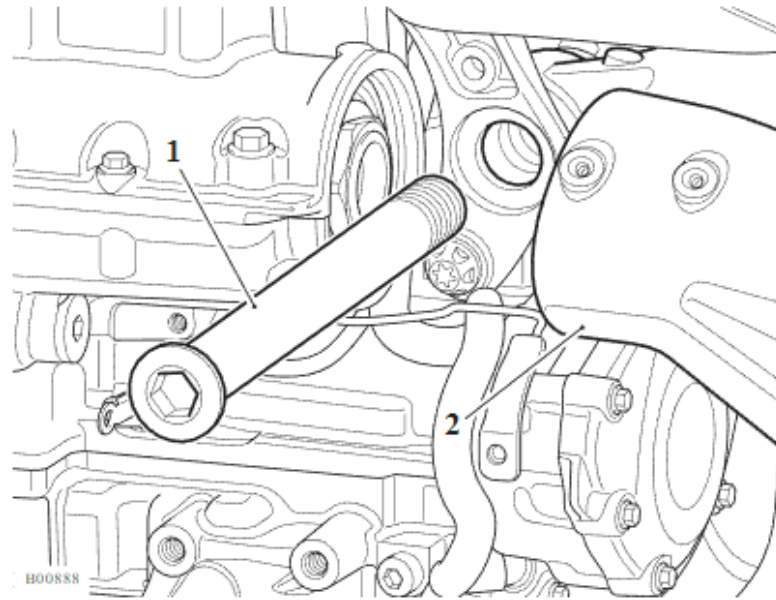


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|---|
| <ol style="list-style-type: none"> <li>1. Front fixing</li> <li>2. Lock nut</li> <li>3. Washers</li> <li>4. Fixing</li> </ol> |
|---|

16. Fit the crankcase rear mounting bolts.
17. Counter hold the lock nut and tighten the cylinder head front mounting bolt to 10 Nm.
18. Position the swinging arm to the frame.



19. Fit the swinging arm spindle from the left hand side.

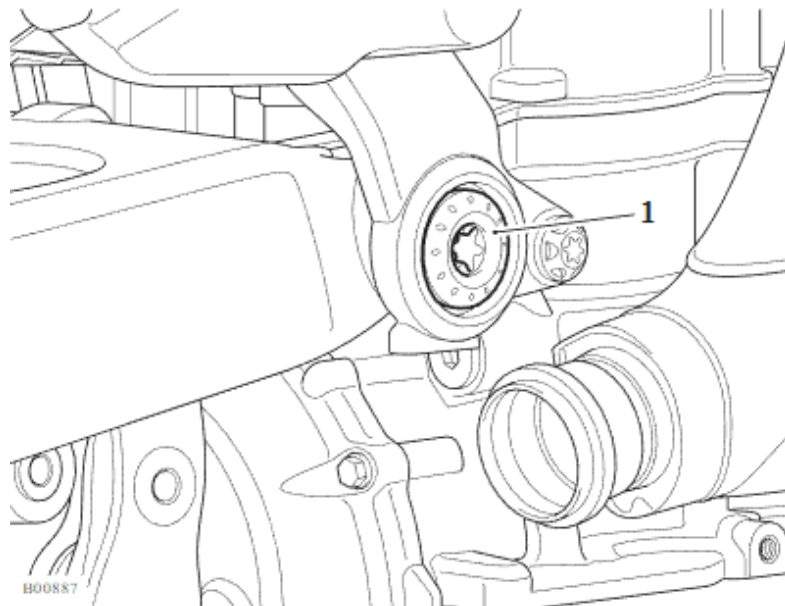


- 1. Pivot
- 2. Swinging arm

20. Fit the swinging arm bolt from the right hand side. Do not fully tighten at this stage.

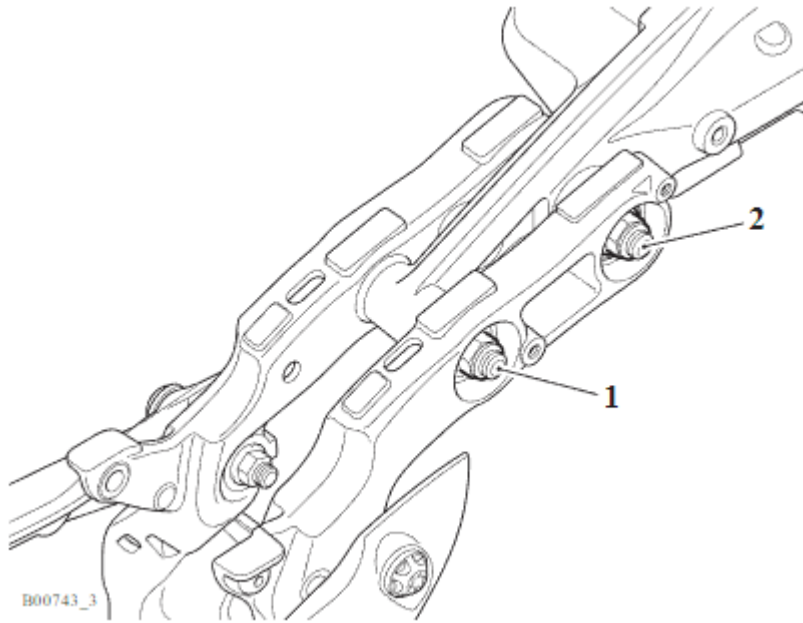
### Stage 2

21. Counter hold the swinging arm spindle and tighten the bolt to 100 Nm.



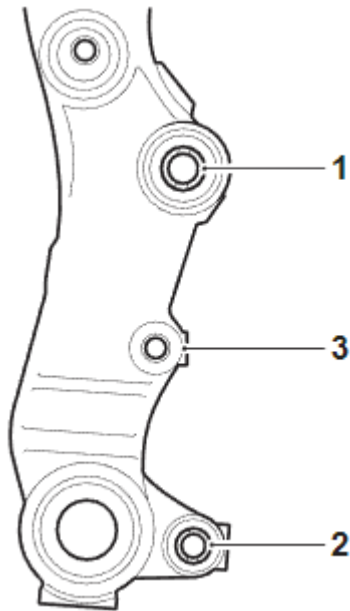
- 1. Bolt

22. Counter hold the lock nut and tighten the outrigger rear mounting bolt to 80 Nm.
23. Counter hold the lock nut and tighten the outrigger front mounting bolt to 80 Nm.



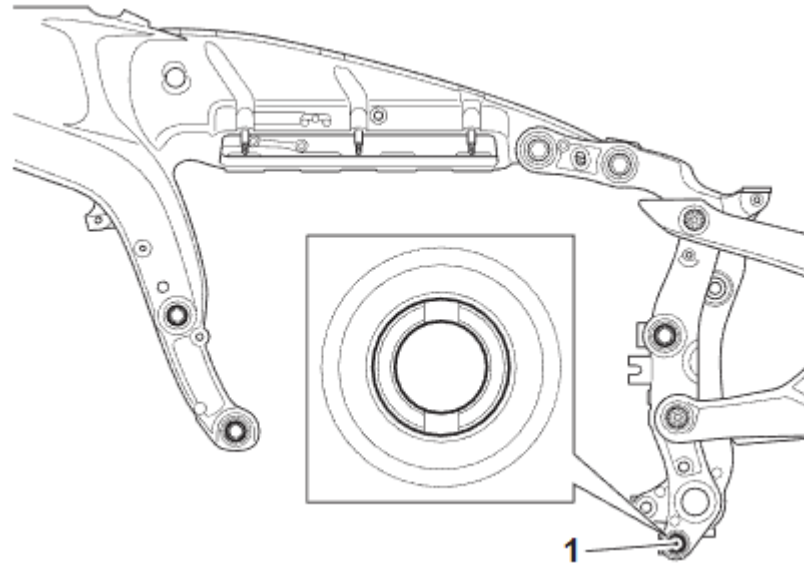
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| <ol style="list-style-type: none"><li>1. Rear lock nut</li><li>2. Front lock nut</li></ol> |
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24. Remove the crankcase rear mounting bolts.
25. Using service tool T3880103 tighten the crankcase right hand frame adjuster to 3 Nm.



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| Right Hand Frame Adjuster  |
| <ol style="list-style-type: none"><li>1. Cylinder head frame adjuster</li><li>2. Crankcase frame adjuster</li><li>3. Outrigger</li></ol> |

26. Using service tool T3880181 tighten the crankcase left hand rear frame adjuster to 3 Nm.

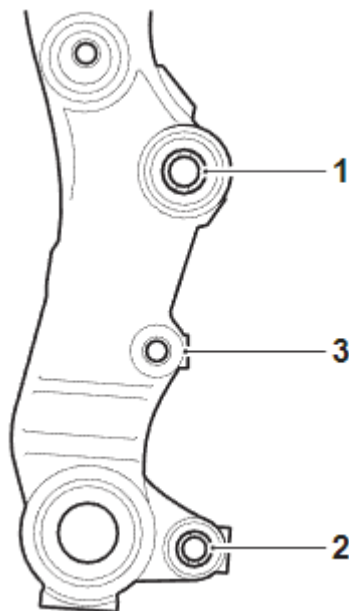


1. Frame adjuster

27. Fit the crankcase right hand rear mounting bolt with a washer between the bolt and the frame. Do not fully tighten at this stage.

28. Fit the crankcase left hand rear mounting bolt with a washer between the bolt and the frame. Do not fully tighten at this stage.

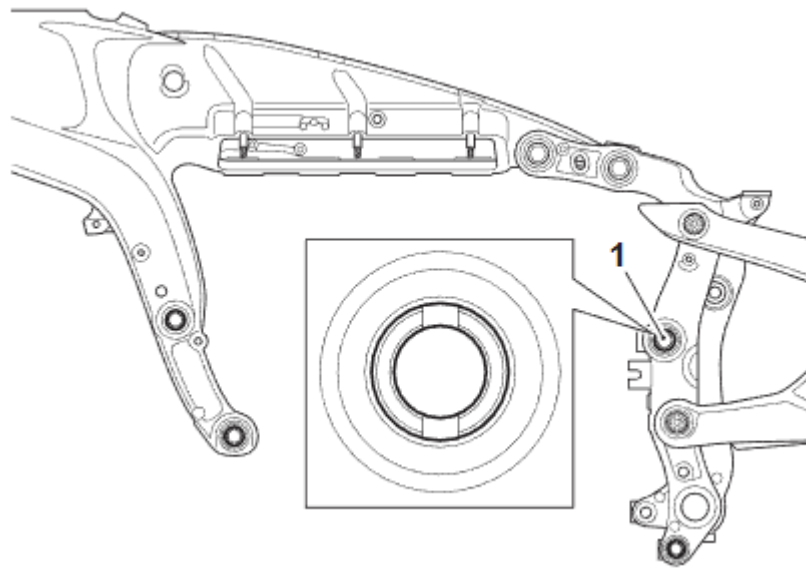
29. Using service tool T3880181 tighten the cylinder head right hand rear frame adjuster to 3 Nm.



Right Hand Frame Adjuster

1. Cylinder head frame adjuster
2. Crankcase frame adjuster
3. Outrigger

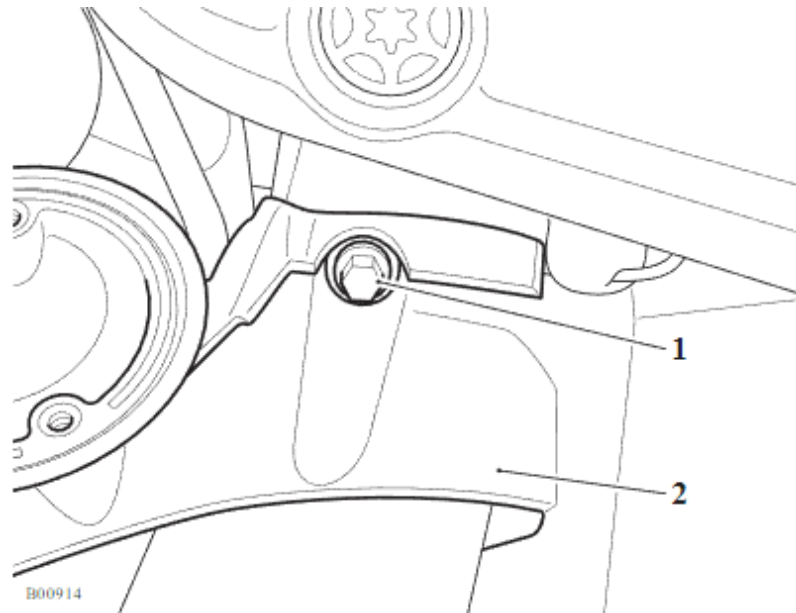
30. Insert the cylinder head rear mounting bolt from the right hand side with a washer between the bolt and the outrigger.
31. Using service tool T3880181 tighten the cylinder head left hand rear frame adjuster to 3 Nm.



1. Frame adjuster

32. Fit the washer and new lock nut to the cylinder head rear mounting bolt. Do not fully tighten at this stage.
33. Counter hold the lock nut and tighten the cylinder head front mounting bolt to 80 Nm.
34. Counter hold the lock nut and tighten the cylinder head rear mounting bolt to 80 Nm.
35. Counter hold the lock nut and tighten the crankcase front mounting bolt to 80 Nm.
36. Tighten the crankcase right hand rear mounting bolt to 48 Nm.
37. Tighten the crankcase left hand rear mounting bolt to 48 Nm.

38. Secure the left hand side panel moulding to the frame, tighten the fixing to 3 Nm.



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| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Side panel moulding</li></ol> |
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39. Fit the engine oil dipstick.

40. Connect the cooling fan speed controller to the main harness.

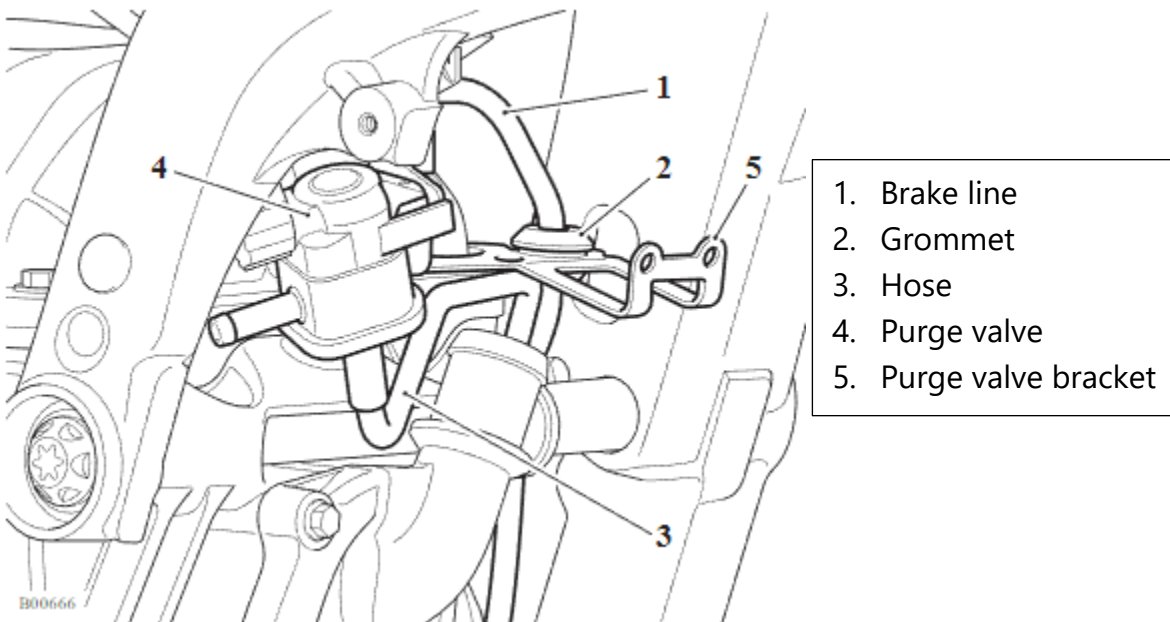
41. Connect the coolant temperature sensor to the main harness.

42. Position the rear brake line to the motorcycle.

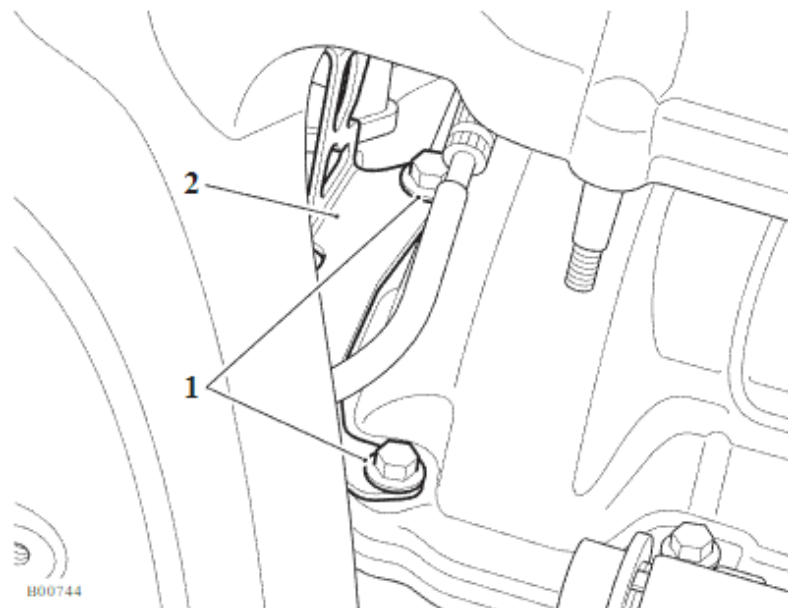
43. Position the purge valve and bracket assembly to the cylinder head.

44. Attach the brake line and its grommet to the bracket.

45. Attach the hose to the purge valve.

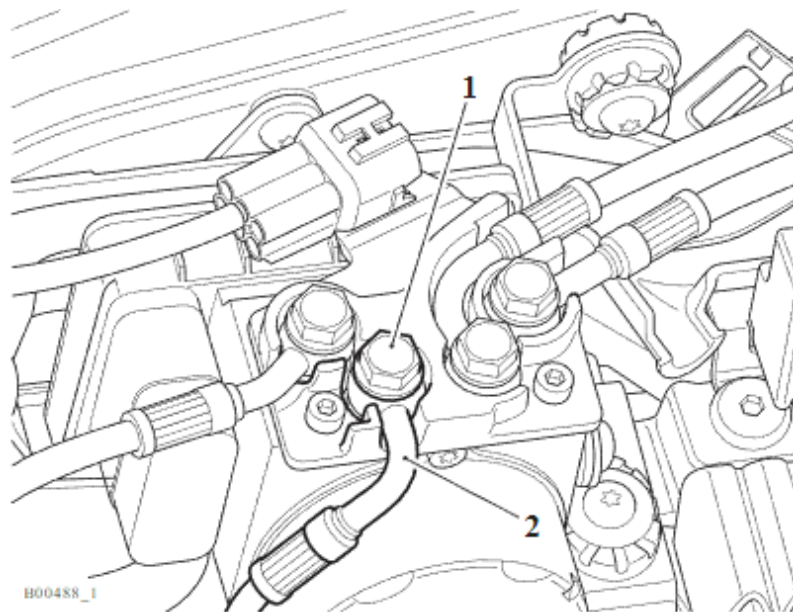


46. Attach the purge valve bracket to the cylinder head and tighten the fixings to 10 Nm.



47. Incorporating new sealing washers to either side of the union, fit the brake line to the ABS modulator as noted for removal. Tighten the brake line union to 25 Nm.

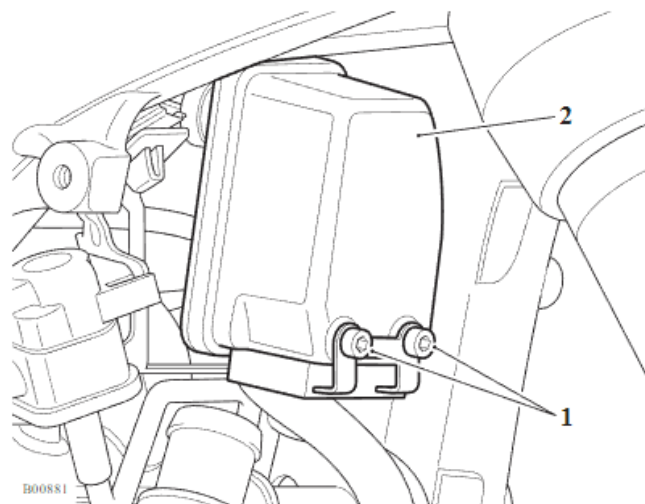
48. Release the brake line union for the rear brake master cylinder at the ABS hydraulic modulator. Discard the sealing washers.



- 1. Brake line union
- 2. Brake line (rear master cylinder)

49. Connect the ABS modulator multiplug (see [ABS Electrical Connectors](#)).

50. Route the secondary air injection hoses as noted for removal, fit the silencer box and tighten the fixings to 5 Nm.

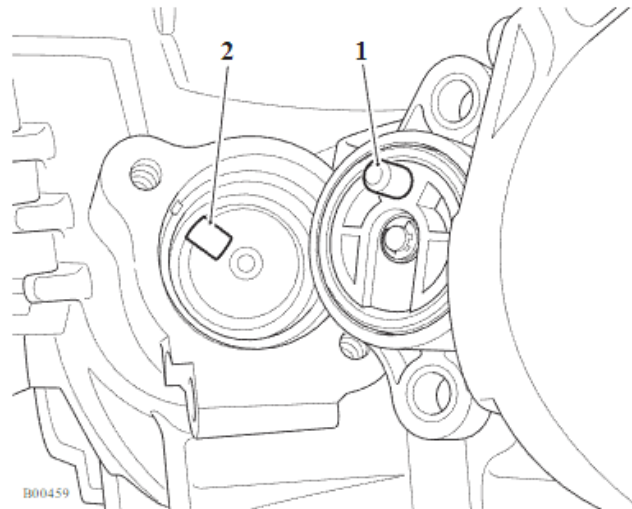


- 1. Fixings
- 2. Secondary air injection silencer box

51. Route the alternator and regulator/rectifier harnesses to the regulator/rectifier as noted for removal.

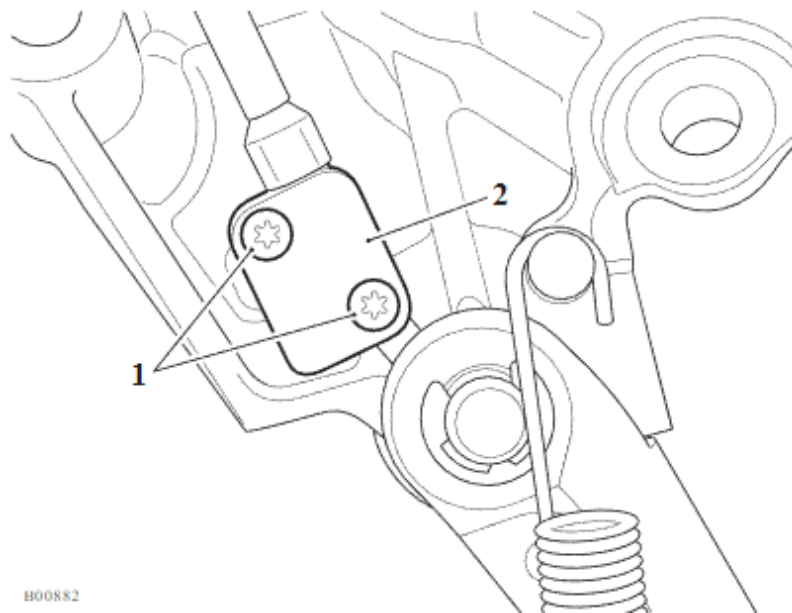
52. Rout the gear position sensor as noted for removal.

53. Fit two new O-rings to the gear position sensor. Lubricate the O-rings with a smear of petroleum jelly.
54. Fit the gear position sensor to the engine. Make sure that the locating pin on the sensor fits into the hole in the end of the gear selector drum.



- 1. Locating pin
- 2. Hole

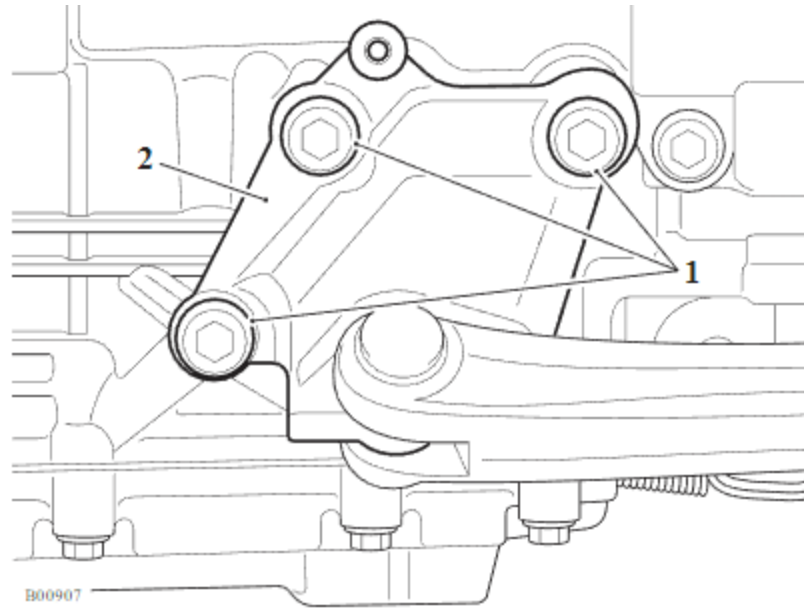
55. Fit the gear position sensor fixings and tighten to 10 Nm.
56. Attach the side stand switch to the side stand assembly and tighten the new fixings to 3 Nm.



- 1. Fixings
- 2. Side stand switch

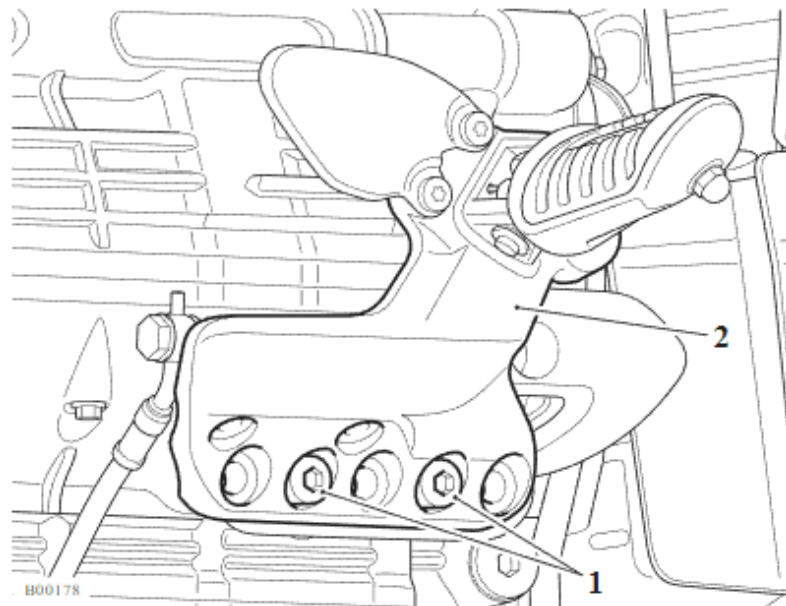


57. Fit the side stand assembly to the crankcase and tighten the fixings to 41 Nm.



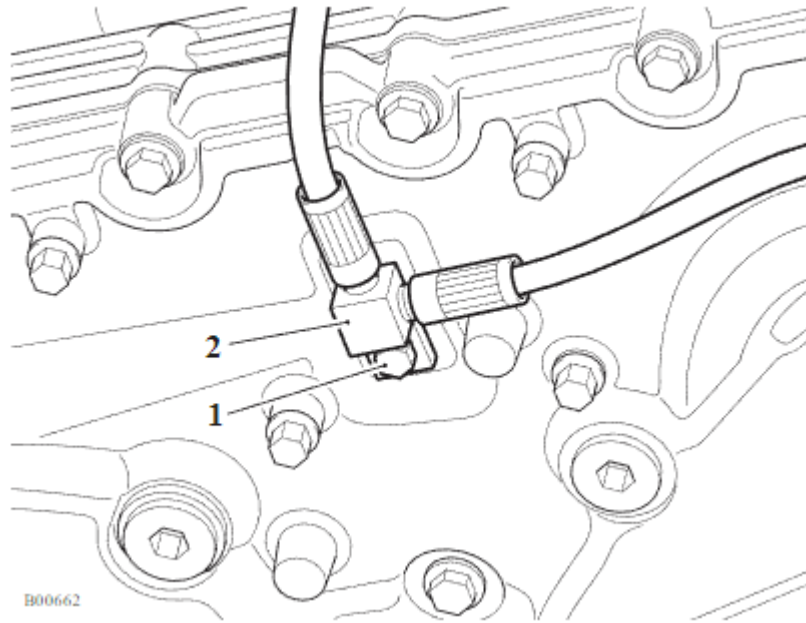
1. Fixings
2. Side stand assembly

58. Fit the rider right hand control plate to the engine and tighten the fixings to 25 Nm.



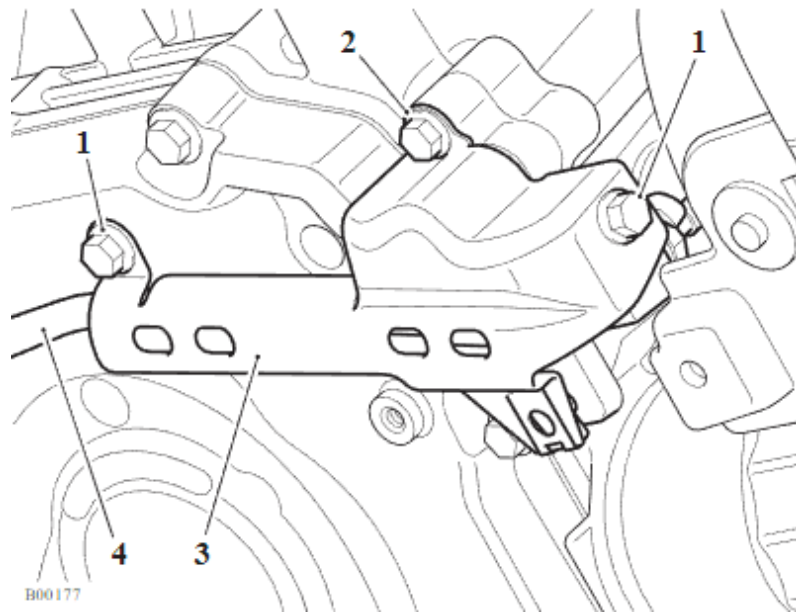
1. Fixings
2. Right hand control plate

59. Attach the rear brake line to the sump and tighten the fixing to 4 Nm.



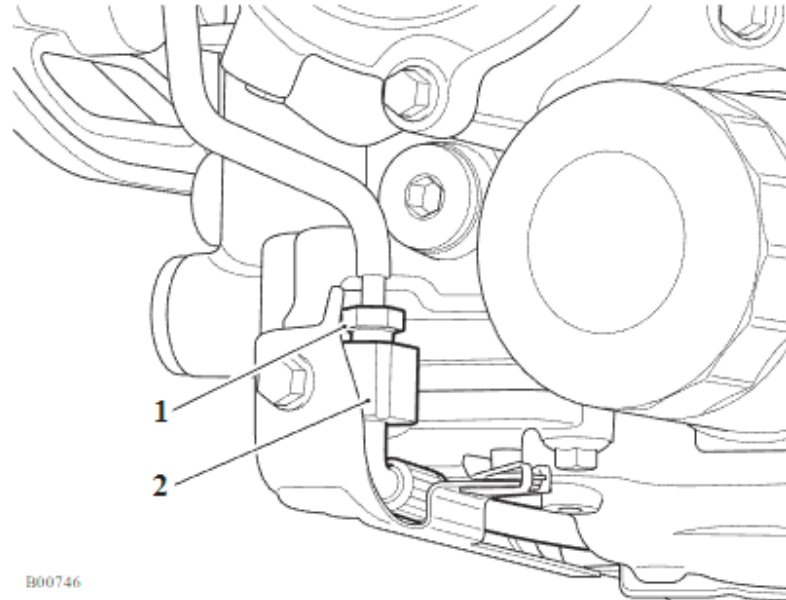
- 1. Fixing
- 2. Brake line

60. Fit the rear brake line front bracket and tighten its fixings as shown in the illustration.



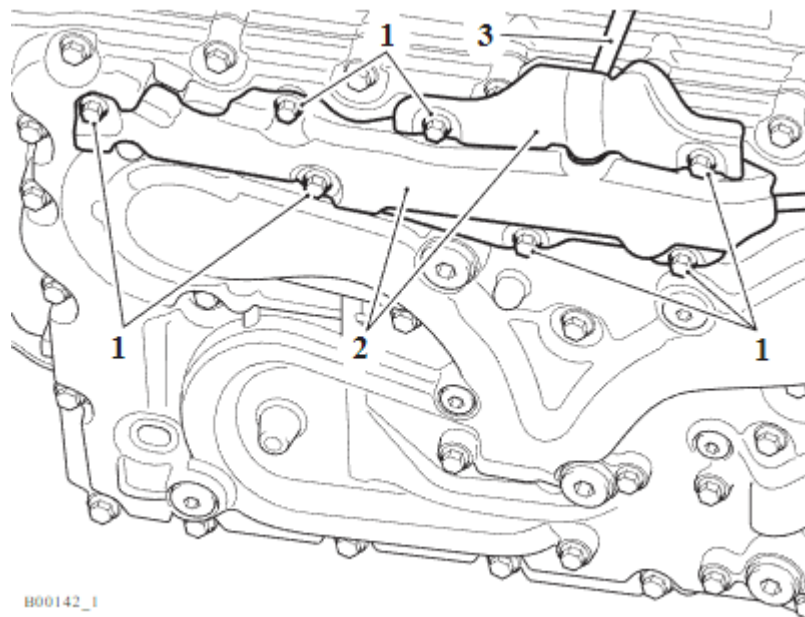
- 1. Fixings - tighten to 5 Nm
- 2. Fixing - tighten to 8 Nm
- 3. Brake line bracket
- 4. Rear brake line

61. Attach the rear brake line to the union block at the front of the sump and tighten to 5 Nm.



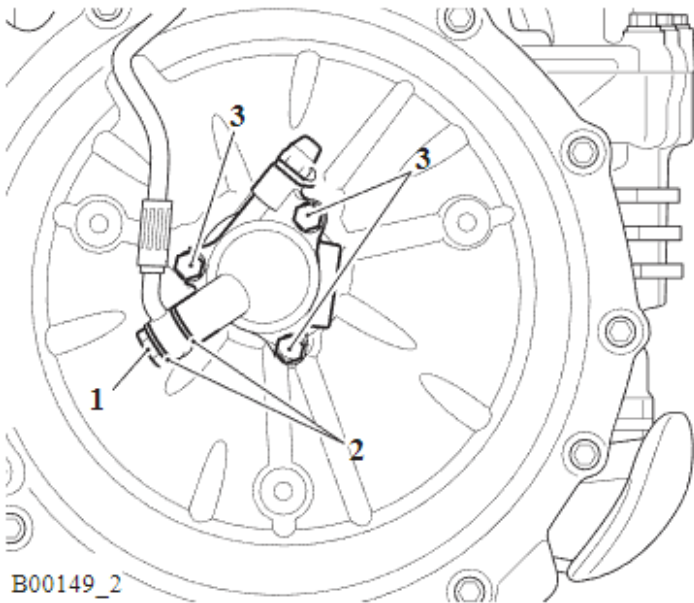
- 1. Rear brake line
- 2. Union block

62. Route the brake line and the coolant expansion tank hose as noted for removal. Fit the brake line two rear brackets and tighten the fixings to 5 Nm.



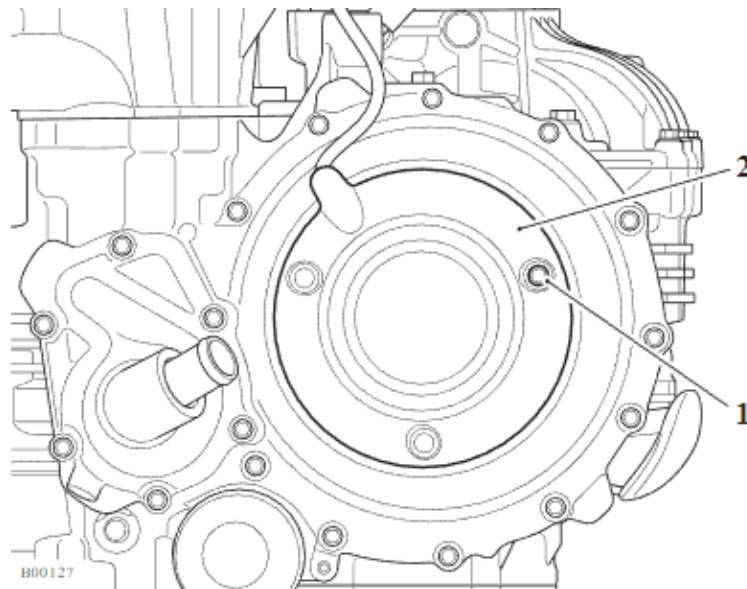
- 1. Fixings
- 2. Brake line bracket
- 3. Brake line

63. Fit a new clutch slave cylinder gasket.
64. If fitted remove the rubber band or cable tie securing the piston to the slave cylinder.
65. Fit the clutch slave cylinder as noted for removal and tighten its fixings to 10 Nm.
66. Fit two new sealing and tighten the clutch hose union bolt to 25 Nm.
67. Bleed the clutch (see [Bleeding the Clutch](#)).



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| <ol style="list-style-type: none"> <li>1. Union bolt</li> <li>2. Sealing washers</li> <li>3. Fixings</li> </ol> |
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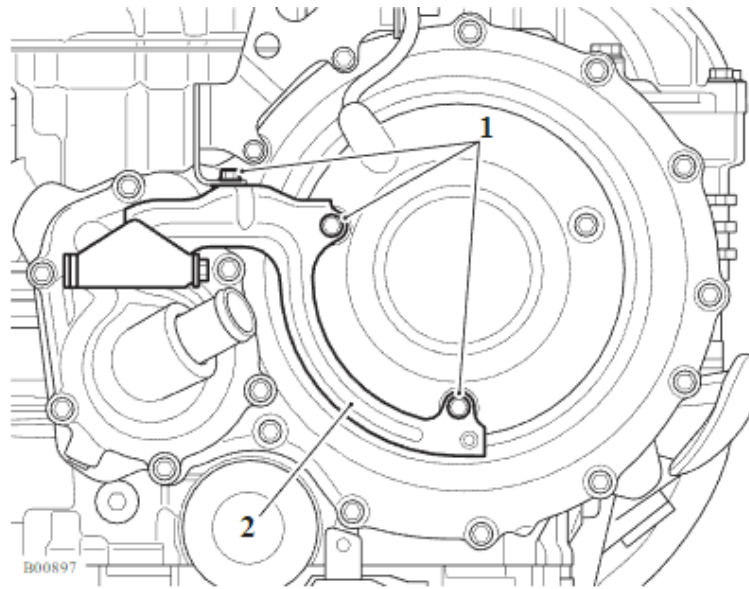
68. Check the clutch for correct operation and fluid leaks. Rectify as necessary.
69. Fit the clutch cover finisher and secure with the single fixing as noted for removal. Do not fully tighten the fixing at this stage.



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| <ol style="list-style-type: none"> <li>1. Fixings</li> <li>2. Clutch cover finisher</li> </ol> |
|--|

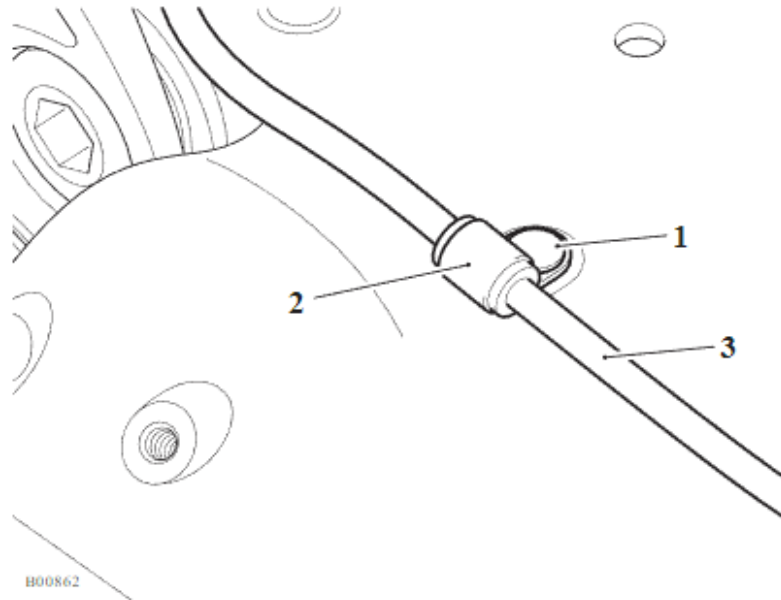
70. Fit the lower radiator cowl bracket and tighten the clutch cover fixings to 10 Nm.

71. Secure the radiator lower bracket to the lower radiator cowl bracket and tighten the fixing to 5 Nm.



- 1. Fixings
- 2. Bracket

72. Attach the rear brake hose P-clip to the swinging arm with a new fir tree clip.



- 1. Fir tree clip
- 2. P-clip
- 3. Rear brake hose

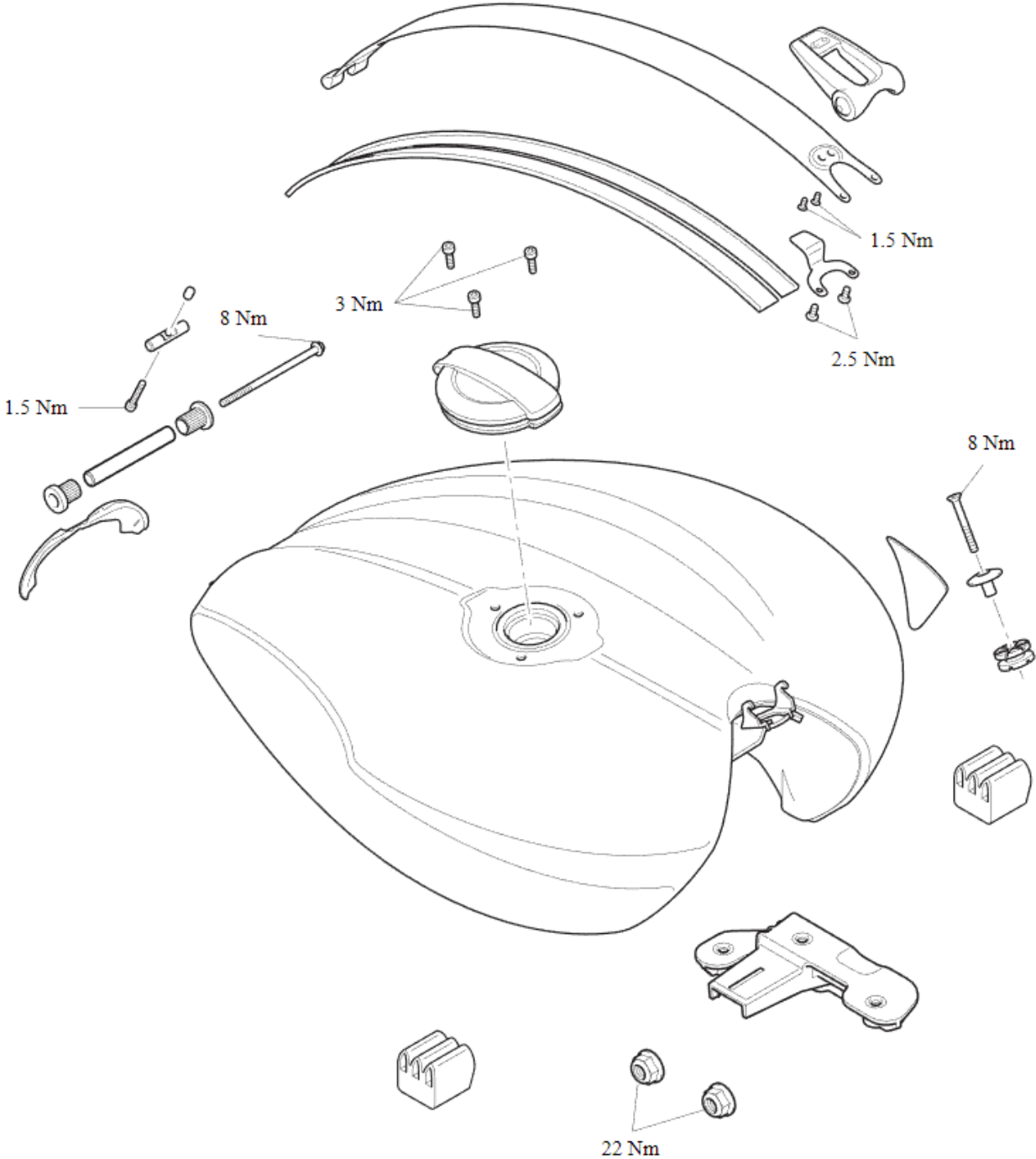
Perform the following operations:

- [Rear Bevel Box - Installation](#)
- [Rear Suspension Linkage - Installation](#)
- [Rear Suspension Unit - Installation](#)
- [Rear Bevel Box - Installation](#) with the final drive shaft.
- [Catalytic Converter - Installation](#)
- [Rear Wheel - Installation](#)
- [Left Hand Control Plate - Installation](#)
- [Starter Motor - Installation](#)
- [Side Panels - Installation](#)
- [Exhaust Headers - Installation](#)
- [Secondary Air Injection Solenoid - Installation](#)
- [Ignition Coils - Installation](#)
- [Evaporative Canister - Installation](#)
- [Radiator - Installation](#)
- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Fuel Tank - Installation](#)
- [Coolant Replacement - Filling](#)
- [Bleeding the Rear Brake](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

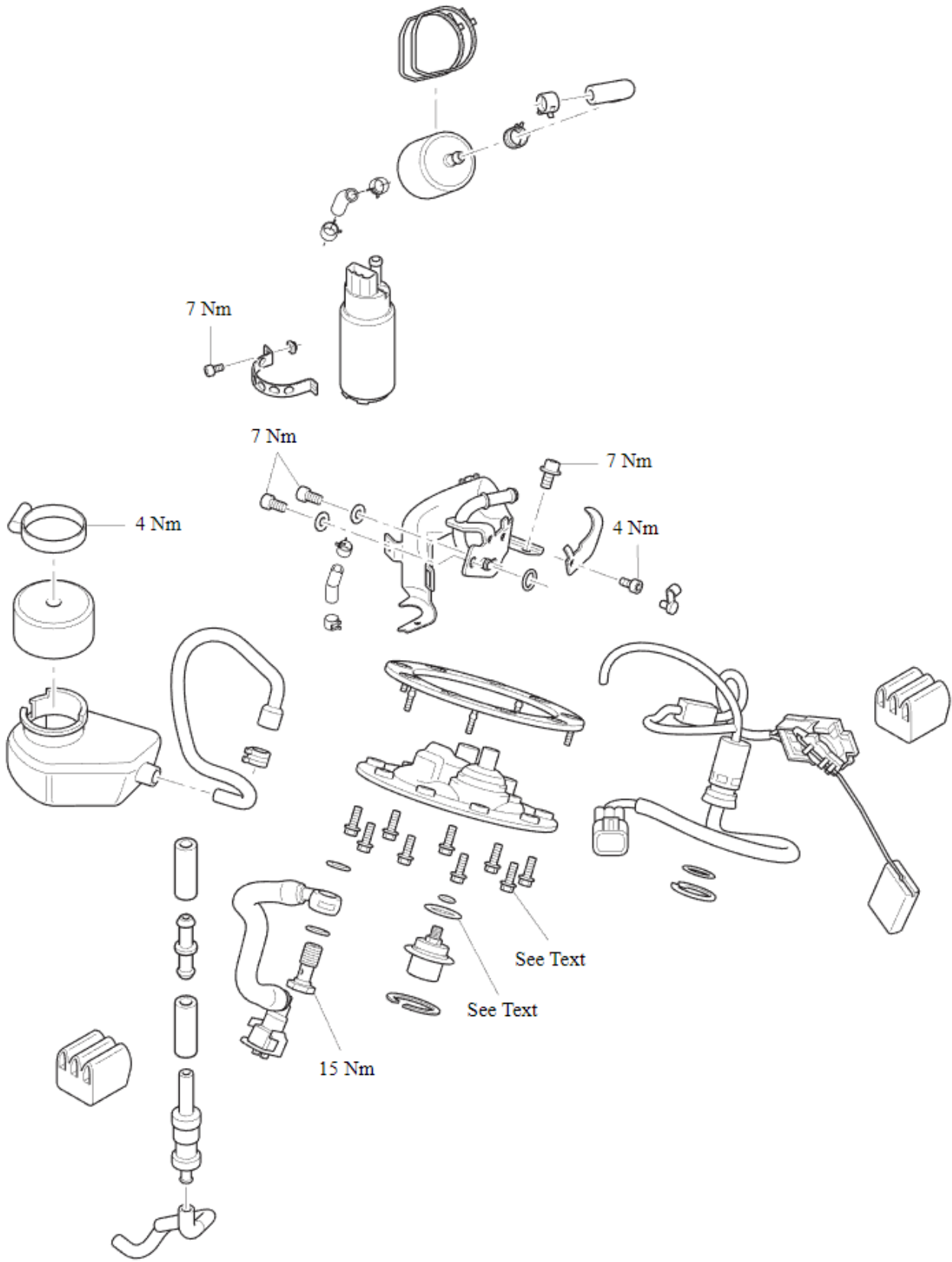
# Fuel and Exhaust System and Engine Management

## Exploded Views

### Exploded View - Fuel Tank

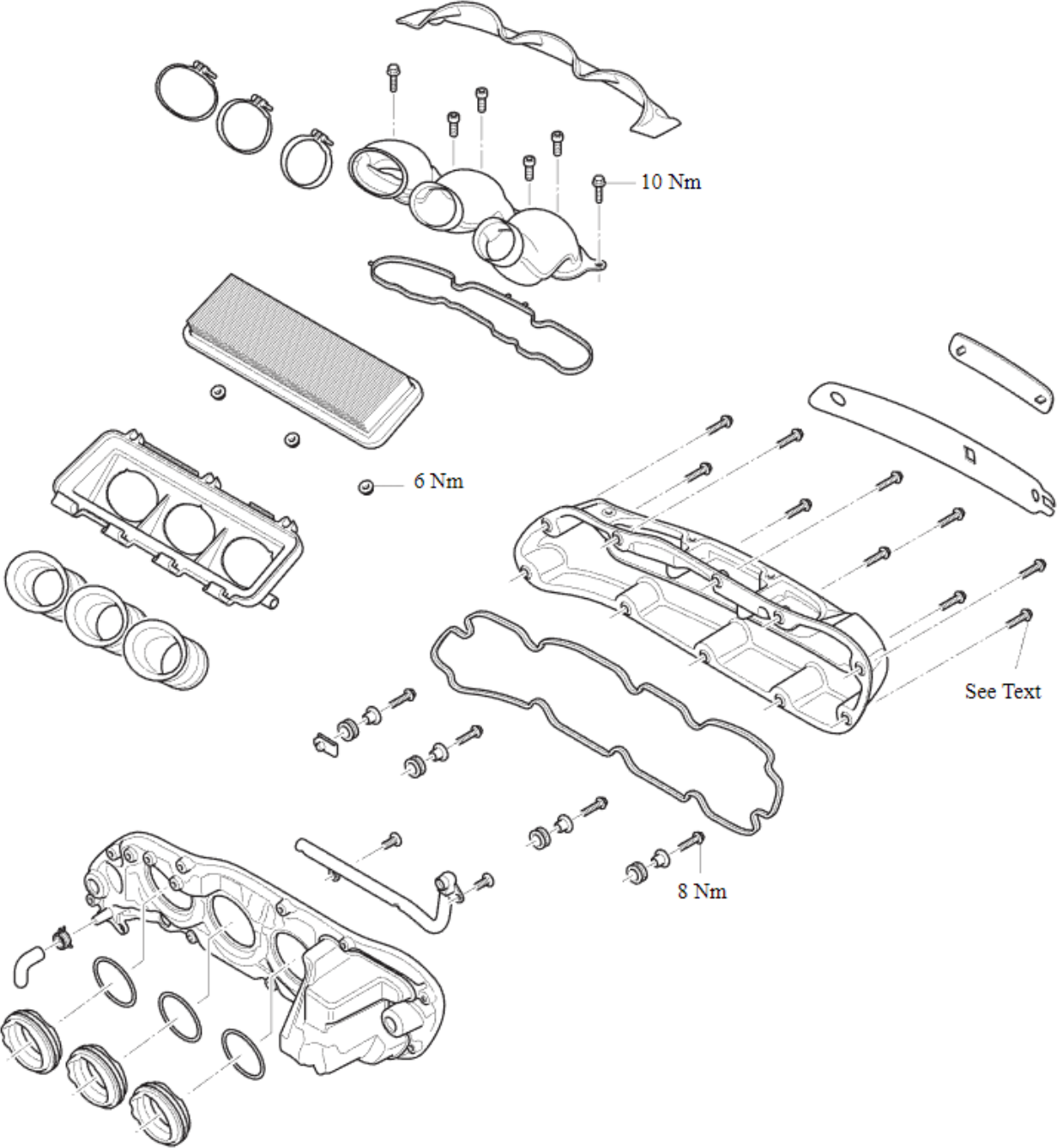


# Exploded View - Fuel Pump

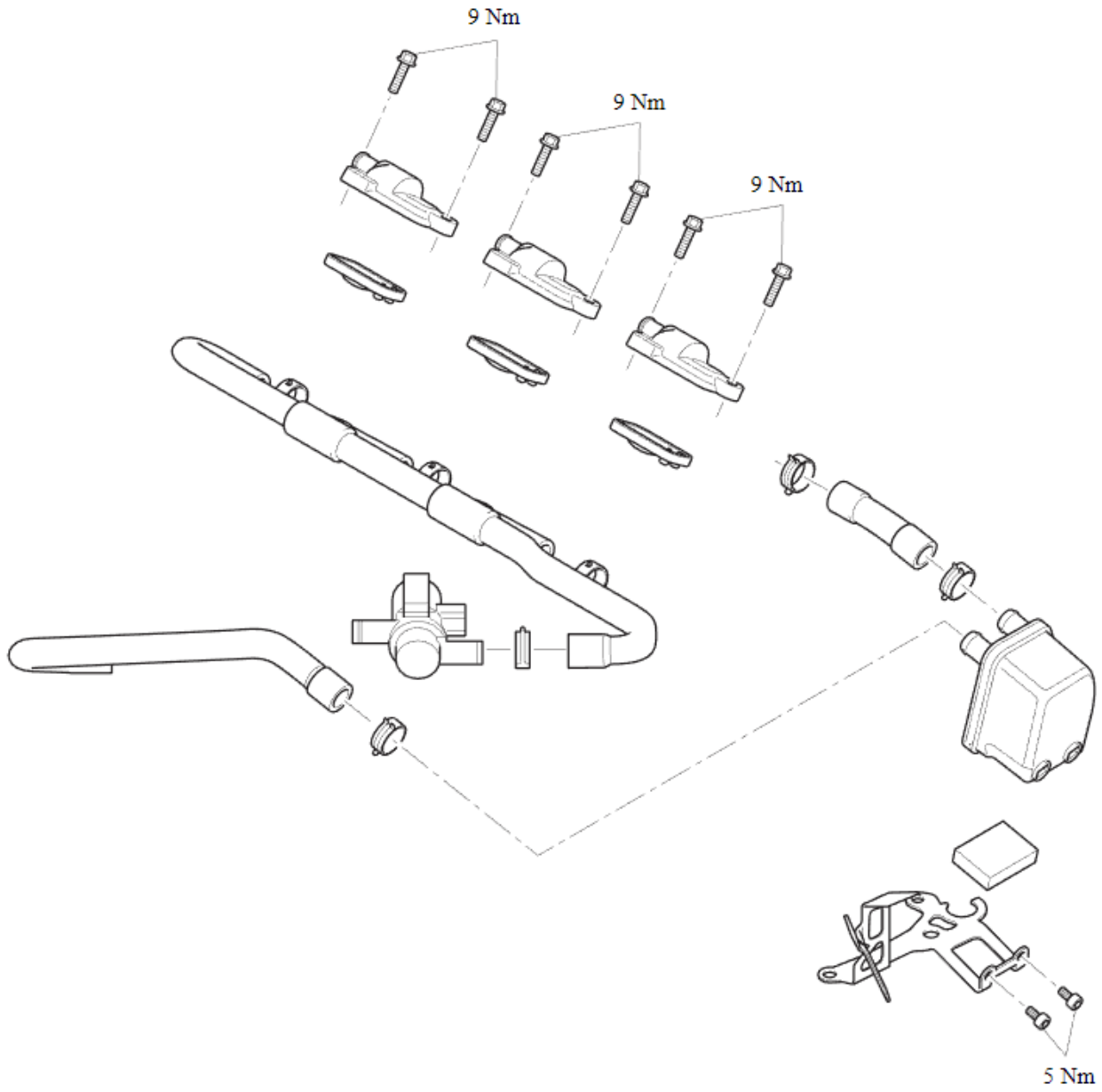




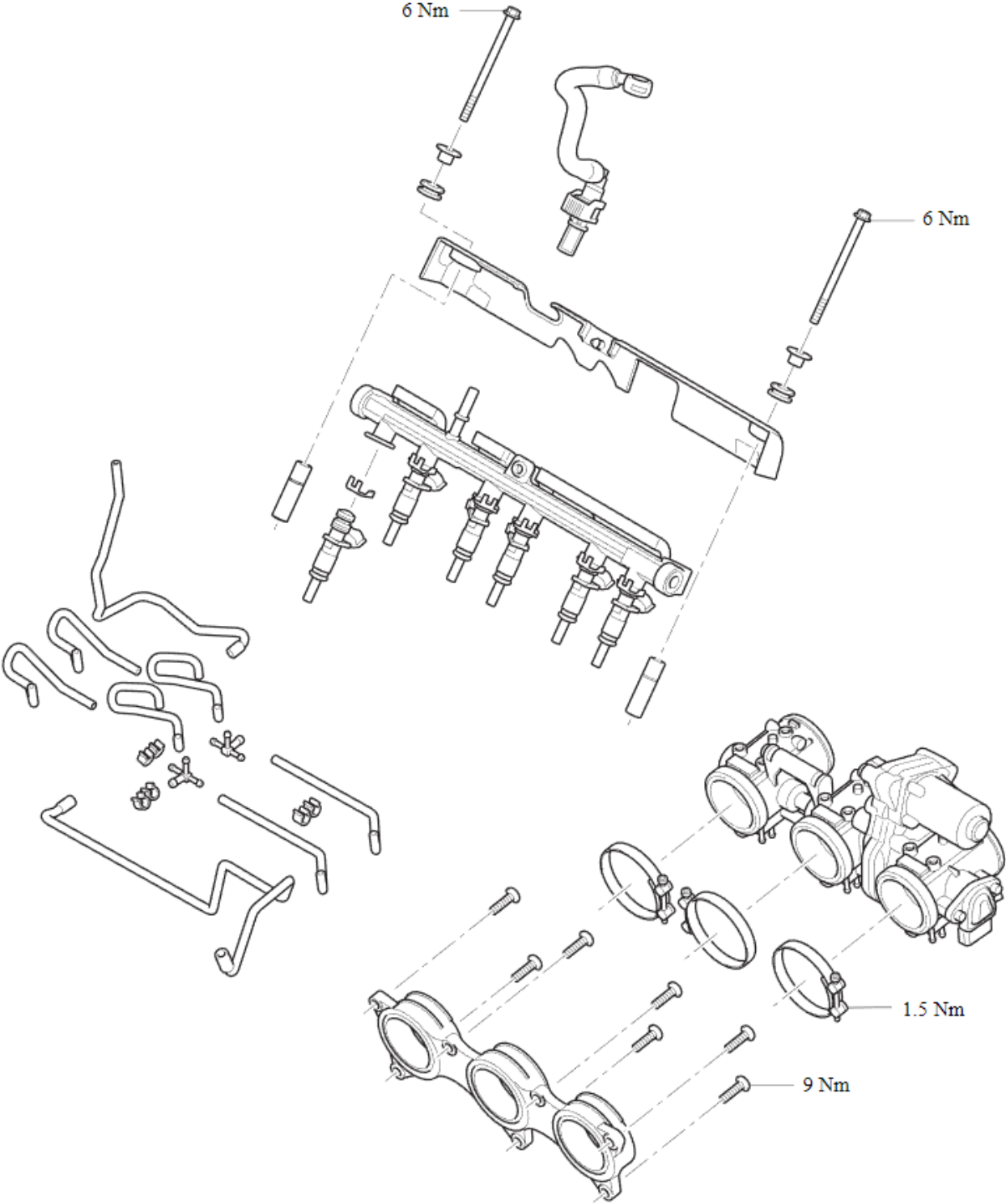
Exploded View – Airbox



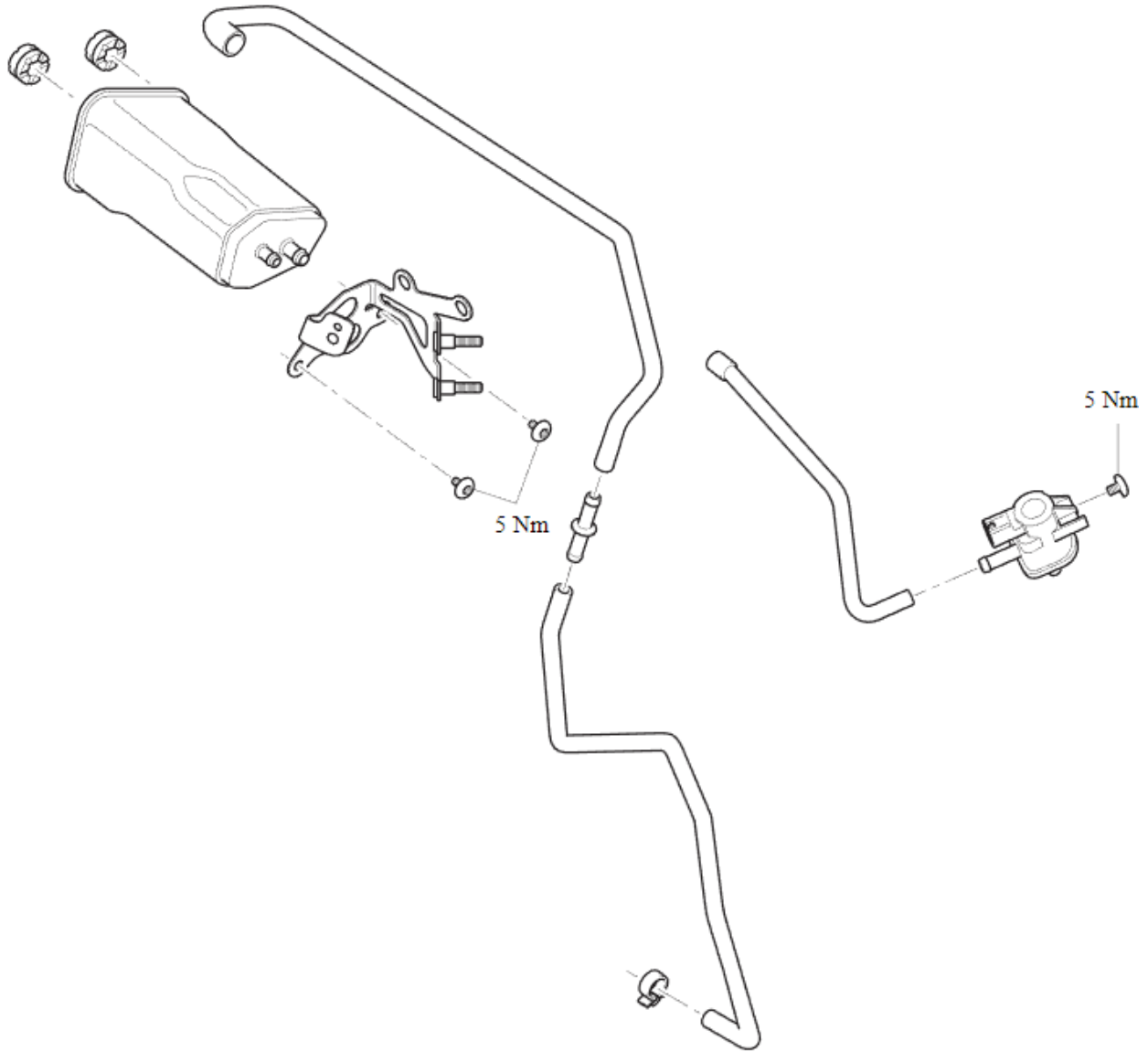
Exploded View - Secondary Air Injection



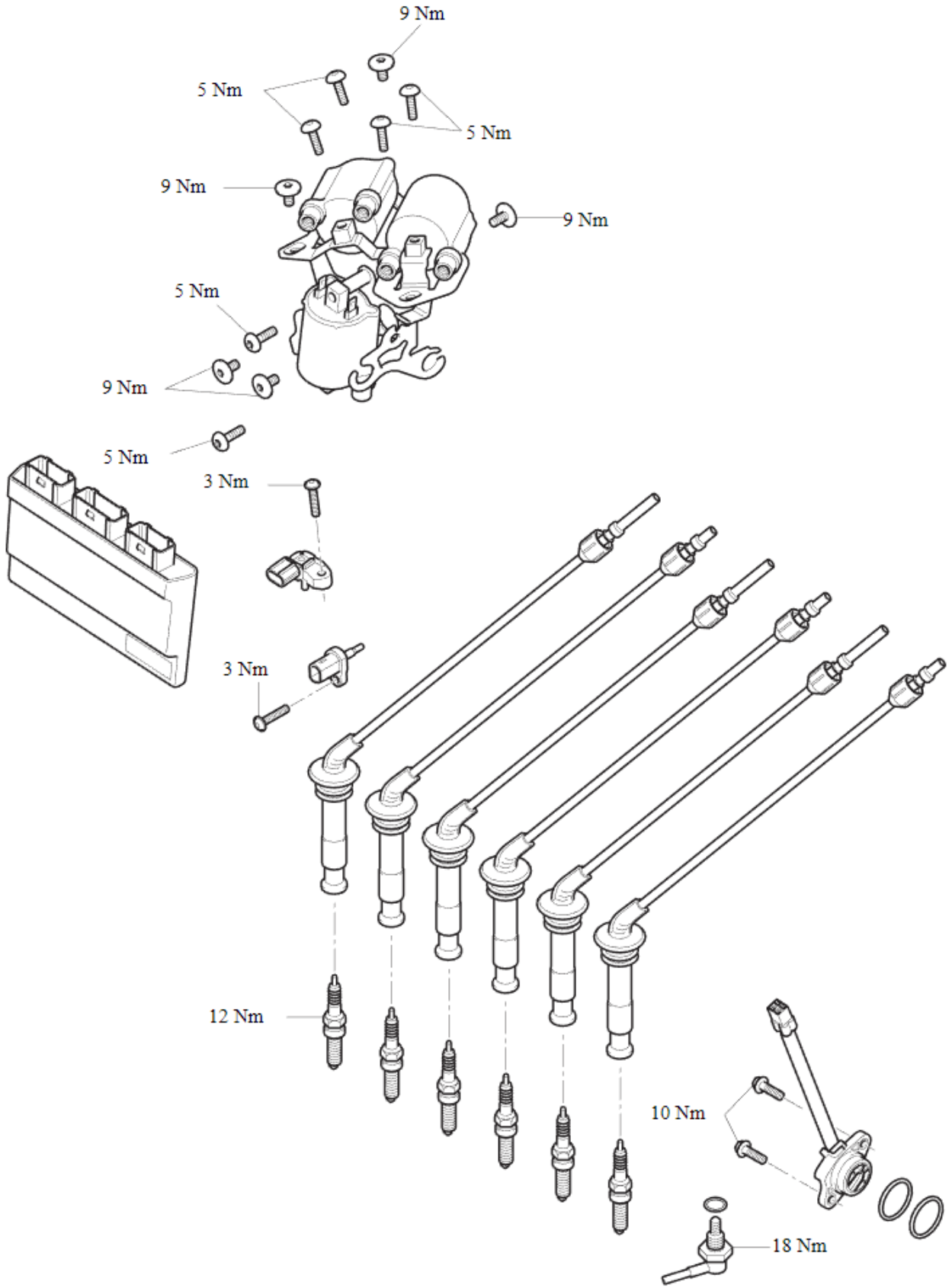
Exploded View - Fuel Rail, Throttles and Injectors



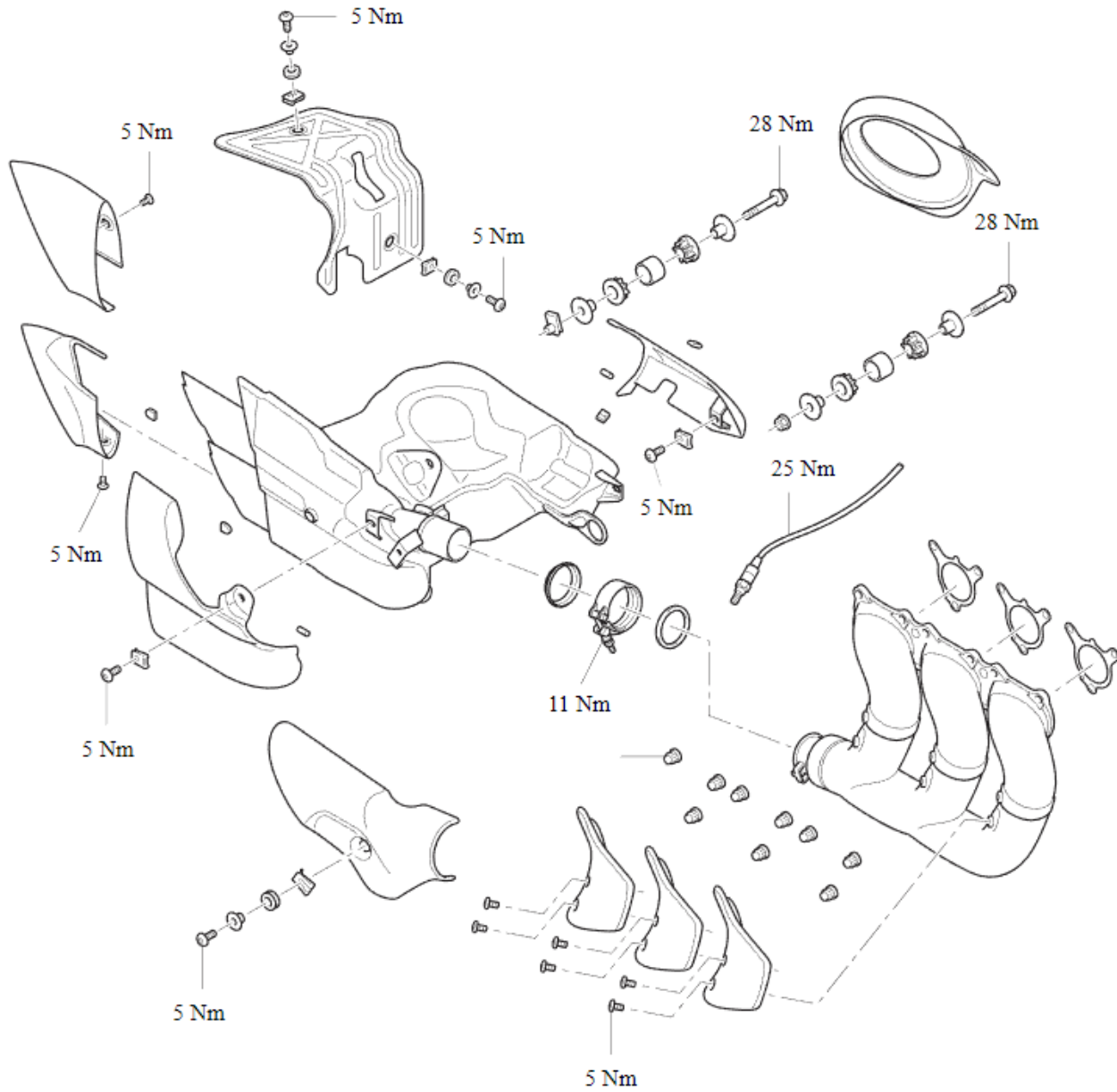
Exploded View - Evaporative System



Exploded View - Engine Management System



## Exploded View - Exhaust System



## Engine Management

### Fuel Requirements

Fuel Requirements - all countries except USA

This model must be run on 91 RON or higher unleaded fuel.

## Ethanol

Ethanol is added to petrol in volumes up to 10% in Europe and up to 85% in other countries. Triumph motorcycles can use fuel containing ethanol up to 25%.

## Fuel Requirements - USA

In the United States of America where the octane rating of fuel is measured in a different way, the following information may be applied:

This model is designed to run on unleaded gasoline with a CLC or AKI octane rating  $(R+M)/2$  of 87 or higher.

### **NOTICE**

If 'Knocking' or 'Pinking' occurs at a steady engine speed under normal load, use a different brand of gasoline or a higher octane rating.

### **⚠ CAUTION**

The use of leaded gasoline is illegal in some countries, states or territories and will invalidate the vehicle and emissions control warranties. Additionally, leaded gasoline will cause damage to emissions control components.

## Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. This model will give best performance when using unleaded gasoline. However, the following should be used as a guide to the use of oxygenated fuels.

### **⚠ CAUTION**

Because of the generally higher volatility of oxygenated fuels, starting, engine response and fuel consumption may be adversely affected by their use. Should any of these difficulties be experienced, run the motorcycle on normal unleaded gasoline.

## Ethanol

Ethanol fuel is a mixture of 10% ethanol and 90% gasoline and is often described under the names 'gasohol', 'ethanol enhanced', or 'contains ethanol'. This fuel may be used in Triumph motorcycles.

## Methanol

### CAUTION

Fuels containing methanol should not be used in Triumph motorcycles as damage to components in the fuel system can be caused by contact with methanol.

## MTBE (Methyl Tertiary Butyl Ether)

The use of gasolines containing up to 15% MTBE (Methyl Tertiary Butyl Ether) is permitted in Triumph motorcycles.

## Glossary of Terms

The following terms and abbreviations will be found in this section. Below is given a brief explanation of what some of the more common terms and abbreviations mean.

### **ABDC**

After Bottom Dead Centre.

### **Air temperature**

The air temperature in the airbox and intake hose.

### **Air temperature sensor**

Sensor to detect the temperature of the incoming air.



**Ambient air pressure**

Pressure of the air in the airbox.

**ATDC**

After Top Dead Centre.

**BBDC**

Before Bottom Dead Centre.

**BDC**

Bottom Dead Centre.

**BTDC**

Before Top Dead Centre (TDC).

**Battery Voltage**

The voltage at the input to the Engine Electronic Control Module (ECM).

**Catalytic converter**

Device placed in the exhaust system which converts toxic gases and pollutants in exhaust gas into less-toxic pollutants by an oxidation and a reduction reaction.

**Closed throttle position**

Throttle position at idle, measured as a voltage and expressed as a percentage.

**Coolant temperature**

The coolant temperature in the cylinder head.

**Coolant temperature sensor**

Sensor which detects coolant temperature.

**Cooling fan status**

The ON or OFF condition of the cooling fan.

**Cooling fan variable speed controller**

The cooling fan controller controls the cooling fans at various speeds depending on the temperature of the coolant.

**Cruise control cancel switch (if fitted)**

A switch located in the twist grip housing, used to cancel the cruise control. The switch is operated by the over-closing of the twist grip.

**DTC**

Diagnostic Trouble Code.

**Electronic steering lock (if fitted)**

The electronic steering lock operated by a switch.

**EMS main relay**

Engine Management System Main Relay. When the ignition is switched on, the EMS main relay is powered up to provide a stable Voltage supply for the engine ECM.

**Engine ECM**

Engine Electronic Control Module.

**Engine speed**

The crankshaft revolutions per minute.

**Fall detection (if fitted)**

The fall detection switch will detect if the motorcycle is on its side and will cut power to the engine ECM immediately.

If the fall detection switch is fitted, the inertial measurement unit (IMU) will not be fitted.

**Freeze-frame**

A data set captured at the time a Diagnostic Trouble Code (DTC) is set.

**Gear position sensor**

Gearbox mounted sensor which delivers information to the engine ECM. This is converted to the gear position value that is displayed on the instrument's gear position indicator and/or neutral lamp.

**Idle fuel trim**

The percentage above or below the nominal fuel requirement for the volume of air entering at idle.

**Idle fuelling**

Adjustment of fueling at idle to suit the actual air inducted.

**Idle reference speed**

The target idle speed as determined by the engine Electronic Control Module (ECM). (It should be the same as the actual idle speed if the motorcycle is operating correctly).

**Ignition advance**

The timing of ignition at the spark plug relative to Top Dead Centre.

**Ignition switch position**

The ON or OFF position of either or both the ignition switch and the engine stop switch.

**Ignition timing**

Same as ignition advance.

**Immobiliser and Tyre Pressure Monitoring System (TPMS) Control Module**

The control module for the immobiliser and TPMS system.

**IMU (if fitted)**

The Inertial Measurement Unit measures the following:

- Longitudinal acceleration
- Vertical acceleration
- Lateral acceleration
- Pitch rate
- Yaw rate
- Roll rate

From these measurements the IMU calculates the motorcycle's lean angle.

The IMU outputs are used for multiple systems, for example, optimised cornering ABS (OCABS) and fall detection.

If the IMU is fitted, the fall detection switch will not be fitted.

**Injector pulse time**

The time during which an injector remains open (i.e. delivering fuel).

**Keyless ECM (if fitted)**

Keyless Electronic Control Module.

**Long term fuel trim**

Fueling after adapting to the engine's long term fueling requirements (closed loop only). See also short term fuel trim.

**MAP sensor**

Manifold Absolute Pressure (the air pressure in the intake system).

**MIL**

Malfunction Indicator Lamp.

Illuminates when most Diagnostic Trouble Codes (DTCs) are set.

**Neutral switch status**

The NEUTRAL or IN GEAR status of the transmission.

**Off idle fuel trim**

The percentage above or below the nominal fuel requirement for the volume of air entering at engine speeds other than idle. This function is not currently used in the Triumph system.

**Open circuit**

A break in an electrical circuit - current cannot flow.

**Over temperature**

High temperature within the engine Electronic Control Module (ECM) caused by an internal or external failure.

**Oxygen sensor**

The oxygen sensor measures the oxygen levels in the exhaust gases and feeds this information to the engine ECM. Based on this information, adjustments to air/fuel ratio are made.

**Primary throttle position sensor**

Sensor for the primary (lower) throttle position.

**Purge valve duty cycle (if fitted)**

The time the purge valve is open in an open/close cycle, expressed as a percentage of the cycle time.

**Road speed sensor**

The rear wheel speed sensor is used to supply road speed data to the engine ECM.

**Secondary air injection (if fitted)**

A small amount of air injected into the exhaust port to reduce the levels of pollutants in the exhaust gases.

**Sensor supply Voltage**

Supply voltage to the system sensors (nominally 5 volts).

**Short circuit**

A short cut in an electrical circuit - current bypasses the intended circuit (usually to ground).

**Short term fuel trim**

A correction applied to the fuel mixture during closed loop operation. This, in turn, has an effect on the long term fuel trim in that if an engine constantly requires mixture correction, the long term fuel trim will adapt to this requirement thus reducing the need for constant short term adjustment.

**Side stand status**

The 'up' or 'down' position of the side stand.

**Target dwell time**

The actual time from coil ON to coil OFF.

**TDC**

Top Dead Centre.

**Throttle actuator motor**

Motor used to open/close the throttle.

**Throttle position**

The position of the throttle butterfly given as a percentage of the movement range. When the data is displayed on the diagnostic software, fully open need not be 100% nor fully closed 0%.

**Throttle Voltage**

Voltage at the throttle potentiometer.

**TPMS (if fitted)**

Tyre Pressure Monitoring System.

## Twist grip position sensor

The twist grip position sensor is used to relay twist grip position information to the engine ECM. The engine ECM uses this information to drive the throttle actuation motor to the correct position.

## Transponder

A transponder-responder chip located in the ignition key. The transponder is activated by a radio signal sent out by the immobiliser control module, via an antenna located around the ignition switch. If the immobiliser control module does not receive the correct code signal from the transponder, the immobiliser will remain active and the engine will not start.

## Engine Management System

### System Description

This model is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The engine electronic control module (ECM) draws information from sensors positioned around the engine, cooling and air intake systems and precisely calculates ignition advance and fueling requirements for all engine speeds and loads.

In addition, the system has an on-board diagnostic function. For additional information, see [System Diagnostics](#).

### System Sensors

- **Intake air temperature sensor** - situated on the rear of the airbox plenum. As the density of the air changes with temperature (therefore the amount of oxygen available to ignite the fuel), an intake air temperature sensor is fitted. Changes in air temperature are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Ambient air pressure sensor** - situated on the on the engine electronic control module bracket under the rider's seat. The ambient air pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is

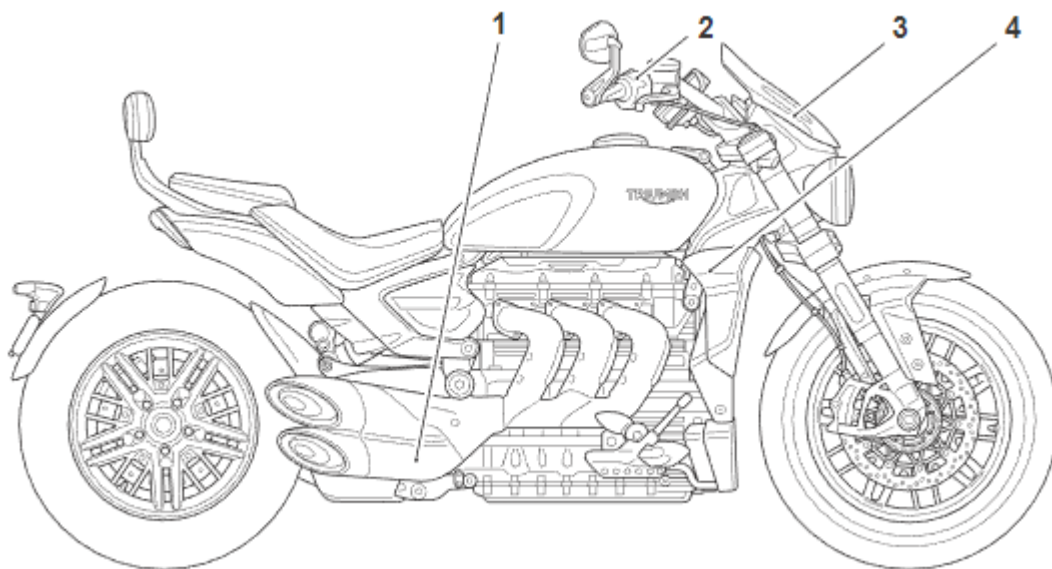


adjusted to suit the prevailing conditions.

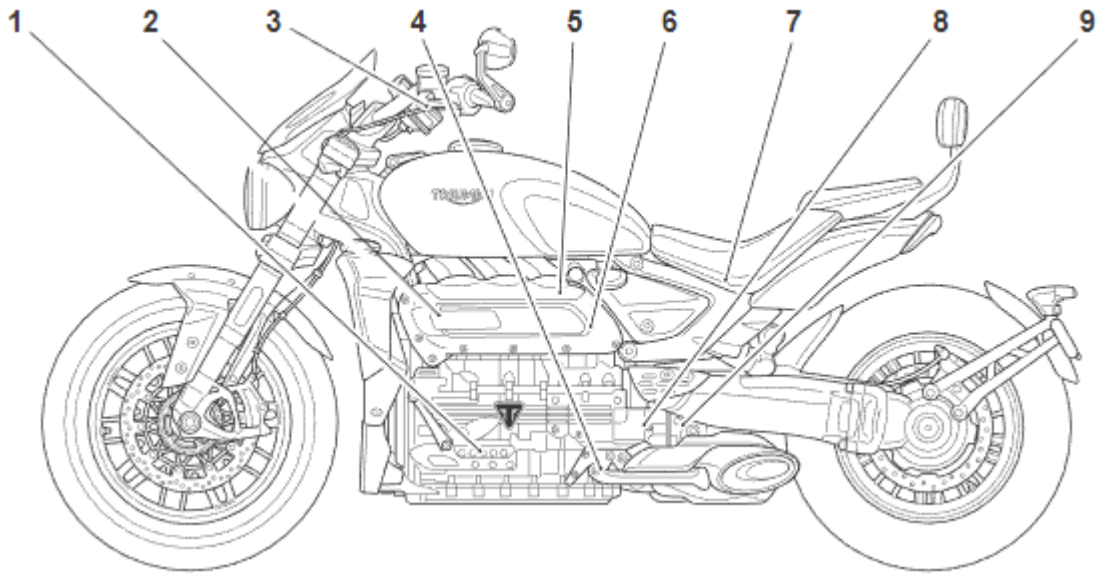
- **Manifold Absolute Pressure (MAP) sensor** - situated behind the airbox plenum, top right hand side, and is connected to each of the three throttle bodies by equal length tubes. The MAP sensor provides information to the engine ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the ECM. This degree of engine load accuracy allows the ECM to make very small adjustments to fuel and ignition which would otherwise not be possible from throttle angle data alone.
- **Clutch switch** - situated on the clutch lever. The clutch must be pulled in for the starter motor to operate.
- **Crankshaft position sensor** - situated in the alternator cover. The crankshaft position sensor detects movement of teeth attached to the alternator rotor. The teeth give a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the engine ECM to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the fuel occurs.
- **Engine coolant temperature sensor** - situated at the front of the cylinder head in the thermostat housing. Coolant temperature information, received by the engine ECM, is used to optimise fueling at all engine temperatures and to calculate hot and cold start fueling requirements.
- **Oxygen sensors** - situated in the front end of the catalytic converter assembly. The oxygen sensors constantly feed information to the engine ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.
- **Side stand switch** - situated at the top of the side stand leg. If the side stand is in the down position, the engine will not run unless the transmission is in neutral.
- **Twist grip position sensor** - situated in the twist grip housing. The twist grip position sensor is used to relay twist grip position information to the engine ECM. The engine ECM uses this information to drive the throttle actuation motor to the correct position.

- **Throttle position sensor** - situated on the left hand side of the throttle bodies. The throttle position sensor is used to relay throttle position information to the engine ECM.
- **Gear position sensor** - situated in the upper crankcase near the starter motor. The gear position sensor provides the engine ECM with selected gear information. This is used to prevent the engine from starting if the transmission is in gear. The TFT instruments will show the selected gear.
- **Triumph Shift Assist (TSA) (if fitted)** - situated on the gear change linkage. Triumph Shift Assist adjusts the engine torque to allow gears to engage, without closure of the throttle twist grip or operation of the clutch. This feature works for both up shifts and down shifts of gear. The clutch must be used for stopping and pulling away.

#### Sensor Locations



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Oxygen sensor</li> <li>2. Twist grip position sensor</li> <li>3. Ambient air temperature sensor</li> <li>4. Coolant temperature sensor</li> </ol> |
|---|



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Triumph Shift Assist (TSA) (if fitted)</li> <li>2. Throttle position sensor</li> <li>3. Clutch switch</li> <li>4. Side stand switch</li> <li>5. MAP sensor</li> <li>6. Intake air temperature sensor</li> <li>7. Ambient air pressure sensor</li> <li>8. Gear position sensor</li> <li>9. Crankshaft position sensor</li> </ol> |
|---|

## Actuators

### System Actuators

In response to signals received from the sensors, the engine ECM controls and directs messages to a series of electronic and electromechanical actuators. The function and location of the actuators is given below.

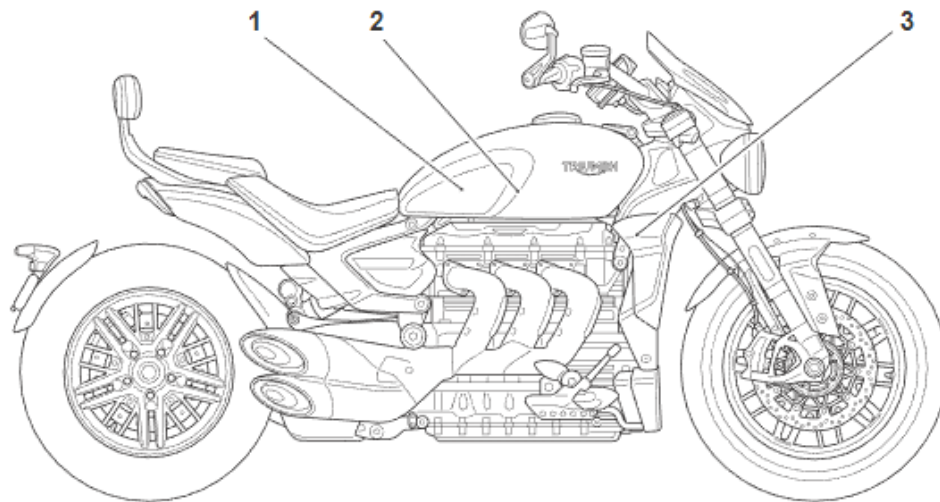
- **Throttle actuator motor** - situated on top of the throttle body. The throttle actuator motor opens and closes the throttle plate in the throttle body, in response to commands from the engine ECM. The throttle actuator motor is an integral part of the throttle bodies.

- **Canister purge valve** - situated in front of the cylinder head. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is 'pulsed' by the engine ECM to give control over the rate at which the canister is purged.
- **Injectors** - located in the cylinder head. The engine is fitted with six injectors (two for each cylinder). The spray pattern of the injectors is fixed but the length of time each injector can remain open is variable according to operating conditions. The duration of each injection is calculated by the engine ECM using data received from the various sensors in the system.
- **Ignition coils** - situated above the camshaft cover, attached to the frame. There are three coils fitted, one for each of the cylinders. There are two high tension leads from each ignition coil to the pair of spark plugs at each cylinder. The engine ECM controls the point at which the coils are switched on and off. In calculating the switch-on time, the engine ECM allows sufficient time for the coils to charge to a level where a spark can be produced. The coils are switched off at the point of ignition, the timing of which is optimised for good engine performance.
- **Engine management system relay** - situated in front of the battery under the rider's seat. When the ignition is switched on, the main power relay is powered up to provide a stable voltage supply for the engine ECM.
- **Fuel pump** - situated inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant 3.5 bar pressure. The pump is run continuously when the engine is operating and is also run briefly when the ignition is first switched on to ensure that fuel at 3.5 bar pressure is available to the system as soon as the engine is cranked. Fuel pressure is controlled by a regulator also situated inside the fuel tank.
- **Cooling fan speed controller** - situated behind the radiator. The cooling fans are controlled by the cooling fan speed controller. When the coolant temperature rises to 91°C the fans will operate at 10% speed. As the coolant temperature rises the fans speed will gradually increase up to 100% at 103°C.
- **Secondary air injection solenoid** - situated in front of the cylinder head. The secondary air injection solenoid controls airflow through the secondary air injection system.

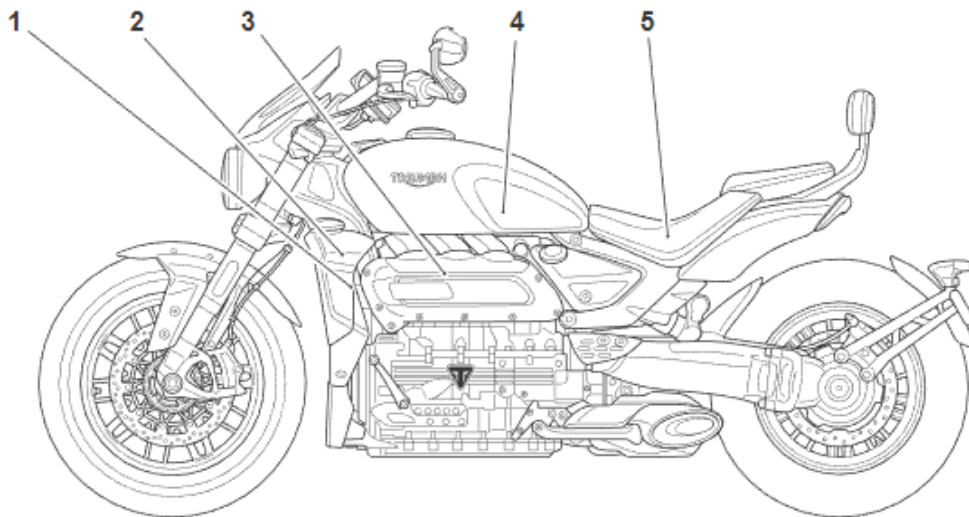
## NOTICE

In this system, the starter lockout system (clutch switch, neutral switch, side stand switch) all operate through the engine management ECM.

### Actuator Locations



1. Ignition coils
2. Evaporative canister
3. Canister purge valve



1. Cooling fan speed controller
2. Secondary air injection solenoid
3. Throttle actuator motor
4. Fuel pump
5. Engine management system relay

### System Description

This model is fitted with an electronic immobiliser and keyless ignition system to help protect it against theft. The immobiliser and keyless ignition system are incorporated in the keyless ECM. The keyless ECM has to be paired with the engine ECM and the ignition keys which each contain a transponder chip. If all the components are correctly paired, the immobiliser will allow the engine to start. These components can only be paired using the Triumph diagnostic tool.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the immobiliser system, a malfunction code is stored in the keyless ECM memory. This stored data can then be recovered using the Triumph diagnostic tool (see [System Diagnostics](#)).

### System Components and Operation

- **Transponder chip** - situated inside the ignition key. The chip is activated when requested by the keyless ECM, providing the key is in range of the LF antenna (within one meter/three feet for smart keys, within 50 mm for passive keys).
- **Low Frequency (LF) Antenna** - there are two LF Antenna on this model. One is situated on the left hand rear mudguard under tray. Two moulded in pips in the left hand undertray indicate the location of the LF antenna. The second is under the flyscreen on the right hand side. The transponder chip in the ignition key is activated when it is in range of the LF antenna. The signal from the chip is interpreted by the keyless ECM.
- **Keyless ECM** - situated at the rear of the airbox. This control module communicates with the transponder chip in the key via the LF antenna, and with the engine ECM. The keyless ECM will only allow the motorcycle's electronic systems to turn on and the engine to start if a matching signal is received.
- **Alarm/immobiliser warning indicator light** - situated in the instrument pack. The light will flash on and off for 24 hours to show that the engine immobiliser is on. When the ignition switch is turned to the ON position the immobiliser and the indicator light will be off. If the indicator light remains on it indicates that the

immobiliser has a malfunction that requires investigation. If an accessory alarm is fitted, the immobiliser indicator light will only illuminate when the conditions described in the accessory alarm instructions are met.

- **Electronic Steering Lock (ESL)** - Situated on the upper yoke. The ESL will activate to lock the steering when requested, provided that the motorcycle is stationary and the steering is positioned to full left hand lock to enable locking.

## Keys

When the motorcycle is delivered from the factory it is supplied with two standard keys and one smart key.

### **NOTICE**

An additional smart key can be purchased from your Triumph dealer. However, only three keys can be programmed to the motorcycle. This can be any combination of smart keys and standard keys.

A previously paired key must be present when pairing a new key.

Make sure all keys to be paired are present before starting the key pairing process.

Keys can be deleted or added to the immobiliser system using the Triumph diagnostic tool.

To make sure that the immobiliser system functions correctly note the following:

- Do not put any magnetic materials on the same key ring as the motorcycle key.
- Do not put any other ignition key with a transponder chip fitted near the motorcycle key when in use.
- Do not modify the immobiliser system.
- Do not submerge the key in water or any other fluid.
- Do not drop or strike the key against hard material.

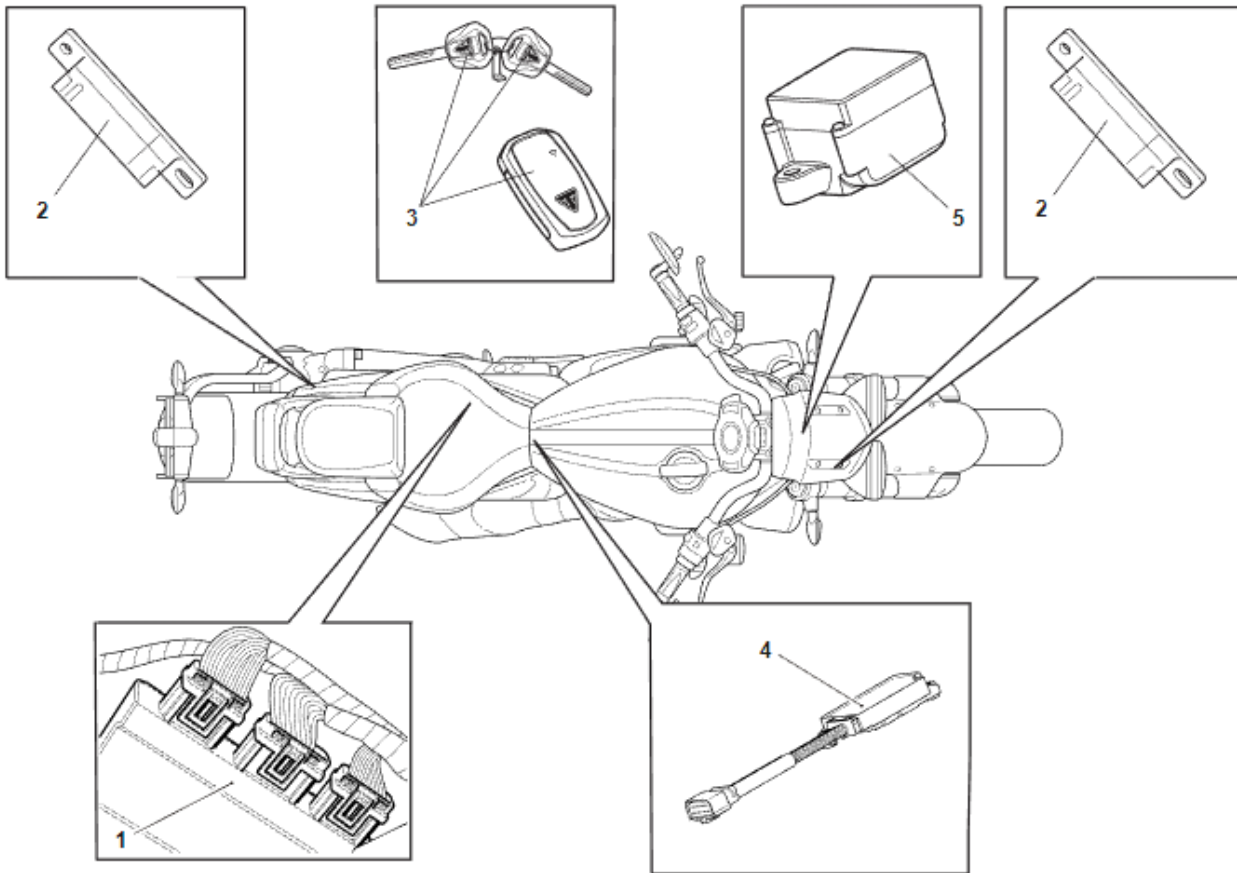
## Diagnostics

To fully diagnose the immobiliser system it is necessary to check for fault codes in the keyless ECM using the Triumph diagnostic tool (see [System Diagnostics](#)).

## Further Diagnosis

The diagnostic trouble code tables, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored (see System Diagnosis - Keyless ECM).

## Immobiliser Components Location



1. Engine ECM
2. LF Antenna
3. Transponder chip
4. Keyless ECM
5. Electronic steering lock



**NOTICE**

After the engine management adaption has been reset on this model, the Cruise Control Switch Check Function Test must be performed (see Cruise Control Switch Check). After the adaptations have been reset, DTC 1575 (cruise control disabled until button press sequence completed) will be stored, and the cruise control disabled, until the function test is completed.

General Information

The engine management system fitted to this model is adaptive. This means that the system is able to learn about new or changing operating conditions and continuously adapt itself without needing to constantly make major adjustments from a fixed baseline setting.

Adaptive changes can become necessary because of changing rider behaviour, changes in the region in which the bike is operated (i.e. operation at high altitude where it was previously used at sea level) or because a new part may have been fitted which has slightly different characteristics to the old part. All adaptive changes are automatic and require no intervention by rider or dealer.

Adaption Status

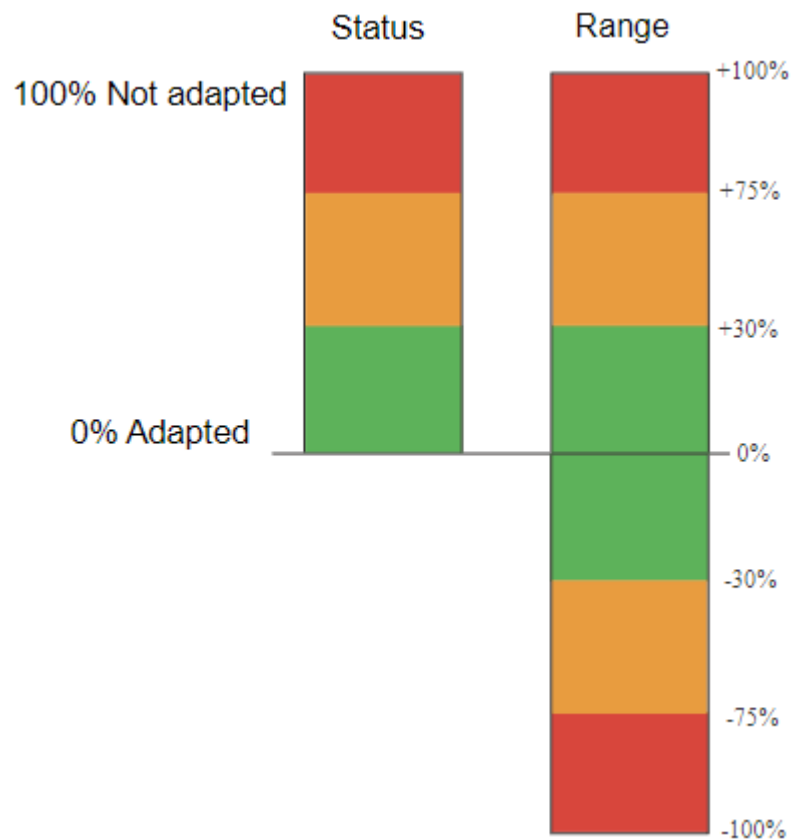
To see if a motorcycle has fully adapted, a facility named 'ADAPTION STATUS' is provided on the diagnostic tool. The following adaption details can be examined:

| <b>Function Examined</b>                  | <b>Report Method</b> |
|---|----------------------|
| Closed throttle position reference status | Adapted/not adapted  |
| Idle speed control adaption status        | %                    |
| Oxygen sensor adaption status (off idle)  | %                    |
| Oxygen sensor adaption range (off idle)   | %                    |
| Oxygen sensor adaption status (idle)      | %                    |
| Oxygen sensor adaption range (idle)       | %                    |

## Terminology

Where the term 'status' is used, this indicates how far the present operating parameter is from the stored (baseline) value. The nearer these figures are to zero the better as it indicates the motorcycle has adapted to its current operating conditions.

The term 'range' indicates how much (in percentage terms) of the adjustment range has been used to reach the current operating status.



## Typical Values

In a correctly adapted motorcycle, the following will be typical:

| Function Examined                         | Read Out               |
|---|------------------------|
| Closed throttle position reference status | Adapted                |
| Idle speed control adaption status        | Between +100 and -100% |
| Oxygen sensor adaption status (off idle)  | 0% +/- 10%             |
| Oxygen sensor adaption range (off idle)   | Between +100 and -100% |
| Oxygen sensor adaption status (idle)      | 0% +/- 10%             |
| Oxygen sensor adaption range (idle)       | Between +100 and -100% |

## Forcing Adaption to Take Place

If the read out indicates that the motorcycle is not adapted, the following will force the system to make adaptations:

### **WARNING**

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

### **NOTICE**

Resetting adaptations with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, causing poor engine running. Always reset the adaptations with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well ventilated area.

1. Make sure the engine is cold.
2. **WITHOUT TOUCHING THE THROTTLE**, start the engine and allow it to warm up until the cooling fan comes on.
3. Leave the engine to idle for a further 12 minutes.

### **NOTICE**

As an alternative to the above process, connect the diagnostic tool, select ADJUST TUNE (see the Triumph Diagnostic Tool User Guide) and select RESET ADAPTIONS. This will force a fast adaption routine to take place in around five seconds. For this to happen, the engine **MUST** be running, it must be at normal operating temperature and in closed loop control mode. Under any other conditions fast adaption will not take place and may cause default values to be loaded, which may then require a normal 12 minute adaption routine to be run.

## Fault Indications

If 'range' figures at 100% are seen, then the adjustment has reached maximum indicating a mechanical fault exists on the motorcycle. This can be due to a number of faults but the most likely causes will be low/high fuel pressure, faulty injectors or air leaks at the throttle bodies or airbox.

In these circumstances, locate and rectify the fault, and reset the adaptations as described above.

## Diagnosics and Testing

### Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

#### **NOTICE**

A major cause of hidden electrical faults can be traced to faulty electrical connectors.

For example:

Dirty/corroded terminals

Damp terminals

Broken or bent cable pins within multiplugs.

For example, the electronic control module (ECM) relies on the supply of accurate information to enable it to plan the correct fuelling and ignition timing. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

Before Disconnection:

- If testing with a voltmeter, the voltage across a connector should be virtually battery Volts (unless a resistor is fitted in the circuit). If there is a noticeable change, suspect faulty/dirty connections.

When Disconnecting a Connector:

- Check for a security device that must be released before the connector can be separated, for example barb, hook and eye.

#### When Inspecting a Connector:

- Check that the individual pins have not been bent
- Check for dampness/dirt/corrosion
- Check cables for security
- Check cable pin joints for damage.

#### When Connecting a Connector:

- Make sure there is no dirt around the connector/seal
- Make sure there is no dirt or dampness in or around the cavities of the ECU sockets.
- Push together squarely to ensure terminals are not bent or incorrectly located
- Push the two halves together positively.

#### Disconnection of the Engine ECM Connectors

### CAUTION

When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

### CAUTION

Never disconnect an ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

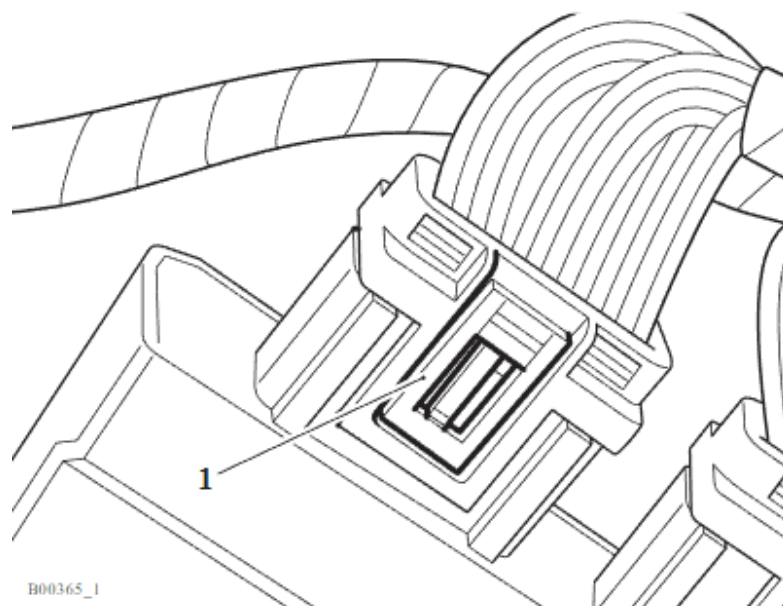
Always disconnect an ECM after disconnecting the battery negative (black) lead first.

1. Turn the ignition to the OFF position and wait at least 1 minute for the ECM to complete its power down sequence.
2. Detach the engine ECM from its bracket and the frame (see [Engine Electronic Control Module \(Engine ECM\) - Removal](#)).

#### NOTICE

Three connectors of two different size and colour are used for the engine ECM. Two connectors have 33 pins, one connector is coloured black and the other gray. One connector has 39 pins and is coloured black.

3. Press on the locking device and gently pull the electrical connector to release it from the engine ECM.



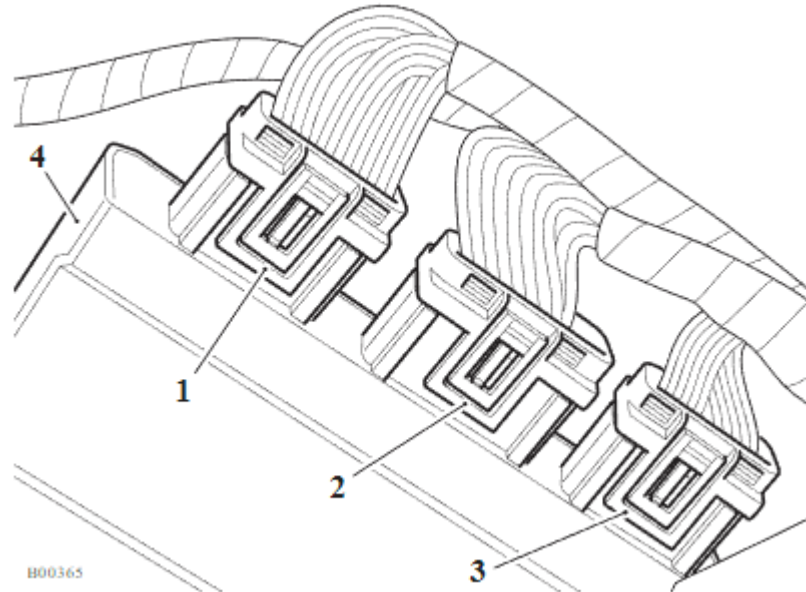
1. Locking device

#### Reconnection of the Engine ECM Connectors

#### **⚠ CAUTION**

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

1. Fit the connectors into their sockets until they are fully in and the locking device secures them in position.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. 33 pin connector</li><li>2. 39 pin connector</li><li>3. Gray connector</li><li>4. Engine ECM</li></ol> |
|---|

2. Secure the engine ECM to the motorcycle (see [Engine Electronic Control Module \(Engine ECM\) - Installation](#)).

#### System Diagnostics

The engine management system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the seat. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor

adjustments to the set-up of the system. The data and tests available are described on the following pages.

### On-board Fault Detection System

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted. For example, if there is a fault in the crankshaft position sensor, the counter will increment its count each time the crankshaft turns through 360°, provided the fault is still present.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a predetermined threshold, the fault becomes confirmed. If the fault is an emissions related fault or a serious malfunction affecting engine performance, a DTC (Diagnostic Trouble Code) and freeze-frame data will be logged in the ECM's memory and the MIL (Malfunction Indicator Lamp) on the motorcycle instrument panel is illuminated. Once a fault is confirmed, the number of warm-up cycles made by the engine is counted. If the fault clears, the warm-up cycle counter will extinguish the MIL (Malfunction Indicator Lamp) at a predetermined count, and erase the DTC and freeze-frame data from the ECM memory at another (higher) count.

A single warm-up cycle is deemed to have taken place when the following criteria have been met:

- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.
- A controlled power down sequence must take place.

#### **NOTICE**

When a fault has been rectified, the MIL will remain illuminated until sufficient non-fault warm-up cycles have taken place to turn it off. The MIL will be immediately extinguished if, after first rectifying the fault, the DTC (diagnostic trouble code) that caused the MIL illumination is erased from the ECM memory using the Triumph diagnostic software.



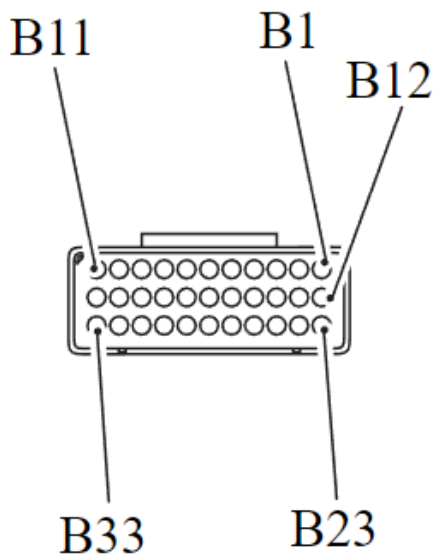
## NOTICE

In some cases, when a fault is detected, the engine management system will revert to a limp-home mode. In this mode, the engine will still function though the performance and fuel economy may be marginally affected. In some cases, the rider may not notice any appreciable difference from normal operation.

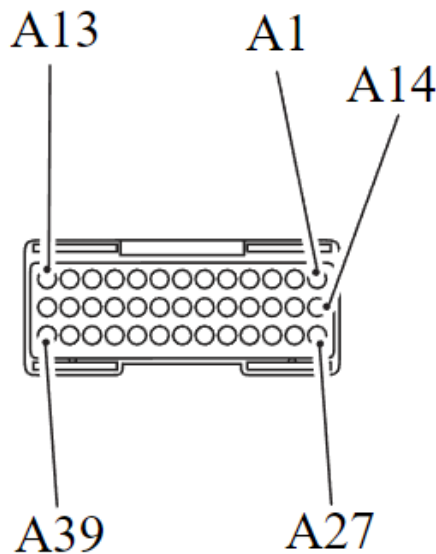
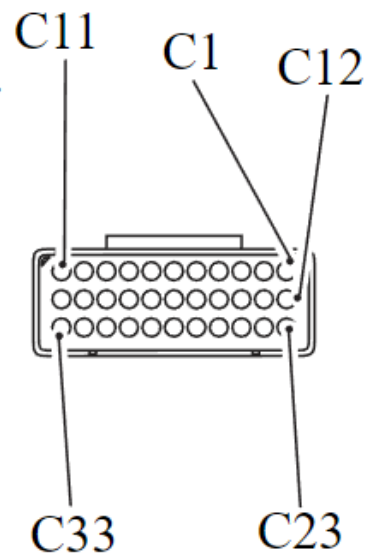
### Service Symbol/General Warning Symbol

- The service symbol will illuminate for five seconds after the motorcycle start up sequence as a reminder that a service is due in approximately 60 miles (100 km). The service symbol will illuminate permanently when the mileage is reached, it will remain permanently illuminated until the service interval is reset using the Triumph Diagnostic tool.
- The general warning symbol will flash if an ABS or engine management fault has occurred and the ABS and/or MIL warning lights are illuminated. Rectify the fault and clear the diagnostic trouble codes using the Triumph Diagnostic tool.

### Connector B



### Connector C



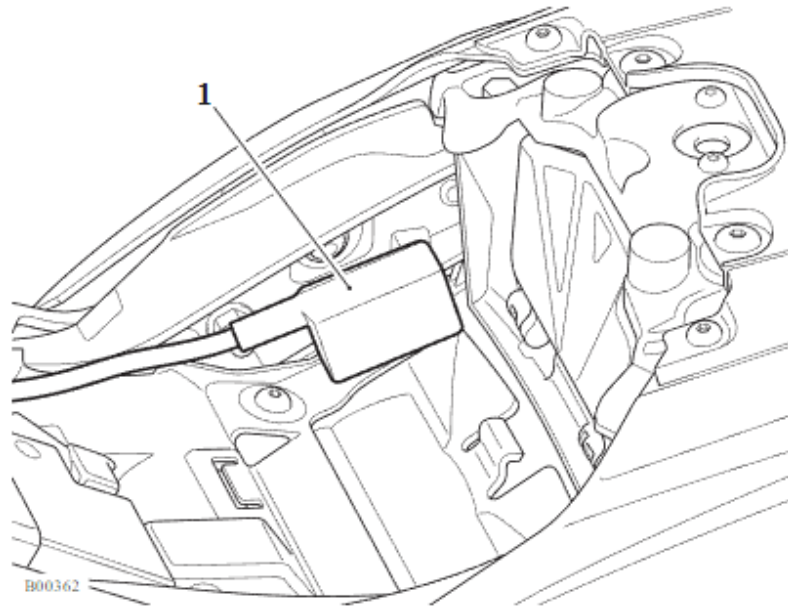
### Connector A

The above illustration shows the pin numbering system used in the engine management circuit diagram.

The smaller connector's pins are prefixed B and C and the larger connector pins A. Connector C is grey in colour. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

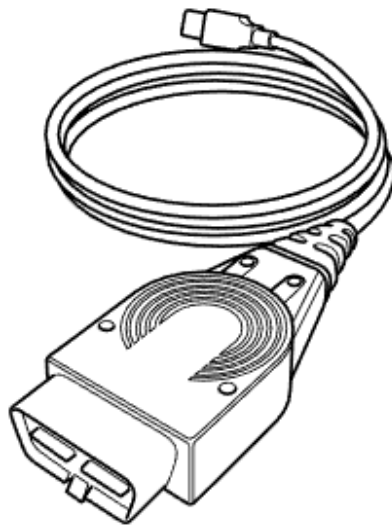
## System Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the seat (see [Seat - Removal](#)) and release the diagnostic connector from its locating tang.



2. Diagnostic connector

2. Plug the Triumph diagnostic interface directly into the diagnostic connector.



T3880057 - Triumph Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see [Seat - Installation](#)).

Described on the following pages is the range of information which can be retrieved from the engine ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

**NOTICE**

Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from [www.triumphonline.net](http://www.triumphonline.net).

### Build Data

The Build Data screen will display the following information:

- Motorcycle model
- Vehicle Identification Number (VIN)
- ECM type
- ECM ID
- ECM serial number
- Tune number
- Date of last tune download
- Total tune downloads since manufacture
- The lock status of the Engine ECM (ECM Locked, Unlocked or Not Applicable).

## Current Data

The data available under Current Data is:

| Function Examined                 | Result Reported (Scale)       |
|-----------------------------------|-------------------------------|
| Fuel system status                | open or closed loop operation |
| Calculated load value             | %                             |
| Engine coolant temperature        | °C                            |
| Short term fuel trim              | %                             |
| Intake manifold absolute pressure | mmHg                          |
| Engine speed                      | rpm                           |
| Vehicle speed                     | km/h                          |
| Ignition timing advance           | Degrees                       |
| Intake air temperature            | °C                            |
| Absolute throttle position        | %                             |
| Oxygen sensor                     | Volts                         |

## Sensor Data

When using this function it is possible to check the status of various sensors and actuators.

The data sets are divided into seven groups - Sensor Voltages, Sensor Readings, Injector Data, Ignition Data, Idle Speed, Throttle Data and Inputs and Adaption Status. Each of these screens is described on the following pages.

## Sensor Voltages

The data available under Sensor Voltages is:

| Item Checked                               | Result Unit |
|--|-------------|
| Battery Voltage                            | Volts       |
| Voltage from ignition switch to engine ECM | Volts       |
| Air temperature sensor Voltage             | Volts       |
| Coolant temperature sensor Voltage         | Volts       |
| Atmospheric pressure sensor Voltage        | Volts       |
| Manifold absolute pressure sensor Voltage  | Volts       |
| Throttle position sensor Voltage           | Volts       |
| Fuel level sensor Voltage                  | Volts       |
| Oxygen sensor output Voltage               | Volts       |
| Throttle position sensor 1 Voltage         | Volts       |
| Throttle position sensor 2 Voltage         | Volts       |
| Twist grip position sensor 1 Voltage       | Volts       |
| Twist grip position sensor 2 Voltage       | Volts       |

## Sensor Readings

The data available under Sensor Readings is:

| Item Checked  | Result Unit |
|---|-------------|
| Air temperature                                       | °C          |
| Coolant temperature                                   | °C          |
| Atmospheric (barometric) pressure                     | mmHg        |
| Manifold absolute pressure (one reading per cylinder) | mmHg        |
| Low fuel light  | on/off      |
| Oxygen sensor 1 short term fuel trim                  | %           |
| Oxygen sensor heater status                           | on/off      |

## Injector Data

The data available under Injector Data is:

| Item Checked          | Result Unit  |
|-----------------------|--------------|
| Injector 1 pulse time | milliseconds |
| Injector 2 pulse time | milliseconds |
| Injector 3 pulse time | milliseconds |

## Ignition Data

The data available under Ignition Data is:

| Item Checked          | Result Unit  |
|-----------------------|--------------|
| Ignition timing cyl 1 | degrees BTDC |
| Ignition timing cyl 2 | degrees BTDC |
| Ignition timing cyl 3 | degrees BTDC |
| Coil 1 dwell time     | milliseconds |
| Coil 2 dwell time     | milliseconds |
| Coil 3 dwell time     | milliseconds |

## Idle Speed and Throttle Data

The data available under Idle Speed and Throttle Data is:

| Item Checked                     | Result Unit |
|----------------------------------|-------------|
| Engine speed                     | RPM         |
| Idle reference speed             | RPM         |
| Idle speed control current steps | numeric     |
| Idle speed control target steps  | numeric     |
| Throttle position 1              | % open      |
| Throttle position 2              | % open      |
| Secondary air injection status   | SAI on/off  |
| Twist grip position              | %           |



## Inputs

The data available under Inputs is:

| Function Examined                              | Result Unit   |
|--|---------------|
| Starter switch status                          | switch on/off |
| Side stand status                              | up/down       |
| Fall detection status                          | normal/over   |
| Clutch switch status                           | release/grip  |
| Neutral switch                                 | gear/neutral  |
| Vehicle speed                                  | km/h          |
| Calculated load                                | %             |
| Brake switch 1 status                          | on/off        |
| Brake switch 2 status                          | on/off        |
| Cruise control accelerate switch status        | on/off        |
| Cruise control decelerate switch status        | on/off        |
| Cruise control ON/OFF switch status            | on/off        |
| Twist grip cruise control cancel switch status | on/off        |
| Cruise control status                          | on/off        |

## Outputs

The data available under Outputs is:

| Function Examined                      | Result Unit    |
|--|----------------|
| EMS Main relay status                  | relay on/off   |
| Fuel pump relay status                 | on/off         |
| Starter relay status                   | starter on/off |
| Malfunction indicator light status     | MIL on/off     |
| Cooling fan status                     | fan on/off     |
| Purge valve duty cycle                 | %              |
| Throttle actuator motor internal relay | on/off         |

## Adaption Status

Because the fuel system is adaptive, the engine management system is able to automatically adjust to new working conditions, such as changes in fuel quality, component wear, air leaks etc. This screen displays information on the adaption status of the vehicle which will show if it has adapted or not.

| Function Examined                        | Report Method       |
|--|---------------------|
| Closed throttle position adapted         | adapted/not adapted |
| Twist grip adapted                       | yes/no              |
| Oxygen sensor adaption range (off idle)  | %                   |
| Oxygen sensor adaption range (idle)      | %                   |
| Oxygen sensor adaption status (off idle) | %                   |
| Oxygen sensor adaption status (idle)     | %                   |

## Function Tests

The system allows the diagnostic software to perform a series of function tests on various actuators in the engine management system. In some cases it is necessary to make a visual observation of a component and in others, if faults are present, DTCs will be logged.

The Function Tests available are:

| Function Examined              | Report Method  |
|--------------------------------|--|
| Instrument panel               | Observe instrument panel, refer to Service Manual  |
| Idle air control stepper motor | Observe throttle position/Stored fault code*   |
| Purge valve                    | Listen for valve operation/Stored fault code*  |
| Secondary air injection        | Listen for valve operation/Stored fault code*  |
| Ride by wire motor open/closed | Observe throttle position/Stored fault code*   |
| Cruise control switch check    | Operate the cruise control switches as instructed. Observe the relevant switch response and rectify as necessary |

\*If a fault is detected.

## Adjust Tune

Using the Triumph diagnostic software, it is possible to:

- Reset the adaptations
- Balance the throttle bodies.

To reset the adaptations, see [Engine Management Adaption](#).

To balance the throttles, see [Throttle Body Balancing](#).

## Freeze Frame Data

Freeze frame data is stored at the time a DTC is recorded (confirmed) by the ECM. If multiple DTCs are recorded, the freeze frame data which is stored will relate to the first recorded DTC only.

By calling up freeze frame data associated with the first recorded DTC, the technician can check the engine condition at the time the fault occurred. The data available is:

| Function Examined                  | Report Method                        |
|------------------------------------|--------------------------------------|
| DTC                                | Diagnostic Trouble Code (DTC) number |
| Fuel system status                 | open or closed loop operation        |
| Calculated load                    | %                                    |
| Coolant temperature                | °C                                   |
| Short term fuel trim               | %                                    |
| Intake manifold absolute pressure  | mmHg                                 |
| Engine speed                       | RPM                                  |
| Vehicle speed                      | km/h                                 |
| Ignition advance                   | degrees                              |
| Intake air temperature             | °C                                   |
| Throttle position                  | %                                    |
| Oxygen sensor output Voltage       | Volts                                |
| Oxygen sensor short term fuel trim | %                                    |

## Cruise Control Switch Check

The cruise control switch check is required after certain DTCs or defects have been repaired which relate to the ride by wire system or cruise control system, or after the adaptations have been reset. The switch check requires the user to operate the switches in order, following the instructions on screen.

The following switches will be checked:

- Front brake switch
- Rear brake switch
- Clutch switch
- Twist grip cruise cancel switch (operated by holding the twistgrip in the fully closed position)
- Cruise control accelerate switch
- Cruise control decelerate switch.

A malfunction of any switch will not necessarily cause a DTC to be stored and may prevent the cruise control from operating correctly.

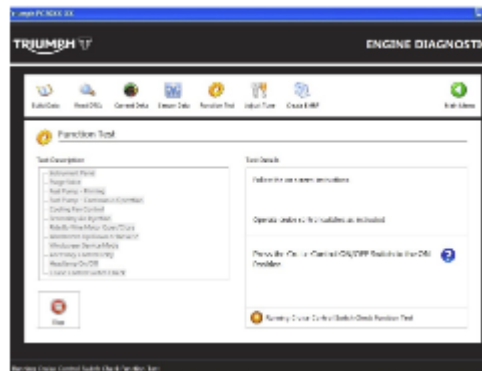
### ***NOTICE***

If the cruise control switch check is not carried out, the green cruise control warning light will illuminate when the ignition is turned to the ON position but the cruise function will be disabled.

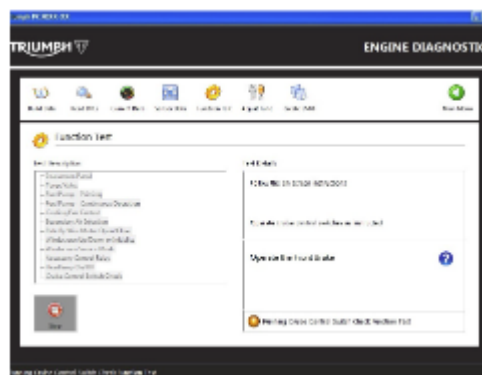
## Cruise Control Switch Check Function

If the engine is running you will be prompted to turn it off before the test will start.

If the cruise control is turned on you will be prompted to turn it off before the test will start.



Follow the on-screen instructions to operate and then release each switch in turn.



## Crankshaft Position Adaption (European Markets Only)

Signals from the crankshaft position sensor are used by the motorcycle's engine misfire detection system. In order to accurately detect an engine misfire, the crankshaft position must be adapted to allow for manufacturing and assembly tolerances.

The motorcycle is delivered from the factory with the crankshaft position fully adapted. If for any reason the crankshaft position is not adapted, the Malfunction Indicator Light (MIL) will be illuminated and DTC P0315 will be stored.

In service, the crankshaft position must be re-adapted under the following conditions:

- The MIL is illuminated and DTC P0315 is stored, indicating that the crankshaft position sensor is not adapted.

- The crankshaft position sensor has been disturbed, removed or disconnected.
- The crankshaft position sensor has been replaced.
- The crankcases have been disassembled/reassembled.
- The engine ECM has been replaced.\*
- The engine adaptations have been reset using the 'Reset Engine Adaptions' function in the Triumph diagnostic tool.\*

\* Under these conditions, the MIL is illuminated and DTC P0315 will be stored.

### Preliminary Steps

1. Make sure the transmission is in neutral.
2. Connect the Triumph diagnostic tool and turn the ignition ON.
3. Make sure the engine stop switch is in the RUN position.
4. Navigate to ENGINE DIAGNOSTICS - Sensor Data - Inputs.
5. Make sure the Gear Position Status is reporting as Neutral.
6. Navigate to Sensor Data - Gear Position Adaption.
7. Make sure the Neutral Position Adaption Status is reporting as Adapted.
8. Reset and re-adapt the neutral position if any of the following conditions exist:
  - The Neutral Position Adaption is reported as Not Adapted.
  - The Gear Position Status is not reported as Neutral when the transmission is in neutral (regardless of the current Neutral Position Adaption Status).

### Crankshaft Position Adaption (European Markets Only)

#### **NOTICE**

If the neutral position adaption is reset and re-adapted, the ignition must be turned off for at least 60 seconds before starting the crankshaft position adaption process.

To Adapt the Crankshaft Position:

## **WARNING**

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

1. Navigate to ENGINE DIAGNOSTICS - Function Test - Adapt the crankshaft position.
2. Click Start.
3. Follow the on-screen instructions.

## **NOTICE**

The function test will check that the transmission is in neutral and that the neutral position is adapted. If these conditions are not met, the test will be aborted and you will be prompted to check the transmission and neutral adaption status.

If the transmission conditions are correct, you will be prompted to start the engine and bring the engine up to the required temperature.

Once the engine has reached the required temperature the test will progress automatically and you will be prompted to hold the throttle (twist grip) fully open.

The test will be aborted if the throttle is not opened within 60 seconds.

It is important that the throttle is held fully open during this stage of the test. The diagnostic tool will display a red light if the throttle is not in the correct position. The light will change to green when the throttle is held fully open.

4. Hold the throttle fully open within 60 seconds of being prompted by the diagnostic tool. Do not close the throttle until instructed to do so by the diagnostic tool.



### **NOTICE**

Upon holding the throttle open, the engine speed will increase and decrease in cycles at approximately one cycle per second. The cycles are repeated until the crankshaft position adaption is complete.

Adaption is typically completed after the fourth cycle.

You will be prompted to close the throttle when adaption has completed.

The diagnostic tool will allow the test to operate with the throttle held open for a maximum of 10 seconds (approximately 10 cycles). If adaption is not completed in this time, the test will stop and you will be prompted to close the throttle and turn the ignition OFF. Note any on-screen messages and investigate the cause before attempting to restart the test.

5. Close the throttle when prompted by the diagnostic tool.
6. Note the results of the adaption and follow the on-screen instructions.
7. Click Finish.
8. Turn the ignition OFF as prompted by the diagnostic tool and wait for 60 seconds for the Engine ECM to fully power down.

#### Final Steps

Successful crankshaft position adaption can be verified as follows:

1. Turn the ignition ON.
2. Navigate to ENGINE DIAGNOSTICS - Read DTCs.
3. Check that DTC P0315 has cleared.
4. Check that the MIL light goes out when the engine is started.

### **NOTICE**

The presence of other DTCs may cause the MIL light to remain illuminated. Where this is the case, rectify and erase any other stored DTCs as necessary.

## Trouble Shooting

| Symptom  | Possible Causes  | Action  |
|--|--|---|
| Test is aborted immediately after clicking Start.  | <p>Transmission is not in neutral.</p> <p>Neutral position is not adapted.</p> <p>Neutral position adaption is in a state of error.</p>                              | <p>Check the transmission is in neutral. Reset the neutral position adaption. Start the engine and allow the neutral position to adapt.</p> <p>Turn the ignition off for at least 60 seconds before restarting the crankshaft position adaption test.</p> |
| Test is aborted after the engine has reached the required temperature.   | <p>The throttle was not held open within 60 seconds of the engine reaching the required temperature.</p>   | <p>Turn the ignition off for at least 60 seconds before restarting the crankshaft position adaption test.</p> <p>Make sure the throttle is held open within 60 seconds of being instructed to do so by the diagnostic tool.</p>                           |
| <p>Crank adaption failed.</p> <p>Throttle was held fully open for 10 seconds before the diagnostic tool displayed an instruction to close the throttle.</p>          | <p>Ignition was not turned off for 60 seconds after adapting the neutral position.</p>   | <p>Turn the ignition off for at least 60 seconds before restarting the crankshaft position adaption test.</p>   |
| <p>Crank adaption failed.</p> <p>The diagnostic tool displayed an instruction to close the throttle at the expected time (after the forth engine revving cycle).</p> | <p>Adaption has completed abnormally.</p> <p>Mechanical fault.</p> <p>Crankshaft position signal out of range.</p> <p>Crankshaft trigger wheel out of tolerance.</p> | <p>Investigate potential mechanical faults. Contact Triumph Service.</p>  |

Diagnostic trouble codes (DTCs) are logged in the ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic software as a four digit code.

As mentioned earlier, when the system detects a fault, it begins to count the number of times the fault occurs before illuminating the MIL and storing a fault code.

Similarly, if a fault clears, the ECM also records this fact and will turn off the MIL when sufficient no fault warm-up cycles have taken place. Any fault codes will remain in the ECM memory until the required number of no fault warm-up cycles have taken place. The number of warm-up cycles required to extinguish the MIL will always be less than the number required to remove a DTC from the ECM memory. DTCs can be removed at any time using the Triumph diagnostic software.

The system will log the diagnostic trouble codes listed below/over:

| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                  |
|-------------------------------|--|--|--|--------------------------------------|--|
| P0030                         | Oxygen sensor heater open circuit or short to ground-bank 1 sensor 1                   | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor Heater</a>       |
| P0032                         | Oxygen sensor heater short circuit to battery positive-bank 1 sensor 1                 | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor Heater</a>       |
| P011B                         | Engine coolant temperature sensor correlation error with intake air temperature sensor | 3  | 40   | Yes                                  | <a href="#">Coolant Temperature Sensor</a> |

| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                               |
|-------------------------------|--|--|--|--------------------------------------|---|
| P0053                         | Oxygen sensor heater resistance - bank 1 sensor 1  | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor Heater</a>                    |
| P0068                         | Manifold absolute pressure sensor correlation error with throttle position sensor          | 3  | 40   | Yes                                  | <a href="#">Manifold Absolute Pressure (MAP) Sensor</a> |
| P0069                         | Manifold absolute pressure sensor correlation error with ambient pressure sensor           | 3  | 40   | Yes                                  | <a href="#">Manifold Absolute Pressure (MAP) Sensor</a> |
| P0105                         | Manifold absolute pressure sensor 1 open circuit or short 3circuit to 5 Volt sensor supply | 3  | 40   | Yes                                  | <a href="#">Manifold Absolute Pressure (MAP) Sensor</a> |
| P0107                         | Manifold absolute pressure sensor 1 short circuit to ground                                | 3  | 40   | Yes                                  | <a href="#">Manifold Absolute Pressure (MAP) Sensor</a> |
| P0110                         | Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply        | 3  | 40   | Yes                                  | <a href="#">Intake Air Temperature Sensor</a>           |
| P0111                         | Intake air temperature sensor signal out of range  | 3  | 40   | Yes                                  | <a href="#">Intake Air Temperature Sensor</a>           |

| Diagnostic Trouble Code (DTC) | Fault Description   | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                     |
|-------------------------------|---|--|--|--------------------------------------|---|
| P0112                         | Intake air temperature sensor short circuit to ground   | 3  | 40   | Yes                                  | <a href="#">Intake Air Temperature Sensor</a> |
| P0115                         | Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply                     | 3  | 40   | Yes                                  | <a href="#">Coolant Temperature Sensor</a>    |
| P0117                         | Engine coolant temperature sensor short circuit to ground   | 3  | 40   | Yes                                  | <a href="#">Coolant Temperature Sensor</a>    |
| P0120                         | Throttle position sensor 1 short circuit to battery positive or open circuit                                | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a>      |
| P0121                         | Throttle position sensor 1 signal out of range  | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a>      |
| P0122                         | Throttle position sensor 1 short circuit to ground  | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a>      |
| P0125                         | Engine coolant temperature sensor signal low-not reaching temperature required for closed loop fuel control | 3  | 40   | Yes                                  | <a href="#">Coolant Temperature Sensor</a>    |

| Diagnostic Trouble Code (DTC) | Fault Description   | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                     |
|-------------------------------|---|--|--|--------------------------------------|---|
| P0130                         | Oxygen sensor open circuit or short circuit to battery positive - bank 1 sensor 1 | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor</a>                 |
| P0131                         | Oxygen sensor short circuit to ground-bank 1 sensor 1                             | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor</a>                 |
| P0133                         | Oxygen sensor circuit slow response - bank 1 sensor 1                             | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor – Slow Response</a> |
| P0134                         | Oxygen sensor circuit no activity detected - bank 1 sensor 1                      | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor Heater</a>          |
| P0171                         | System too lean - bank 1  | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor Heater</a>          |
| P0172                         | System too rich - bank 1  | 3  | 40   | Yes                                  | <a href="#">Oxygen Sensor Heater</a>          |
| P0201                         | Injector 1-1 circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Fuel Injector</a>                 |
| P0202                         | Injector 2-1 circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Fuel Injector</a>                 |
| P0203                         | Injector 3-1 circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Fuel Injector</a>                 |
| P0205                         | Injector 1-2 circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Fuel Injector</a>                 |
| P0206                         | Injector 2-2 circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Fuel Injector</a>                 |

| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                |
|-------------------------------|--|--|--|--------------------------------------|--|
| P0207                         | Injector 3-2 circuit malfunction   | 3  | 40   | Yes                                  | <a href="#">Fuel Injector</a>            |
| P0220                         | Throttle position sensor 2 short circuit to battery positive or open circuit | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a> |
| P0221                         | Throttle position sensor 2 signal out of range                               | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a> |
| P0222                         | Throttle position sensor 2 short circuit to ground                           | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a> |
| P0300                         | Random/Multiple cylinder misfire detected                                    | 3  | 40   | Yes                                  | <a href="#">Engine Misfire</a>           |
| P0301                         | Cylinder 1 misfire detected  | 3  | 40   | Yes                                  | <a href="#">Engine Misfire</a>           |
| P0302                         | Cylinder 2 misfire detected  | 3  | 40   | Yes                                  | <a href="#">Engine Misfire</a>           |
| P0303                         | Cylinder 3 misfire detected  | 3  | 40   | Yes                                  | <a href="#">Engine Misfire</a>           |
| P0315                         | Crankshaft sensor circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Crankshaft Sensor</a>        |
| P0335                         | Crankshaft sensor circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Crankshaft Sensor</a>        |
| P0351                         | Ignition coil 1 malfunction  | 3  | 40   | Yes                                  | <a href="#">Ignition Coils</a>           |

| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                     |
|-------------------------------|--|--|--|--------------------------------------|---|
| P0352                         | Ignition coil 2 malfunction  | 3  | 40   | Yes                                  | <a href="#">Ignition Coils</a>                |
| P0353                         | Ignition coil 3 malfunction  | 3  | 40   | Yes                                  | <a href="#">Ignition Coils</a>                |
| P0412                         | Secondary air injection short circuit to ground or open circuit                    | 3  | 40   | Yes                                  | <a href="#">Secondary Air Injection Valve</a> |
| P044F                         | Secondary air injection short circuit to battery positive                          | 3  | 40   | Yes                                  | <a href="#">Secondary Air Injection Valve</a> |
| P0443                         | Purge valve short circuit to ground or open circuit                                | 3  | 40   | Yes                                  | <a href="#">Purge Valve</a>                   |
| P0459                         | Purge valve short circuit to battery positive                                      | 3  | 40   | Yes                                  | <a href="#">Purge Valve</a>                   |
| P0460                         | Fuel Level Sensor Circuit malfunction  | 3  | 40   | Yes                                  | <a href="#">Fuel Level Sensor Circuit</a>     |
| P050C                         | Engine coolant temperature sensor signal high – too warm for cold start conditions | 0  | 40   | No                                   | <a href="#">Coolant Temperature Sensor</a>    |
| P0500                         | Vehicle speed sensor – Wheel speed sensor fault                                    | 3  | 40   | Yes                                  | <a href="#">Vehicle Speed Sensor</a>          |



| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                                     |
|-------------------------------|--|--|--|--------------------------------------|---|
| P050C                         | Engine coolant temperature sensor signal high-too warm for cold start conditions | 3  | 40   | Yes                                  | <a href="#">Engine Coolant Temperature Sensor Signal High</a> |
| P0506                         | Idle control system RPM lower than expected                                      | 3  | 40   | Yes                                  | <a href="#">Engine Idle Lower than Expected</a>               |
| P0507                         | Idle control system RPM higher than expected                                     | 3  | 40   | Yes                                  | <a href="#">Engine Idle Higher than Expected</a>              |
| P0560                         | System voltage-battery circuit malfunction                                       | 3  | 40   | Yes                                  | <a href="#">System Voltage</a>                                |
| P056C                         | Twist grip cruise cancel switch circuit malfunction                              | 3  | 40   | Yes                                  | <a href="#">Cruise Control</a>                                |
| P06A4                         | 5V Sensor Circuit D - reference voltage low                                      | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit D</a>                           |
| P06A5                         | 5V Sensor Circuit D- reference voltage high                                      | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit D</a>                           |
| P06A6                         | 5V Sensor Circuit A- reference voltage out of range                              | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit A</a>                           |
| P06A7                         | 5V Sensor Circuit B-reference voltage out of range                               | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit B</a>                           |

| Diagnostic Trouble Code (DTC) | Fault Description                                  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                 |
|-------------------------------|--|--|--|--------------------------------------|---|
| P06A8                         | 5V Sensor Circuit C-reference voltage out of range | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit C</a>       |
| P06A9                         | 5V Sensor Circuit D-reference voltage out of range | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit D</a>       |
| P06B8                         | EEPROM Error                                       | 0  | 40   | No                                   | <a href="#">EEPROM Error</a>              |
| P0606                         | ECM internal error                                 | 0  | 0  | Yes                                  | <a href="#">Engine ECM Internal Error</a> |
| P0642                         | 5V Sensor Circuit A- reference voltage low         | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit A</a>       |
| P0643                         | 5V Sensor Circuit A- reference voltage high        | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit A</a>       |
| P0652                         | 5V Sensor Circuit B - reference voltage low        | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit B</a>       |
| P0653                         | 5V Sensor Circuit B- reference voltage high        | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit B</a>       |
| P0698                         | 5V Sensor Circuit C- reference voltage low         | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit C</a>       |
| P0699                         | 5V Sensor Circuit C-reference voltage high         | 3  | 40   | Yes                                  | <a href="#">5V Sensor Circuit C</a>       |
| P0704                         | Clutch switch 1 input circuit malfunction          | 3  | 40   | Yes                                  | <a href="#">Clutch Switch</a>             |

| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number   |
|-------------------------------|--|--|--|--------------------------------------|---|
| P0914                         | Gear position sensor short circuit to ground or open circuit             | 3  | 40   | Yes                                  | <a href="#">Gear Position Sensor</a>  |
| P0915                         | Gear position sensor signal error - correlation error with vehicle speed | 3  | 40   | Yes                                  | <a href="#">Gear Position Sensor</a>  |
| P0917                         | Gear position sensor short circuit to 5 Volt sensor supply               | 3  | 40   | Yes                                  | <a href="#">Gear Position Sensor</a>  |
| P1105                         | Manifold absolute pressure sensor 1 pipe malfunction                     | 3  | 40   | Yes                                  | <a href="#">Manifold Absolute Pressure (MAP) Sensor</a>                     |
| P1135                         | Traction Control prevented due to ABS malfunction                        | 3  | 40   | Yes                                  | <a href="#">Traction Control Disabled Due to ABS Malfunction</a>            |
| P1136                         | Cornering traction control disabled due to IMU malfunction               | 3  | 40   | Yes                                  | <a href="#">Cornering Traction Control and Roll Over Detection Disabled</a> |
| P1231                         | Fuel pump relay short circuit to ground or open circuit                  | 3  | 40   | Yes                                  | <a href="#">Fuel Pump Relay</a>   |
| P1232                         | Fuel pump relay short circuit to battery Voltage                         | 3  | 40   | Yes                                  | <a href="#">Fuel Pump Relay</a>   |
| P1508                         | Unmatched Immobiliser ECM  | 3  | 40   | Flashing                             | <a href="#">Immobiliser and TPMS Control Module ID Incompatible</a>         |

| Diagnostic Trouble Code (DTC) | Fault Description   | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number  |
|-------------------------------|---|--|--|--------------------------------------|--|
| P1520                         | Unmatched ABS module  | 3  | 40   | Flashing                             | <a href="#">ABS Modulator ID Incompatible</a>  |
| P1521                         | CAN fault - lost communication with ABS module or ABS system status error | 3  | 40   | Yes                                  | <a href="#">ABS Modulator Communication</a>  |
| P1552                         | Cooling fan relay short circuit to ground or open circuit                 | 0  | 0  | No                                   | <a href="#">Cooling Fan Controller</a>   |
| P1553                         | Cooling fan relay short circuit to battery positive or over temp          | 0  | 0  | No                                   | <a href="#">Cooling Fan Controller</a>   |
| P1574                         | Cruise Control prevented due to other malfunction condition               | 3  | 40   | Yes                                  | <a href="#">Cruise Control</a>   |
| P1575                         | Cruise Control disabled until button press sequence completed             | 3  | 40   | Yes                                  | <a href="#">Cruise Control</a>   |
| P16A0                         | Engine ECM detects IMU present but ID incompatible                        | 3  | 40   | Yes                                  | <a href="#">ABS Modulator ID Incompatible</a>  |
| P16A1                         | Engine ECM detects IMU circuit malfunction                                | 3  | 40   | Yes                                  | <a href="#">Engine ECM detects Inertial Measurement Unit (IMU) circuit malfunction</a> |

| Diagnostic Trouble Code (DTC) | Fault Description   | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number   |
|-------------------------------|---|--|--|--------------------------------------|---|
| P16A2                         | Engine ECM detects IMU present but with signal error                            | 3  | 40   | Yes                                  | <a href="#">Cornering Traction Control and Roll Over Detection Disabled</a> |
| P16B0                         | Fully closed throttle position adaption incomplete or unsuccessful              | 3  | 40   | Yes                                  | <a href="#">Closed Throttle Position Adaption</a>                           |
| P1604                         | ECM tamper detected - return to Triumph   | 0  | 0  | Yes                                  | <a href="#">Engine ECM Tamper Detected</a>                                  |
| P1605                         | ECM locked by the tune lock function  | Only if tune lock is unlocked                    |  | Flashing                             | <a href="#">ECM locked by the Calibration Lock Function</a>                 |
| P1607                         | ECM ride by wire internal error   | 3  | 40   | Yes                                  | <a href="#">Engine ECM Internal Error</a>                                   |
| P1608                         | ECM ride by wire internal error   | 3  | 40   | Yes                                  | <a href="#">Engine ECM Internal Error</a>                                   |
| P1614                         | Instrument ID incompatible  | Only if Instrument ID Matching                   |  | Flashing                             | <a href="#">Instrument ID Incompatible</a>                                  |
| P1628                         | Fuel pump short circuit to ground or open circuit                               | 3  | 40   | Yes                                  | <a href="#">Fuel Pump Short Circuit to Ground or Open Circuit</a>           |
| P1640                         | Roll Over detection disabled due to Inertial Measurement Unit (IMU) malfunction | 3  | 40   | Yes                                  | <a href="#">Cornering Traction Control and Roll Over Detection Disabled</a> |

| Diagnostic Trouble Code (DTC) | Fault Description   | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number   |
|-------------------------------|---|--|--|--------------------------------------|---|
| P1650                         | CAN fault - lost communication with Immobiliser ECM                 | 3  | 40   | Yes                                  | <a href="#">Immobiliser Control Module Communication</a>          |
| P1659                         | Ignition power supply malfunction                                   | 3  | 40   | Yes                                  | <a href="#">EMS Ignition Voltage Input Circuit</a>                |
| P1685                         | Main relay circuit malfunction                                      | 3  | 40   | Yes                                  | <a href="#">EMS Main Relay Circuit</a>                            |
| P1690                         | CAN Fault   | 3  | 40   | Yes                                  | <a href="#">CAN Communication</a>                                 |
| P1695                         | CAN fault – lost communication with instrument panel                | 0  | 40   | No                                   | <a href="#">Instrument Communication (CAN)</a>                    |
| P1702                         | Shift force sensor circuit low voltage                              | 3  | 40   | Yes                                  | <a href="#">Shift Force Sensor Circuit (Triumph Shift Assist)</a> |
| P1703                         | Shift force sensor circuit high voltage                             | 3  | 40   | Yes                                  | <a href="#">Shift Force Sensor Circuit (Triumph Shift Assist)</a> |
| P2100                         | Throttle actuator control motor open circuit                        | 3  | 40   | Yes                                  | <a href="#">Throttle Actuator Motor</a>                           |
| P2102                         | Throttle actuator control internal motor relay does not operate     | 3  | 40   | Yes                                  | <a href="#">Throttle Valve Drive Error</a>                        |
| P2103                         | Throttle actuator control internal motor relay operates continually | 3  | 40   | Yes                                  | <a href="#">Throttle Valve Drive Error</a>                        |

| Diagnostic Trouble Code (DTC) | Fault Description  | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number                  |
|-------------------------------|--|--|--|--------------------------------------|--|
| P2111                         | Throttle valve drive error (stuck open)                              | 3  | 40   | Yes                                  | <a href="#">Throttle Valve Drive Error</a> |
| P2119                         | Throttle valve drive error   | 3  | 40   | Yes                                  | <a href="#">Throttle Valve Drive Error</a> |
| P2120                         | Twist grip position sensor 1 short circuit to ground or open circuit | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position 1</a>      |
| P2121                         | Twist grip position sensor 1 signal out of range                     | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position 1</a>      |
| P2123                         | Twist grip position sensor 1 short circuit to battery positive       | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position 1</a>      |
| P2125                         | Twist grip position sensor 2 short circuit to ground or open circuit | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position 2</a>      |
| P2126                         | Twist grip position sensor 2 signal out of range                     | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position 1</a>      |
| P2128                         | Twist grip position sensor 2 short circuit to battery positive       | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position 2</a>      |

| Diagnostic Trouble Code (DTC) | Fault Description   | Number of no-fault cycles before turning off MIL | Number of no-fault cycles before DTC is erased | MIL illuminated when fault is logged | Pinpoint test page number   |
|-------------------------------|---|--|--|--------------------------------------|---|
| P2135                         | Throttle position sensor 1 correlation error with throttle position sensor 2              | 3  | 40   | Yes                                  | <a href="#">Throttle Position Sensor</a>  |
| P2138                         | Twist grip position sensor 1 correlation error with twist grip position 2                 | 3  | 40   | Yes                                  | <a href="#">Twist Grip Position Sensor 1 Correlation Error with Twist Grip Position 2</a> |
| P2226                         | Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply | 3  | 40   | Yes                                  | <a href="#">Ambient air pressure sensor</a>   |
| P2228                         | Ambient air pressure sensor circuit short circuit to ground Sensor                        | 3  | 40   | Yes                                  | <a href="#">Ambient air pressure sensor</a>   |



## Further Diagnosis

### Pinpoint Tests

Pin point tests, if used correctly, help to diagnose a fault in the system once a diagnostic trouble code has been stored.

#### Before Starting Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.

#### After Completion of Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If a DTC is stored, there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

## Pinpoint Tests – Fuel

### Manifold Absolute Pressure (MAP) Sensor

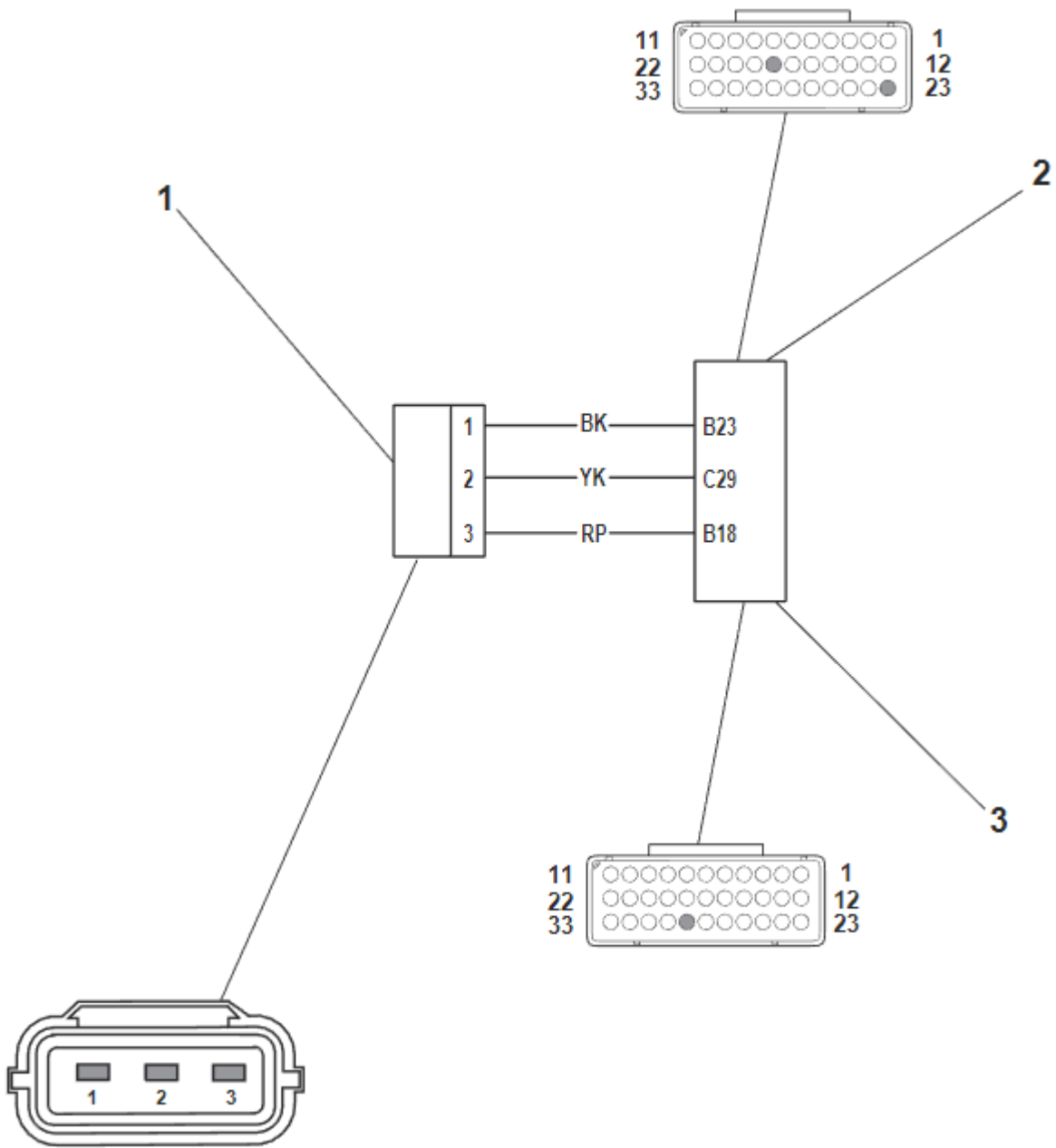
#### **NOTICE**

For Fault Code P0068, carry out the actions as listed in the action column for P0068. Only carry out the Camshaft Timing Check/Adjust if all the previous checks listed for P0068 do not clear the fault code.

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P0068      | Manifold absolute pressure sensor correlation error with throttle position sensor         | <p>Check for air leak at the throttle body/transition piece to cylinder head face.</p> <p>Check for trapped, twisted and damaged MAP sensor hose(s).</p> <p>Check for air leak at the MAP sensor hoses.</p> <p>View and note 'freeze-frame data if available.</p> <p>View and note 'sensor' data.</p> <p>Make sure sensor connector is secure.</p> <p>Disconnect the engine ECM and proceed to pinpoint test 1:<br/>Camshaft Timing Check/Adjust, as described in the service manual</p> |
| P0069      | Manifold absolute pressure sensor correlation error with ambient pressure sensor          | <p>View and note 'freeze-frame' data if available.</p> <p>View and note 'sensor' data.</p> <p>Make sure sensor connector is secure.</p>  |
| P0107      | Manifold absolute pressure sensor 1 short circuit to ground                               |  |
| P0105      | Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply |  |
| P1105      | Manifold absolute pressure sensor 1 pipe malfunction                                      | Check connection/condition of pipes from MAP sensors to throttle body.   |

## Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B23<br>- Engine ECM pin B18<br>- Engine ECM pin C29<br>- MAP sensor pin 1, 2, 3  | OK<br>Disconnect MAP sensors and proceed to test 2          |
|      | Faulty   | Rectify fault, proceed to test 4                            |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C29 to Engine ECM pin B23<br>- Engine ECM pin C29 to Engine ECM pin B18<br>- Engine ECM pin B18 to Engine ECM pin B23<br>- Engine ECM pin B18 to ground<br>- Engine ECM pin C29 to ground | OK<br>Proceed to test 3                                     |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 4          |
| 3    | Check cable for continuity:<br>- Engine ECM pin B18 to MAP sensor pin 3<br>- Engine ECM pin B23 to MAP sensor pin 1<br>- Engine ECM pin C29 to MAP sensor pin 2  | OK<br>Renew relevant MAP pressure sensor, proceed to test 4 |
|      | Open Circuit   | Locate and rectify wiring fault, proceed to test 4          |
| 4    | Reconnect harness, clear fault code and run engine.  | OK<br>Action complete - quit test                           |
|      | Fault still present  | Contact Triumph service                                     |



- 1. MAP Sensor
- 2. Engine ECM Connector B
- 3. Engine ECM Connector C

### Intake Air Temperature Sensor

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| P0110      | Intake air temperature sensor open circuit or short circuit to 5 volt sensor supply | View and note diagnostic software 'freeze-frame' data if available.<br>View and note diagnostic software 'sensor' data. |
| P0111      | Intake air temperature sensor signal out of range                                   | Make sure sensor connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1:                          |
| P0112      | Intake air temperature sensor short circuit to ground                               | Disconnect engine ECM and sensor and proceed to pinpoint test 6:  |

### Pinpoint Tests

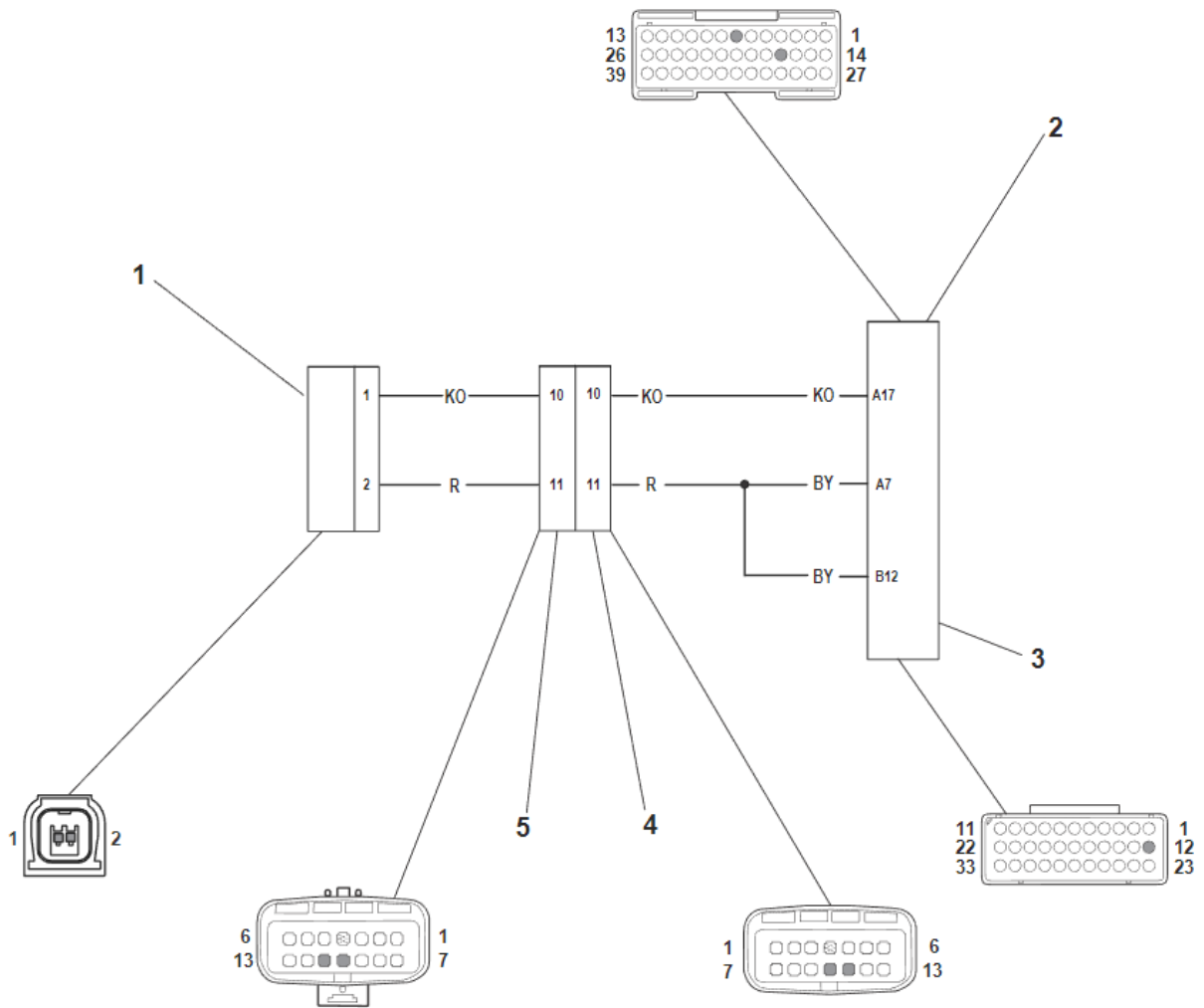
| Test | Result   | Action  |
|------|--|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin A07<br>- Engine ECM pin A17                      | OK<br>Proceed to test 2   |
|      | - Air Intake Sensor Connector pin 1<br>- Air Intake Sensor Connector pin 2                               | Faulty<br>Rectify fault, proceed to test 7                          |
| 2    | Check cable for short circuit:<br>- Engine ECM pin A17 to ground   | OK<br>Proceed to test 3   |
|      |  | Short Circuit<br>Locate and rectify wiring fault, proceed to test 7 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin A17 to ECM relay pin 5                                | OK<br>Proceed to test 4   |
|      | - Engine ECM pin A17 to Engine ECM pin B12   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 7 |
| 4    | Check cable continuity.<br>- Engine ECM pin A17 to sensor pin 1  | OK<br>Proceed to test 5   |
|      | - Engine ECM pin A07 to sensor pin 2<br>- Engine ECM pin B12 to sensor pin 2<br>- Ground to sensor pin 2 | Open Circuit<br>Locate and rectify wiring fault, proceed to test 7  |

| Test |   | Result                 | Action  |
|------|---|------------------------|---|
| 5    | Check resistance value:<br>- Engine ECM pin A17 to ground<br>Temperature dependent see<br>Resistance Data below | OK                     | Proceed to test 6   |
|      |   | Open<br>Circuit        | Disconnect temperature<br>sensor and proceed to test<br>6               |
|      |   | Short<br>Circuit       | Disconnect temperature<br>sensor Short circuit and<br>proceed to test 6 |
| 6    | Check sensor resistance:<br>Sensor pin 1 to sensor pin 2<br>Temperature dependent see Resistance<br>Data below  | OK                     | Proceed to test 7   |
|      |   | Faulty                 | Renew air temperature<br>sensor, proceed to test 7                      |
| 7    | Reconnect harness, clear fault code<br>and run engine to verify fault cleared.                                  | OK                     | Action complete - quit test   |
|      |   | Fault still<br>present | Contact Triumph service   |

Resistance data:

If engine is warm, remove the sensor and allow time to cool to ambient temperature prior to test.

| Ambient Temperature | Resistance Value     |
|---------------------|----------------------|
| 80°C                | 200 to 400 Ohms      |
| 20°C                | 2.35 to 2.65 K Ohms  |
| -10°C               | 8.50 to 10.25 K Ohms |



- 1. Inlet Air Temperature Sensor
- 2. Engine ECM Connector A
- 3. Engine ECM Connector B
- 4. Engine Subharness (main harness side)
- 5. Engine Subharness (engine harness side)

## Coolant Temperature Sensor

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P011B      | Engine coolant temperature sensor correlation error with intake air temperature sensor                        | View and note diagnostic software freeze frame data if available<br>View and note diagnostic software sensor data<br>Make sure sensor connector is secure<br>Disconnect ECM and proceed to pinpoint test 1 |
| P0115      | Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply                       |  |
| P0112      | Engine coolant temperature sensor short circuit to ground   |  |
| P0125      | Engine coolant temperature sensor signal low - not reaching temperature required for closed loop fuel control |  |
| P050C      | Engine coolant temperature sensor signal high - too warm for cold start conditions                            |  |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B20<br>- Engine ECM pin B12 | OK<br>Proceed to test 2   |
|      | - Coolant Temperature Sensor pin 1<br>- Coolant Temperature Sensor pin 2            | Faulty<br>Rectify fault, proceed to test 6                          |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B20 to ground                    | OK<br>Proceed to test 3   |
|      |   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 6 |
| 3    | Check cable continuity:<br>- Engine ECM pin B20 to sensor pin 1                     | OK<br>Proceed to test 4   |
|      | - Ground to sensor pin 2  | Open Circuit<br>Locate and rectify wiring fault, proceed to test 6  |

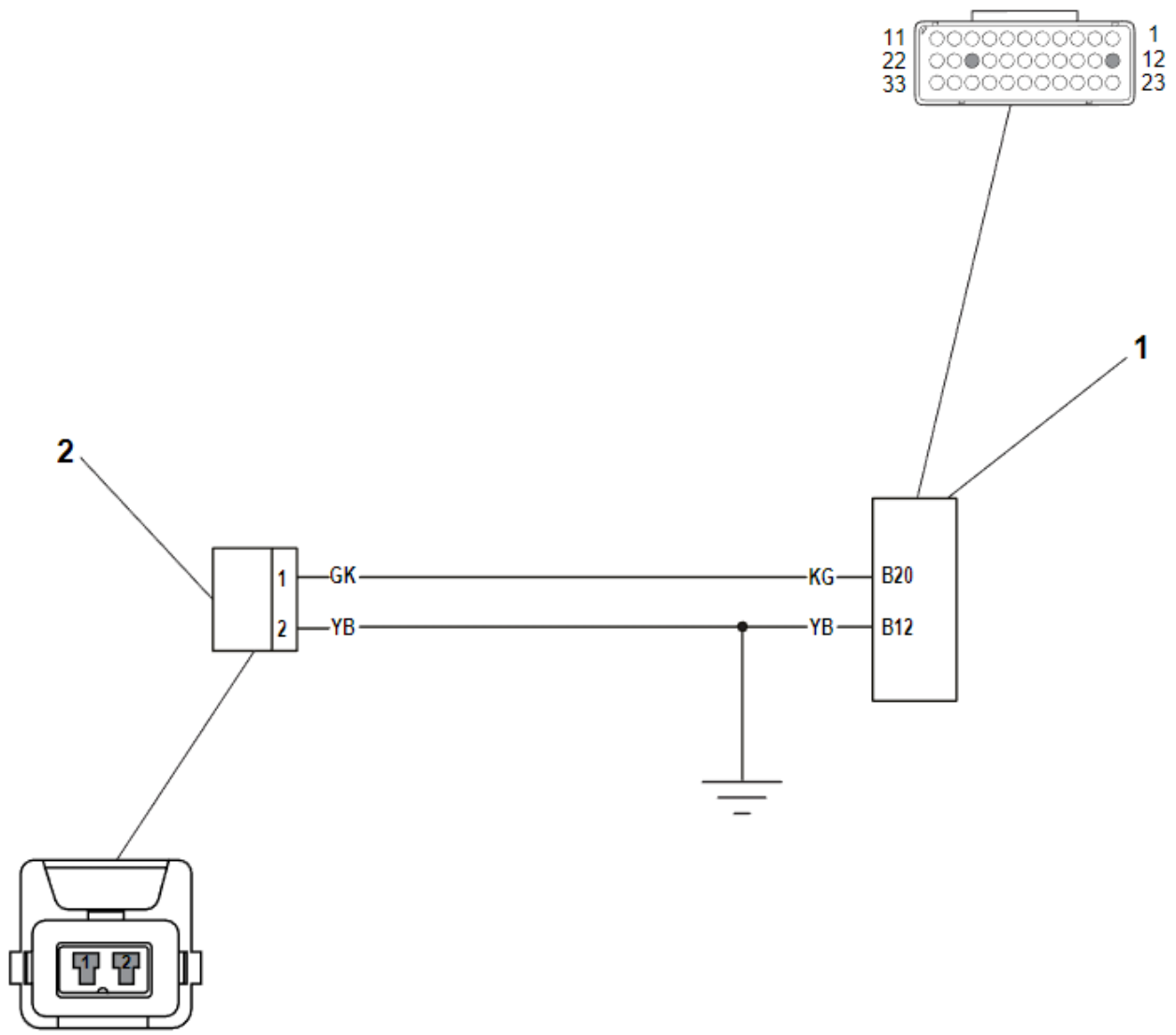


| Test |   | Result                 | Action  |
|------|---|------------------------|---|
| 4    | Check resistance value:<br>- Engine ECM pin B20 to ground<br>Temperature dependent see<br>Resistance Data below | OK                     | Proceed to test 5                               |
|      |   | Open<br>Circuit        | Disconnect temp sensor<br>and proceed to test 5 |
|      |   | Short<br>Circuit       | Disconnect temp sensor<br>and proceed to test 5 |
| 5    | Check sensor resistance:<br>Sensor pin 1 to sensor pin 2<br>Temperature dependent see Resistance<br>Data below  | OK                     | Proceed to test 6                               |
|      |   | Short<br>Circuit       | Renew temp sensor,<br>proceed to test 6         |
| 6    | Reconnect harness, clear fault code<br>and run engine to verify fault cleared.                                  | OK                     | Action complete - quit test                     |
|      |   | Fault still<br>present | Contact Triumph service                         |

Resistance data:

Resistance data under typical conditions:

| Temperature                | Resistance Value     |
|----------------------------|----------------------|
| Warm engine                | 200 to 400 Ohms      |
| Cold engine: 20°C ambient  | 2.35 to 2.60 K Ohms  |
| Cold engine: -10°C ambient | 8.50 to 10.20 K Ohms |



- 1. Engine ECM Connector B
- 2. Coolant Temperature Sensor

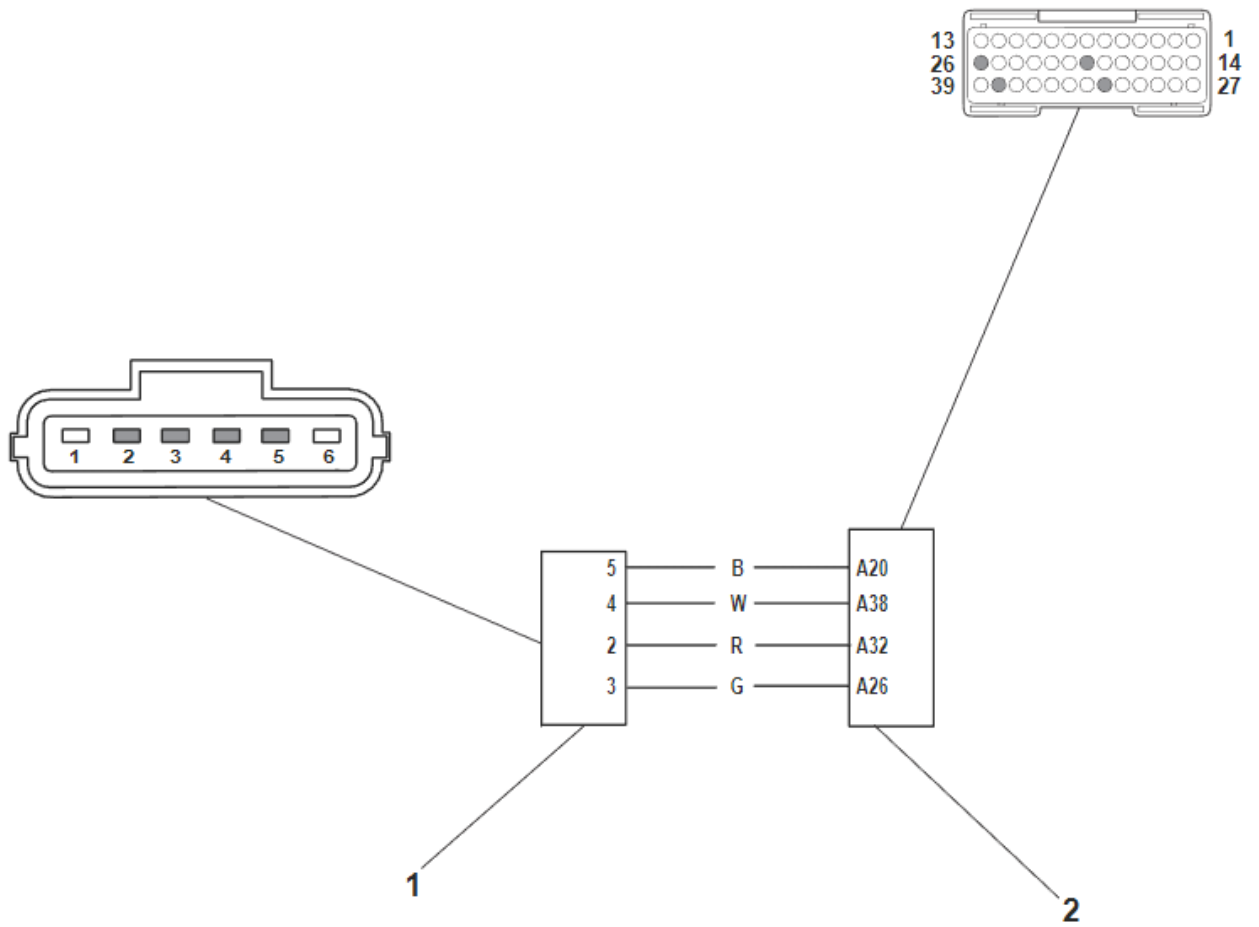
## Throttle Position Sensor

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P0120      | Throttle position sensor 1 short circuit to battery positive or open circuit | <p>View and note diagnostic software freeze frame data if available.</p> <p>View and note diagnostic software sensor data.</p> <p>Make sure sensor connector is secure</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p> |
| P0121      | Throttle position sensor 1 signal out of range                               |  |
| P0122      | Throttle position sensor 1 short circuit to ground                           |  |
| P0220      | Throttle position sensor 2 short circuit to battery positive or open circuit |  |
| P0221      | Throttle position sensor 2 signal out of range                               |  |
| P0222      | Throttle position sensor 2 short circuit to ground                           |  |
| P2135      | Throttle position sensor 1 correlation error with throttle position sensor 2 |  |

## Pinpoint Tests

| Test | Result   | Action        |  |
|------|--|---------------|--|
| 1    | Check cable and terminal integrity:<br><b>All Fault Codes</b><br>- Engine ECM pin A20<br>- Engine ECM pin A32<br><b>P0220, P0221, P0222, P2135</b> | OK            | Disconnect sensor and proceed to test 2            |
|      | - Engine ECM pin A38<br>- Engine ECM pin A26   | Faulty        | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:<br><b>P0220, P0221, P0222, P2135</b>  | OK            | Proceed to test 3                                  |
|      | - Engine ECM pin A26 to ground<br>- Engine ECM pin A38 to ground   | Short Circuit | Locate and rectify wiring fault, proceed to test 5 |

| Test |   | Result              | Action   |
|------|---|---------------------|--|
| 3    | Check cable continuity:<br><b>All Fault Codes</b><br>- Engine ECM pin A32 to throttle position sensor connector pin 2<br>- Engine ECM pin A20 to throttle position sensor connector pin 5<br><b>P0220, P0221, P0222, P2135</b>                              | OK                  | Proceed to test 4                                  |
|      | - Engine ECM pin A38 to throttle position sensor connector pin 4<br>- Engine ECM pin A26 to throttle position sensor connector pin 3  | Open Circuit        | Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable for short circuit:<br><b>P0120, P0121</b><br>- Engine ECM pin A26 to Engine ECM pin A32<br>- Engine ECM pin A32 to Engine ECM pin A38<br><b>P0120, P0121, P0220, P0221</b><br>- Engine ECM pin A26 to Engine ECM pin A38<br><b>P0220, P0221</b> | OK                  | Renew throttle position sensor, proceed to test 5  |
|      | - Engine ECM pin A32 to Engine ECM pin A38<br><b>P0220, P0221, P2135</b><br>- Engine ECM pin A26 to Engine ECM pin A20<br>- Engine ECM pin A26 to Ground<br>- Engine ECM pin A38 to Engine ECM pin A20<br>- Engine ECM pin A38 to Ground                    | Short Circuit       | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK                  | Action complete - quit test                        |
|      |   | Fault still present | Contact Triumph service                            |



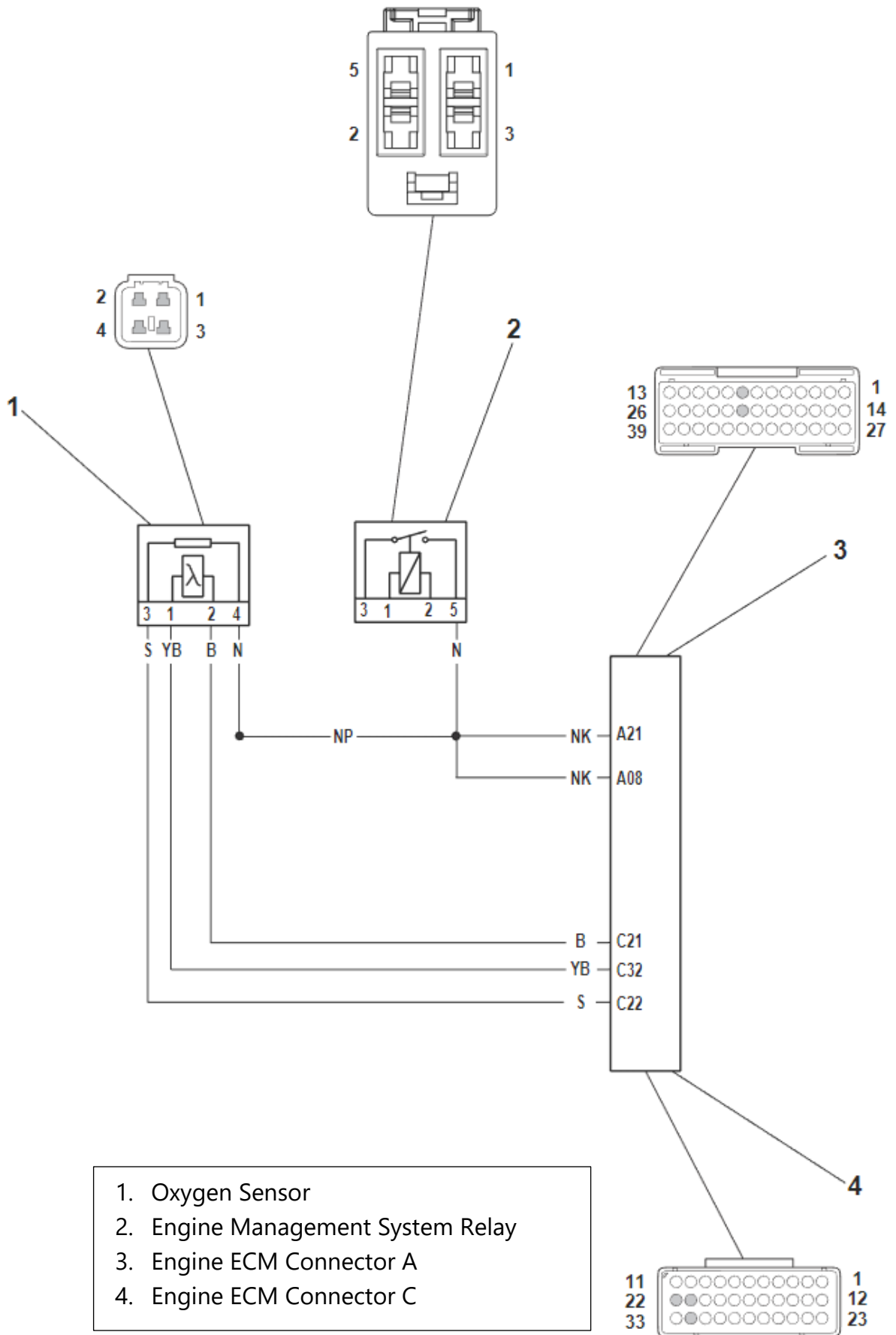
1. Throttle Position Sensor
2. Engine ECM Connector A

## Oxygen Sensor Heater

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P0030      | Oxygen sensor heater open circuit or short to ground - bank 1 sensor 1   | View and note 'freeze-frame' data if available.  |
| P0032      | Oxygen sensor heater short circuit to battery positive - bank 1 sensor 1 | View and note 'sensor' data.<br>Make sure sensor connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin A08<br>- EMS relay pin 5                                      | OK<br>Disconnect oxygen sensors and proceed to test 2               |
|      |   | Faulty<br>Rectify fault, proceed to test 5                          |
| 2    | Check cable for short circuit:<br>- - Engine ECM pin A08 to ground  | OK<br>Proceed to test 3   |
|      |   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 4 |
| Test | Result  | Action  |
| 3    | Check cable continuity.<br>- Engine ECM pin A08 to oxygen sensor pin 4<br>- Engine ECM pin C22 to oxygen sensor pin 3 | OK<br>Proceed to test 4   |
|      |   | Open Circuit<br>Locate and rectify wiring fault, proceed to test 4  |
| 4    | Check cable for short circuit:<br>- - Engine ECM pin C22 to Engine ECM pin A08  | OK<br>Renew oxygen sensor, proceed to test 5                        |
|      |   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine. Check adaption status.  | OK<br>Action complete - quit test                                   |
|      |   | Fault still present<br>Contact Triumph service                      |



- 1. Oxygen Sensor
- 2. Engine Management System Relay
- 3. Engine ECM Connector A
- 4. Engine ECM Connector C

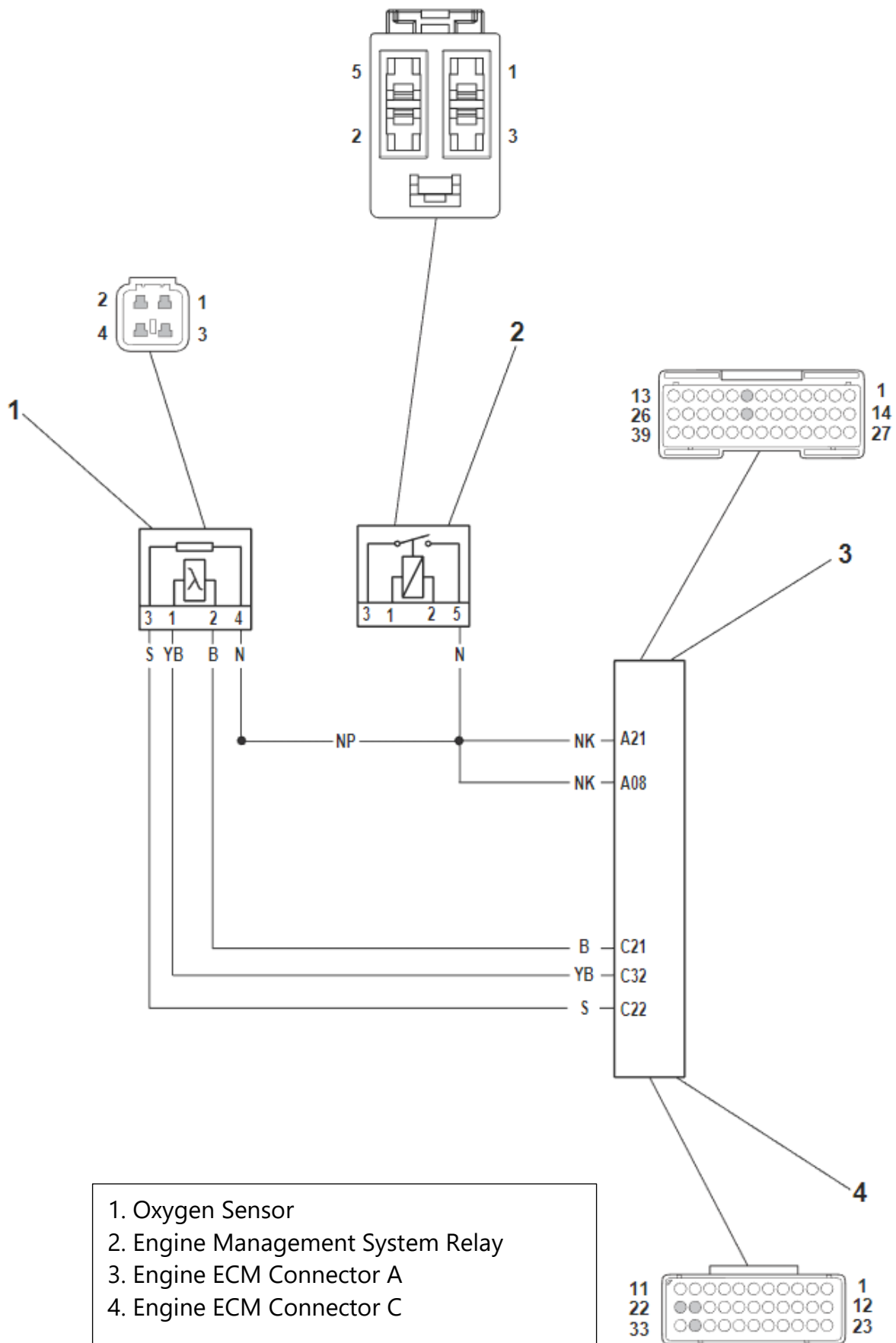
## Oxygen Sensor Heater

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P0053      | Oxygen sensor heater resistance - bank 1 sensor 1            | View and note 'freeze-frame' data if available.<br>Disconnect engine ECM and proceed to pinpoint test 1: |
| P0134      | Oxygen sensor circuit no activity detected - bank 1 sensor 1 |  |
| P0171      | System too lean - bank 1                                     |  |
| P0172      | System too rich - bank 1                                     |  |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity.<br>- Oxygen sensor pin 3<br>- Oxygen sensor pin 4<br>- EMS relay pin 5<br>- Engine ECM pin C22                                   | OK<br>Disconnect oxygen sensor and proceed to test 2 |
|      | Faulty   | Rectify fault, proceed to test 5                     |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C22 to ground   | OK<br>Proceed to test 3                              |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 5   |
| 3    | Check cable continuity:<br>- Engine ECM pin C22 to oxygen sensor pin 3<br>- Engine ECM pin A08 to oxygen sensor pin 4<br>- Engine ECM pin A21 to oxygen sensor pin 4 | OK<br>Proceed to test 4                              |
|      | Open Circuit   | Locate and rectify wiring fault, proceed to test 5   |
| 4    | Check sensor resistance:<br>- Oxygen sensor pin 3 to 4   | 13 to 18.5 Ohms<br>Proceed to test 5                 |
|      | Faulty   | Rectify fault, proceed to test 5                     |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.  | OK<br>Action complete - quit test                    |
|      | Fault still present  | Contact Triumph service                              |





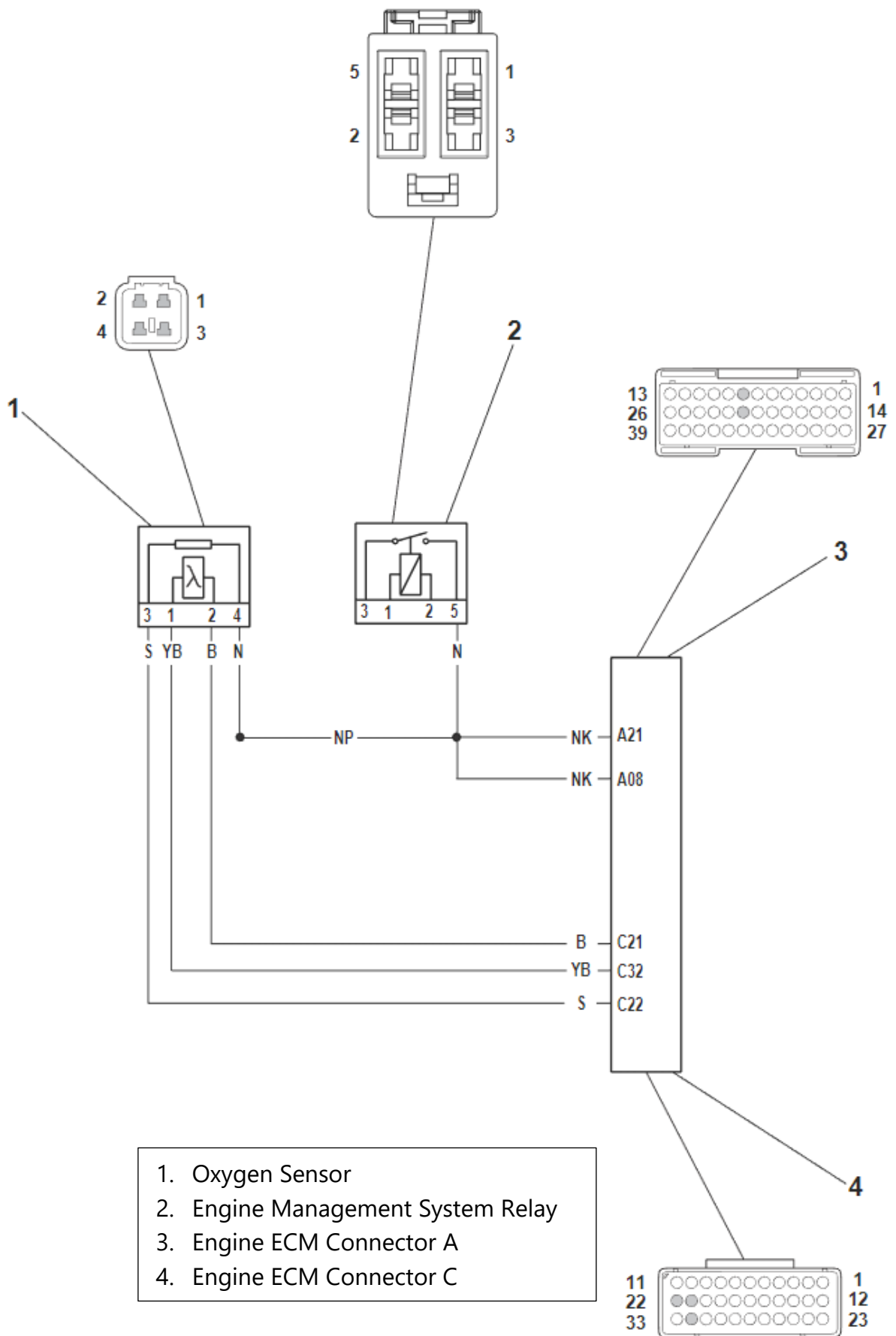
- 1. Oxygen Sensor
- 2. Engine Management System Relay
- 3. Engine ECM Connector A
- 4. Engine ECM Connector C

## Oxygen Sensor

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P0130      | Oxygen sensor open circuit or short circuit to battery positive - bank 1 sensor 1 | Disconnect oxygen sensor and proceed to pinpoint test 4:   |
| P0131      | Oxygen sensor short circuit to ground - bank 1 sensor 1                           | View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin C32<br>- Engine ECM pin C21<br>- Oxygen sensor connector pin 1<br>- Oxygen sensor connector pin 2 | OK<br>Disconnect oxygen sensor and proceed to test 2 |
|      | Faulty  | Rectify fault, proceed to test 5                     |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C32 to ground  | OK<br>Proceed to test 3                              |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5   |
| 3    | Check cable continuity.<br>- Engine ECM pin C21 to oxygen sensor pin 2  | OK<br>Proceed to test 5                              |
|      | Open Circuit  | Locate and rectify wiring fault, proceed to test 5   |
| 4    | Check cable for short circuit:<br>-Engine ECM pin C32 EMS relay pin 5   | OK<br>Renew oxygen sensor and proceed to test 5      |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5   |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK<br>Action complete - quit test                    |
|      | Fault still present   | Contact Triumph service                              |



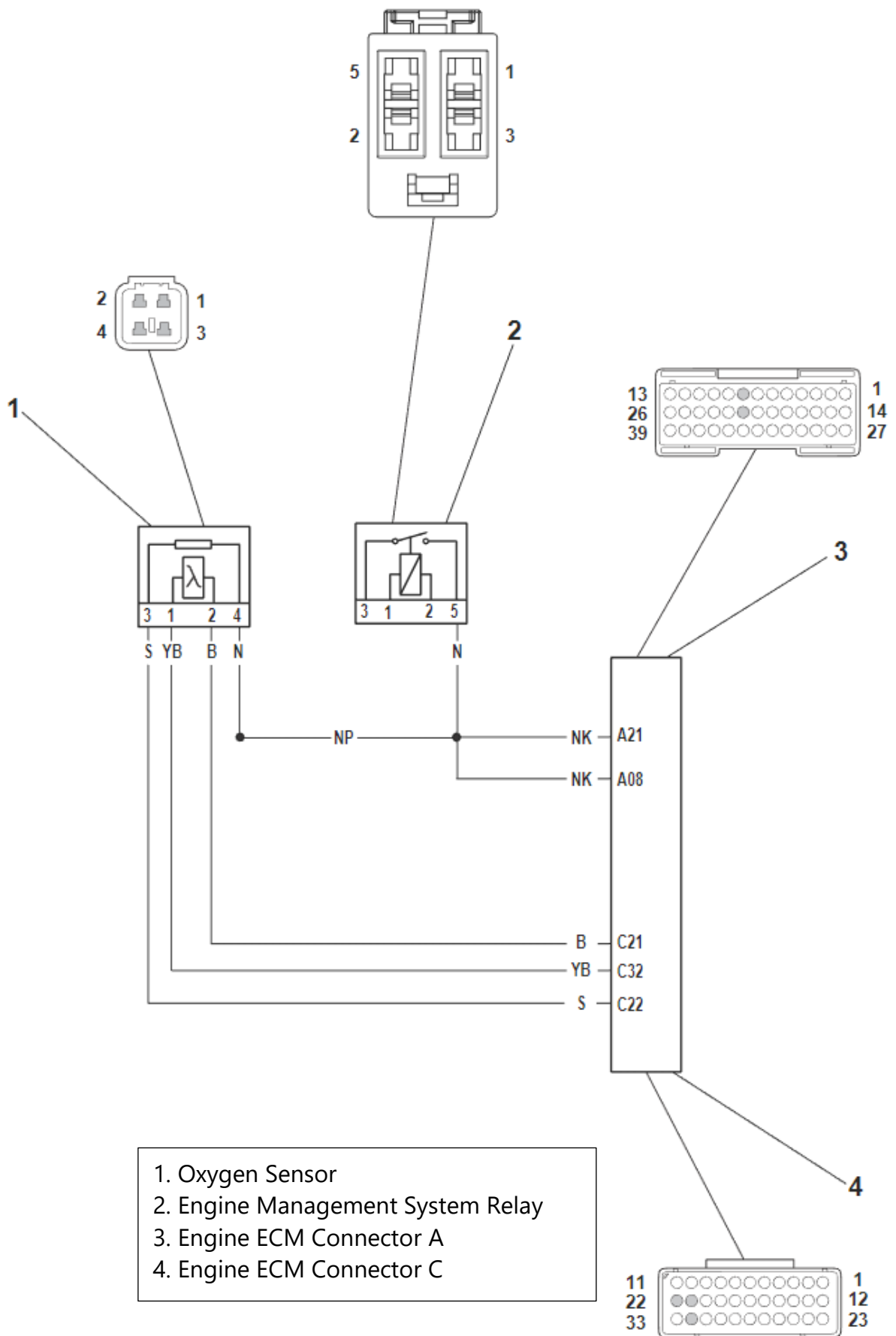
- 1. Oxygen Sensor
- 2. Engine Management System Relay
- 3. Engine ECM Connector A
- 4. Engine ECM Connector C

## Oxygen Sensor - Slow Response

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| P0133      | Oxygen sensor circuit slow response - bank 1 sensor 1 | View and not 'freeze-frame' data if available.<br>Disconnect engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Check cable and terminal integrity:<br>- Oxygen sensor pin 1<br>- Oxygen sensor pin 2<br>- EMS relay pin 5<br>- Engine ECM pin C22 | OK<br>Disconnect oxygen sensor and proceed to test 2                |
|      | Faulty   | Rectify fault, proceed to test 4                                    |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C22 to ground   | OK<br>Proceed to test 3   |
|      | Check sensor resistance:<br>- Oxygen sensor pin 3 to 4   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 4 |
| 3    | Check cable continuity:<br>- Engine ECM pin C22 to oxygen sensor pin 3   | OK<br>Proceed to test 4   |
|      | - Engine ECM pin A08 to oxygen sensor pin 4  | Open Circuit<br>Locate and rectify wiring fault, proceed to test 4  |
| 4    | Reconnect harness, clear fault code and run engine. Check adaption status.   | OK<br>Action complete - quit test                                   |
|      | Fault still present  | Contact Triumph service   |



1. Oxygen Sensor
2. Engine Management System Relay
3. Engine ECM Connector A
4. Engine ECM Connector C

## Fuel Injectors

| Fault Code | Possible cause                   | Action  |
|------------|----------------------------------|---|
| P0201      | Injector 1-1 circuit malfunction | View and note diagnostic software 'freeze-frame' data if available. Make sure relevant injector connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1: |
| P0202      | Injector 2-1 circuit malfunction |   |
| P0203      | Injector 3-1 circuit malfunction |   |
| P0205      | Injector 1-2 circuit malfunction |   |
| P0206      | Injector 2-2 circuit malfunction |   |
| P0207      | Injector 3-2 circuit malfunction |   |

## Pinpoint Tests

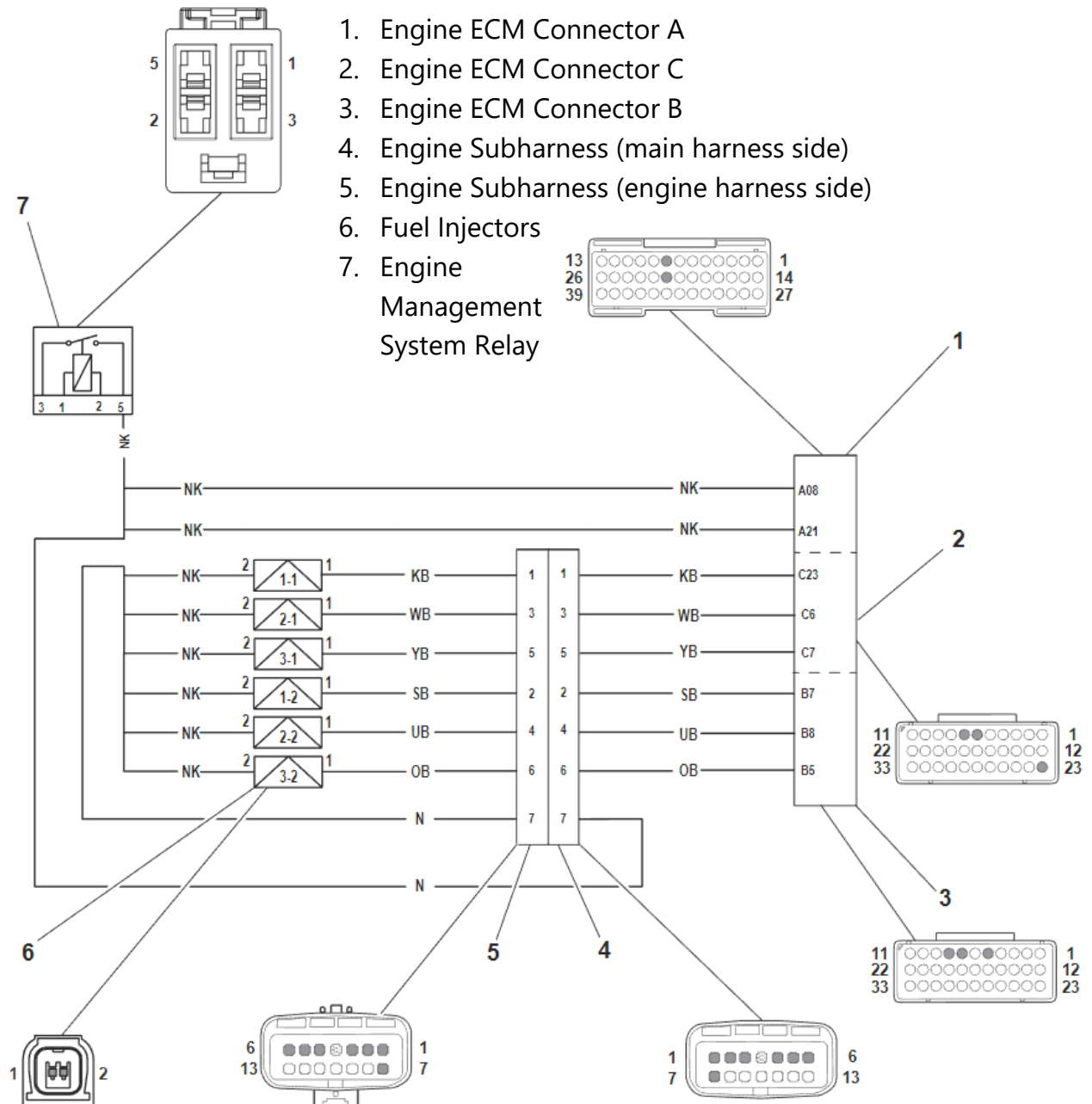
| Test | Result   | Action                           |                   |
|------|--|----------------------------------|-------------------|
| 1    | Check cable and terminal integrity:<br><b>All Fault Codes</b><br><ul style="list-style-type: none"> <li>- EMS relay pin 5</li> <li>- Engine Subharness connector pin 7</li> </ul> <b>P0201</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin C23</li> <li>- Engine Subharness connector pin 1</li> <li>- Injector 1-1 pins 1 and 2</li> </ul> <b>P0202</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin C6</li> <li>- Engine Subharness connector pin 3</li> <li>- Injector 1-2 pins 1 and 2</li> </ul> <b>P0203</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin C7</li> <li>- Engine Subharness connector pin 5</li> <li>- Injector 1-3 pins 1 and 2</li> </ul> <b>P0205</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin B7</li> <li>- Engine Subharness connector pin 2</li> <li>- Injector 2-1 pins 1 and 2</li> </ul> <b>P0206</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin B8</li> <li>- Engine Subharness connector pin 4</li> <li>- Injector 2-2 pins 1 and 2</li> </ul> <b>P0207</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin B5</li> <li>- Engine Subharness connector pin 3</li> <li>- Injector 2-3 pins 1 and 2</li> </ul> | OK                               | Proceed to test 2 |
|      | Faulty   | Rectify fault, proceed to test 7 |                   |

| Test   | Result        | Action   |
|--|---------------|--|
| 2<br>Check cable for short circuit to ground:<br><b>P0201</b><br>- Engine ECM pin C23 to ground<br><b>P0202</b><br>- Engine ECM pin C6 to ground<br><b>P0203</b><br>- Engine ECM pin C7 to ground<br><b>P0205</b><br>- Engine ECM pin B7 to ground<br><b>P0206</b><br>- Engine ECM pin B8 to ground<br><b>P0207</b><br>- - Engine ECM pin B5 to ground   | OK            | Proceed to test 3                                  |
|  | Short Circuit | Locate and rectify wiring fault, proceed to test 7 |
| 3<br>Check cable for short circuit to supply box:<br><b>P0201</b><br>- Engine ECM pin C23 to EMS relay pin 5<br><b>P0202</b><br>- Engine ECM pin C6 to EMS relay pin 5<br><b>P0203</b><br>- Engine ECM pin C7 to EMS relay pin 5<br><b>P0205</b><br>- Engine ECM pin B7 to EMS relay pin 5<br><b>P0206</b><br>- Engine ECM pin B8 to EMS relay pin 5<br><b>P0207</b><br>- Engine ECM pin B5 to EMS relay pin 5<br>Reconnect the injector | OK            | Proceed to test 4                                  |
|  | Short Circuit | Locate and rectify wiring fault, proceed to test 7 |

| Test |   | Result       | Action   |
|------|---|--------------|--|
| 4    | <p>Check cable continuity:<br/>For all fault codes, only the individual injector needs to be tested</p> <ul style="list-style-type: none"> <li>- Relevant injector pin 2 to EMS relay pin 5</li> </ul> <p><b>P0201</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C23 to injector 1-1 pin 1</li> </ul> <p><b>P0202</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C6 to injector 2-1 pin 1</li> </ul> <p><b>P0203</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C7 to injector 3-1 pin 1</li> </ul> <p><b>P0205</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin B7 to injector 1-2 pin 1</li> </ul> <p><b>P0206</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin B8 to injector 2-2 pin 1</li> </ul> <p><b>P0207</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin B5 to injector 3-2 pin 1</li> </ul> | OK           | Proceed to test 5                                  |
|      |   | Open Circuit | Locate and rectify wiring fault, proceed to test 7 |
| 5    | <p>Check resistance value integrity, with the injectors connected:</p> <p><b>P0201</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C23 to EMS relay pin 5</li> </ul> <p><b>P0202</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C6 to EMS relay pin 5</li> </ul> <p><b>P0203</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C7 to EMS relay pin 5</li> </ul> <p><b>P0205</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin B7 to EMS relay pin 5</li> </ul> <p><b>P0206</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin B8 to EMS relay pin 5</li> </ul> <p><b>P0207</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin B5 to EMS relay pin 5</li> </ul>   | OK           | Proceed to test 7                                  |
|      |   | Open Circuit | Disconnect relevant injector and proceed to test 6 |
|      |   | Open Circuit | Disconnect relevant injector and proceed to test 6 |



| Test | Result  | Action                 |  |
|------|---|------------------------|--|
| 6    | Check relevant injector resistance:<br>- Injector pin 1 to injector pin 2   | 11.4 Ohms to 12,6 Ohms | Proceed to test 7                          |
|      |   | Faulty                 | Renew relevant injector, proceed to test 7 |
| 7    | Reconnect harness, clear fault code and run engine to verify fault cleared. | OK                     | Action complete - quit test                |
|      |   | Fault still present    | Contact Triumph service                    |



## Engine Misfire

| Fault Code | Possible cause                            | Action  |
|------------|---|---|
| P0300      | Random/Multiple Cylinder Misfire Detected | View and note diagnostic software freeze frame data if available Make sure relevant injector and coil connectors are secure. Disconnect Engine ECM and proceed to pinpoint test 1 |
| P0301      | Cylinder 1 Misfire Detected               |   |
| P0302      | Cylinder 2 Misfire Detected               |   |
| P0303      | Cylinder 3 Misfire Detected               |   |

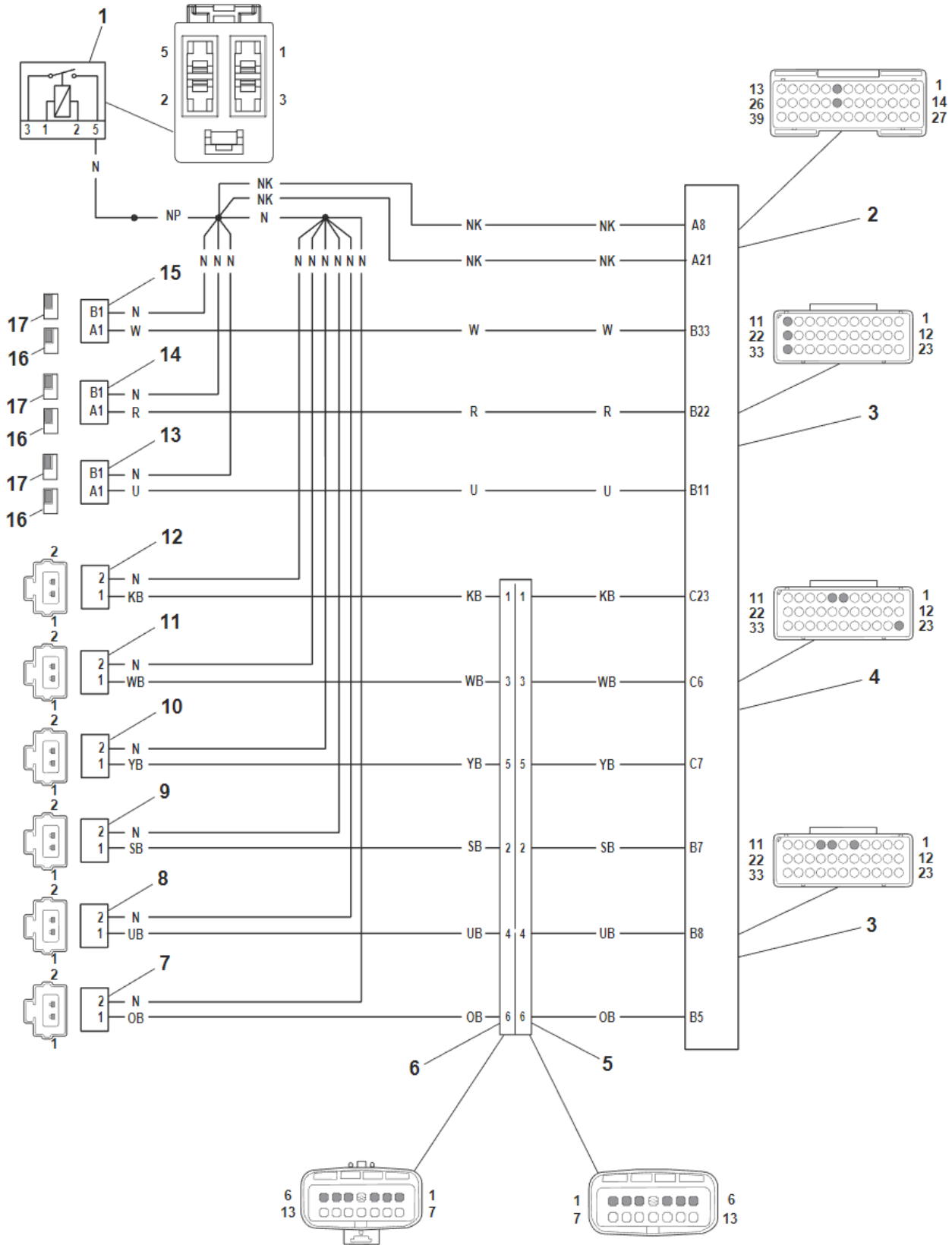
## Pinpoint Tests

| Test | Result   | Action                           |                   |
|------|--|----------------------------------|-------------------|
| 1    | Check cables and terminal integrity for the relevant fault code, <b>P0300</b> will require all terminals/cables listed to be checked:<br><b>P0301</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin C23</li> <li>- Subharness engine inline pin 1</li> <li>- Engine ECM pin B7</li> <li>- Subharness engine inline pin 2</li> <li>- Engine ECM pin B33</li> </ul> <b>P0302</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin C6</li> <li>- Subharness engine inline pin 3</li> <li>- Engine ECM pin B8</li> <li>- Subharness engine inline pin 4</li> <li>- Engine ECM pin B22</li> </ul> <b>P0303</b><br><ul style="list-style-type: none"> <li>- Engine ECM pin C7</li> <li>- Subharness engine inline pin 5</li> <li>- Engine ECM pin B5</li> <li>- Subharness engine inline pin 6</li> <li>- Engine ECM pin B11</li> </ul> <b>All</b><br><ul style="list-style-type: none"> <li>- EMS relay pin 5</li> </ul> | OK                               | Proceed to test 2 |
|      | Faulty   | Rectify fault, proceed to test 9 |                   |

| Test |  | Result   | Action   |
|------|--|--|--|
| 2    | <p>Check cable for short circuit to ground integrity for the relevant fault code, <b>P0300</b> will require all terminals/cables listed to be checked:</p> <p><b>P0301</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C23 to ground</li> <li>- Engine ECM pin B7 to ground</li> <li>- Engine ECM pin B33 to ground</li> </ul> <p><b>P0302</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C6 to ground</li> <li>- Engine ECM pin B8 to ground</li> <li>- Engine ECM pin B22 to ground</li> </ul> <p><b>P0302</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C7 to ground</li> <li>- Engine ECM pin B5 to ground</li> <li>- Engine ECM pin B11 to ground</li> </ul>   | OK   | Proceed to test 3  |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 9 |  |
| 3    | <p>Check cable for short circuit to supply box for the relevant fault code, <b>P0300</b> will require all terminals/cables listed to be checked:</p> <p><b>P0301</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C23 to EMS relay pin 5</li> <li>- Engine ECM pin B7 to EMS relay pin 5</li> <li>- Engine ECM pin B33 to EMS relay pin 5</li> </ul> <p><b>P0302</b></p> <ul style="list-style-type: none"> <li>- Engine ECM pin C6 to EMS relay pin 5</li> <li>- Engine ECM pin B8 to EMS relay pin 5</li> <li>- Engine ECM pin B22 to EMS relay pin 5</li> </ul> <p><b>P0303</b></p> <ol style="list-style-type: none"> <li>1. Engine ECM pin C7 to EMS relay pin 5</li> <li>2. Engine ECM pin B5 to EMS relay pin 5</li> <li>3. Engine ECM pin B11 to EMS relay pin 5</li> </ol> | OK   | <p>For <b>P0301</b> detach the ignition coils from their brackets (see <a href="#">Ignition Coils - Removal</a>) then proceed to test 4</p> <p>For P0302 and P0303 proceed to test 4</p> |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 9 |  |

| Test  | Result       | Action   |
|---|--------------|--|
| <p>4</p> <p>Check cable continuity for the relevant fault code, P0300 will require all terminals/cables listed to be checked:</p> <p><b>P0301</b></p> <ul style="list-style-type: none"> <li>- EMS relay pin 5 to injector 1-1 pin 2</li> <li>- EMS relay pin 5 to injector 1-2 pin 2</li> <li>- EMS relay pin 5 to ignition coil 1 pin 2</li> <li>- Engine ECM pin C23 to injector 1-1 pin 1</li> <li>- Engine ECM pin B7 to injector 1-2 pin 1</li> <li>- Engine ECM pin B33 ignition coil 1</li> </ul>   | OK           | Proceed to test 5                                  |
| <p><b>P0302</b></p> <ul style="list-style-type: none"> <li>- EMS relay pin 5 to injector 2-1 pin 2 –</li> <li>- EMS relay pin 5 to injector 2-2 pin 2</li> <li>- EMS relay pin 5 to ignition coil 2 pin 2</li> <li>- Engine ECM pin C6 to injector 2-1 pin 1</li> <li>- Engine ECM pin B8 to injector 2-2 pin 1</li> <li>- Engine ECM pin B22 to ignition coil 2 pin 1</li> </ul> <p><b>P0303</b></p> <ul style="list-style-type: none"> <li>- EMS relay pin 5 to injector 3-1 pin 2</li> <li>- EMS relay pin 5 to injector 3-2 pin 2</li> <li>- EMS relay pin 5 to ignition coil 3 pin 2</li> <li>- Engine ECM pin C7 to injector 3-1 pin 1</li> <li>- Engine ECM pin B5 to injector 3-2 pin 1</li> <li>- Engine ECM pin B11 to ignition coil 3 pin 1</li> </ul> | Open Circuit | Locate and rectify wiring fault, proceed to test 9 |

| Test |  | Result                       | Action   |
|------|--|------------------------------|--|
| 5    | Check injector resistance value integrity for the relevant fault code, <b>P0300</b> will require all terminals listed to be checked:<br><b>P0301</b><br>- Engine ECM pin C23 to EMS relay pin 5  | OK<br>11.4 Ohms to 12.6 Ohms | Proceed to test 7                                  |
|      | <b>P0303</b><br>- Engine ECM pin B7 to EMS relay pin 5<br><b>P0303</b><br>- Engine ECM pin C6 to EMS relay pin 5<br>- Engine ECM pin B8 to EMS relay pin 5<br><b>P0303</b><br>- Engine ECM pin C7 to EMS relay pin 5<br>- Engine ECM pin B5 to EMS relay pin | Faulty                       | Disconnect relevant injector and proceed to test 6 |
| 6    | Check relevant injector resistance:<br>- Injector pin 1 to injector pin 2  | 11.4 Ohms to 12,6 Ohms       | Proceed to test 7                                  |
|      |  | Faulty                       | Renew relevant injector, proceed to test 9         |
| 7    | Check coil resistance value for the relevant fault code, <b>P0300</b> will require all terminals listed to be checked:<br><b>P0301</b><br>- Engine ECM pin B33 to EMS relay pin 5  | OK<br>3.0 Ohms to 4.2 Ohms   | Proceed to test 9                                  |
|      | <b>P0302</b><br>- Engine ECM pin B22 to EMS relay pin 5<br><b>P0303</b><br>- Engine ECM pin B11 to EMS relay pin 51  | Faulty                       | Renew relevant ignition coil, proceed to test 8    |
| 8    | Check relevant ignition coil resistance:<br>- Ignition coil pin A-1 to ignition coil pin B-1   | OK<br>3.0 Ohms to 4.2 Ohms   | Proceed to test 9                                  |
|      |  | Faulty                       | Renew relevant ignition coil, proceed to test 9    |
| 9    | Reconnect harness, clear fault code and run engine to verify fault cleared.  | OK                           | Action complete - quit test                        |
|      |  | Fault still present          | Contact Triumph service                            |



1. Engine Management System Relay
2. Engine ECM Connector A
3. Engine ECM Connector B
4. Engine ECM Connector C
5. Engine Subharness (main harness side)
6. Engine Subharness (subharness side)
7. Fuel Injector 3-2
8. Fuel Injector 2-2
9. Fuel Injector 1-2
10. Fuel Injector 3-1
11. Fuel Injector 2-1
12. Fuel Injector 1-1
13. Ignition Coil 3
14. Ignition Coil 2
15. Ignition Coil 1
16. Ignition Coil Connector Negative
17. Ignition Coil Connector Positive

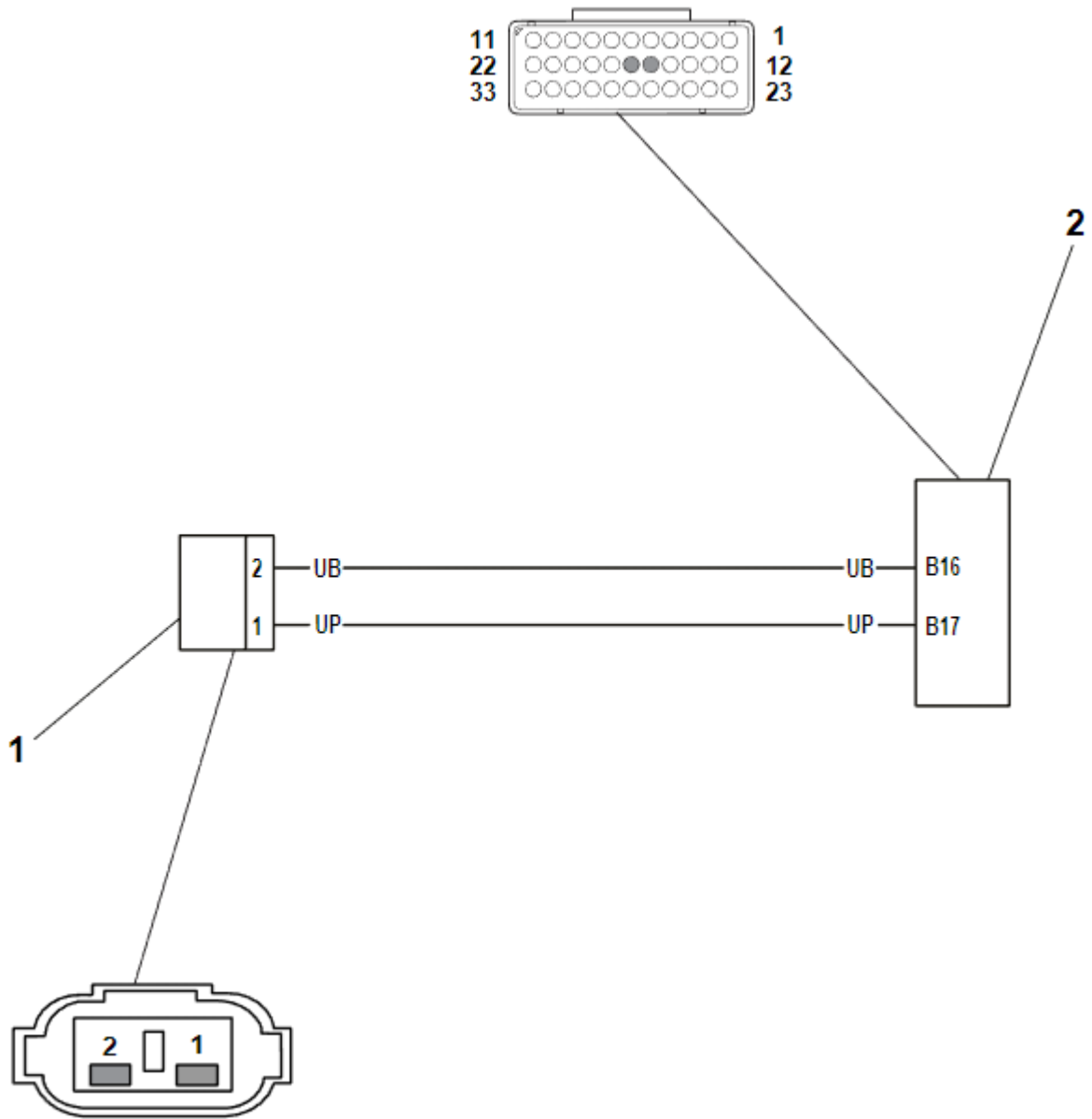
## Crankshaft Sensor

| Fault Code | Possible cause                        | Action   |
|------------|---------------------------------------|--|
| P0315      | Crankshaft sensor circuit malfunction | View and note diagnostic software freeze frame data if available Make sure sensor is fitted correctly and connector is secure Disconnect Engine ECM and proceed to pinpoint test 1 |
| P0335      | Crankshaft sensor circuit malfunction |  |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check terminal and cable integrity:<br>- Engine ECM pin B17<br>- Engine ECM pin B16                     | OK<br>Disconnect sensor and proceed to test 2                       |
|      |   | Faulty<br>Rectify fault, proceed to test 6                          |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B17 to ground<br>- Engine ECM pin B16 to ground      | OK<br>Proceed to test 3   |
|      |   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 6 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B17 to Engine ECM pin B16                            | OK<br>Proceed to test 4   |
|      |   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 6 |
| 4    | Check cable continuity:<br>- Engine ECM pin B16 to sensor pin 2<br>- Engine ECM pin B17 to sensor pin 1 | OK<br>Renew crankshaft sensor, proceed to test 6                    |
|      |   | Open Circuit<br>Locate and rectify wiring fault, proceed to test 6  |
| 5    | Check crankshaft toothed wheel:<br>- Damage to teeth - magnetic debris contamination                    | OK<br>Proceed to test 6   |
|      |   | Faulty<br>Clean/renew toothed wheel, proceed to test 6              |
| 6    | Reconnect harness, clear fault code and run engine to verify fault cleared.                             | OK<br>Action complete - quit test                                   |
|      |   | Fault still present<br>Contact Triumph service                      |





1. Crankshaft Position Sensor
2. Engine ECM Connector B

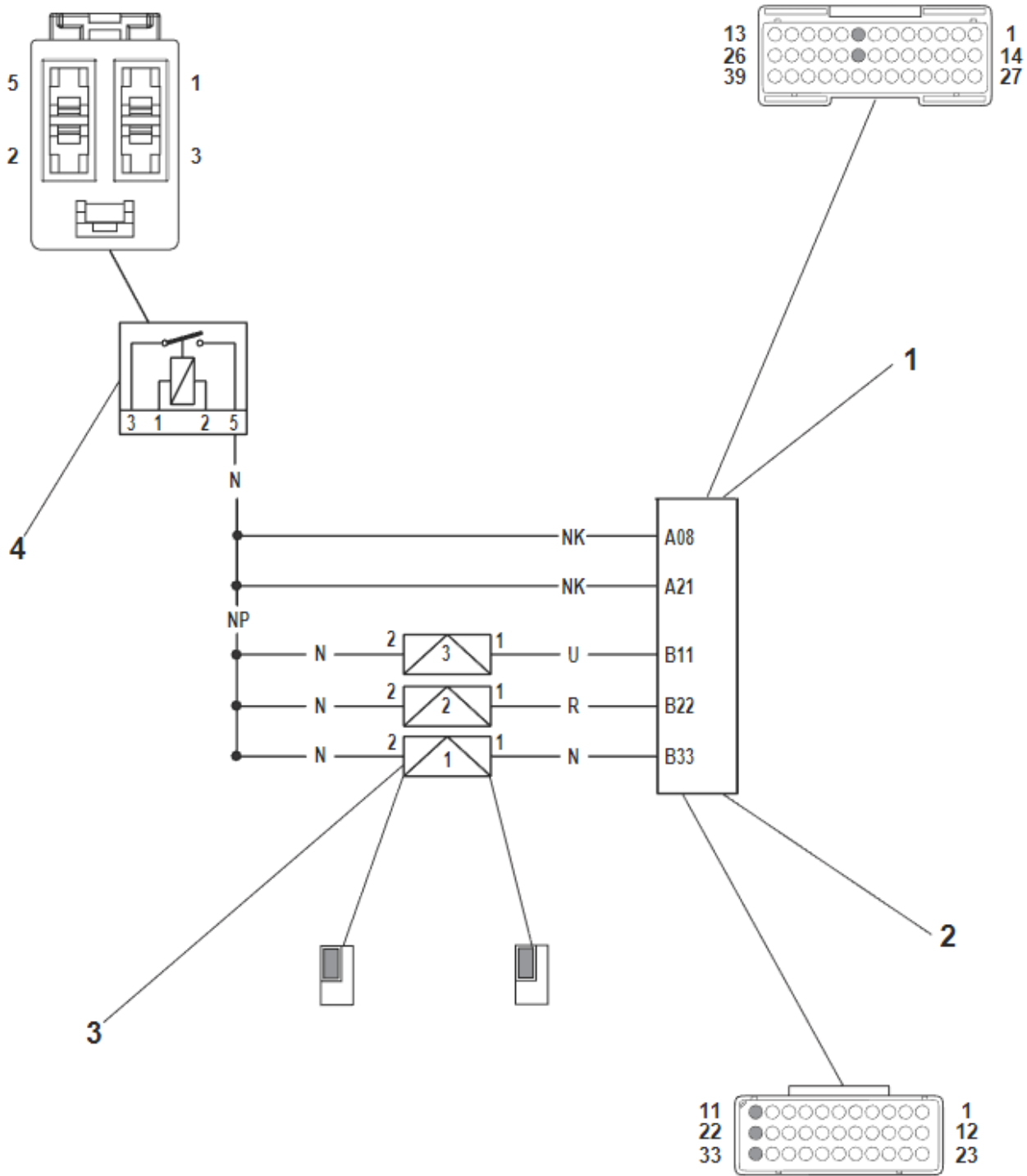
#### Ignition Coils

| Fault Code | Possible cause              | Action  |
|------------|-----------------------------|---|
| P0351      | Ignition coil 1 malfunction | View and note diagnostic software 'freeze-frame' data if available. Make sure relevant ignition coil connector is secure. Disconnect engine ECM and proceed to pinpoint test 1: |
| P0352      | Ignition coil 2 malfunction |   |
| P0353      | Ignition coil 3 malfunction |   |

## Pinpoint Tests

| Test | Result   | Action   |                   |
|------|--|--|-------------------|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B33 (fault code P0351)<br>- Engine ECM pin B22 (fault code P0352)<br>- Engine ECM pin B11 (fault code P0353)<br>- EMS relay pin 5 (all fault codes)  | OK   | Proceed to test 2 |
|      | Faulty   | Rectify fault, proceed to test 7                   |                   |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B33 to ground (fault code P0351)<br>- Engine ECM pin B22 to ground (fault code P0352)<br>- Engine ECM pin B11 to ground (fault code P0353)  | OK   | Proceed to test 3 |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 7 |                   |
| 3    | Check cable for short circuit:<br>- EMS relay pin 5 to<br>- Engine ECM pin B33 (fault code P0351)<br>- Engine ECM pin B22 (fault code P0352)<br>- Engine ECM pin B11 (fault code P0353)  | OK   | Proceed to test 4 |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 7 |                   |
| 4    | Check cable continuity:<br>- EMS relay pin 5 to relevant ignition coil pin<br>- Engine ECM pin B33 to ignition coil 1 pin 1 (fault code P0351)<br>- Engine ECM pin B22 to ignition coil 2 pin 1 (fault code P0352)<br>- Engine ECM pin B11 to ignition coil 3 pin 1 (fault code P0353) | OK   | Proceed to test 5 |
|      | Open Circuit   | Locate and rectify wiring fault, proceed to test 7 |                   |

| Test |   | Result               | Action  |
|------|---|----------------------|---|
| 5    | Check resistance value:<br>Engine ECM pin A08 to<br>- Engine ECM pin B33 (ignition coil 1 (fault code P0351))<br>- Engine ECM pin B22 (ignition coil 2 (fault code P0352))<br>- Engine ECM pin B11 (ignition coil 3 (fault code P0353))<br>Engine ECM pin A21 to<br>- Engine ECM pin B33 (ignition coil 1 (fault code P0351))<br>- Engine ECM pin B22 (ignition coil 2 (fault code P0352))<br>- Engine ECM pin B11 (ignition coil 3 (fault code P0353)) | 3.0 Ohms to 4.2 Ohms | Proceed to test 6                                       |
|      |   | Open Circuit         | Disconnect relevant ignition coil and proceed to test 6 |
|      |   | Short Circuit        | Disconnect relevant ignition coil and proceed to test 6 |
| 6    | Check relevant ignition coil resistance:<br>- Ignition coil pin 1 to ignition coil pin 2  | 3.0 Ohms to 4.2 Ohms | Proceed to test 7                                       |
|      |   | Faulty               | Renew relevant ignition coil, proceed to test 7         |
| 7    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK                   | Action complete - quit test                             |
|      |   | Fault still present  | Contact Triumph service                                 |



- 1. Engine ECM Connector A
- 2. Engine ECM Connector B
- 3. Ignition Coils
- 4. Engine Management System Relay

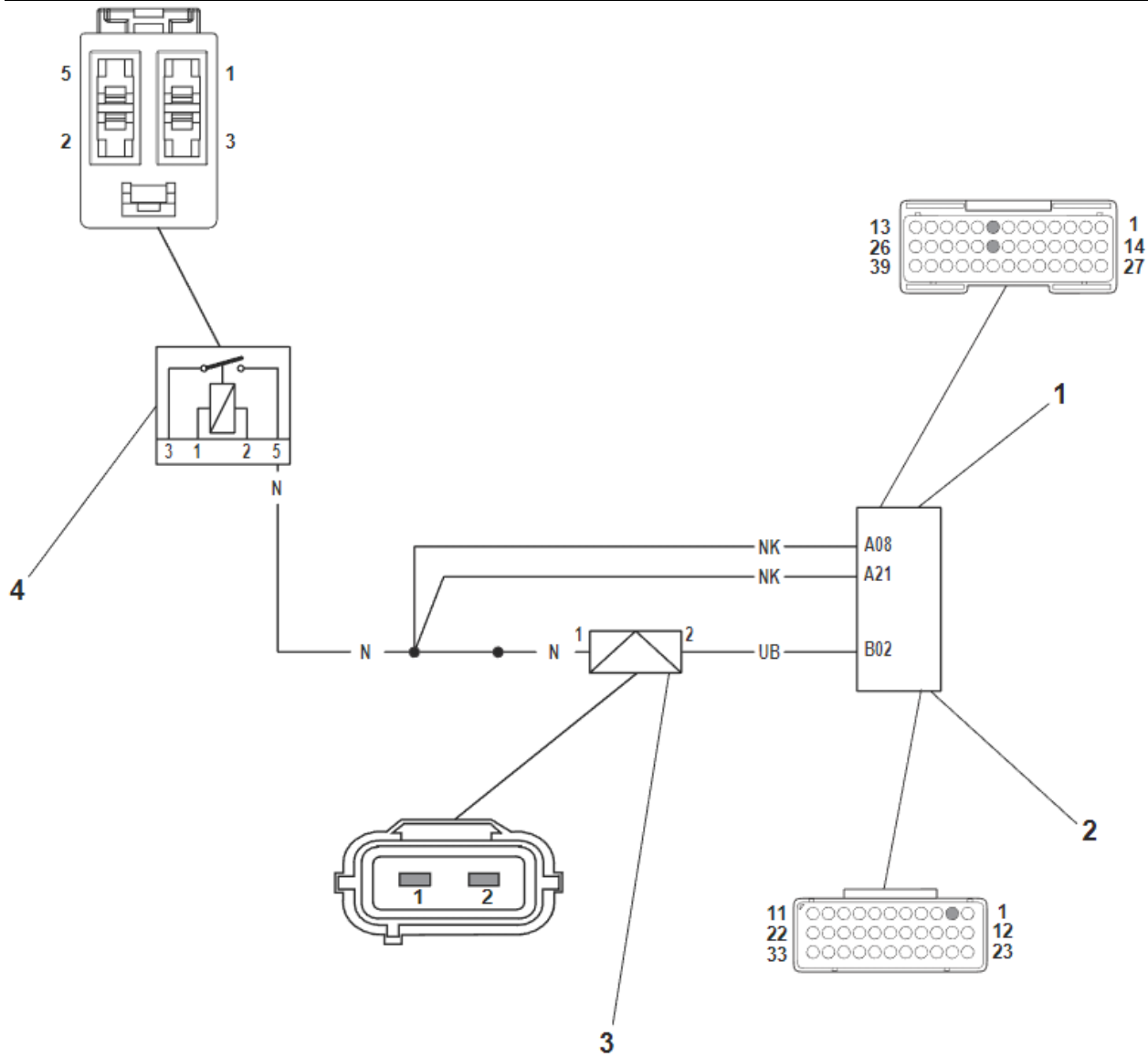
## Secondary Air Injection Valve

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| P0412      | Secondary air injection short circuit to ground or open circuit | View and note diagnostic tool sensor data.<br>Make sure the SAI valve connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1: |
| P044F      | Secondary air injection short circuit to battery positive       | Disconnect engine ECM and SAI valve and proceed to pinpoint test 5:   |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B02<br>- EMS Relay pin 5<br>- SAI solenoid pin 1<br>- SAI solenoid pin 2 | OK<br>Proceed to test 2 for P0412<br>Proceed to test 3 for P044F |
|      | Faulty   | Rectify fault, proceed to test 7                                 |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B02 to ground   | OK<br>Proceed to test 4  |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 7               |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B02 to EMS Relay pin 5  | OK<br>Proceed to test 5  |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 4               |
| 4    | Check cable continuity:<br>- EMS relay pin 5 to SAI valve pin 1<br>- Engine ECM pin B02 to SAI valve pin 2                       | OK<br>Proceed to test 5  |
|      | Fault still present  | Locate and rectify wiring fault, proceed to test 7               |
| 5    | Check resistance value, reconnect SAI valve:<br>Engine ECM pin B02 to EMS Relay pin 5  | 18 Ohms to 24 Ohms<br>Proceed to test 6                          |
|      | Open Circuit   | Disconnect SAI valve and proceed to test 6                       |
|      | Short Circuit  | Disconnect SAI valve and proceed to test 6                       |

|   |   |                     |                                    |
|---|---|---------------------|------------------------------------|
| 6 | Check SAI valve resistance:<br>- SAI valve pin 1 to SAI valve pin 2         | 18 Ohms to 24 Ohms  | Proceed to test 7                  |
|   |   | Faulty              | Renew SAI valve, proceed to test 7 |
| 7 | Reconnect harness, clear fault code and run engine to verify fault cleared. | OK                  | Action complete - quit test        |
|   |   | Fault still present | Contact Triumph service            |



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Engine ECM Connector A</li> <li>2. Engine ECM Connector B</li> <li>3. Secondary Air Injection Valve</li> <li>4. Engine Management System Relay</li> </ol> |
|---|

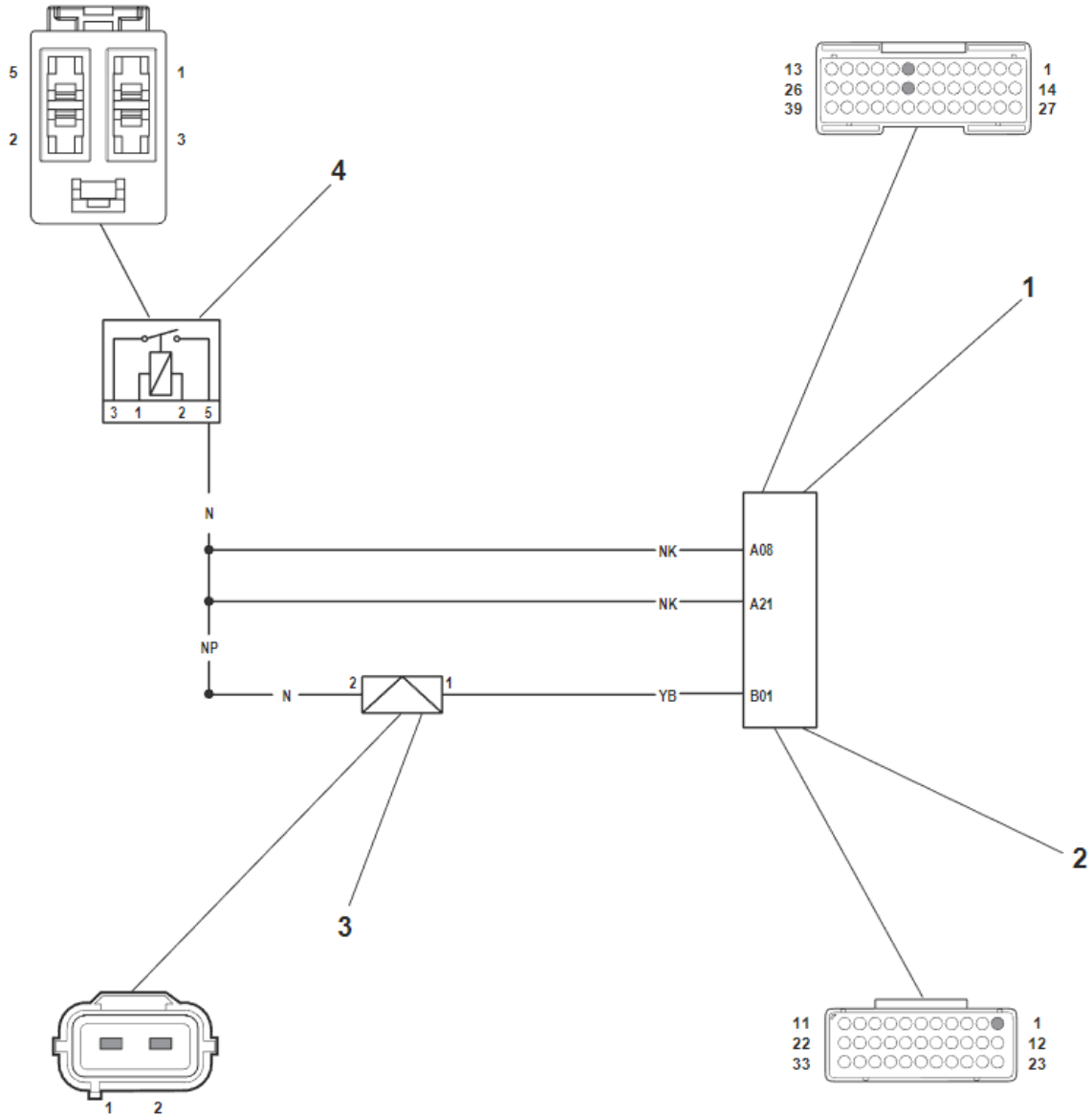
## Purge Valve

| Fault Code | Possible cause                                      | Action  |
|------------|---|---|
| P0443      | Purge valve short circuit to ground or open circuit | View and note diagnostic software 'sensor' data.<br>Make sure the purge valve connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1: |
| P0459      | Purge valve short circuit to battery positive       | Disconnect the purge valve and proceed to pinpoint test 5:  |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin A08<br>- Engine ECM pin A21<br>- Engine ECM pin B01<br>- EMS relay pin 5 | OK<br>Proceed to test 2 for P0443<br>Proceed to test 3 for P0459 |
|      | Faulty   | Rectify fault, proceed to test 7                                 |
| 2    | Check cable for short circuit:<br><b>P0443</b><br>- Engine ECM pin B01 to ground   | Open Circuit<br>Proceed to test 4                                |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 7               |
| 3    | Check cable for short circuit:<br><b>P0459</b><br>- Engine ECM pin A06 to EMS relay pin 5  | OK<br>Proceed to test 4  |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 7               |
| 4    | Check cable continuity:<br>- EMS relay pin 5 to purge valve pin 2<br>- Engine ECM pin B01 to purge valve pin 1                   | OK<br>Proceed to test 5  |
|      | Open Circuit   | Locate and rectify wiring fault, proceed to test 7               |
| 5    | Check resistance value, reconnect Purge valve:<br>- Engine ECM pin B01 to EMS relay pin 5  | 22 Ohms to 30 Ohms<br>Proceed to test 7                          |
|      | Open Circuit   | Disconnect purge valve and proceed to test 6                     |
|      | Short Circuit  | Disconnect purge valve and proceed to test 6                     |

|   |  |                     |                                      |
|---|--|---------------------|--------------------------------------|
| 6 | Check purge valve resistance, disconnect Purge valve:<br>- Valve pin 1 to valve pin 2                                      | 22 Ohms to 30 Ohms  | Proceed to test 7                    |
|   |  | Faulty              | Renew purge valve, proceed to test 7 |
| 7 | Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of purge valve. | OK                  | Action complete - quit test          |
|   |  | Fault still present | Contact Triumph service              |



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Engine ECM Connector A</li> <li>2. Engine ECM Connector B</li> <li>3. Secondary Air Injection Valve</li> <li>4. Engine Management System Relay</li> </ol> |
|---|

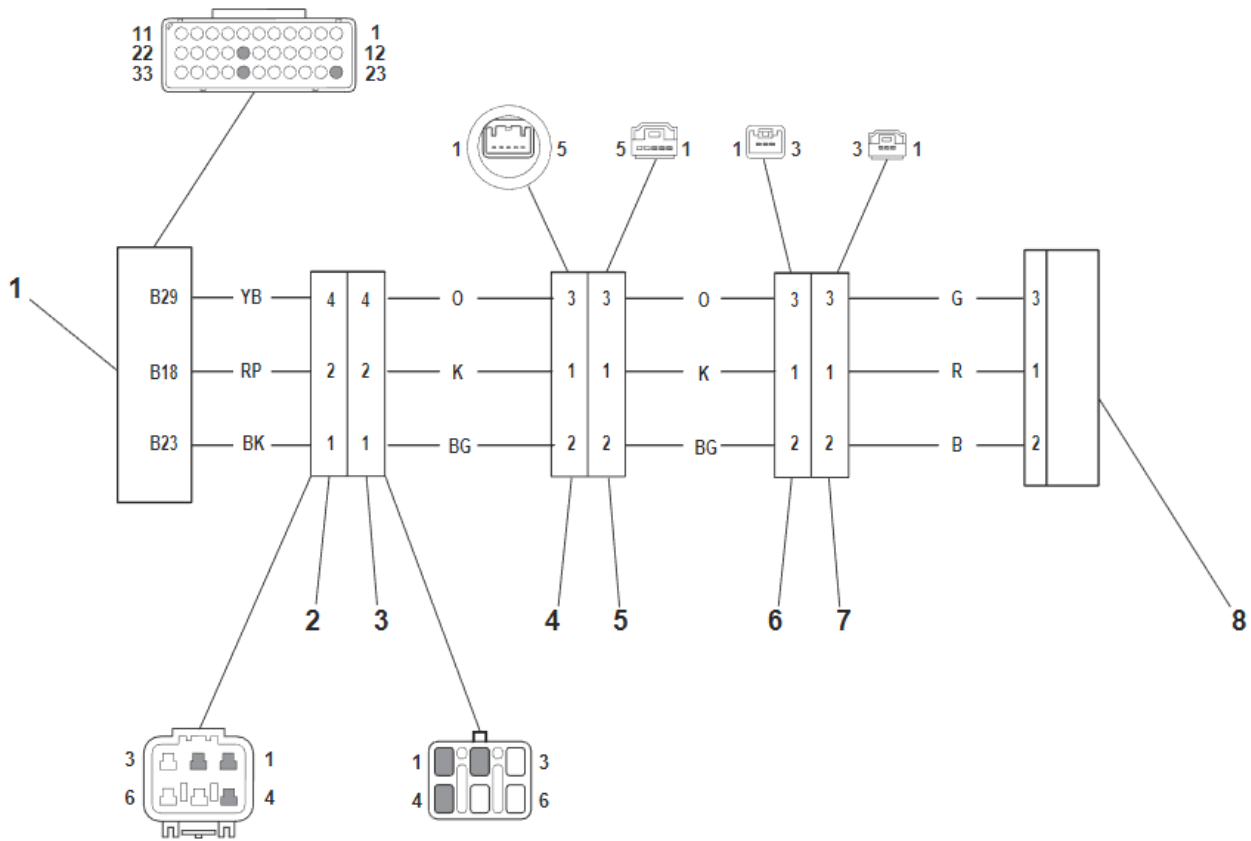


### Fuel Level Sensor Circuit

| Fault Code | Possible cause                        | Action  |
|------------|---------------------------------------|---|
| P0460      | Fuel level sensor circuit malfunction | View and note 'freeze-frame' data if available.<br>View and note 'sensor' data.<br>Make sure sensor connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B29<br>- Engine ECM pin B18<br>- Engine ECM pin B23  | OK<br>Disconnect sensor and proceed to test 2                       |
|      |  | Faulty<br>Rectify fault, proceed to test 4                          |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B29 to ground<br>- Engine ECM pin B29 to Engine ECM pin B23   | OK<br>Proceed to test 3   |
|      |  | Short Circuit<br>Locate and rectify wiring fault, proceed to test 4 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B29 to Engine ECM pin B18<br>- Engine ECM pin B29 to Engine ECM pin A08<br>- Engine ECM pin B29 to Engine ECM pin A21 | OK<br>Proceed to test 4   |
|      |  | Short Circuit<br>Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Engine ECM pin C29 to sensor pin 3<br>- Engine ECM pin B18 to sensor pin 1<br>- Engine ECM pin B23 to sensor pin 2                          | OK<br>Proceed to test 5   |
|      |  | Open Circuit<br>Locate and rectify wiring fault, proceed to test 5  |
| 5    | Reconnect harness, clear fault code.   | OK<br>Action complete - quit test                                   |
|      |  | Fault still present<br>Contact Triumph service                      |



1. Engine ECM Connector C
2. Fuel pump subharness (main harness end)
3. Fuel pump subharness (subharness end)
4. Fuel pump subharness (at fuel pump mounting plate)
5. Fuel pump harness (inside fuel tank)
6. Fuel pump harness to fuel level sensor fly lead (inside fuel tank)
7. Fuel level sensor fly lead (inside fuel tank)
8. Fuel Level Sensor

#### Vehicle Speed Sensor

| Fault Code | Possible cause           | Action   |
|------------|--------------------------|--|
| P0500      | Wheel speed sensor fault | Refer to the following ABS DTCs.<br><a href="#">Front Wheel Sensor Open Circuit/Short Circuit</a><br><a href="#">Front Wheel Sensor Abnormal Input/Losing Contact</a><br><a href="#">Rear Wheel Sensor Open Circuit/Short Circuit</a><br><a href="#">Rear Wheel Sensor Abnormal Input/Losing Contact</a> |

## Cruise Control

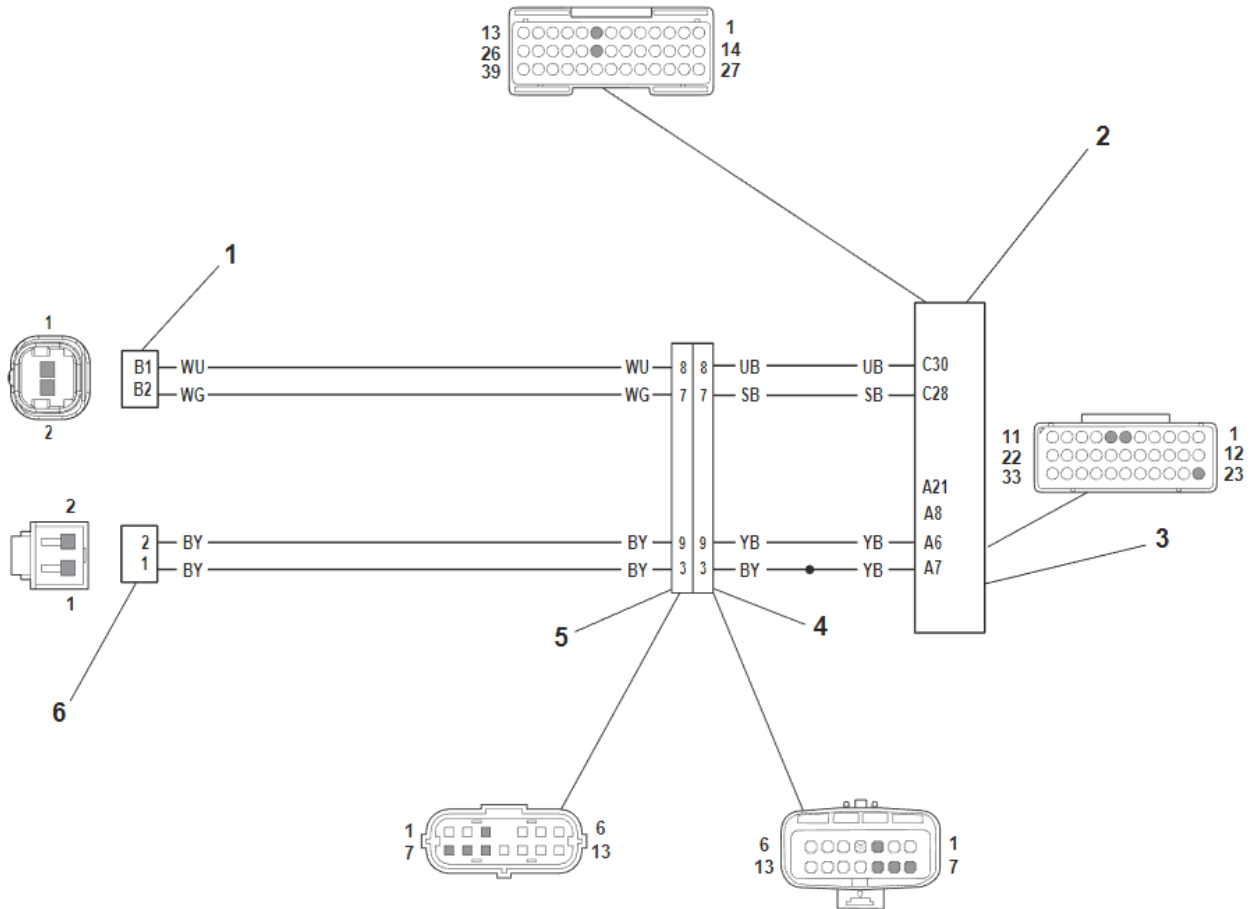
| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P056C      | Twist grip cruise cancel switch circuit malfunction           | View and note 'freeze-frame' data if available.<br>Perform throttle position sensor tests, see <a href="#">Throttle Position Sensor</a> ,<br>If fault still present, disconnect engine ECM and proceed to pinpoint test 1: |
| P1574      | Cruise Control prevented due to other malfunction condition   | View and note 'freeze-frame' data if available.<br>Check for associated DTCs and perform tests as required.<br>If fault still present, disconnect engine ECM and proceed to pinpoint test 1:                               |
| P1575      | Cruise Control disabled until button press sequence completed | Carry out the button press sequence see Cruise Control Switch Check, if fault still present, disconnect engine ECM and proceed to pinpoint test 1:   |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin A6 -Engine ECM pin C30<br>- Engine ECM pin C28<br>- Clutch switch pin 1<br>- Clutch switch pin 2<br>- Left hand switch housing, two pin connector pin 1<br>- Left hand switch housing, two pin connector pin 2 | OK<br>Disconnect sensor and proceed to test 2      |
|      | Faulty   | Rectify fault, proceed to test 7                   |
| 2    | Check cable for short circuit:<br>- Engine ECM pin A6 to ground<br>- Engine ECM pin C30 to ground<br>- Engine ECM pin C28 to ground  | OK<br>Proceed to test 3                            |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 7 |

| Test |  | Result        | Action  |
|------|--|---------------|---|
| 3    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin A6 to Engine ECM pin A8</li> <li>- Engine ECM pin A6 to Engine ECM pin A21</li> <li>- Engine ECM pin C30 to Engine ECM pin A8</li> <li>- Engine ECM pin C30 to Engine ECM pin A21</li> <li>- Engine ECM pin C28 to Engine ECM pin A8</li> <li>- Engine ECM pin C28 to Engine ECM pin A21</li> </ul> | OK            | Disconnect the clutch switch from the switch housing subharness see <a href="#">Clutch Switch - Removal</a> , proceed to test 4<br>Disconnect the two connectors from the left hand switch housing, proceed to test 4   |
|      |  | Short Circuit | Locate and rectify wiring fault, proceed to test 7  |
| 4    | Check cable continuity: <ul style="list-style-type: none"> <li>- Engine ECM pin A6 to clutch switch pin 2</li> <li>- Engine ECM pin C30 to left hand switch housing, two way connector pin 1</li> <li>- Engine ECM pin C28 to left hand switch housing, two way connector pin 2</li> </ul>   | OK            | Proceed to test 5   |
|      |  | Open Circuit  | Locate and rectify wiring fault, proceed to test 7  |
| 5    | Check clutch switch operation: <ul style="list-style-type: none"> <li>- Using a low voltage ohmmeter, attach one lead to the clutch switch pin 1 and the other to pin 2.</li> <li>• Clutch lever released - Short circuit</li> <li>• Clutch lever operated - Open circuit</li> </ul>   | OK            | Connect the clutch switch to the switch housing subharness see <a href="#">Clutch Switch - Installation</a><br>Connect the two connectors to the left hand switch housing<br>Disconnect the switch housing subharness from the main harness (located behind the flyscreen), proceed to test 6 |
|      |  | Faulty        | Replace the clutch switch, proceed to test 7  |

| Test |  | Result              | Action  |
|------|--|---------------------|---|
| 6    | Check operation of cruise control set and reset switches:<br>- Using a low voltage ohmmeter, connect one lead to the switch housing subharness connector pin 1 and the other to the two way connector pin 8 Expected result<br><br><ul style="list-style-type: none"> <li>• SET switch released - Open circuit</li> <li>• SET switch operated - Short circuit</li> </ul> | OK                  | Proceed to test 7                             |
|      | - Using a low voltage ohmmeter, connect one lead to the switch housing subharness connector pin 1 and the other to the two way connector pin 8 Expected result<br><br><ul style="list-style-type: none"> <li>• RESET switch released - Open circuit</li> <li>• RESET switch operated - Short circuit</li> </ul>  | Faulty              | Replace the switch housing, proceed to test 7 |
| 7    | Reconnect harness, clear fault code.   | OK                  | Action complete - quit test                   |
|      |  | Fault still present | Contact Triumph service                       |



1. Left Hand Switch Housing (two pin connector)
2. Engine ECM Connector C
3. Engine ECM Connector A
4. Switch Housing Subharness Connector (main harness side)
5. Switch Housing Subharness Connector (subharness side)
6. Clutch Switch Connector

### Engine Coolant Temperature Sensor Signal High

| Fault Code | Possible cause   | Action  |
|------------|--|---|
| P050C      | Engine coolant temperature sensor signal high-too warm for cold start conditions | <p>View and note 'freeze-frame' data if available.</p> <p>Check for associated DTCs and perform tests as required. Reset DTCs, if fault still present check the following:</p> <ul style="list-style-type: none"> <li>• Check/clean radiator cooling fins</li> <li>• Coolant level, adjust if necessary see - <a href="#">Coolant Level Adjustment</a></li> <li>• Check cooling system for leaks see - <a href="#">Coolant System - Check Hoses for Chafing, Cracks, Damage</a></li> <li>• Check coolant temperature sensor - see <a href="#">Coolant Temperature Sensor</a></li> <li>• Check thermostat - see <a href="#">Thermostat - Inspection</a></li> </ul> |

### Engine Idle Lower than Expected

| Fault Code | Possible cause                              | Action   |
|------------|---|--|
| P0506      | Idle control system RPM lower than expected | <p>View and note 'freeze-frame' data if available.</p> <p>Check for associated DTCs and perform tests as required. Reset DTCs, if fault still present check the following:</p> <ul style="list-style-type: none"> <li>• Air vacuum leak (MAP sensor hoses)</li> <li>• Air restriction at air intake</li> <li>• Restriction in the exhaust system</li> <li>• Restriction in the fuel system</li> <li>• Make sure the injector connectors are secure.</li> </ul> <p>Make sure the ignition coil connectors are secure.</p> |

### Engine Idle Higher than Expected

| Fault Code | Possible cause                               | Action   |
|------------|--|--|
| P0507      | Idle control system RPM higher than expected | <p>View and note 'freeze-frame' data if available.</p> <p>Check for associated DTCs and perform tests as required.</p> <p>Reset DTCs, if fault still present check the following:</p> <ul style="list-style-type: none"> <li>• Air vacuum leak (MAP sensor hoses)</li> <li>• Leaking air intake after the throttle bodies</li> <li>• Evaporative system</li> <li>• Secondary air injection system</li> </ul> |

### System Voltage

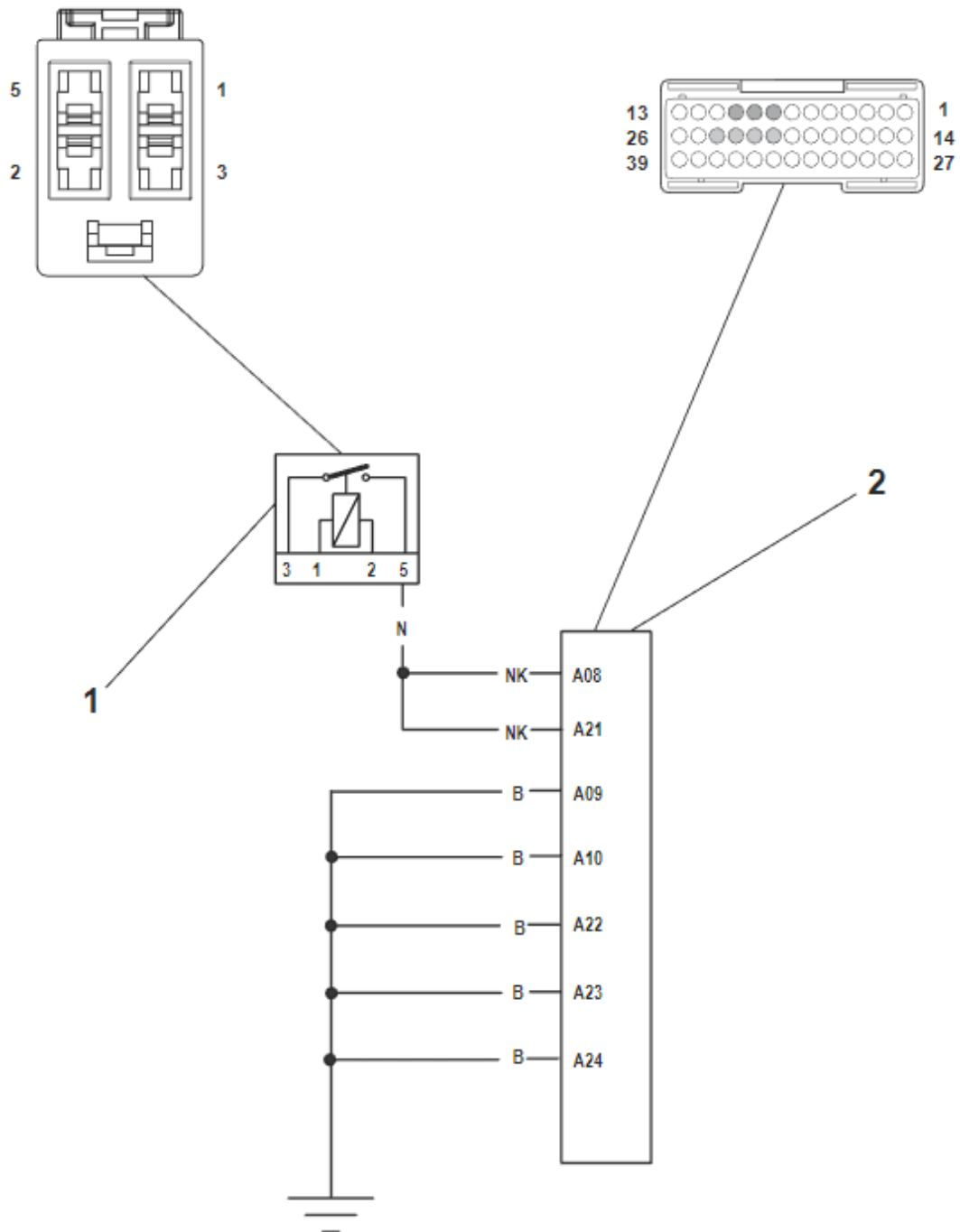
| Fault Code | Possible cause                               | Action  |
|------------|--|---|
| P0560      | System voltage - battery circuit malfunction | <p>View and note diagnostic software 'sensor' data.</p> <p>Make sure voltage across battery is acceptable, note voltage.</p> <p>Disconnect engine ECM and proceed to pinpoint test 1:</p> |

### Pinpoint Tests

| Test |   | Result                           | Action   |
|------|---|----------------------------------|--|
| 1    | <p>Check cable and terminal integrity:</p> <ul style="list-style-type: none"> <li>- Engine ECM pin A08</li> <li>- Engine ECM pin A21</li> <li>- Engine EMS relay pin 5</li> </ul> | OK                               | Proceed to test 2                                  |
|      |   | Faulty                           | Rectify fault, proceed to test 3                   |
| 2    | <p>With Ignition on check voltage at:</p> <ul style="list-style-type: none"> <li>- Engine ECM pin A08</li> <li>- Engine ECM pin A21</li> </ul>                                    | Same as across battery voltage   | Proceed to test 3                                  |
|      |   | Less than across battery voltage | Locate and rectify wiring fault, proceed to test 3 |



| Test | Result  | Action                  |                             |
|------|---|-------------------------|-----------------------------|
| 3    | Reconnect harness, clear fault code and run engine to verify fault cleared. | OK                      | Action complete - quit test |
|      | Fault still present   | Contact Triumph service |                             |



1. Engine Management System Relay
2. Engine ECM Connector A

### Engine ECM Internal Error

| Fault Code | Possible cause                         | Action                   |
|------------|--|--------------------------|
| P0606      | Engine ECM internal error              | Contact Triumph service. |
| P1607      | Engine ECM ride by wire internal error |                          |
| P1608      |  |                          |

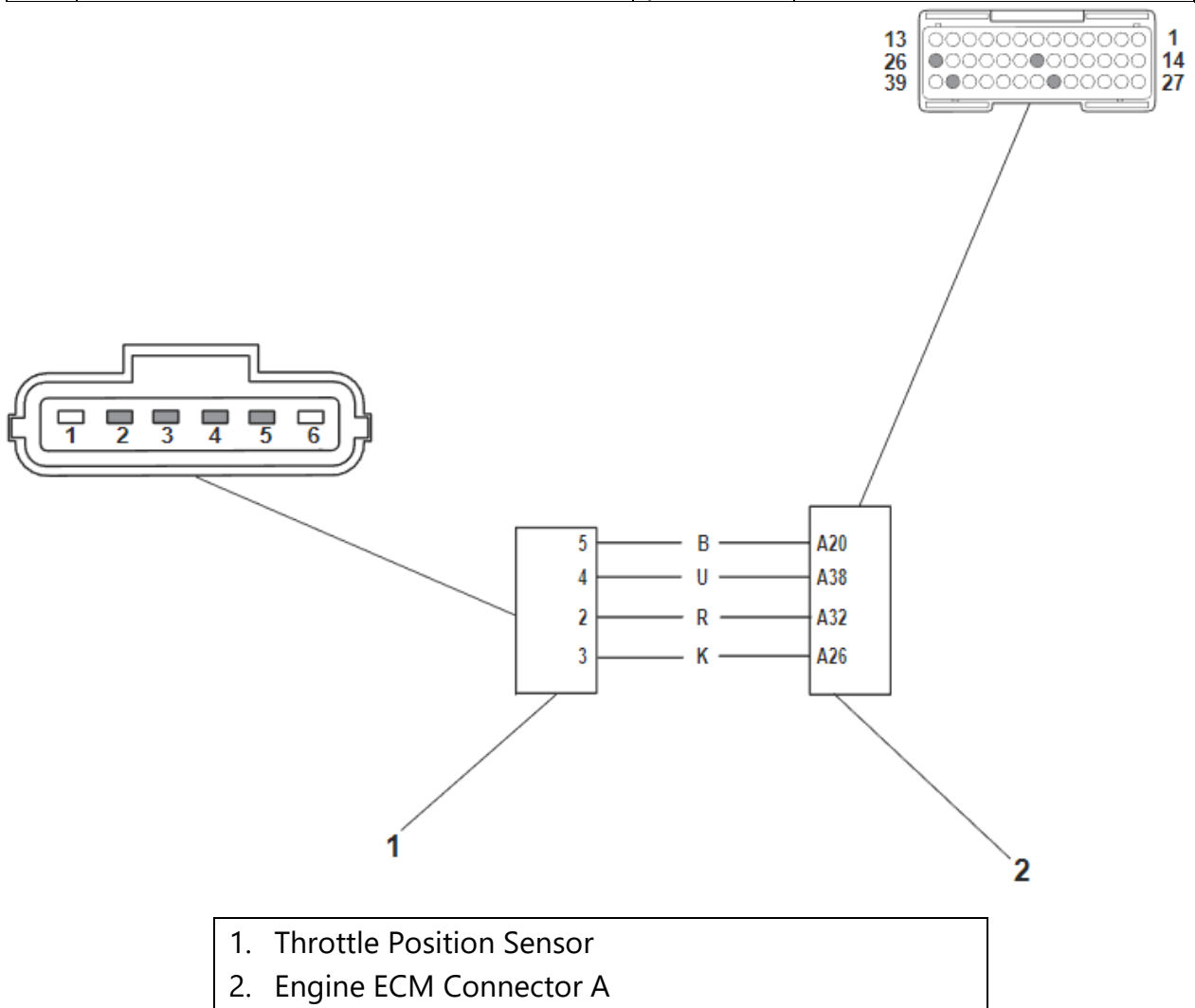
### 5V Sensor Circuit A

| Fault Code | Possible cause                                       | Action  |
|------------|--|---|
| P0642      | 5V Sensor Circuit A - reference voltage low          | View and note diagnostic software 'freeze-frame' data if available. Disconnect engine ECM and proceed to pinpoint test 1: |
| P0643      | 5V Sensor Circuit A-reference voltage high           |   |
| P06A6      | 5V Sensor Circuit A - reference voltage out of range |   |

### Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin A32<br>- Engine ECM pin A20  | OK<br>Disconnect sensor and proceed to test 2      |
|      | Faulty   | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:<br>- Engine ECM pin A32 to ground<br>- Engine ECM pin A32 to Engine ECM pin A20             | OK<br>Proceed to test 3                            |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 5 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin A32 to Engine ECM pin A08<br>- Engine ECM pin A32 to Engine ECM pin A21 | OK<br>Proceed to test 4                            |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 5 |

| Test | Result  | Action              |  |
|------|---|---------------------|--|
| 4    | Check cable continuity:<br>- Engine ECM pin A32 to throttle position sensor connector pin 2<br>- Engine ECM pin A20 to throttle position sensor connector pin 5 | OK                  | Proceed to test 5                                  |
|      | - Engine ECM pin A20 to throttle position sensor connector pin 5  | Open Circuit        | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK                  | Action complete - quit test                        |
|      |   | Fault still present | Contact Triumph service                            |

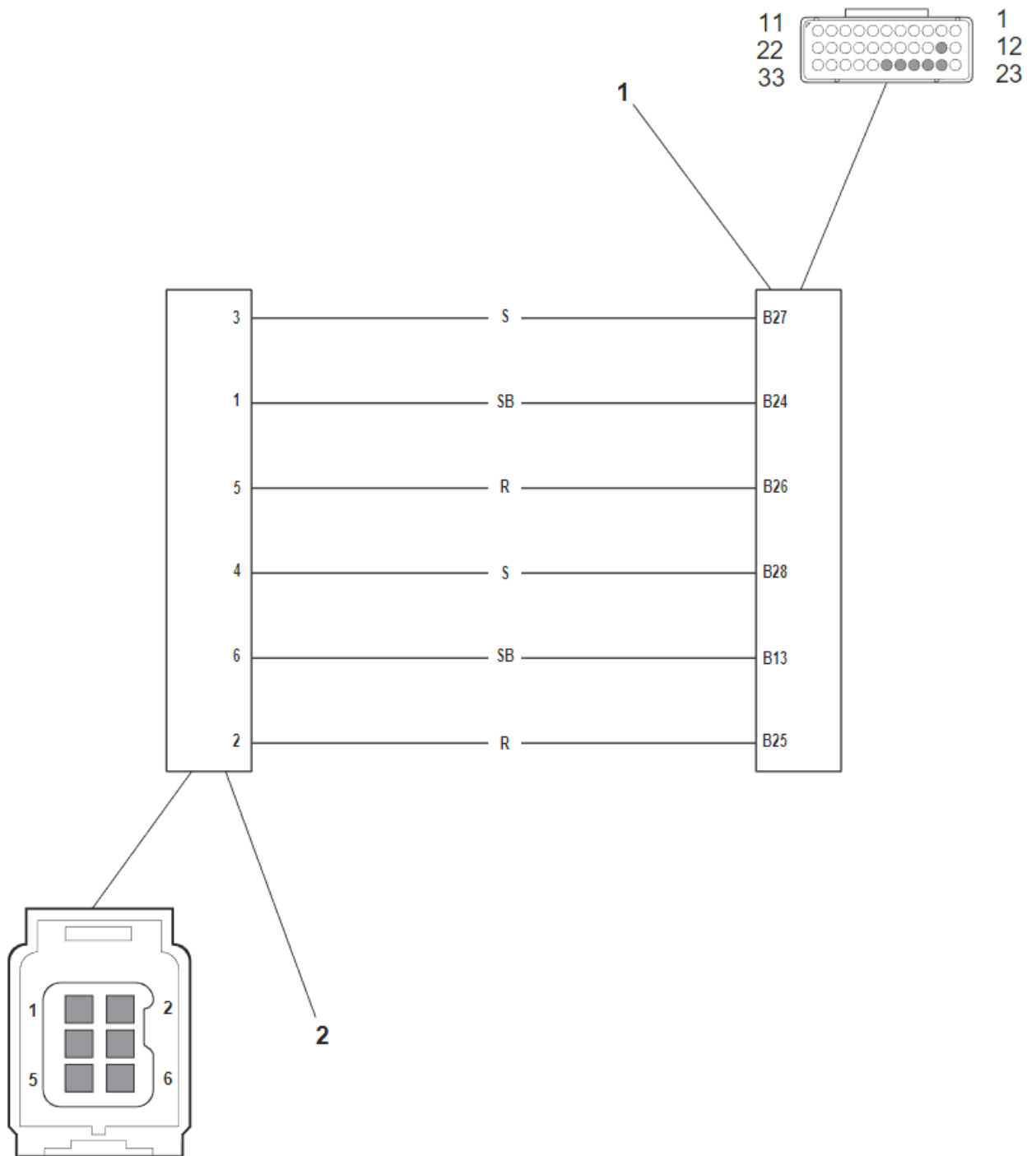


## 5V Sensor Circuit B

| Fault Code | Possible cause                                       | Action  |
|------------|--|---|
| P0652      | 5V Sensor Circuit B - reference voltage low          | View and note diagnostic 'freeze-frame' data if available.            |
| P0653      | 5V Sensor Circuit B-reference voltage high           |   |
| P06A7      | 5V Sensor Circuit B - reference voltage out of range | Disconnect twist grip position sensor and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B26<br>- Engine ECM pin B24   | OK<br>Disconnect sensor and proceed to test 2      |
|      | Faulty  | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B26 to ground<br>- Engine ECM pin B26 to Engine ECM pin B24                                  | OK<br>Proceed to test 3                            |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B26 to Engine ECM pin A08<br>- Engine ECM pin B26 to Engine ECM pin A21                      | OK<br>Proceed to test 4                            |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Engine ECM pin B26 to twist grip position sensor pin 5<br>- Engine ECM pin B24 to twist grip position sensor pin 1 | OK<br>Proceed to test 5                            |
|      | Open Circuit  | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK<br>Action complete - quit test                  |
|      | Fault still present   | Contact Triumph service                            |



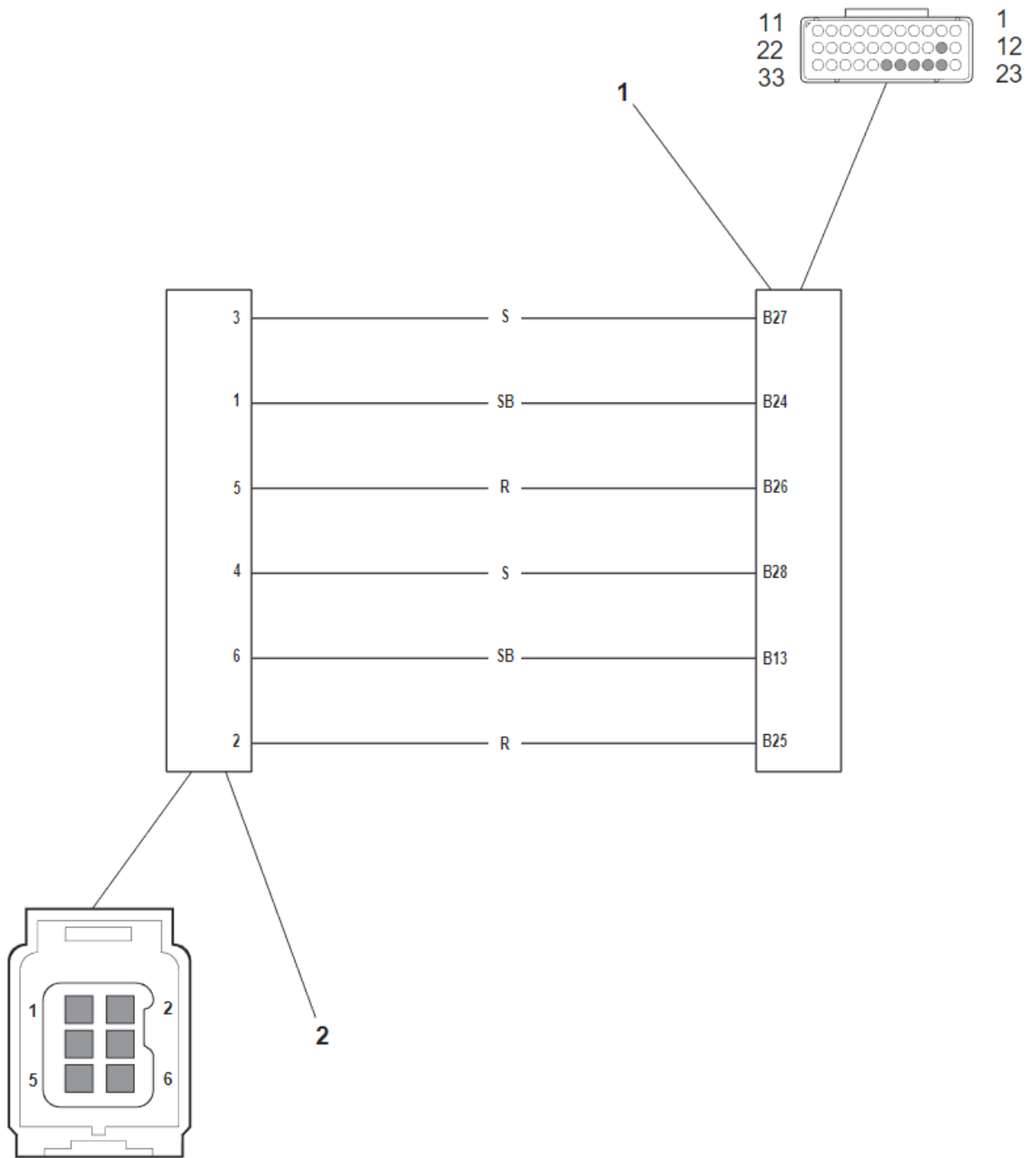
- 1. Engine ECM Connector B
- 2. Twist Grip Position Sensor

## 5V Sensor Circuit C

| Fault Code | Possible cause                                       | Action   |
|------------|--|--|
| P0698      | 5V Sensor Circuit C - reference voltage low          | View and note diagnostic 'freeze-frame' data if available.<br>View and note diagnostic tool sensor data<br>Disconnect twist grip position sensor and proceed to pinpoint test 1: |
| P0699      | 5V Sensor Circuit C-reference voltage high           |  |
| P06A8      | 5V Sensor Circuit C - reference voltage out of range |  |

## Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B25<br>- Engine ECM pin B13   | OK<br>Proceed to test 2                                      |
|      |   | Faulty<br>Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B25 to ground<br>- Engine ECM pin B25 to Engine ECM pin B13                                  | OK<br>Proceed to test 3                                      |
|      |   | Short Circuit<br>Rectify fault, proceed to test 5            |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B25 to Engine ECM pin A08<br>- Engine ECM pin B25 to Engine ECM pin A21                      | OK<br>Proceed to test 4                                      |
|      |   | Short Circuit<br>Locate and rectify fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Engine ECM pin B25 to twist grip position sensor pin 2<br>- Engine ECM pin B13 to twist grip position sensor pin 6 | OK<br>Proceed to test 5                                      |
|      |   | Open Circuit<br>Locate and rectify fault, proceed to test 5  |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK<br>Action complete - quit test                            |
|      |   | Fault still present<br>Contact Triumph service               |



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Engine ECM Connector B</li> <li>2. Twist Grip Position Sensor</li> </ol> |
|--|

## 5V Sensor Circuit D

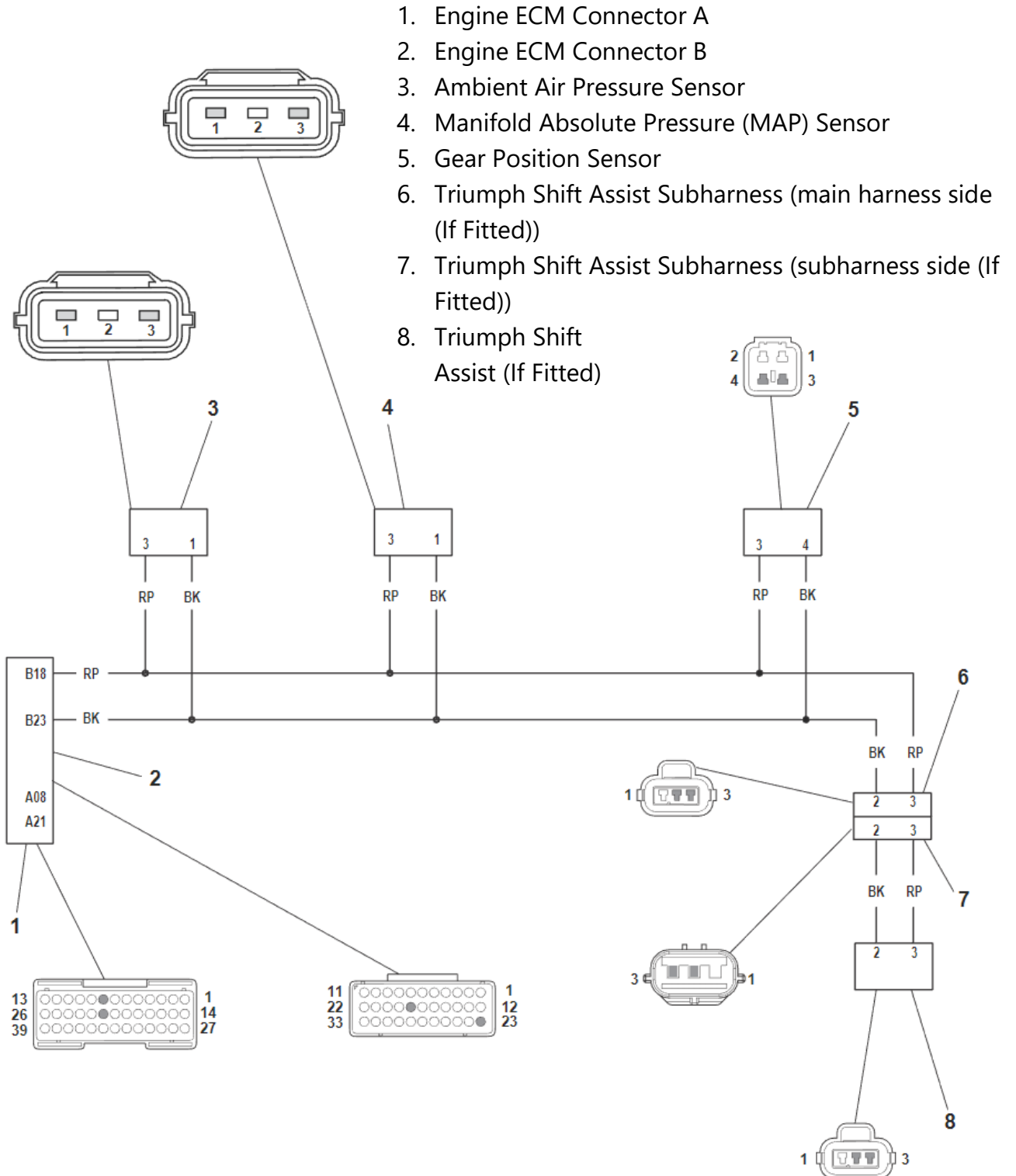
| Fault Code | Possible cause                                       | Action  |
|------------|--|---|
| P06A4      | 5V Sensor Circuit D - reference voltage low          | View and note diagnostic 'freeze-frame' data if available.            |
| P06A5      | 5V Sensor Circuit D - reference voltage high         |   |
| P06A9      | 5V Sensor Circuit D - reference voltage out of range | Disconnect twist grip position sensor and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action        |   |
|------|--|---------------|---|
| 1    | Check cable and terminal integrity:  | OK            | Proceed to test 2                           |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B18</li> <li>- Engine ECM pin B23</li> </ul>   | Faulty        | Rectify fault, proceed to test 5            |
| 2    | Check cable for short circuit:   | OK            | Proceed to test 3                           |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B18 to ground</li> <li>- Engine ECM pin B18 to Engine ECM pin B23</li> </ul>   | Short Circuit | Rectify fault, proceed to test 5            |
| 3    | Check cable for short circuit:   | OK            | Proceed to test 4                           |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B18 to Engine ECM pin A08</li> <li>- Engine ECM pin B18 to Engine ECM pin A21</li> </ul>   | Short Circuit | Locate and rectify fault, proceed to test 5 |
| 4    | Check cable continuity:  | OK            | Proceed to test 5                           |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B18 to ambient pressure sensor pin 3</li> <li>- Engine ECM pin B23 to ambient pressure sensor pin 1</li> <li>- Engine ECM pin B18 to MAP sensor pin 3</li> <li>- Engine ECM pin B23 to MAP sensor pin 1</li> <li>- Engine ECM pin B18 to Triumph shift assist sensor pin 3</li> <li>- Engine ECM pin B23 to Triumph shift assist sensor pin 2</li> <li>- Engine ECM pin B18 to gear position sensor pin 3</li> <li>- Engine ECM pin B23 to gear position sensor pin 4</li> </ul> | Open Circuit  | Locate and rectify fault, proceed to test 5 |



| Test | Result  | Action              |                             |
|------|---|---------------------|-----------------------------|
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared. | OK                  | Action complete - quit test |
|      |   | Fault still present | Contact Triumph service     |

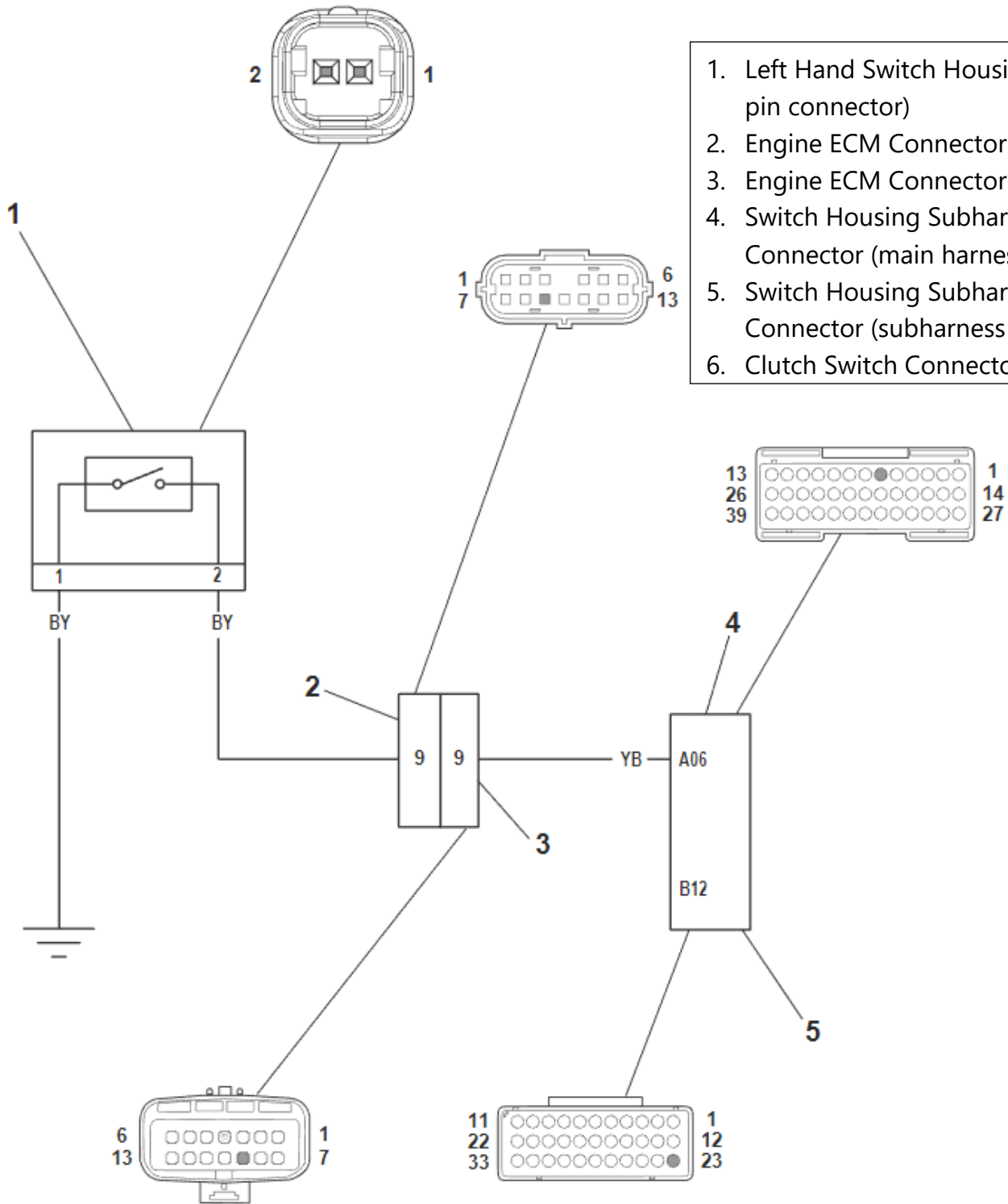


## Clutch Switch

| Fault Code | Possible cause                            | Action  |
|------------|---|---|
| P0704      | Clutch switch 1 input circuit malfunction | View and note diagnostic tool freeze frame data if available. Disconnect Engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check terminal and cable integrity:<br>- Engine ECM pin A06   | OK<br>Proceed to test 2   |
|      |   | Faulty<br>Rectify fault, proceed to test 5                          |
| 2    | Check cable for short circuit:<br>- Engine ECM pin A06 to ground<br>- Engine ECM pin A06 to B12                             | OK<br>Proceed to test 3   |
|      |   | Short Circuit<br>Locate and rectify wiring fault, proceed to test 5 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin A06 to B18<br>- Engine ECM pin A06 to A08<br>- Engine ECM pin A06 to A21 | OK<br>Proceed to test 4   |
|      |   | Short Circuit<br>Locate and rectify fault, proceed to test 5        |
| 4    | Check cable continuity:<br>- Engine ECM pin A06 to left hand switch housing connector C pin 2                               | OK<br>Proceed to test 5   |
|      |   | Open Circuit<br>Locate and rectify fault, proceed to test 5         |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK<br>Action complete – quit test                                   |
|      |   | Fault still present<br>Contact Triumph service                      |



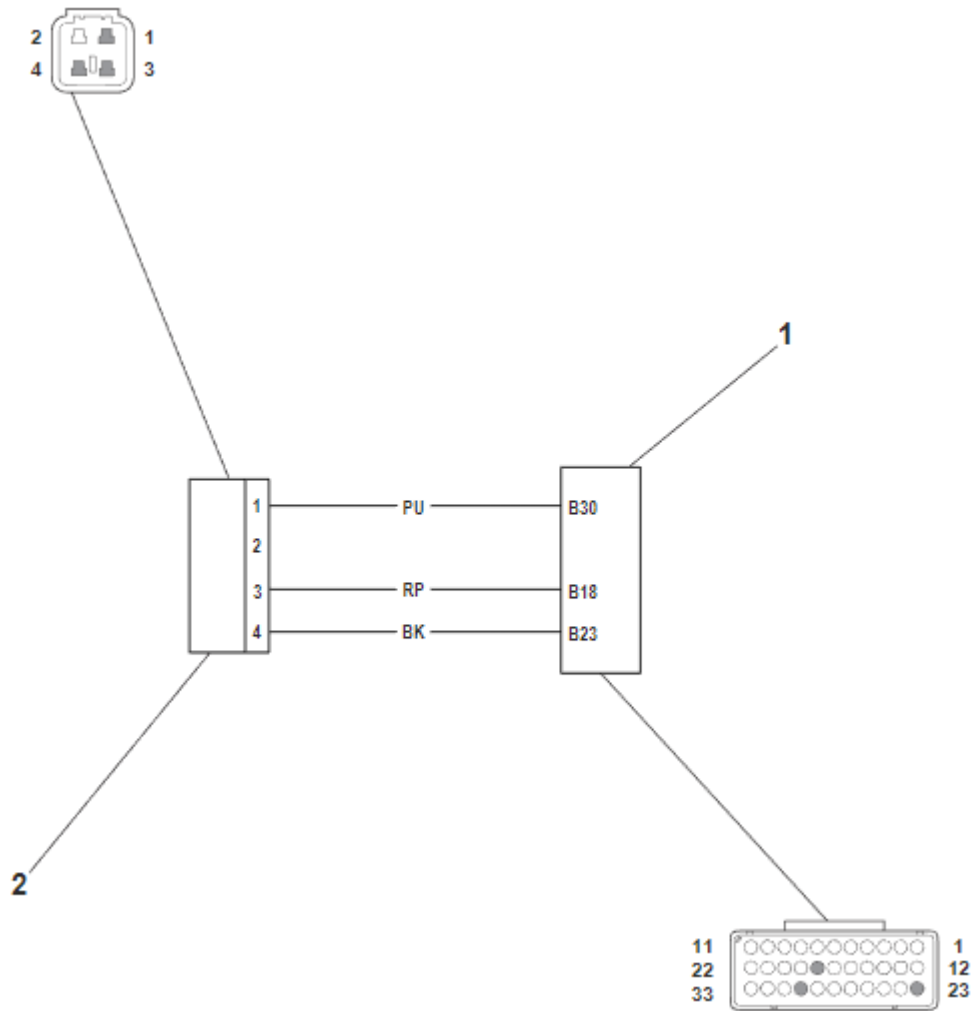
## Gear Position Sensor

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P0914      | Gear position sensor short circuit to ground or open circuit             | View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure the sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1: |
| P0915      | Gear position sensor signal error - correlation error with vehicle speed |  |
| P0917      | Gear position sensor short circuit to 5 Volt sensor supply               |  |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B30  | OK<br>Disconnect sensor and proceed to test 2                          |
|      |  | Faulty<br>Rectify fault, proceed to test 5                             |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B18 to ground<br>- Engine ECM pin B30 to ground<br>- Engine ECM pin B30 to Engine ECM pin B23                         | OK<br>Proceed to test 3  |
|      |  | Short Circuit<br>Locate and rectify wiring fault, proceed to test 5    |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B30 to Engine ECM pin B18<br>- Engine ECM pin B30 to Engine ECM pin A08<br>- Engine ECM pin B30 to Engine ECM pin A21 | OK<br>Proceed to test 4  |
|      |  | Short Circuit<br>Locate and rectify wiring fault, proceed to test 5    |
| 4    | Check cable continuity:<br>- Engine ECM pin B18 to sensor pin 3<br>- Engine ECM pin B23 to sensor pin 4<br>- Engine ECM pin B30 to sensor pin 1                          | OK<br>Renew gear position sensor and contact pin and proceed to test 5 |
|      |  | Open Circuit<br>Locate and rectify wiring fault, proceed to test 5     |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.  | OK<br>Action complete - quit test                                      |
|      |  | Fault still present<br>Contact Triumph service                         |

- Reset the neutral position adaption (see [Neutral Position Adaption](#))



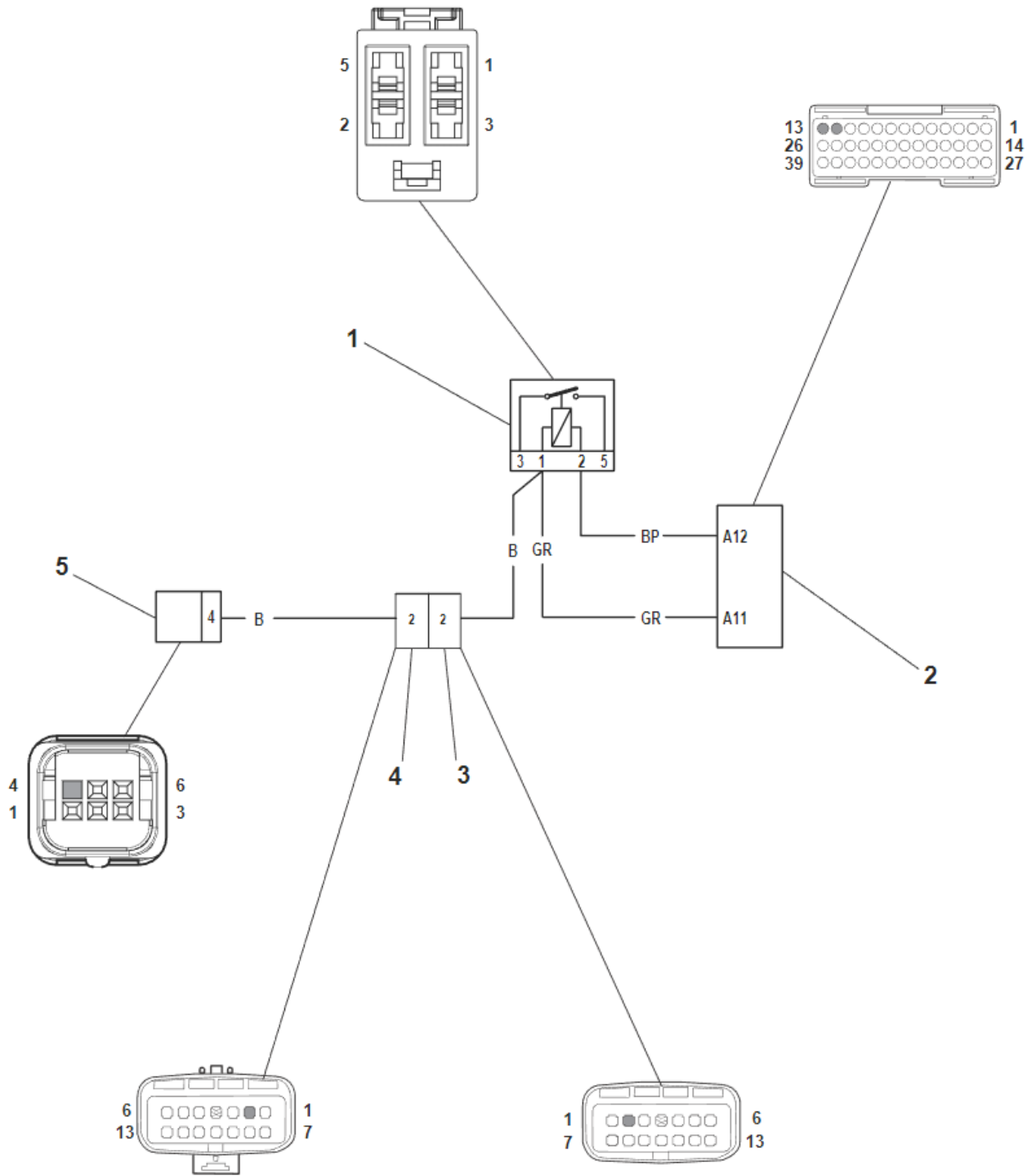
- 1. Engine ECM – Connector B
- 2. Gear position sensor

Fuel Pump Relay

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P1231      | Fuel pump relay short circuit to ground or open circuit | Check if pump runs briefly when ignition is switched on<br>Make sure fuel pump relay connector is secure<br>Disconnect Engine ECM and proceed to pinpoint test 1 |
| P1232      | Fuel pump relay short circuit to battery positive       | Disconnect fuel pump relay and proceed to pinpoint test 4  |

## Pinpoint Tests

| Test |  | Result              | Action   |
|------|--|---------------------|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin A12<br>- Right hand switch housing black connector pin 4<br>- Switch housing subharness connectors pin 2 | OK                  | Disconnect fuel pump relay and proceed to test 2   |
|      |  | Faulty              | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit to ground:<br>- Engine ECM pin A12 to ground   | OK                  | Proceed to test 3                                  |
|      |  | Short Circuit       | Locate and rectify wiring fault, proceed to test 5 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin A12 to right hand switch housing black connector pin 4  | OK                  | Proceed to test 4                                  |
|      |  | Short Circuit       | Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Engine ECM pin A12 to fuel pump relay pin 2<br>- Right hand switch housing black connector pin 4 to fuel pump relay pin 1           | OK                  | Proceed to test 5                                  |
|      |  | Open Circuit        | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run diagnostic software function test to verify operation of fuel pump.  | OK                  | Action complete - quit test                        |
|      |  | Fault still present | Contact Triumph service                            |



1. Fuel Pump Relay
2. Engine ECM Connector A
3. Switch Housing Subharness (main harness side)
4. Switch Housing Subharness (engine harness side)
5. Right Hand Switch Housing Connector A

### Immobiliser and TPMS Control Module ID Incompatible

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P1508      | Unmatched Immobiliser/chassis ECM, causing the engine ECM to be disabled to prevent the motorcycle from being operated | This is also identified by a fast flashing MIL indication and a disabled engine management system. |

### Pinpoint Tests

| Test | Result   | Action              |                             |
|------|--|---------------------|-----------------------------|
| 1    | Follow the Pair ECM and Immobiliser procedure as described in the Triumph Diagnostic Tool user guide | OK                  | Action complete - quit test |
|      |  | Fault still present | Contact Triumph service     |

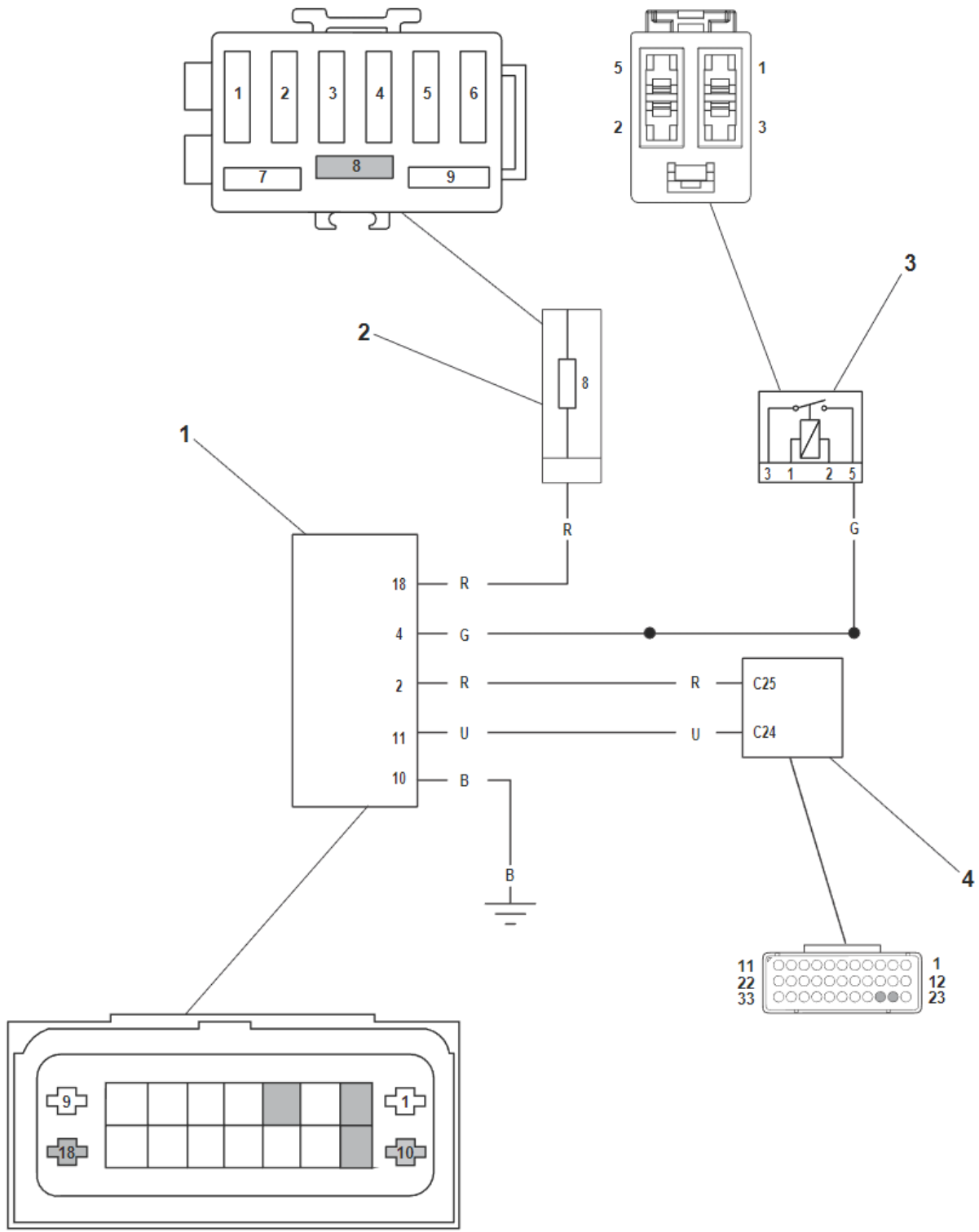
### ABS Modulator Communication

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P1521      | CAN fault - lost communication with ABS module or ABS system status Error | View and note 'freeze-frame' data if available.<br>Make sure ABS modulator connector is secure.<br>Proceed to pinpoint test 1: |



## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin C25<br>- Engine ECM pin C24<br>- ABS modulator pin 2<br>- ABS modulator pin 10<br>- ABS modulator pin 11<br>- ABS modulator pin 18             | OK<br>Disconnect ECM and proceed to test 2           |
|      | Faulty   | Rectify fault, proceed to test 6                     |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C25 to ground<br>- Engine ECM pin C24 to ground   | OK<br>Disconnect ABS modulator and proceed to test 3 |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 5   |
| 3    | - Check cable for short circuit: - ABS pin 2 to ground - ABS pin 11 to ground  | OK<br>Proceed to test 4                              |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 5   |
| 4    | Check cable continuity:<br>- Engine ECM pin C25 to ABS pin 2<br>- Engine ECM pin C24 to ABS pin 11<br>- ABS pin 10 to ground<br>- Fuse box fuse 8 to ABS pin 18<br>- Ignition Relay Pin 5 to ABS pin 4 | OK<br>Proceed to test 5                              |
|      | Faulty   | Locate and rectify wiring fault, proceed to test 5   |
| 5    | Check fuse box fuse 8 integrity.   | OK<br>Proceed to test 6                              |
|      | Faulty   | Renew fuse, proceed to test 6                        |
| 6    | Reconnect harness, clear fault code and run engine.  | OK<br>Action complete - quit test                    |
|      | Fault still present  | Contact Triumph service                              |



1. ABS Modulator
2. Fuse Box
3. Ignition Relay
4. Engine ECM Connector C

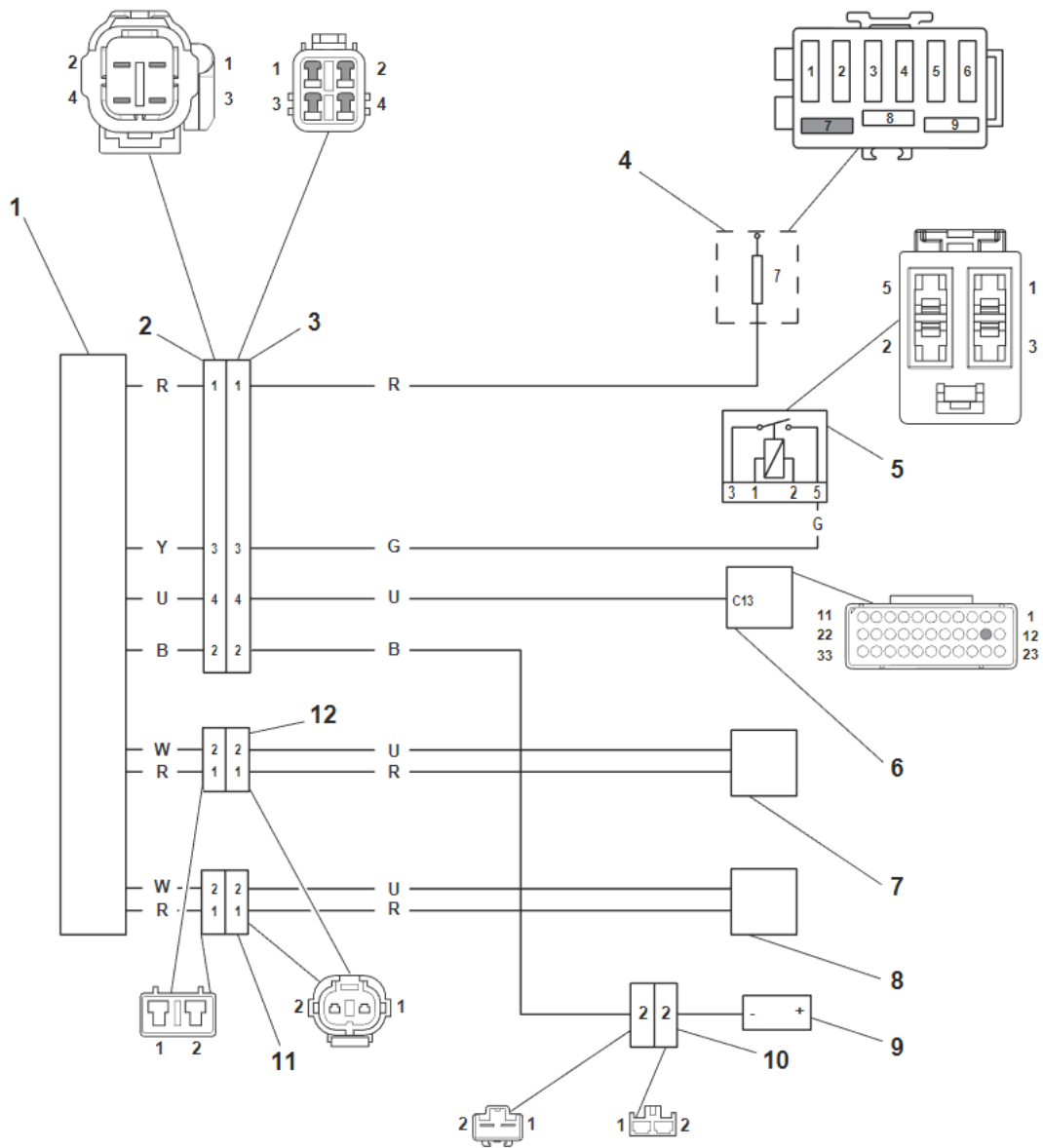
### Cooling Fan Controller

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| P1552      | Cooling fan controller short circuit to ground or open circuit        | View and note diagnostic software 'sensor' data. Make sure fan relay connector is secure. Disconnect engine ECM and proceed to pinpoint test 1: |
| P1553      | Cooling fan controller short circuit to battery positive or over temp | Disconnect engine ECM and fan relay and proceed to pinpoint test 4:   |

### Pinpoint Tests

| Test | Result  | Action   |  |
|------|---|--|--|
| 1    | Check cable and terminal integrity:<br><ul style="list-style-type: none"> <li>- Fan speed controller connector pin 1</li> <li>- Fan speed controller connector pin 2</li> <li>- Fan speed controller connector pin 3</li> <li>- Fan speed controller connector pin 4</li> <li>- Engine ECU connector pin C13</li> </ul> | OK   | Disconnect fan relay, proceed to test 2 for P1552<br>Disconnect fan relay, proceed to test 3 for P1553 |
|      | Faulty  | Rectify fault, proceed to test 5                   |  |
| 2    | Check cable for short circuit:<br><ul style="list-style-type: none"> <li>- Fan speed controller connector pin 1 to ground</li> <li>- Fan speed controller connector pin 3 to ground</li> <li>- Fan speed controller connector pin 4 to ground</li> </ul>  | OK   | Proceed to test 3  |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5 |  |
| 3    | Check cable for short circuit:<br><ul style="list-style-type: none"> <li>- Fan speed controller connector pin 2 to pin 1</li> <li>- Fan speed controller connector pin 3 to pin 1</li> <li>- Fan speed controller connector pin 4 to pin 1</li> </ul>   | OK   | Proceed to test 4  |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5 |  |

| Test |  | Result              | Action   |
|------|--|---------------------|--|
| 4    | Check cable continuity:<br>- Fan speed controller connector pin 1 to Fuse box fuse 7   | OK                  | Proceed to test 5                                  |
|      | - Fan speed controller connector pin 2 to ground<br>- Fan speed controller connector pin 3 to Ignition relay pin 5<br>- Fan speed controller connector pin 4 to Engine ECU connector pin C13 | Open Circuit        | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of cooling fan.   | OK                  | Action complete - quit test                        |
|      |  | Fault still present | Contact Triumph service                            |



1. Cooling Fan Speed Controller
2. Cooling Fan Speed Controller Connector
3. Cooling Fan Speed Controller Connector (main harness side)
4. Fuse Box Fuse 7
5. Ignition Relay
6. Engine ECM Connector C
7. Cooling Fan 1
8. Cooling Fan 2
9. Battery
10. Battery Subharness Connector
11. Cooling Fan 2 Connector
12. Cooling Fan 1 Connector

Engine ECM detects Inertial Measurement Unit (IMU) circuit malfunction

| Fault Code | Possible cause   | Action  |
|------------|--|---|
| P16A1      | Engine ECM detects Inertial Measurement Unit (IMU) circuit malfunction | View and note 'freeze-frame' data if available.<br>Make sure ABS modulator connector is secure. Proceed to pinpoint test 1: |

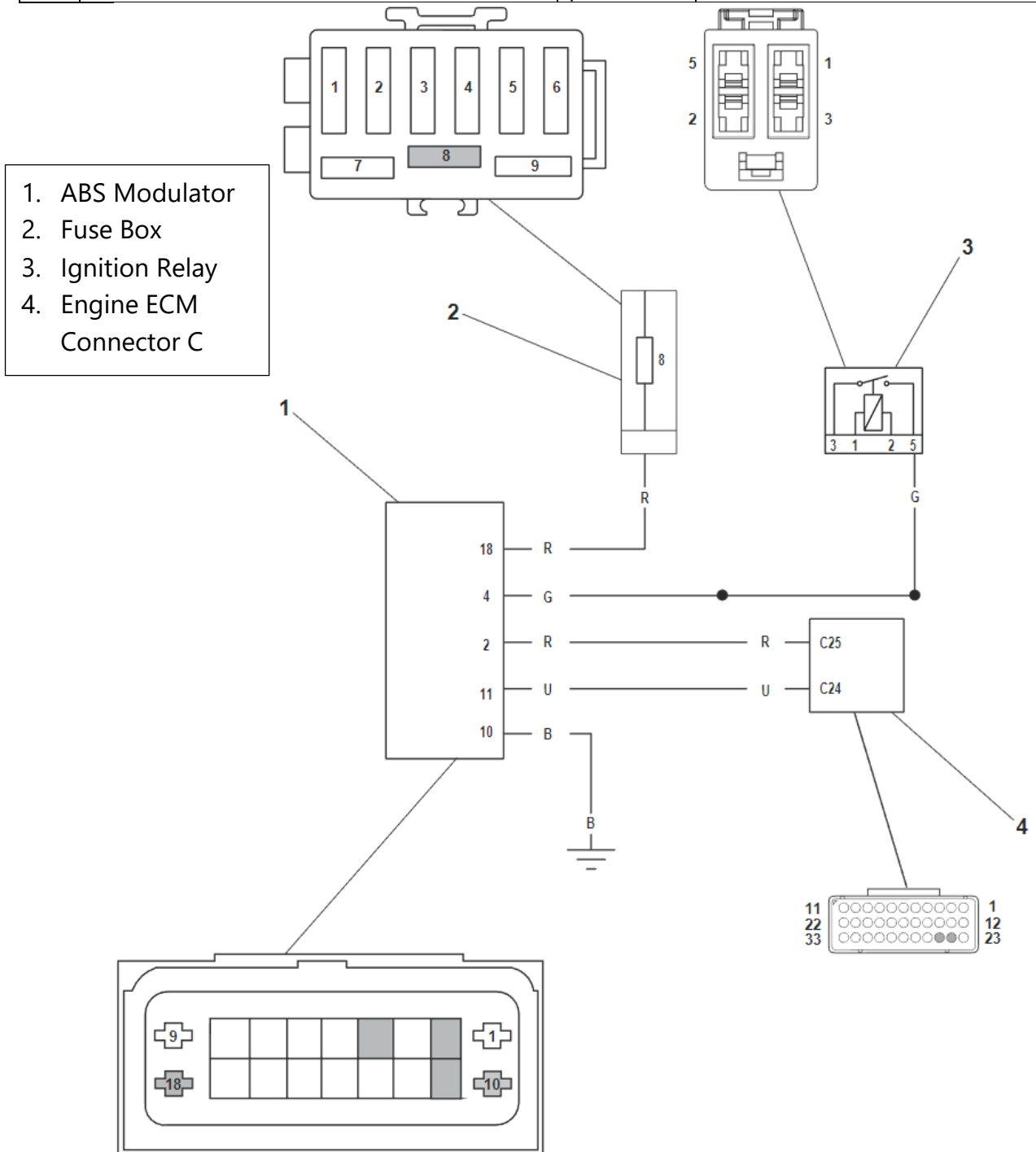
**NOTICE**

For this model, the Inertial Measurement Unit (IMU) circuit is incorporated in the ABS module.

Pinpoint Tests

| Test | Result  | Action  |  |
|------|---|---|--|
| 1    | Check cable and terminal integrity.<br>- Engine ECM pin C25<br>- Engine ECM pin C24<br>- ABS modulator pin 2<br>- ABS modulator pin 4<br>- ABS modulator pin 10<br>- ABS modulator pin 11<br>- ABS modulator pin 18<br>- Ignition relay pin 5 | OK  | Disconnect ECM and proceed to test 2           |
|      | Faulty  | Rectify fault, proceed to test 6  |  |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C25 to ground<br>- Engine ECM pin C24 to ground  | OK  | Disconnect ABS modulator and proceed to test 3 |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5                        |  |
| 3    | Check cable for short circuit:<br>- ABS pin 2 to ground<br>- ABS pin 11 to ground   | OK  | Proceed to test 4                              |
|      | Short Circuit   | Proceed to test 5   |  |
| 4    | Check cable continuity:<br>- Engine ECM pin C25 to ABS pin 2<br>- Engine ECM pin C24 to ABS pin 11<br>- ABS pin 10 to ground<br>- Fuse box fuse 8 to ABS pin 18<br>- Ignition Relay Pin 5 to ABS pin 4  | OK  | Proceed to test 5                              |
|      | Open Circuit  | Locate and rectify wiring fault, replace relevant fuse proceed to test 65 |  |

| Test |   | Result              | Action   |
|------|---|---------------------|--|
| 5    | Check fuse box fuse 8 integrity.                    | OK                  | Proceed to test 6                                  |
|      |   | Fault still present | Locate and rectify wiring fault, proceed to test 6 |
| 6    | Reconnect harness, clear fault code and run engine. | OK                  | Action complete - quit test                        |
|      |   | Fault still present | Contact Triumph service                            |



### Cornering Traction Control and Roll Over Detection Disabled

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P1136      | Cornering Traction Control disabled due to Inertial Measurement Unit (IMU) malfunction | View and note 'freeze-frame' data if available.<br>Make sure ABS modulator connector is secure.  |
| P16A2      | Engine ECM detects IMU present but with signal error                                   | Check for associated DTC C1713, perform tests for this DTC. Reset DTCs, if problem persists contact Triumph service.   |
| P1640      | Roll Over detection disabled due to Inertial Measurement Unit (IMU) malfunction        | View and note 'freeze-frame' data if available.<br>Make sure ABS modulator connector is secure.<br>Check for associated DTCs P16A0, P16A1, and P16A2, perform the tests for any DTC present.<br>Reset DTCs, if problem persists contact Triumph service. |

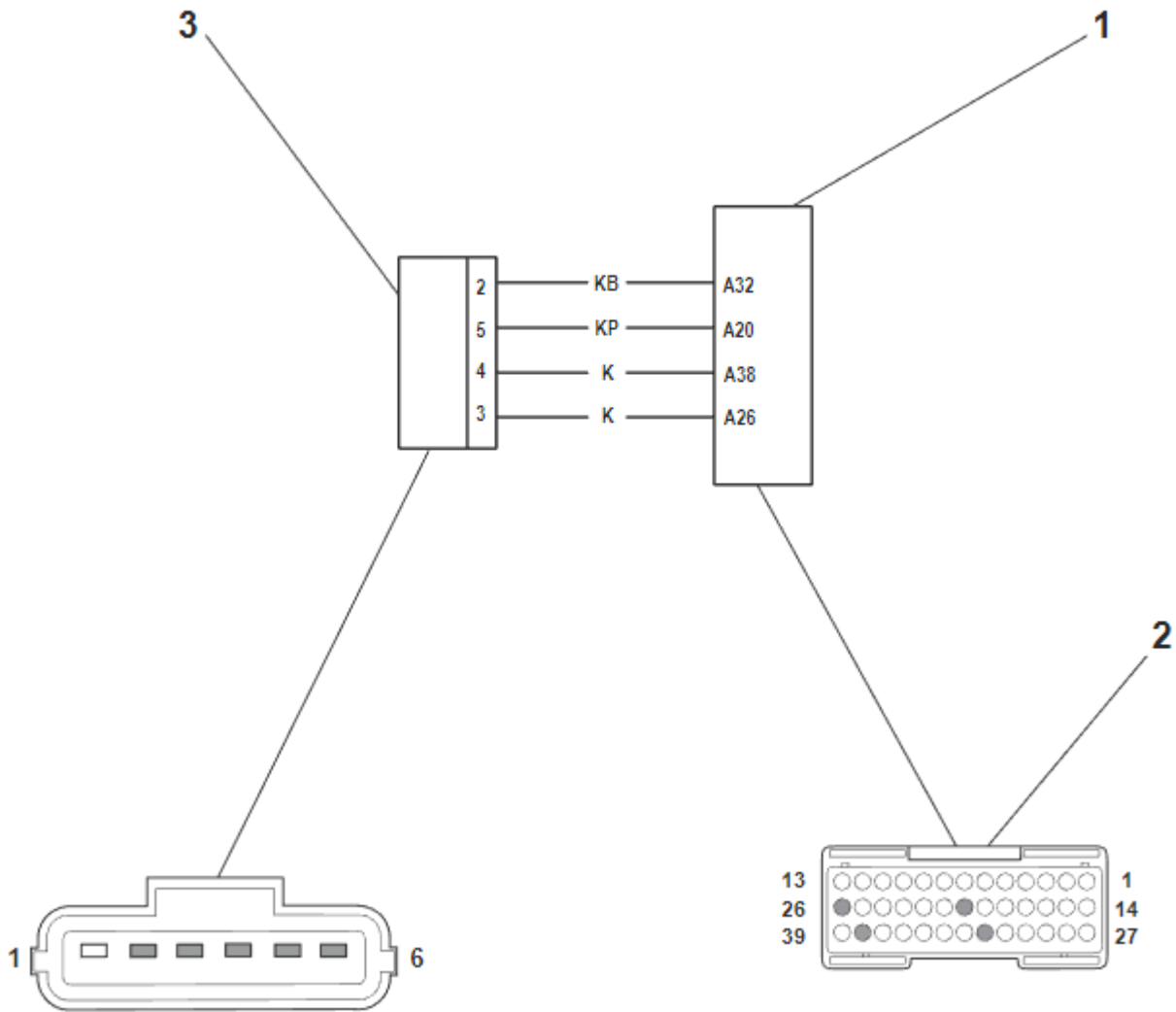
### Closed Throttle Position Adaption

| Fault Code | Possible cause   | Action  |
|------------|--|---|
| P16B0      | Fully closed throttle position adaption incomplete or unsuccessful | View and note 'freeze-frame' data if available.<br>View and note diagnostic software 'sensor' data.<br>Check the throttle body for any mechanical restrictions.<br>Make sure throttle position sensor connector is secure.<br>Disconnect engine ECM and proceed to pinpoint test 1: |



## Pinpoint Tests

| Test |  | Result              | Action   |
|------|--|---------------------|--|
| 1    | Check cable and terminal integrity:<br>Engine ECM pin A20  | OK                  | Disconnect sensor and proceed to test 2            |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin A38</li> <li>- Engine ECM pin A26</li> <li>- Engine ECM pin A32</li> </ul>   | Faulty              | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:   | OK                  | Proceed to test 3                                  |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin A26 to ground</li> <li>- Engine ECM pin A38 to ground</li> </ul>   | Short Circuit       | Locate and rectify wiring fault, proceed to test 5 |
| 3    | Check cable for short circuit:   | OK                  | Proceed to test 4                                  |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin A26 to Engine ECM pin A32</li> <li>- Engine ECM pin A26 to Engine ECM pin A38</li> <li>- Engine ECM pin A32 to Engine ECM pin A38</li> <li>- Engine ECM pin A26 to Engine ECM pin A20</li> <li>- Engine ECM pin A26 to Ground</li> <li>- Engine ECM pin A38 to Engine ECM pin A20</li> <li>- Engine ECM pin A38 to Ground</li> </ul> |                     |  |
| 4    | Check cable continuity:  | OK                  | Renew throttle position sensor, proceed to test 5  |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin A32 to throttle position sensor connector pin 2</li> <li>- Engine ECM pin A38 to throttle position sensor connector pin 4</li> <li>- Engine ECM pin A20 to throttle position sensor connector pin 5</li> <li>- Engine ECM pin A26 to throttle position sensor connector pin 3</li> </ul>   |                     | Open Circuit                                       |
| 5    | Reconnect harness, clear fault code and run engine.  | OK                  | Action complete - quit test                        |
|      |  | Fault still present | Contact Triumph service                            |



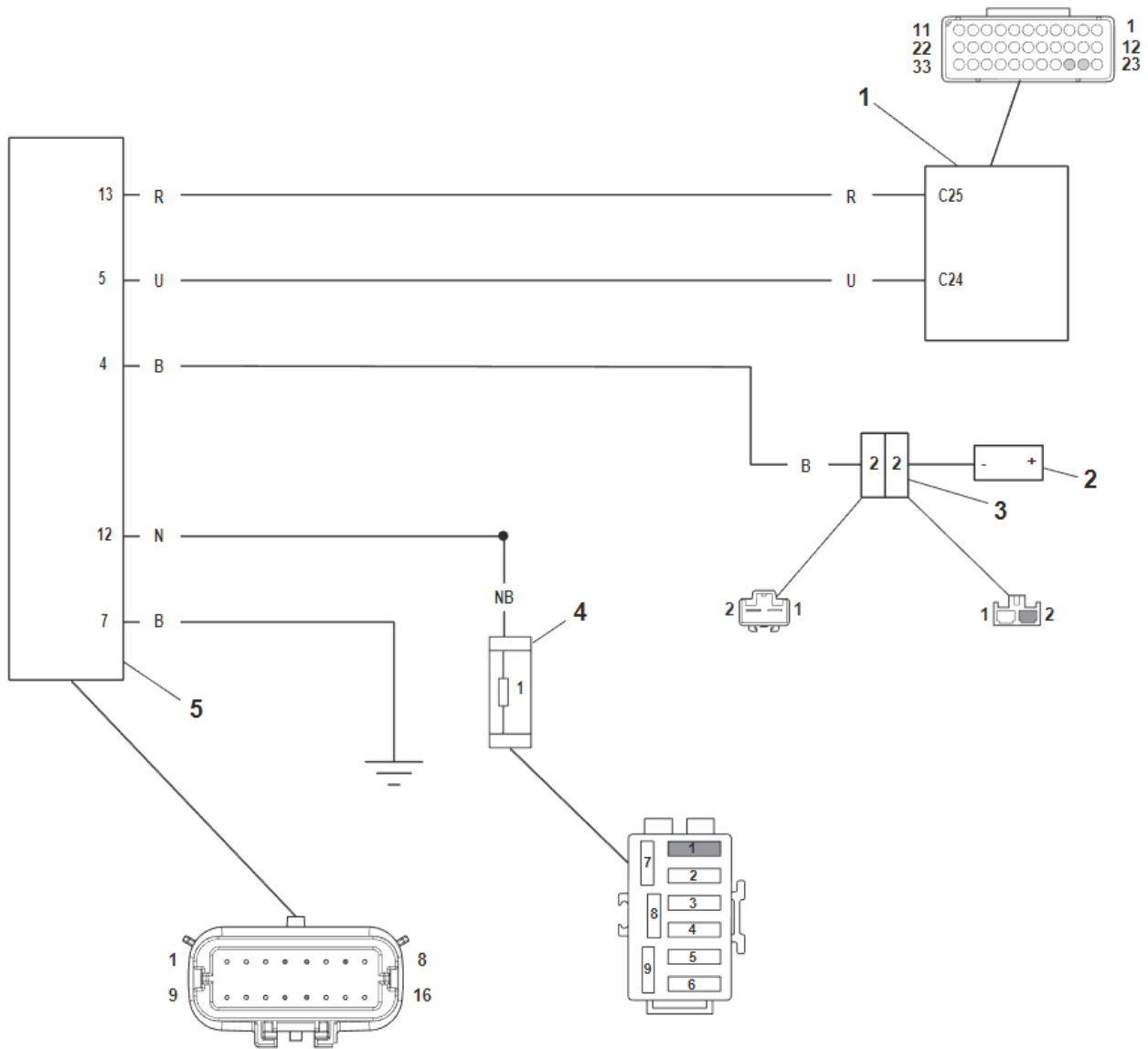
- 1. Engine ECM
- 2. Engine ECM Connector A
- 3. Throttle Position Sensor

Immobiliser Control Module Communication

| Fault Code | Possible cause                                     | Action  |
|------------|--|---|
| P1650      | CAN fault - Lost communication with Keyless module | View and note 'freeze-frame' data if available.<br>Make sure Keyless module connector is secure.<br>Proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result   | Action              |   |
|------|--|---------------------|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin C25<br>- Engine ECM pin C24<br>- Keyless module pin 4<br>- Keyless module pin 12<br>- Keyless module pin 13<br>- Keyless module pin 5              | OK                  | Disconnect ECM and proceed to test 2                                      |
|      |  | Faulty              | Rectify fault, proceed to test 5  |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C25 to ground<br>- Engine ECM pin C24 to ground<br>- Keyless module pin 4 to ground   | OK                  | Disconnect keyless module and proceed to test 3                           |
|      |  | Short Circuit       | Locate and rectify wiring fault, proceed to test 5                        |
| 3    | Check cable for short circuit:<br>- Engine ECM pin C25 to ECM relay pin 5<br>- Engine ECM pin C24 to ECM relay pin 5<br>- Keyless module pin 4 to ECM relay pin 5  | OK                  | Proceed to test 4   |
|      |  | Short Circuit       | Locate and rectify wiring fault, proceed to test 5                        |
| 4    | Check cable continuity:<br>- Engine ECM pin C25 to keyless module pin 13<br>- Engine ECM pin C24 to keyless module pin 5<br>- Keyless module pin 4 to ground<br>- Fuse box fuse 1 to keyless module pin 12 | OK                  | Proceed to test 5   |
|      |  | Open Circuit        | Locate and rectify wiring fault, replace relevant fuse, proceed to test 5 |
| 5    | - Check fuse box fuse 1 integrity  | OK                  | Proceed to test 6   |
|      |  | Faulty              | Replace Fuse, proceed to test 6   |
| 6    | Reconnect harness, clear fault code and run engine.  | OK                  | Action complete - quit test   |
|      |  | Fault still present | Contact Triumph service   |



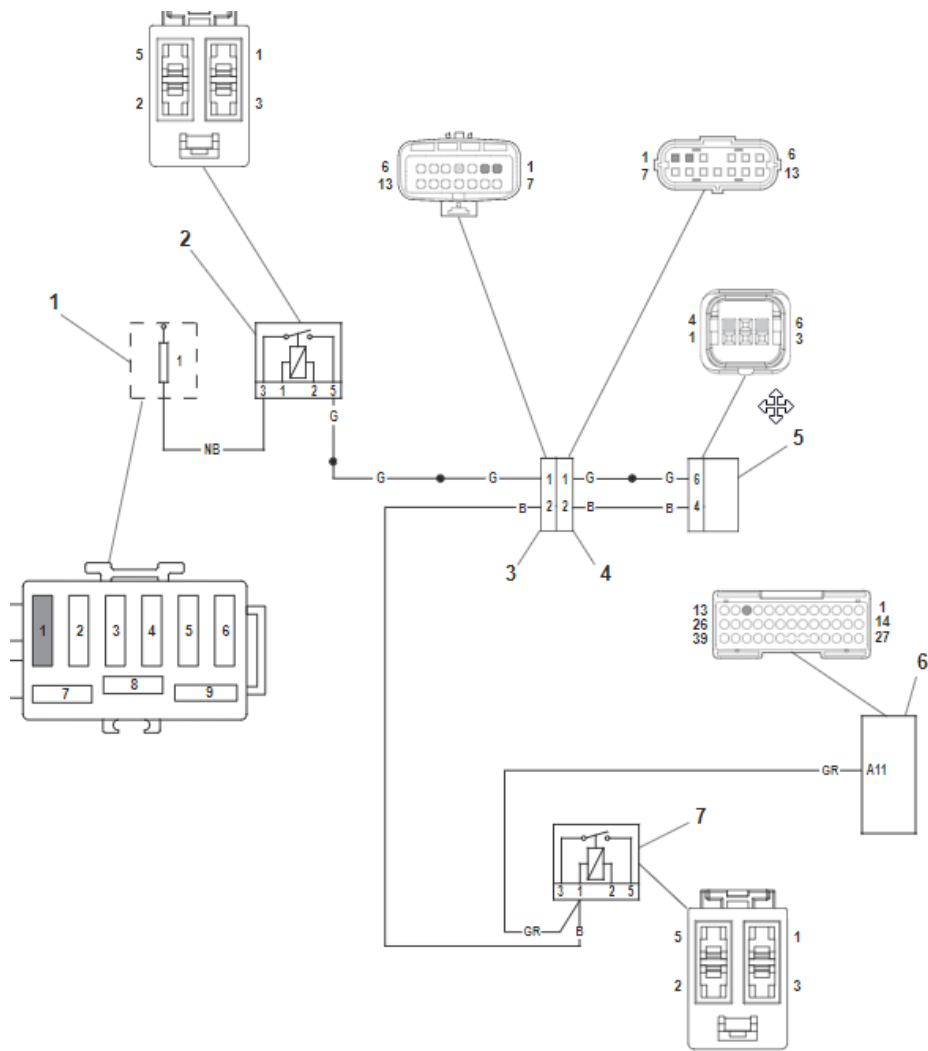
- 1. Engine ECM Connector C
- 2. Battery
- 3. Battery subharness
- 4. Fuse Box
- 5. Keyless Module

EMS Ignition Voltage Input Circuit

| Fault Code | Possible cause                    | Action  |
|------------|-----------------------------------|---|
| P1659      | Ignition power supply malfunction | Disconnect engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test |   | Result              | Action  |
|------|---|---------------------|---|
| 1    | Check cable and terminal integrity:<br><ul style="list-style-type: none"> <li>- Engine ECM pin A11</li> <li>- Right hand switch housing pin 6 (black connector)</li> <li>- Right hand switch housing pin 4 (black connector)</li> </ul> | OK                  | Proceed to test 2   |
|      |   | Faulty              | Rectify fault, proceed to test 3  |
| 2    | Check cable for short circuit:<br><ul style="list-style-type: none"> <li>- Engine ECM pin A11 to ground</li> </ul>  | OK                  | Proceed to test 3   |
|      |   | Short Circuit       | Locate and rectify wiring fault, replace Fuse 1 and proceed to test 5                     |
| 3    | Check cable continuity:<br><ul style="list-style-type: none"> <li>- Engine ECM pin A11 to Ignition Relay pin 5</li> <li>- Ignition Relay pin 3 to fuse box fuse 1</li> </ul>  | OK                  | Proceed to test 4   |
|      |   | Open Circuit        | Locate and rectify wiring, keyless module, or engine stop switch fault, proceed to test 4 |
| 4    | Check fuse box fuse 1 integrity.  | OK                  | Proceed to test 5   |
|      |   | Faulty              | Replace Fuse 1 and proceed to test 4  |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.<br>Note that the engine stop switch must be in the RUN position and any alarm fitted must be disarmed   | OK                  | Action complete - quit test   |
|      |   | Fault still present | Contact Triumph service   |



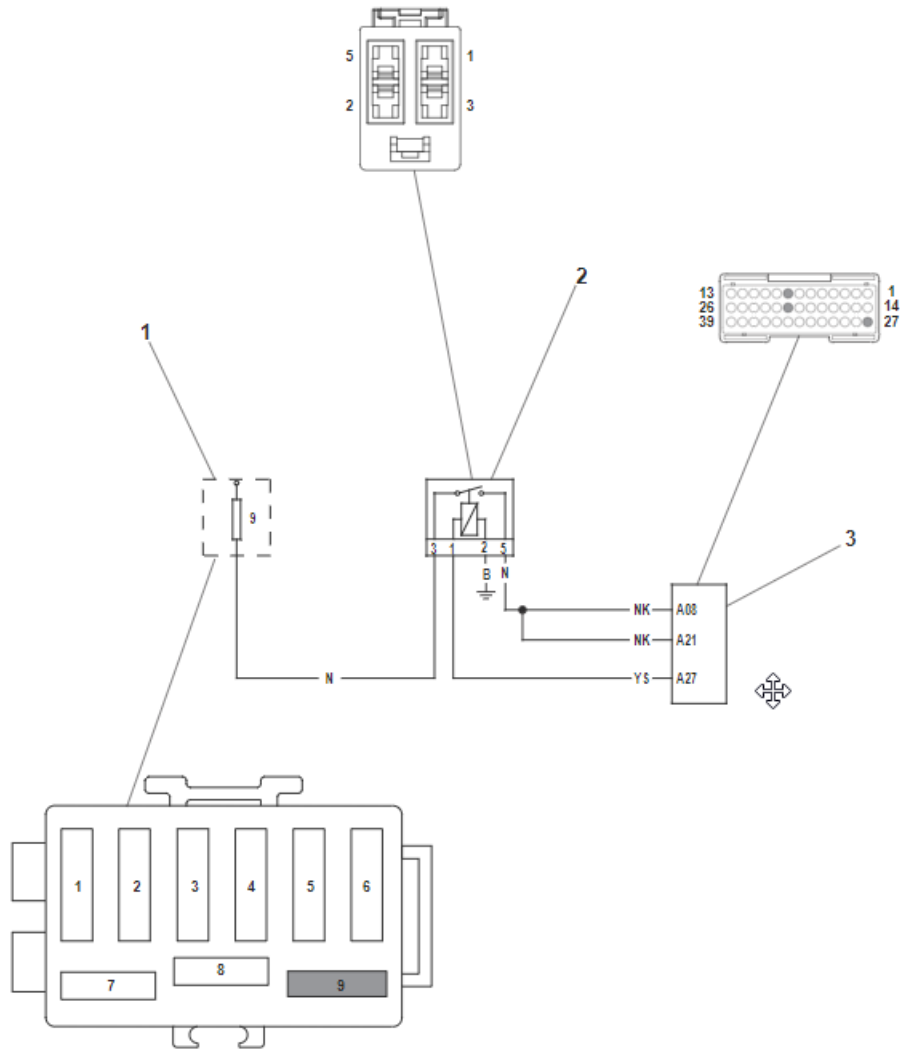
1. Fuse Box
2. Ignition Relay
3. Switch Housing Subharness (main harness side)
4. Switch Housing Subharness (subharness side)
5. Right Hand Switch Housing (black connector)
6. Engine ECM Connector A
7. Fuel Pump Relay

#### EMS Main Relay Circuit

| Fault Code | Possible cause                 | Action   |
|------------|--------------------------------|--|
| P1685      | Main relay circuit malfunction | <p>Note that the starter motor cannot be powered if a main relay fault exists. Ensure the EMS main relay connector is secure.</p> <p>Proceed to pinpoint test 1:</p> |

## Pinpoint Tests

| Test | Result  | Action  |   |
|------|---|---|---|
| 1    | Make sure the key is out of range of the keyless control module, or is in a signal-blocking container.<br>Make sure the ignition has been off for greater than 90 seconds. Identify the EMS relay on the harness.<br>Check that the relay operates when the key is brought into range and the stop and run switch is in the RUN position. | OK  | Proceed to test 4                               |
|      | Faulty  | Disconnect EMS main relay and engine ECM.<br>Proceed to test 2.       |   |
| 2    | Check cable and terminal integrity:<br>- Engine ECM pin A27<br>- EMS main relay pin 1<br>- EMS main relay pin 2<br>- EMS main relay pin 3<br>- EMS main relay pin 5   | OK  | Disconnect EMS main relay and proceed to test 3 |
|      | Faulty  | Rectify fault, proceed to test 5                                      |   |
| 3    | Check cable for short circuit:<br>- Engine ECM pin A27 to ground<br>- Engine ECM pin A08 to ground<br>- Engine ECM pin A21 to ground  | OK  | Proceed to test 3                               |
|      | Short Circuit   | Locate and rectify wiring fault, replace Fuse 9 and proceed to test 6 |   |
| 4    | Check fuse box fuse 9 integrity.  | OK  | Proceed to test 6                               |
|      |   | Open Circuit  | Replace fuse 9 and proceed to test 6            |
| 5    | Check cable continuity:<br>- Engine ECM pin A08 to EMS main relay pin 5<br>- Engine ECM pin A21 to EMS main relay pin 5<br>- Engine ECM pin A27 to EMS relay pin 1<br>- EMS main relay pin 2 to ground<br>- EMS main relay pin 3 to fuse box fuse 5   | OK  | Replace EMS main relay and proceed to test 6    |
|      | Open Circuit  | Locate and rectify wiring fault, proceed to test 6                    |   |
| 6    | Reconnect harness, clear fault code. Take the key out of range of the keyless control module, or place in a signal-blocking container for longer than 90 seconds.<br>Bring the key into range and check that the EMS main relay operates. Start engine as final check.  | OK  | Action complete - quit test                     |
|      | Fault still present   | Contact Triumph service   |   |



- 1. Fuse box
- 2. Engine Management System Relay
- 3. Engine ECM Connector A

CAN Communication

| Fault Code | Possible cause | Action  |
|------------|----------------|---|
| P1690      | CAN Fault      | View and note 'freeze-frame' data if available.<br>View and note 'sensor' data.<br>Make sure Instrument connector is secure.<br>Disconnect the engine ECM and proceed to pinpoint test 1: |

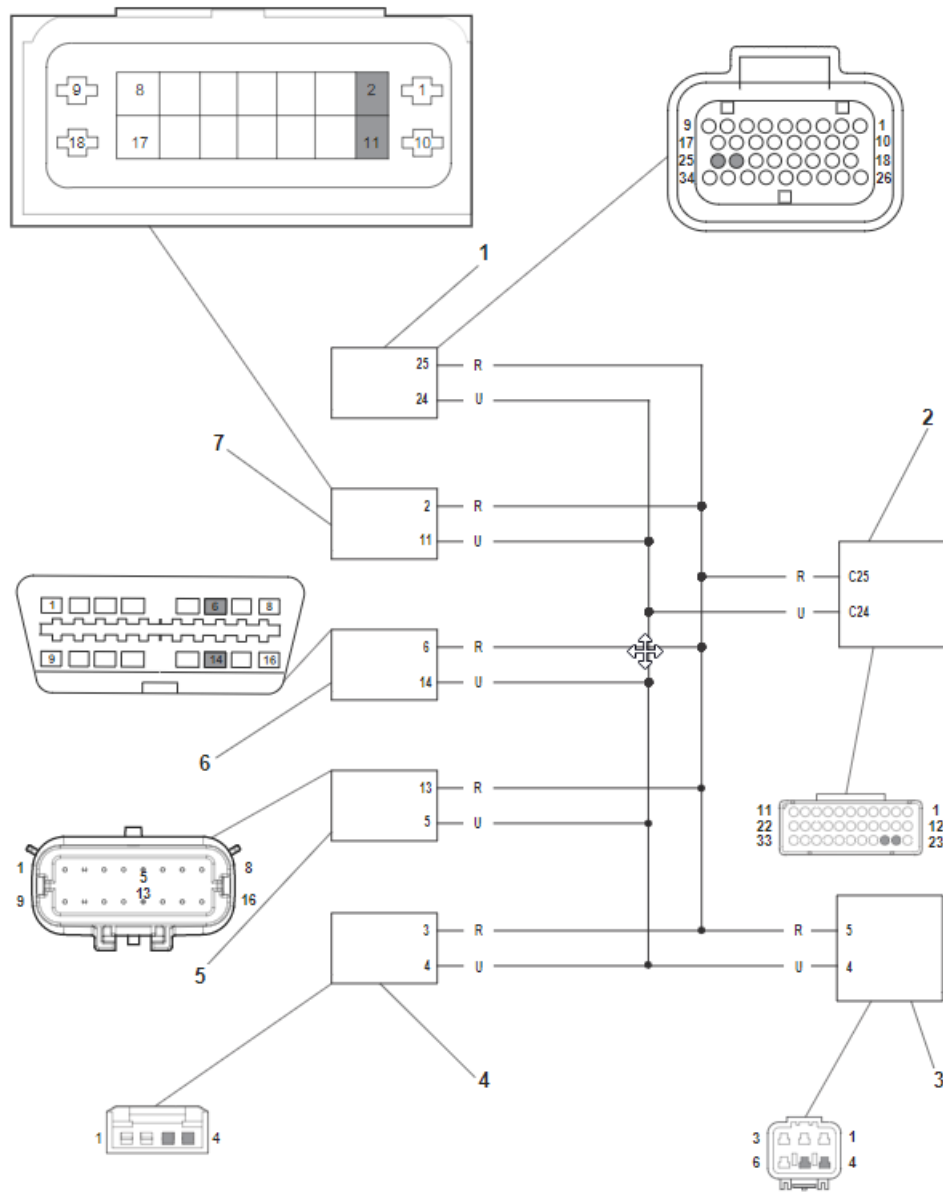


## Pinpoint Tests

| Test |   | Result        | Action  |
|------|---|---------------|---|
| 1    | Check cable and terminal integrity: <ul style="list-style-type: none"> <li>- Engine ECM pin C24</li> <li>- Engine ECM pin C25</li> <li>- Instrument pin 24</li> <li>- Instrument pin 25</li> <li>- ABS module pin 2</li> <li>- ABS module pin 11</li> <li>- Diagnostic connector pin 6</li> <li>- Diagnostic connector pin 14</li> <li>- Keyless module pin 13</li> <li>- Keyless module pin 5</li> <li>- Steering lock module pin 5</li> <li>- Steering lock module pin 4</li> <li>- Bluetooth module pin 3*</li> <li>- Bluetooth module pin 4*</li> </ul> | OK            | Disconnect and proceed to test 2                    |
|      |   | Faulty        | Rectify fault, proceed to test 5                    |
| 2    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin C24 to ground</li> <li>- Engine ECM pin C25 to ground</li> </ul>   | OK            | Proceed to test 3                                   |
|      |   | Short Circuit | Locate and rectify wiring fault, proceed to test 5  |
| 3    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin C24 to Engine ECM pin C25</li> </ul>   | OK            | Proceed to test 4                                   |
|      |   | Short Circuit | Locate and rectify wiring, fault, proceed to test 5 |

| Test |  | Result              | Action   |
|------|--|---------------------|--|
| 4    | Check cable continuity: <ul style="list-style-type: none"> <li>- Engine ECM pin C24 to Instrument pin 24</li> <li>- Engine ECM pin C25 to Instrument pin 25</li> <li>- Engine ECM pin C24 to ABS control module pin 11</li> <li>- Engine ECM pin C25 to ABS control module pin 2</li> <li>- Engine ECM pin C24 to Diagnostic connector pin 14</li> <li>- Engine ECM pin C25 to Diagnostic connector pin 6</li> <li>- Engine ECM pin C24 to Keyless module pin 5</li> <li>- Engine ECM pin C25 to Keyless module pin 13</li> <li>- Engine ECM pin C24 to Steering lock module pin 4</li> <li>- Engine ECM pin C25 to Steering lock module pin 5 - Engine ECM pin C24 to Bluetooth® module pin 4*</li> <li>- Engine ECM pin C25 to Bluetooth® module pin 3*</li> </ul> | OK                  | Proceed to test 5                                  |
|      |  | Open Circuit        | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine.  | OK                  | Action complete - quit test                        |
|      |  | Fault still present | Contact Triumph service                            |

\* Bluetooth is an optional accessory.



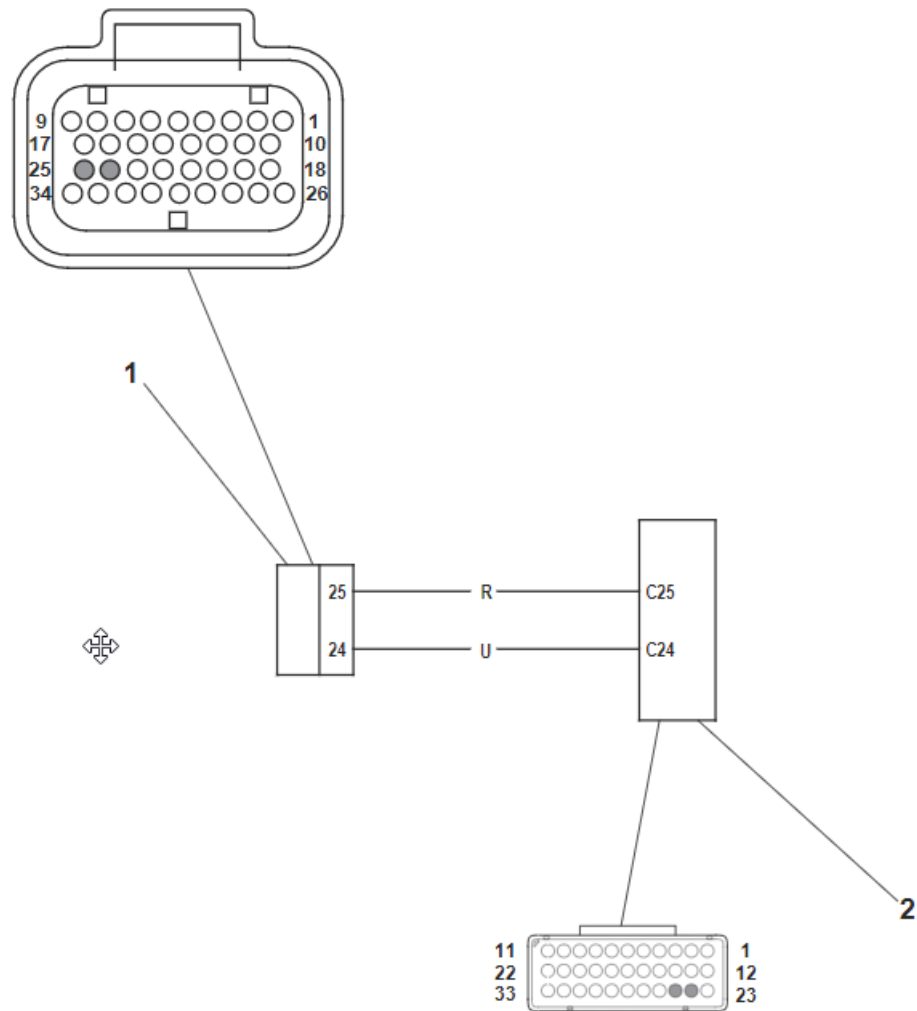
1. Instruments
2. Engine ECM Connector C
3. Steering Lock Module
4. Bluetooth module Connector
5. Keyless Module
6. Diagnostic Connector
7. ABS Control Module

## Instrument Communication (CAN)

| Fault Code | Possible cause                           | Action  |
|------------|--|---|
| P1695      | Lost communication with instrument panel | View and note 'freeze-frame' data if available. Disconnect engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin C25<br>- Engine ECM pin C24<br>- Instrument pin 24<br>- Instrument pin 25 | OK<br>Disconnect instrument and proceed to test 2   |
|      | Faulty  | Rectify fault, proceed to test 5                    |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C25 to ground<br>- Engine ECM pin C24 to ground                                | OK<br>Proceed to test 3                             |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5  |
| 3    | Check cable for short circuit:<br>- Engine ECM pin C25 to Engine ECM pin C24  | OK<br>Proceed to test 4                             |
|      | Short Circuit   | Locate and rectify wiring, fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Engine ECM pin C25 to Instrument pin 25<br>- Engine ECM pin C24 to Instrument pin 24                 | OK<br>Proceed to test 5                             |
|      | Open Circuit  | Locate and rectify wiring fault, proceed to test 5  |
| 5    | Reconnect harness, clear fault code and run engine.   | OK<br>Action complete - quit test                   |
|      | Fault still present   | Contact Triumph service                             |



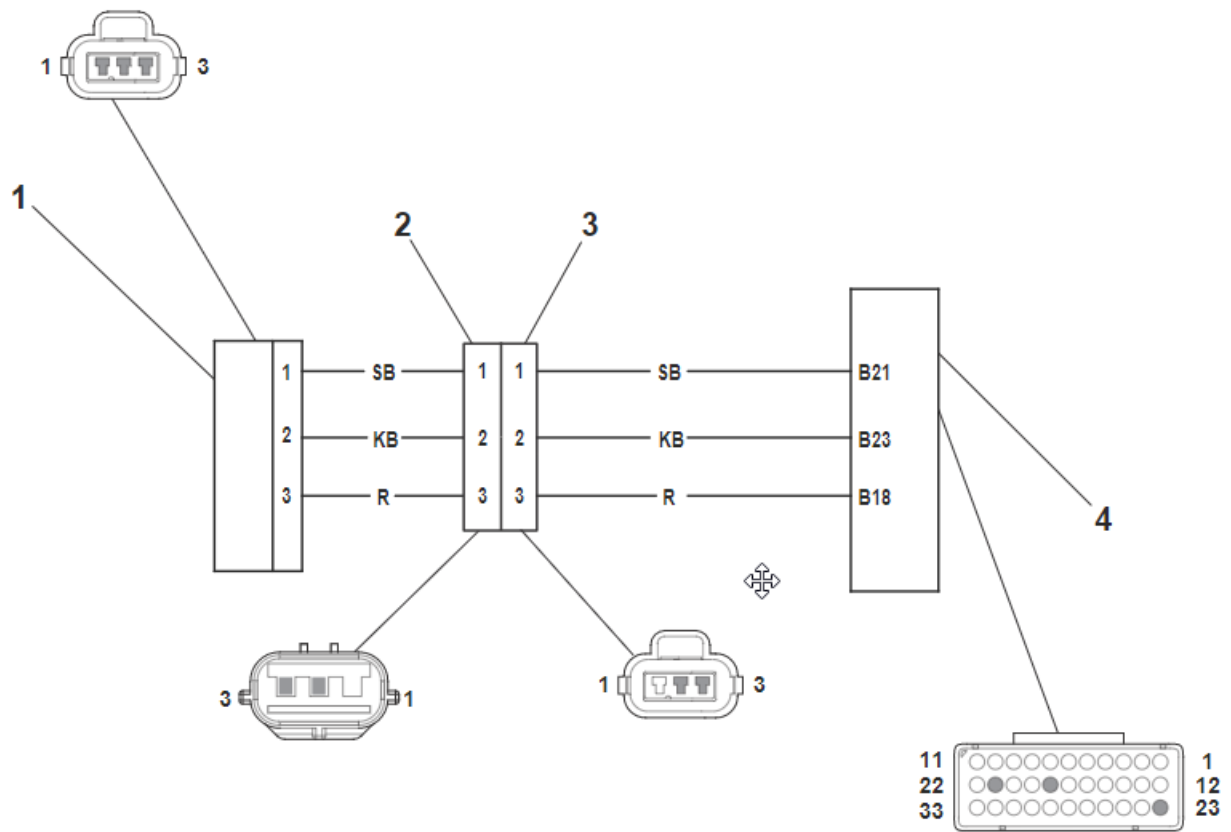
- |  |
|--|
| 1. Instrument<br>2. Engine ECM Connector C |
|--|

Shift Force Sensor Circuit (Triumph Shift Assist)

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P1702      | Shift force sensor short circuit to ground or open circuit<br>Shift force sensor voltage too low | View and note diagnostic tool 'sensor' data<br>Disconnect engine ECM and proceed to pinpoint test 1: |
| P1703      | Shift force sensor short circuit to 5 volt supply<br>Shift force sensor voltage too high         | Disconnect engine ECM and proceed to pinpoint test 2:  |

## Pinpoint Tests

| Test |   | Result              | Action  |
|------|---|---------------------|---|
| 1    | Check cable and terminal integrity: <ul style="list-style-type: none"> <li>- Engine ECM pin B21</li> <li>- Engine ECM pin B18</li> <li>- Engine ECM pin B23</li> <li>- Triumph shift assist connector pin 1</li> <li>- Triumph shift assist connector pin 2</li> <li>- Triumph shift assist connector pin 3</li> <li>- Triumph shift assist subharness connector pin 1</li> <li>- Triumph shift assist subharness connector pin 2</li> <li>- Triumph shift assist subharness connector pin 3</li> </ul> | OK                  | Disconnect shift force sensor and proceed to test 2 |
|      |   | Faulty              | Rectify fault, proceed to test 5                    |
| 2    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin B21 to Engine ECM pin B23</li> <li>- Engine ECM pin B18 to Engine ECM pin B23</li> <li>- Engine ECM pin B21 to ground</li> <li>- Engine ECM pin B18 to ground</li> </ul>   | OK                  | Proceed to test 3                                   |
|      |   | Short Circuit       | Locate and rectify wiring fault, proceed to test 5  |
| 3    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin B21 to Engine ECM pin B18</li> </ul>   | OK                  | Proceed to test 4                                   |
|      |   | Short Circuit       | Locate and rectify wiring, fault, proceed to test 5 |
| 4    | Check cable continuity: <ul style="list-style-type: none"> <li>- Engine ECM pin B21 to Triumph shift assist connector pin 1</li> <li>- Engine ECM pin B23 to Triumph shift assist connector pin 2</li> <li>- Engine ECM pin B18 to Triumph shift assist connector pin 3</li> </ul>  | OK                  | Renew shift force sensor, proceed to test 5         |
|      |   | Open Circuit        | Locate and rectify wiring fault, proceed to test 5  |
| 5    | Reconnect harness, clear fault code and run engine to verify fault clear.   | OK                  | Action complete - quit test                         |
|      |   | Fault still present | Contact Triumph service                             |



- 1. Shift Force Sensor
- 2. Triumph Shift Assist Subharness (main harness side)
- 3. Triumph Shift Assist Subharness (subharness side)
- 4. Engine ECM Connector B

#### EEPROM Error

| Fault Code | Possible cause | Action   |
|------------|----------------|--|
| P06B8      | EEPROM error   | View and note 'freeze frame' data if available.<br>No tests available - contact Triumph service. |

#### Traction Control Disabled Due to ABS Malfunction

| Fault Code | Possible cause                               | Action   |
|------------|--|--|
| P1135      | Traction Control disabled due to malfunction | Check that there is no other DTC linked to the ABS system or CAN communication stored.<br>Contact Triumph service. |

#### ABS Modulator ID Incompatible

| Fault Code | Possible cause | Action  |
|------------|----------------|---|
| P1520      | Unmatched ABS  | Make sure the diagnostic tool is using the latest software version.<br>Update all ECM software.<br>Clear fault code and retest.<br>If fault is still present contact Triumph Service. |
| P16A0      | Unmatched IMU  |   |

#### Engine ECM Tamper Detected

| Fault Code | Possible cause                                 | Action                  |
|------------|--|-------------------------|
| P1604      | Engine ECM tamper detected - return to Triumph | Contact Triumph service |

#### ECM locked by the Calibration Lock Function

| Fault Code | Possible cause                                     | Action  |
|------------|--|---|
| P1605      | Engine ECM locked by the Calibration Lock function | This is also identified by a fast flashing MIL indication, and a disabled engine management system.<br>Unlock the engine ECM using the diagnostic software and supplied unlock code from Triumph service. |

#### Instrument ID Incompatible

| Fault Code | Possible cause             | Action  |
|------------|----------------------------|---|
| P1614      | Instrument ID incompatible | This is also identified by a fast flashing MIL indication, and a disabled engine management system. |



## Pinpoint Tests

| Test | Result   | Action              |   |
|------|--|---------------------|---|
| 1    | Check engine ECM part number is correct for the motorcycle.                              | OK                  | Proceed to test 2   |
|      |  | Incorrect           | Replace engine ECM with correct part and proceed to test 3      |
| 2    | Check that the calibration is correct for the motorcycle, using the diagnostic software. | OK                  | Proceed to test 3   |
|      |  | Incorrect           | Update calibration using diagnostic software, proceed to test 3 |
| 3    | Clear fault code, check for normal operation.  | OK                  | Proceed to test 4   |
|      |  | Fault still present | Action complete - quit test<br>Contact Triumph service          |

## Fuel Pump Short Circuit to Ground or Open Circuit

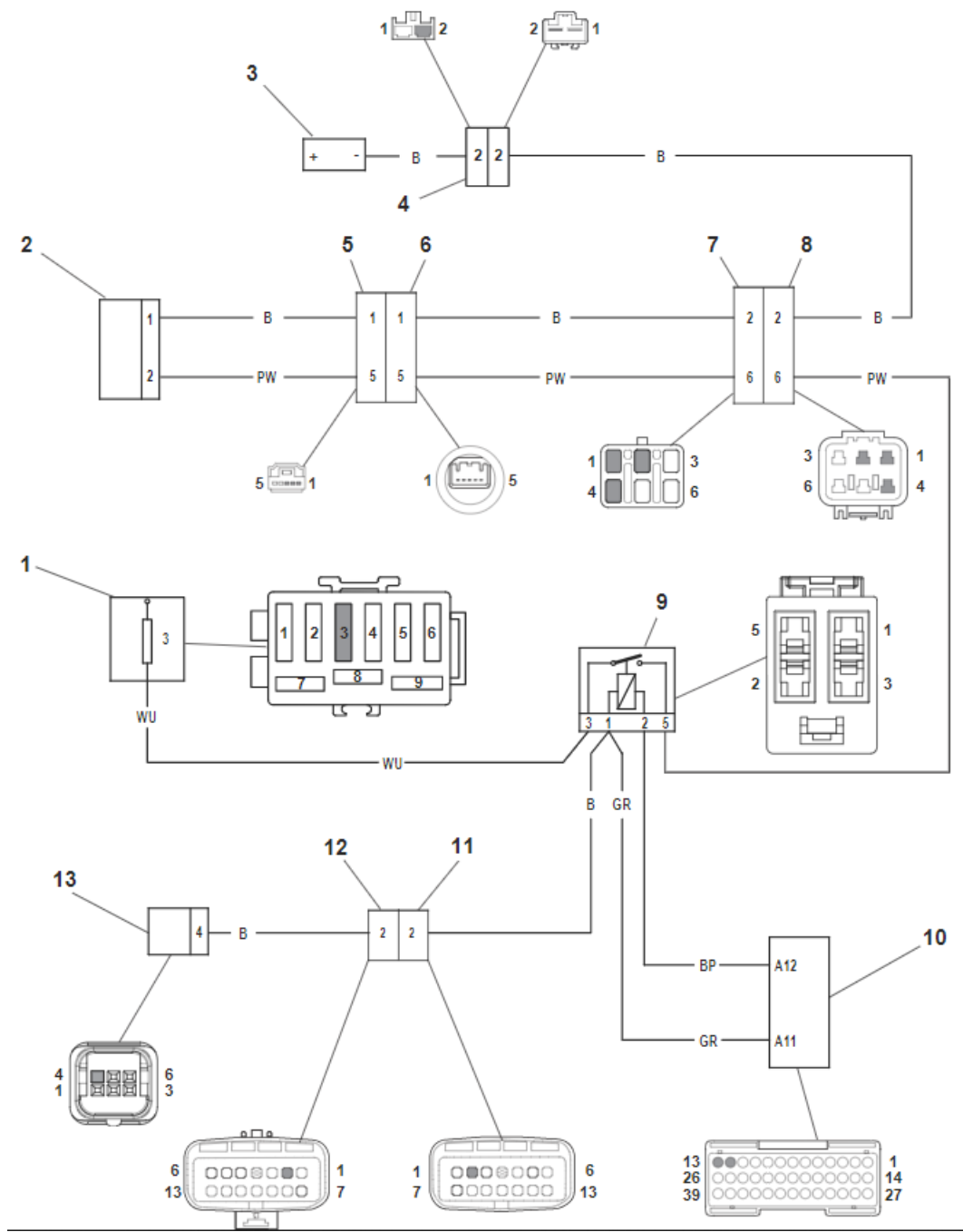
| Fault Code | Possible cause                                      | Action  |
|------------|---|---|
| P1628      | Fuel pump - short circuit to ground or open circuit | View and note diagnostic tool freeze frame data if available.<br>Make sure pump is fitted correctly and all connectors are secure<br>Disconnect Fuel pump relay and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action |                                  |
|------|---|--------|----------------------------------|
| 1    | Check terminal and cable integrity:<br>- Fuel pump relay pin 3<br>- Fuel pump relay pin 5<br>- Fuel level subharness connector pin 6<br>- Fuel level subharness connector pin 5<br>- Fuel pump plate subharness connector pin 5<br>- Fuel pump plate subharness connector pin 5<br>- Fuel pump pin 1<br>- Fuel pump pin 2 | OK     | Proceed to test 2                |
|      |   | Faulty | Rectify fault, proceed to test 4 |

| Test | Result   | Action              |                                  |
|------|--|---------------------|----------------------------------|
| 2    | Check cable for short circuit:<br>- Fuel pump relay pin 5 to ground                                  | OK                  | Proceed to test 3                |
|      |  | Faulty              | Rectify fault, proceed to test 4 |
| 3    | Check cable continuity:<br>- Fuel pump relay pin 5 to fuel pump pin 2<br>- Fuel pump pin 1 to ground | OK                  | Proceed to test 4                |
|      |  | Faulty              | Rectify fault, proceed to test 4 |
| 4    | - Check fuse box Fuse 1 integrity  | OK                  | Proceed to test 5                |
|      |  | Faulty              | Replace fuse, proceed to test 5  |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.                          | OK                  | Action complete - quit test      |
|      | h  | Fault still present | Contact Triumph service          |

1. Fuse Box
2. Fuel Pump
3. Battery
4. Battery Subharness
5. Fuel pump harness (inside fuel tank)
6. Fuel pump subharness (at fuel pump mounting plate)
7. Fuel pump subharness (subharness end)
8. Fuel pump subharness (main harness end)
9. Fuel Pump Relay
10. Engine ECM Connector A
11. Left Hand switch Housing Subharness (main harness side)
12. Left Hand switch Housing Subharness (subharness side)
13. Left Hand Switch Housing

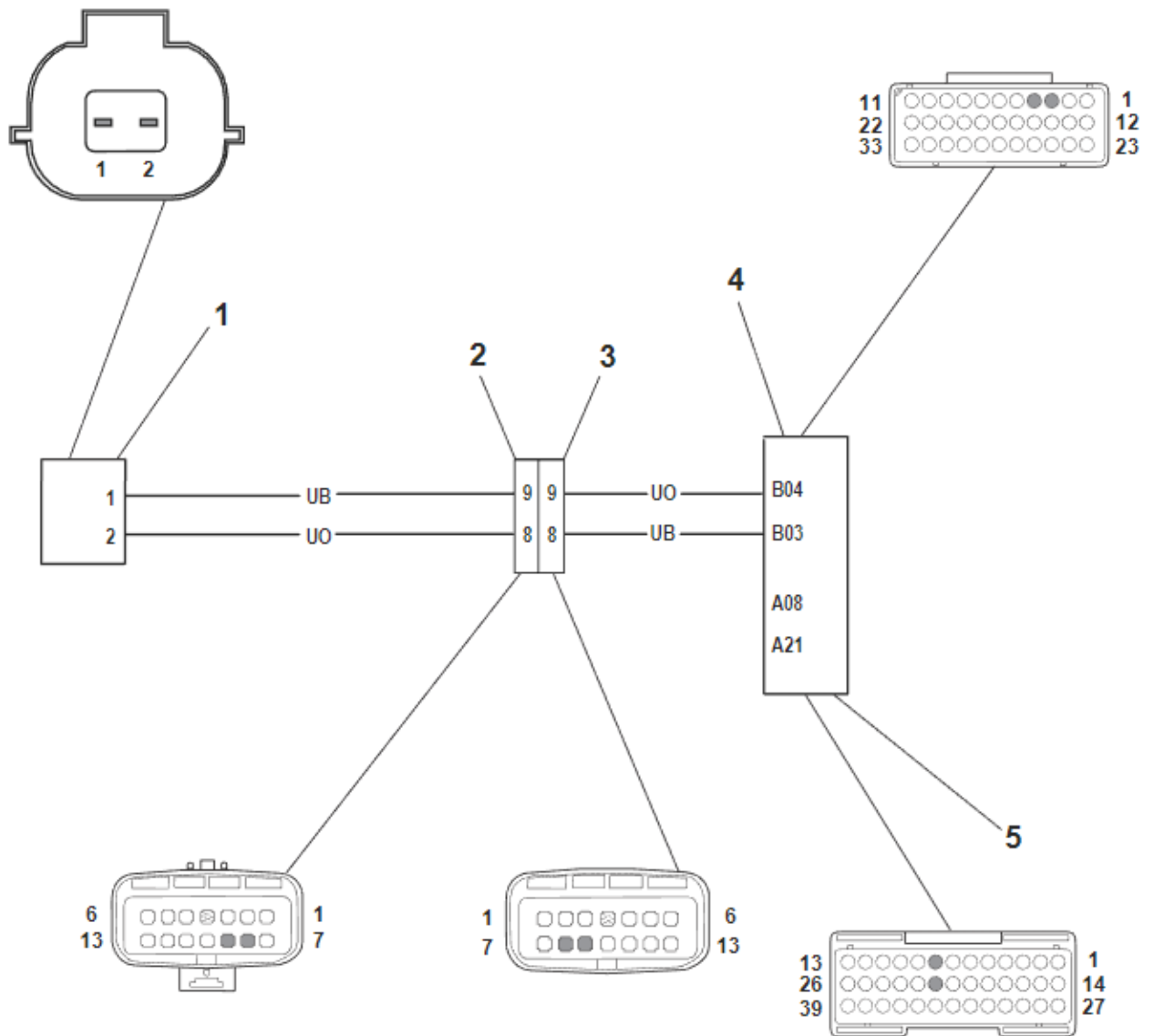


## Throttle Actuator Motor

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P2100      | Throttle actuator control motor open circuit<br>Throttle actuator short circuit to ground or short circuit to battery positive<br>Throttle actuator with default spring open circuit | View and note diagnostic tool freeze frame data if available.<br>View and note diagnostic tool sensor data.<br>Make sure accelerator position sensor connector is secure.<br>Disconnect the engine ECM and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action              |   |
|------|--|---------------------|---|
| 1    | Check cable and terminal integrity: <ul style="list-style-type: none"> <li>- Engine ECM pin B04</li> <li>- Engine ECM pin B03</li> <li>- Throttle actuator motor connector pin 1</li> <li>- Throttle actuator motor connector pin 2</li> </ul> | OK                  | Disconnect accelerator position and proceed to test 2 |
|      | <ul style="list-style-type: none"> <li>- Engine subharness connectors pin 8</li> <li>- Engine subharness connectors pin 9</li> </ul>   | Faulty              | Rectify fault, proceed to test 5                      |
| 2    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin B04 to ground</li> <li>- Engine ECM pin B03 to ground</li> </ul>  | OK                  | Proceed to test 3                                     |
|      |  | Short Circuit       | Locate and rectify wiring fault, proceed to test 4    |
| 3    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin B04 to EMS relay pin 5</li> <li>- Engine ECM pin B03 to EMS relay pin 5</li> </ul>  | OK                  | Proceed to test 4                                     |
|      |  | Short Circuit       | Locate and rectify wiring fault, proceed to test 4    |
| 4    | Check cable continuity: <ul style="list-style-type: none"> <li>- Engine ECM pin B03 to Throttle actuator motor connector pin 2</li> <li>- Engine ECM pin B04 to Throttle actuator motor connector pin 1</li> </ul>                             | OK                  | Renew twist grip position sensor, proceed to test 5   |
|      |  | Open Circuit        | Locate and rectify wiring fault, proceed to test 4    |
| 5    | Reconnect harness, clear fault code and run engine.  | OK                  | Action complete - quit test                           |
|      |  | Fault still present | Contact Triumph service                               |



1. Throttle Actuator Motor
2. Engine Subharness (subharness side)
3. Engine Subharness (main harness side)
4. Engine ECM Connector B
5. Engine ECM Connector A

### Throttle Valve Drive Error

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P2120      | Throttle valve drive error (stuck open)                             | View and note 'freeze-frame' data if available.<br>View and note 'sensor' data.<br>Check throttle body for mechanical malfunctions.<br>Clear fault code and contact Triumph service if fault is still present. |
| P2121      | Throttle valve drive error  |  |
| P2123      | Throttle actuator control internal motor relay does not operate     |  |
| P2126      | Throttle actuator control internal motor relay operates continually |  |

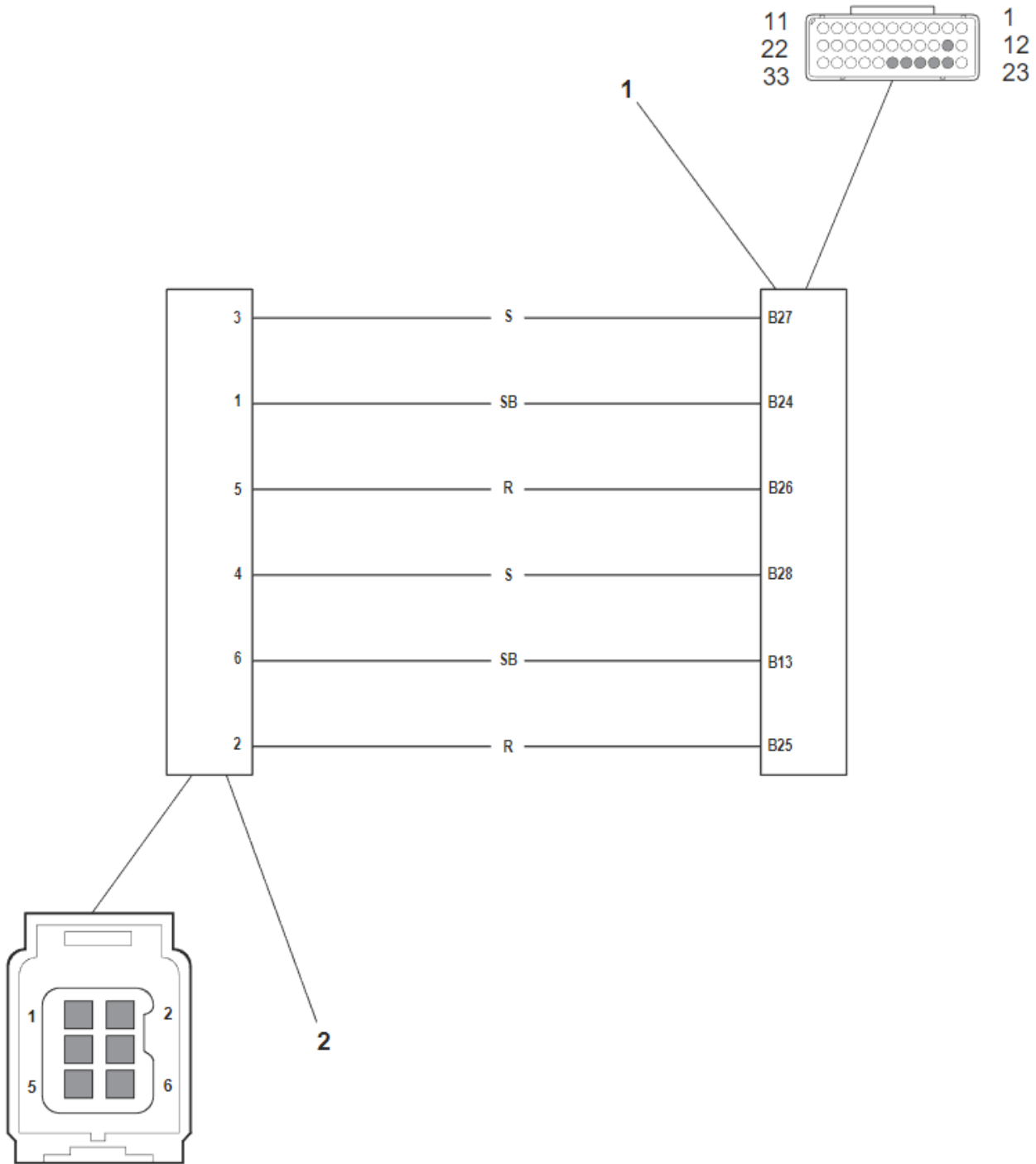
### Twist Grip Position 1

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P2111      | Twist grip position sensor 1 short circuit to ground or open circuit | View and note 'sensor' data. Note ECM sensors requiring a power supply will not be active.<br>Make sure twist grip position sensor is secure.<br>Disconnect the engine ECM and proceed to pinpoint test 1: |
| P2119      | Twist grip position sensor 1 signal out of range                     |  |
| P2102      | Twist grip position sensor 1 short circuit to battery positive       |  |
| P2103      | Twist grip position sensor 2 signal out of range                     |  |

### Pinpoint Tests

| Test | Result  | Action                           |   |
|------|---|----------------------------------|---|
| 1    | Check cable and terminal integrity:<br><ul style="list-style-type: none"> <li>- Engine ECM pin B26</li> <li>- Engine ECM pin B27</li> <li>- Engine ECM pin B24</li> <li>- Engine ECM pin B28</li> <li>- Engine ECM pin B25</li> <li>- Engine ECM pin B13</li> <li>- Twist grip position sensor pin 1</li> <li>- Twist grip position sensor pin 2</li> <li>- Twist grip position sensor pin 3</li> <li>- Twist grip position sensor pin 4</li> <li>- Twist grip position sensor pin 5</li> <li>- Twist grip position sensor pin 6</li> </ul> | OK                               | Disconnect twist grip position sensor and proceed to test 2 |
|      | Faulty  | Rectify fault, proceed to test 5 |   |

| Test |  | Result              | Action  |
|------|--|---------------------|---|
| 2    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Engine ECM pin B25 to ground</li> <li>- Engine ECM pin B25 to B13</li> <li>- Engine ECM pin B26 to ground</li> <li>- Engine ECM pin B26 to B24</li> </ul>  | OK                  | Proceed to test 3                                   |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B27 to ground</li> <li>- Engine ECM pin B27 to B24</li> <li>- Engine ECM pin B28 to ground</li> <li>- Engine ECM pin B28 to B13</li> </ul>   | Short Circuit       | Locate and rectify wiring fault, proceed to test 5  |
| 3    | Check cable for short circuit:   | OK                  | Proceed to test 4                                   |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B27 to Engine ECM pin B26</li> <li>- Engine ECM pin B27 to Engine ECM pin B25</li> <li>- Engine ECM pin B28 to Engine ECM pin B25</li> <li>- Engine ECM pin B28 to Engine ECM pin B26</li> </ul>   | Short Circuit       | Locate and rectify wiring fault, proceed to test 5  |
| 4    | Check cable continuity:  | OK                  | Renew twist grip position sensor, proceed to test 5 |
|      | <ul style="list-style-type: none"> <li>- Engine ECM pin B26 to sensor pin 5</li> <li>- Engine ECM pin B27 to sensor pin 3</li> <li>- Engine ECM pin B24 to sensor pin 1</li> <li>- Engine ECM pin B25 to sensor pin 2</li> <li>- Engine ECM pin B28 to sensor pin 4</li> <li>- Engine ECM pin B13 to sensor pin 6</li> </ul> |                     | Open Circuit  |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.  | OK                  | Action complete - quit test                         |
|      |  | Fault still present | Contact Triumph service                             |



- 1. Engine ECM Connector B
- 2. Twist Grip Position Sensor

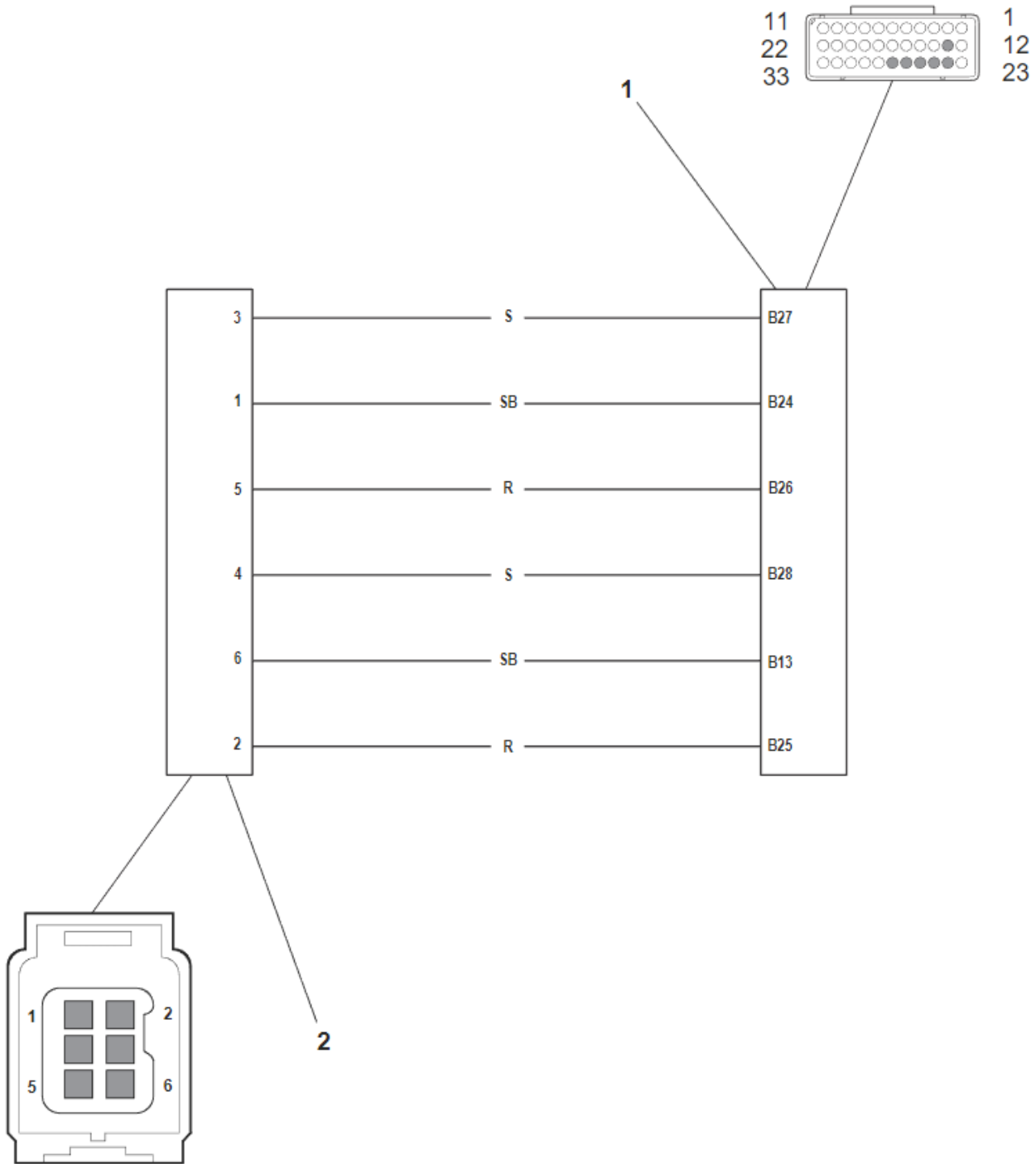


## Twist Grip Position 2

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P2111      | Twist grip position sensor 1 short circuit to ground or open circuit | View and note 'sensor' data. Note ECM sensors requiring a power supply will not be active.<br>Make sure twist grip position sensor is secure.<br>Disconnect the engine ECM and proceed to pinpoint test 1: |
| P2119      | Twist grip position sensor 1 signal out of range                     |  |
| P2102      | Twist grip position sensor 1 short circuit to battery positive       |  |
| P2103      | Twist grip position sensor 2 signal out of range                     |  |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B13<br>- Engine ECM pin B28<br>- Engine ECM pin B25<br>- Twist grip position sensor pin 2<br>- Twist grip position sensor pin 4<br>- Twist grip position sensor pin 6 | OK<br>Disconnect twist grip position sensor and proceed to test 2 |
|      | Faulty  | Rectify fault, proceed to test 5                                  |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B28 to ground<br>- Engine ECM pin B28 to Engine ECM pin B13  | OK<br>Proceed to test 3   |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5                |
| 3    | Check cable for short circuit:<br>- Engine ECM pin B28 to Engine ECM pin B25  | OK<br>Proceed to test 4   |
|      | Short Circuit   | Locate and rectify wiring fault, proceed to test 5                |
| 4    | Check cable continuity:<br>- Engine ECM pin B13 to sensor pin 6<br>- Engine ECM pin B28 to sensor pin 4<br>- Engine ECM pin B25 to sensor pin 2   | OK<br>Renew twist grip position sensor, proceed to test 5         |
|      | Open Circuit  | Locate and rectify wiring fault, proceed to test 5                |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK<br>Action complete - quit test                                 |
|      |   | Fault still present<br>Contact Triumph service                    |



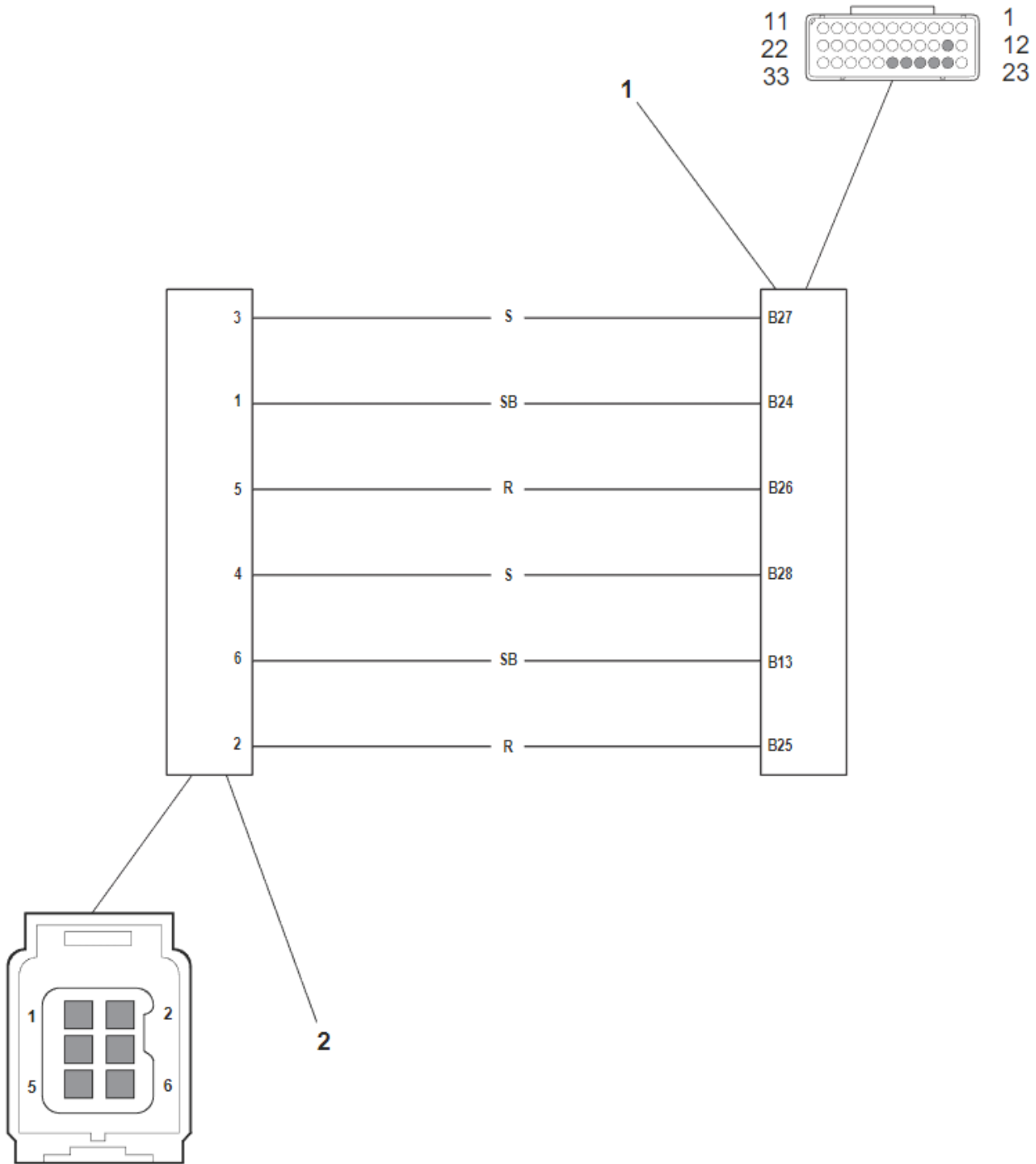
- 1. Engine ECM Connector B
- 2. Twist Grip Position Sensor

## Twist Grip Position Sensor 1 Correlation Error with Twist Grip Position 2

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| P2138      | Twist grip position sensor 1 correlation error with twist grip position sensor 2 | View and note diagnostic tool freeze frame data if available.<br>View and note diagnostic tool sensor data.<br>Disconnect twist grip position sensor and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Turn the ignition on and measure the Voltage between:<br>- Engine ECM pin B25 and Engine ECM pin B13<br>- Engine ECM pin B26 and Engine ECM pin B24 | Ok - 5V DC<br>Proceed to test 2                  |
|      | Faulty  | Rectify fault, proceed to test 2                 |
| 2    | Check cable continuity:<br>- Engine ECM pin B27 to sensor pin 3<br>- Engine ECM pin B28 to sensor pin 4   | OK<br>Renew the twist grip and proceed to test 3 |
|      | Open circuit  | Rectify fault, proceed to test 3                 |
| 3    | Reconnect harness, clear fault code and run engine to verify fault cleared.   | OK<br>Action complete - quit test                |
|      | Fault still present   | Contact Triumph service                          |



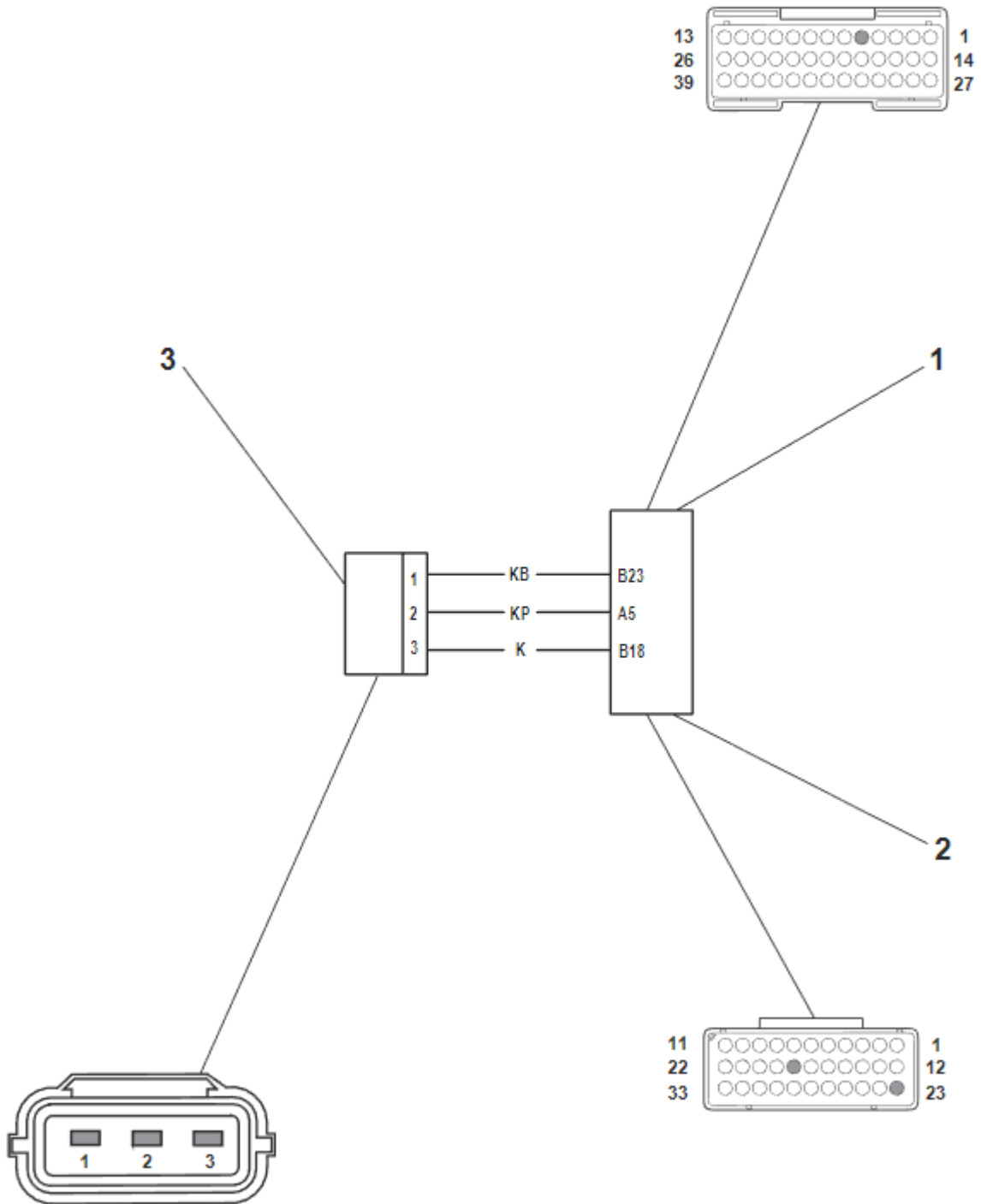
- 1. Engine ECM Connector B
- 2. Twist Grip Position Sensor

## Ambient Air Pressure Sensor

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| P2228      | Ambient air pressure sensor circuit short circuit to ground                               | View and note 'freeze-frame' data if available.<br>View and note 'sensor' data.                    |
| P2226      | Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply | Make sure sensor connector is secure.<br>Disconnect the engine ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- Engine ECM pin B23<br>- Engine ECM pin A5<br>- Engine ECM pin B18<br>- Sensor pin 1, 2, 3                                     | OK<br>Disconnect ambient pressure sensor and proceed to test 2 |
|      | Faulty   | Rectify fault, proceed to test 4                               |
| 2    | Check cable for short circuit:<br>- Engine ECM pin B18 to Engine ECM pin B23<br>- Engine ECM pin B18 to Engine ECM pin A5<br>- Engine ECM pin B23 to Engine ECM pin A5 | OK<br>Proceed to test 3  |
|      | Short Circuit  | Locate and rectify wiring fault, proceed to test 4             |
| 3    | Check cable for continuity:<br>- Engine ECM pin B23 to sensor pin 1<br>- Engine ECM pin A5 to sensor pin 2<br>- Engine ECM pin B18 to sensor pin 3                     | OK<br>Renew ambient pressure sensor, proceed to test 4         |
|      | Open Circuit   | Locate and rectify wiring fault, proceed to test 4             |
| 4    | Reconnect harness, clear fault code and run engine.  | OK<br>Action complete - quit test                              |
|      | Fault still present  | Contact Triumph service  |



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Engine ECM Connector A</li> <li>2. Engine ECM Connector B</li> <li>3. Ambient Air Pressure Sensor</li> </ol> |
|--|

## Fault Finding - Non Electrical

| Symptom   | Possible cause(s)   |
|---|---|
| Poor throttle response at low rpm                               | Low fuel pressure caused by filter blockage/leaks   |
|   | Low fuel pressure caused by loose fuel pipes to the fuel pump and filter  |
| Cutting out at idle   | Throttle bodies out of balance  |
|   | Low fuel pressure caused by loose fuel pipes to the fuel pump and filter  |
|   | Low fuel pressure   |
|   | Weak mixture caused by air leak at the throttle body/transition piece to cylinder head face                               |
| Idle speed too low/high   | Incorrect closed throttle position setting  |
| Diagnostic software malfunctions during tune download procedure | Low battery voltage   |
| Throttle hang-up  | Incorrect closed throttle position setting  |
| Motorcycle will start but cuts out immediately                  | Low fuel pressure caused by loose fuel pipes to the fuel pump and filter  |
|   | Low fuel pressure caused by filter blockage/leaks   |
| Abnormally high fuel pressure                                   | Fuel pressure regulator inoperative   |
| Temperature gauge reads cooler than normal                      | Cooling system air-locked resulting in coolant temperature sensor operating in air instead of coolant<br>Thermostat fault |
| Motorcycle will not start                                       | Check the immobiliser system for faults   |
|   | Make sure that the keys, Engine ECM and Chassis ECM are all correctly paired  |

## Pinpoint Tests - Immobiliser/TPMS

### L0001 - Front Wheel Unit Sensor Battery Alert

| <b>NOTICE</b>  |
|--|
| All the fault codes for the tyre pressure monitoring system and the immobiliser system can only be viewed in the Chassis section of the Triumph diagnostic software. |

| <b>Fault Code</b>  | <b>Possible cause</b> | <b>Action</b>   |
|--|-----------------------|---|
| L0001<br>or<br>The TPMS tyre symbol in the instrument pack will be on for 8 seconds with the 'F' symbol with 'lo batt' shown in the display screen | Low battery voltage   | Replace the front wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |

L0002 - Rear Wheel Unit Sensor Battery Alert

| <b>Fault Code</b>  | <b>Possible cause</b> | <b>Action</b>  |
|--|-----------------------|--|
| L0002<br>or<br>The TPMS tyre symbol in the instrument pack will be on for 8 seconds with the 'R' symbol with 'lo batt' shown in the display screen | Low battery voltage   | Replace the rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |

L0003 - Front Wheel Unit Sensor Fault Alert

| <b>Fault Code</b> | <b>Possible cause</b>   | <b>Action</b>   |
|-------------------|---|---|
| L0003             | Front wheel sensor unit fault alert<br>Note: This DTC will automatically be generated if DTC L0007 occurs | If the problem persists:<br>Replace the front wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |



L0004 - Rear Wheel Unit Sensor Fault Alert

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| L0004      | Rear wheel sensor unit fault alert<br>Note: This DTC will automatically be generated if DTC L0007 occurs | If the problem persists:<br>Replace the rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |

L0005 - Front Wheel Unit Sensor Loss of Communication

|  |  |  |
|--|--|--|
| <b>NOTICE</b>  |  |  |
| Refer to the owner's handbook for the wheel pressure sensors ID numbers. |  |  |

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| L0005      | Front wheel sensor unit loss of communication error<br>Low battery voltage<br>Wrong sensor ID number has been registered in the immobiliser/TPMS control module | If the problem persists:<br>Using the Triumph diagnostic tool, check that the correct ID number for the front wheel pressure sensor is registered to the Immobiliser/TPMS control module.<br>Replace the front wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |

L0006 - Rear Wheel Unit Sensor Loss of Communication

**NOTICE**

Refer to the owner's handbook for the wheel pressure sensors ID numbers.

| Fault Code | Possible cause   | Action  |
|------------|--|---|
| L0006      | Rear wheel sensor unit loss of communication error<br>Low battery voltage<br>Wrong sensor ID number has been registered in the immobiliser/TPMS control module | If the problem persists:<br>Using the Triumph diagnostic tool, check that the correct ID number for the front wheel pressure sensor is registered to the Immobiliser/TPMS control module.<br>Replace the rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |

L0007 - Immobiliser/TPMS Control Module Fault

**NOTICE**

Refer to the owner's handbook for the wheel pressure sensors ID numbers.

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| L0007      | Immobiliser/TPMS control module fault<br>Low battery voltage<br>Wrong sensor ID numbers have been registered in the immobiliser/TPMS control module | Using the Triumph diagnostic tool, check that the correct ID numbers for the wheel pressure sensors are registered to the Immobiliser/TPMS control module.<br>If the correct IDs are registered, replace the front and rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide.<br>Record the new sensor's ID number into the owner handbook before fitting. |

## Removal and Installation - Fuel and Air Components

### Fuel Tank – Removal

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

#### **WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

#### **WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
Before disconnecting any fuel lines, make sure the engine and exhaust system has cooled down.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

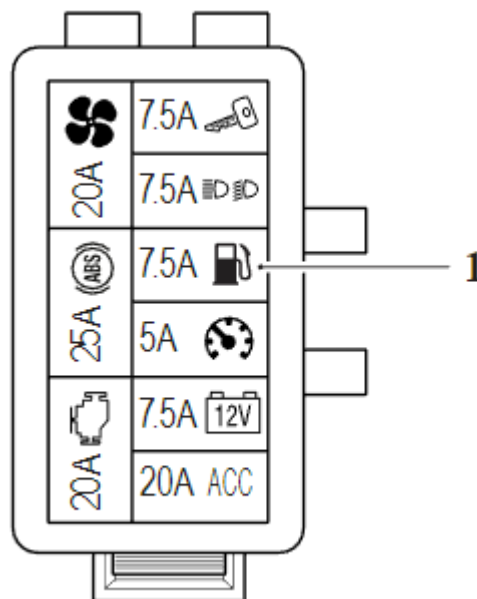
#### **WARNING**

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)
- Using proprietary professional automotive workshop equipment approved for fuel handling, drain the fuel from the fuel tank.

1. Remove the fuel pump fuse from the fuse box.



1. Fuel pump fuse location

**⚠ WARNING**

If the fuel rail is dismantled without first reducing pressure, fuel may escape causing clothing and components to be coated with fuel.

This would represent a serious fire hazard which could lead to burn injuries and damage to property.

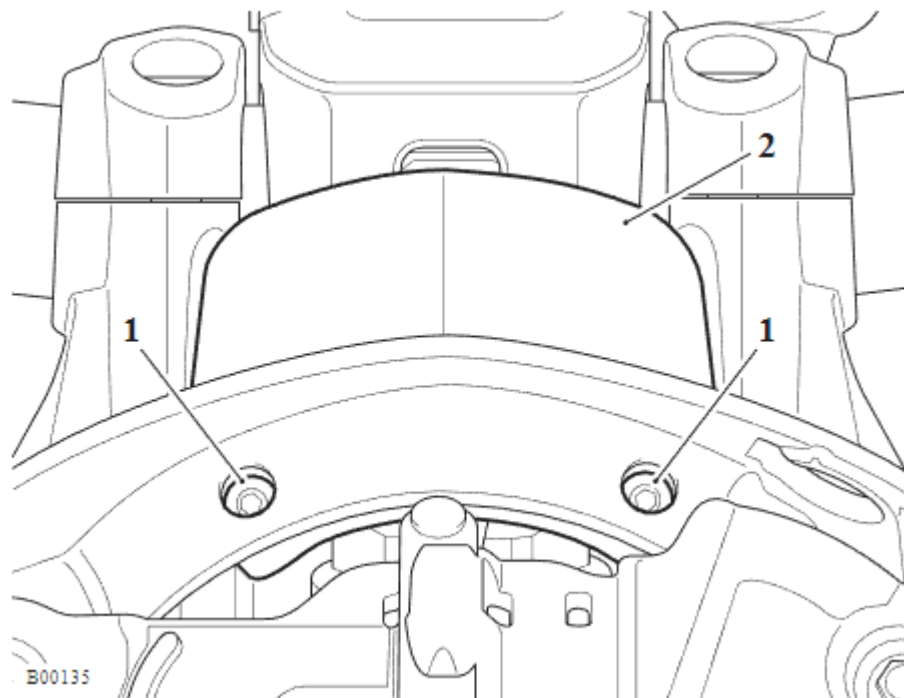
## NOTICE

Because fuel stored in the fuel rail will be at 3.5 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the fuel rail takes place. To reduce pressure, briefly crank the engine with the fuel pump fuse removed.

When disconnected, the fuel tank is self-sealing but a small amount of fuel may dribble from the hose.

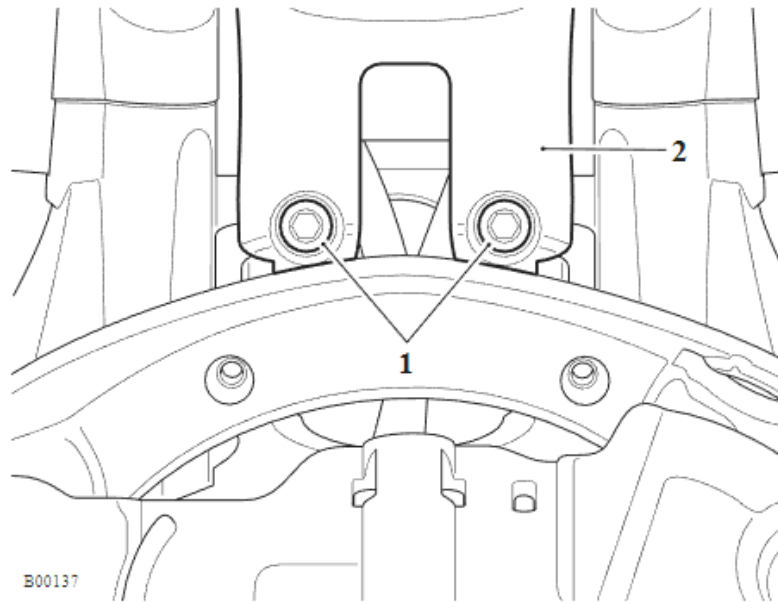
To protect the components under the fuel tank, place suitable material over the components to absorb the small amount of fuel that may come from the fuel tank and its fuel lines.

2. Temporarily reconnect the battery, positive (red) lead first and tighten the terminals to 4.5 Nm.
3. Start the engine and run until it stalls to drain fuel from the fuel rail.
4. Disconnect the battery, negative (black) lead first.
5. Release the two fixings and remove the headstock harness cover.



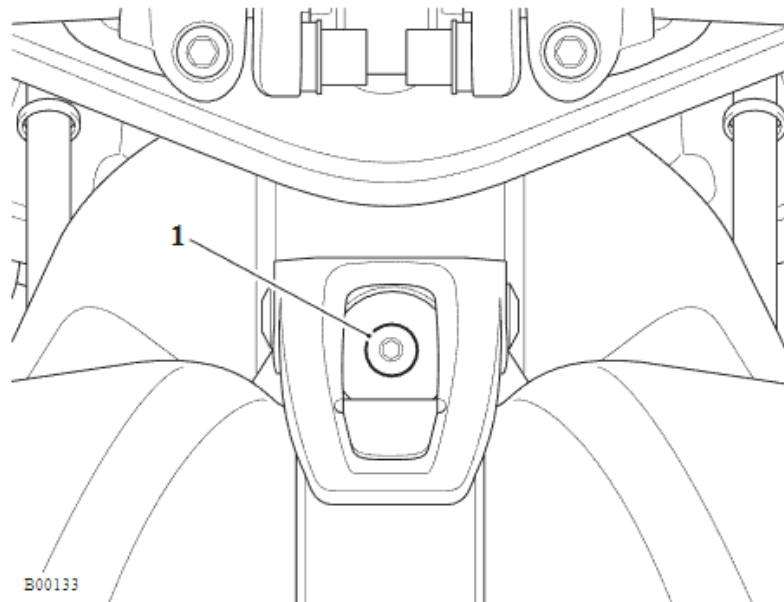
1. Fixings
2. Harness cover

6. Loosen the instruments clamp fixings and tilt the instruments forward.



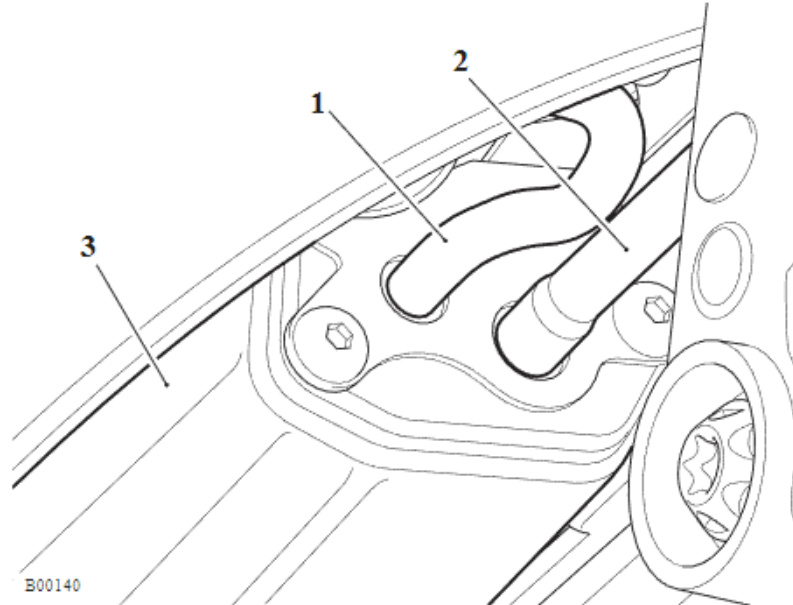
- 1. Fixings
- 2. Instruments clamp

7. Remove the fixing securing the front of the fuel tank to the frame.



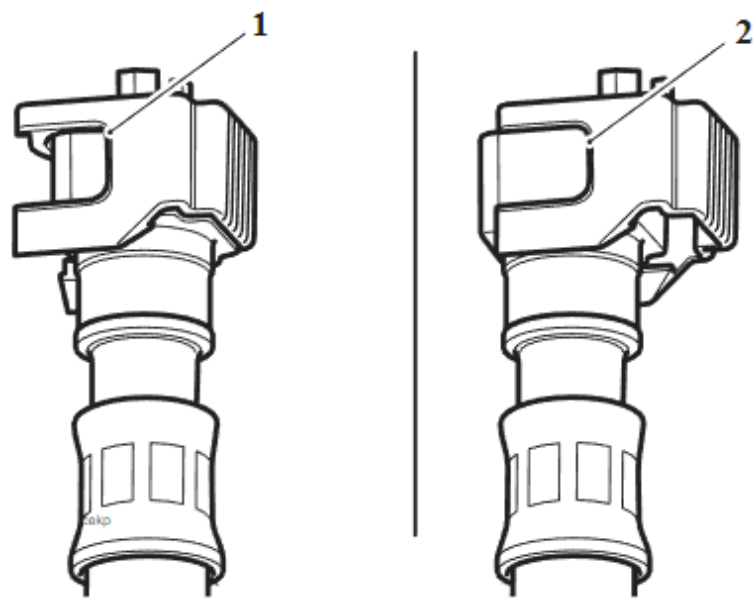
- 1. Fixing

8. Raise the front of the fuel tank 50 - 100 mm and disconnect the fuel tank breather hose from the evaporative canister.



- 1. Roll over valve hose
- 2. Purge valve haose
- 3. Evaporative canister

9. To release the double check clip, ease the latch away from the connector until the release buttons are exposed.

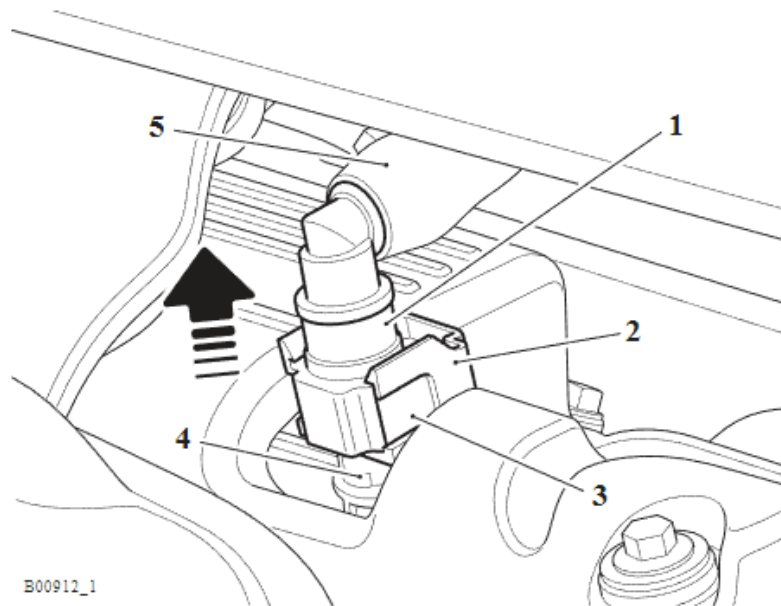


- 1. Locked Position
- 2. Unlocked Position

## **⚠ CAUTION**

Do not pull on the fuel hose to disconnect the connector from the fuel rail.  
Pulling on the fuel hose may damage the fuel hose connector.  
Disconnect from the fuel line by lifting up the fuel hose connector.

10. Press in the release buttons (one either side of the fuel hose connector) to release the locking device.
11. Without pulling on the fuel hose, lift up the fuel hose connector to disconnect it from the fuel rail.

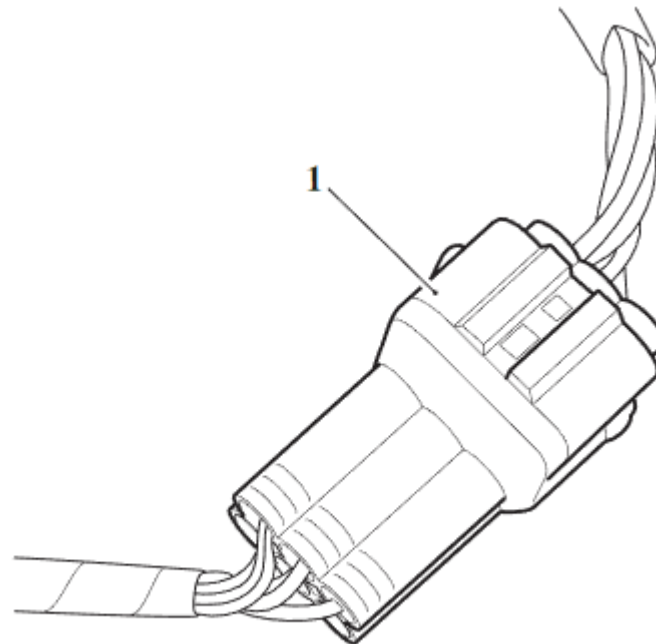


1. Fuel hose connector
2. Latch
3. Release button (one of two shown)
4. Fuel rail
5. Fuel hose

12. Raise the front of the fuel tank 100 - 150 mm.
13. Disconnect the roll over valve hose from the fuel tank.



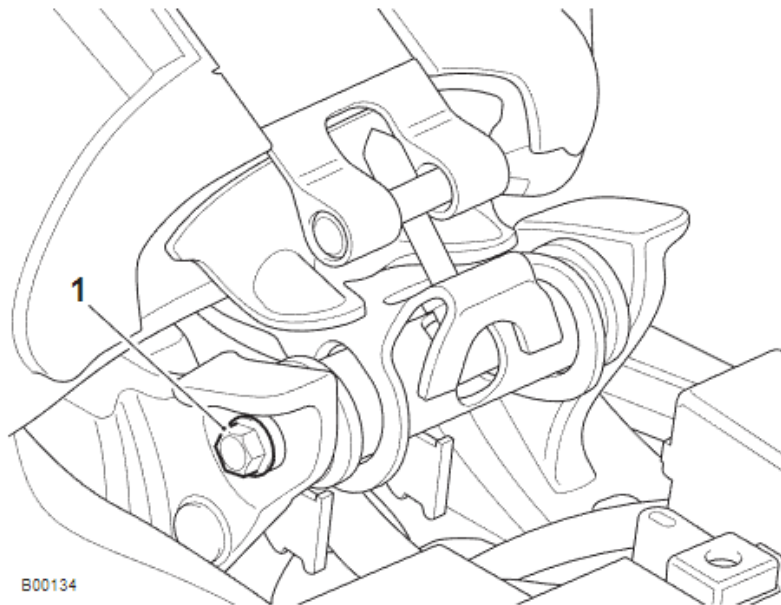
14. Disconnect the electrical connector for the fuel pump.



B00913

1. Electrical connector

15. Remove the fixing securing the rear of the fuel tank to the frame.



B00134

1. Fixing

16. Remove the fuel tank's rear fixing sleeve and remove the fuel tank. Make sure the fuel tank is lifted over the ignition coils.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

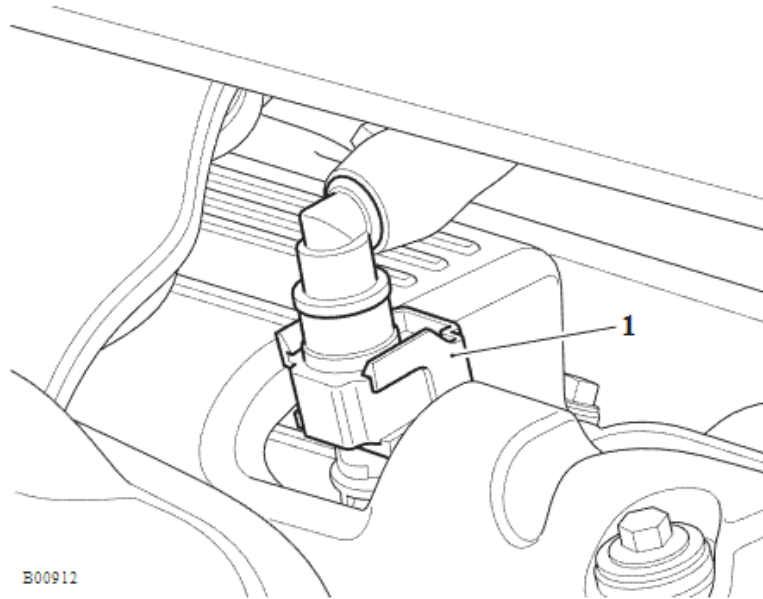
**⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
Before disconnecting any fuel lines, make sure the engine and exhaust system has cooled down.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

**⚠ WARNING**

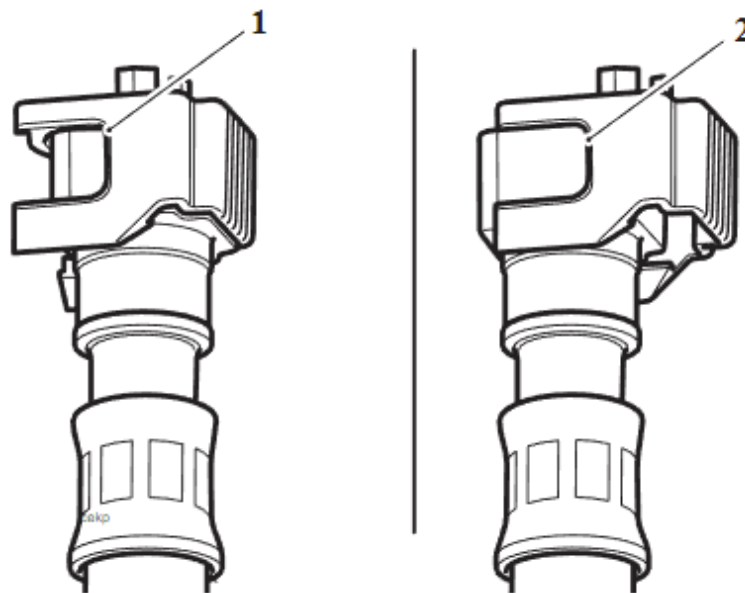
Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

1. With the aid of an assistant, lift the fuel tank over the ignition coils and position it onto the motorcycle. Connect the fuel hose to its spigot by gently pushing inwards until the hose engages with a click.



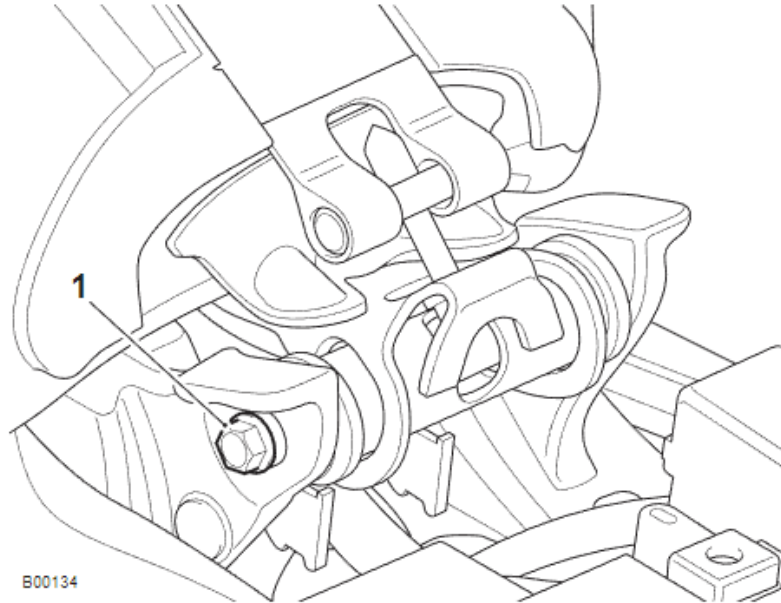
1. Fuel hose

2. Slide the double check latch down (towards the spigot) until the release buttons are covered. If the latch will not slide into position, then the fuel hose is not fully home on its spigot and must therefore be refitted correctly.



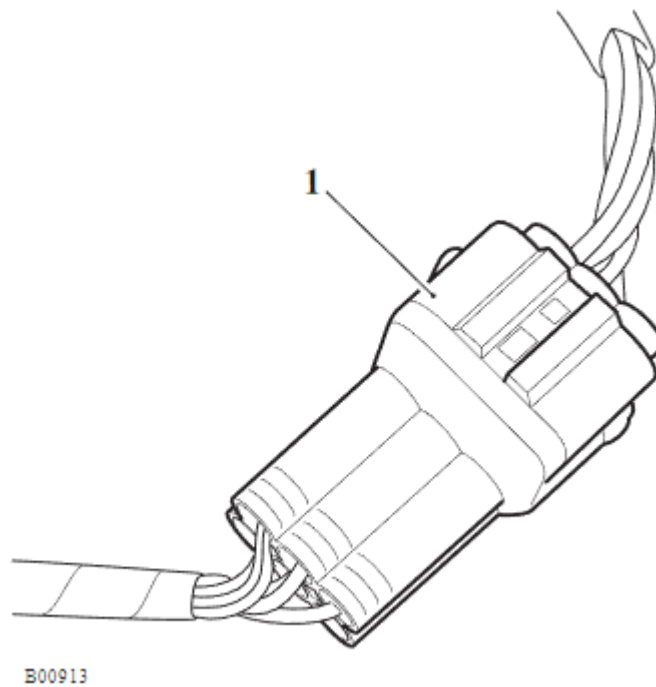
1. Locked Position  
2. Unlocked Position

- Secure to the frame with its rear sleeve and fixing only. Do not fully tighten. Make sure the fuel tank is lifted over the ignition coils.



1. Fixing

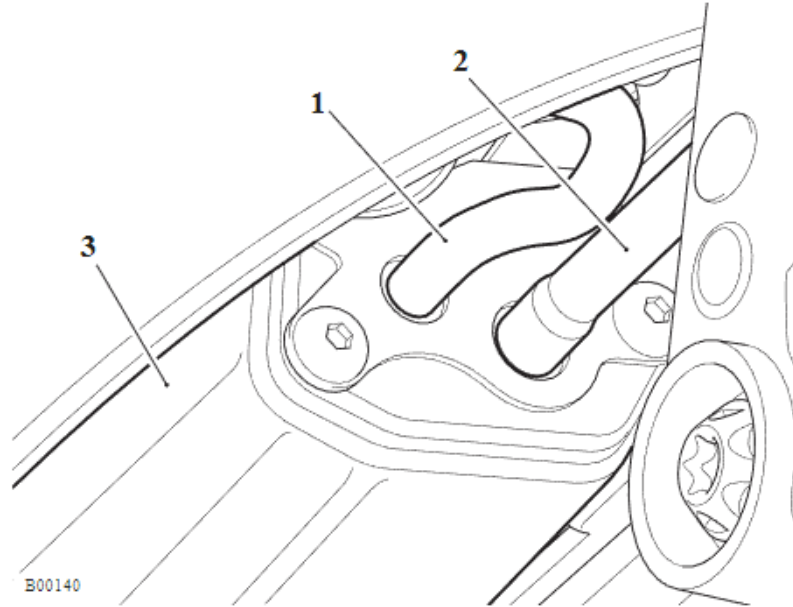
- Raise the front of the fuel tank 100 - 150 mm.
- Connect the electrical connector to the fuel pump.



1. Electrical connector

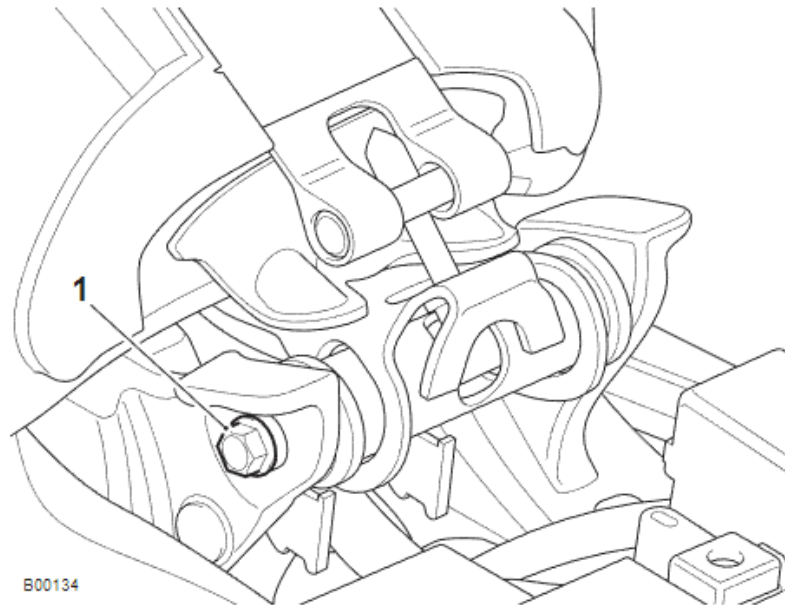
- Connect the roll over valve hose to the fuel tank.

7. Lower the front of the fuel tank 50 - 100 mm.
8. Connect the roll over and purge valve hoses to the evaporative canister.



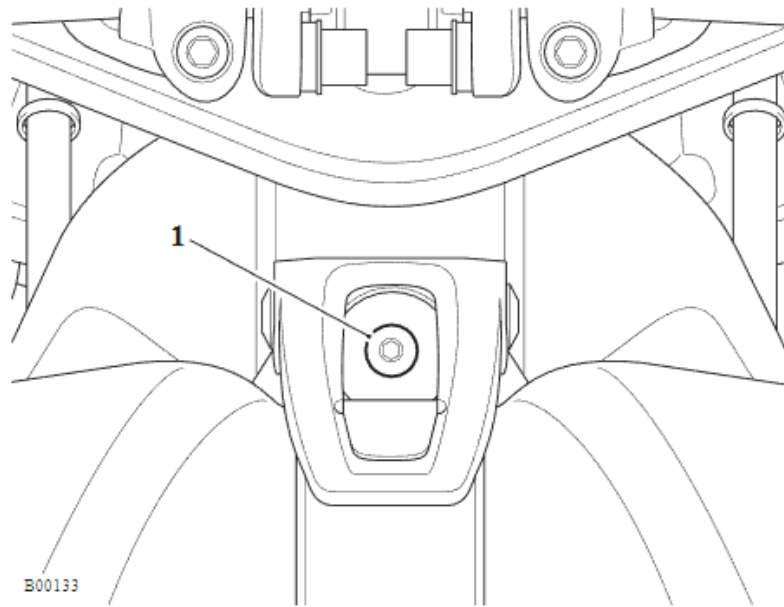
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Roll over valve hose</li><li>2. Purge valve haose</li><li>3. Evaporative canister</li></ol> |
|--|

9. Lower the front of the fuel tank and tighten the rear fixing to 8 Nm.



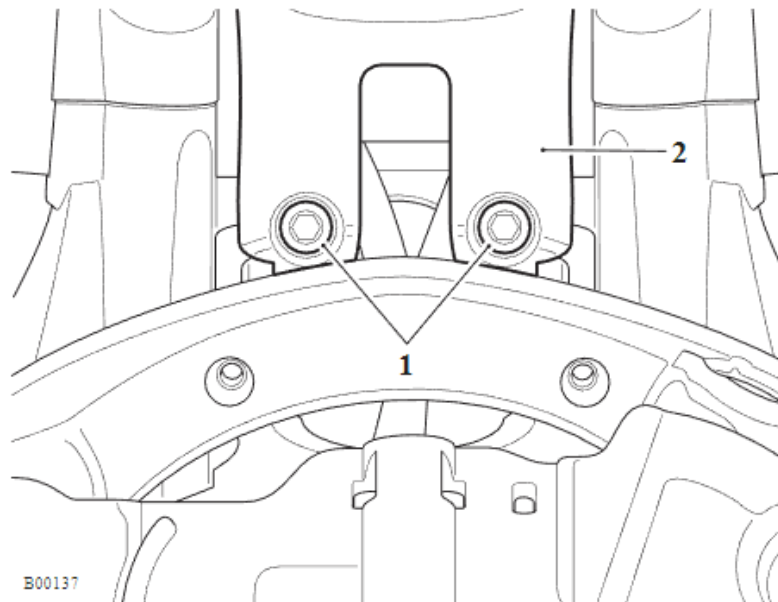
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li></ol> |
|---|

10. Fit the fixing securing the front of the fuel tank to the frame and tighten to 8 Nm.



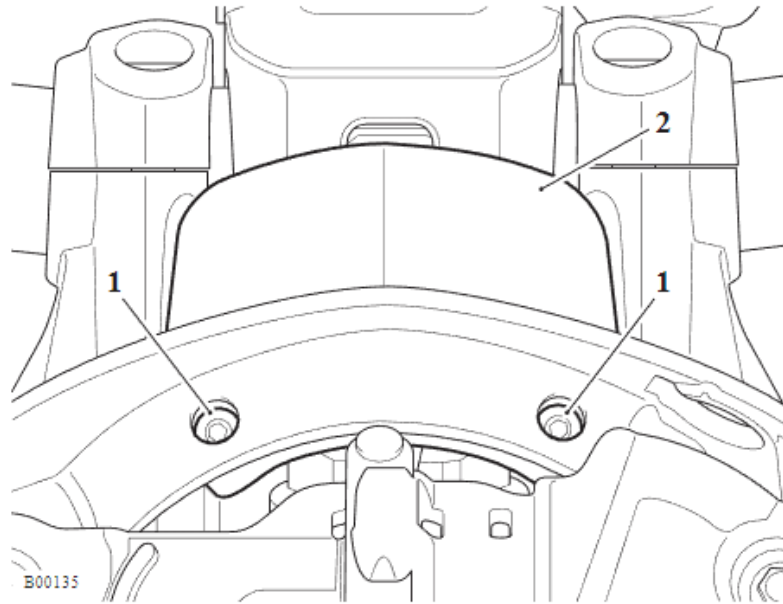
1. Fixing

11. Tilt the instruments clamp to its original position and tighten the clamp fixings to 9 Nm.



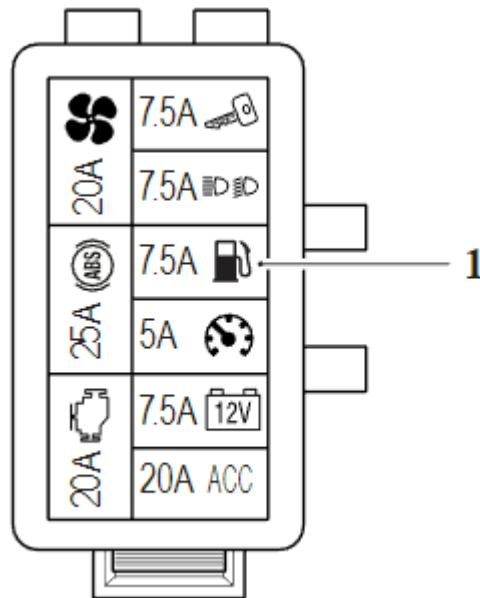
1. Fixings  
2. Instruments clamp

12. Fit the headstock harness cover and tighten the fixings to 5 Nm.



- 1. Fixings
- 2. Harness cover

13. Fit the fuel pump fuse to the fuse box.



- 1. Fuel pump fuse location

- Refill the fuel tank with the fuel drained during removal, and check carefully for fuel leaks.
- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

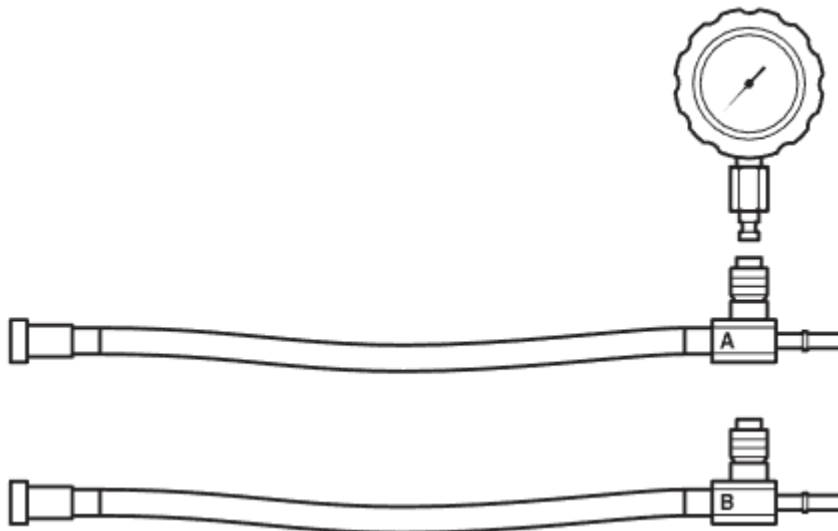
#### Fuel Pressure Checking

### **⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

Fuel pressure is checked using service tool T3880001.



T3880001 - Fuel Pressure Gauge

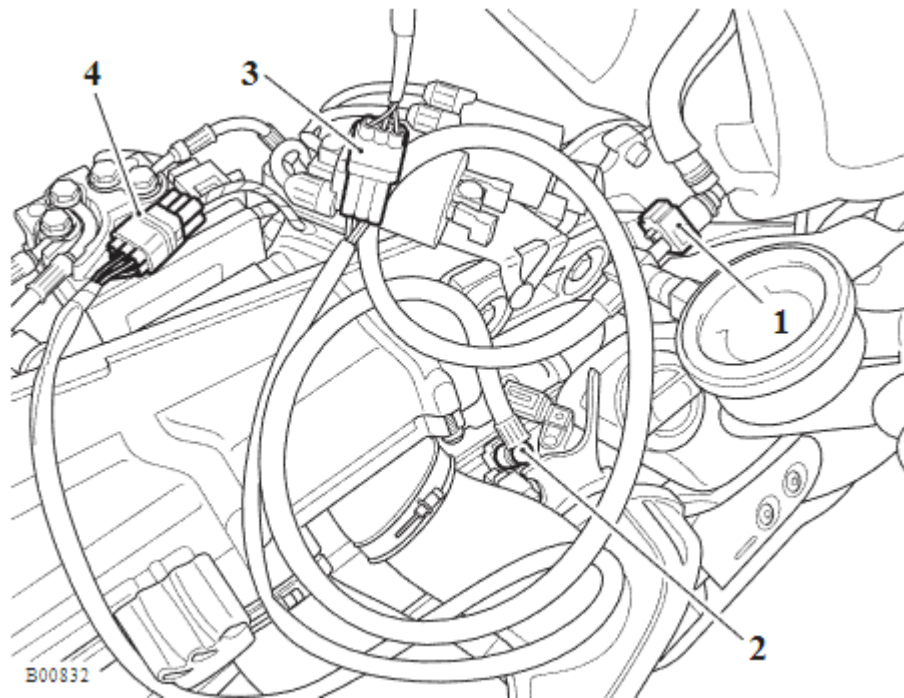
1. Remove the fuel tank (see [Fuel Tank - Removal](#)) and place on a suitable support, close to the motorcycle.
2. Using service tool T3880123, carefully connect the fuel pump connection on the main harness to the fuel tank. Connect the other end of the extension cable to the motorcycle main harness.
3. Select the fuel pressure gauge adapter marked 'B' from service tool T3880001.



## **⚠ WARNING**

Always use the correct fuel pressure gauge adapter (**adapter 'B' for Explorer models**). Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

4. Connect the adapter hose to the fuel pump plate outlet as shown in the illustration below.
5. Connect the adapter between the fuel pump plate outlet and fuel hose as shown in the illustration below. Insert the gauge to the adapter also as shown in the illustration.



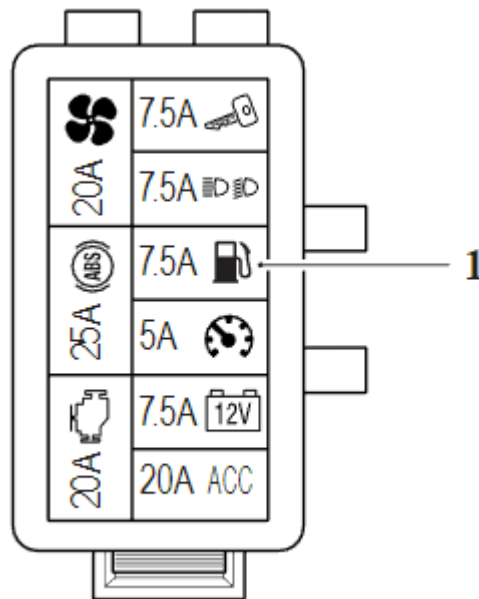
1. Fuel pump connection
2. fuel rail connection
3. Fuel pump electrical connector
4. Main harness electrical connector

## NOTICE

To release the fuel pressure gauge from the adapter, slide the outer ferrule downwards. This will allow the gauge to spring upwards from the adapter.

To insert the gauge to the adapter, push the gauge spigot into the adapter until a click can be heard.

6. Make sure the gauge is visible to the side of the motorcycle.
7. Using proprietary professional automotive workshop equipment approved for fuel handling, partially refill the fuel tank with the fuel removed earlier.
8. Refit the fuel pump fuse to the fuse box.



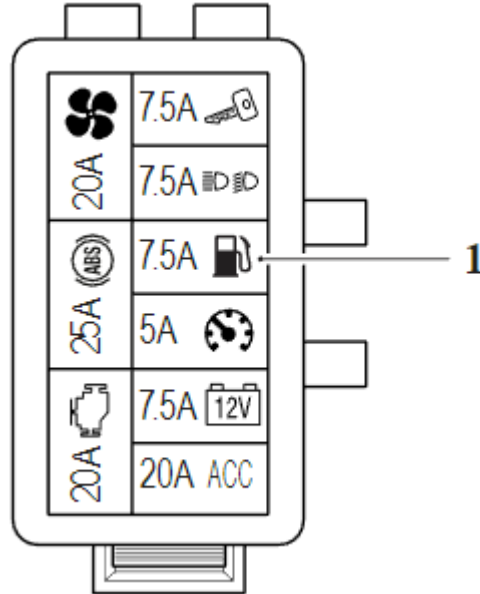
1. Fuel pump fuse location

9. Reconnect the battery, positive (red) lead first.
10. Start the engine and observe the fuel pressure reading on the gauge.

## NOTICE

The fuel pressure should be 3.5 bar nominally.

11. When fuel pressure checking is complete, turn the ignition to the OFF position and remove the fuel pump fuse from the fuse box.



1. Fuel pump fuse location

#### NOTICE

Because fuel stored in the fuel rail will be at 3.5 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the fuel rail takes place. To reduce pressure, briefly crank the engine with the fuel pump fuse removed.

When disconnected, the fuel tank is self-sealing but a small amount of fuel may dribble from the hose.

To protect the components under the fuel tank, place suitable material over the components to absorb the small amount of fuel that may come from the fuel tank and its fuel lines.

12. Start the engine and run until it stalls to drain fuel from the fuel rail.
13. Disconnect the battery, negative (black) lead first.
14. Disconnect the fuel pressure gauge adapter and wiring extension.
15. Using proprietary professional automotive workshop equipment approved for fuel handling, drain any remaining fuel from the fuel tank.
16. Refit the fuel tank (see [Fuel Tank - Installation](#)).

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
Before disconnecting any fuel lines, make sure the engine and exhaust system has cooled down.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

**⚠ WARNING**

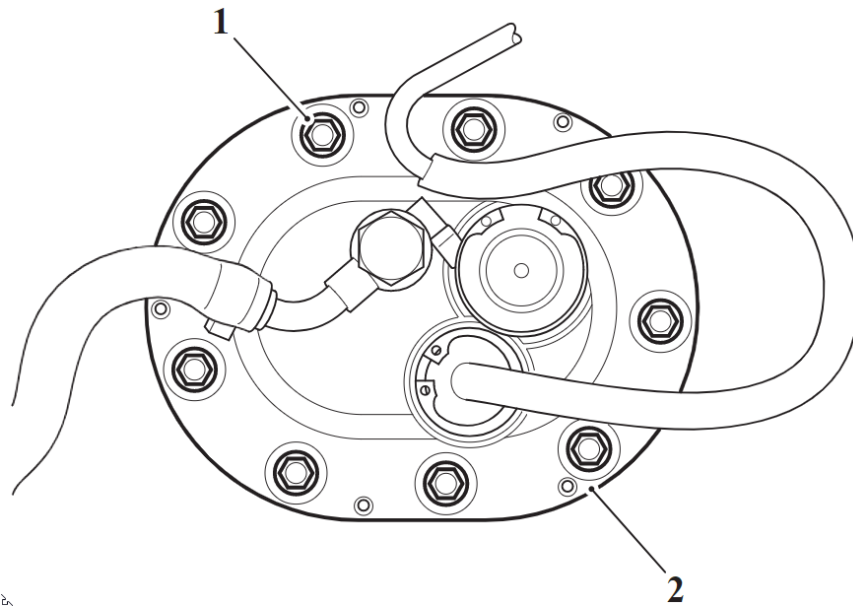
Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

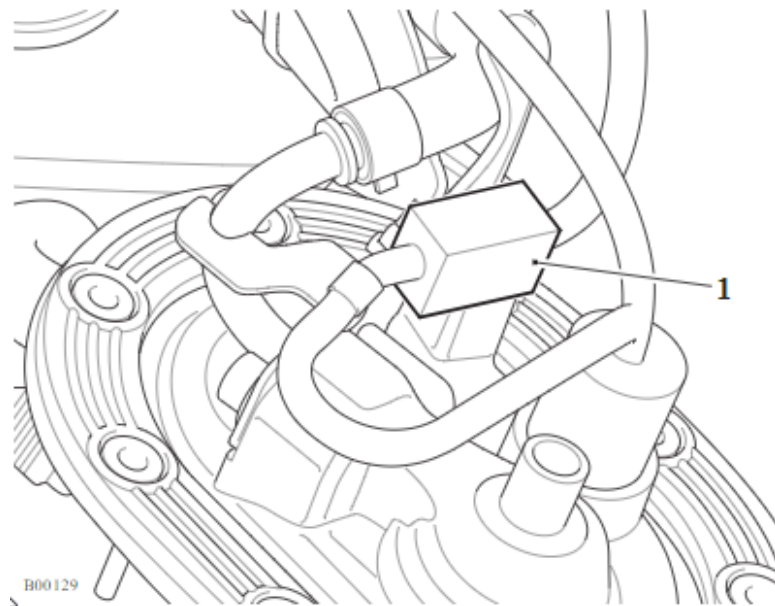
1. Using proprietary professional automotive workshop equipment approved for fuel handling, drain all fuel from the fuel tank.
2. Remove the fuel tank (see Fuel Tank - Removal).
3. Invert the fuel tank and place on a protective surface to prevent paint damage.

4. Remove the ring of fixings securing the fuel pump mounting plate to the fuel tank.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Fuel pump mounting plate</li></ol> |
|---|

5. Detach the pump assembly from the fuel tank.
6. Disconnect the fuel level sensor from the fuel pump assembly harness.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Electrical connector</li></ol> |
|---|

7. Remove the fuel pump assembly and discard the fuel pump plate seal.

#### Fuel Pump Assembly – Inspection

1. Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary.
2. Check all hose clamps for cracks and signs of distortion. Replace as necessary.
3. Check the mesh filter for damage and replace if necessary.

#### Fuel Pump Assembly – Installation

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

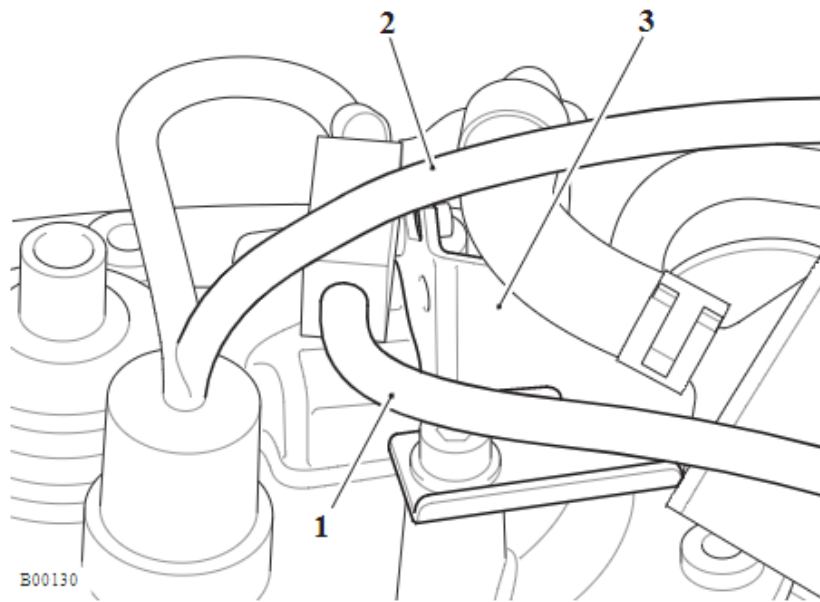
Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
Before disconnecting any fuel lines, make sure the engine and exhaust system has cooled down.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

### **WARNING**

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

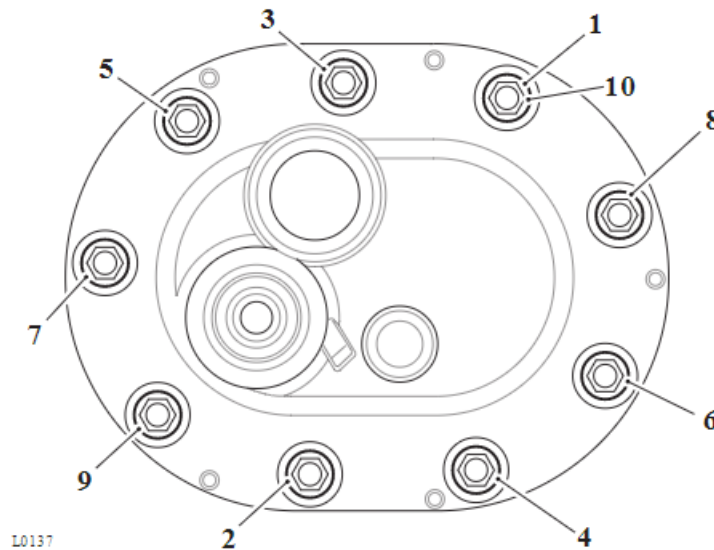
1. Position a new fuel pump plate seal on to the fuel pump plate.

2. Connect the fuel level sensor fly lead connector to the fuel pump assembly harness as noted for removal. Make sure the fly lead is routed between the fuel pump harness and the fuel pump bracket.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fuel level sensor fly lead</li><li>2. Fuel pump assembly harness</li><li>3. Fuel pump bracket</li></ol> |
|--|

3. Refit the fuel pump assembly to the fuel tank. Fit and tighten the fixings to 5 Nm in the sequence shown below.



|                                     |
|-------------------------------------|
| Fuel Pump Plate Tightening Sequence |
|-------------------------------------|

Perform the following operations:

- [Fuel Tank - Installation](#)
- Refill the fuel tank with the fuel drained during removal, and check carefully for fuel leaks.
- [Battery - Installation](#)
- [Seat - Installation](#)

Fuel Pressure Regulator – Removal

 **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

 **WARNING**

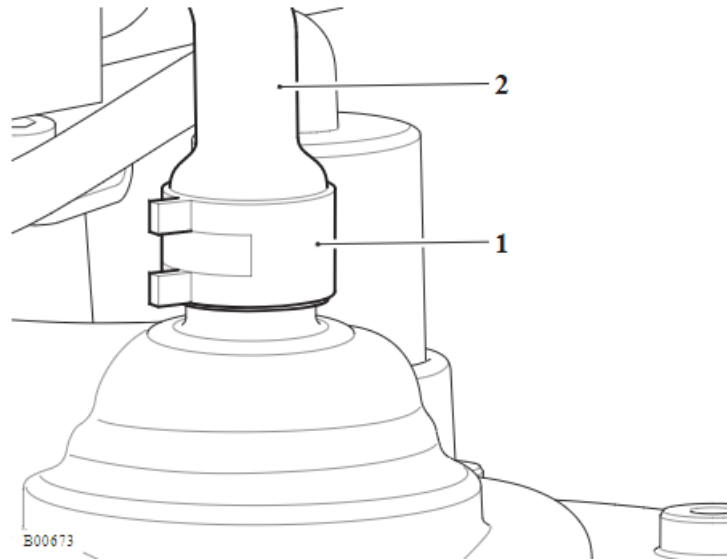
Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

Perform the following operations:

- [Fuel Pump Assembly - Removal](#)

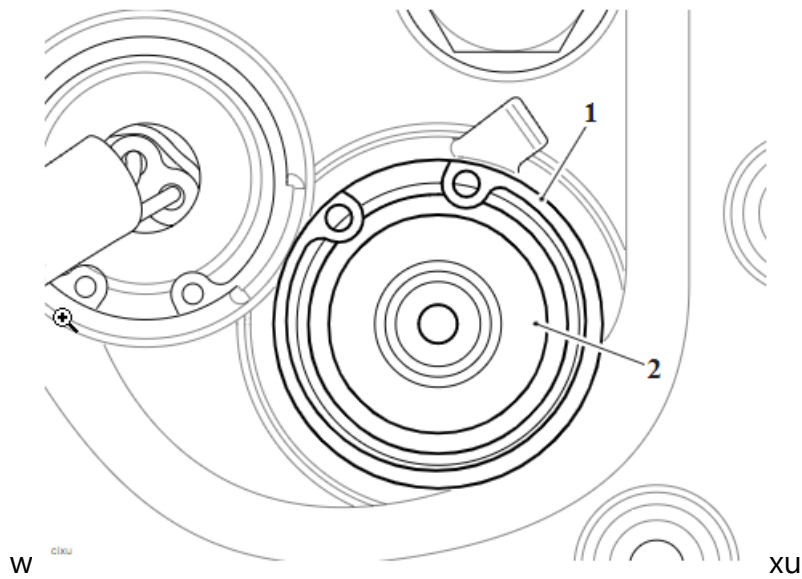


3. Release the hose clamp and detach the hose from the fuel pressure regulator.



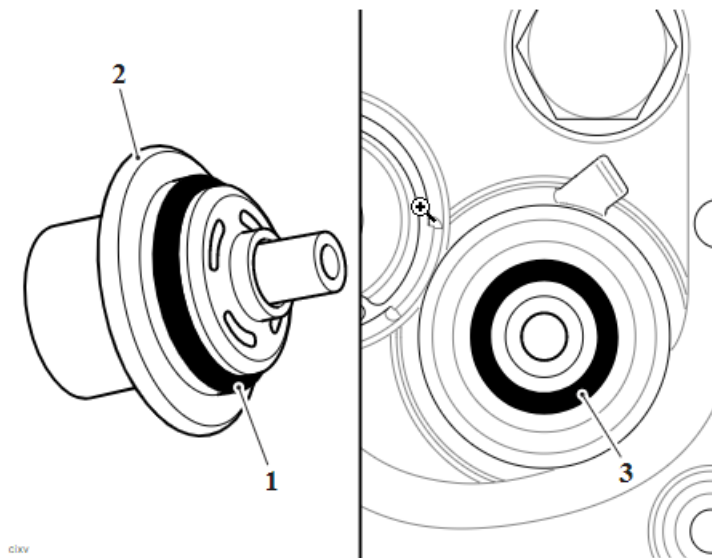
- 1. Clamp
- 2. Hose

2. Remove and discard the circlip securing the fuel pressure regulator in its housing.



- 1. Circlip
- 2. Fuel pressure regulator

3. Remove the fuel pressure regulator from the fuel pump plate. Discard the large O-ring from the fuel pressure regulator and the small O-ring in the pressure regulator housing.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Large O-ring</li><li>2. Fuel pressure regulator</li><li>3. Small O-ring</li></ol> |
|--|

#### Fuel Pressure Regulator – Inspection

1. Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary
2. Check all hose clamps for cracks and signs of distortion. Replace as necessary
3. Check the mesh filter for damage and replace if necessary.

#### Fuel Pressure Regulator – Installation

### **⚠ WARNING**

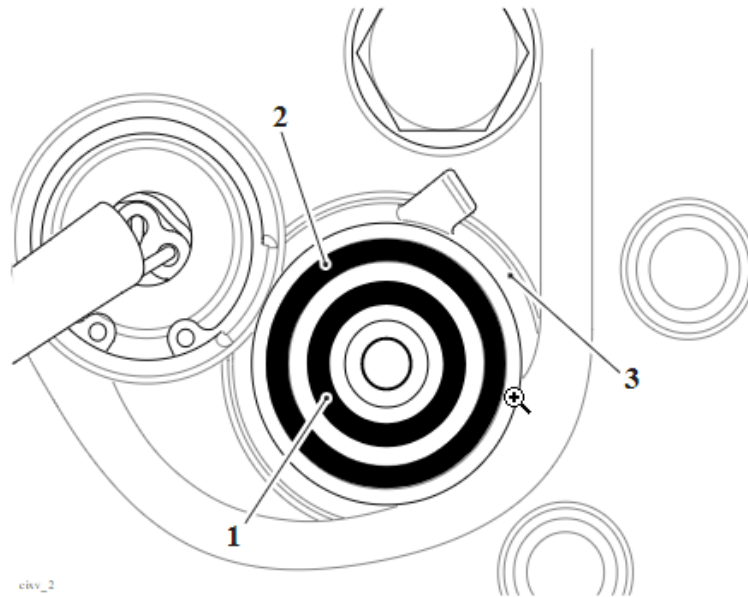
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

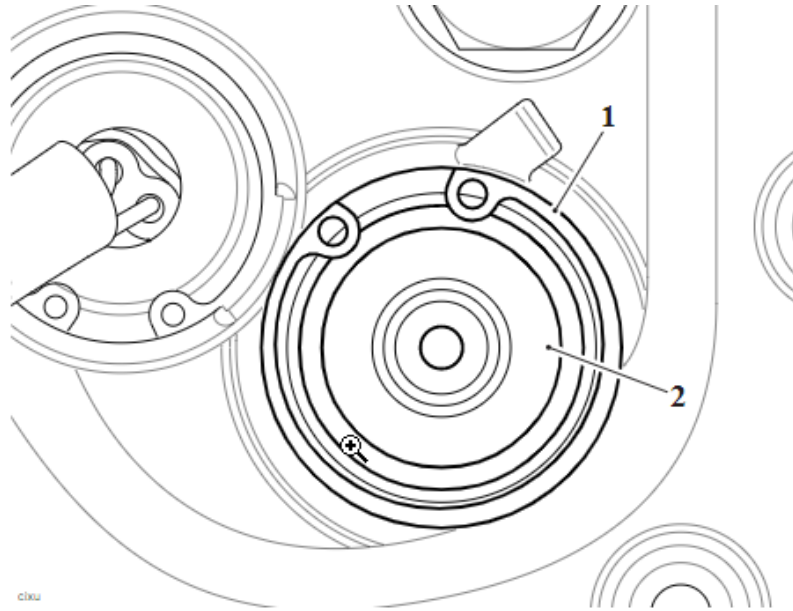
1. Install new O-rings to the fuel pressure regulator housing on the fuel pump plate.



1. Small O-ring
2. Large O-ring
3. Housing

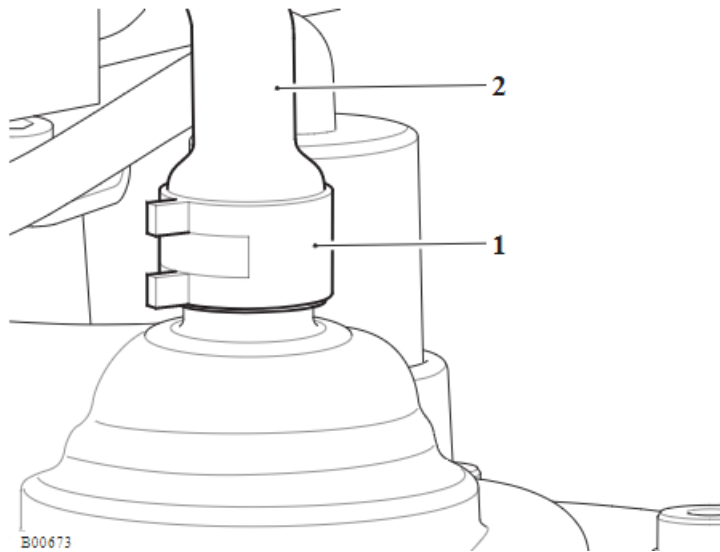
2. Apply a small amount of clean engine oil to the two O-rings.
3. Position the fuel pressure regulator squarely to the fuel pump plate and press it evenly into its housing.

4. Secure the fuel pressure regulator with a new circlip.



- 1. Circlip
- 2. Fuel pressure regulator

5. Refit the hose and secure with the hose clip. Check for any fuel leaks and rectify if necessary.



- 1. Clamp
- 2. Hose

**⚠ WARNING**

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A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

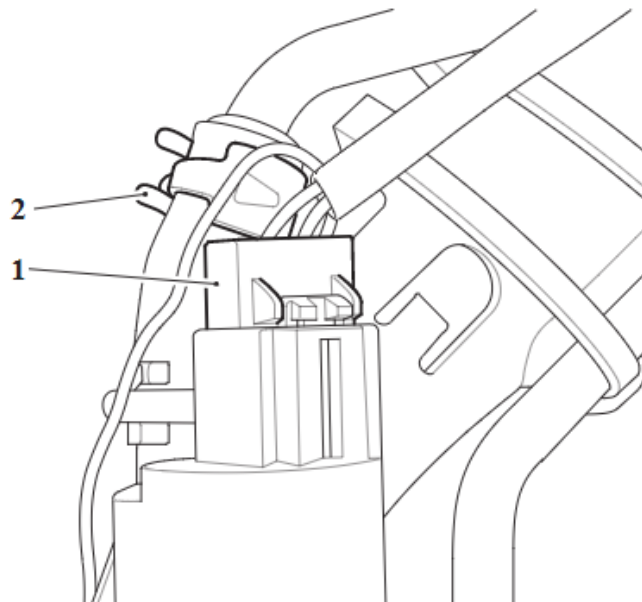
**⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

Perform the following operations:

- **Fuel Pump Assembly - Removal**

1. Disconnect the fuel pump electrical connector.
2. Release the hose clip securing the hose to the fuel pipe.



1. Hose clip
2. Electrical connector

### NOTICE

Note the orientation of the baffle housing for installation.

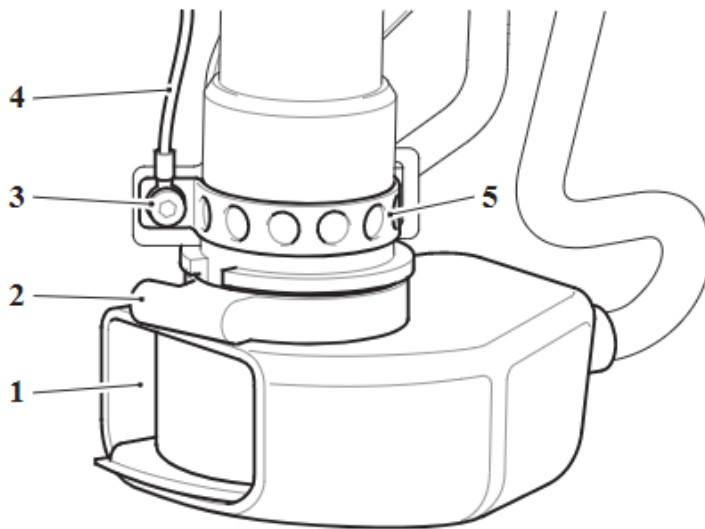
It is not necessary to disconnect the baffle housing hose from the fuel pressure regulator unless it is to be removed at the same time as the fuel pump.

3. Release the hose clamp securing the baffle housing to the fuel pump.
4. Reposition the hose clamp and carefully slide the baffle housing off the fuel pump body.
5. Remove the baffle housing hose clamp over the inlet filter.

### NOTICE

Note that there is a ground cable secured by the fuel pump clamp fixing for installation.

6. Release the fixing, detach the ground cable and remove the fuel pump strap.



1. Hose clamp
2. Baffle housing
3. Fixing
4. Ground cable
5. Strap

7. Remove the fuel pump.

## Fuel Pump – Inspection

1. Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary.
2. Check all hose clamps for cracks and signs of distortion. Replace as necessary.
3. Check the mesh filter for damage and replace if necessary.

## Fuel Pump – Installation

### **⚠ WARNING**

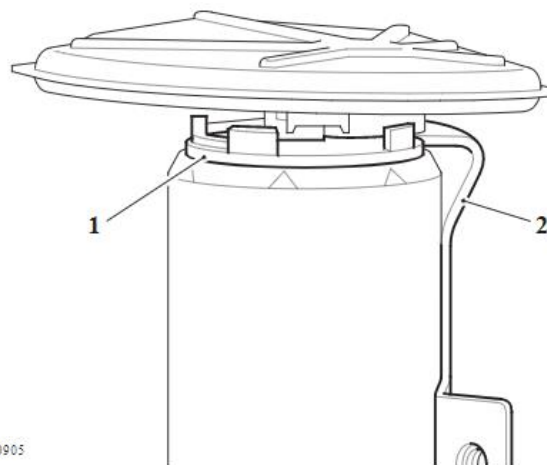
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

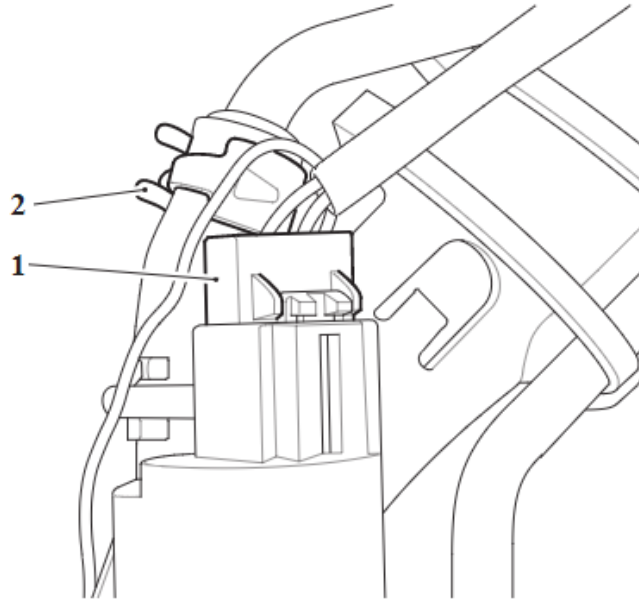
1. Position the fuel pump to the bracket, make sure the fuel pump base engage correctly in the fork of the bracket.



1. Fork
2. Isolator feet

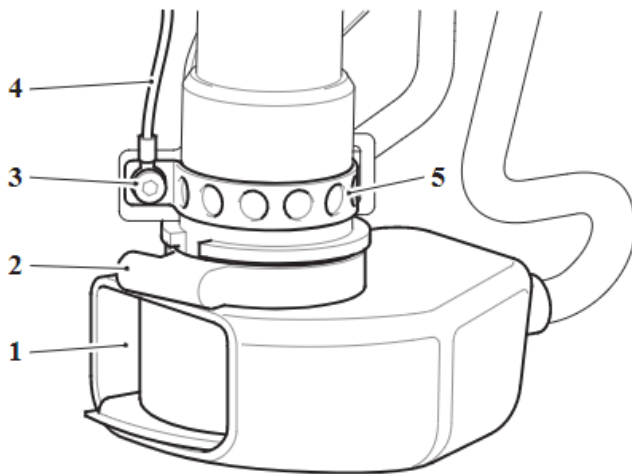
2. Align the fuel pump to the fuel pump bracket and fit the hose on to the fuel pipe.

3. Reconnect the fuel pump electrical connector.



- |                         |
|-------------------------|
| 1. Hose clip            |
| 2. Electrical connector |

4. Fit the fuel pump strap, ground cable as noted for removal, secure with a new fixing and tighten to 4 Nm.
5. Position the baffle housing hose clip loosely over the fuel pump body.
6. Check that the baffle material within the baffle housing is positioned as noted for removal.
7. Fit the baffle housing over the fuel pump, as noted for removal. Fit the hose clamp and tighten to 4 Nm.



- |                   |
|-------------------|
| 1. Hose clamp     |
| 2. Baffle housing |
| 3. Fixing         |
| 4. Ground cable   |
| 5. Strap          |

Perform the following operations:

- [\*\*Fuel Pump Assembly - Installation\*\*](#)



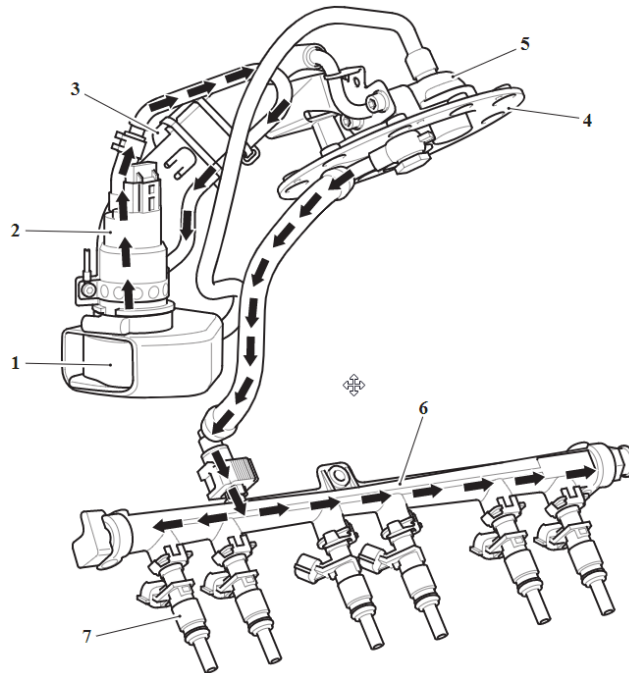
## Fuel Delivery System

Fuel is delivered to the injectors by a fuel pump. The fuel pump is a part of the pump assembly located on the underside of the fuel tank.

The fuel pump assembly consists of the following components:

- Fuel pump baffle and filter assembly
- Fuel pump
- Fuel filter
- Fuel pump plate
- Fuel pressure relief valve (fitted within the fuel pump plate)

Fuel is pumped from the fuel tank to the injectors (two injectors per cylinder) in the direction of the arrows shown in the diagram below.



### Fuel Flow

1. Baffle and filter assembly
2. Fuel pump
3. Fuel filter
4. Fuel pump plate
5. Fuel pressure relief valve location
6. Fuel rail
7. Injectors

**⚠ WARNING**

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

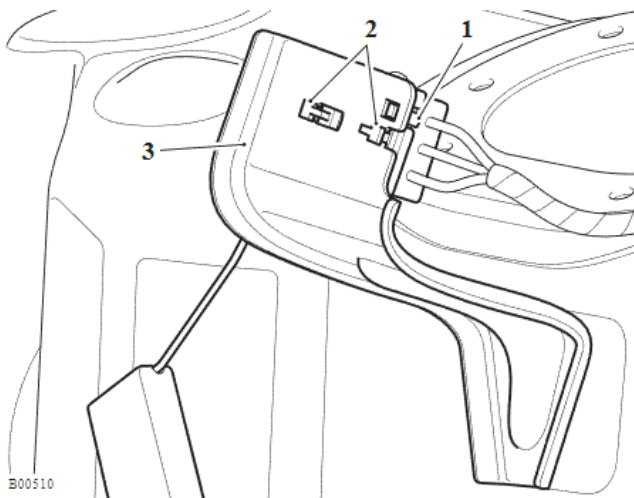
Perform the following operations:

- [Fuel Pump Assembly - Removal](#)

**NOTICE**

The mounting for the fuel level sensor is located inside the fuel tank. The illustration shows the bracket outside the fuel tank for clarity.

1. Release the locking device and slide the fuel level sensor rearwards to release the two locating lugs from the bracket.



1. Locking device
2. Locating lugs
3. Bracket

2. Remove the fuel level sensor.

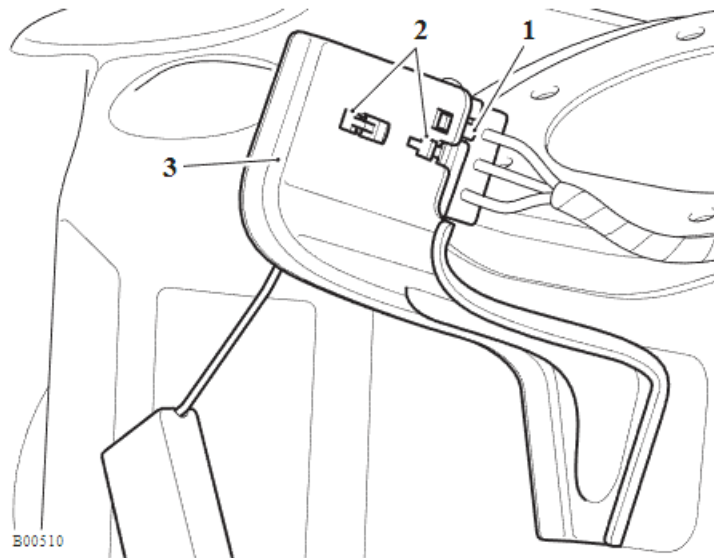
**⚠ WARNING**

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**⚠ WARNING**

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.  
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

1. Align the two locating lugs into the holes in the bracket.
2. Slide the fuel level sensor down the bracket for the locking device to engage and secure the sensor.



1. Locking device
2. Locating lugs
3. Bracket

Perform the following operations:

- [Fuel Pump Assembly - Installation](#)

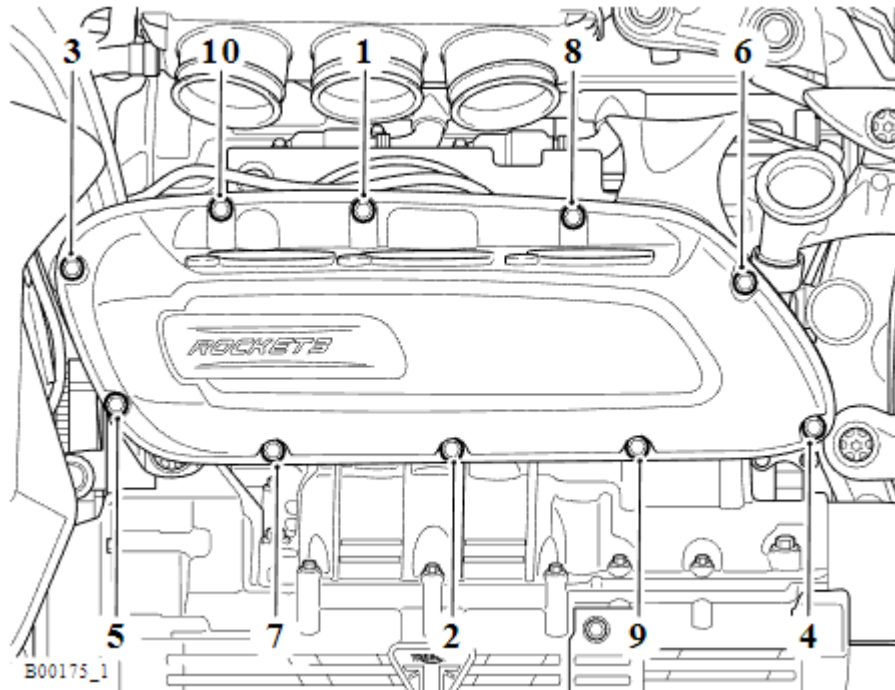
## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- Left hand [Side Panels - Removal](#)
- [Manifold Absolute Pressure \(MAP\) Sensor - Removal](#)
- Remove the air intake runner [Air Filter - Renew](#)

1. Release the fixings in the sequence shown and remove the plenum cover, remove and discard the plenum seal.



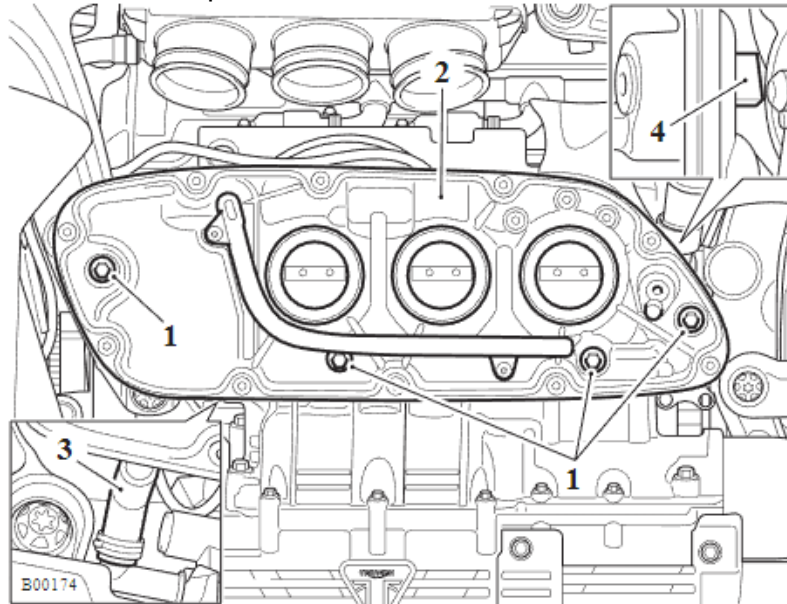
Plenum Cover Release Sequence

## NOTICE

Note that the crankcase breather pipe is attached to rear of the plenum base near the lower right hand corner.

The air temperature sensor is also attached to the rear of the plenum base on the right hand side.

2. Release the four fixings and detach the plenum base from the throttle bodies.
3. Disconnect the crankcase breather pipe, the air temperature sensor electrical connector and remove the plenum base.



1. Fixings
2. Plenum base
3. Crankcase breather pipe
4. Air temperature sensor

Plenum - Installation (All Markets Except US)

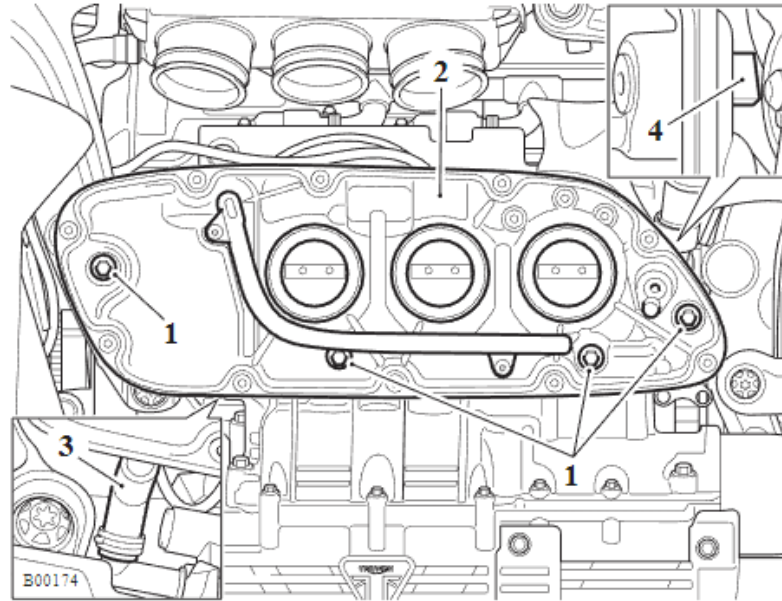
## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Connect the crankcase breather pipe and the air temperature sensor electrical connector to the plenum base.
2. Position the plenum base on to the throttle bodies.
3. Fit the four fixings and tighten to 8 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Plenum base</li><li>3. Crankcase breather pipe</li><li>4. Air temperature sensor</li></ol> |
|--|

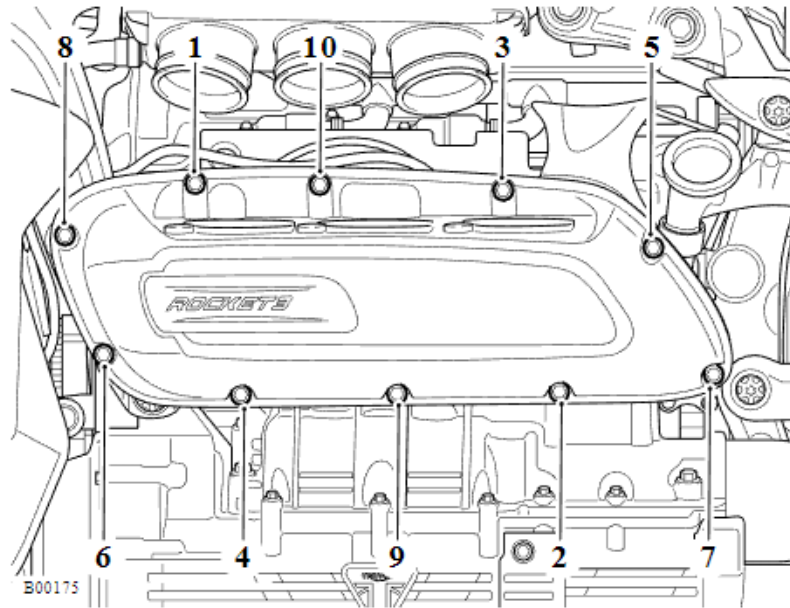
4. Fit a new seal to the plenum base.
5. Fit the plenum cover to the base and tighten the plenum cover fixings in the following two stages:

|                |
|----------------|
| <b>Stage 1</b> |
|----------------|

6. Tighten the fixings one to four in the sequence shown to 4 Nm.

## Stage 2

7. Tighten the fixings one to ten in the sequence shown to 8 Nm.



Plenum Cover Tightening Sequence

Perform the following operations:

- Fit the air intake runner [Air Filter - Renew](#)
- Left hand [Side Panels - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Plenum - Removal (US Markets Only)

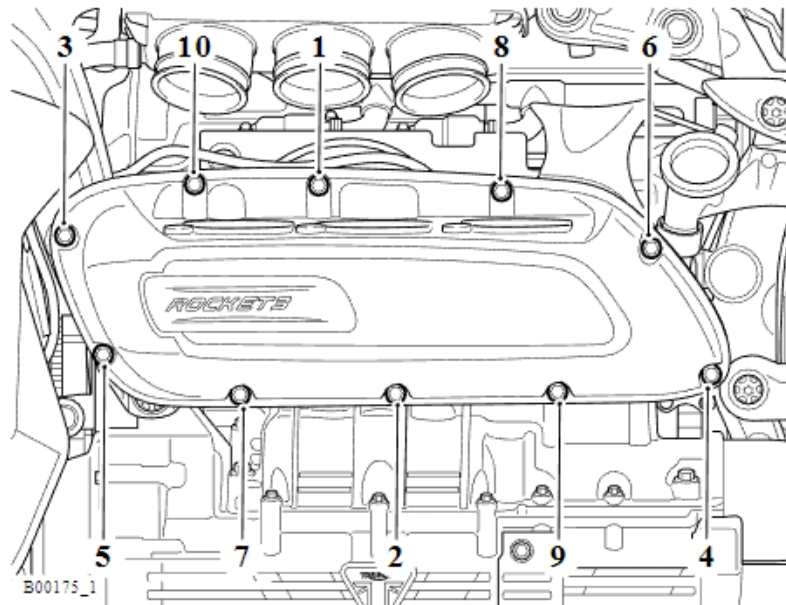
### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- Left hand [Side Panels - Removal](#)
- [Manifold Absolute Pressure \(MAP\) Sensor - Removal](#)
- Remove the air intake runner [Air Filter - Renew](#)

1. Release the fixings and remove the plenum cover, remove and discard the plenum seal.



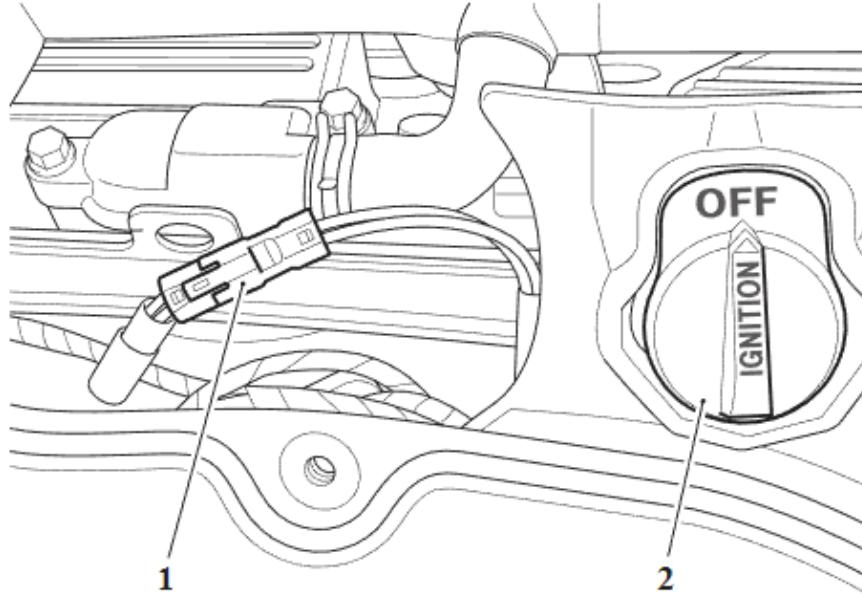
Plenum Cover Release Sequence

**NOTICE**

Note that the crankcase breather pipe is attached to rear of the plenum base near the lower right hand corner.  
The air temperature sensor is also attached to the rear of the plenum base on the right hand side.

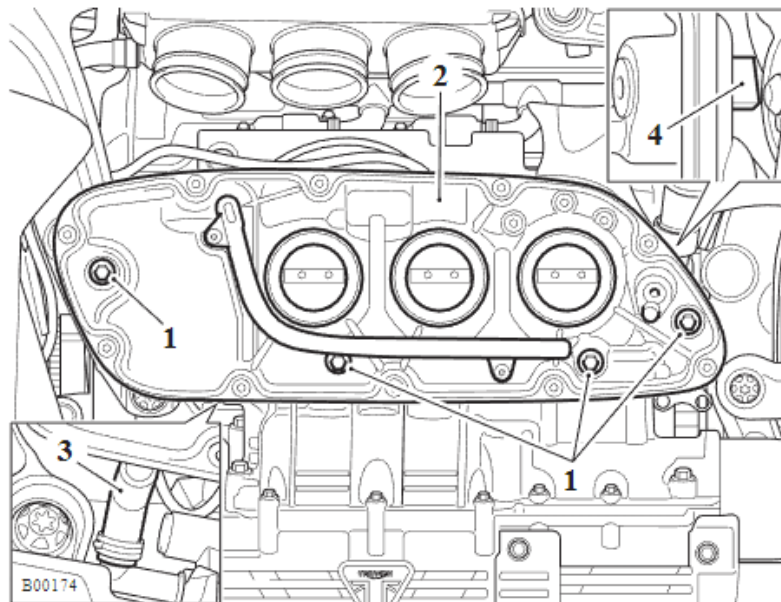


2. Release the four fixings and detach the plenum base from the throttle bodies.
3. Disconnect the ignition master switch from the main harness.



1. Ignition master switch
2. Connector

4. Disconnect the crankcase breather pipe, the air temperature sensor electrical connector and remove the plenum base.

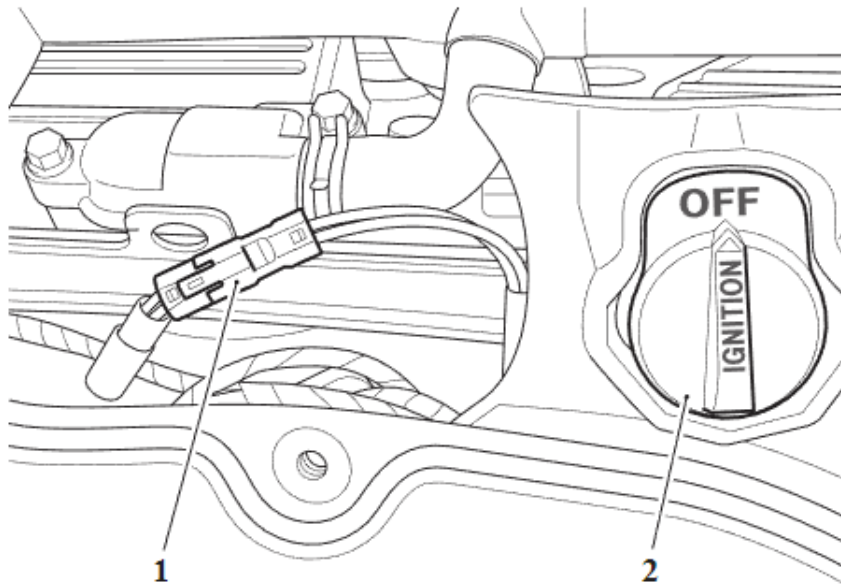


1. Fixings
2. Plenum base
3. Crankcase breather pipe
4. Air temperature sensor

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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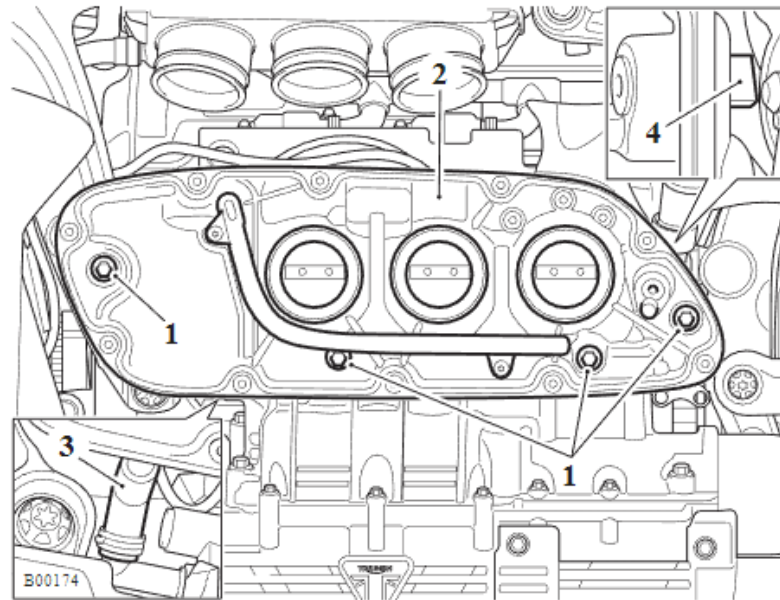
1. Connect the crankcase breather pipe and the air temperature sensor electrical connector to the plenum base.
2. Connect the ignition master switch to the main harness.



1. Ignition master switch
2. Connector

3. Position the plenum base on to the throttle bodies.

4. Fit the four fixings and tighten to 8 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Plenum base</li><li>3. Crankcase breather pipe</li><li>4. Air temperature sensor</li></ol> |
|--|

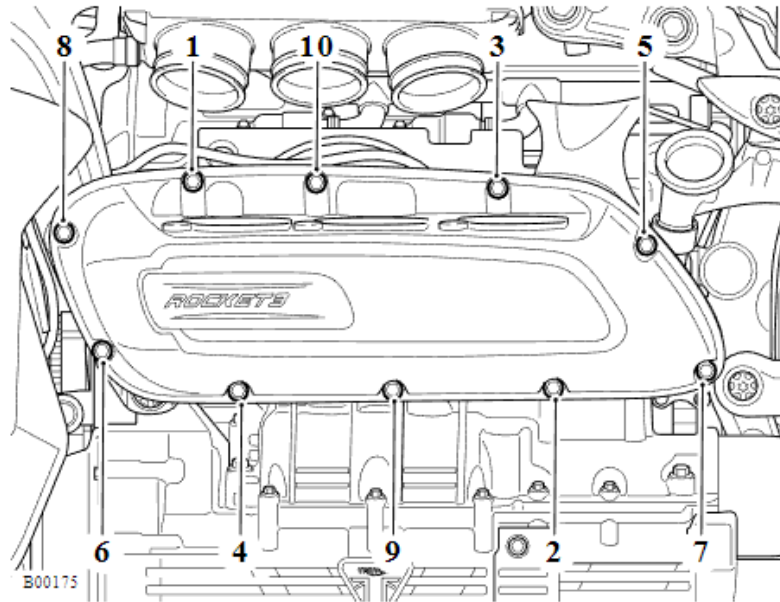
5. Fit a new seal to the plenum base.
6. Fit the plenum cover to the base and tighten the plenum cover fixings in the following two stages:

|                |
|----------------|
| <b>Stage 1</b> |
|----------------|

7. Tighten the fixings one to four in the sequence shown to 4 Nm.

## Stage 2

8. Tighten the fixings one to ten in the sequence shown to 8 Nm.



Plenum Cover Tightening Sequence

Perform the following operations:

- Fit the air intake runner [Air Filter - Renew](#)
- Left hand [Side Panels - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Fuel Injectors and Fuel Rail – Removal

### **⚠ WARNING**

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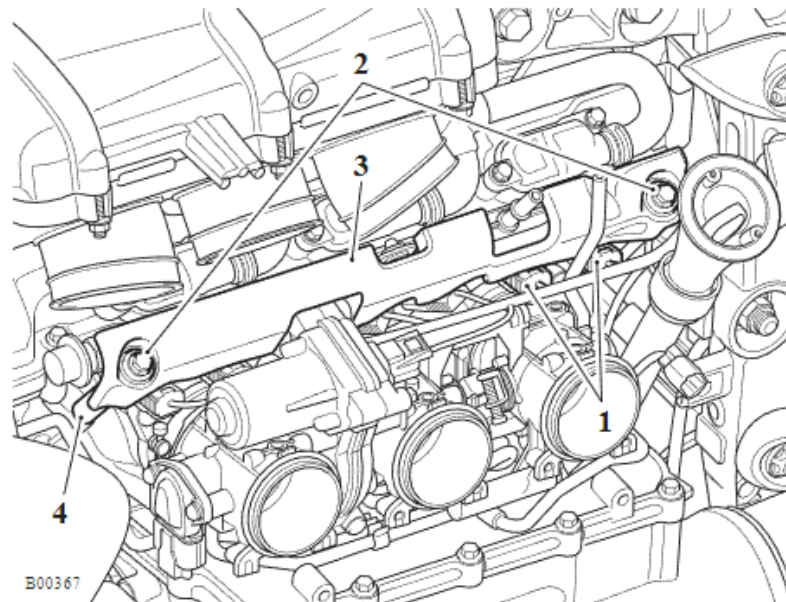
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)

### NOTICE

The fuel rail and injectors are removed from the cylinder head together.

1. Disconnect the electrical connector from the six fuel injectors.
2. Remove the two fixings securing the fuel rail and fuel rail covers to the cylinder head. Collect the spacers between the fuel rail and cylinder head and the cover.



1. Injector connector (2 of 6 shown)
2. Fixings
3. Cover
4. Spacers

3. Gently ease the fuel rail and injectors upwards to release them from the cylinder head.

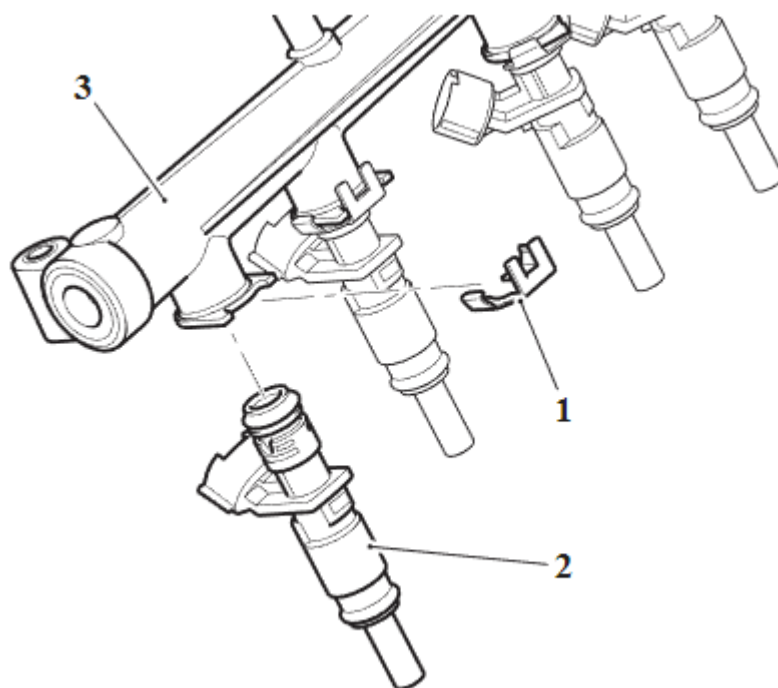
### NOTICE

The fuel injectors are not to be removed from the fuel rail unless they are to be replaced.

If the injectors require replacing continue from step 4.

Note the position of the retaining clip for installation.

4. Carefully remove the retaining clips securing the fuel injectors to the fuel rail.
5. Ease each injector from the fuel rail.



1. Retaining clip^
2. Injector
3. Fuel rail

**⚠ WARNING**

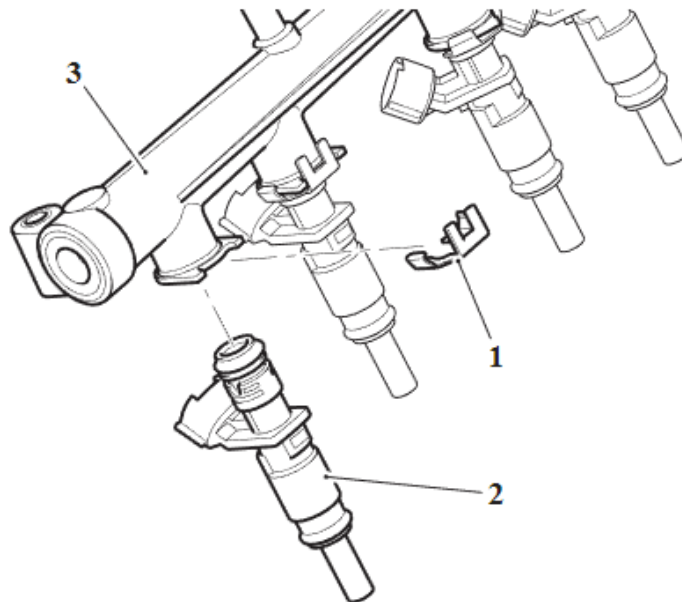
Make sure the motorcycle is stabilised and adequately supported.  
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**NOTICE**

If the fuel injectors have been removed from the fuel rail, continue from step 1 and omit steps 3 and 4.

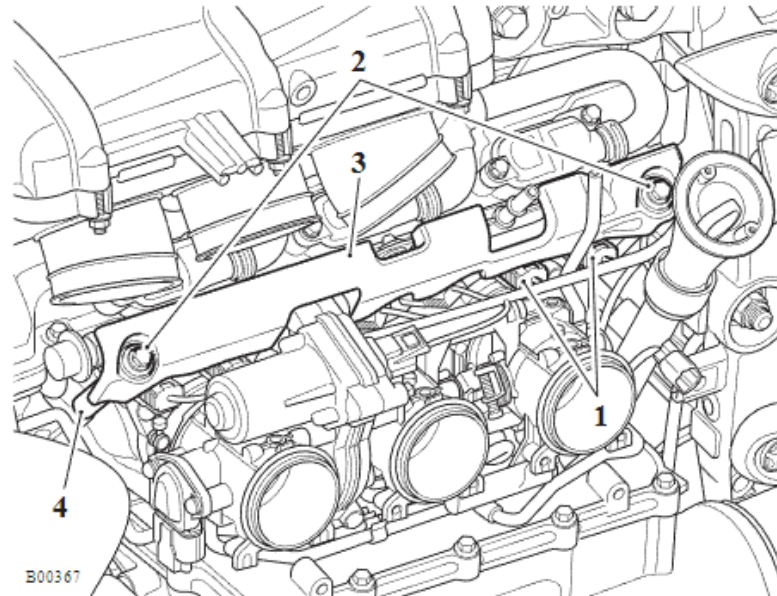
If the fuel injectors have not been removed, continue from step 3.

1. Lightly lubricate the O-rings with clean engine oil and fit the new fuel injectors to the fuel rail.
2. Fit the retaining clip for each fuel injector as noted for removal.



1. Retaining clip
2. Injector
3. Fuel rail

3. Remove and discard the O-ring on the fuel injector.
4. Fit a new O-ring using finger pressure only.
5. Lightly lubricate the O-ring on the injectors and fit the injector/fuel rail assembly to the cylinder head, orientating each injector such that the electrical connection is facing upwards.
6. Fit the spacers between the fuel rail and cylinder head, fit the fuel rail cover, fit and tighten the fixings to 6 Nm.
7. Connect the electrical connectors to the six fuel injectors.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Injector connector (2 of 6 shown)</li><li>2. Fixings</li><li>3. Cover</li><li>4. Spacers</li></ol> |
|---|

Perform the following operations:

- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)



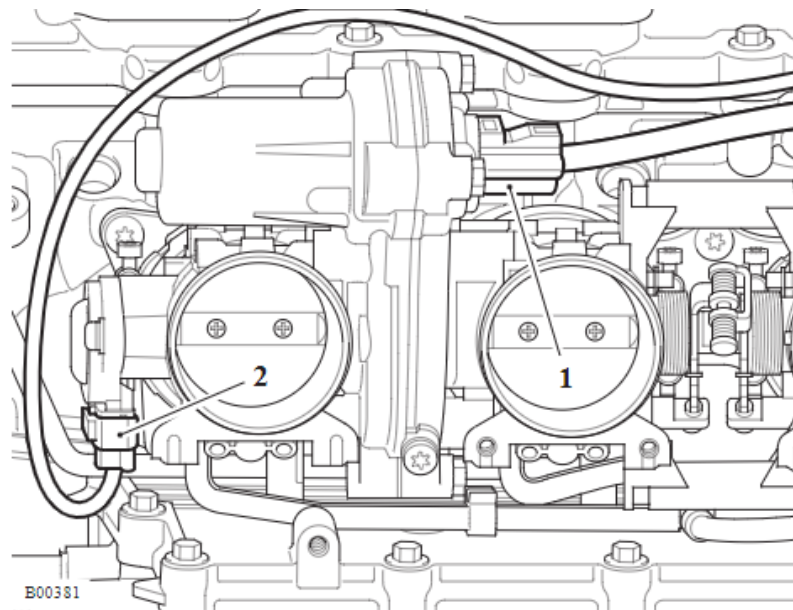
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Fuel injectors and Fuel Rail - Removal](#)

1. Disconnect the throttle actuator motor multiplug.
2. Disconnect the throttle position sensor multiplug.



1. Throttle actuator multiplug
2. Throttle position sensor multiplug

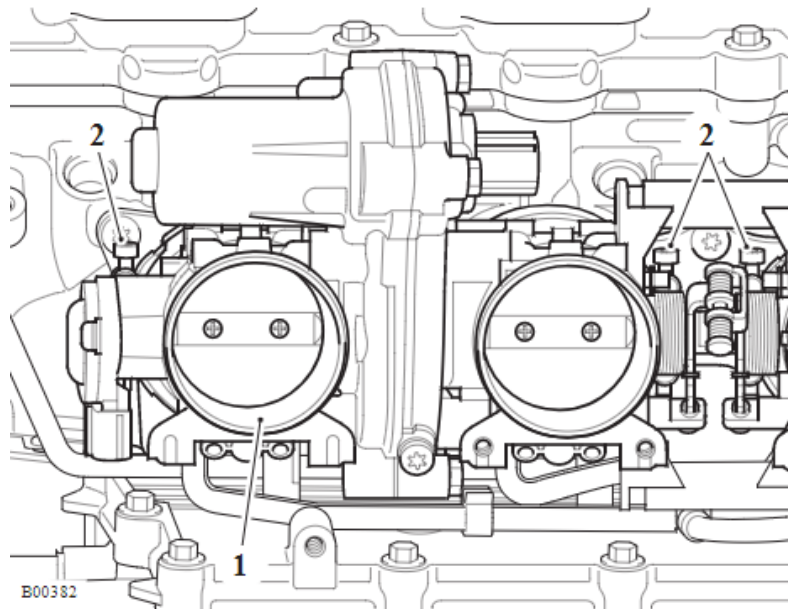
## **CAUTION**

To prevent damage to the manifold absolute pressure (MAP) sensor and purge valve hoses, care must be taken when removing and fitting the throttle bodies.

## **NOTICE**

Note the orientation of the throttle body retaining clamps for installation.

3. Release the clamps and detach the throttle bodies from the transition piece.

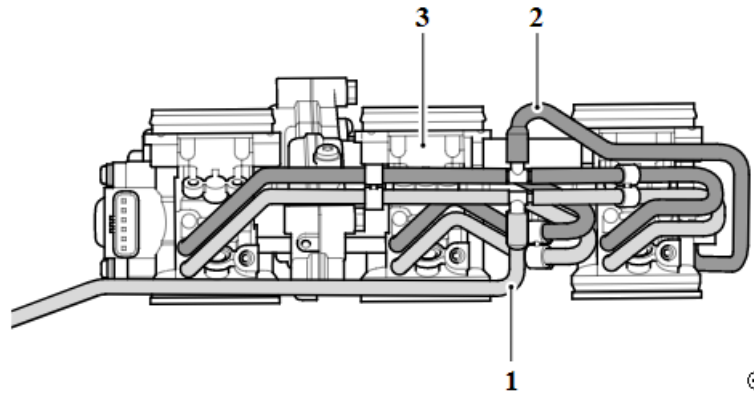


1. Clamps
2. Throttle body

## **NOTICE**

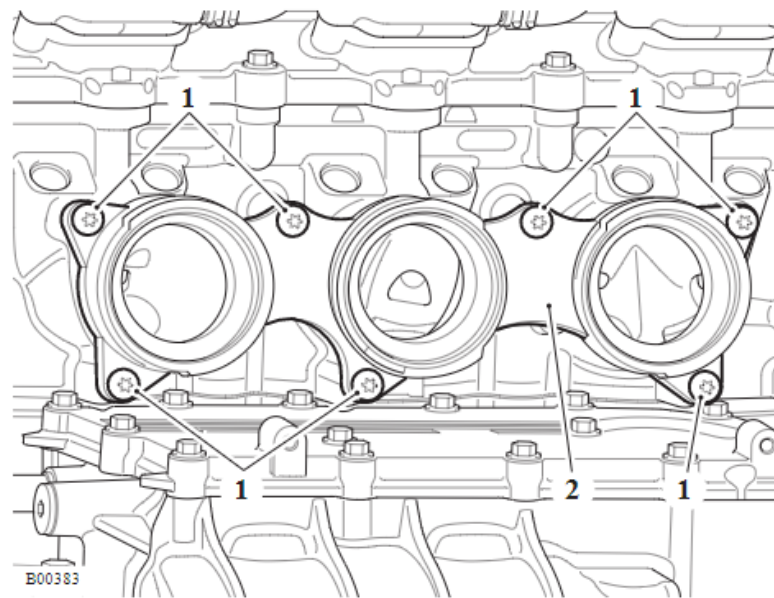
Note the routing of the manifold absolute pressure (MAP) sensor, purge valve hoses and their retaining clips for installation.

4. Detach the purge valve hose and remove the throttle bodies.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Purge valve hose (yellow)</li><li>2. MAP sensor hose (green)</li><li>3. Throttle body</li></ol> |
|--|

5. If required, release the fixings and remove the transition piece.

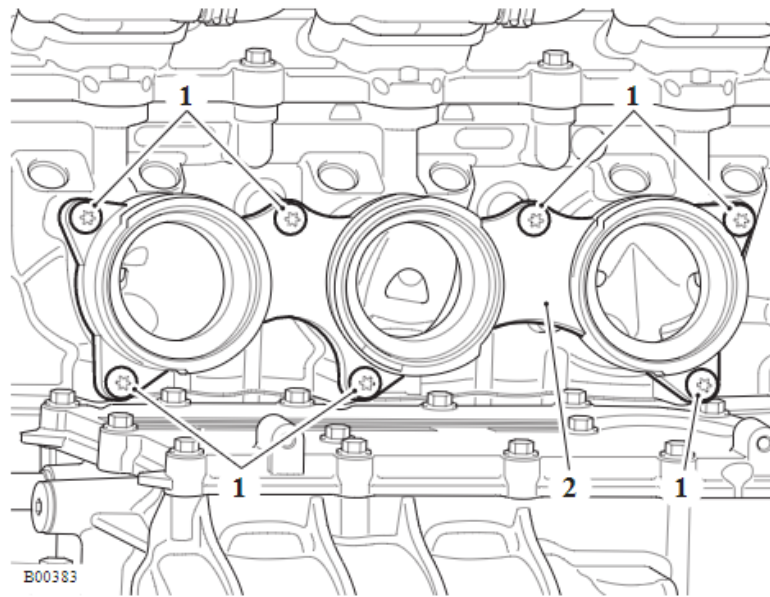


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Transition piece</li></ol> |
|--|

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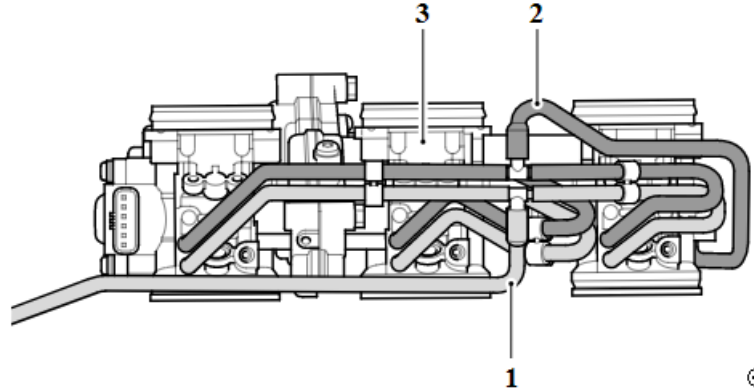
1. If removed, fit the transition piece and tighten the fixings to 9 Nm.



1. Fixings
2. Transition piece

2. Check to make sure the purge valve and MAP sensor hoses are correctly fitted to the throttle bodies, as noted for removal.

3. Attach the purge valve to the throttle bodies as noted for removal.



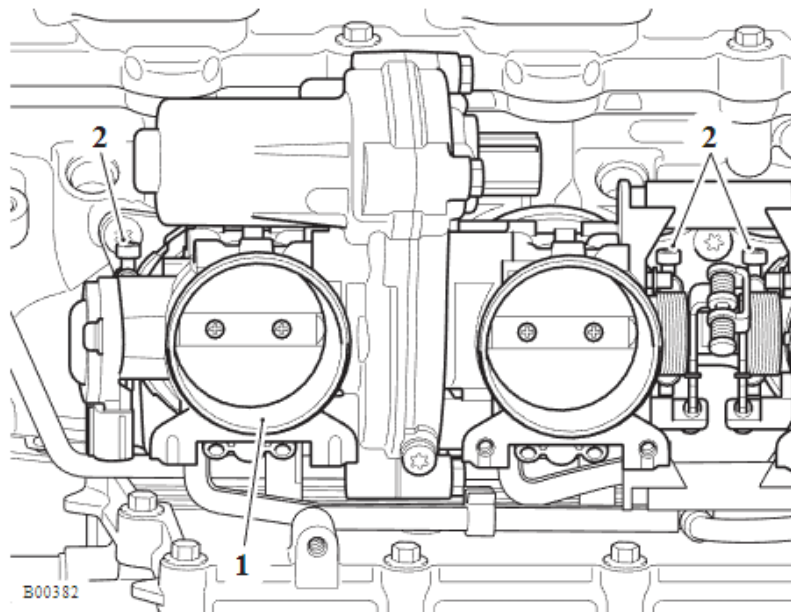
1. Purge valve hose (yellow)
2. MAP sensor hose (green)
3. Throttle body

4. Make sure the throttle bodies clamps are in the same orientation as noted for removal on the transition piece.

### **⚠ CAUTION**

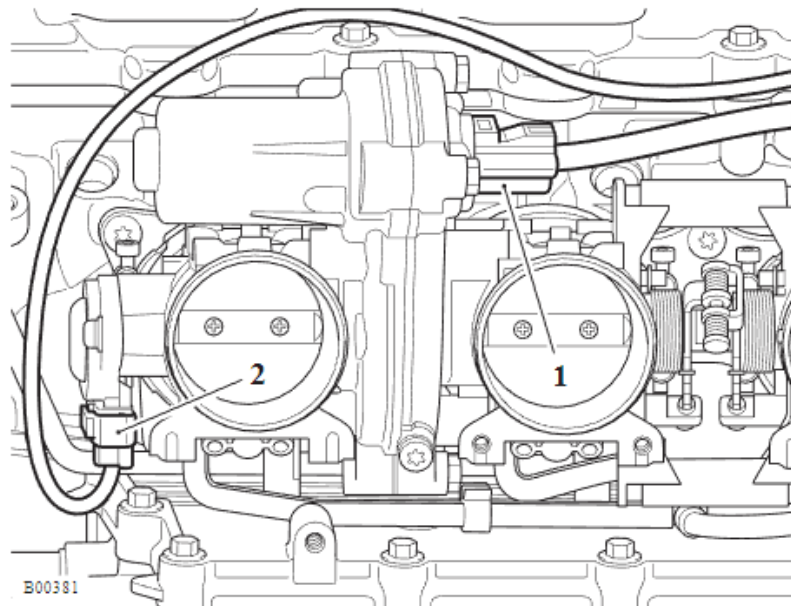
To prevent damage to the manifold absolute pressure (MAP) sensor and purge valve hoses, care must be taken when removing and fitting the throttle bodies.

5. With hoses routed as noted for removal, fit the throttle bodies and tighten the clamps to 1.5 Nm. Check to make sure the manifold absolute pressure (MAP) sensor and purge valve hoses are routed correctly and are not twisted or trapped between the throttle bodies and the oil tank cover.



- 1. Clips
- 2. Throttle body

- 6. Connect the throttle actuator motor multiplug.
- 7. Connect the throttle position sensor multiplug.



- 1. Throttle actuator multiplug
- 2. Throttle position sensor multiplug

Perform the following operations:

- [Fuel Injectors and Fuel Rail - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

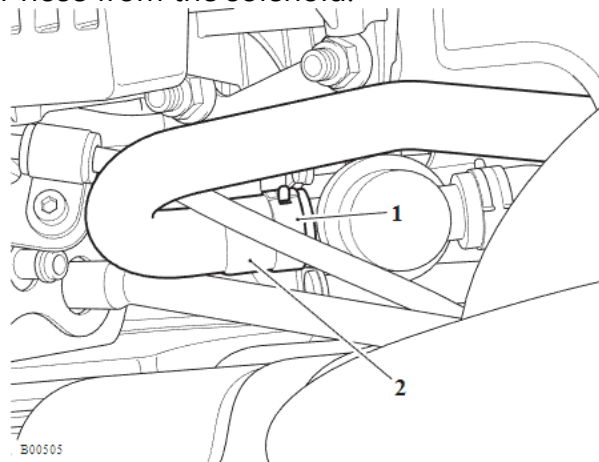
Secondary Air Injection Solenoid – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

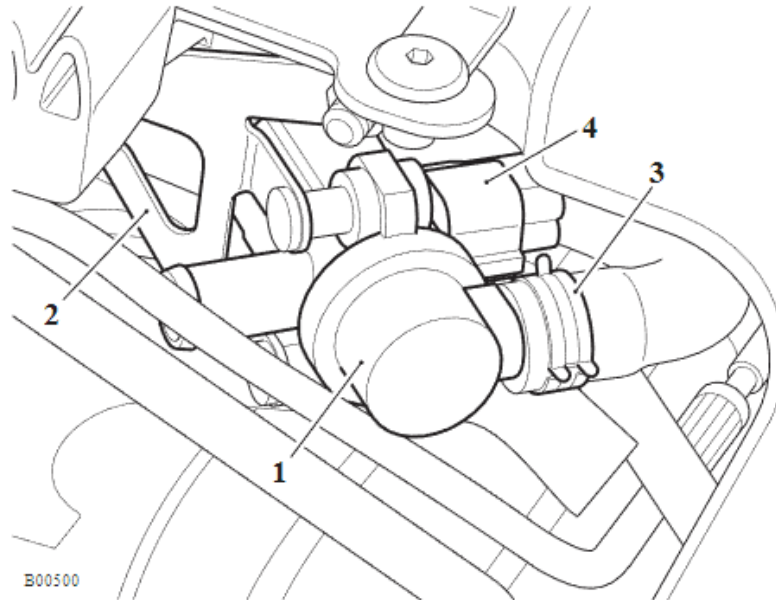
Perform the following operations:

- [Seat - Removal](#)
  - [Battery - Removal](#)
  - [Fuel Tank - Removal](#)
  - [Evaporative Canister - Removal](#)
1. Using service tool T3880207 release the clamp and detach the secondary air injection silencer hose from the solenoid.



1. Clamp
2. Silencer hose

2. Detach the solenoid from the evaporative canister bracket.
3. Using service tool T3880207 release the clamp and detach the secondary air injection hose from the solenoid.
4. Disconnect the electrical connector and remove the secondary air injection solenoid.



1. Purge valve
2. Evaporative canister bracket
3. Clamp
4. Electrical connector

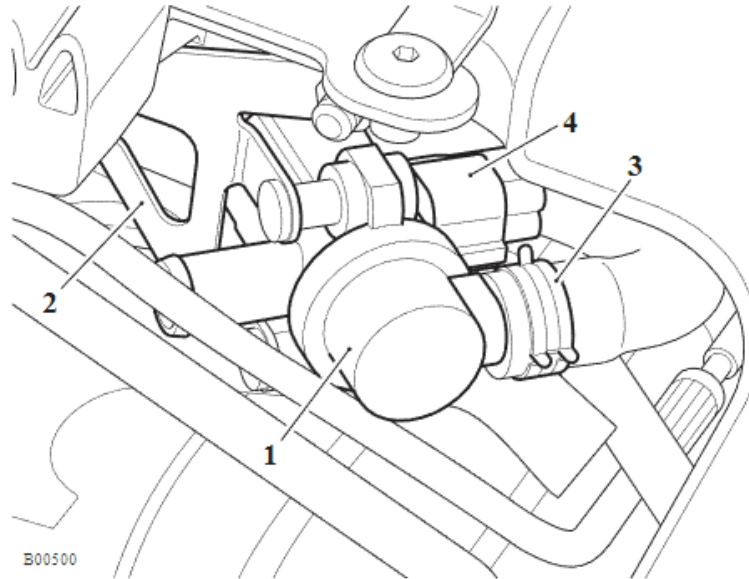
#### Secondary Air Injection Solenoid - Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

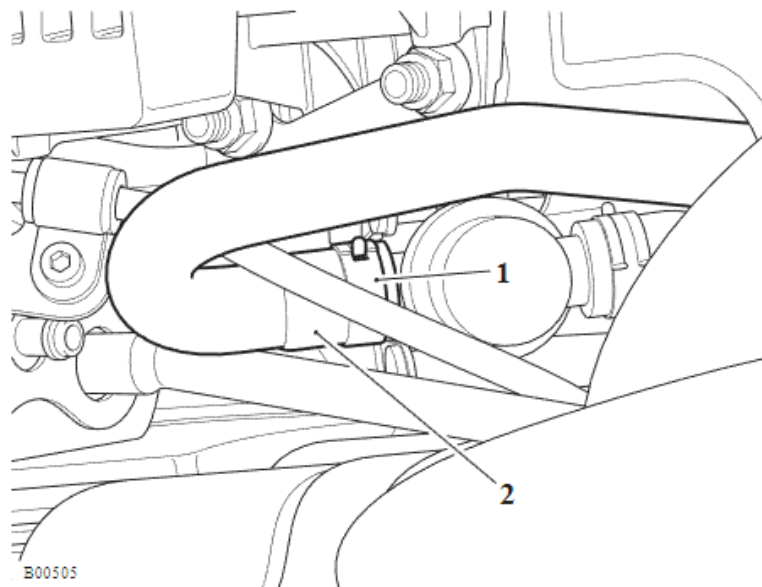


1. Connect the electrical connector to the secondary air injection solenoid.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Purge valve</li><li>2. Evaporative canister bracket</li><li>3. Clamp</li><li>4. Electrical connector</li></ol> |
|---|

2. Connect the secondary air injection hose to the solenoid and secure with its clamp.
3. Attach the solenoid to the evaporative canister bracket.
4. Connect the secondary air injection silencer hose to the solenoid and secure with its clamp.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Camp</li><li>2. Silencer hose</li></ol> |
|--|

Perform the following operations:

- [Evaporative Canister - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Removal and Installation - Engine Management Components

Engine Electronic Control Module (Engine ECM) – Removal

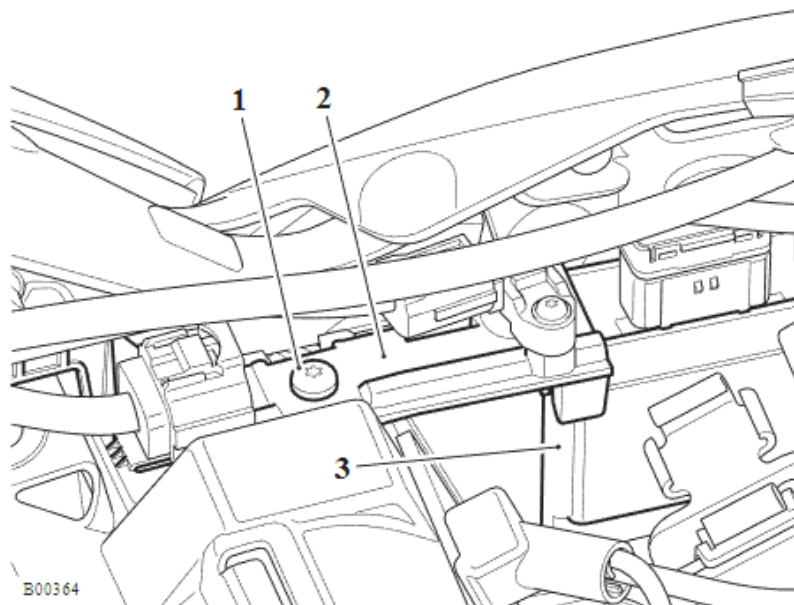
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. Release the fixing and detach the engine ECM bracket from the engine ECM.



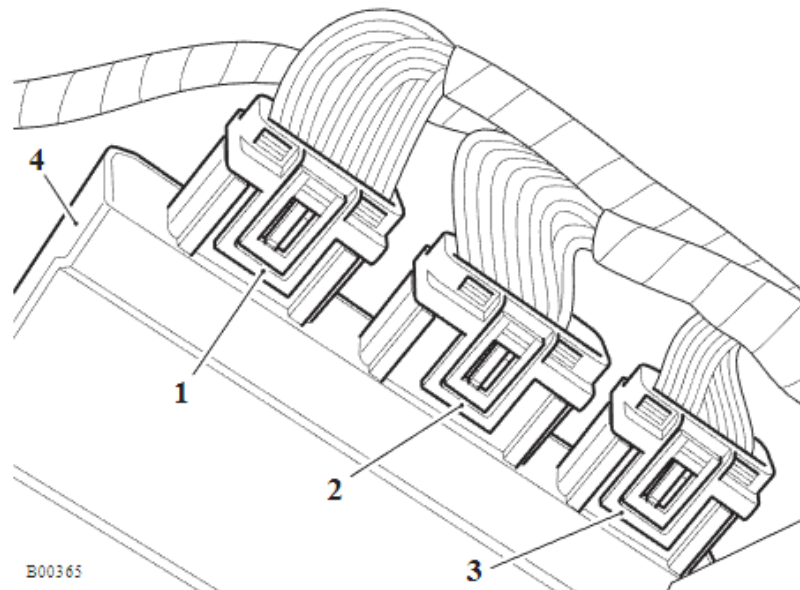
1. Fixing
2. Bracket
3. Engine ECM

2. Manoeuvre the engine ECM rearwards and upward to access the last two electrical connectors.

### NOTICE

Three connectors of two different size and colour are used for the engine ECM. Two connectors have 33 pins and one connector is coloured black and the other grey. One connector has 39 pins and is coloured black. Note the position of the three electrical connectors for installation.

3. Disconnect the two accessible electrical connectors (see [Electrical Connectors](#)) and manoeuvre the engine ECU rearwards to access the third connector.
4. Disconnect the third grey connector and remove the engine ECU.

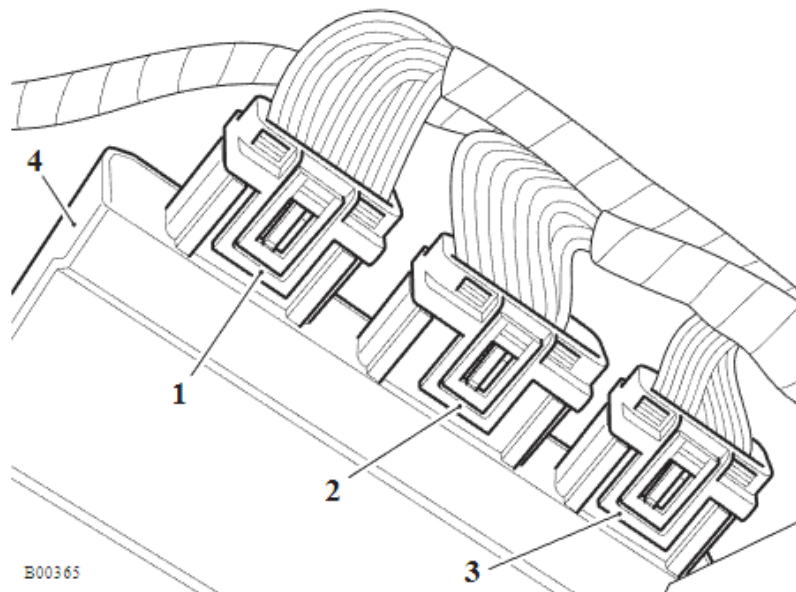


1. Connector B (33 pin connector)
2. Connector A (39 pin connector)
3. Connector C (33 pin connector Grey)
4. Engine ECM

**⚠ WARNING**

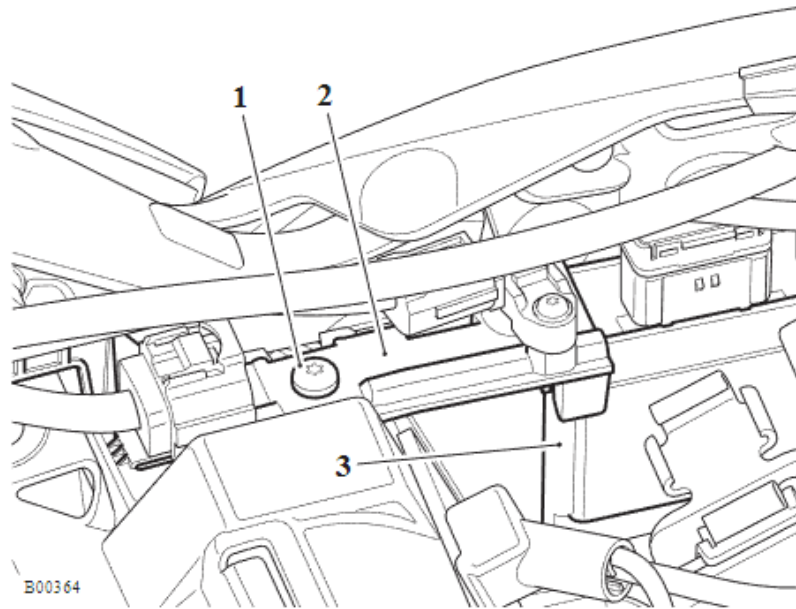
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Connect the third grey connector (see [Electrical Connectors](#)) as noted for removal and manoeuvre the engine ECU into position to connect the two black connectors.
2. Connect the two black electrical connectors as noted for removal and manoeuvre the engine ECU to its location in the battery box.



1. Connector B (33 pin connector)
2. Connector A (39 pin connector)
3. Connector C (33 pin connector Grey)
4. Engine ECM

3. Fit the engine ECM bracket and tighten its fixing to 9 Nm.



1. Fixing
2. Bracket
3. Engine ECM

Perform the following operations:

- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Heated Twist Grip – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

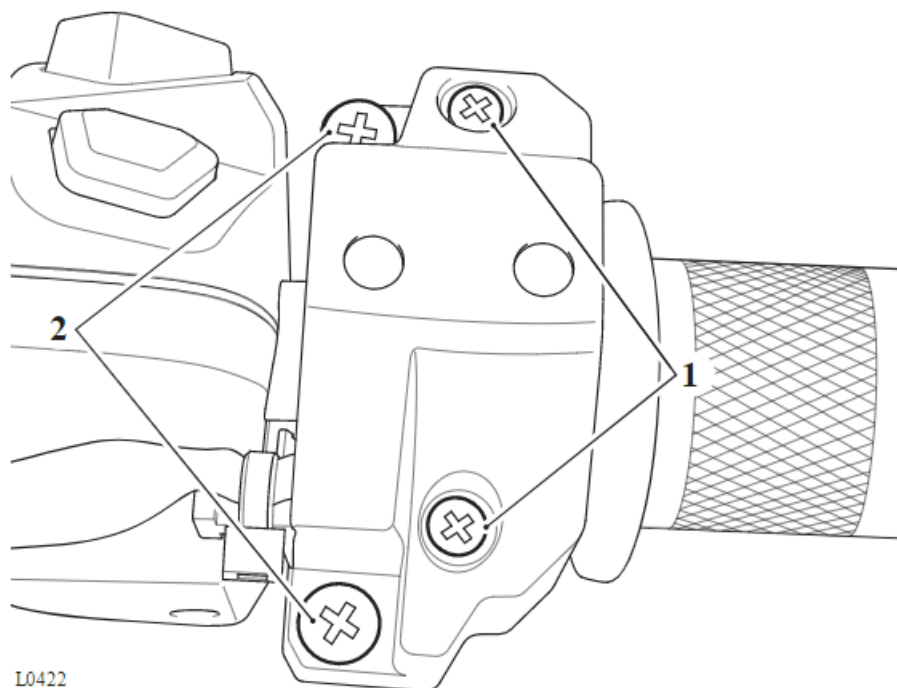
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Mirrors - Removal](#)

#### NOTICE

The anti-tamper fixings on the twist grip housing must not be loosened or removed. If the anti-tamper fixings have been loosened or removed any warranty claims for the twist grip housing will not be honoured.

1. Release the fixings and remove the clamp for the twist grip housing from the handlebar.

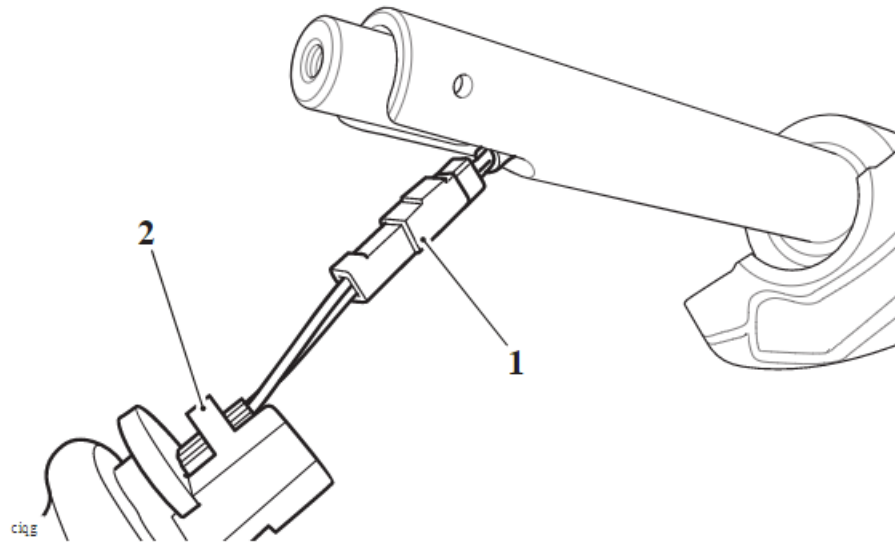


1. Anti-tamper fixings
2. Fixings

#### NOTICE

Note the position and orientation of the twist grip to its housing for installation. Note the routing of the heated grip harness for installation.

2. Slide the heated twist grip off the handlebar while carefully feeding the heated grip subharness out of the handlebar.
3. Disconnect the electrical connector and remove the heated twist grip.



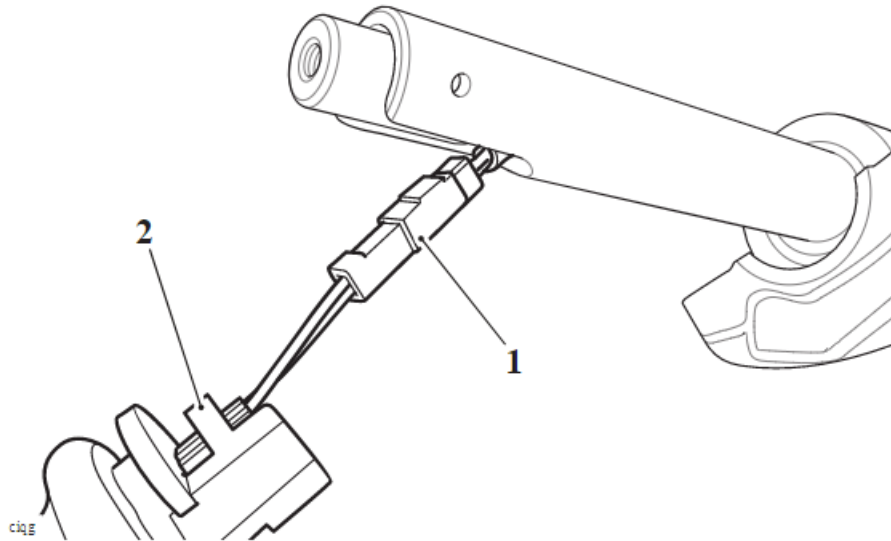
1. Electrical connector
2. Heated twist grip

#### Heated Twist Grip – Installation

### **⚠ WARNING**

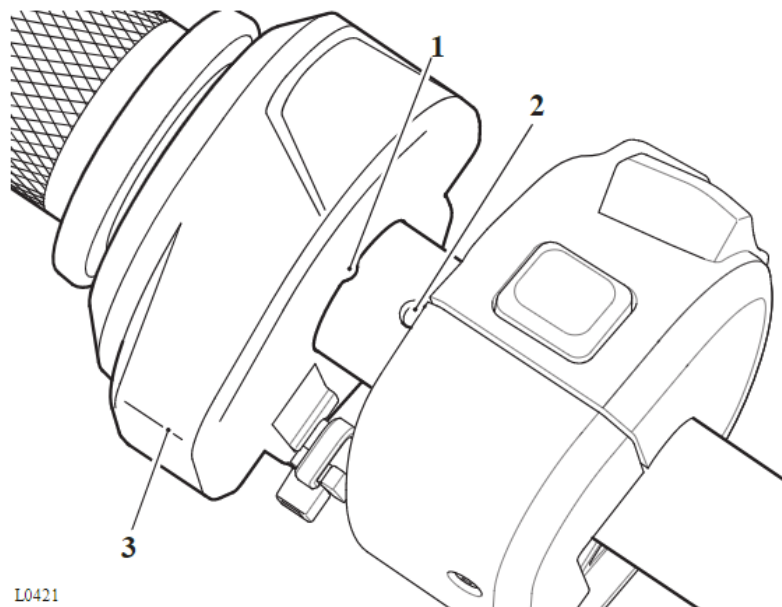
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

2. Connect the electrical connector of the heated twist grip to the subharness.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Electrical connector</li><li>2. Heated twist grip</li></ol> |
|--|

3. Fit the heated twist grip while carefully feeding the subharness into the handlebar.
4. Align the twist grip to the twist grip position sensor as noted for removal.
5. Fit the twist grip clamp. Make sure the locating lug fits into its hole on the handlebar.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Locating lug</li><li>2. Hole</li><li>3. Twist grip clamp</li></ol> |
|---|



6. Fit and fixings and tighten, upper one first, to 2.5 Nm.

Perform the following operations:

- [Mirrors - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

### **WARNING**

Move the handlebars to left and right full lock while checking that the brake hose, clutch hose and electrical harnesses do not bind or that the steering feels tight or difficult to turn. A hose, cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

Check for correct operation of the front brake, clutch and twist grip. Check that the brake hose, clutch hose and electrical harnesses do not bind or restrict the steering when the handlebars are turned from lock-to-lock. Rectify as necessary.

Twist Grip Position Sensor – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

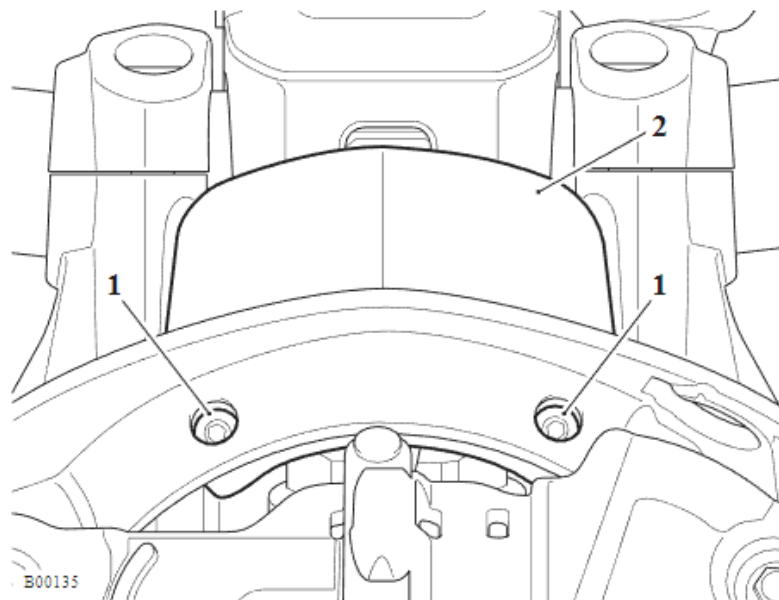
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)
- [Heated Twist Grip - Removal](#)

1. Release the two fixings and remove the headstock harness cover.

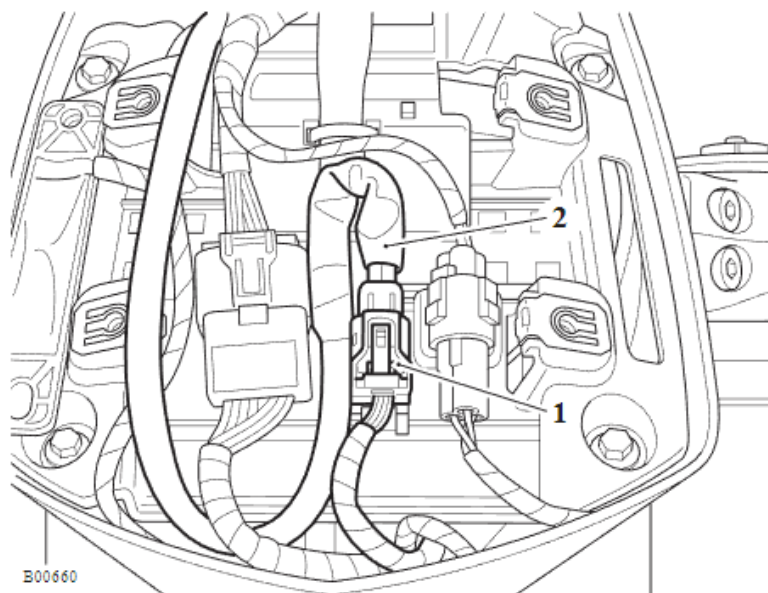


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Harness cover</li></ol> |
|---|

**NOTICE**

Note the routing of the twist grip position sensor harness for installation.

2. Disconnect the twist grip position sensor from the main harness at the front subframe and route to the handlebar.

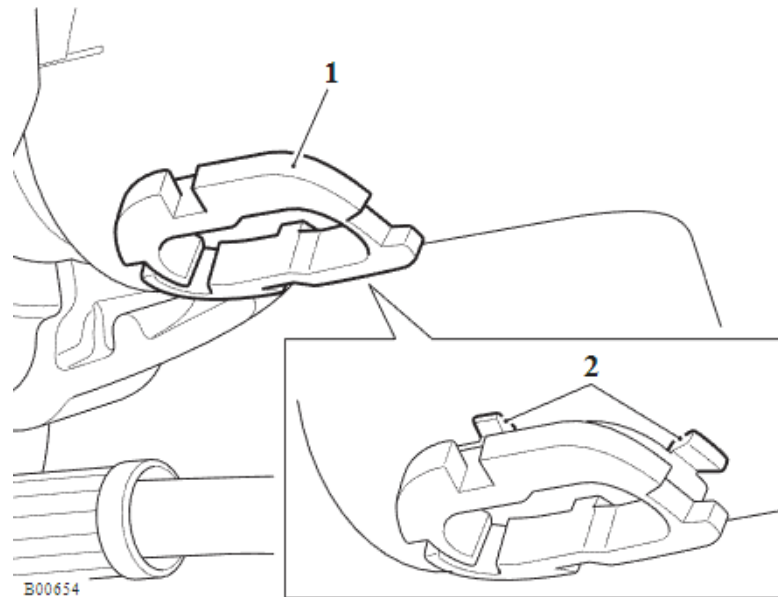


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Connector</li><li>2. Harness</li></ol> |
|---|

### NOTICE

Three locating lugs hold the plastic grommet in position.

3. Press in the sides of the plastic grommet to release two of the locating lugs and remove the grommet.



1. Plastic grommet (harness removed for clarity)
2. Locating lugs (two of three shown)

### NOTICE

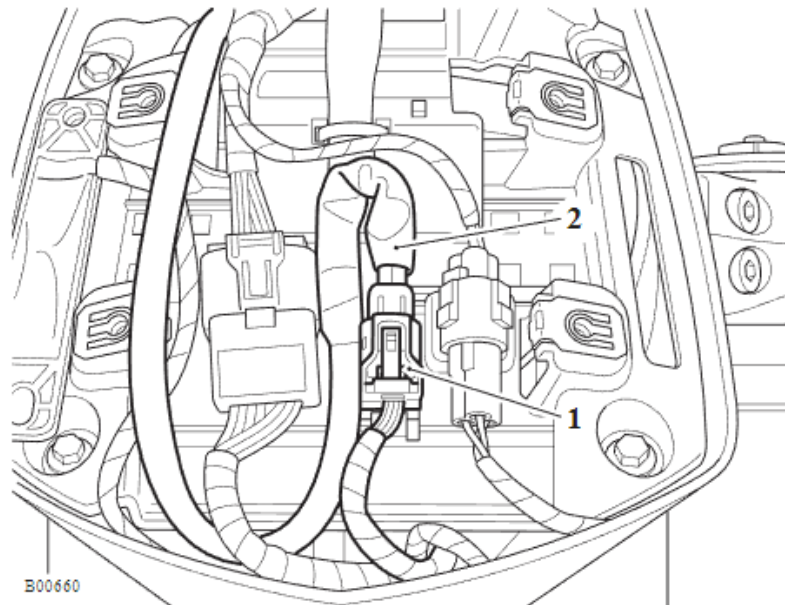
Note the routing of the twist grip position sensor harness through the handlebar for installation.

4. Slide the twist grip position sensor off the handlebar while feeding its harness through the handlebar.

**⚠ WARNING**

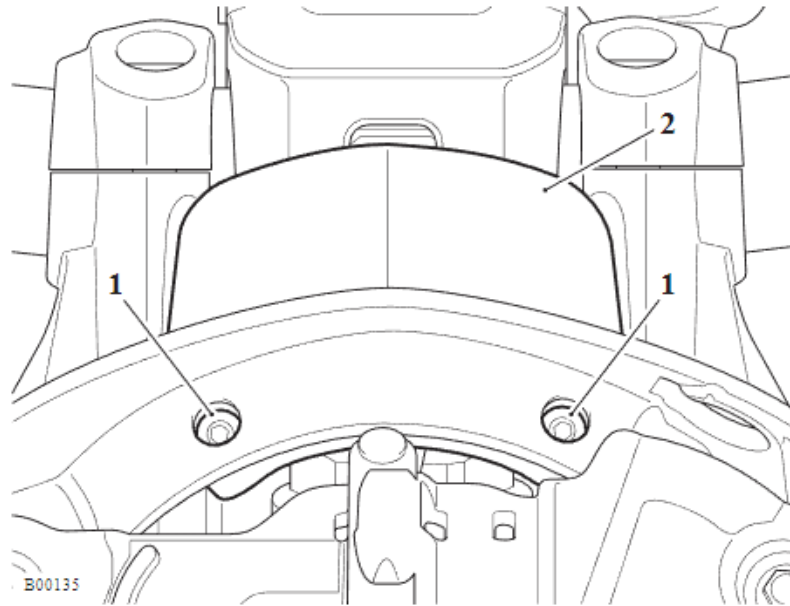
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Slide the twist grip position sensor on to the handlebar while feeding its harness through the handlebar as noted for removal.
2. Route the twist grip position sensor harness to the front subframe as noted for removal and connect to the main harness.



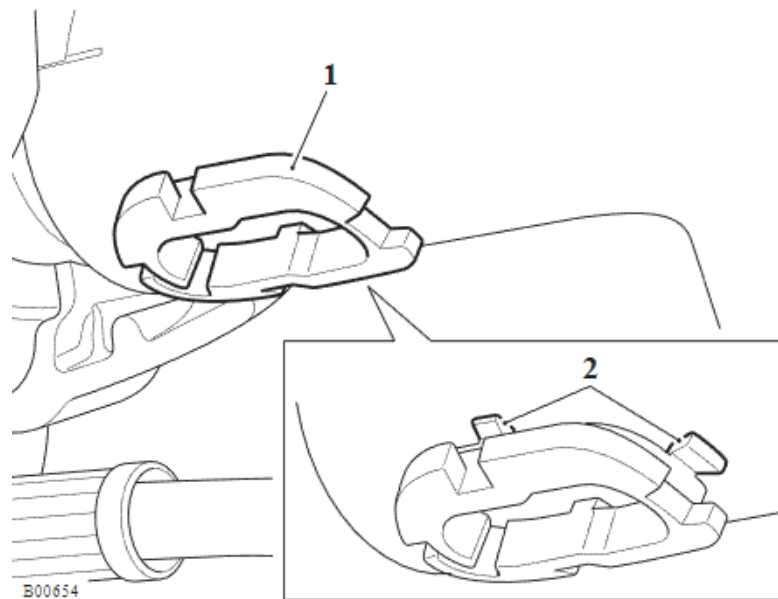
1. Connector
2. Harness

3. Fit the headstock harness cover and tighten the fixings to 5 Nm.



1. Fixings
2. Harness cover

4. Fit the plastic grommet to the handlebar.



1. Plastic grommet (harness removed for clarity)
2. Locating lugs (two of three shown)

Perform the following operations:

- [Heated Twist Grip - Installation](#)
- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Throttle Position Sensor

### **⚠ CAUTION**

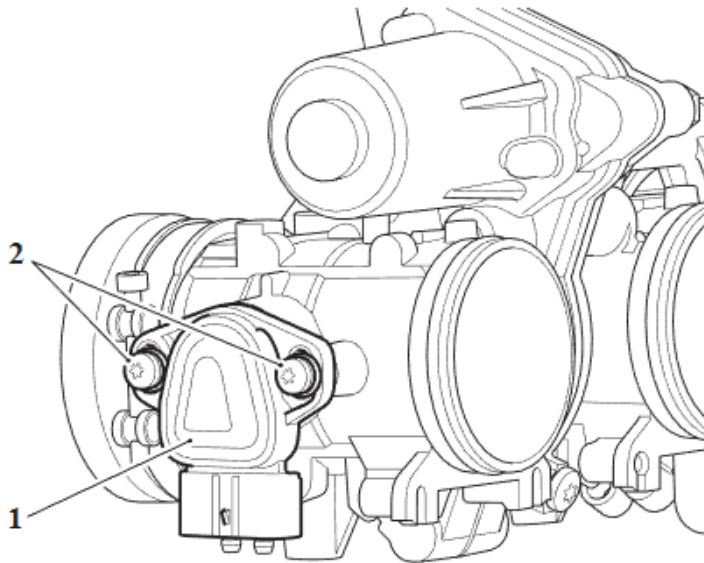
The fixings for the throttle position sensor must not be loosened or removed.

If the throttle position sensor fixings have been loosened or removed, the throttle body assembly must be replaced as there are no means to reset throttle position sensor to its correct position.

### **NOTICE**

If the throttle position sensor fixings have been loosened or removed, any warranty claims for the throttle bodies will be rejected.

The throttle position sensor can not be removed, replaced or adjusted in service. If necessary, the throttle bodies and throttle position sensor must be replaced as an assembly.



1. Throttle position sensor
2. Fixings

**⚠ CAUTION**

The fixings for the throttle actuator motor and the butterfly hard stop adjustment screws are marked with yellow paint and must not be loosened or removed.

If the fixings or adjustment screws have been loosened or removed the throttle body assembly must be replaced as there are no means to reset the throttle actuator motor to its correct position.

The throttle actuator motor is an integral part of the throttle body and cannot be adjusted or replaced separately.

The only adjustment permitted on the throttle body is throttle balance adjustment (see [Throttle Body Balancing](#)).

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

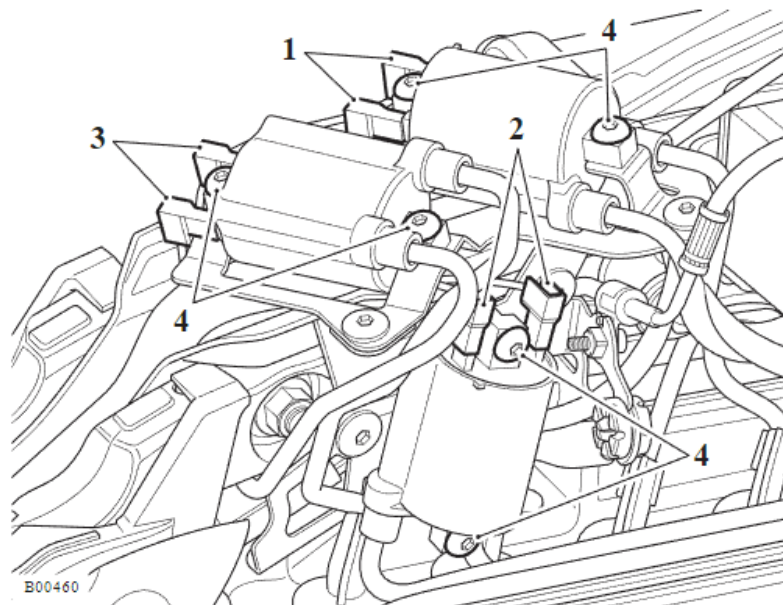
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Evaporative Canister - Removal](#)

## NOTICE

1. The ignition coil harnesses are identified by coloured tape as follows:  
White - Number one cylinder  
  
Red - Number two cylinder  
  
Blue - Number three cylinder
2. Note the routing and position of the six wires connected to the ignition coils for installation.
3. Note the routings of the high tension cables for installation.

1. Disconnect the six wires from the ignition coils.
2. Remove and discard the fixings securing the ignition coils to their brackets. discard the fixings.

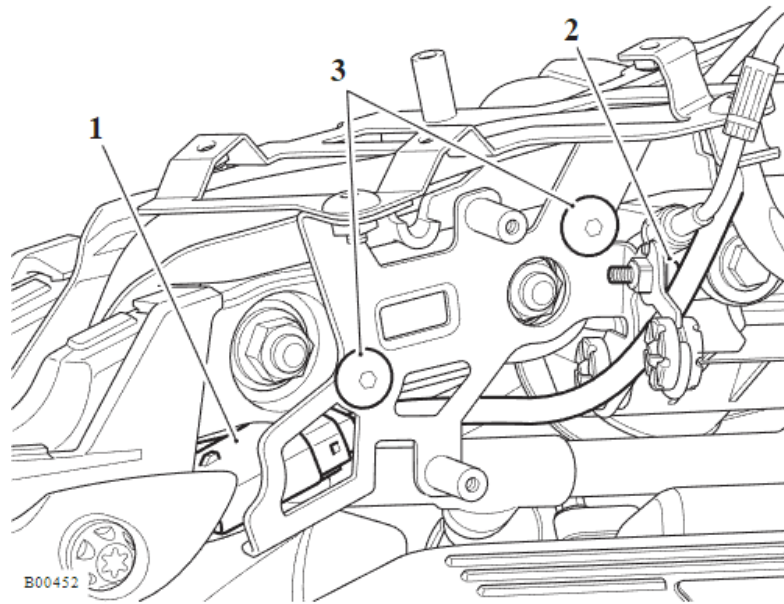


1. Ignition coil connections (Number one cylinder)
2. Ignition coil connections (Number two cylinder)
3. Ignition coil connections (Number three cylinder)
4. Fixings

3. Disconnect the high tension cables from the spark plugs and remove the ignition coils.

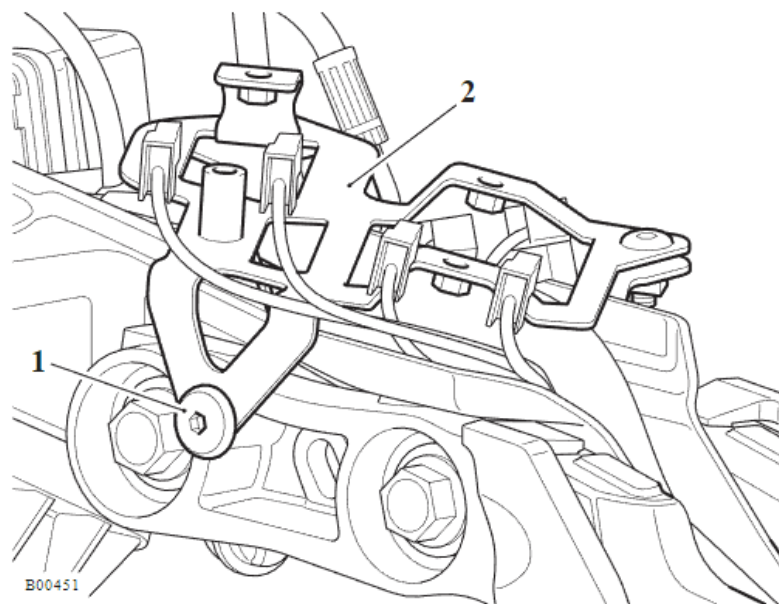


4. If required, detach the electrical connector and brake line clamp from the ignition coils bracket. Discard the fixing.
5. Remove and discard the fixings on the right hand side of the ignition coils bracket.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Electrical connector</li><li>2. Fixing (brake in clamp)</li><li>3. Fixing (bracket)</li></ol> |
|--|

6. Remove the fixing on the left hand side and remove the ignition coils bracket. Discard the fixing.

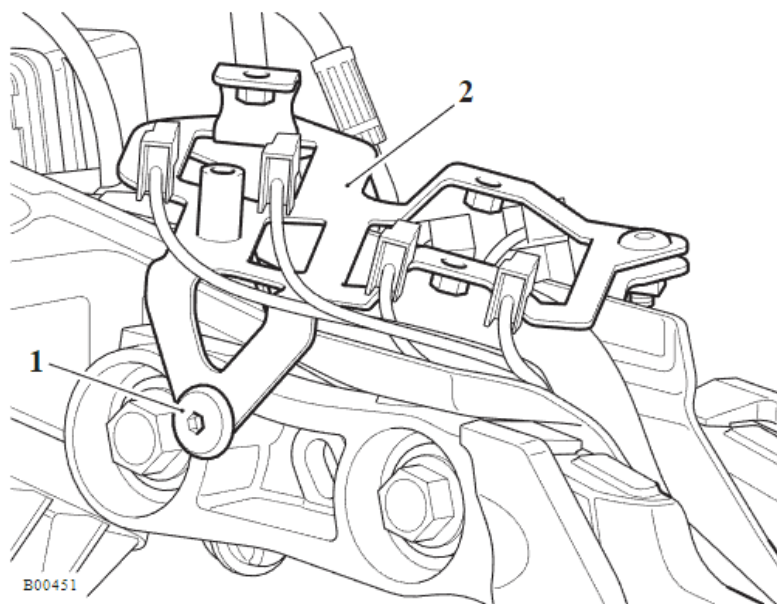


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Ignition coil bracket</li></ol> |
|--|

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

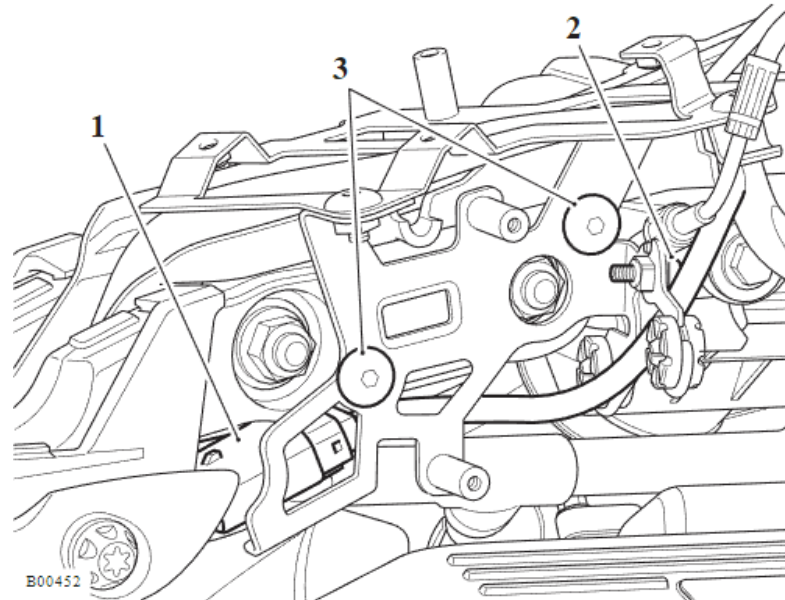
1. Fit the ignition coils bracket to the motorcycle frame. Fit a new fixing on the left hand side and tighten to 9 Nm.



1. Fixing
2. Ignition coil bracket

2. Fit the ignition coils bracket to the motorcycle frame. Fit two new fixings on the right hand side and tighten to 9 Nm.
3. If removed, attach the electrical connector to the ignition coils bracket.

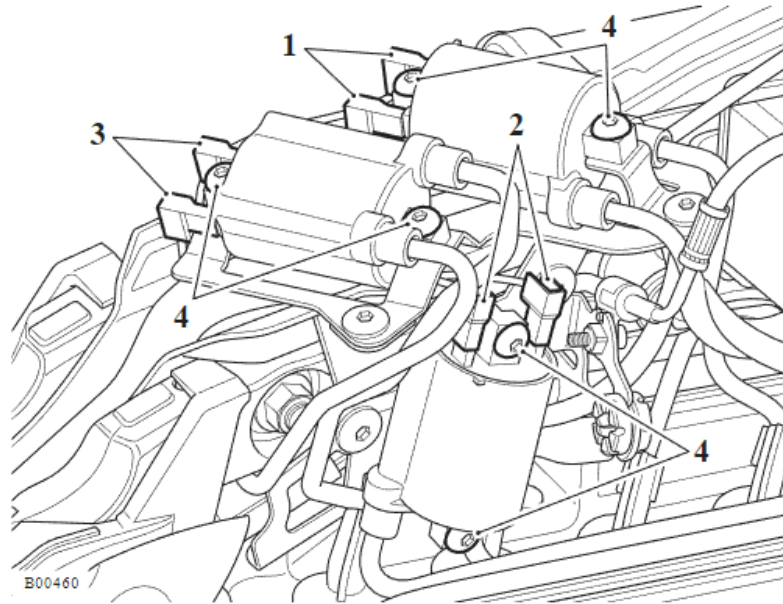
4. Attach the brake line clamp to the ignition coils bracket and tighten its new fixing to 5 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Electrical connector</li><li>2. Fixing (brake in clamp)</li><li>3. Fixing (bracket)</li></ol> |
|--|

5. Route the high tension cables as noted for removal and connect them to the spark plugs.
6. Fit the ignition coils to their brackets and tighten the new fixings to 5 Nm.

7. Connect the six wires to the ignition coils as noted for removal.



1. Ignition coil connections (Number one cylinder)
2. Ignition coil connections (Number two cylinder)
3. Ignition coil connections (Number three cylinder)
4. Fixings

Perform the following operations:

- [Evaporative Canister - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Coolant Temperature Sensor – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

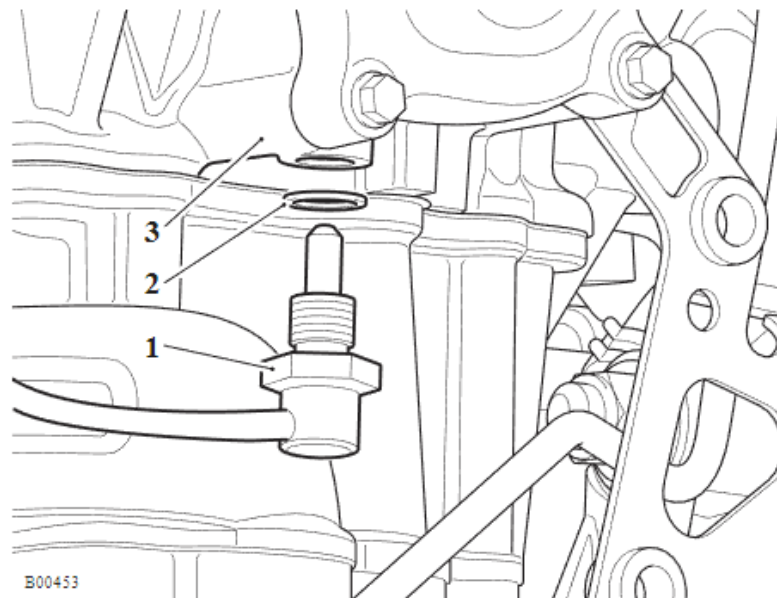
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Radiator - Removal](#)

#### NOTICE

The coolant temperature sensor is located in front of the cylinder head.  
Note the routing of the coolant temperature harness for installation.

1. Press the wire locking device fully in and detach the coolant temperature sensor from the main harness.
2. Remove the rubber cover and using a suitable 19 mm slotted socket, remove the coolant temperature sensor from the cylinder head and discard the sealing washer.

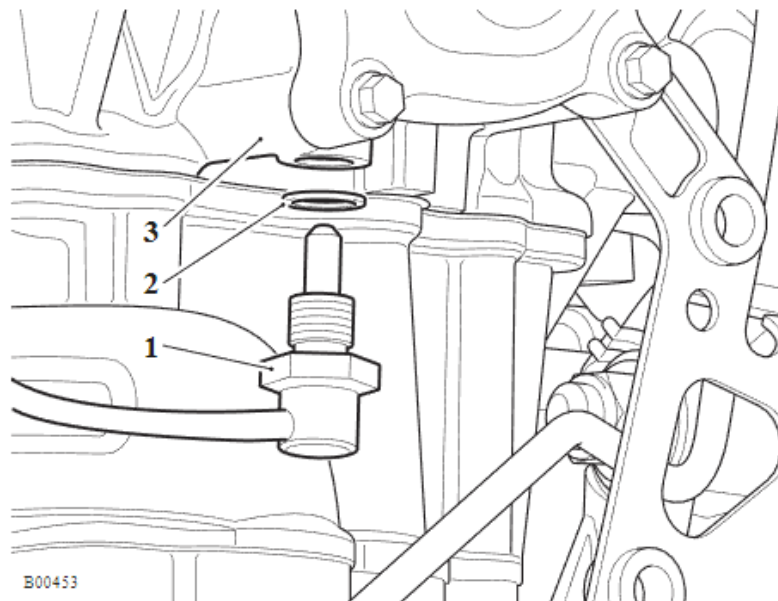


1. Coolant temperature sensor
2. Sealing washer
3. Thermostat housing

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new sealing washer to the coolant temperature sensor and fit to the cylinder head.



1. Coolant temperature sensor
2. Sealing washer
3. Thermostat housing

2. Using a suitable 19 mm slotted socket, tighten temperature sensor to 18 Nm.
3. Route the wiring as noted for removal and reconnect the sensor to the main harness.

Perform the following operations:

- [Radiator - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

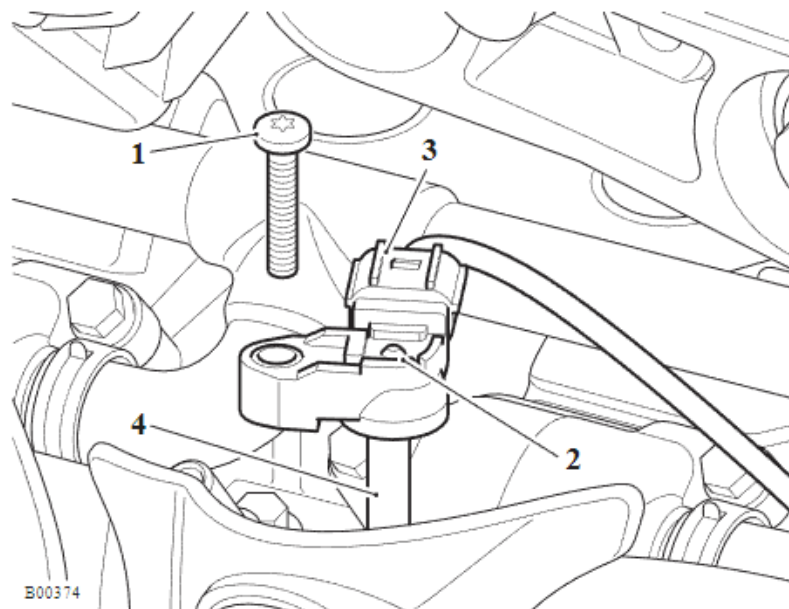
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

**NOTICE**

Note the routing of the MAP sensor hose for installation.

1. Release the fixing and detach the MAP sensor from its mounting. Discard the fixing.
2. Disconnect the MAP sensor hose, the electrical connector and remove the MAP sensor.

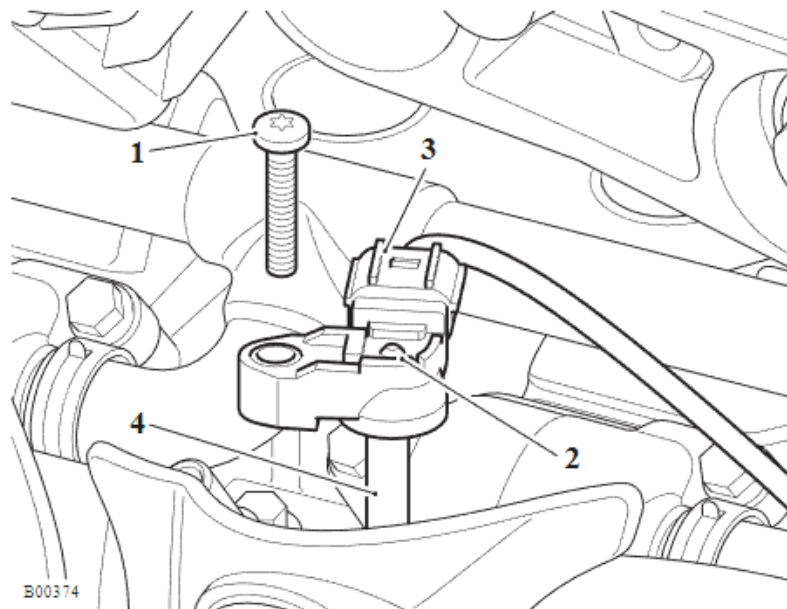


1. Fixing
2. MAP sensor
3. Connector
4. Hose

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Connect the MAP sensor hose and the electrical connector to the MAP sensor as noted for removal.
2. Fit the MAP sensor to its mounting and tighten the new fixing to 3 Nm.



1. Fixing
2. MAP sensor
3. Connector
4. Hose

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)



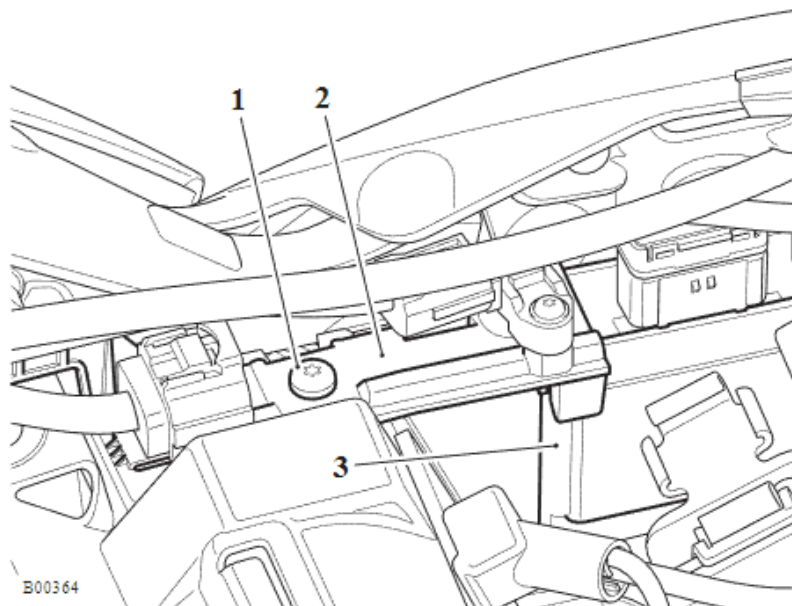
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

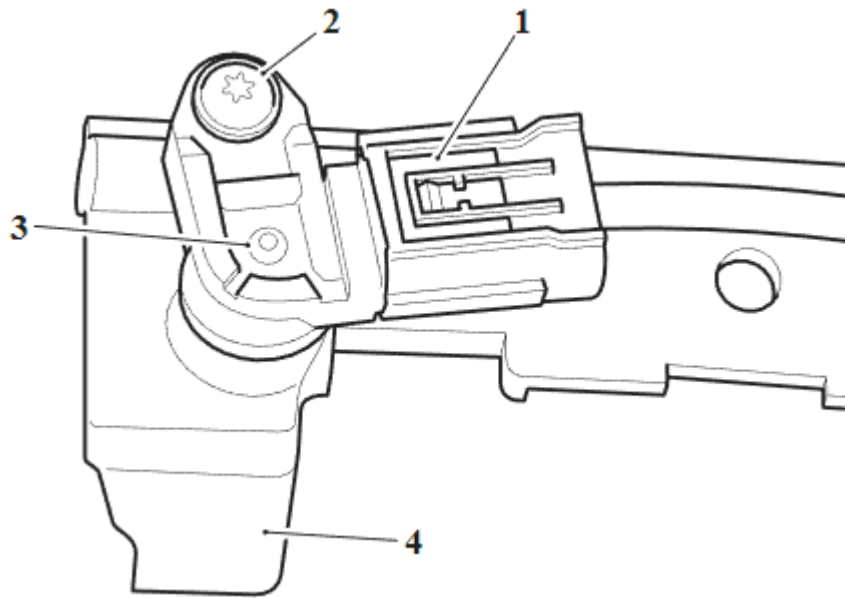
1. Release the fixing and detach the engine ECM bracket from the engine ECM.



1. Fixing
2. Bracket
3. Engine ECM

2. Disconnect the electrical connector.

3. Release the fixing and remove the ambient air temperature sensor.



- 1. Connector
- 2. Fixing
- 3. Ambient air temperature sensor
- 4. Bracket

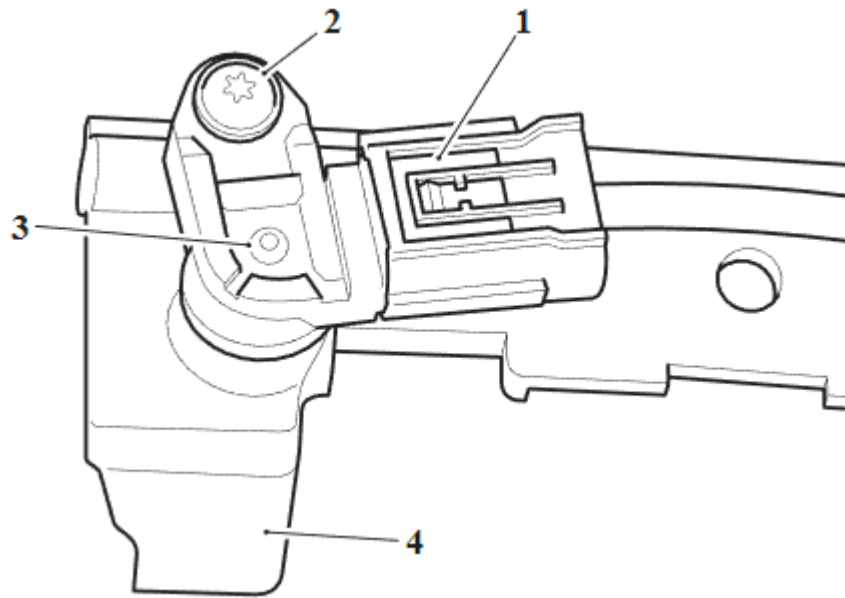
#### Ambient Air Pressure Sensor – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

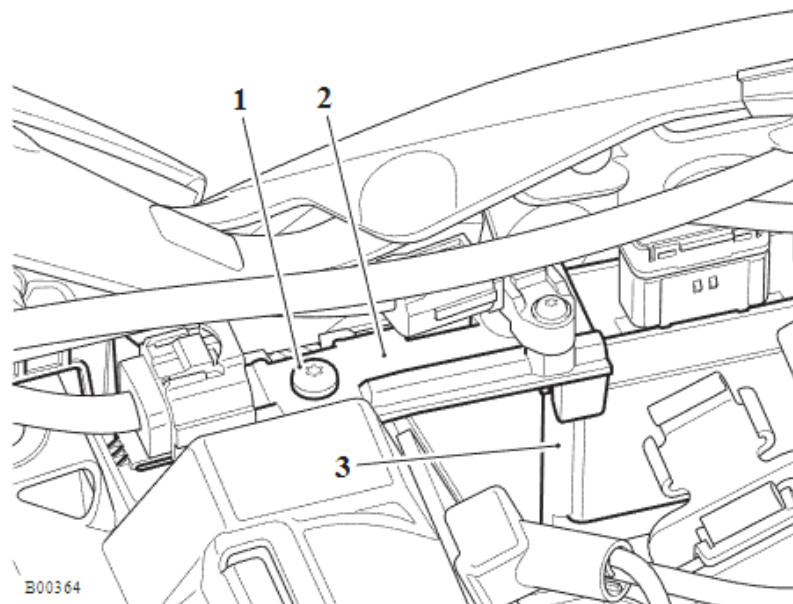
1. Fit the ambient air temperature sensor to the engine ECM bracket and tighten the fixing to 3 Nm.

2. Connect the electrical connector.



- 1. Connector
- 2. Fixing
- 3. Ambient air temperature sensor
- 4. Bracket

3. Fit the engine ECM bracket and tighten its fixing to 9 Nm.



- 1. Fixing
- 2. Bracket
- 3. Engine ECM

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Intake Air Temperature Sensor – Removal

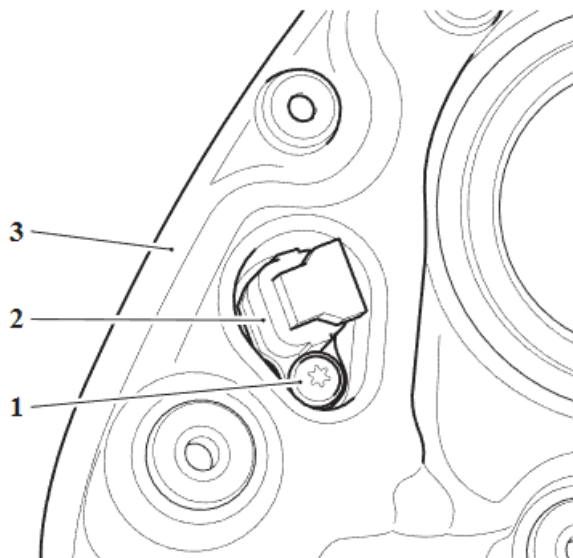
## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)

1. Release the fixing and remove the intake air temperature sensor from the plenum base.

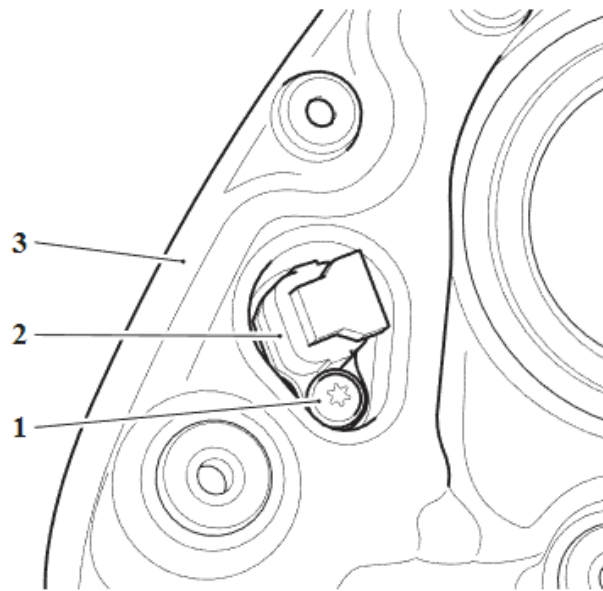


1. Fixing
2. Intake air temperature sensor
3. Plenum base

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the intake air temperature sensor to the plenum base and tighten the fixing to 3 Nm.



1. Fixing
2. Intake air temperature sensor
3. Plenum base

Perform the following operations:

- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

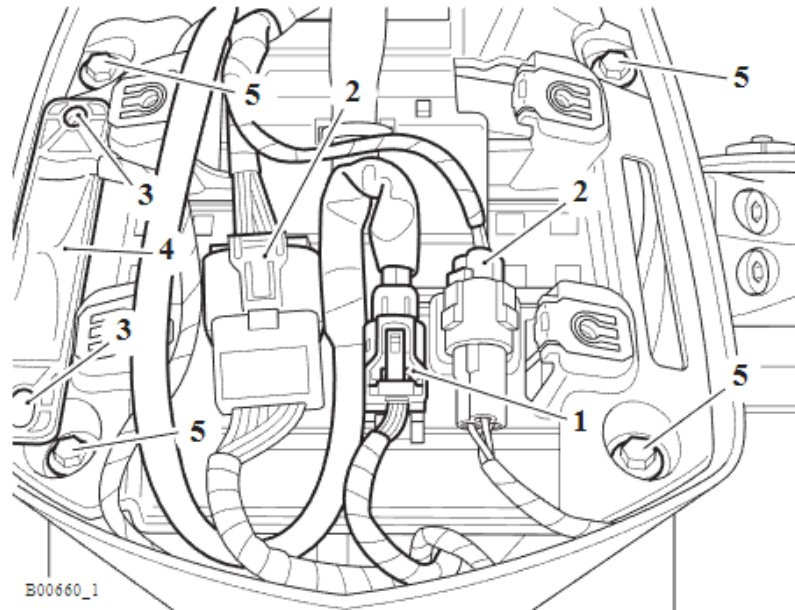
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)

**NOTICE**

Note the routing of the harnesses under the flyscreen for installation.

1. Disconnect the two handlebar sub harness and the twist grip position sensor connectors from the main harness.
2. Release the fixings and detach the low frequency antenna from the flyscreen mounting.

3. Release the fixings and detach the flyscreen mounting from the front subframe.

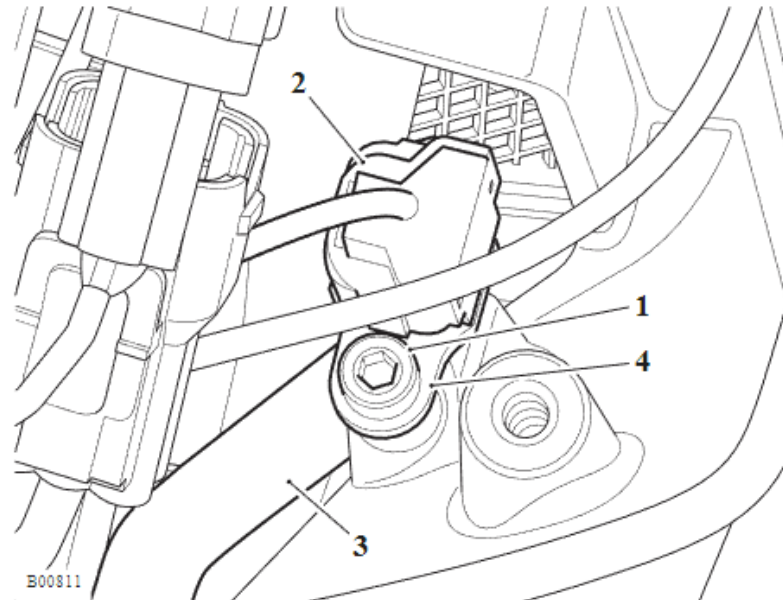


1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Low frequency antenna fixings
4. Low frequency antenna
5. Flyscreen mounting fixings

### **NOTICE**

Note the routing of the hose connected to the temperature sensor for installation.

4. Release the fixing, disconnect the electrical connector and remove the temperature sensor and hose assembly.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Electrical connector</li><li>3. Hose</li><li>4. Temperature sensor</li></ol> |
|---|

5. If required, remove the hose from the temperature sensor.

#### Ambient Air Temperature Sensor – Installation

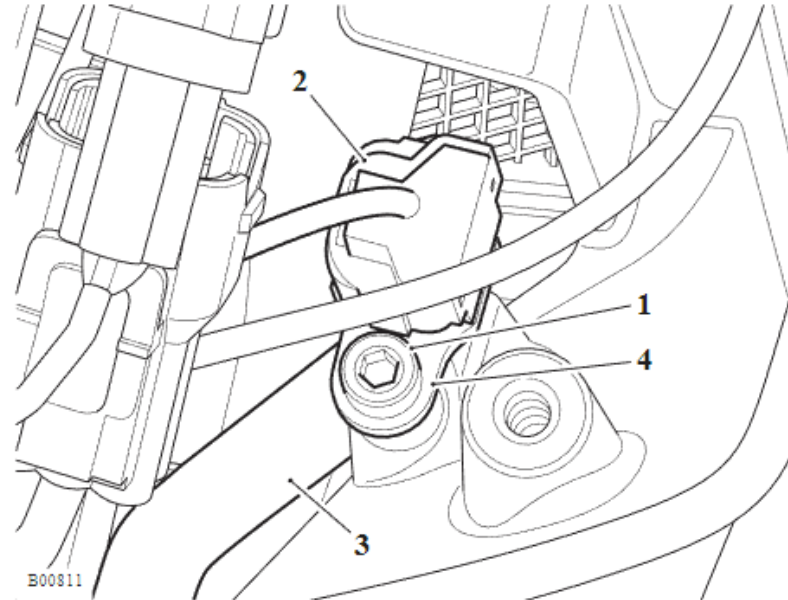
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, fit the hose to the temperature sensor as noted for removal.



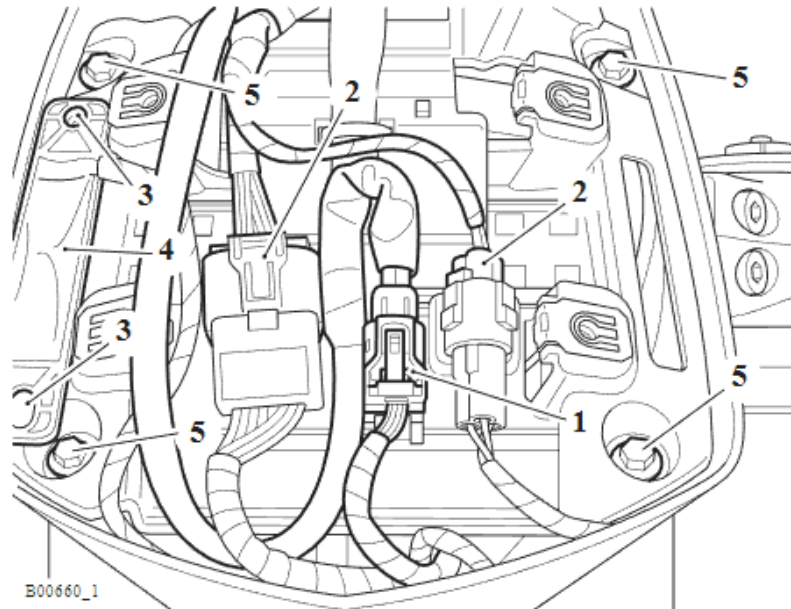
2. Connect the electrical connector and position the temperature sensor with the hose routed as for removal. Fit and tighten the fixing to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Electrical connector</li><li>3. Hose</li><li>4. Temperature sensor</li></ol> |
|---|

3. With harnesses as noted for removal, fit the fit the flyscreen mounting to the front subframe and tighten the fixings to 5 Nm.
4. Connect the two handlebar sub harness and the twist grip position sensor connectors to the main harness as noted for removal.

5. Fit the low frequency antenna to the flyscreen mounting and tighten the fixings to 3 Nm.



1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Low frequency antenna fixings
4. Low frequency antenna
5. Flyscreen mounting fixings

Perform the following operations:

- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

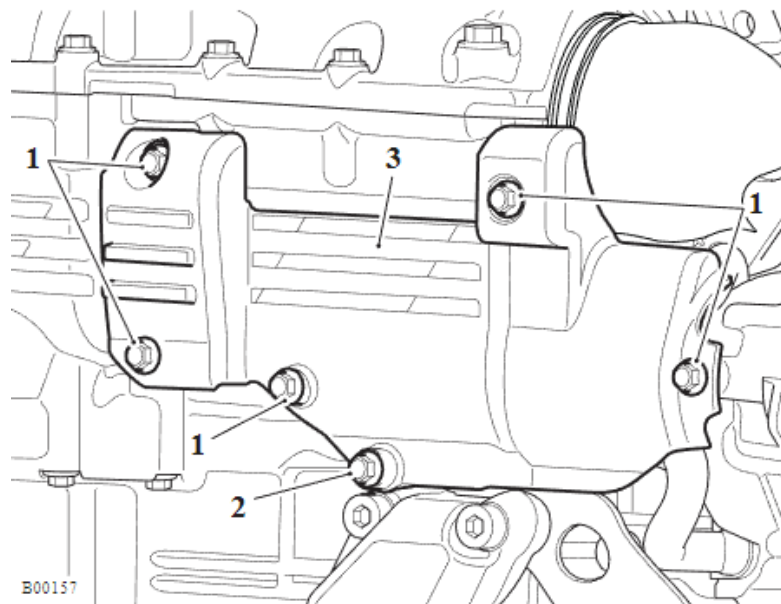
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- Right hand [Side Panels - Removal](#)
- [Battery Box - Removal](#)

## NOTICE

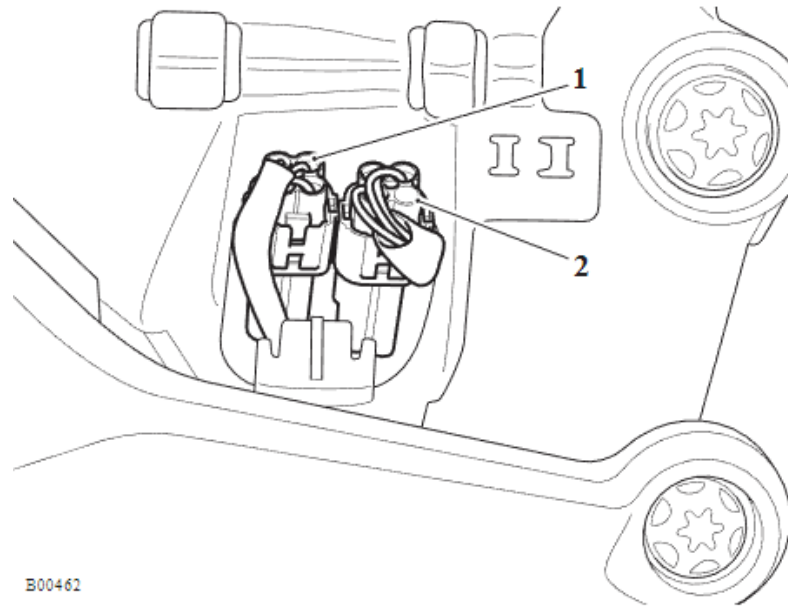
The front upper fixing also secure the drive shaft cover.

1. Release the fixings and remove the starter motor cover.



1. Fixings M6 x 20mm
2. Fixing M6 x 42mm
3. Starter motor cover

2. Disconnect the gear position sensor electrical connector from the main harness.



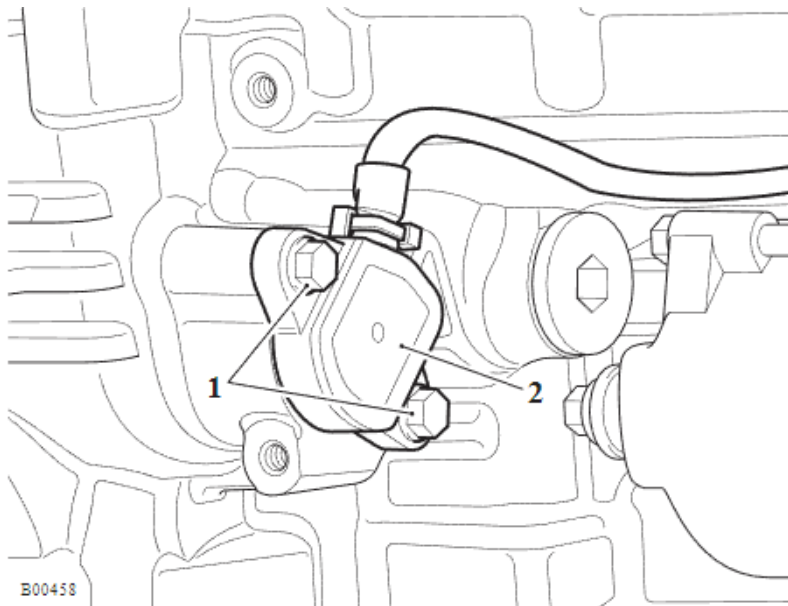
B00462

1. Gear position sensor connector
2. Oxygen sensor connector

### NOTICE

Note the routing of the gear position sensor harness for installation.

3. Route the gear position sensor harness through the frame to the gear position sensor.
4. Release the fixings and remove the gear position sensor.



1. Fixings
2. Gear position sensor

B00458

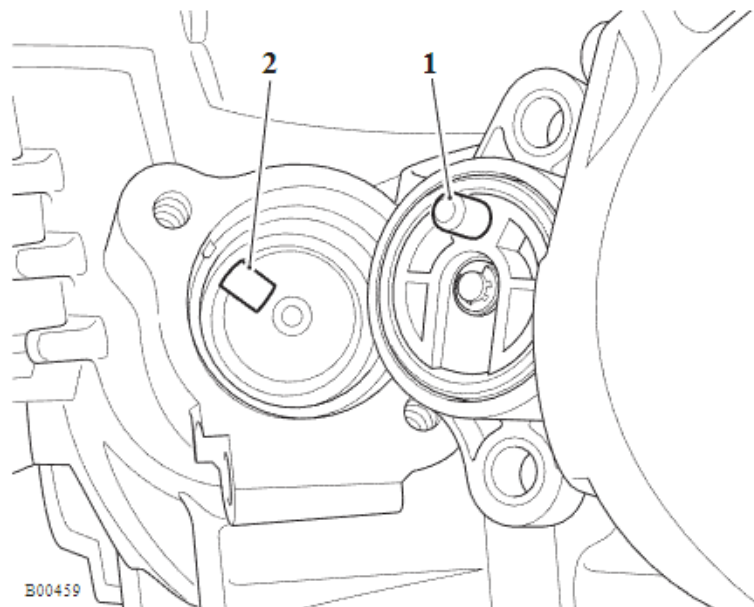
5. Remove and discard the two O-rings from the gear position sensor.

#### Gear Position Sensor – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
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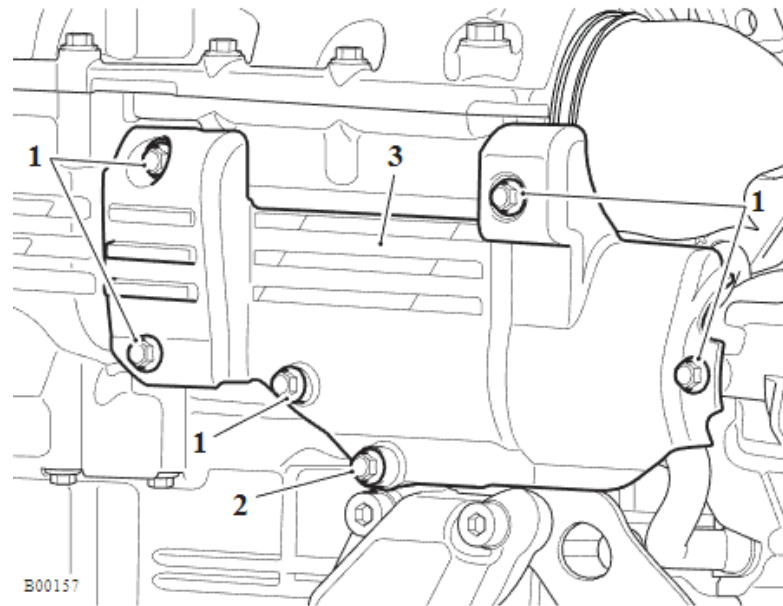
1. Fit two new O-rings to the gear position sensor.
2. Lubricate the new O-rings with a proprietary temporary rubber lubricant (at the factory P-80 is used).
3. Route the gear position sensor as noted for removal and connect to the main harness.
4. Fit the gear position sensor to the engine. Make sure that the locating pin on the sensor fits into the hole in the end of the gear selector drum.



1. Locating pin
2. Hole

5. Fit the gear position sensor fixings and tighten to 10 Nm.
6. Fit the starter motor cover tighten the M6 x 20 mm fixings to 9 Nm.

7. Tighten the M6 x 42 mm fixings to 7 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings M6 x 20mm</li><li>2. Fixing M6 x 42mm</li><li>3. Starter motor cover</li></ol> |
|---|

Perform the following operations:

- [Battery Box - Installation](#)
- Right hand [Side Panels - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## ⚠ WARNING

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

## NOTICE

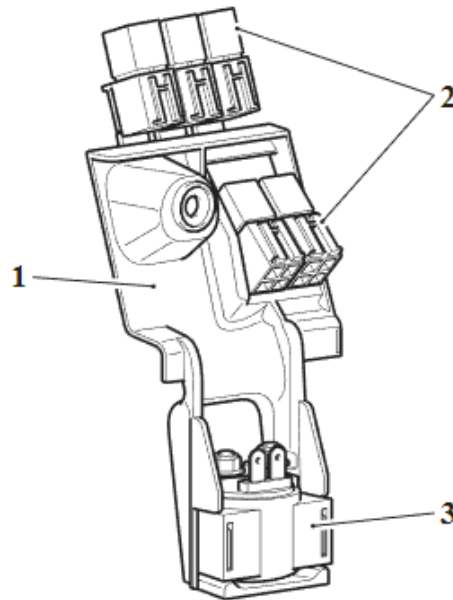
Note the positions of the relays and starter motor solenoid for installation.

1. Remove the relay cover.
2. Release the push release plastic rivet and detach the starter motor solenoid bracket from the relay bracket.



1. Relay cover
2. Starter motor solenoid bracket
3. Push release plastic rivet

3. While lifting up the starter motor relay bracket, detach the relays and starter motor solenoid from it.



- 1. Starter motor solenoid bracket
- 2. Relays
- 3. Starter motor solenoid

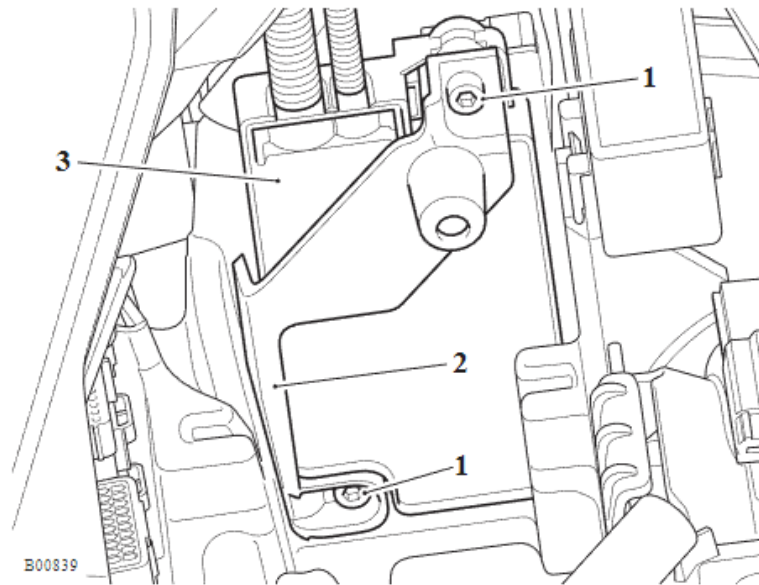
4. Disconnect the engine ECM connectors (see [Engine Electronic Control Module \(Engine ECM\) - Removal](#)).

**NOTICE**

Note the routing of the harness for installation.

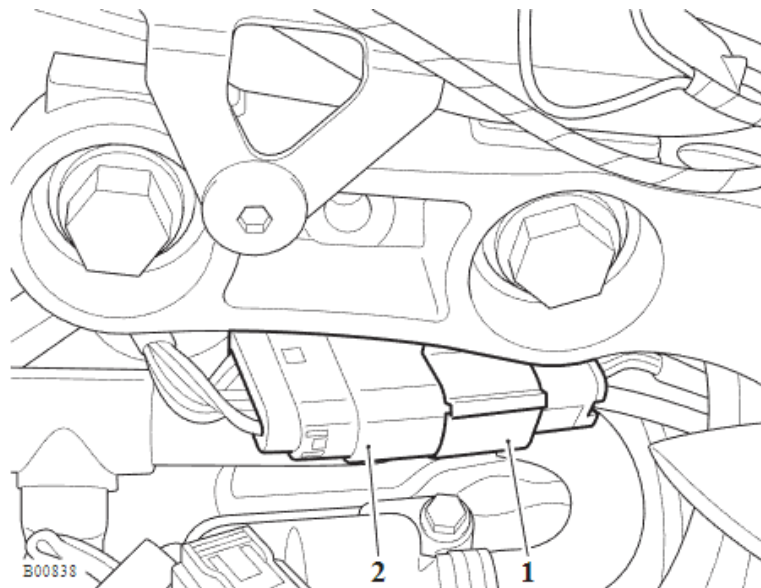


5. Release the fixings, remove the relay bracket and detach the keyless ECM from the battery box. Manoeuvre the keyless ECM upwards to allow extra harness into the engine area.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Relay bracket</li><li>3. Keyless ECM</li></ol> |
|--|

6. Detach the keyless ECM connector from its bracket and disconnect from the main harness.



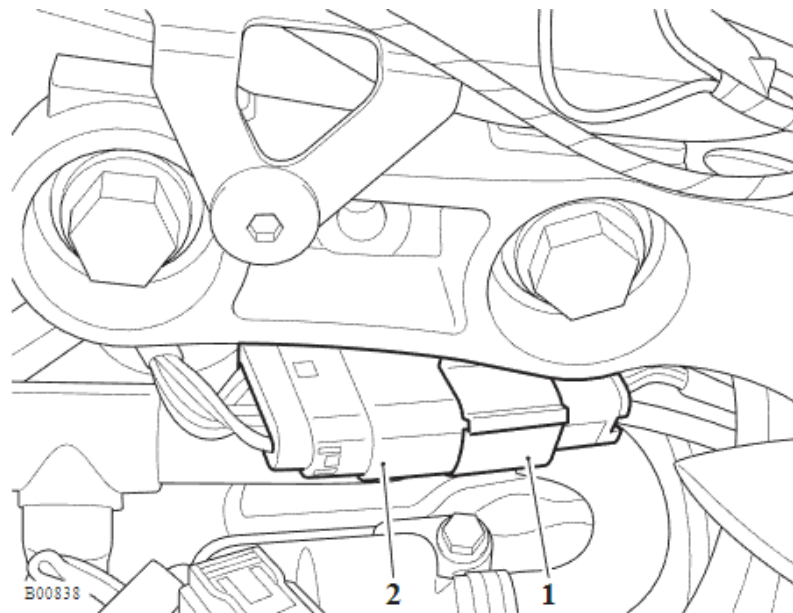
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Connector (keyless ECM side)</li><li>2. Connector (main harness side)</li></ol> |
|--|

7. Route keyless ECM harness into the battery box and remove the ECM.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

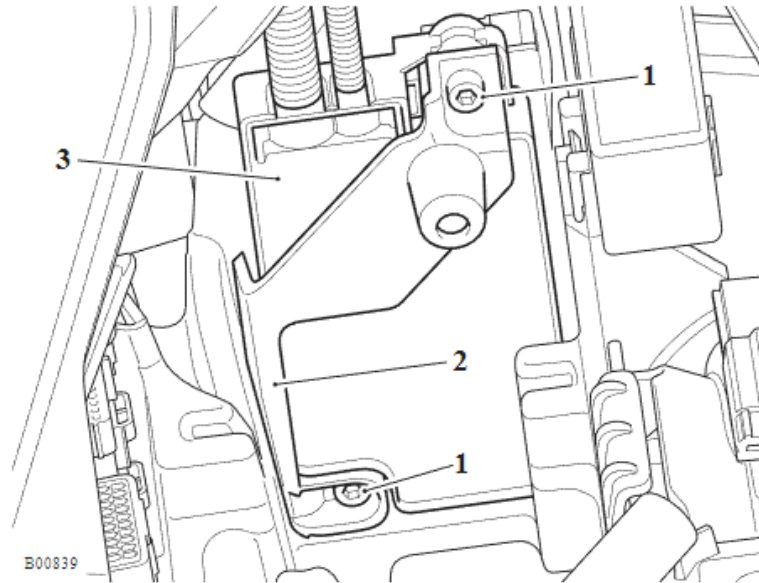
1. Position the keyless ECM into the battery box and feed its harness to the top of the engine area, as noted for removal.
2. Connect from the keyless ECM to the main harness.



1. Connector (keyless ECM side)
2. Connector (main harness side)

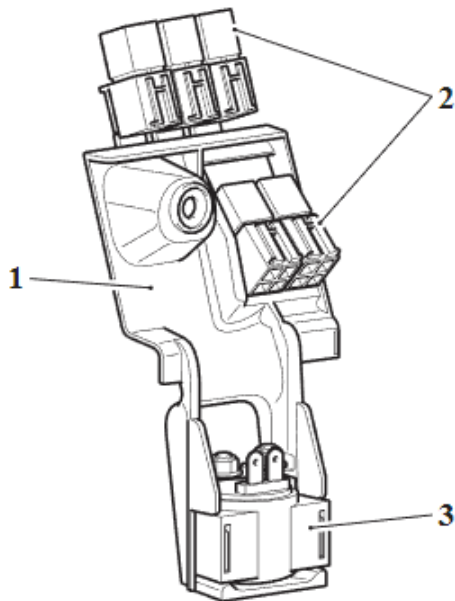
3. Attach the connector to its bracket.

4. Fit the relay bracket to the keyless ECM and tighten the fixings to 3 Nm.



1. Fixings
2. Relay bracket
3. Keyless ECM

5. Connect the engine ECM connectors (see [Engine Electronic Control Module \(Engine ECM\) - Installation](#)).
6. Fit the relays and starter motor solenoid to the starter motor relay bracket as noted for removal.



1. Starter motor solenoid bracket
2. Relays
3. Starter motor solenoid

7. Fit the starter motor solenoid bracket to the relay bracket and secure with the push release plastic rivet.
8. Fit the relay cover



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Relay cover</li><li>2. Starter motor solenoid bracket</li><li>3. Push release plastic rivet</li></ol> |
|--|

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)

**NOTICE**

If a new keyless ECM has been fitted, the new ECM and keys must be paired.

- If a new keyless ECM is fitted it will have to be setup, see [Setup Flow Chart - Replacement Keys and Keyless ECM - Models with an Electronic Steering Lock Fitted](#).
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
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**NOTICE**

If the crankshaft position sensor needs to be replaced, the alternator stator will also be replaced as they are one assembly.

Perform the following operations:

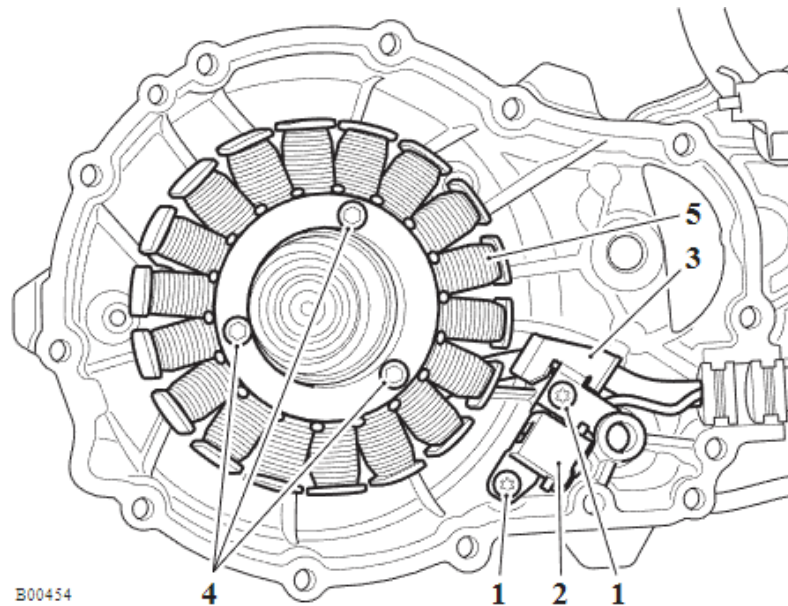
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Plenum - Removal \(All Markets Except US\)](#) or [Plenum - Removal \(US Markets Only\)](#)
- [Alternator Cover - Removal](#)

**NOTICE**

Note the routing of the alternator harness and the orientation of the harness guide for installation.

1. Remove and discard the fixings securing the crankshaft position sensor and the harness guide to the alternator cover.

2. Remove and discard the fixings securing the stator to the alternator cover and remove the stator.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings (position sensor and harness guide)</li><li>2. Position sensor</li><li>3. Harness guide</li><li>4. Fixings (alternator stator)</li><li>5. Alternator stator</li></ol> |
|--|

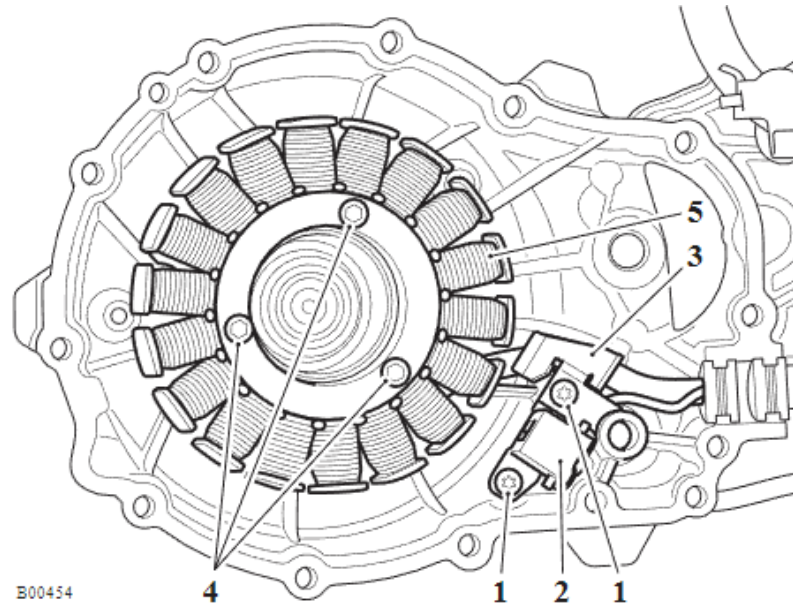
#### Crankshaft Position Sensor – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the stator to the alternator cover and route the harness as noted for removal. Secure the stator with new fixings and tighten to 12 Nm.

2. Fit crankshaft position sensor and the harness guide to the alternator cover as noted for removal. Secure with new fixings and tighten to 6 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings (position sensor and harness guide)</li><li>2. Position sensor</li><li>3. Harness guide</li><li>4. Fixings (alternator stator)</li><li>5. Alternator stator</li></ol> |
|--|

Perform the following operations:

- [Alternator Cover - Installation](#)
- [Plenum - Installation \(All Markets Except US\)](#) or [Plenum - Installation \(US Markets Only\)](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Removal and Installation - Exhaust System Components

### Catalytic Converter – Removal

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

#### **WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

#### **NOTICE**

The exhaust silencers are an integral part of the catalytic converter.

Always note the position and orientation of exhaust clamps prior to releasing them, and return them to the noted position and orientation on assembly.

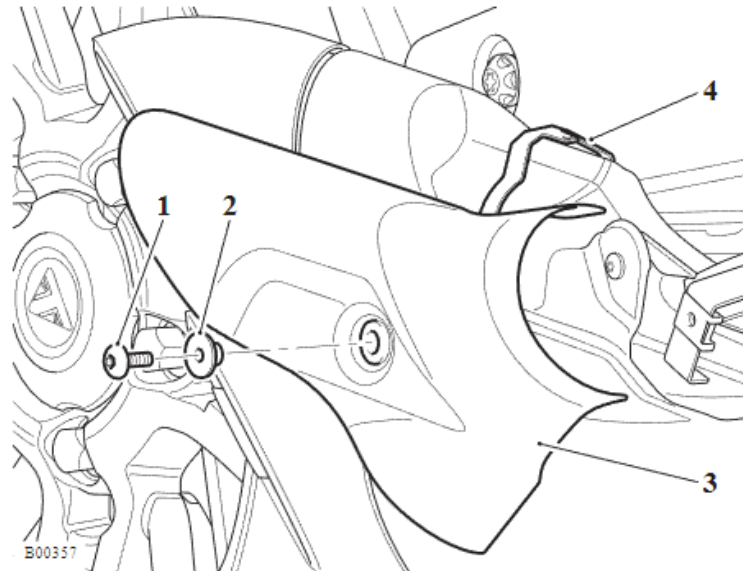
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- Right hand [Side Panels - Removal](#)

1. Remove the fixing and shouldered washer from the catalytic converter right hand cover.



2. Move the cover forward to detach it from its locating lug and remove the cover.

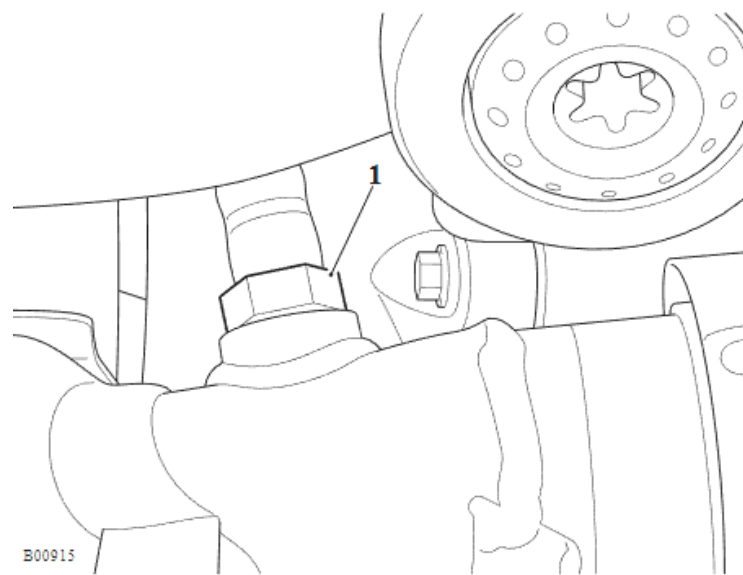


1. Fixing
2. Shouldered washer
3. Cover
4. Locating lug

### NOTICE

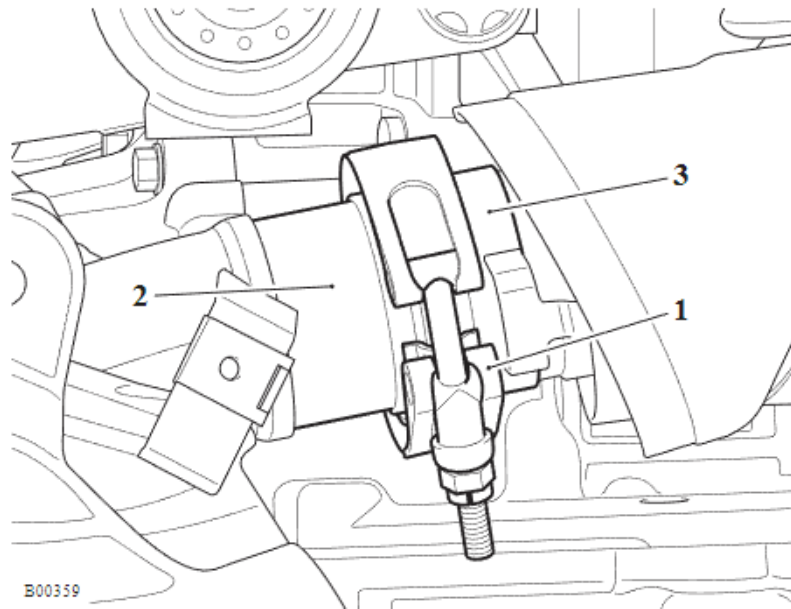
Count the number of turns to detach the oxygen sensor from the catalytic converter for installation.

3. Detach the oxygen sensor from the catalytic converter.



1. Oxygen sensor

4. Release the clamp securing the catalytic converter to the hand header.

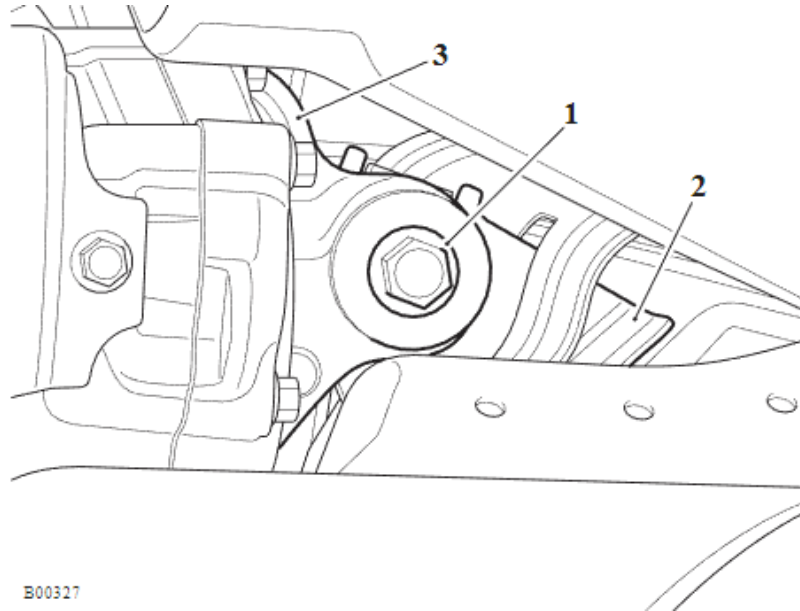


1. Clamp
2. Catalytic converter
3. Header pipe

**NOTICE**

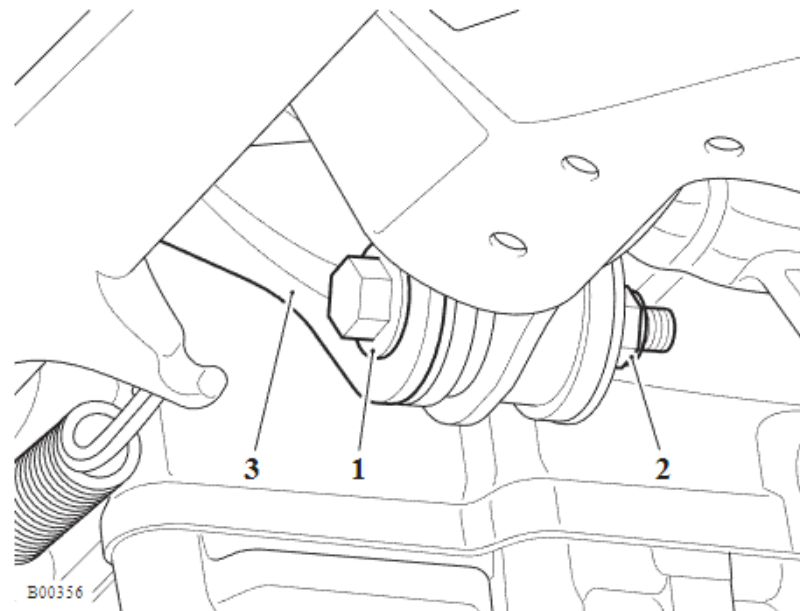
Note the position of the shouldered washers and rubber bushes in the catalytic converter mountings for installation.

- From the left hand side, remove the centre fixing securing the catalytic converter to the left hand drag link bracket. Discard the captive nut.



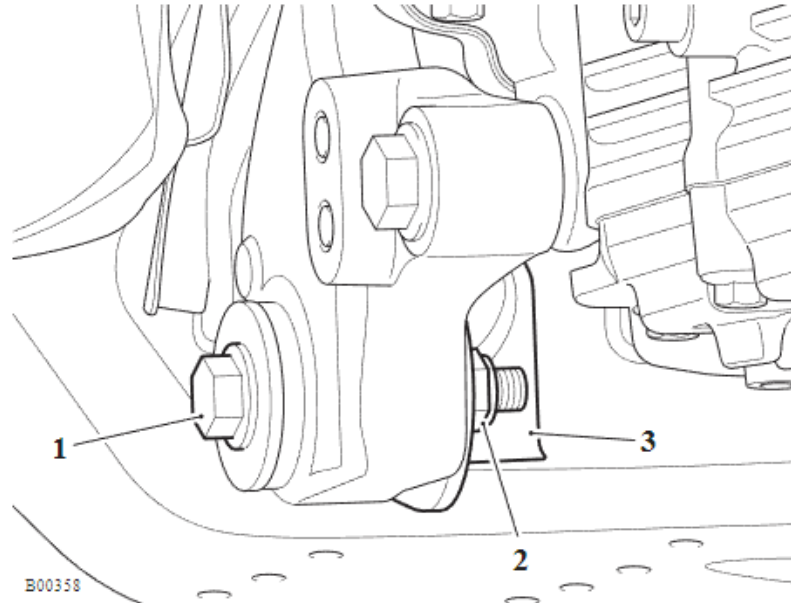
- |  |
|--|
| <ol style="list-style-type: none"><li>Fixing</li><li>Catalytic converter bracket</li><li>Drag link bracket</li></ol> |
|--|

- Release the fixing securing the catalytic converter to the side stand bracket. Discard the lock nut.



- |  |
|--|
| <ol style="list-style-type: none"><li>Fixing</li><li>Lock nut</li><li>Side stand bracket</li></ol> |
|--|

7. While supporting the catalytic converter release the fixing on the right hand side and remove the catalytic converter. Discard the lock nut.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Lock nut</li><li>3. Catalytic converter bracket</li></ol> |
|--|

8. Remove and discard the exhaust gasket from the header pipe.

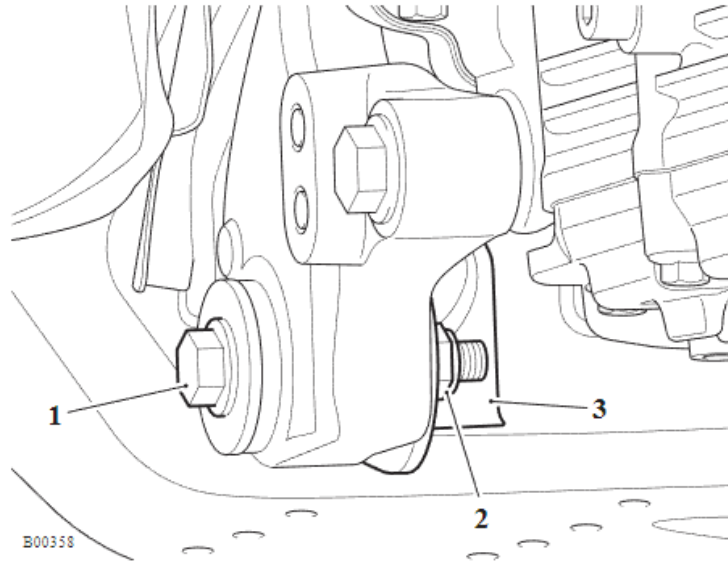
#### Catalytic Converter – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

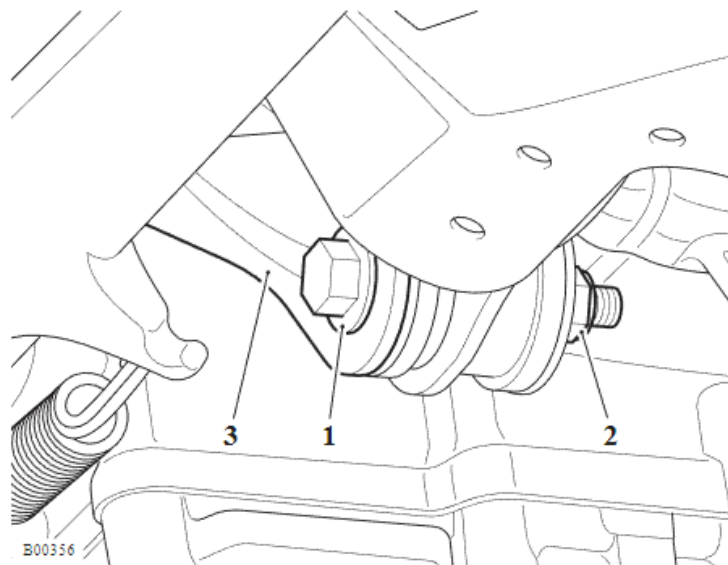
1. If removed, apply a thin smear of anti-seize compound to the threads of the oxygen sensor, install the oxygen sensor and tighten to 25 Nm.
2. Fit the bushes and shouldered washers to the catalytic converter as noted for removal.
3. Fit a new exhaust gasket to the header pipe.

4. Position the catalytic converter clamp onto the header pipe.
5. Fit the catalytic converter to the header pipe and position to its mountings on the motorcycle. Fit the fixing and a new lock nut to the right hand mounting. Do not fully tighten at this stage.



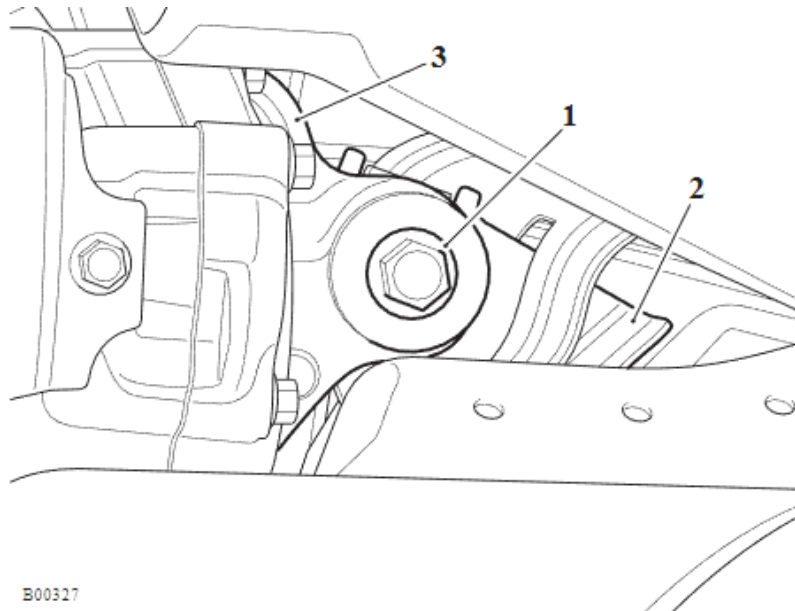
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Lock nut</li><li>3. Catalytic converter bracket</li></ol> |
|--|

6. Align the catalytic converter right hand mounting to the side stand bracket. Fit the fixing and a new lock nut. Do not fully tighten at this stage



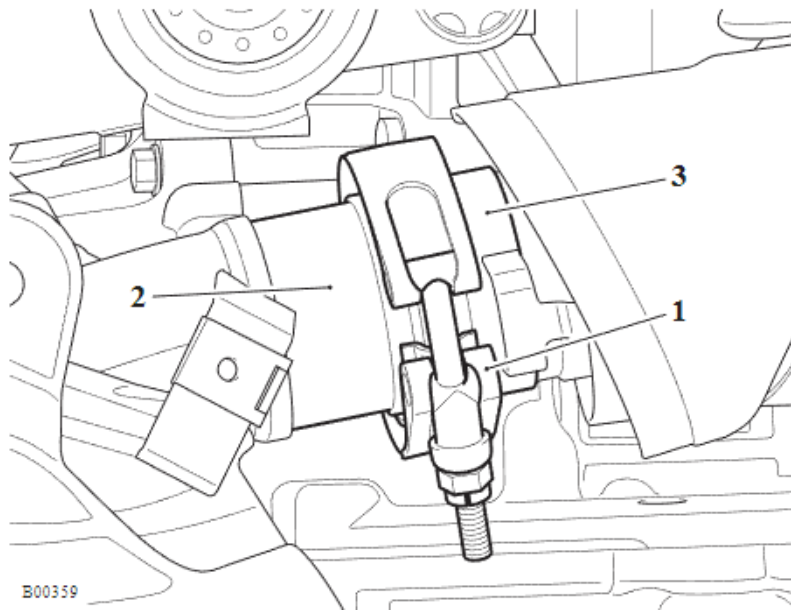
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Lock nut</li><li>3. Side stand bracket</li></ol> |
|---|

7. From the left hand side, fit the centre fixing securing the catalytic converter to the left hand drag link bracket. Do not fully tighten at this stage.



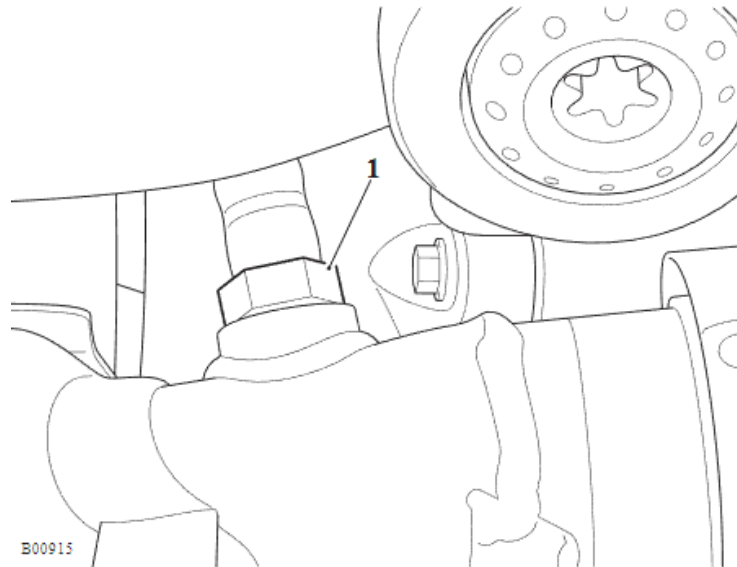
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Catalytic converter bracket</li><li>3. Drag link bracket</li></ol> |
|---|

8. Fit the catalytic converter to the header pipe. Fit the clamp as noted for removal and tighten to 11 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Clamp</li><li>2. Catalytic converter</li><li>3. Header pipe</li></ol> |
|--|

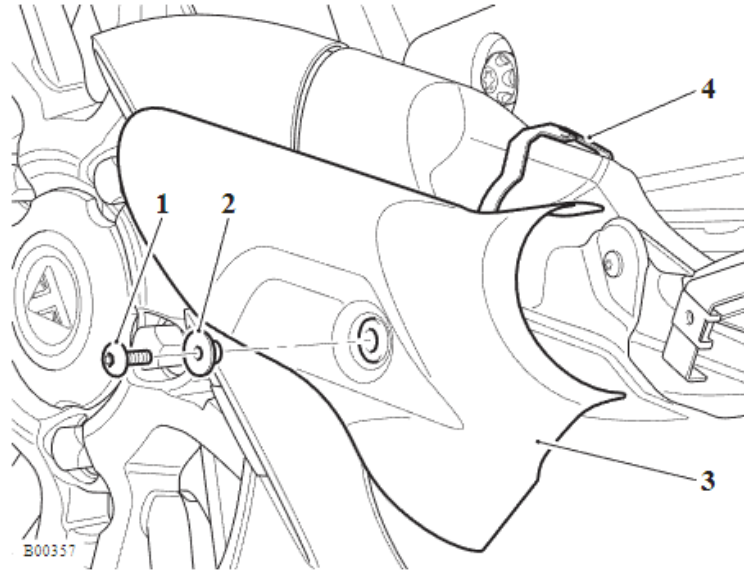
9. Tighten the catalytic converter centre fixing to 28 Nm
10. Hold the lock nut and tighten the catalytic converter left hand fixing to 28 Nm
11. Hold the lock nut and tighten the catalytic converter right hand fixing to 28 Nm
12. Apply a thin smear of anti-seize compound to the threads of the oxygen sensor twist the sensor in an a clockwise direction (looking at the sensor)the number of turn noted for removal. install the oxygen sensor to the catalytic converter and tighten to 25 Nm.



1. Oxygen sensor

13. Start the engine and check for exhaust gas leaks. Rectify if necessary.
14. Fit the cover to the catalytic converter. Make sure the locating lug fit into its its grommet.

15. Fit the shouldered washer and tighten the fixing to 5 Nm.



1. Fixing
2. Shouldered washer
3. Cover
4. Locating lug

#### Exhaust Headers – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

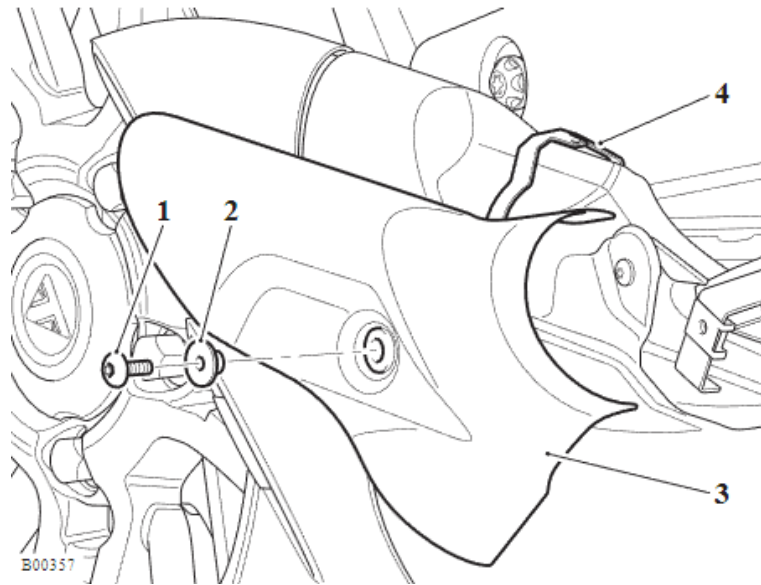
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

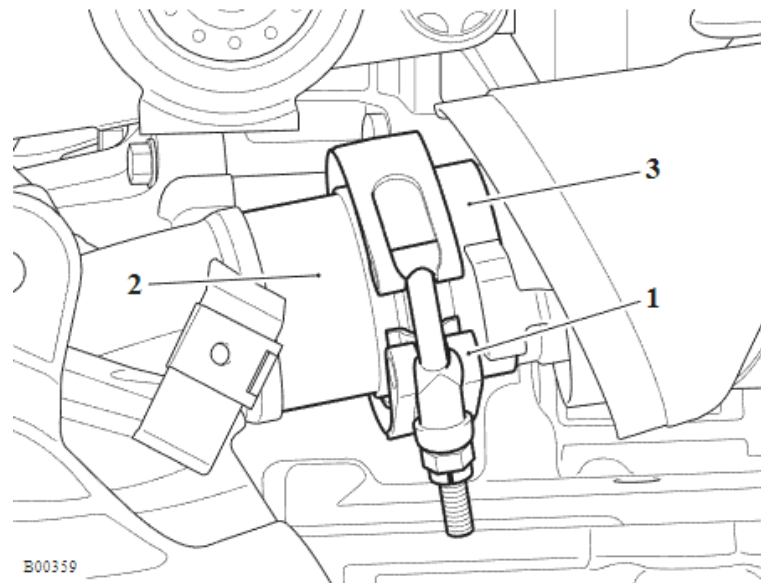


1. Remove the fixing and shouldered washer from the catalytic converter right hand cover.
2. Move the cover forward to detach it from its locating lug and remove the cover.



1. Fixing
2. Shouldered washer
3. Cover
4. Locating lug

3. Release the clamp securing the catalytic converter to the hand header.



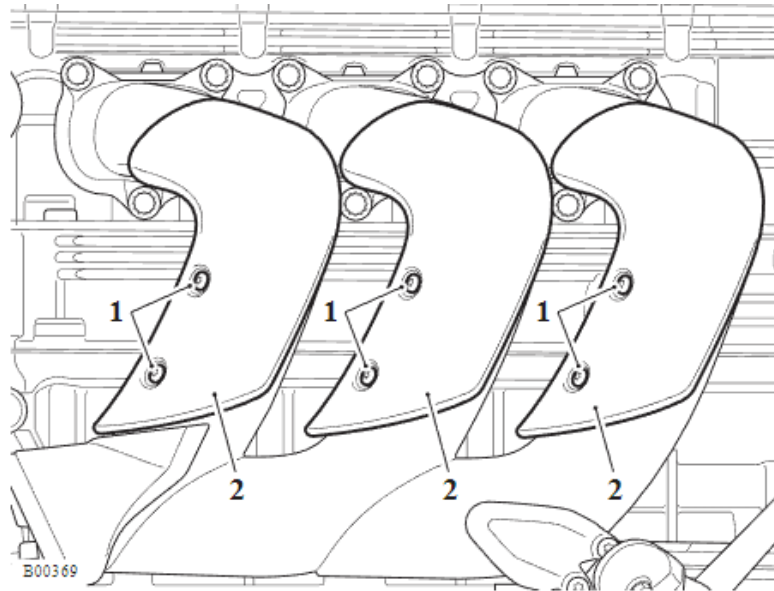
1. Clamp
2. Catalytic converter
3. Header pipe

4. Remove and discard the exhaust gasket from the header pipe.

**NOTICE**

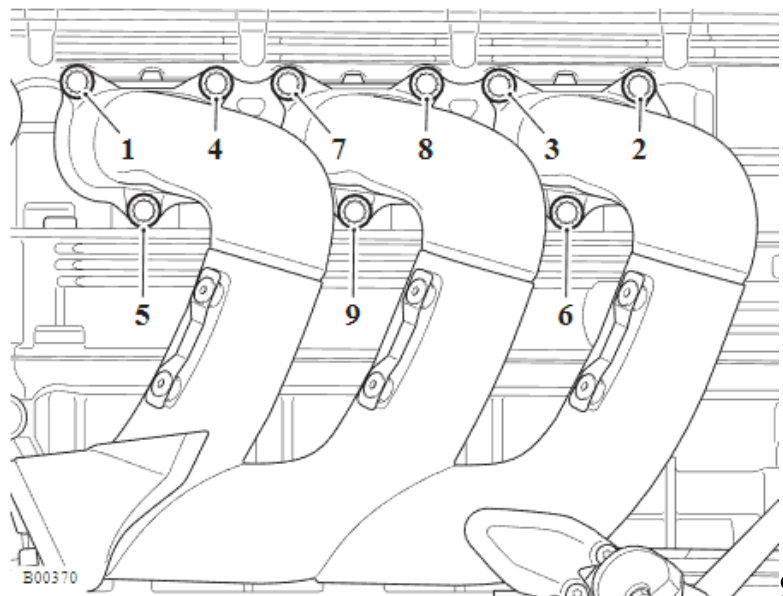
It is not necessary to remove the heat shields to remove the exhaust headers.

5. If required, release the fixings and remove the three heat shields from the exhaust header. Discard the fixings.



1. Fixings
2. Heat shields

6. Release the fixings in the sequence shown and remove the exhaust header pipe.



**Exhaust Header Release Sequence**

## NOTICE

Note the orientation of the three header gaskets for installation.

7. Remove and discard the three gaskets from the cylinder head.

### Exhaust Headers - Installation

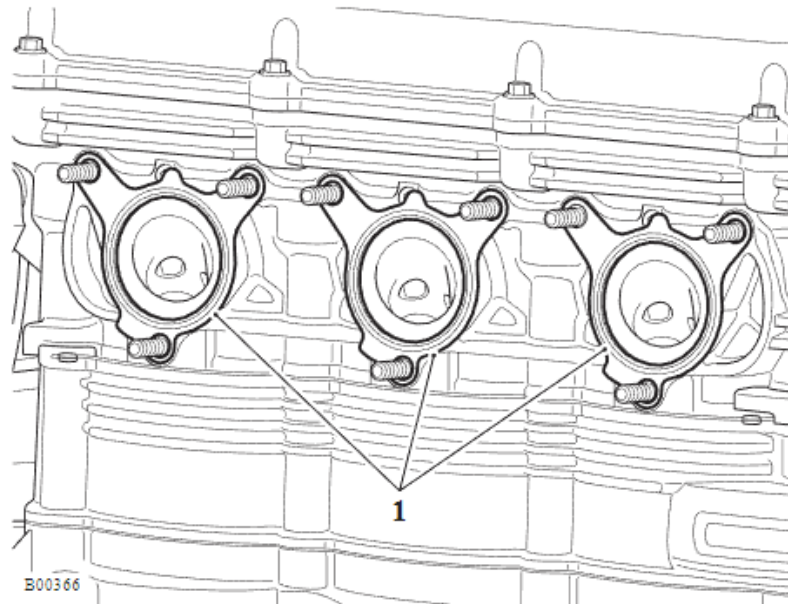
## WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

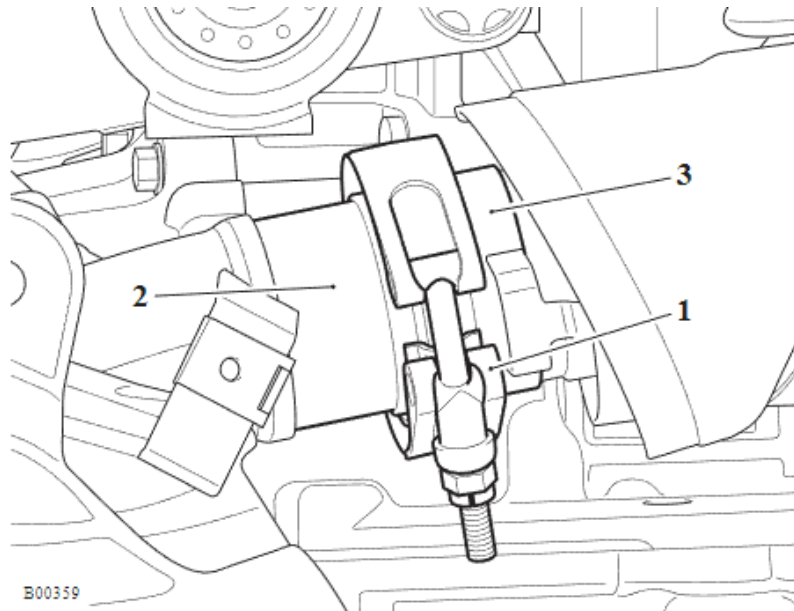
1. Fit new exhaust header gaskets to the cylinder head as noted for removal.



1. Gaskets

2. Fit the exhaust header pipe to the cylinder head. Do not fully tighten the fixings at this stage.
3. Fit a new exhaust gasket to the header pipe.

4. Fit the catalytic converter to the header pipe. Fit the clamp as noted for removal but do not fully tighten at this stage.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Clamp</li><li>2. Catalytic converter</li><li>3. Header pipe</li></ol> |
|--|

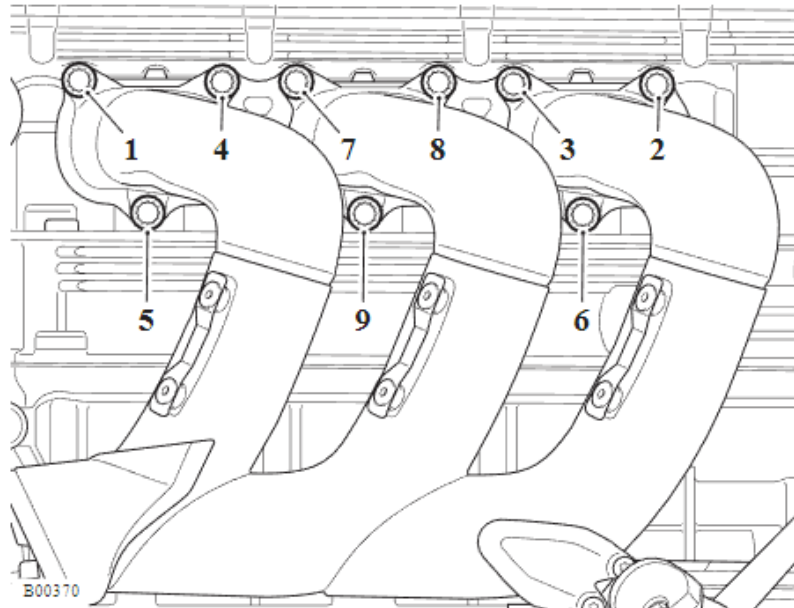
5. Tighten the header pipe fixings in the following two stages:

|         |
|---------|
| Stage 1 |
|---------|

6. Tighten the fixings one to nine in the sequence shown to 22 Nm.

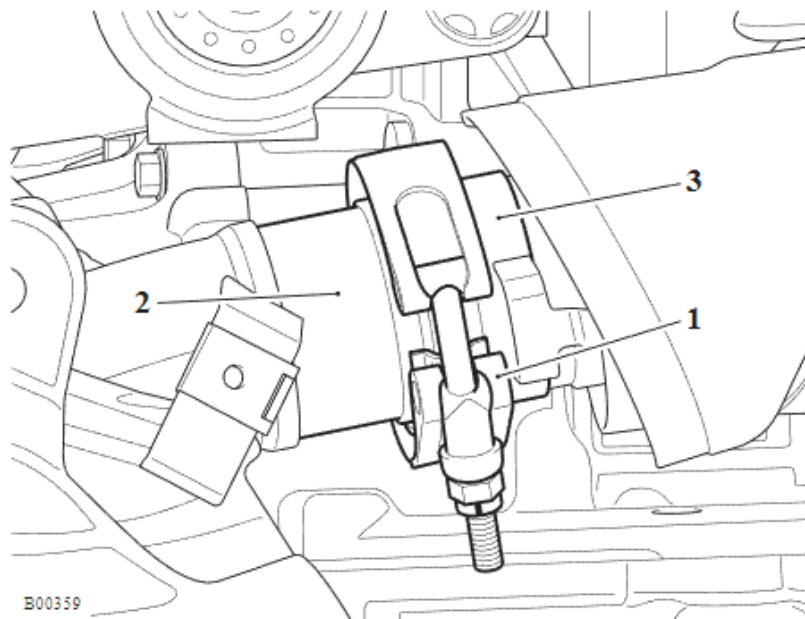
Stage 2

- Retighten fixings one to three to 22 Nm.



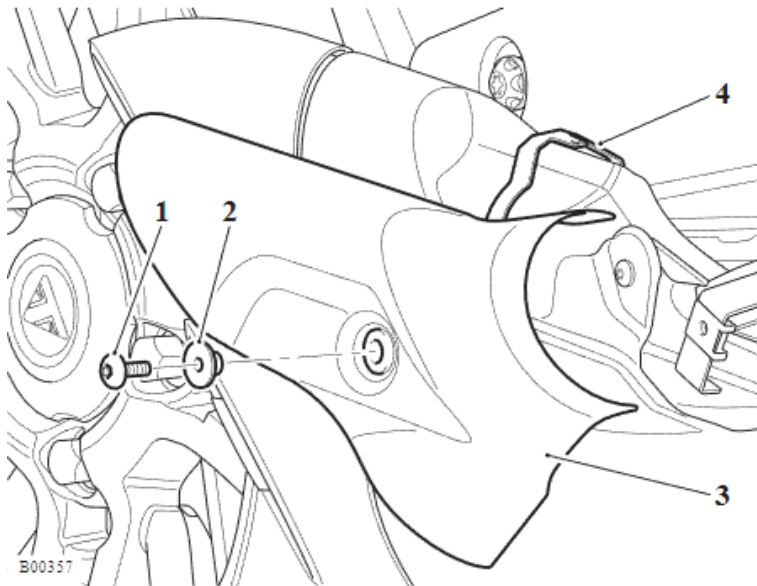
Exhaust Header Tightening Sequence (new illus required)

- With the catalytic converter clamp in the position noted for removal, tighten it to 11 Nm.



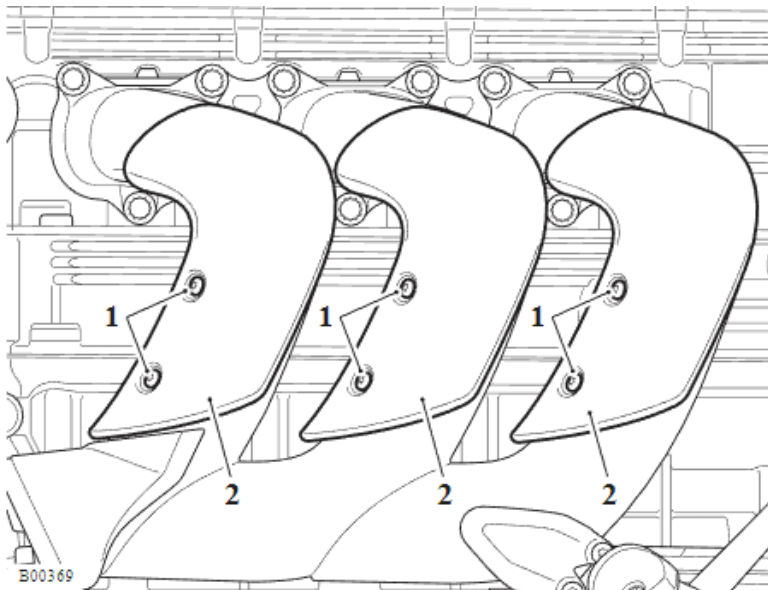
- Clamp
- Catalytic converter
- Header pipe

9. Fit the catalytic converter right hand cover to its locating lug.
10. Fit the shouldered washer and tighten the fixing to 5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Shouldered washer</li><li>3. Cover</li><li>4. Locating lug</li></ol> |
|---|

11. If removed, fit the three heat shields and tighten the new fixings to 5 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Heat shields</li></ol> |
|--|

12. Start the engine and check for exhaust gas leaks. Rectify if necessary.

## Evaporative System Components

### Evaporative Loss Control System

This model is fitted with a system to control the evaporation of fuel vapour to the atmosphere.

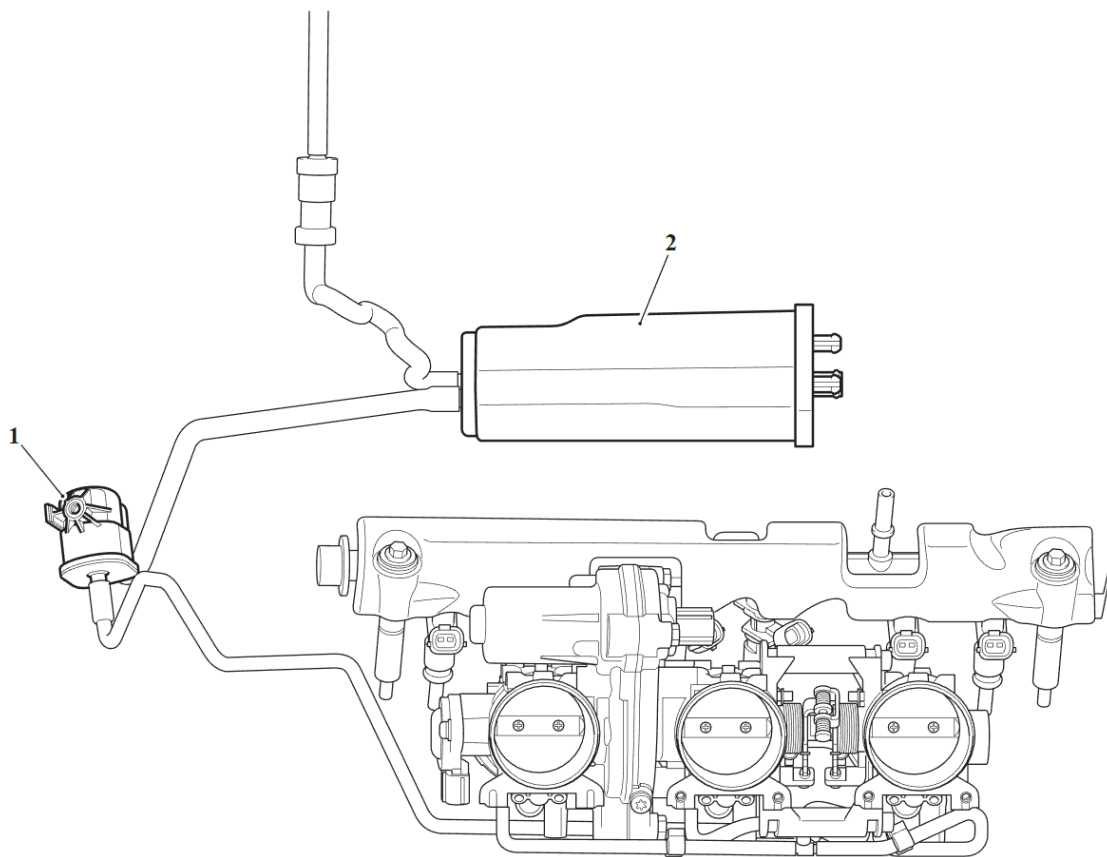
A carbon filled evaporative canister absorbs vapour while the engine is not running. When the engine is started, the vapour is returned to the engine and burnt.

There are two distinct phases to the system's operation; engine off and engine running see [Evaporative Control System - Engine Off](#) and [Evaporative Control System - Engine Running](#).

### Component Locations

Evaporative Canister - to the rear of the frame, beside the ABS modulator bracket.

Purge Control Valve - (electronically controlled by the engine ECM) attached to the ABS modulator bracket.

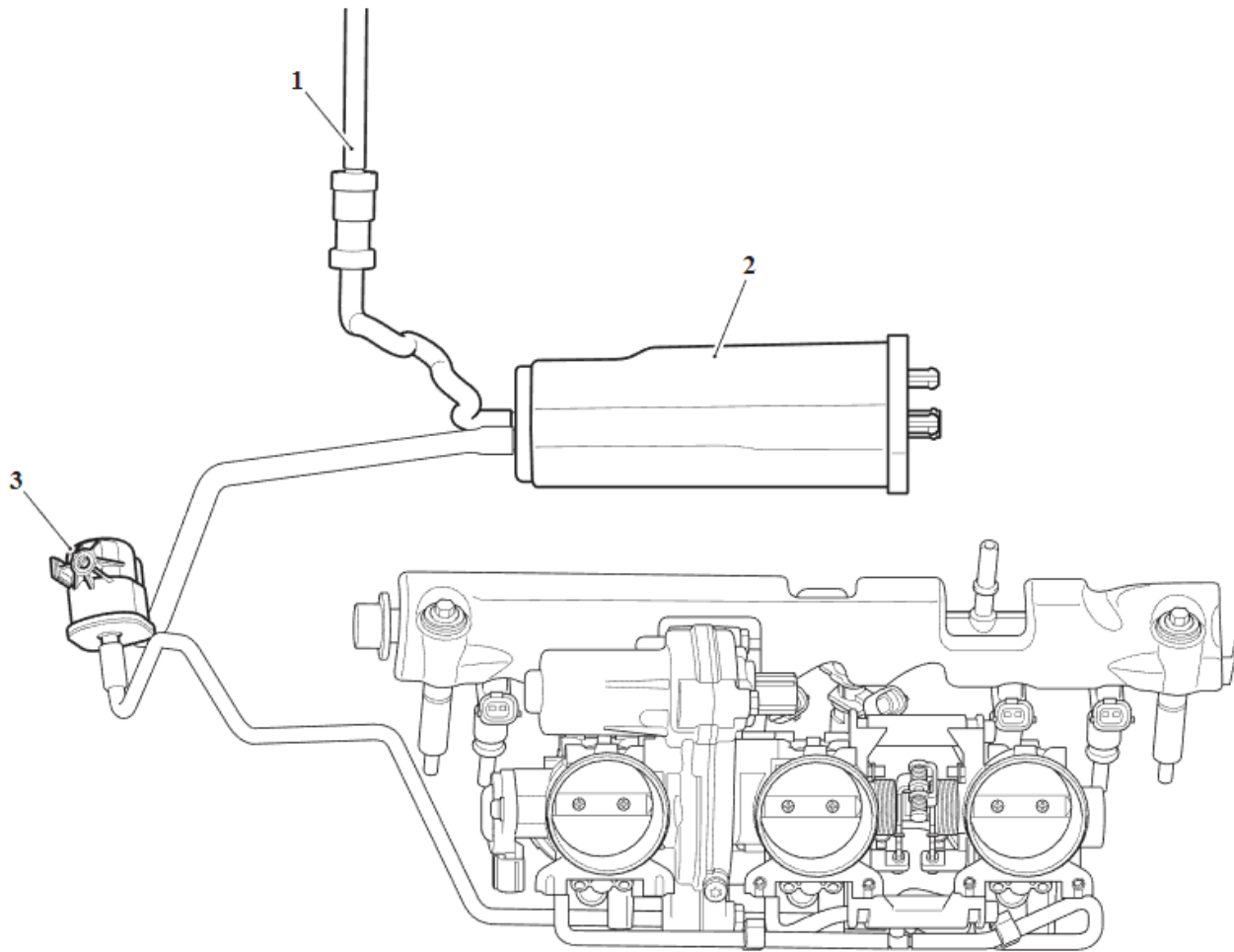


1. Purge control valve
2. Evaporative canister

## Evaporative Control System - Engine Off

When the engine is stationary, any pressure increase in the fuel tank due to a rise in ambient temperature will cause the fuel vapour to pass down via breather pipe A to a carbon filled evaporative canister which stores the vapour.

Once in the canister, vapour cannot enter the engine because the purge valve is closed.



- 1. Breather pipe A
- 2. Evaporative canister
- 3. Purge valve

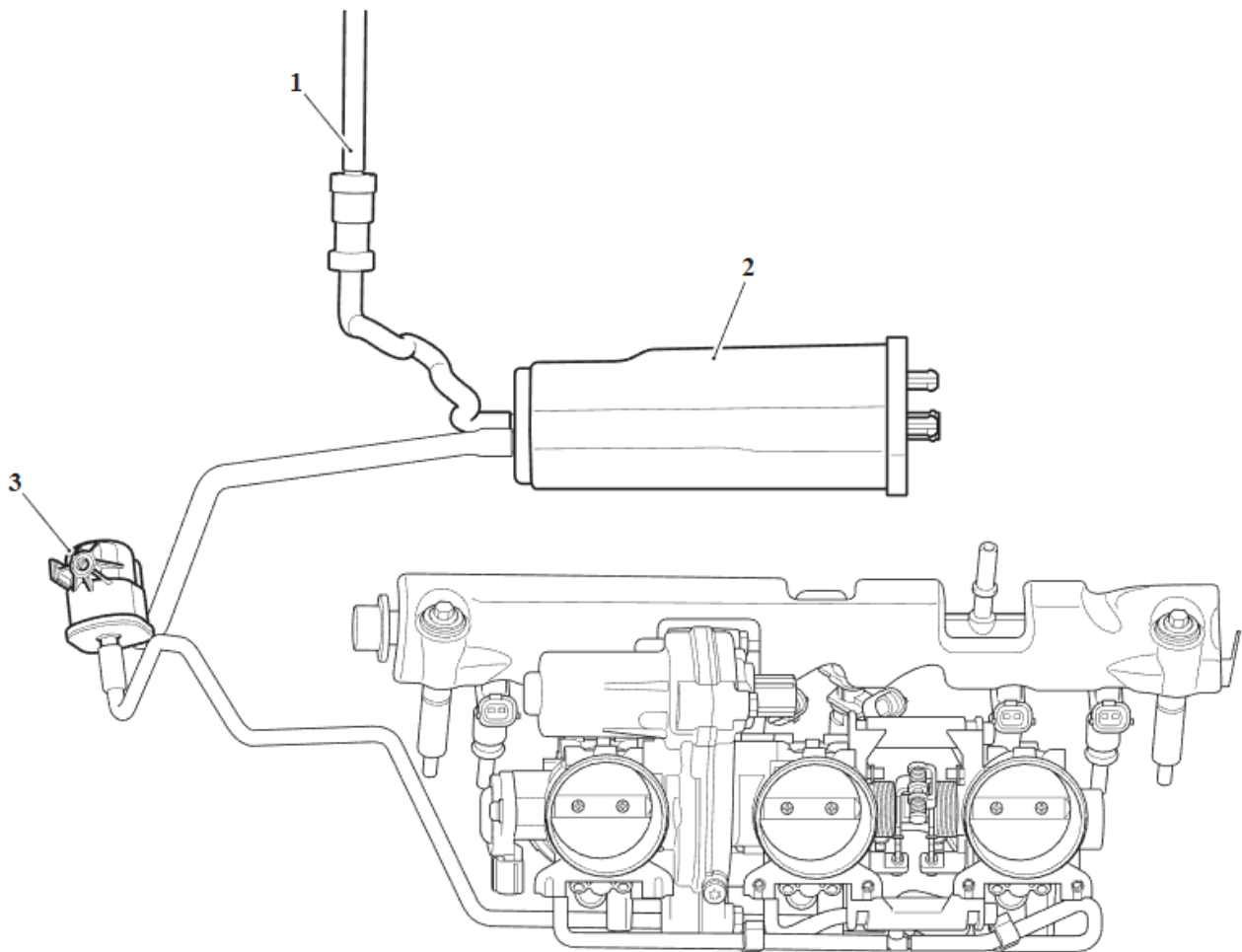


## Evaporative Control System - Engine Running

When the engine is started, a vacuum is applied to the purge hose from the throttle bodies.

At certain times, the engine ECM opens the purge valve. The vacuum applied to the purge valve now begins to draw stored vapour from the carbon filled evaporative canister to the throttle bodies for burning in the engine.

In order to control the speed at which vapour is purged from the canister, the engine management system regularly shuttles the purge control valve between open and closed positions.



1. Throttle bodies
2. Evaporative canister
3. Purge valve

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

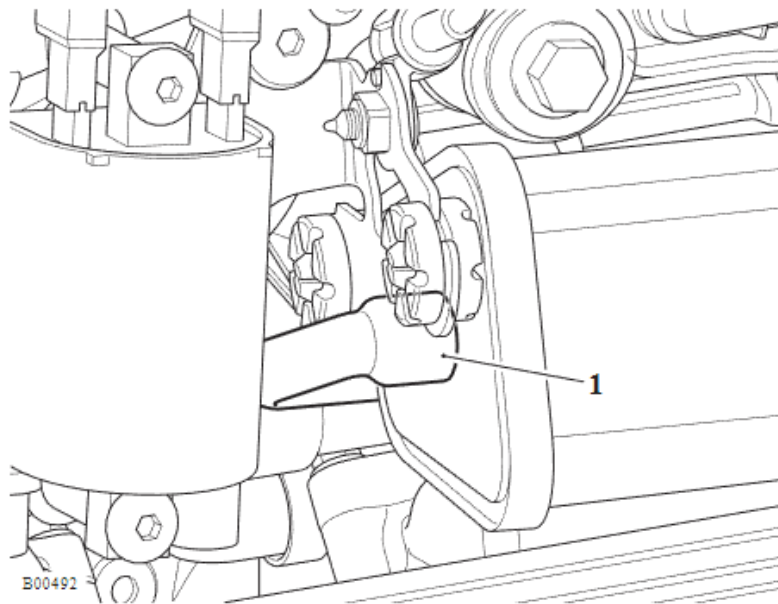
**NOTICE**

Note the routing and locations of the hoses connected to the evaporative canister for installation.  
Not the orientation of the evaporative canister for installation.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

1. Detach the vent hose from the evaporative cannister.



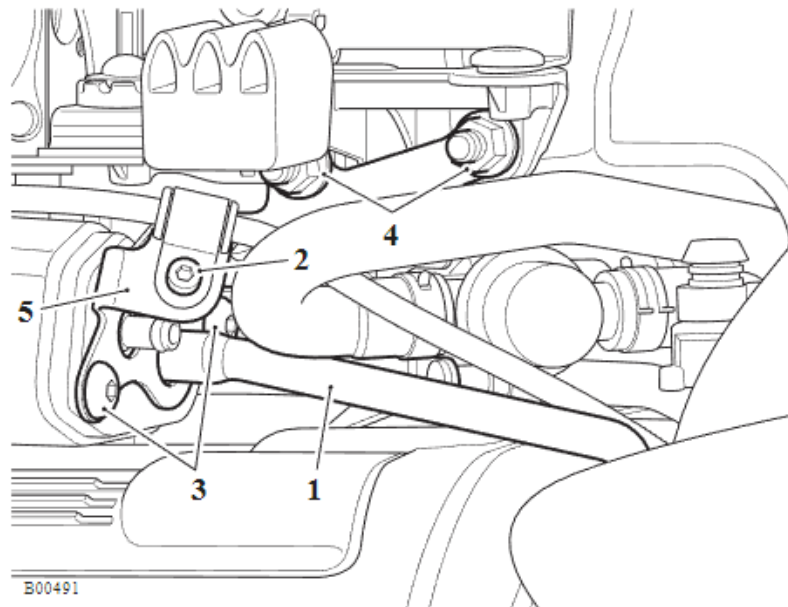
1. Vent hose

2. Detach the purge valve hose from the evaporative canister.
3. Detach the brake line P-clip from the evaporative cannister bracket.

### NOTICE

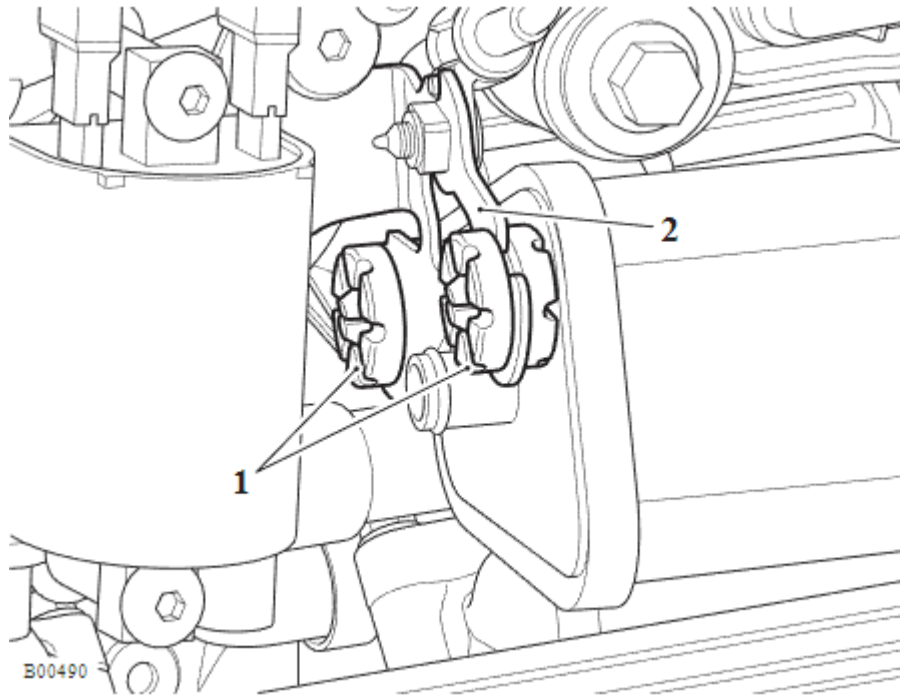
Not the position of the evaporative canister bracket to the fuel tank mounting for installation.

4. Release the lock nuts and detach the fuel tank mounting from the frame. Discard the lock nuts.
5. Detach the purge valve from it bracket.



1. Purge valve hose
2. Fixing (brake line)
3. Fixings (evaporative canister)
4. Lock nuts
5. Bracket

6. Detach the evaporative canister from its rubber grommets to remove the canister.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Grommets</li><li>2. Bracket</li></ol> |
|--|

#### Evaporative Canister – Installation

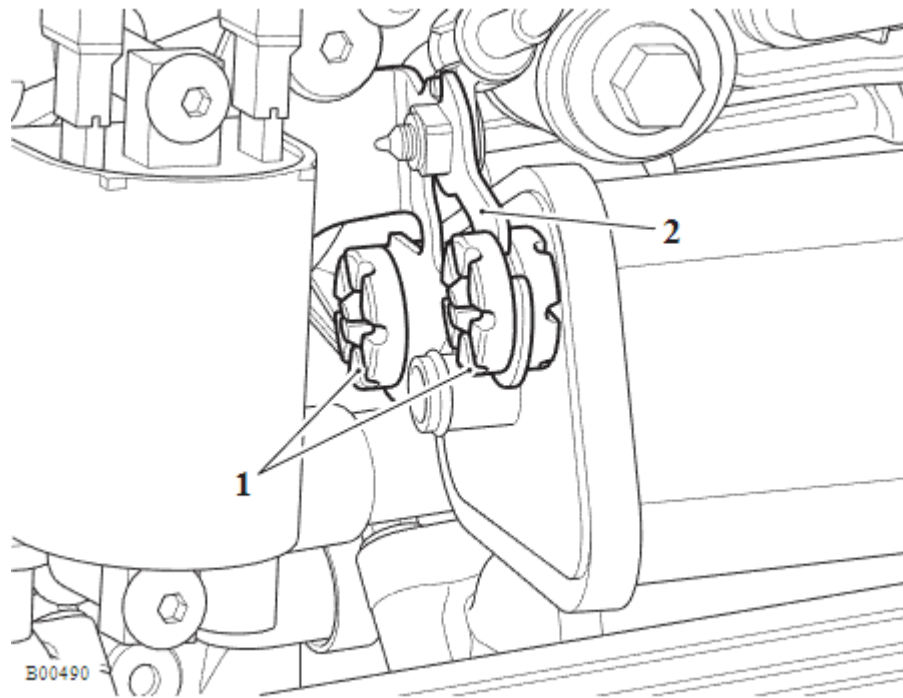
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

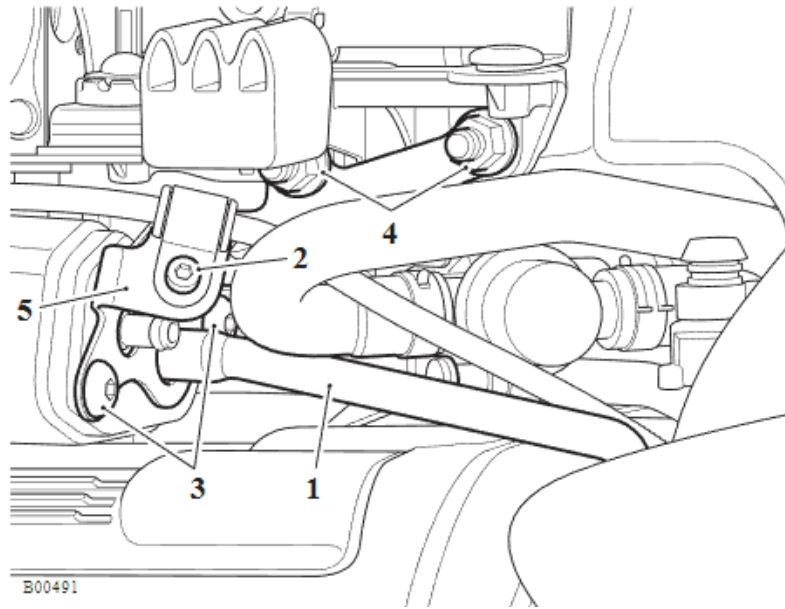
1. Attach the evaporative canister to its rubber grommets on the ignition coil bracket.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Grommets</li><li>2. Bracket</li></ol> |
|--|

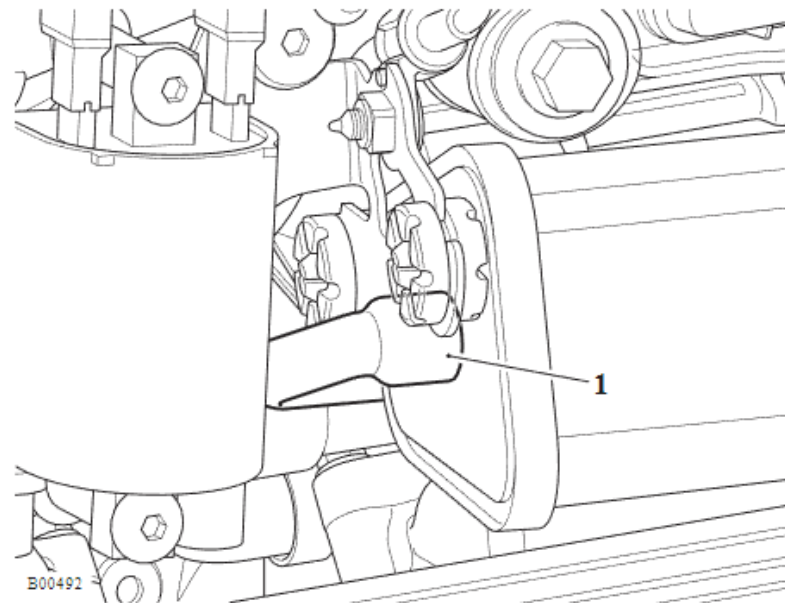
2. Attach the evaporative canister bracket to the evaporative canister. Do not fully tighten the fixings at this stage.
3. Fit the evaporative canister bracket to the fuel tank mounting and tighten the new lock nuts to 22 Nm.
4. Tighten the evaporative canister fixings to 5 Nm.
5. Attach the brake line P-clip to the evaporative canister bracket and tighten the fixing to 5 Nm.

6. Attach the purge valve hose to the evaporative canister as noted for removal.



- 1. Purge valve hose
- 2. Fixing (brake line)
- 3. Fixings (evaporative canister)
- 4. Lock nuts
- 5. Bracket

7. Attach the vent hose to the evaporative canister as noted for removal.



- 1. Vent hose

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Purge Control Valve – Removal

## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

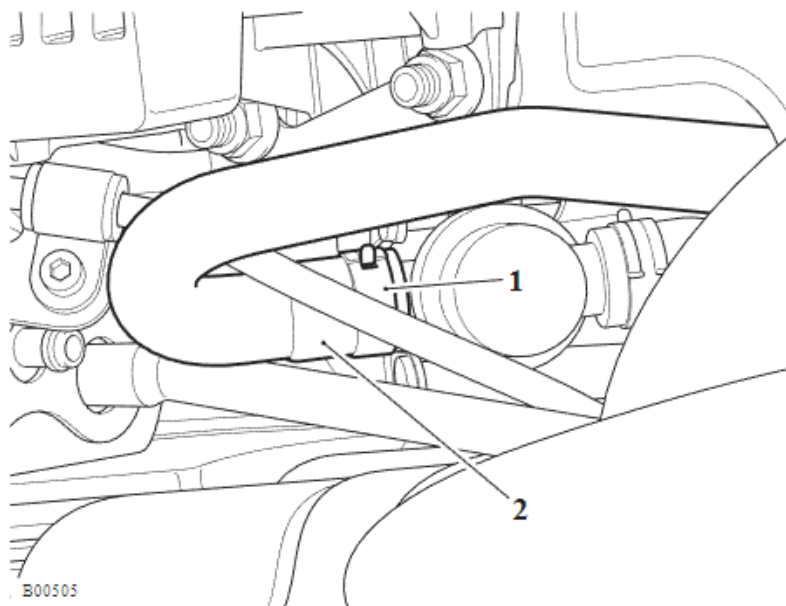
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

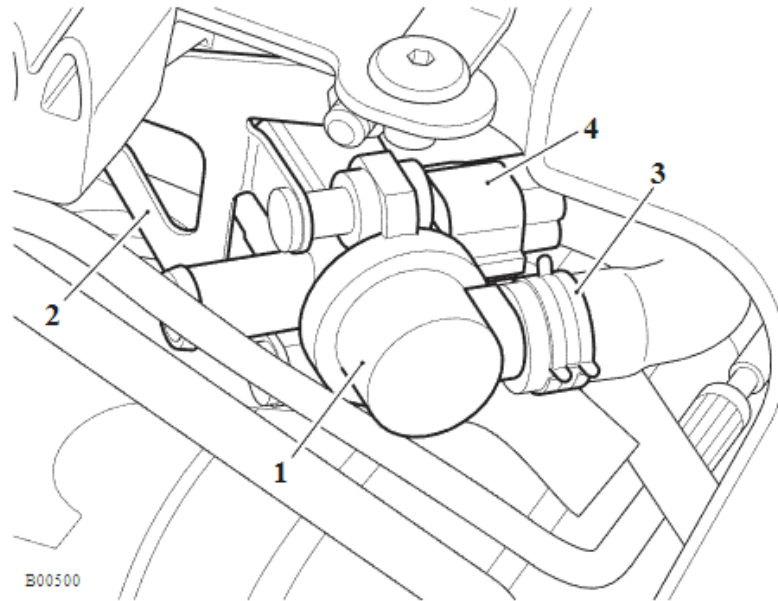
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

1. Using service tool T3880207 release the clamp and detach the secondary air injection silencer hose from the purge valve.



1. Clamp
2. Silencer hose

2. Detach the purge valve from the evaporative canister bracket.
3. Using service tool T3880207 release the clamp and detach the secondary air injection hose from the purge valve.
4. Disconnect the electrical connector and remove the purge valve.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Purge valve</li><li>2. Evaporative canister bracket</li><li>3. Clamp</li><li>4. Electrical connector</li></ol> |
|---|

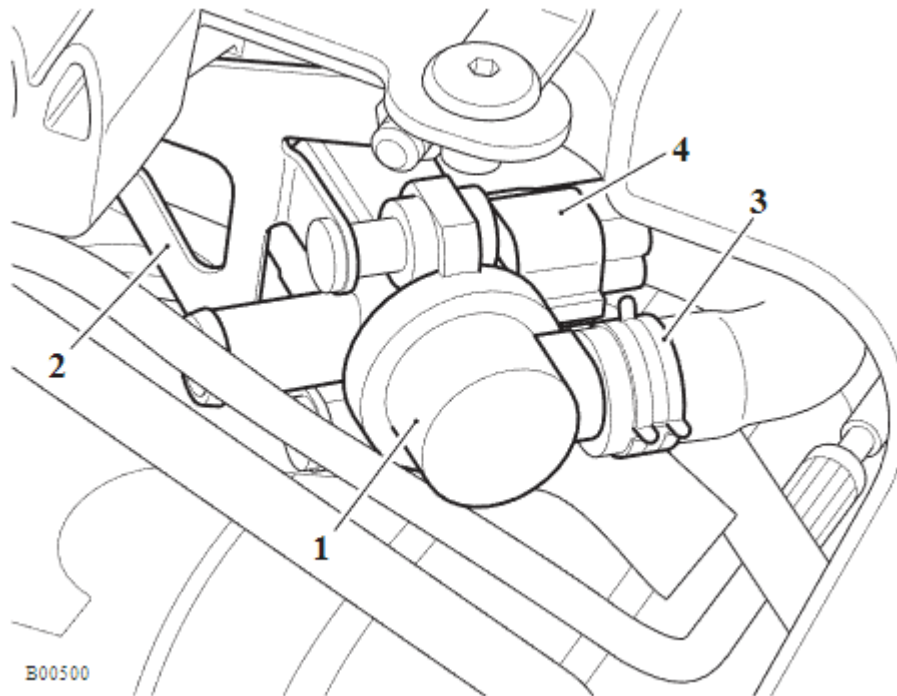
#### Purge Control Valve - Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



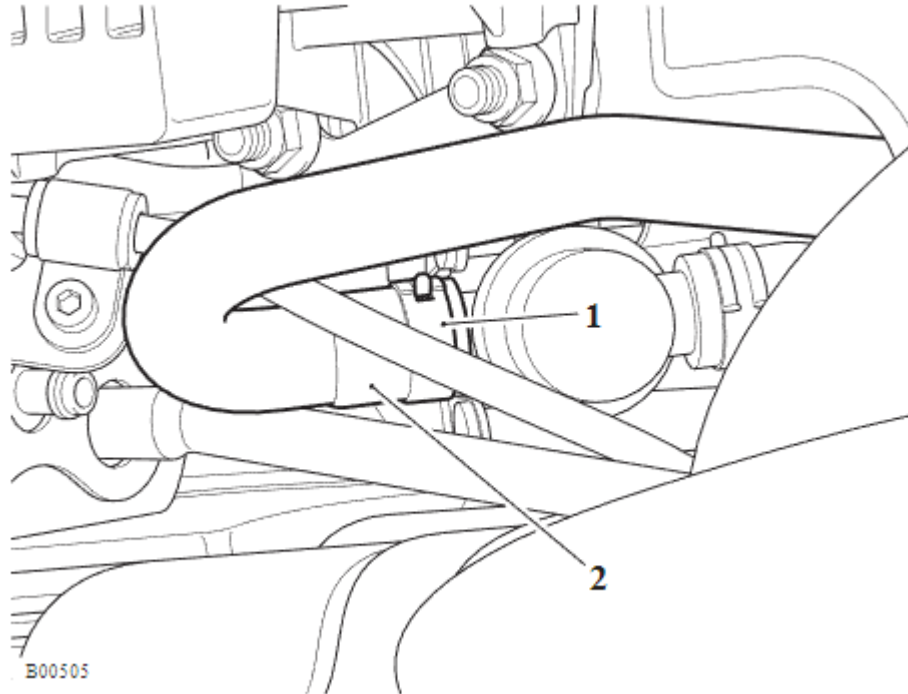
1. Connect the electrical connector to the purge valve.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Purge valve</li><li>2. Evaporative canister bracket</li><li>3. Clamp</li><li>4. Electrical connector</li></ol> |
|---|

2. Connect the secondary air injection hose to the purge valve and secure with its clamp.
3. Attach the purge valve to the evaporative canister bracket.

4. Connect the secondary air injection silencer hose to the purge valve and secure with its clamp.



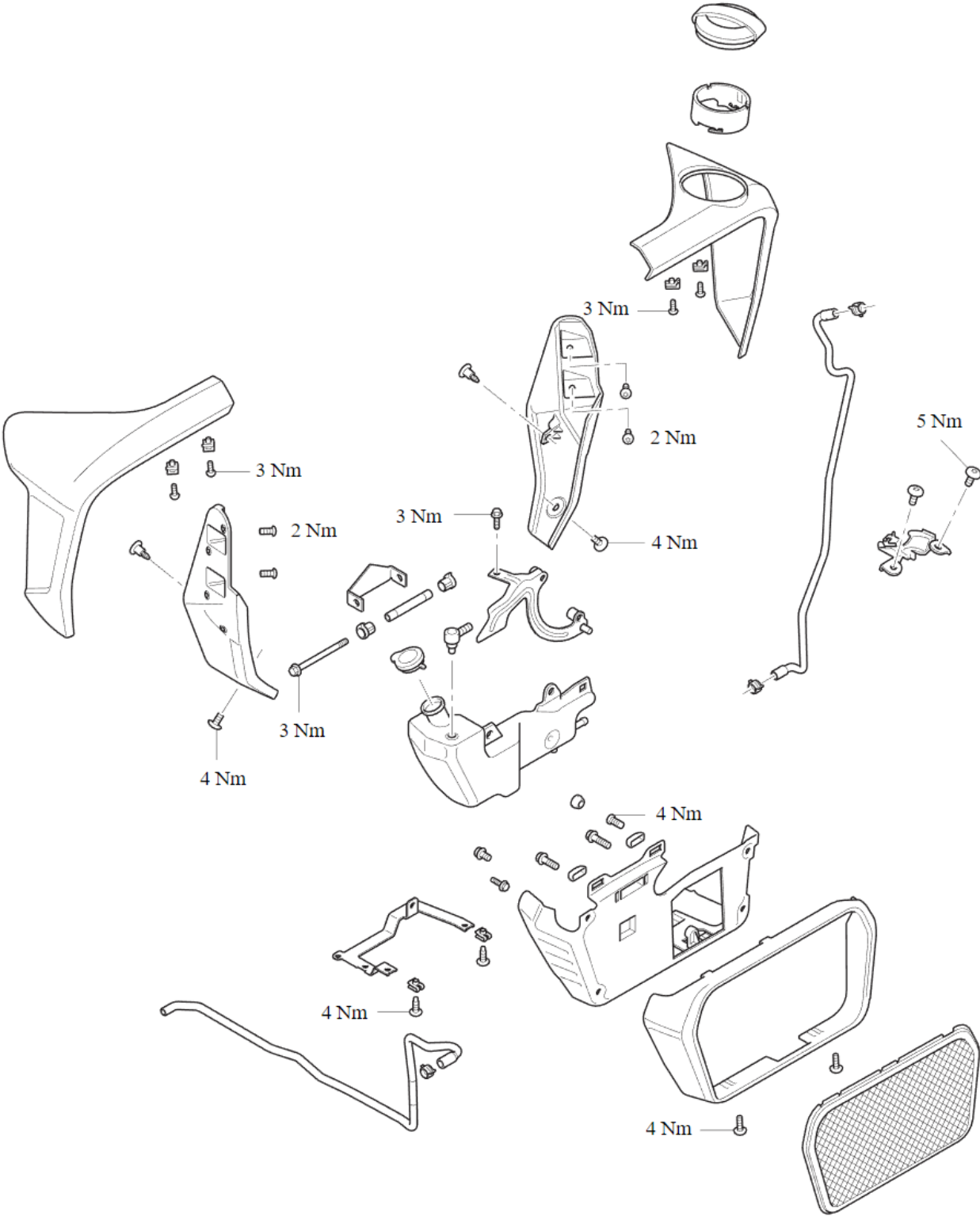
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Clamp</li><li>2. Silencer hose</li></ol> |
|---|

Perform the following operations:

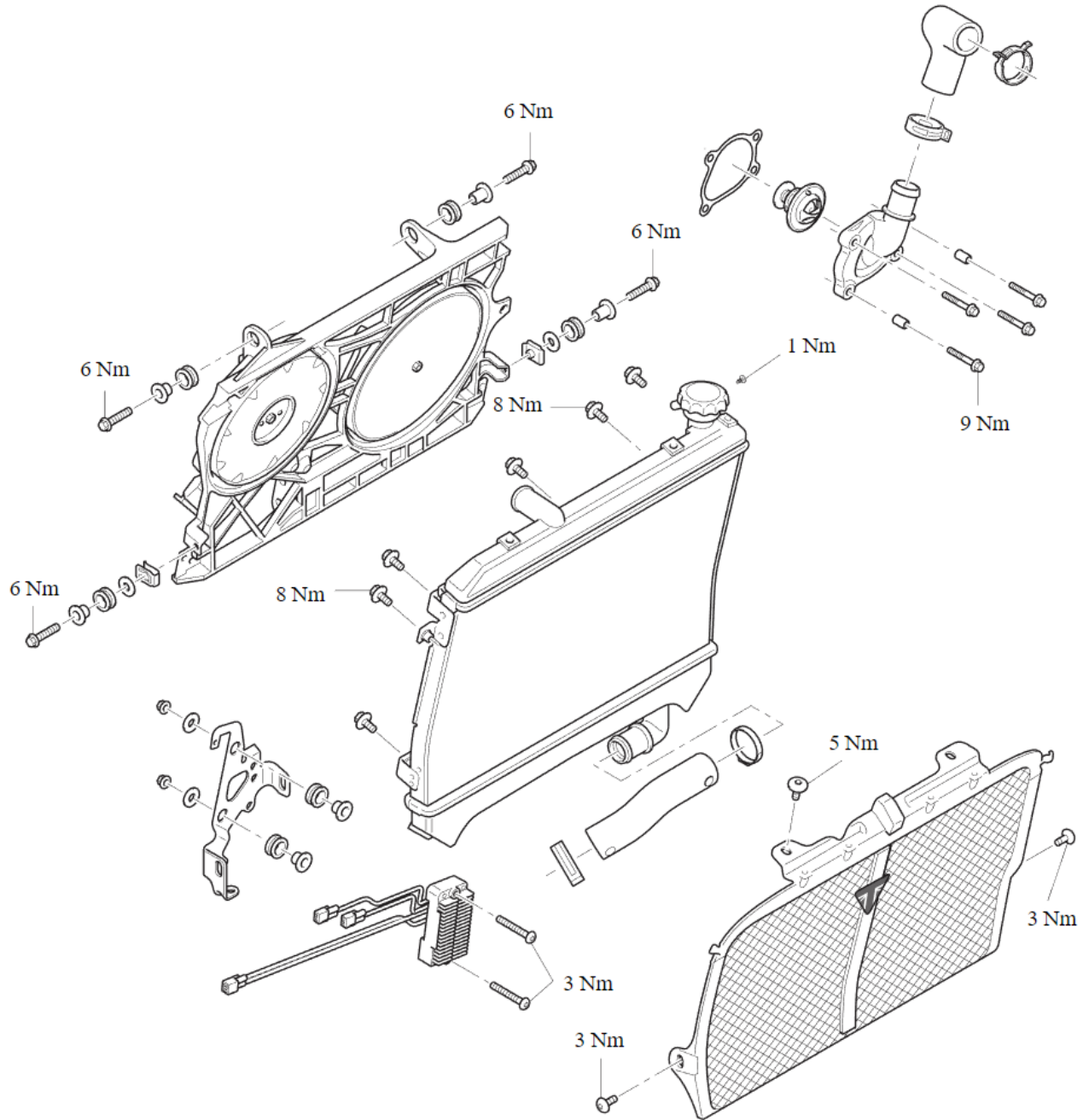
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

# Cooling

## Exploded View - Radiator Cowl and Coolant Expansion Tank



## Exploded View – Radiator



## Radiator Hoses

Check the radiator hoses for cracks or deterioration, and hose clamps for tightness in accordance with scheduled maintenance requirements.

## Radiator and Cooling Fan Inspection

### Radiator

#### CAUTION

Using high pressure water, such as from a pressure-washer, can damage the radiator fins and impair the radiator's efficiency.

Do not obstruct or deflect airflow through the radiator by installing unauthorised accessories in front of the radiator or behind the cooling fan. Interference with the radiator airflow can lead to overheating and consequent engine damage.

1. Check the radiator for stone damage.
2. Check the radiator core for damage to fins or obstructions to air flow.
3. Clean off any obstructions with a stream of low-pressure water.

#### CAUTION

To avoid overheating and consequent engine damage, replace the radiator if the cores are blocked or if the fins are badly deformed or broken.

4. Rectify any damage.

### Cooling Fan

#### WARNING

The cooling fans are switched on and off by the Cooling Fan Controller in response to a signal received from the coolant temperature sensor. To prevent injury, never place loose clothing, fingers or hands near the cooling fans, until the engine is stopped. Loose clothing, fingers or the hands could become trapped during cooling fans operation and cause crushing injury to the fingers, hands or other parts of the anatomy.

The motorcycle is fitted with a cooling fan controller situated behind the radiator which controls the two cooling fans. When the fans operate with the motorcycle stationary or at slow speed, cool air is drawn through the radiator from the front of the motorcycle.

The cooling fan controller controls the cooling fans at various speeds depending on the temperature of the coolant. The controller will switch on the fans at their minimum speed when the coolant temperature reaches 91°C. As the coolant temperature rises the controller will gradually increase the cooling fans speed until they are at maximum speed and the coolant temperature is at 103°C.

When the fans operate with the motorcycle stationary or at slow speed, cool air is drawn through the radiator from the front of the motorcycle.

1. Check that the cooling fans spin freely and without tight spots.
2. Check the cooling fans blades for signs of heat distortion.
3. Rectify as necessary.

## Coolant

### **NOTICE**

From VIN AG0784 the coolant was changed from Triumph HD4X Hybrid OAT coolant to Triumph D2053 OAT coolant.

If the Triumph HD4X Hybrid OAT coolant is drained the cooling system must be flushed through prior to filling the cooling system with the Triumph D2053 OAT coolant.

A year-round, Hybrid Organic Acid Technology (known as Hybrid OAT or HOAT) coolant is installed in the cooling system when the motorcycle leaves the factory. It is coloured green, contains a 50% solution of ethylene glycol based antifreeze, and has a freezing point of -35°C (-31°F).

Always change the coolant at the intervals specified in the Scheduled Maintenance chart.

**⚠ WARNING**

The standard coolant mixture contains toxic chemicals that are harmful to the human body. Never swallow neat antifreeze or any of the coolant mixture.

**⚠ CAUTION**

The antifreeze incorporated in the coolant mixture contains a corrosion inhibitor that helps prevent damage to the cooling system and engine. Without this inhibitor, the coolant would 'attack' the metals and the resulting corrosion would cause blockages in the cooling system leading to engine overheating and damage.

Always use the antifreeze listed in the Specification section and never use a methanol based antifreeze as this does not contain the required corrosion inhibition properties.

**⚠ CAUTION**

If hard water is used in the cooling system, it will cause scale accumulation in the engine and radiator and considerably reduce the efficiency of the cooling system. Reduced cooling system efficiency may cause the engine to overheat and suffer severe damage.

**NOTICE**

HD4X Hybrid OAT coolant, as supplied by Triumph, is premixed and does not need to be diluted prior to filling or topping up the cooling system.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

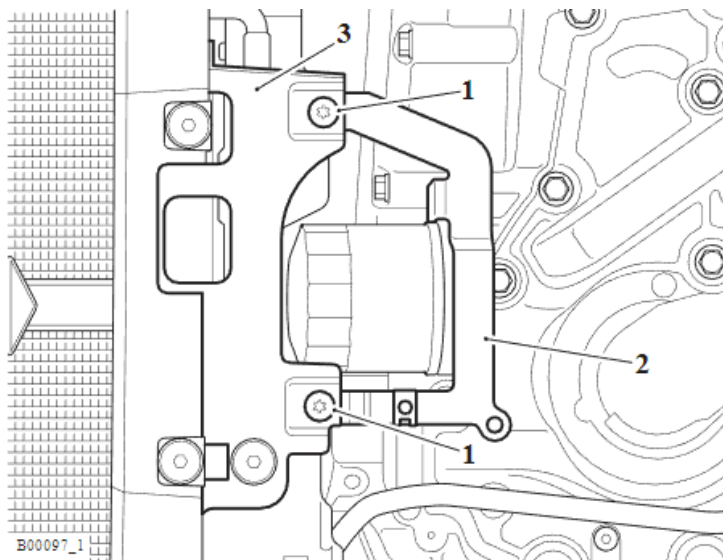
**⚠ WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot.  
When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

**NOTICE**

To access the coolant drain plug, the radiator lower surround will need to be pivoted slightly forward.

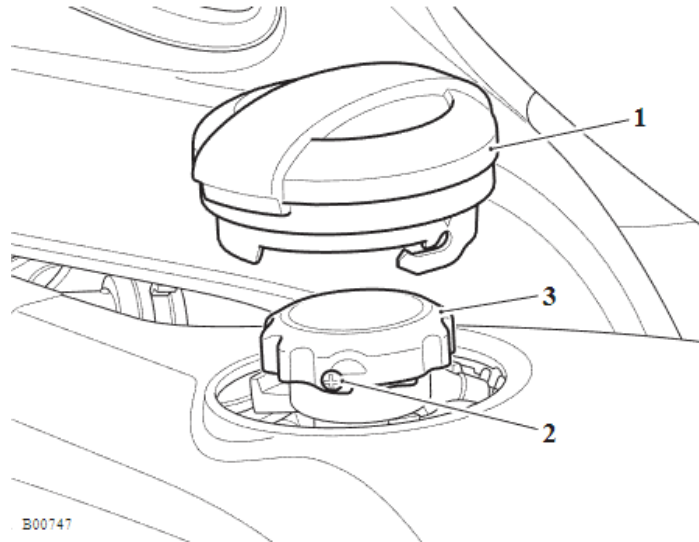
1. Release the two fixings securing the radiator lower surround to its bracket.



1. Fixings
2. Bracket
3. Radiator lower surround

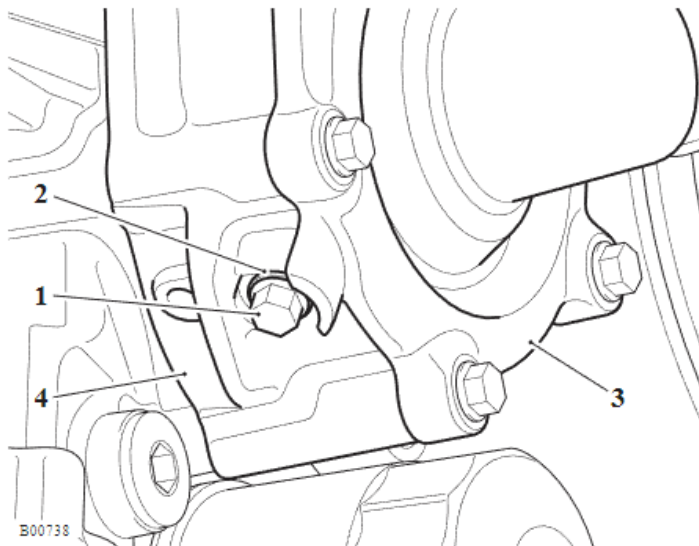


2. Position a container below the engine and radiator to collect the displaced coolant.
3. Turn the radiator cap cover anticlockwise and remove.
4. Release the fixing and remove the coolant pressure cap.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Cover</li><li>2. Fixing</li><li>3. Coolant pressure cap</li></ol> |
|--|

5. Pivot the radiator lower surround and remove the coolant drain plug from clutch cover, located next to the water pump cover, to drain the coolant. Discard the sealing washer.

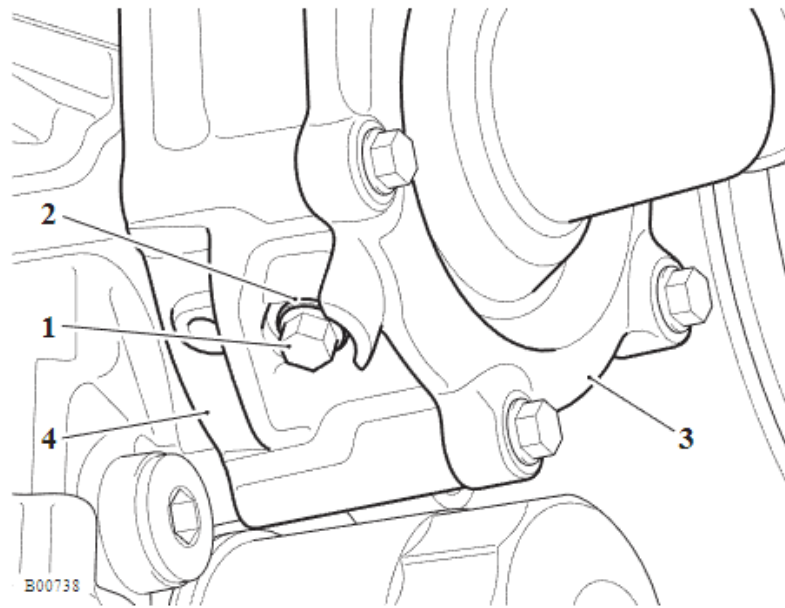


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Drain plug</li><li>2. Sealing washer</li><li>3. Water pump cover</li><li>4. Clutch cover</li></ol> |
|---|

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new sealing washer to the drain plug. Fit the drain plug and tighten to 8 Nm.



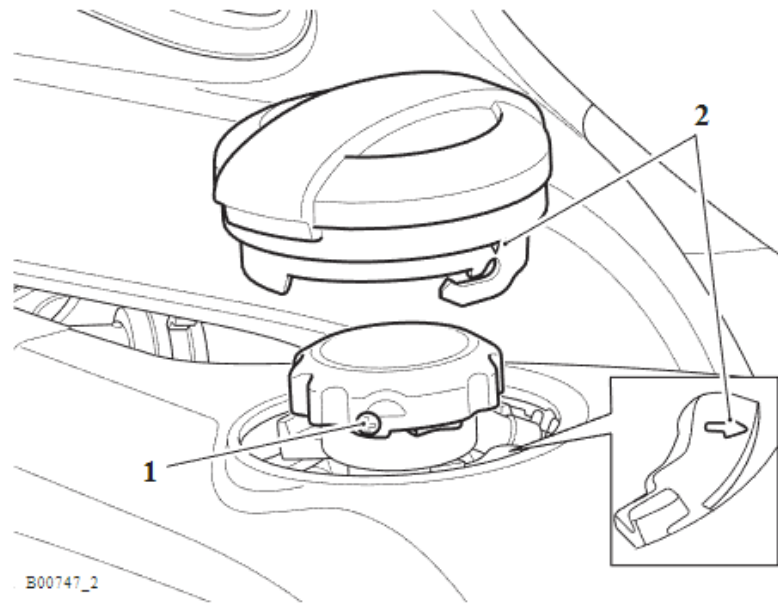
1. Drain plug
2. Sealing washer
3. Water pump cover
4. Clutch cover

2. Slowly add coolant mixture to the system, through the filler opening, until coolant escapes from the filler opening.

**NOTICE**

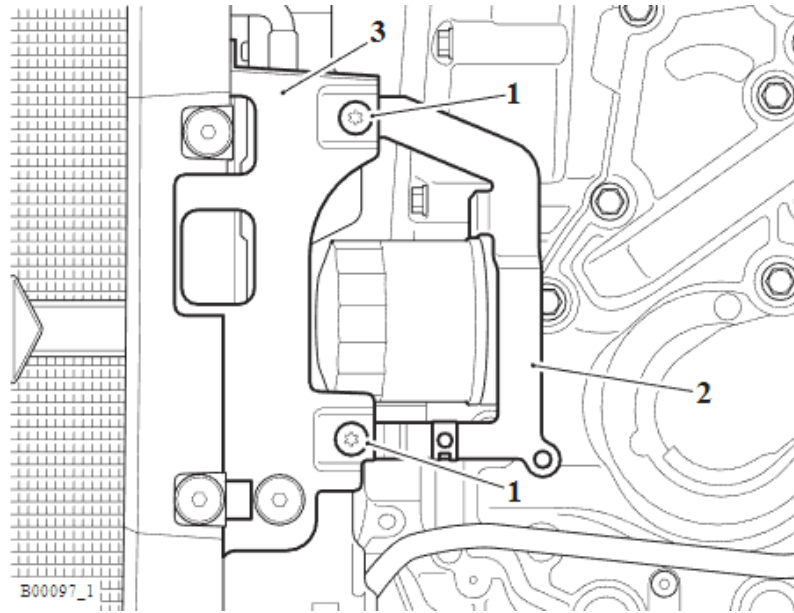
If the system has filled correctly and fully, there should be coolant visible through the filler opening.  
During filling, squeezing the bottom hose with both hands will help to pump coolant around the system and remove trapped air.

3. Refit the coolant pressure cap.
4. Start the motorcycle and allow the engine to idle. Briefly raise the engine speed several times to allow any air to be expelled from the system.
5. Stop the engine and allow it to cool.
6. Remove the coolant pressure cap.
7. If necessary, top up the system through the filler.
8. Fit the coolant pressure cap to the radiator filler neck and tighten the fixing to 1 Nm.
9. Align the alignment mark on the radiator cap cover to alignment mark on the radiator cowl and fit the radiator cap cover. Turn the cap cover clockwise to secure.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Alignment mark</li></ol> |
|---|

10. Fit the radiator lower surround to its bracket and tighten the fixings to 4 Nm.



- 1. Fixings
- 2. Bracket
- 3. Radiator lower surround

#### Coolant Expansion Tank – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

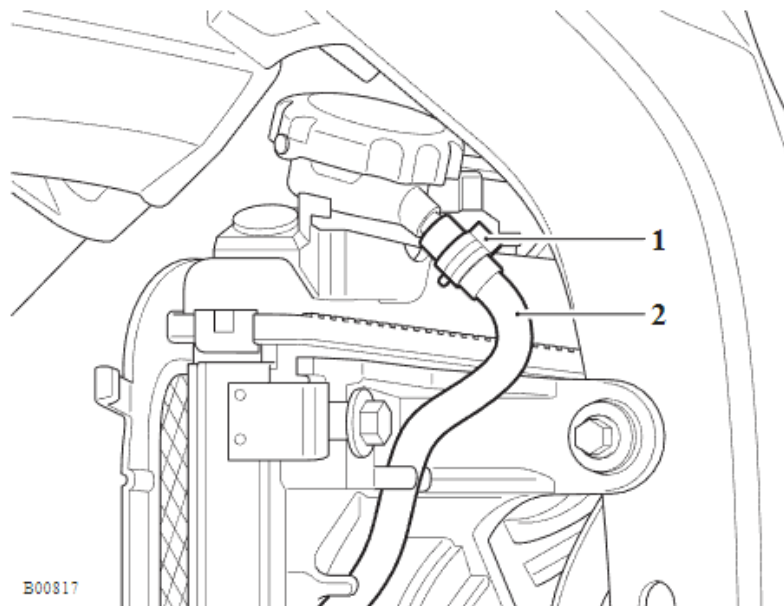
Perform the following operations:

- **Radiator Cowl - Removal**

**NOTICE**

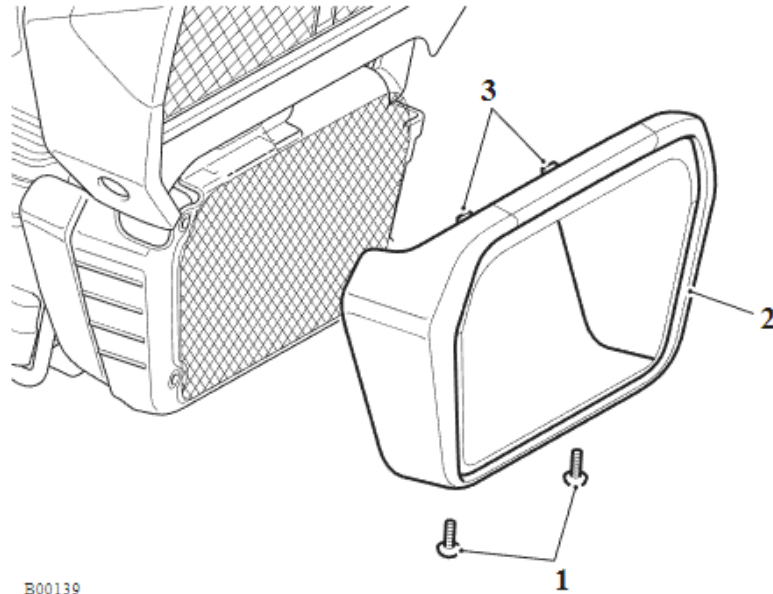
Note the routing of the coolant expansion hose and its retaining clips for installation.

1. Release the clamp and detach the coolant expansion hose from the radiator filler neck.



1. Clamp
2. Hose

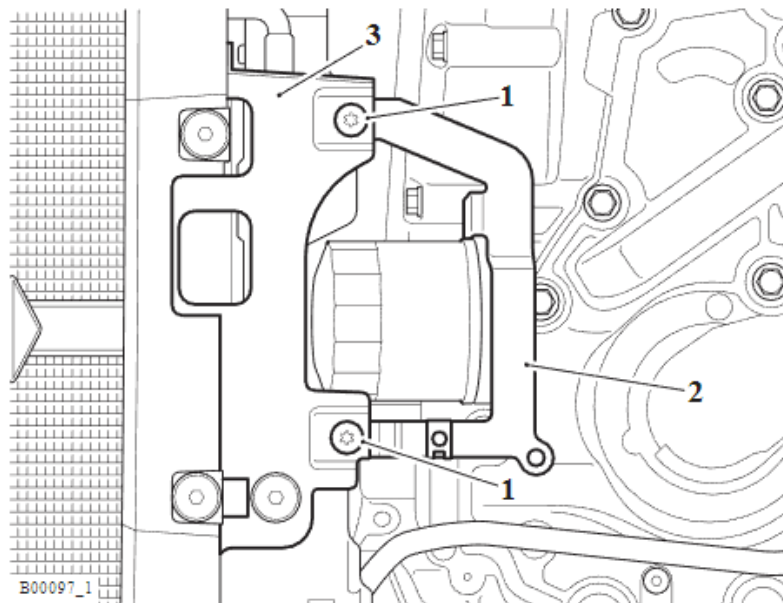
2. Release the fixings, move the radiator lower cowl forward to disengage the upper retaining clips and remove the lower cowl.



B00139

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Lower cowl</li><li>3. Retaining clips</li></ol> |
|---|

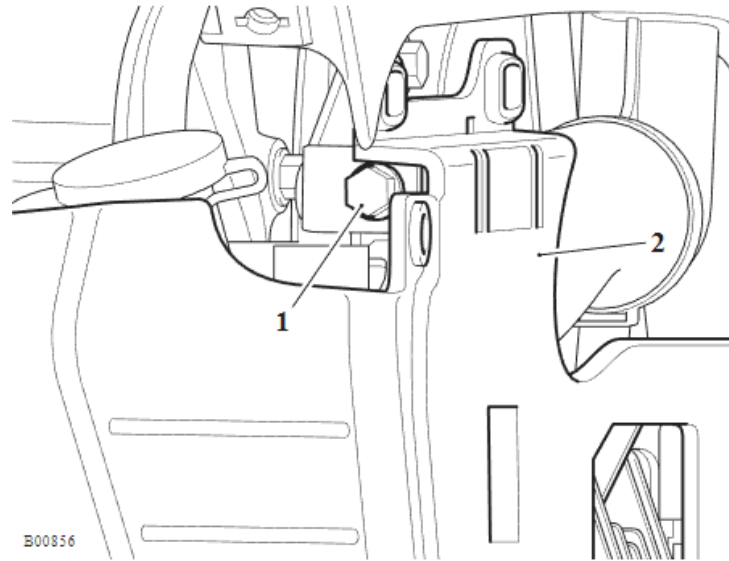
3. Release the two fixings securing the radiator lower surround to its bracket.



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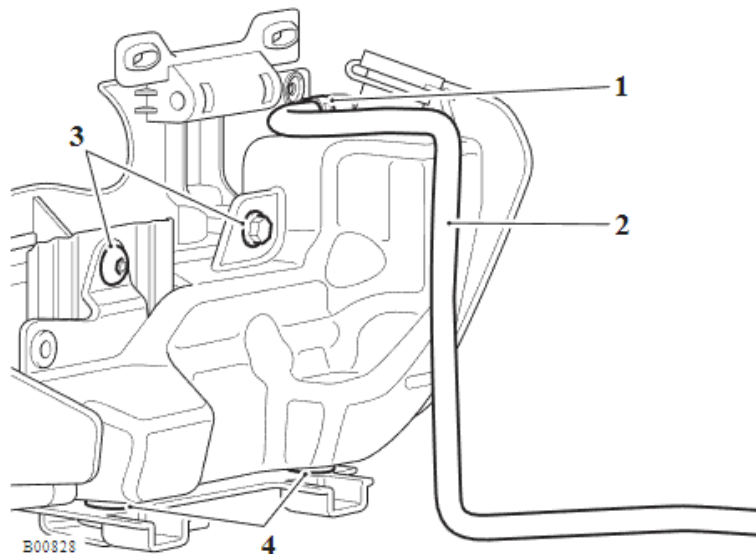
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Bracket</li><li>3. Radiator lower surround</li></ol> |
|--|

4. Release the lower cowl upper fixing and detach the lower cowl assembly from the motorcycle.



1. Fixing
2. Lower cowl assembly

5. Release the clamp and detach the coolant expansion hose from the top of the expansion tank.
6. Release the two fixings, lift the coolant expansion tank upwards to release the lower locating lugs and remove.

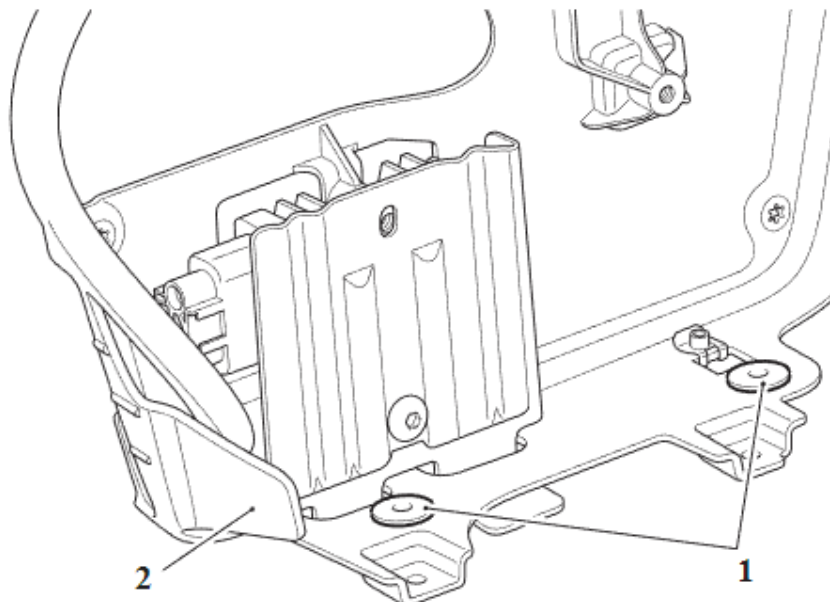


1. Clamp
2. Hose
3. Fixings
4. Locating lugs position

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Make sure the grommets for the expansion tank lower locating lugs are fitted to the lower cowl assembly.

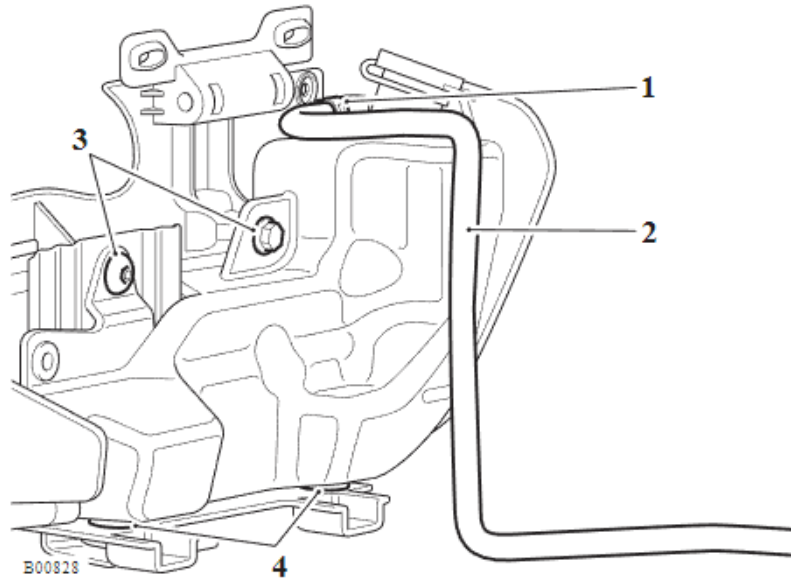


1. Grommets
2. Lower cowl assembly

2. Fit the coolant expansion tank to the lower cowl assembly. Make sure the lower locating lugs fit into their grommets on the lower cowl assembly. Tighten the fixings to 4 Nm.

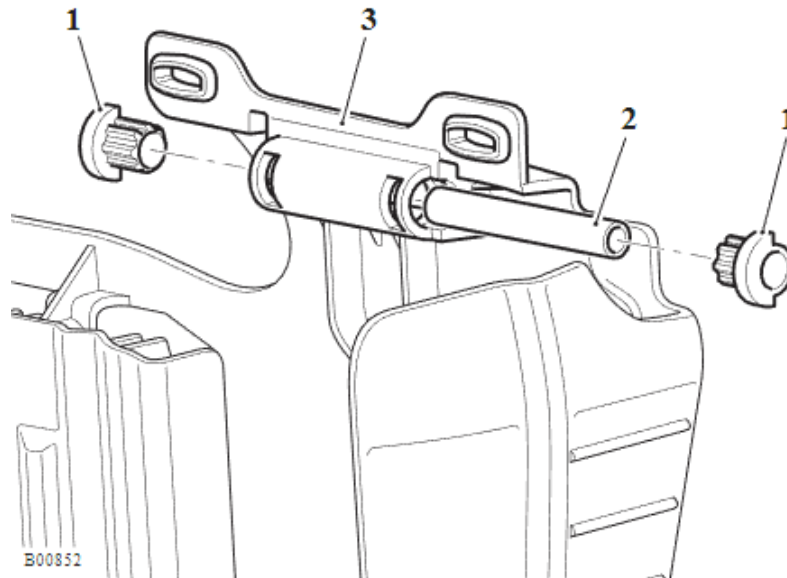


3. Attach the coolant expansion hose to the top of the expansion tank and secure with its clamp.



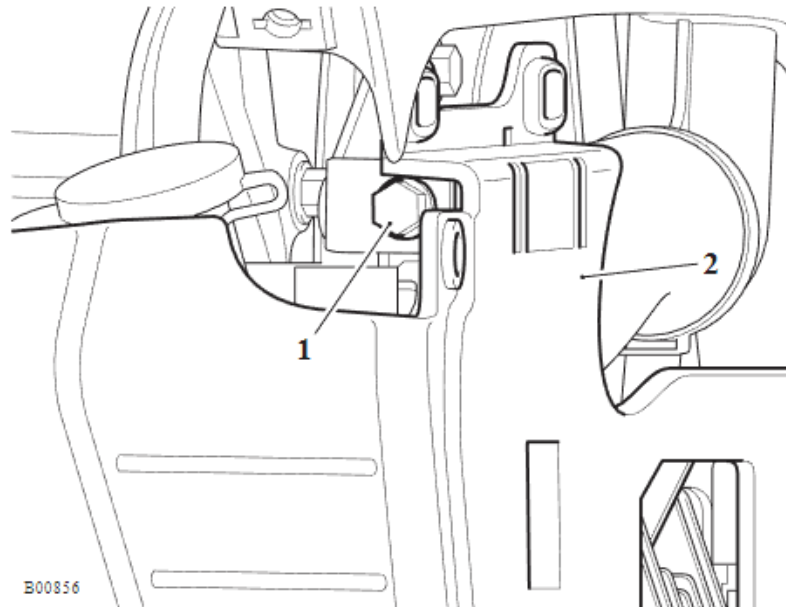
1. Clamp
2. Hose
3. Fixings
4. Locating lugs position

4. Make sure the grommets and the spacer are fitted to the upper mounting of the laower cowl assembly



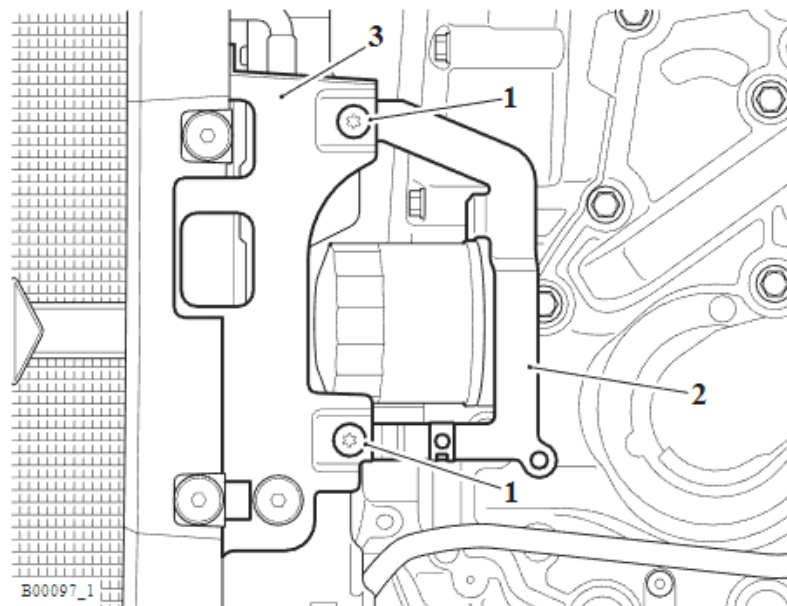
1. Grommet
2. Spacer
3. Lower cowl assembly

5. Position the lower cowl assembly to the motorcycle, fit the upper fixing and tighten to 6 Nm.



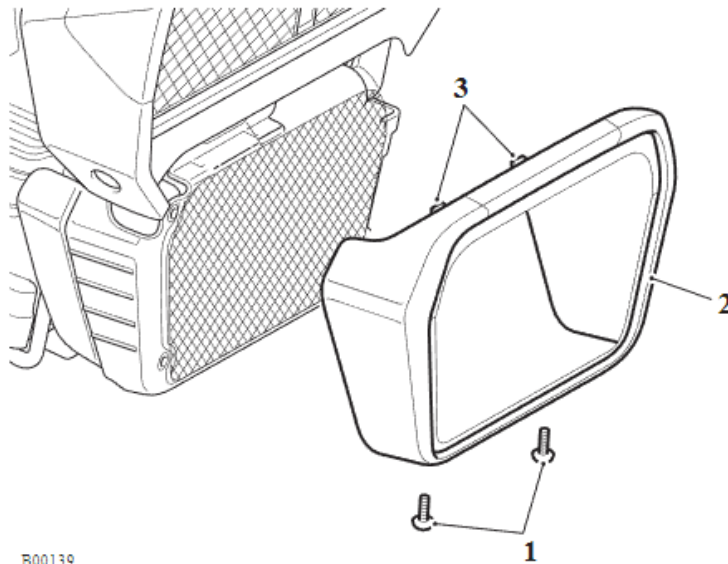
- 1. Fixing
- 2. Lower cowl assembly

6. Fit the radiator lower surround to its bracket and tighten the fixings to 4 Nm.



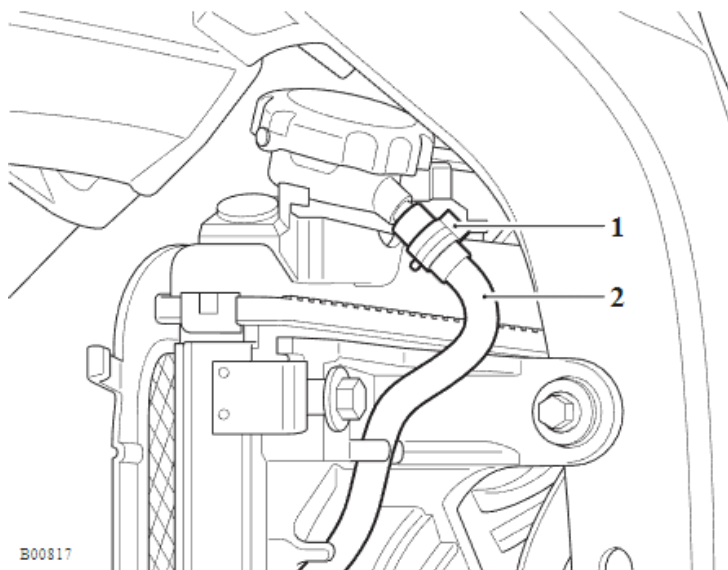
- 1. Fixings
- 2. Bracket
- 3. Radiator lower surround

- Engage the upper retaining clips of the radiator cowl into their slots, fit the fixings and tighten to 4 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>Fixings</li><li>Lower cowl</li><li>Retaining clips</li></ol> |
|--|

- Route the coolant expansion hose to the radiator filler neck as noted for removal. Fit to the filler neck and secure with its clamp. Secure the hose to the radiator mounting frame as noted for removal.



- |  |
|--|
| <ol style="list-style-type: none"><li>Clamp</li><li>Hose</li></ol> |
|--|

9. Check and, if necessary, top up the coolant level in the expansion tank (see [Coolant Level Adjustment](#)).

Perform the following operations:

- [Radiator Cowl - Installation](#)

#### Radiator – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

### **NOTICE**

Prior to disassembly of the coolant hoses, note the orientation and position of the hose clamps to help ensure that they are returned to the same positions and orientation on assembly.

Use T3880207 - Hose Clip Pliers for the removal and installation of the hose clamps.

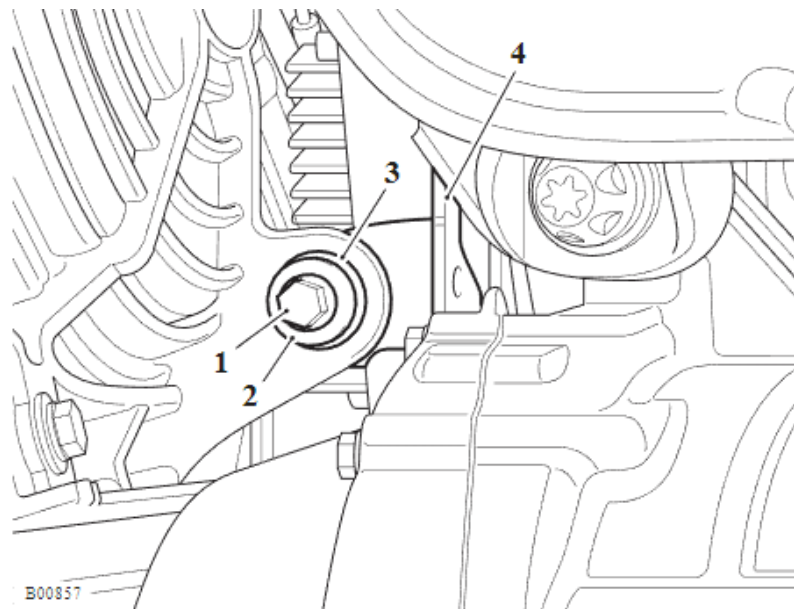
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Radiator Cowl - Removal](#)
- [Coolant Replacement - Drainage](#)
- [Coolant Expansion Tank - Removal](#)

### NOTICE

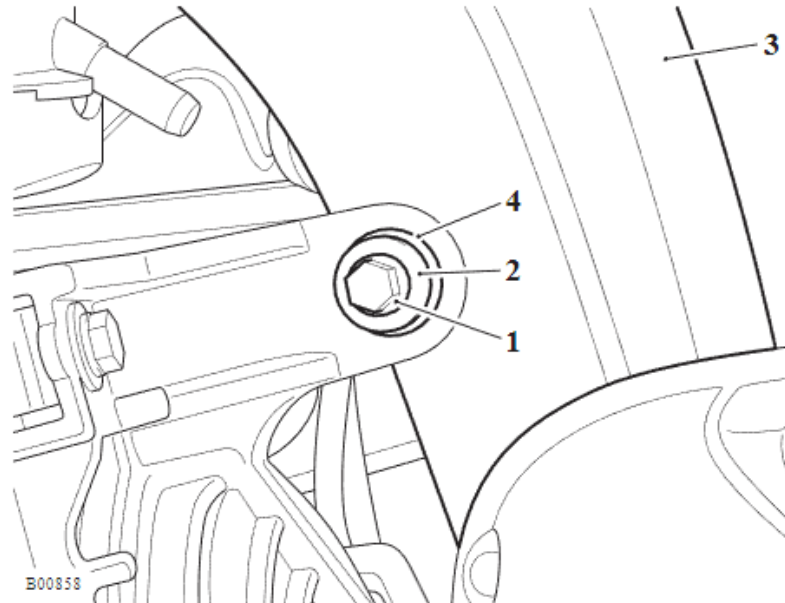
Note the positions and orientations of the grommets, flanged sleeves and washers for installation.

1. Disconnect the horn electrical connectors, release the fixing and remove the horn.
2. Remove the fixings and the flanged sleeves securing the radiator assembly to the lower bracket.



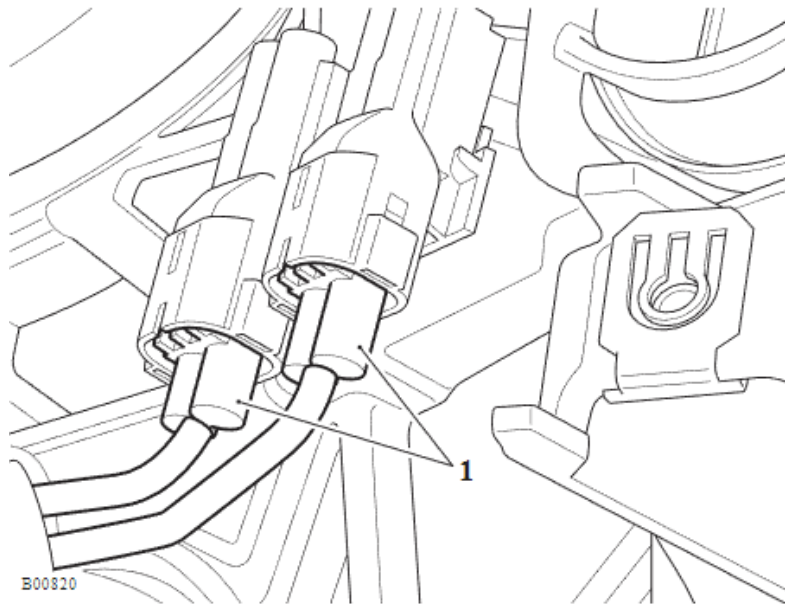
1. Fixing (left hand side shown)
2. Flanged sleeve
3. Grommet
4. Bracket

3. Remove the fixings and the flanged sleeves securing the radiator assembly to the frame.



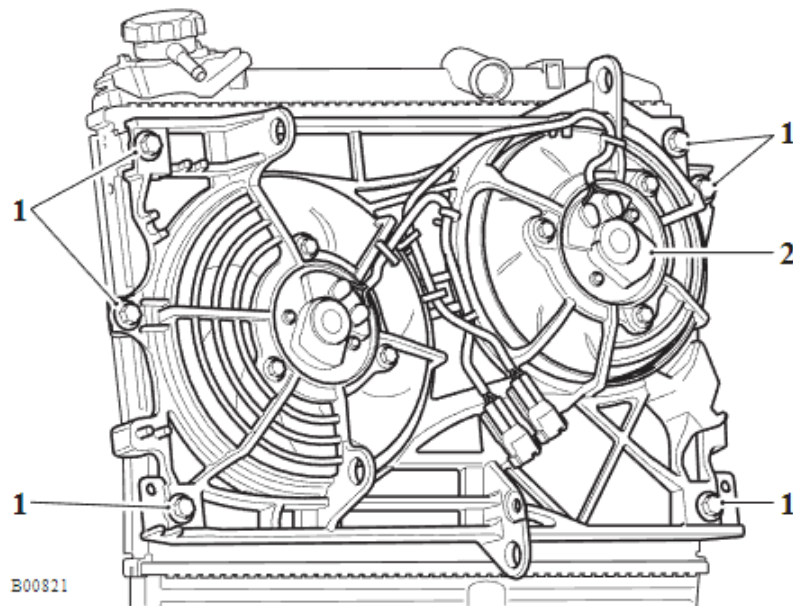
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing (left hand side shown)</li><li>2. Flanged sleeve</li><li>3. Frame</li><li>4. Grommet</li></ol> |
|--|

4. Disconnect the lower coolant hose from the engine.
5. Support the radiator assembly and disconnect the cooling fans electrical connectors.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Connectors</li></ol> |
|---|

6. Disconnect the upper coolant hose and remove the radiator assembly.
7. If required, release the fixings and remove the cooling fan assembly from the radiator.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Cooling fan assembly</li></ol> |
|--|

#### Radiator – Installation

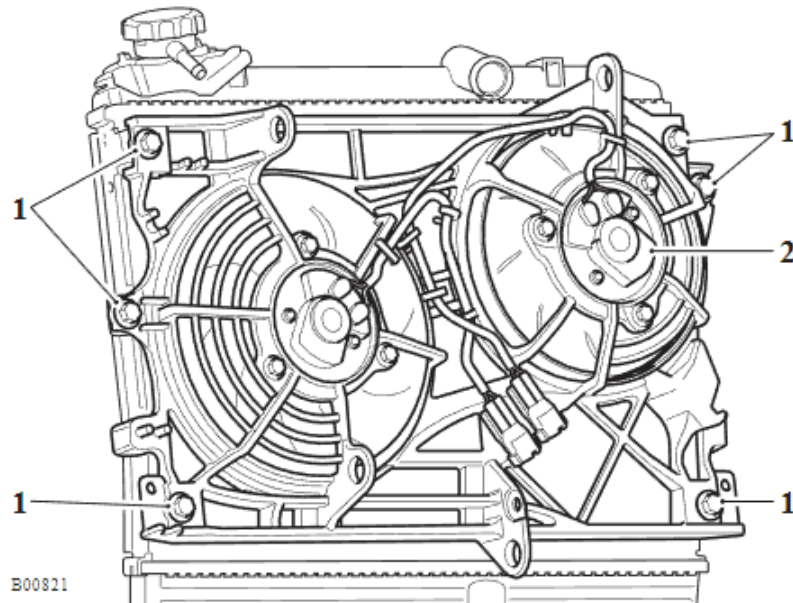
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

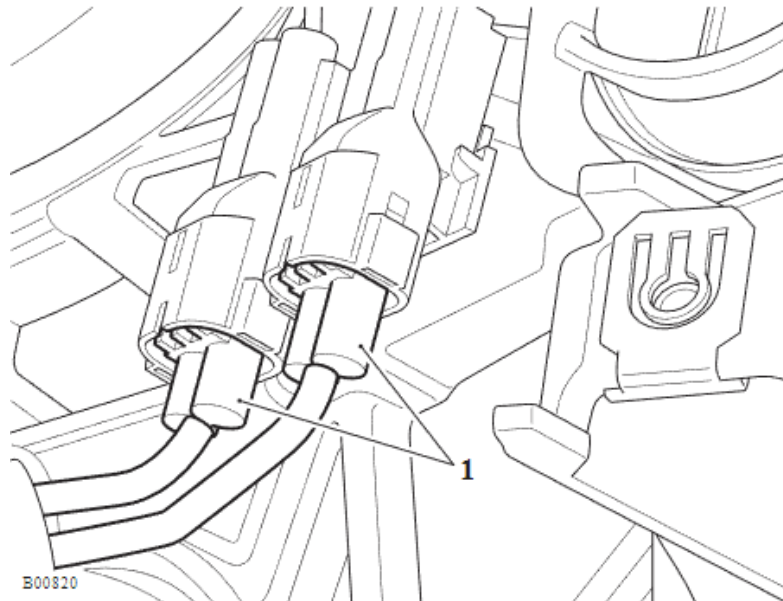
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, fit the cooling fan assembly to the radiator and tighten the fixings to 8 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Cooling fan assembly</li></ol> |
|--|

2. Connect the upper coolant hose and secure with its clamp orientation as noted for removal.
3. Support the radiator assembly and connect the cooling fans electrical connectors.

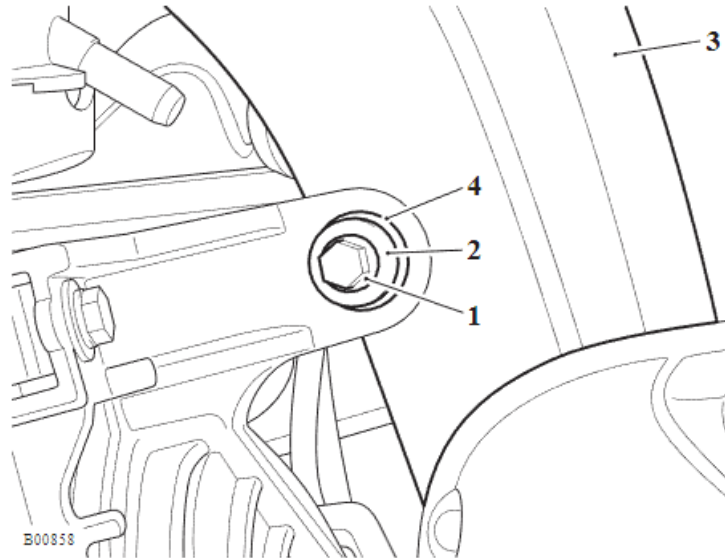


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Connectors</li></ol> |
|---|

4. Connect the lower coolant hose to the engine.

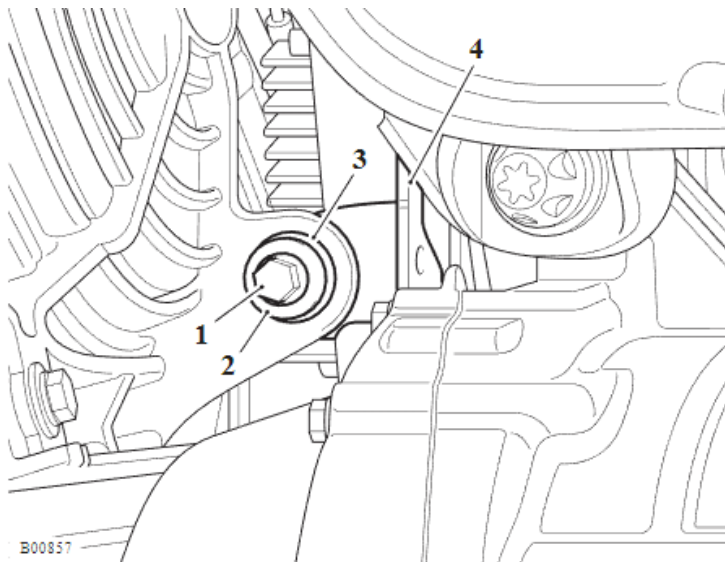


5. Position the radiator assembly to the frame. Fit the grommets, flanged sleeves, washers and fixings as noted for removal. Do not fully tighten at this stage.



1. Fixing (left hand side shown)
2. Flanged sleeve
3. Frame
4. Grommet

6. Align the radiator assembly to its lower bracket. Fit the grommets, flanged sleeves, washers and fixings as noted for removal. Do not fully tighten at this stage.



1. Fixing (left hand side shown)
2. Flanged sleeve
3. Grommet
4. Bracket

7. Tighten the radiator upper fixings to 6 Nm (right hand side first).
8. Tighten the radiator lower fixings to 6 Nm.
9. Fit the horn to the radiator assembly and tighten its fixing to 9 Nm.
10. Connect the horn electrical connectors.

Perform the following operations:

- [Coolant Expansion Tank - Installation](#)
- [Coolant Replacement - Filling](#)
- [Radiator Cowl - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Water Pump

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The water pump is an integral part of the clutch cover. If the water pump requires replacing, a new clutch cover with a water pump must be fitted (see [Clutch Cover - Removal](#)).

## Coolant System Pressure Test

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

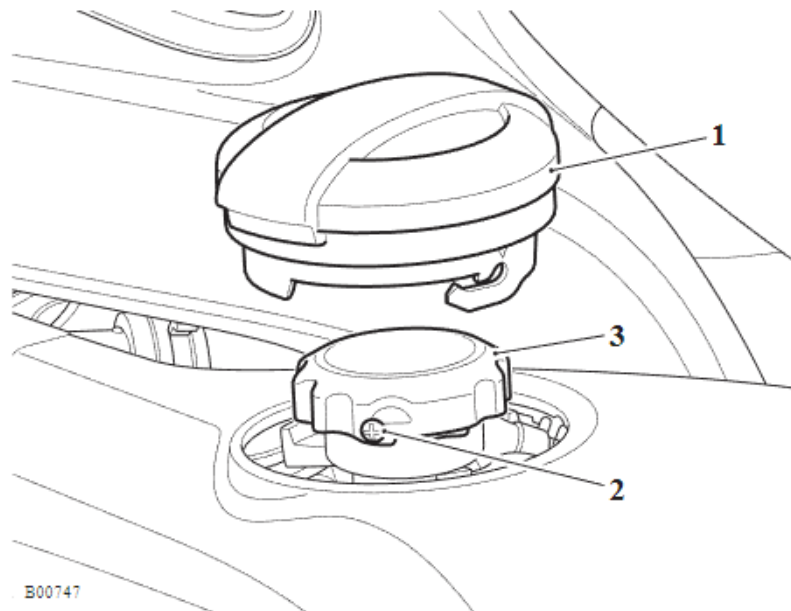
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ WARNING**

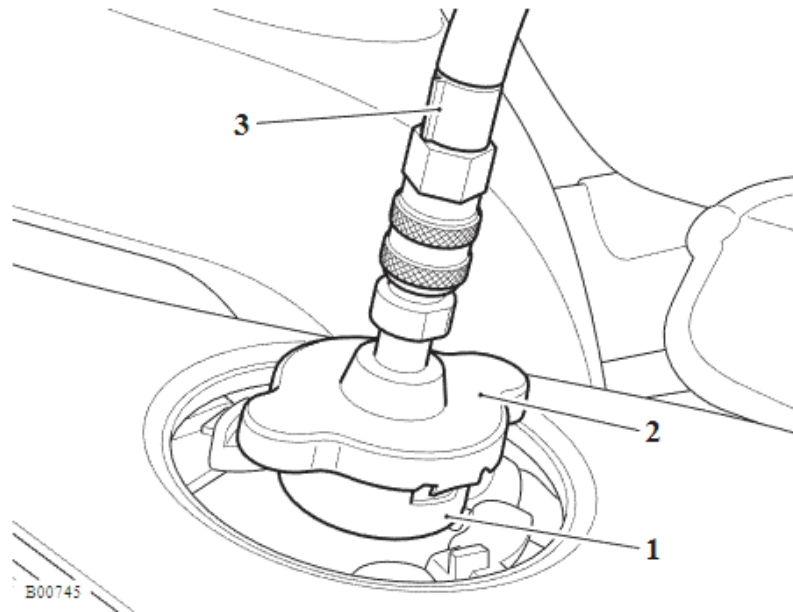
Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Turn the radiator cap cover anticlockwise and remove.
2. Release the fixing and remove the coolant pressure cap.



1. Cover
2. Fixing
3. Coolant pressure cap

3. Securely fit service tool T3880176 to the coolant filler neck.
4. Carefully connect the hand pump (part of service tool T3880147) to the service tool T3880176 ensuring an air tight seal is maintained.



1. Coolant filler neck
2. T3880176 - Radiator Pressure Test (use with T3880147)
3. T3880147 - Radiator and Cap Tester Kit

### **NOTICE**

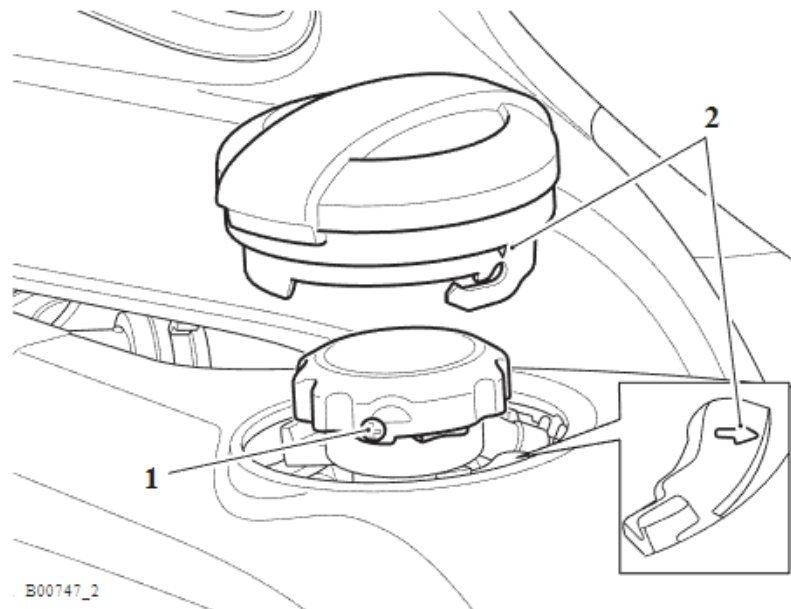
Do not exceed 1.2 bar when carrying out a coolant pressure test.

5. Pressurise the cooling system to the operating pressure, using the hand pump, taking care not to exceed 1.2 bar.
6. Hold the pressure for a minimum of 10 minutes, whilst visually inspecting the external components of the coolant system for leaks.

### **NOTICE**

If the engine oil is contaminated further exploratory investigation will be required. Engine oil with a hazy or milky appearance may indicate water emulsion. If the engine oil is contaminated rectify the cause of the problem and then renew the oil and filter.

7. Remove the engine oil filler cap and check for contamination of the engine oil caused by coolant escaping into the engine sump.
8. Release the pressure from the coolant test kit using the pressure release valve.
9. Detach the service tool T3880176 bayonet type adapter from the coolant filler neck.
10. Fit the coolant pressure cap to the radiator filler neck and tighten the fixing to 1 Nm.
11. Align the alignment mark on the radiator cap cover to alignment mark on the radiator cowl and fit the radiator cap cover. Turn the cap cover clockwise to secure.



1. Fixing
2. Alignment mark

### Coolant Pressure Cap Test

#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

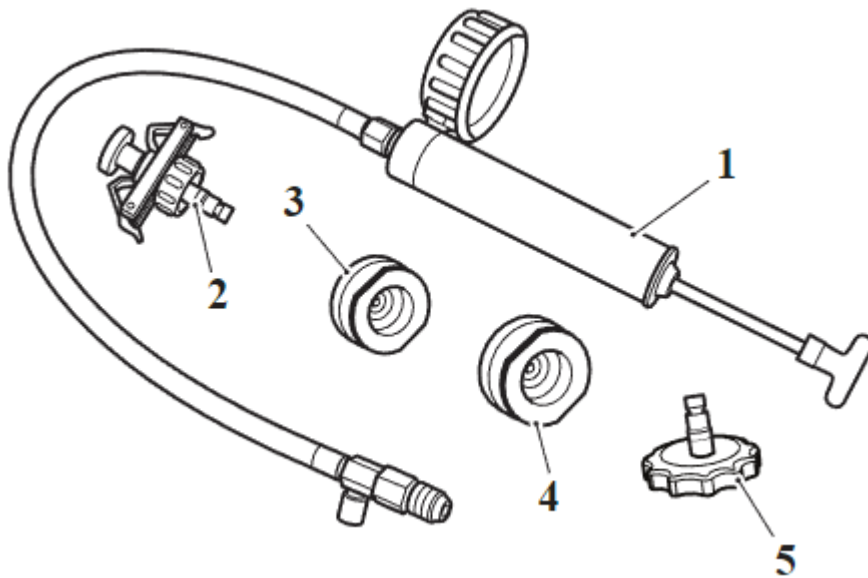
## **⚠ WARNING**

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

## **NOTICE**

It is recommended to carry out coolant pressure cap and cooling system pressure tests consecutively.

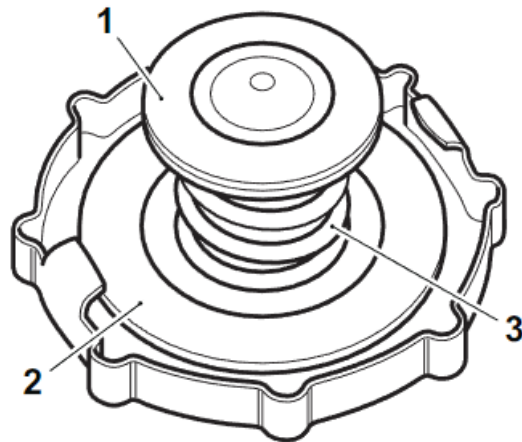
1. Pressure test the cap and cooling system to the blow off pressure of 1.2 bar as described using service tool T3880147.



1. Hand held pump
2. Bayonet type connector
3. Pressure cap test adapter 44 mm
4. Pressure cap test adapter 46 mm
5. Coolant cap type connector

2. Allow the engine temperature to cool for at least 30 minutes.
3. Remove the coolant pressure cap.

4. Check the condition of the upper and lower seals of the coolant pressure cap.

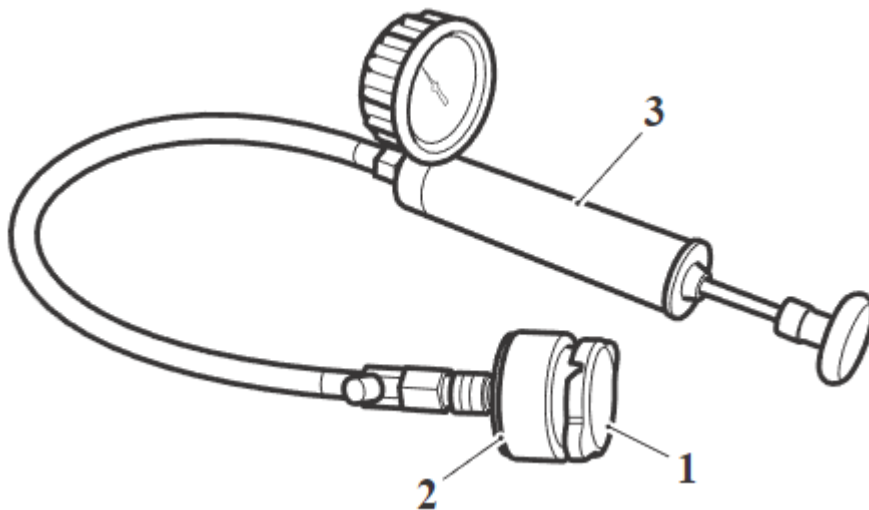


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Lower Seal</li><li>2. Upper Seal</li><li>3. Spring</li></ol> |
|---|

**NOTICE**

If there is any sign of damage or deterioration replace the cap.

5. Select the correct test adapter and securely fasten to the pressure cap.
6. Carefully connect the hand pump to the adapter ensuring an air tight seal is maintained.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Pressure cap</li><li>2. Test adapter</li><li>3. Hand held pump</li></ol> |
|---|

7. Pressure test the cap to it's 1.2 bar blow off pressure. If the coolant cap opens at a lower pressure, fails to open at the correct pressure or the seal leaks, replace the cap.
8. Release the pressure from the coolant test kit using the pressure release valve.
9. Remove the coolant pressure cap from service tool T3880147.

## Thermostat – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Radiator - Removal**

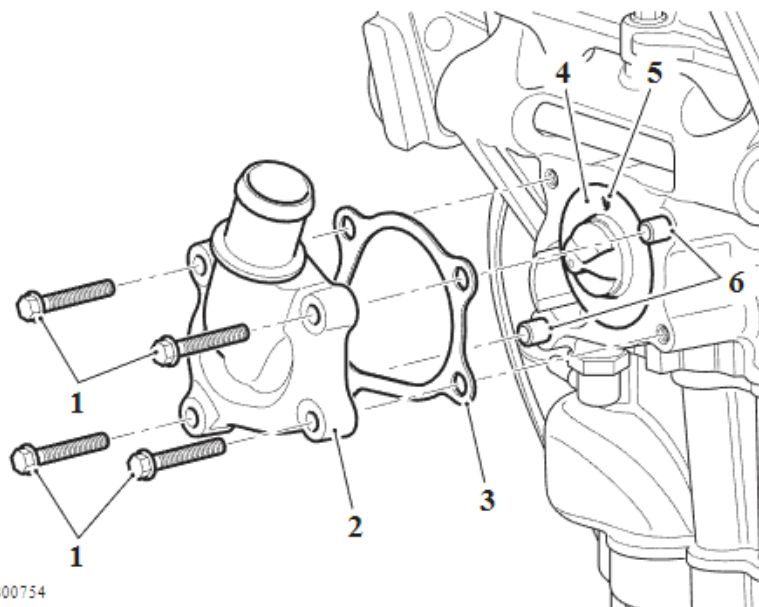
1. Release the fixings and remove the thermostat cover. Discard the gasket.

### **NOTICE**

Note the position of the bypass hole in the thermostat for installation.

Note the position of the two hollow dowels for installation.

2. Remove the thermostat.



1. Fixings
2. Cover
3. Gasket
4. Thermostat
5. Bypass hole
6. Hollow dowels

B00754



## Thermostat – Inspection

1. Inspect the thermostat at room temperature. If the thermostat is open, it must be replaced.
2. To check the thermostat is opening at the correct temperature, suspend the thermostat in a suitable container of water and raise the temperature of the water until the thermostat opens.
3. Measure the water temperature with an accurate thermometer.
  - Refer to the coolant specifications section for the correct thermostat opening temperature.
4. If the temperature at which thermostat opening takes place is incorrect, replace the thermostat.

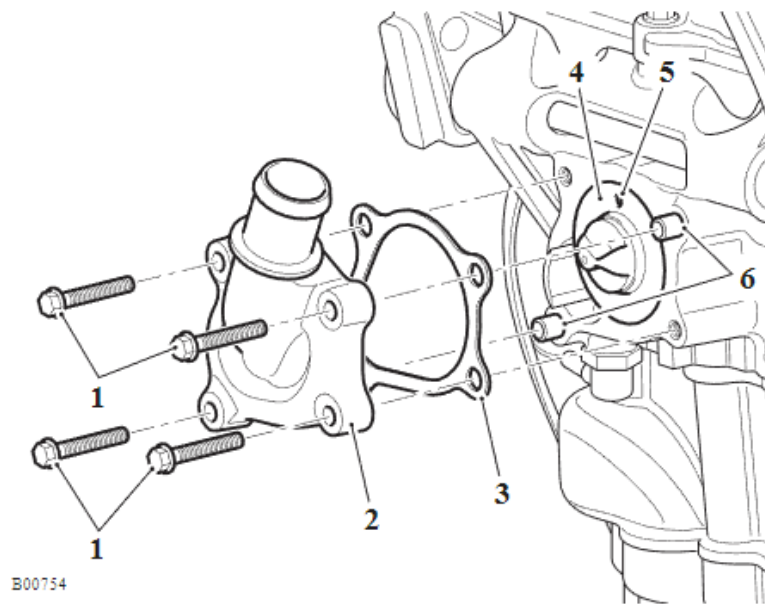
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the thermostat cover and clutch cover mating faces.
2. Make sure the two hollow dowels are located as noted for removal.
3. Position a new gasket to the clutch cover.
4. Fit the thermostat with the bypass hole positioned as noted for removal.
5. Fit the thermostat cover and tighten the fixings to 9 Nm.



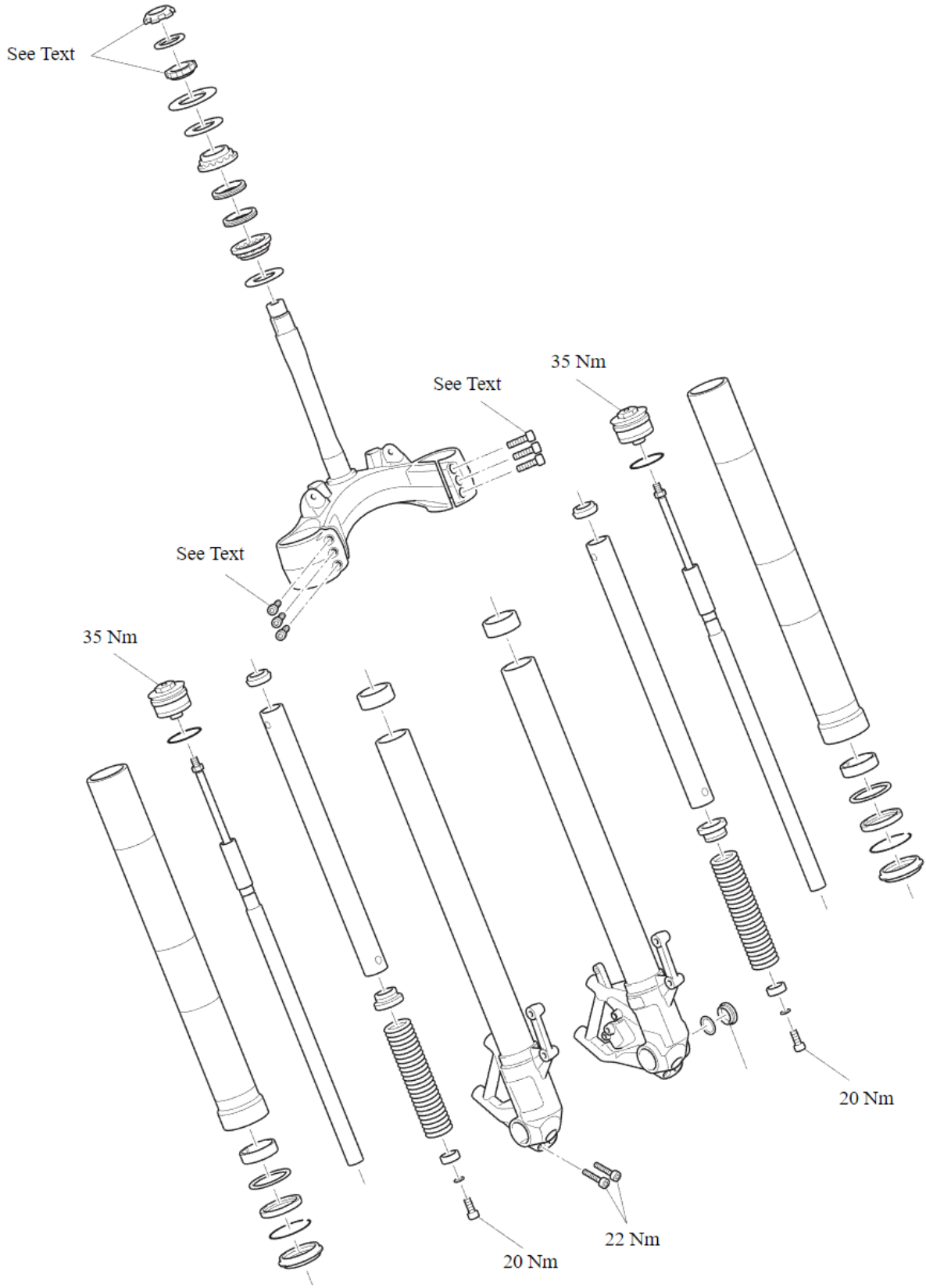
1. Fixings
2. Cover
3. Gasket
4. Thermostat
5. Bypass hole
6. Hollow dowels

Perform the following operations:

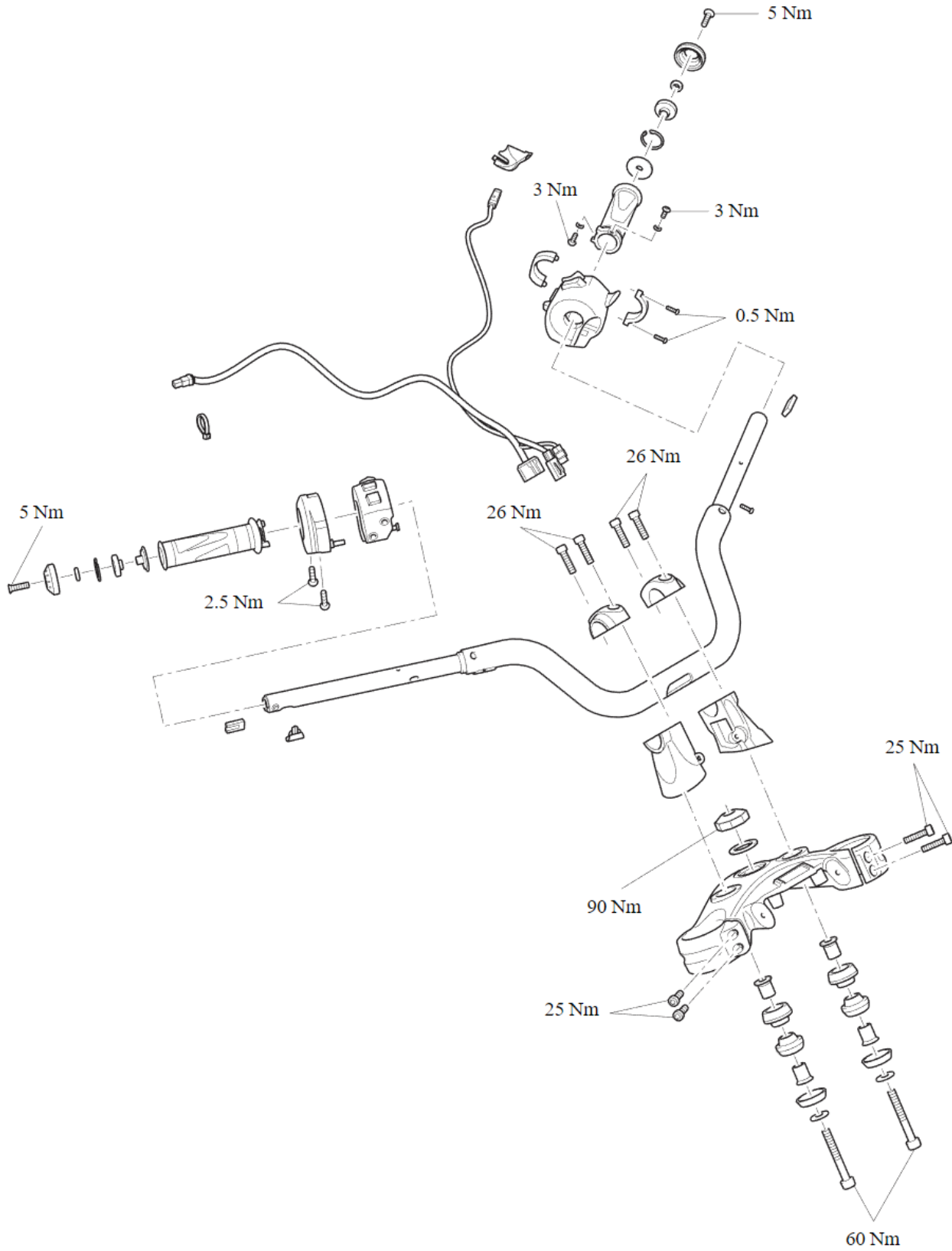
1. [Radiator - Installation](#)

# Front Suspension and Steering

## Exploded View - Front Fork, Lower Yoke and Steering Head Bearings



# Exploded View – Handlebar



## Fork Inspection

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Examine each fork for any sign of damage or scratching of the slider surface or for oil leaks.

If any damage or oil leakage is found, strip and repair as described in this section or consult an authorised Triumph dealer.

Check for smooth operation of the forks as follows:

- Place the motorcycle on level ground.
- While holding the handlebars and applying the front brake, pump the forks up and down several times.

If roughness or excessive stiffness is detected, repair as described in the Front suspension section of this service manual or consult an authorised Triumph dealer.

### **WARNING**

Riding the motorcycle with defective or damaged suspension can cause loss of motorcycle control and an accident. Never ride with damaged or defective suspension.

## Front Fork Oil Seal – Clean

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

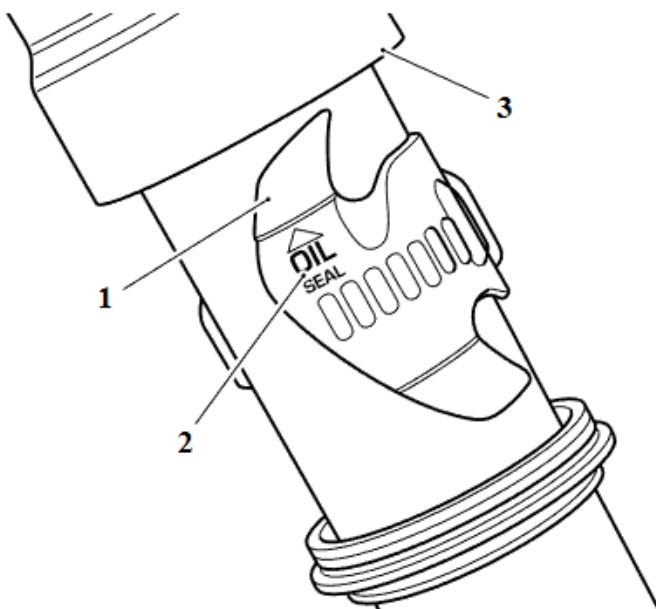
1. Clean the area around the dust seal then carefully detach the dust seal from the fork outer tube.
2. Wipe away any visible dirt or water from the oil seal.

### **NOTICE**

T3880216 - Fork Seal Cleaner, 45-55 mm forks has two cleaning hooks. The one with the OIL SEAL text is for the oil seal, the other cleaning hook is for the dust seal.

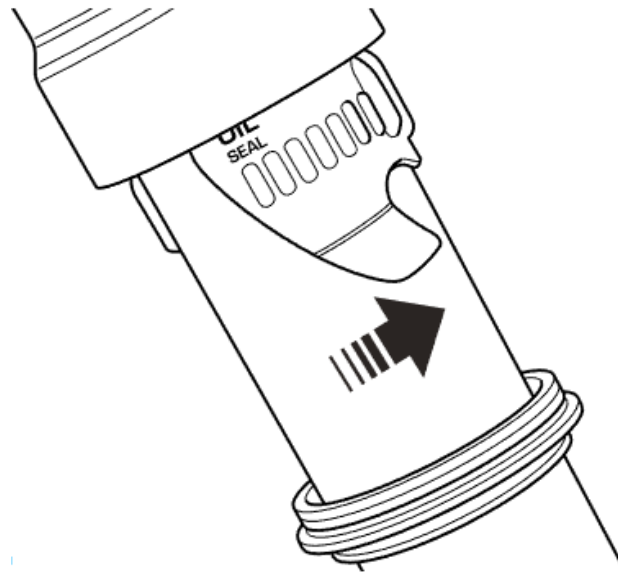
When cleaning the oil seal with service tool T3880216 it is possible that a small amount of fork oil may seep out.

3. Clean service tool T3880216.
4. Fit service tool T3880216 to the fork inner tube. Make sure that the cleaning hook, with the text OIL SEAL below it, is pointing towards the oil seal.



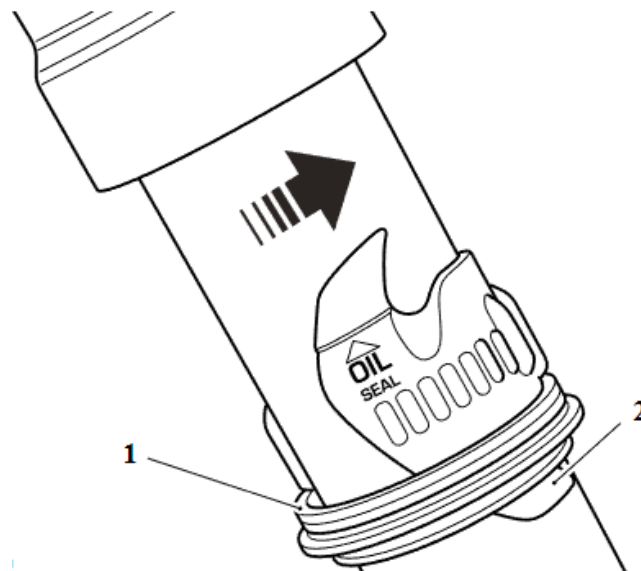
1. Cleaning hook
2. OIL SEAL text
3. Oil seal location

- Slide the cleaning hook carefully under the seal lip. Rotate service tool T3880216 360° in the direction shown then remove the cleaning hook from the oil seal.



Direction of Rotation

- Slide service tool T3880216 down to use the other cleaning hook to clean the dust seal. Rotate service tool T3880216 360° in the direction shown then remove the cleaning hook from the dust seal.



Direction of Rotation

- Dust seal
- Cleaning hook

- Use the wider end of service tool T3880183, with hand pressure only, to press the dust seal into position in the outer tube.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line.

Brake hoses or lines that are not supported may become damaged or bent.

Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

Perform the following operations:

- [Front Wheel - Removal](#)
- [Front Mudguard - Removal](#)

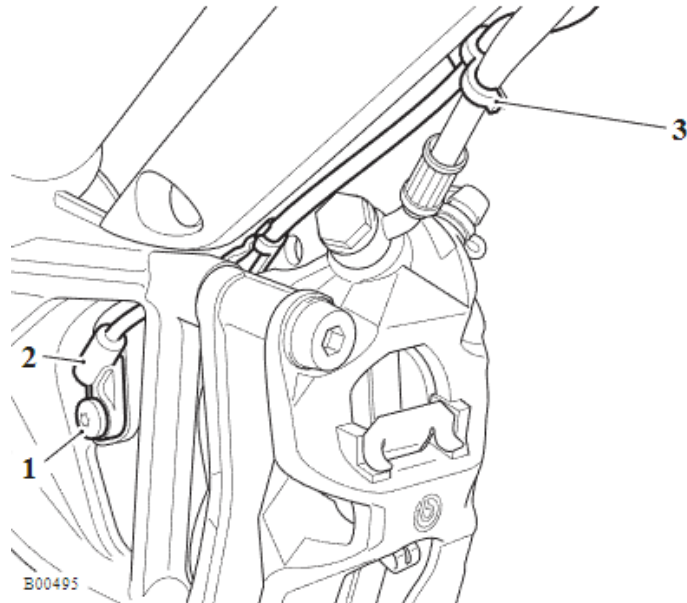
**NOTICE**

Note the routing of the ABS wheel speed sensor harness and its locating clips for installation.

There is a shim between the ABS wheel speed sensor and the front fork leg.



1. Release the fixing and detach the ABS wheel speed sensor from the left hand fork leg, collect the shim.



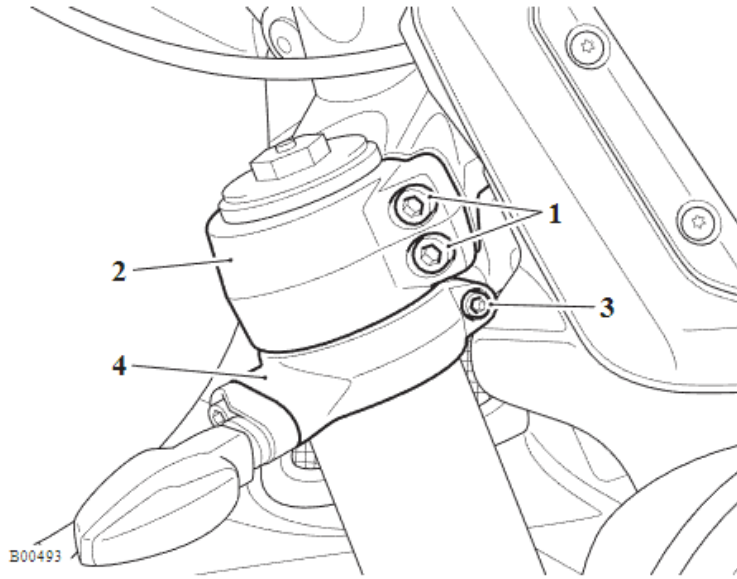
1. Fixing
2. Shim
3. Clip (one of three)

#### **NOTICE**

Note the orientation and position of the direction indicators on the forks for installation.

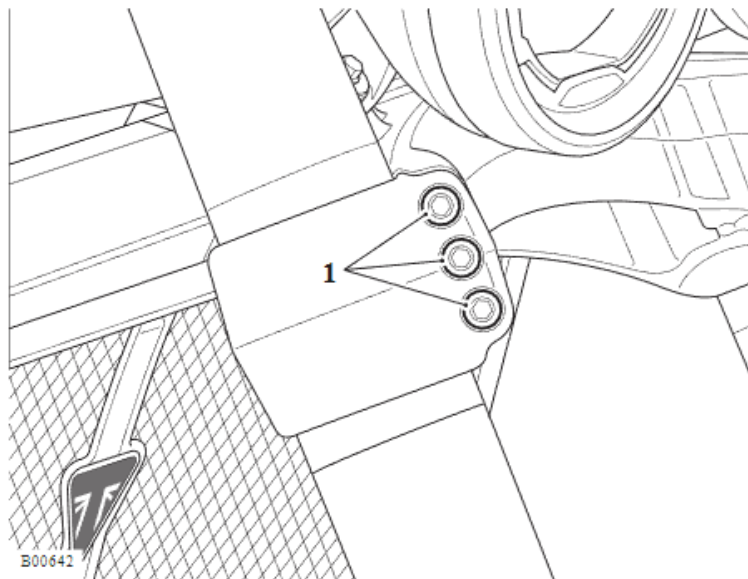
2. Loosen the upper yoke clamp fixings.
3. If the forks are to be dismantled, loosen the fork top caps.

4. Remove the direction indicator bracket pinch bolt.



- 1. Fixings
- 2. Upper yoke
- 3. Fixing
- 4. Direction indicator

5. Remove the lower yoke pinch bolt and slide the fork down through the yokes. Discard the pinch bolt.



- 2. Fixings

6. As the fork is released, slide the direction indicator brackets off the fork and tie aside. Do not allow the direction indicators to hang on the wiring harnesses.

7. Remove the forks from the lower yoke.

#### Front Forks – Installation

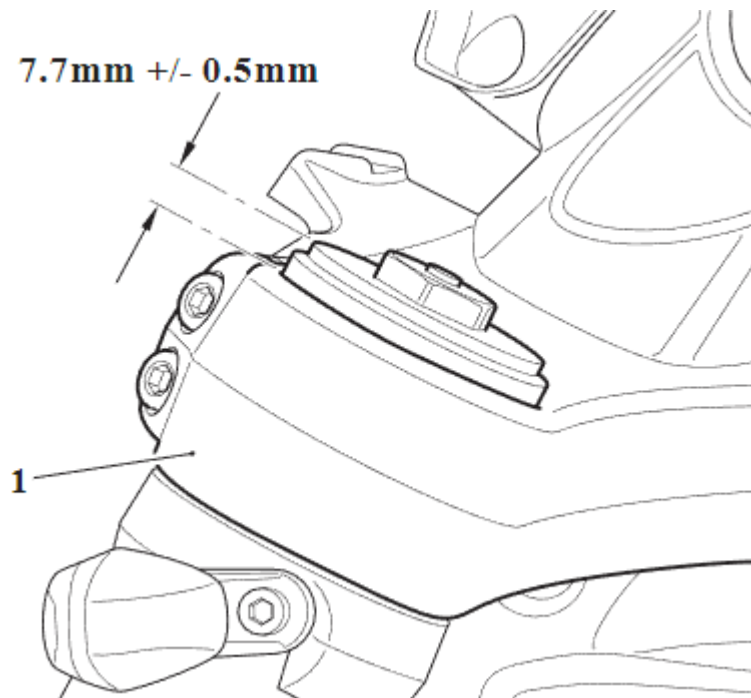
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the indicator clamp end between the upper and lower yoke.
2. Install each fork through the lower yoke, and slide the direction indicator clamp on to the forks.
3. Position the fork through the lower yoke so that the upper surface of the top cap is 7.7 mm (+/- 0.5 mm) is above the upper surface of the upper yoke.



2. Upper yoke

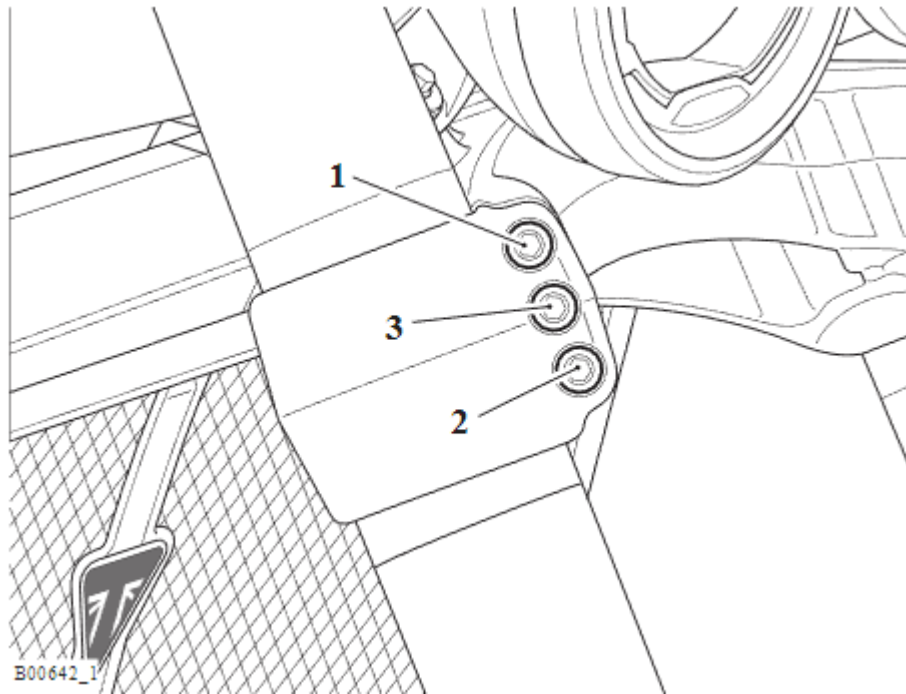
1. Fit new fixings and tighten the lower yoke pinch bolts in the following two stages:

#### **Stage 1**

2. Tighten the fixings in the sequence shown to 25 Nm.

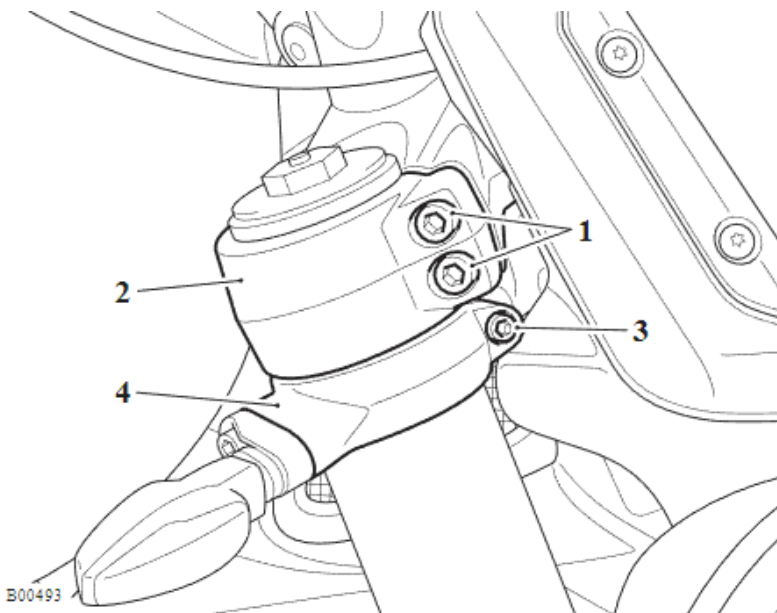
**Stage 2**

3. Tighten the fixings in the sequence shown to 25 Nm.



**Lower Yoke pinch Bolts Tightening Sequence**

- 4. If the fork top caps have been loosened, tighten them to 35 Nm.
- 5. Tighten the upper yoke clamp bolts to 25 Nm.
- 6. Position the direction indicator as noted for removal and tighten its fixing to 3 Nm.



- 1. Fixings
- 2. Upper yoke
- 3. Fixing
- 4. Direction indicator

## **WARNING**

Move the handlebars to the left and right full lock while checking that cables and harnesses do not bind or that the steering feels tight or difficult to turn. A cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

7. Route and secure the ABS wheel speed sensor harness as noted for removal and fit the wheel speed sensor and shim to the fork leg. Tighten the new fixing to 9 Nm.

Perform the following operations:

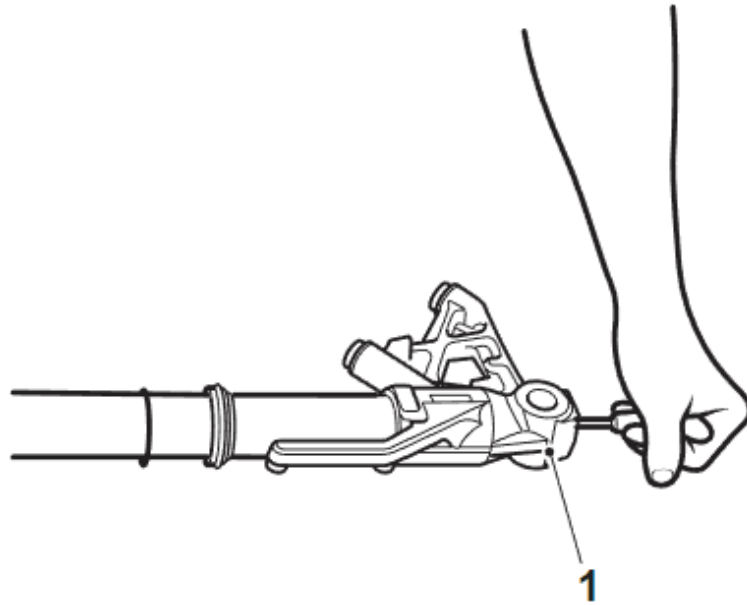
- [Front Mudguard - Installation](#)
- [Front Wheel - Installation](#)
- The air gap between the ABS pulser ring and the sensor must be between 0.37 mm and 1.23 mm. Check, and if necessary, adjust the air gap (see [Air Gap Measurement](#))

### Front Fork – Disassembly

## **WARNING**

Do not change the fork adjustment settings. If they are changed, this will change the handling of the motorcycle from those which the rider is used to. Riding with unfamiliar fork settings may cause unexpected handling characteristics leading to loss of control and an accident.

1. If the damper rod is to be removed, loosen the damper fixing at the bottom of the fork by a half turn.



1. Damping cylinder fixing location

2. Drain the fork oil (see [Fork Oil Renew - Draining](#)).

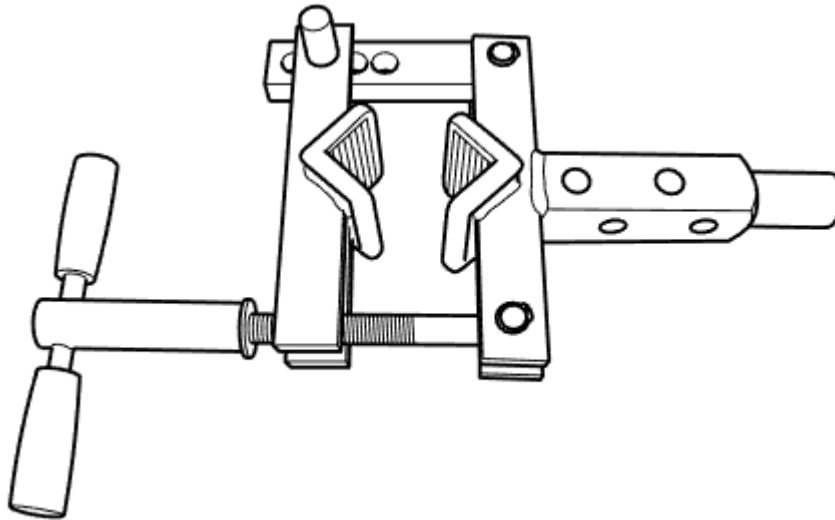
**NOTICE**

The fork seals can be renewed without removal of the damping cylinder. Unless removal of the damping cylinder is necessary, omit steps 16 and 17 of this procedure.

**CAUTION**

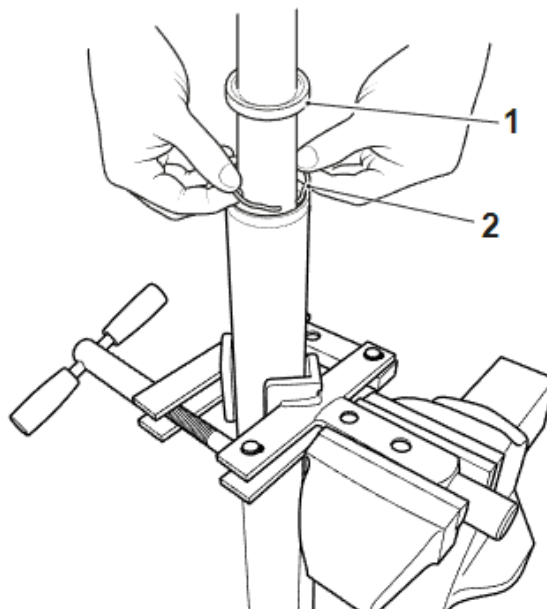
Never tightly clamp the outer tube as this will cause the tube to permanently distort. A distorted tube is not serviceable and must be replaced.

- Using service tool T3880171 clamp the fork outer tube.



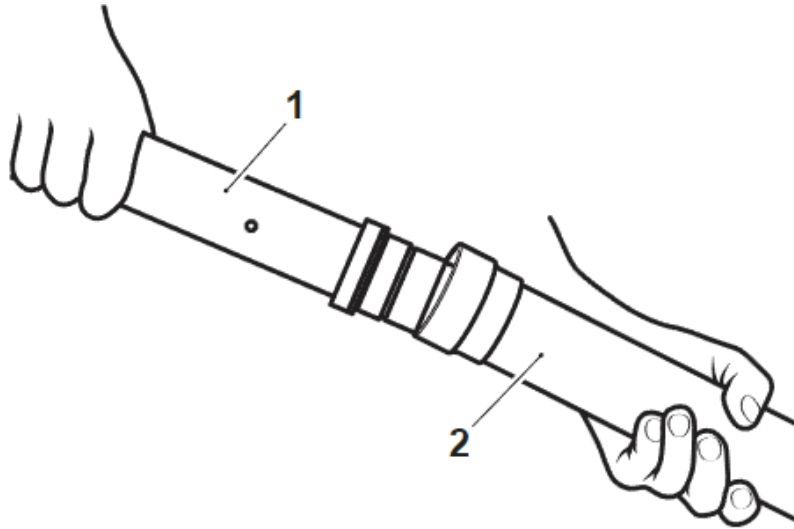
T3880171 - Fork Holding Tool

- Raise the inner tube and remove the dust seal and circlip from the outer tube.



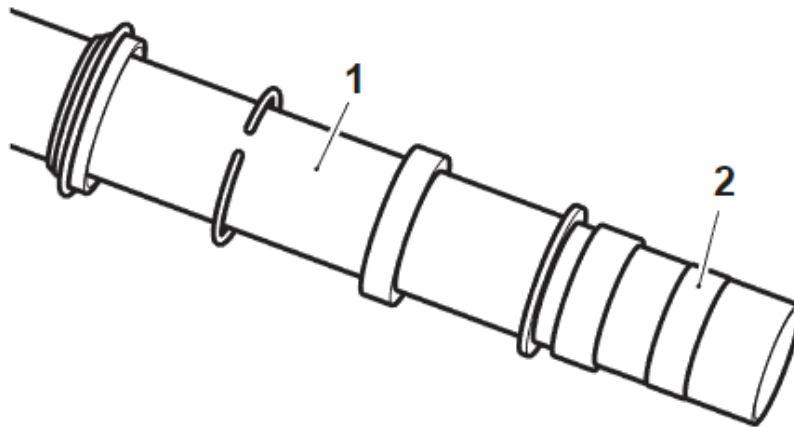
- Dust seal
- Circlip

5. Remove the fork from service tool T3880171 and, using a slide hammer action to release the oil seal and bushes from the outer tube. Separate the inner and outer tubes, leaving the seals and bushes in place on the inner tube. Note the relative positions and orientation of all bushes and seals before removal.



- |               |
|---------------|
| 1. Inner tube |
| 2. Outer tube |

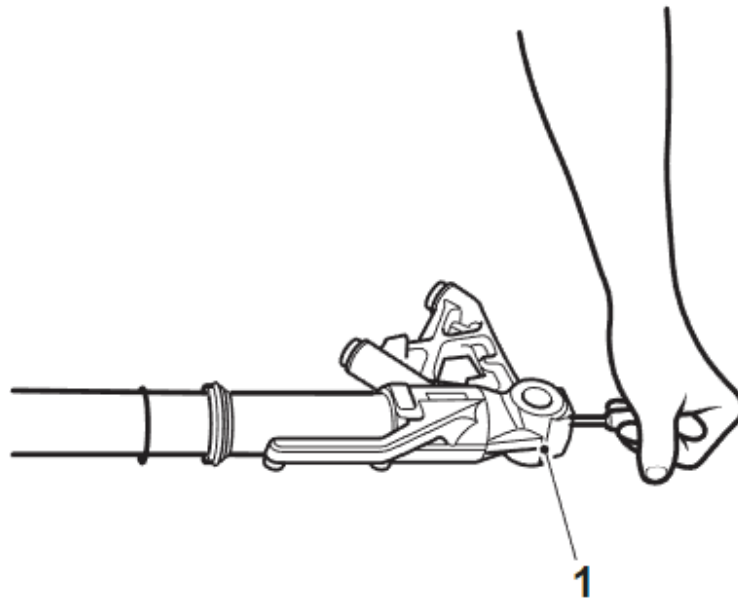
6. To allow the removal of the seals and bushes, carefully remove the upper bush from the inner tube.



- |               |
|---------------|
| 1. Inner tube |
| 2. Upper bush |

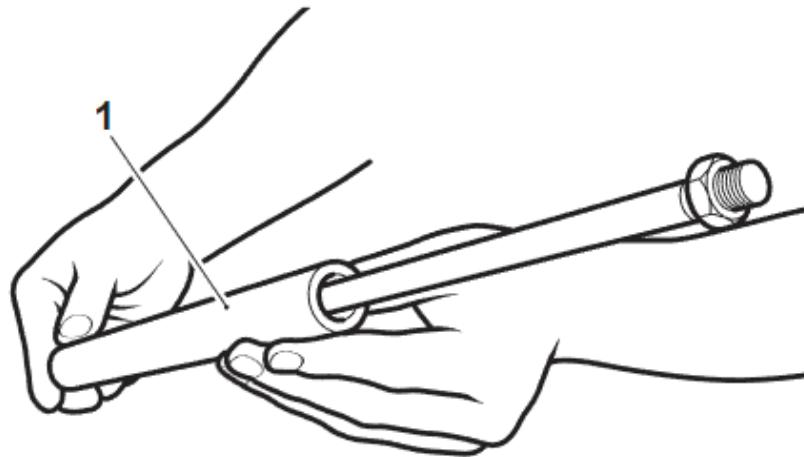


7. Remove the damper fixing from the bottom of the fork.



1. Damping cylinder fixing location

8. Remove the damping cylinder from the inner tube.



1. Damping cylinder

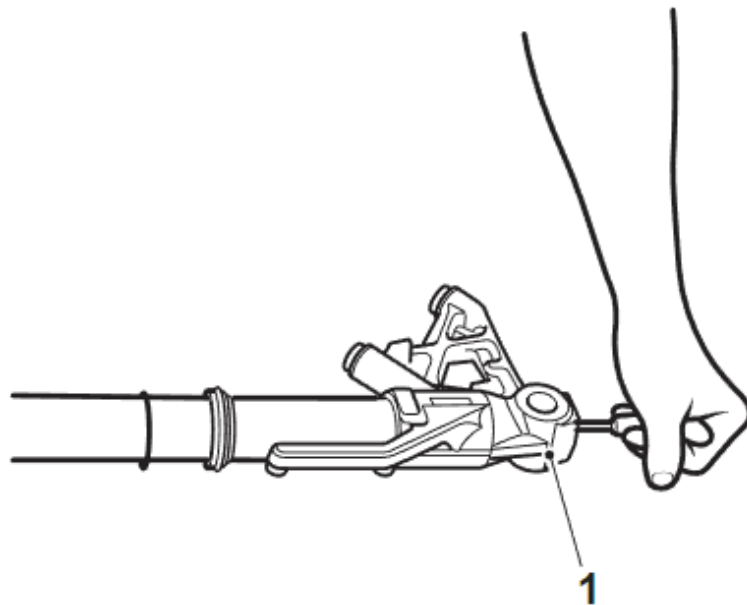
**⚠ WARNING**

The front forks comprise of many precision machined parts. Total cleanliness must be observed at all times and assembly must take place in a dirt/dust-free environment. Dirt ingress may cause damage to the fork parts, leading to incorrect operation, instability, loss of motorcycle control and an accident.

**NOTICE**

If the damper has not been removed, omit operations 1 and 2.

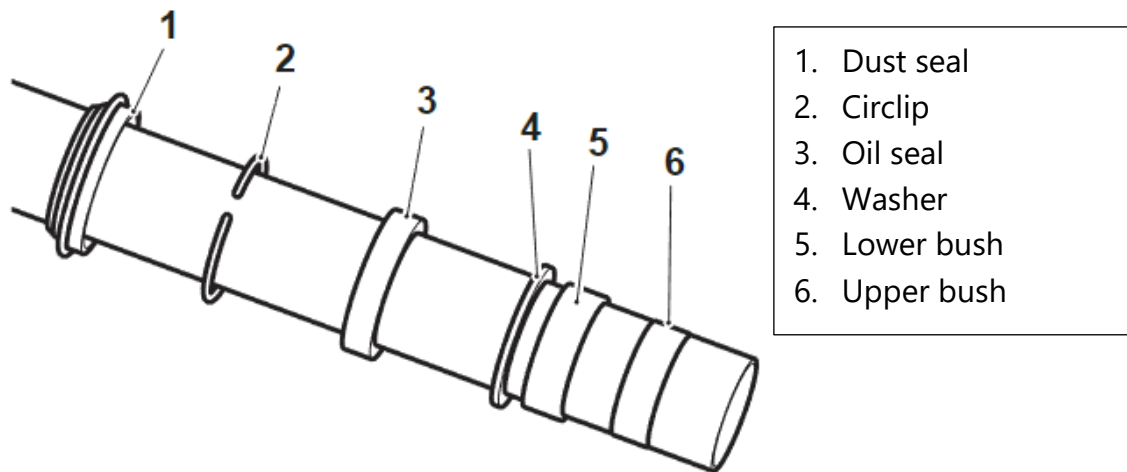
1. Clean the threads of the damping cylinder fixing and fit a new sealing washer. Prevent the cylinder from turning while tightening the damping cylinder securing fixing to 20 Nm.



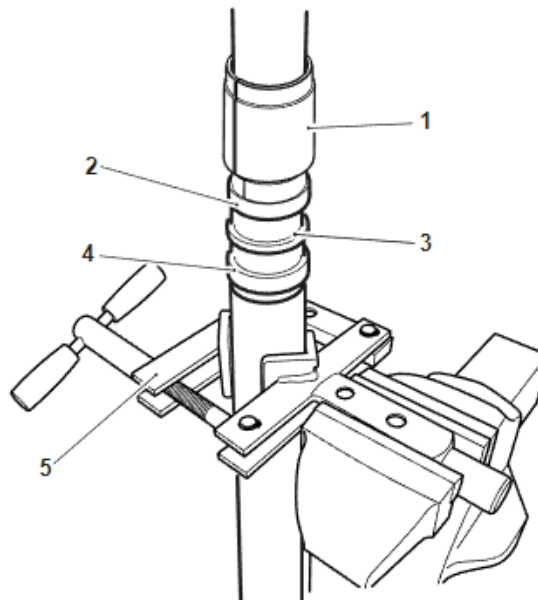
1. Damping cylinder fixing location

2. Invert the fork and secure in service tool T3880171.
3. Apply a smear of fork oil to the bushes and new seals.

4. Position the seals and bushes to the inner tube as noted during removal. Make sure the oil seal (item 3) is positioned with the text end facing the circlip (item 2). Use a new circlip.

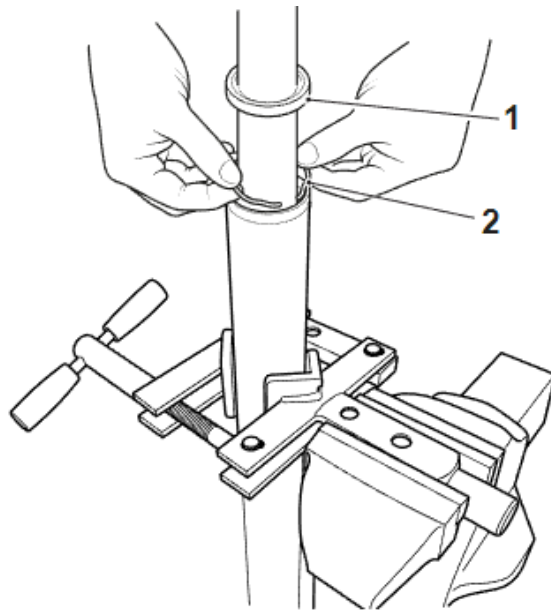


5. Using a suitable tool, fit the upper bush to the fork inner tube.
6. Position the inner tube assembly to the outer, ensuring that the oil and dust seal lips do not become damaged.
7. Use the narrow end of service tool T3880183 to guide the lower bush, washer and oil seal into position.



- |                                     |
|-------------------------------------|
| 1. T3880183 - Fork Seal Tool, 47 mm |
| 2. Oil seal                         |
| 3. Washer                           |
| 4. Lower bush                       |
| 5. T3880171 - Fork Holding Tool     |

8. Install a new circlip to retain the oil seal.
9. Position the dust seal to the outer tube.
10. Use the wider end of service tool T3880183 with hand pressure only, to press the dust seal into position in the outer tube.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Dust seal</li><li>2. Circlip</li></ol> |
|---|

11. Fill the fork with oil (see [Fork Oil Renew - Refilling](#)).

### Steering Head Bearing – Adjustment

|  |
|--|
| <b>⚠ WARNING</b>   |
| <p>Make sure the motorcycle is stabilised and adequately supported.<br/>A correctly supported motorcycle will help prevent it from falling.<br/>An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.</p> |

## **⚠ WARNING**

If the lower yoke fixings are also loosened, the forks will no longer support the weight of the motorcycle.

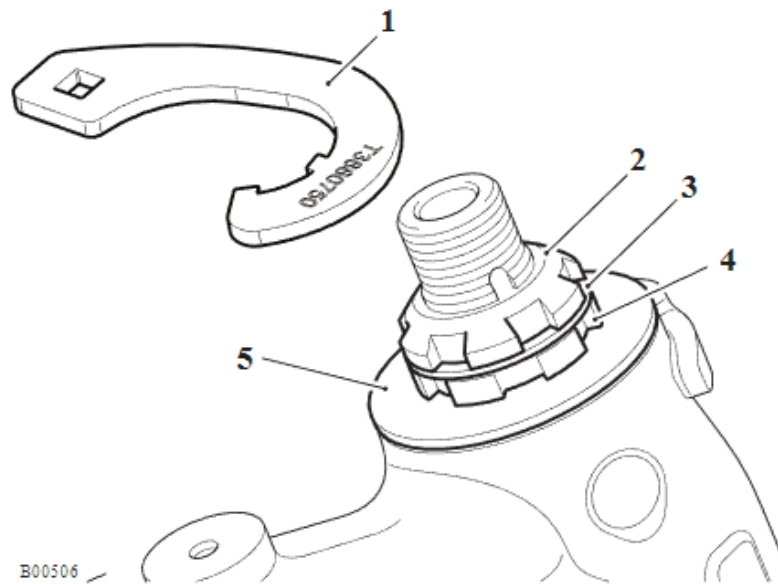
Do not loosen the lower yoke fixings as, in this condition, the motorcycle could topple over causing damage and/or risk of injury.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Upper Yoke - Removal](#)

1. Adjust the bearing free play as follows:

- Use service tool T3880750 to remove the lock nut.
- Remove the tab washer.
- Use service tool T3880750 to remove the adjuster nut.

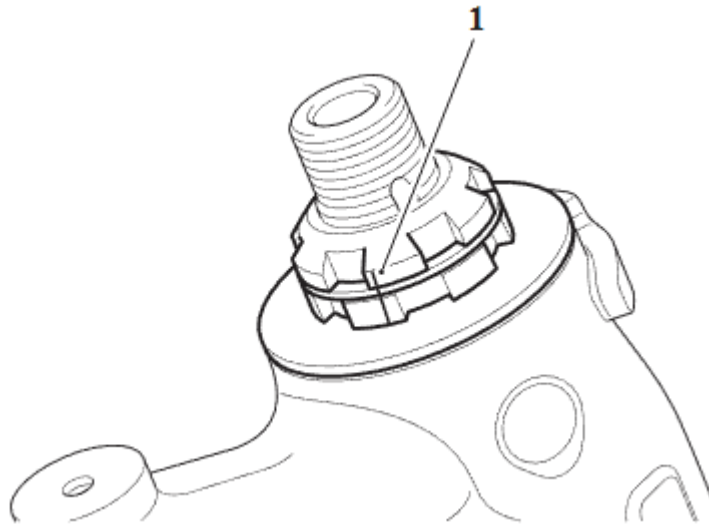


1. T3880750 - Headstock Service Tool
2. Lock nut
3. Tab washer
4. Adjuster nut
5. Dust seal

## **⚠ WARNING**

It is essential that the adjuster nut is not over-tightened. If the adjuster is over-tightened it will cause a pre-load on the headstock bearings. This will introduce tight steering, which could cause loss of motorcycle control and an accident.

- Thoroughly clean the threads on the steering stem.
- Refit the adjuster nut and tighten to 40 Nm.
- Loosen the adjuster nut, then tighten to 15 Nm.
- Fit the tab washer.
- Fit the lock nut and tighten to 45 Nm.
- Using a suitable marker, add an alignment mark to the adjuster nut and lock nut.



1. Alignments mark

## **⚠ WARNING**

Make sure you torque the adjustment nut in an anticlockwise direction in the steps that follows.

If you do not, the headstock bearings can become loose.

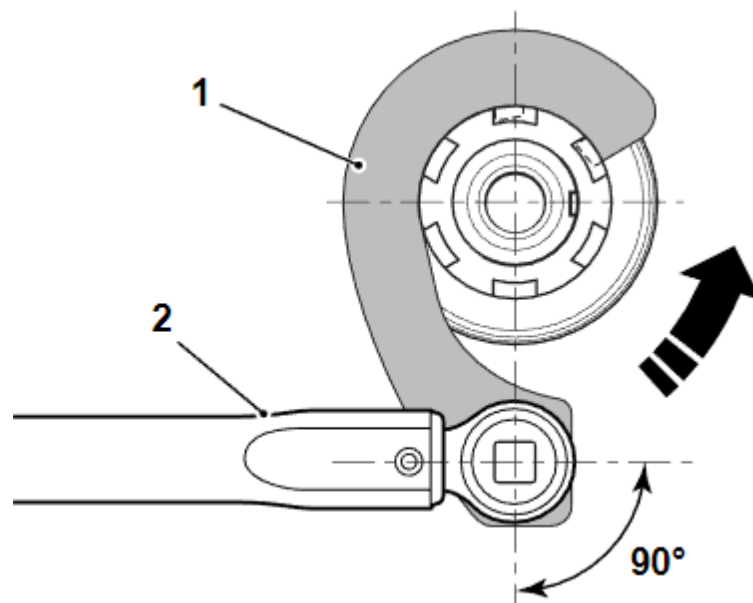
### NOTICE

Keep the torque wrench at 90 degrees to the centre line of the tool when you tighten the adjustment nut in the stage that follows. This will apply the correct torque to the adjustment nut.

### NOTICE

The adjustment nut can turn up to 90 degrees when you tighten it anticlockwise. This is usual.

- Using service tool T3880750 turn the adjuster nut anticlockwise 45°.
- Use service tool T3880750 to tighten the adjustment nut in an anticlockwise direction to 65 Nm. Keep the torque wrench at 90 degrees to the centre line of the tool.



1. T3880750 - Headstock Service Tool
2. Torque wrench

- Check that alignment marks on the adjuster nut and lock nut are no longer aligned.

## WARNING

Operation of the motorcycle with incorrectly adjusted steering head bearings, either too loose or too tight, may cause a dangerous riding condition leading to loss of motorcycle control and an accident.

2. Check that the free play has been eliminated and that the steering can be turned freely from lock-to-lock without any sign of tightness. Readjust if necessary.

Perform the following operations:

- [Upper Yoke - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

### Handlebars – Removal

## WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Instruments - Removal](#)
- [Mirrors - Removal](#)
- [Heated Grip – Removal \(if fitted\)](#)
- [Heated Twist Grip - Removal](#)



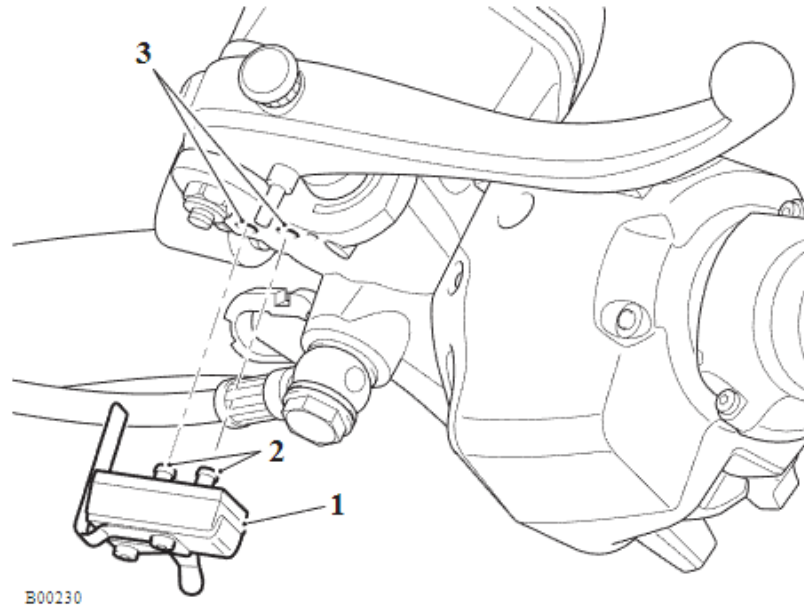
- **Twist Grip Position Sensor - Removal**

**NOTICE**

The clutch switch is secured to its housing by two fixings. The clutch switch housing is a press fit to the clutch master cylinder.

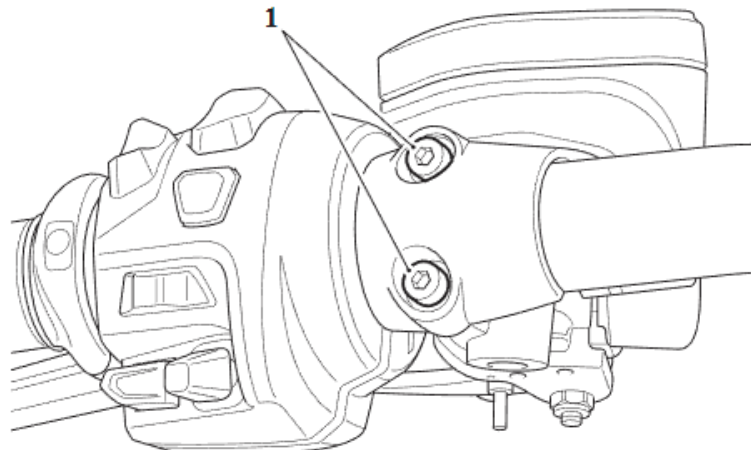
Note the orientation of the clutch switch for installation.

1. Carefully detach the clutch switch assembly from the master cylinder.

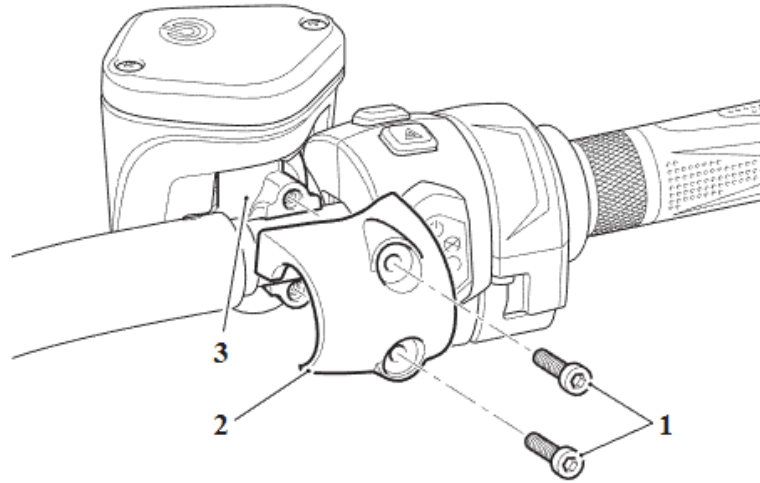


1. Clutch switch
2. Securing lugs
3. Location holes

2. Release the fixings, remove the clamp then detach and support the clutch master cylinder.



3. Release the fixings, lift off the clamp then detach and support the front brake master cylinder.

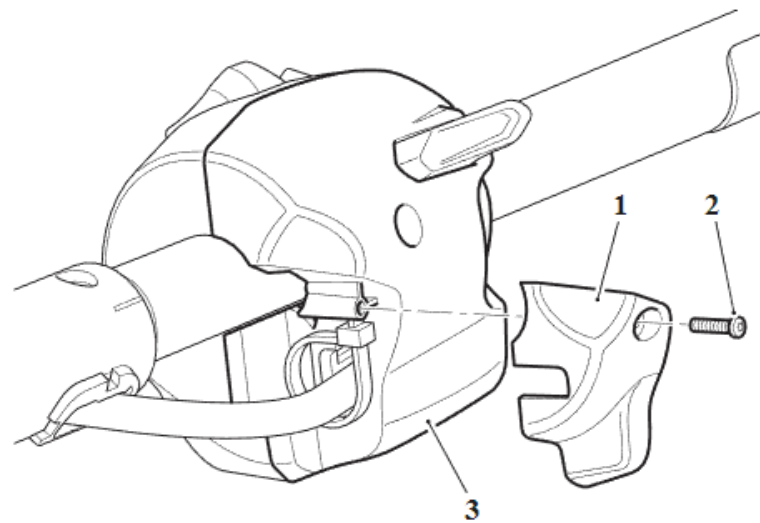


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|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Clamp</li><li>3. Master cylinder</li></ol> |
|--|

**NOTICE**

Note the routing of the handlebar harnesses for installation.

4. Release the fixing and remove the cover on the left hand switch housing.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Cover</li><li>3. Switch housing</li></ol> |
|--|

5. Remove the cable tie securing the switch housing wiring harness to the left hand switch housing.
6. Gently pull on the wiring harness to disconnect the switch housing connectors.

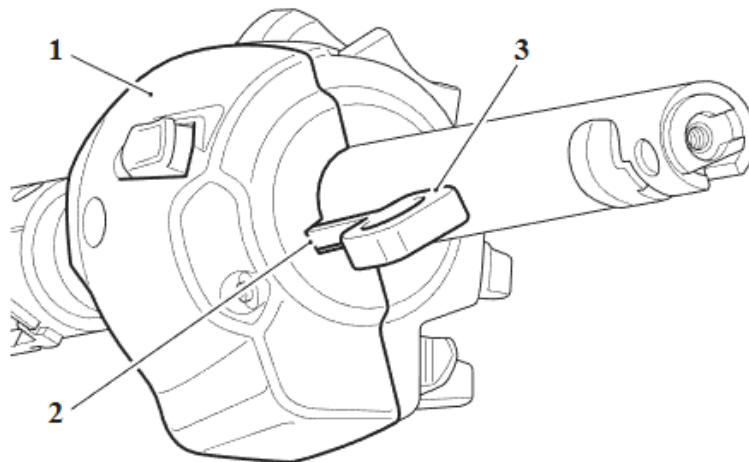
### NOTICE

The service tool T3880369 is required to release the handlebar switch housings from their retaining clips.

When inserting service tool T3880369 into the switch housing, a click can be felt/heard as the retaining clip is released.

The retaining clip will remain in position on the handle bar as the switch housing is removed. Note the position and orientation of the clip for installation.

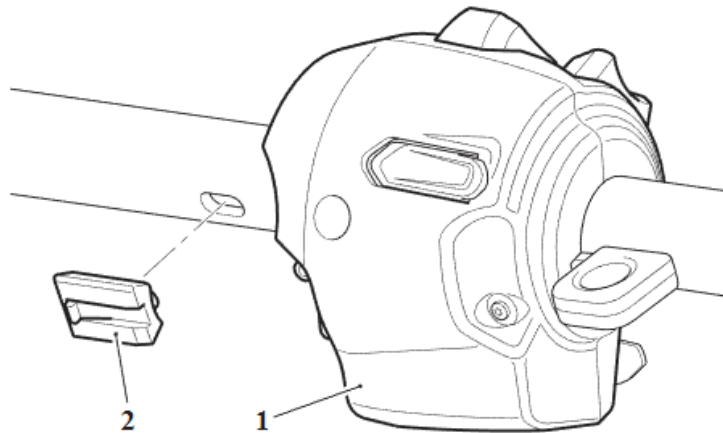
7. Insert service tool T3880369 into the opening on the left hand switch housing until a click is felt/heard.



1. Left hand switch housing
2. Opening
3. T3880369 - Switch Housing Removal Tool

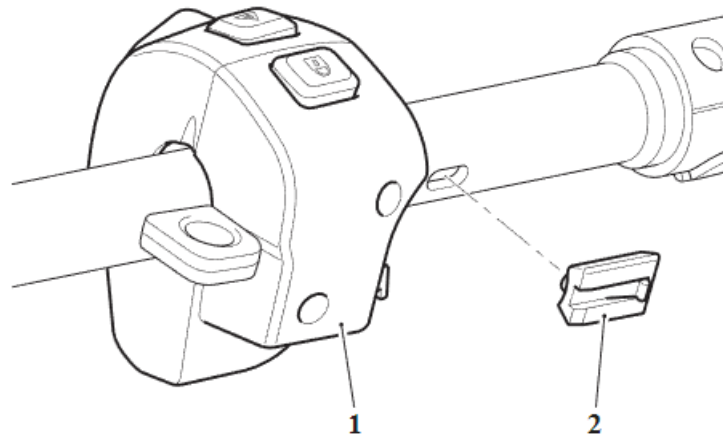
8. Slide the switch housing towards the end of the handlebar to free it from the retaining clip.
9. Withdraw service tool T3880369 from the switch housing.

10. Slide the switch housing off the handlebar and collect the retaining clip.



- 1. Left hand switch housing
- 2. Retaining clip

- 11. Remove the cable tie securing the switch housing wiring harness to the right hand switch housing.
- 12. Gently pull on the wiring harness to disconnect the switch housing connectors.
- 13. Insert service tool T3880369 into the opening on the right hand switch housing until a click is felt/heard.
- 14. Slide the switch housing towards the end of the handlebar to free it from the retaining clip.
- 15. Withdraw service tool T3880369 from the switch housing.
- 16. Slide the switch housing off the handlebar and collect the retaining clip.

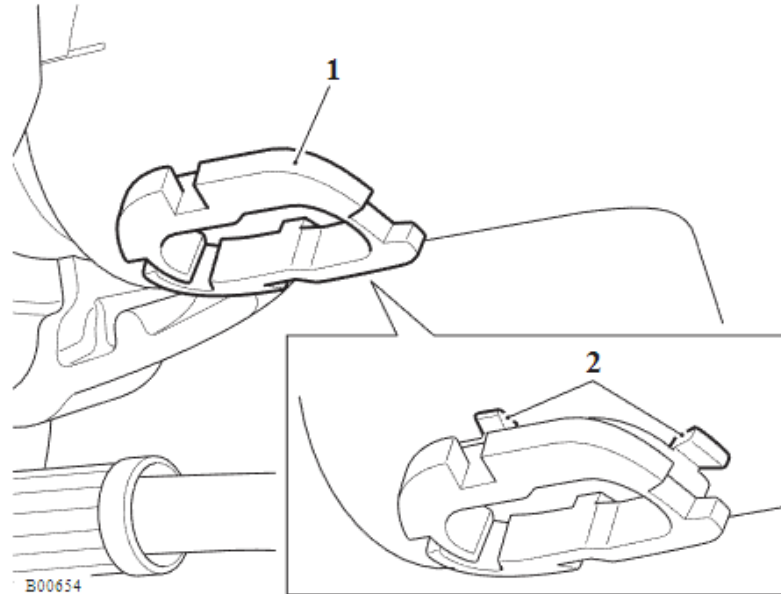


- 1. Right hand switch housing
- 2. Retaining clip

**NOTICE**

Three locating lugs hold the plastic grommet in position.

17. Press in the sides of the left hand plastic grommet to release two of the locating lugs and remove the grommet.



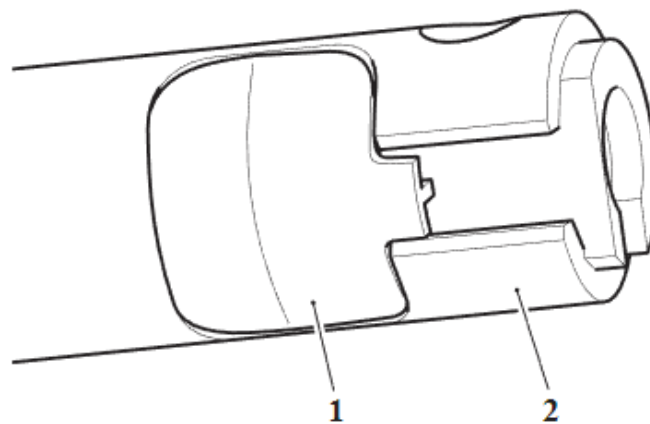
1. Plastic grommet (harness removed for clarity)
2. Locating lugs (two of three shown)

#### NOTICE

If heated grips are not fitted, there is a plastic plug fitted both ends of the handlebar to retain the connector for heated grips.

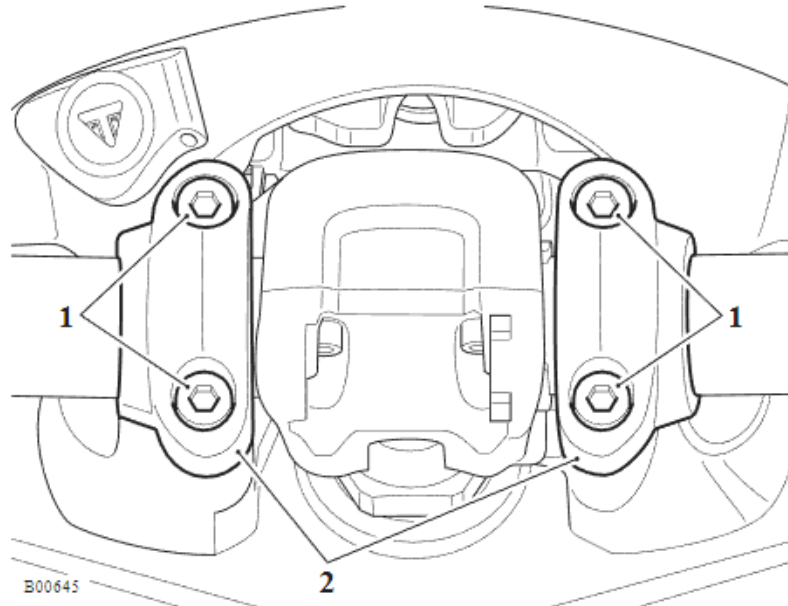
If heated grips are fitted, the plastic plugs will not be fitted to the handlebar.

18. If fitted, detach the plastic plug from the ends of the handlebar. Detach the heated grip connector and remove the plastic plug.



1. Plastic plug (right hand side down)
2. Handlebar

19. With the aid of an assistant, support the handlebar and release the fixings and remove the clamps.

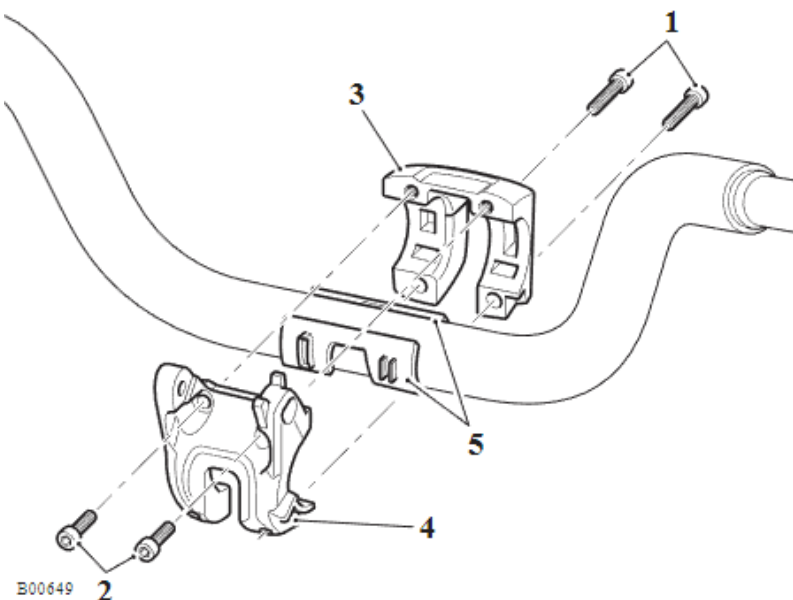


- 1. Fixings
- 2. Handlebar clamps

**NOTICE**

Note the position of the instruments riser and clamp on the handlebar for installation.

20. If required, release the four fixings and remove the instruments mounting and friction rings assembly.

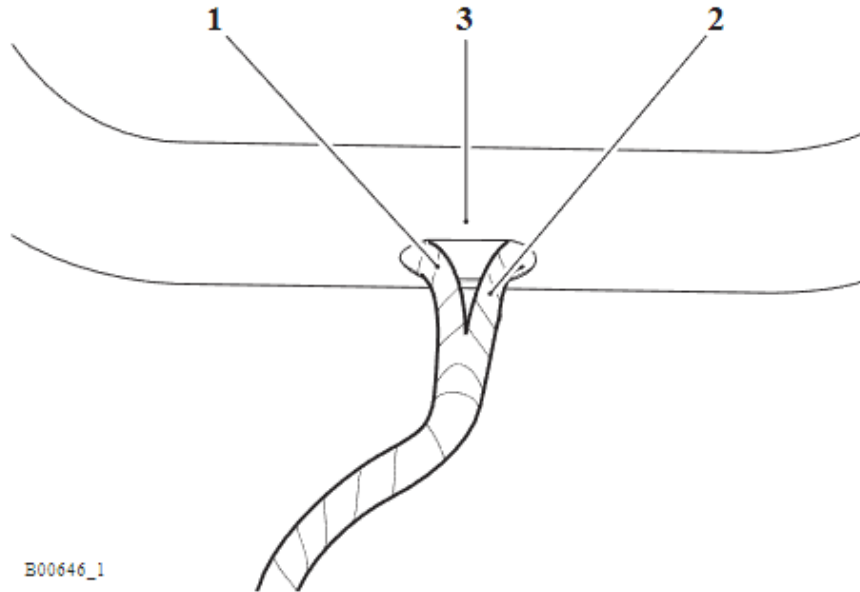


- 1. Fixings (clamp)
- 2. Fixings (riser)
- 3. Clamp
- 4. Riser
- 5. Friction ring

## NOTICE

Note the routing of the switch housing and the twist grip position sensor harnesses for installation.

21. Carefully remove the handlebar while feeding the switch housing and the twist grip position sensor harnesses out the handlebar.



1. Harness (right hand switch housing)
2. Harness (left hand switch housing)
3. Handlebar

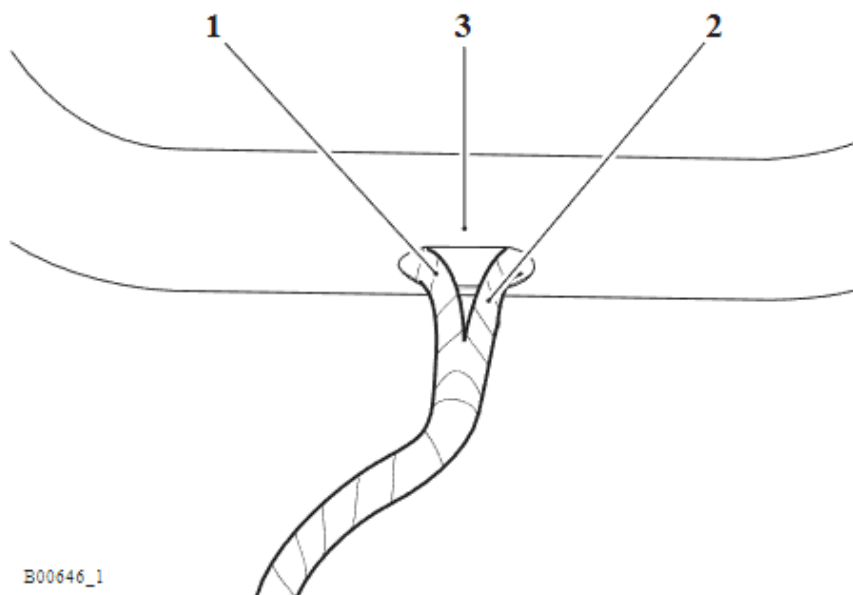
### Handlebars – Installation

## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Carefully fit the switch housing harnesses into the handlebar as noted for removal.

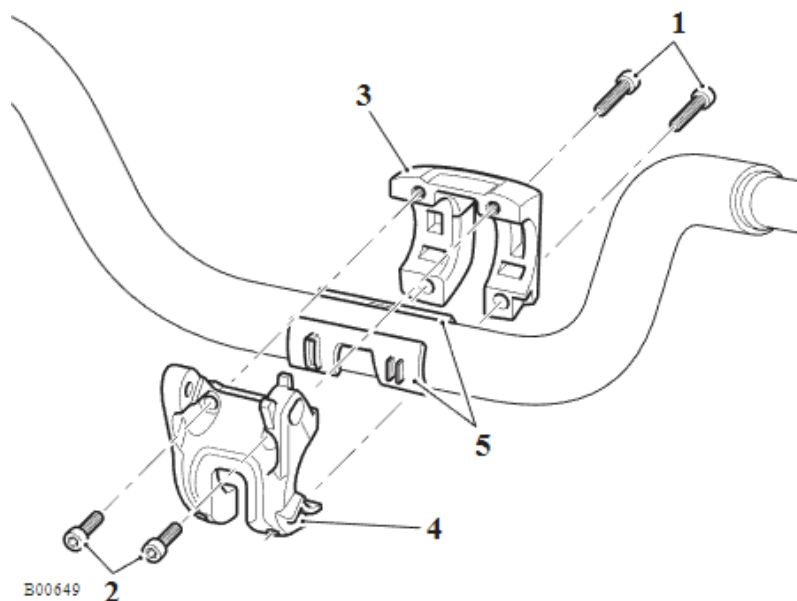
2. Carefully fit the twist grip position sensor harness first into the handlebar as noted for removal.
3. Carefully fit the switch housing harnesses into the handlebar as noted for removal.



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| <ol style="list-style-type: none"> <li>1. Harness (right hand switch housing)</li> <li>2. Harness (left hand switch housing)</li> <li>3. Handlebar</li> </ol> |
|---|

4. Fit the friction rings to the instruments riser and clamp.
5. Fit the instruments riser and clamp to the handlebar as noted for removal. Fit the fixings and tighten the upper fixings to 5.5 Nm. Do not tighten the lower fixings at this stage.

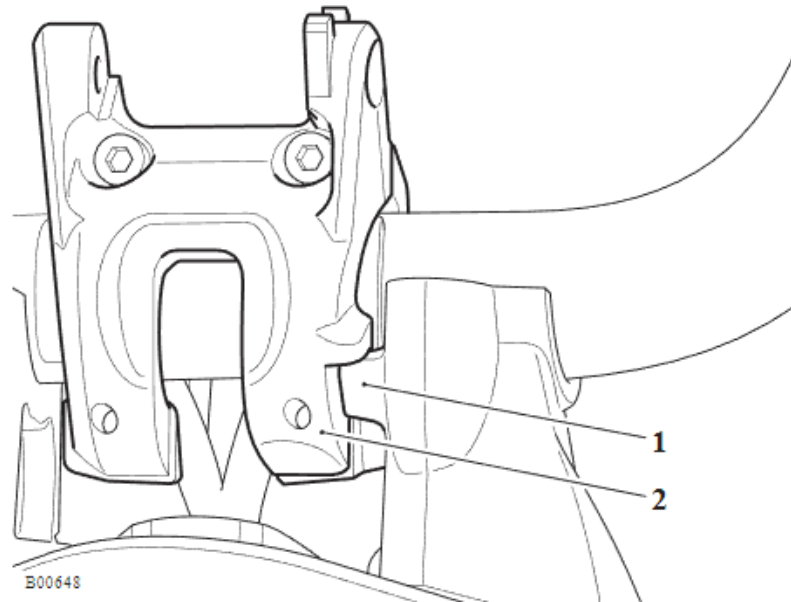


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| <ol style="list-style-type: none"> <li>1. Fixings (clamp)</li> <li>2. Fixings (riser)</li> <li>3. Clamp</li> <li>4. Riser</li> <li>5. Friction ring</li> </ol> |
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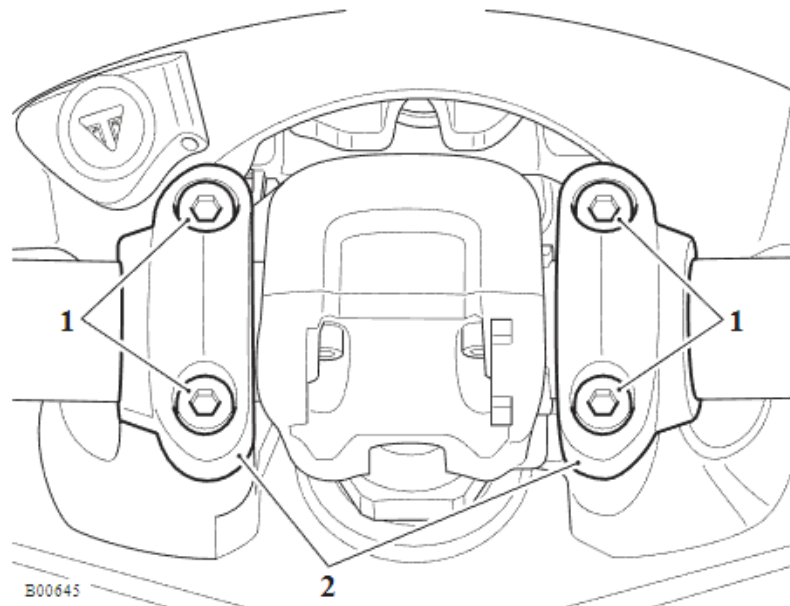


6. Position the handlebar to risers. Make sure the lug on the right hand riser is in the groove of the instruments riser.



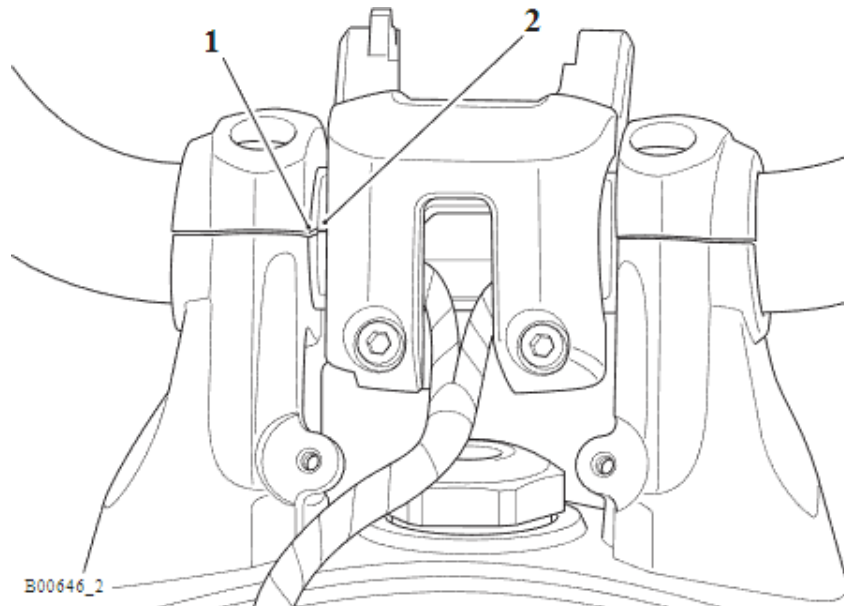
1. Lug (handlebar riser)
2. Groove (instruments riser)

7. Fit the handlebar clamps and fixings. Do not fully tighten at this stage.



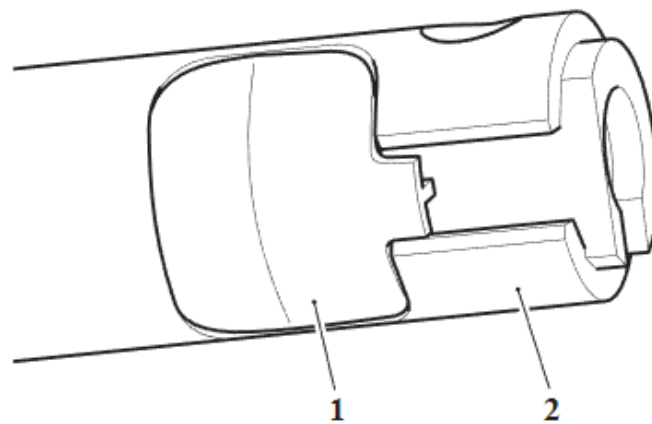
1. Fixings
2. Handlebar clamps

8. Position the handlebar so that the inside corner of the clamp is aligned with the alignment mark on the front of the handlebar, as shown below.



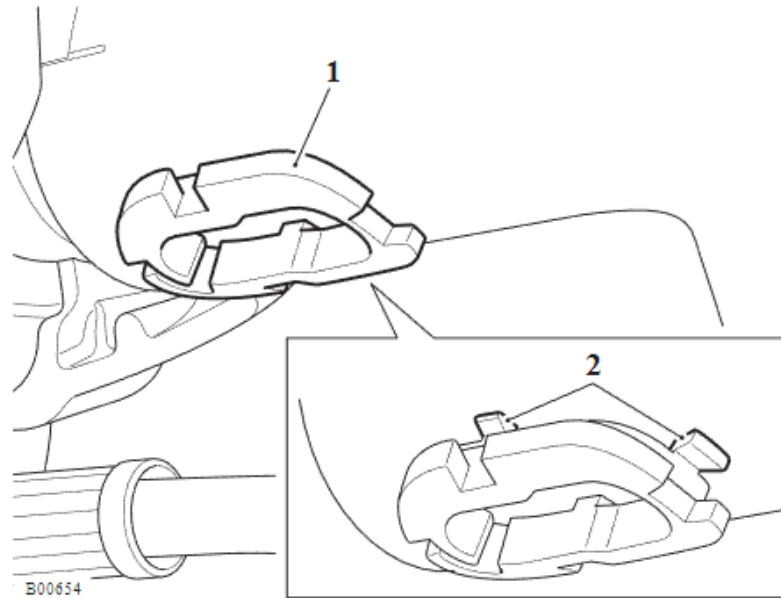
- 1. Alignment mark
- 2. Clamp

9. Tighten the handlebar clamp fixings, front ones first, to 26 Nm.  
10. If removed, attach the heated grip connector to the plastic plug then attach to the handlebar as noted for removal.



- 1. Plastic plug (right hand side down)
- 2. Handlebar

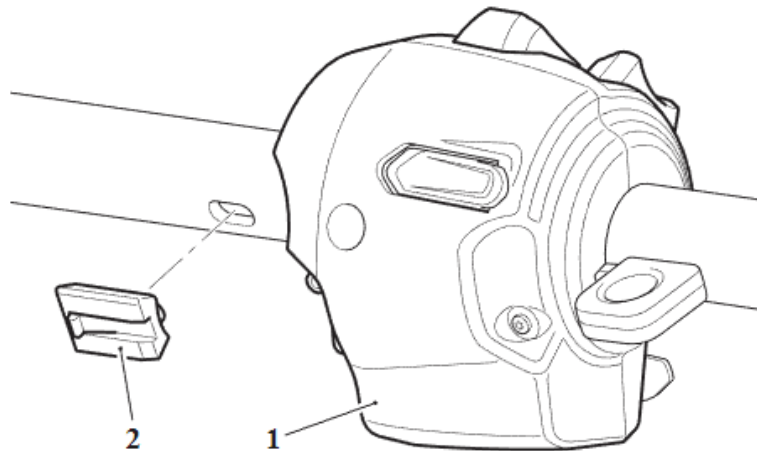
11. Fit the plastic grommet to the left hand side of the handlebar.



- 1. Plastic grommet (harness removed for clarity)
- 2. Locating lugs (two of three shown)

12. Position a new retaining clip into the handlebar in the orientation noted during removal and slide the left hand switch housing onto the handlebar.

13. Slide over the retaining clip until it locks into position.



- 1. Left hand switch housing
- 2. Retaining clip

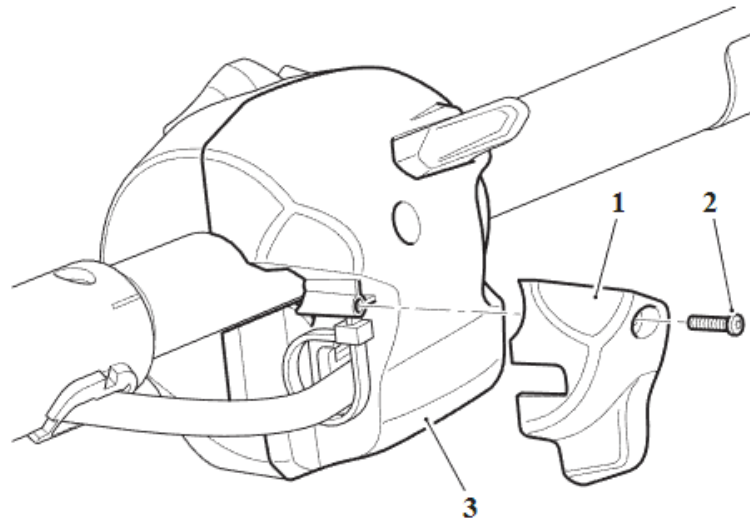
## NOTICE

The switch housing electrical connections are recessed into the switch housing body. To aid orientation, there are coloured dots on each connector. The coloured dots identify the bottom face of the connector.

When inserting the connectors, carefully locate the connectors into their sockets, then use a suitable tool to push the connectors fully home. An audible click can be heard when the connectors are fully inserted.

Do not use sharp tools, such as a flat bladed screw driver, to insert the connectors.

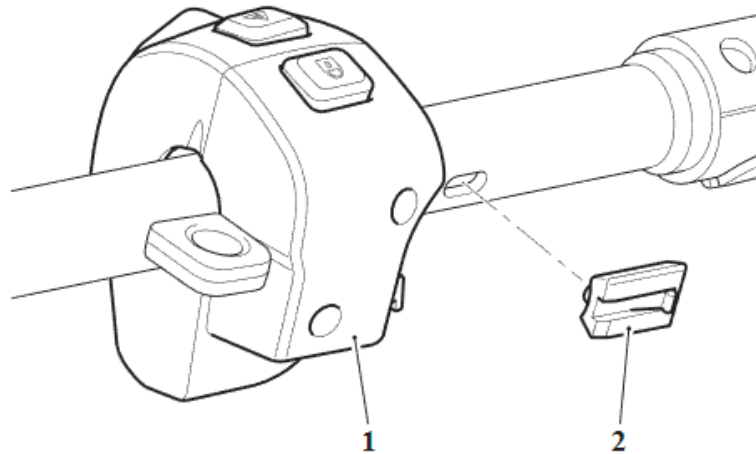
14. Fit the switch housing connectors.
15. Using a new cable tie, secure the switch housing wiring harness to the left hand switch housing.
16. Fit the cover to the left hand switch housing and tighten its fixing to 1 Nm.



1. Fixing
2. Cover
3. Switch housing

17. Position a new retaining clip into the handlebar in the orientation noted during removal and slide the left hand switch housing onto the handlebar.

18. Slide over the retaining clip until it locks into position.



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| <ol style="list-style-type: none"><li>1. Right hand switch housing</li><li>2. Retaining clip</li></ol> |
|--|

19. Fit the switch housing connectors.

20. Using a new cable tie, secure the switch housing wiring harness to the left hand switch housing.

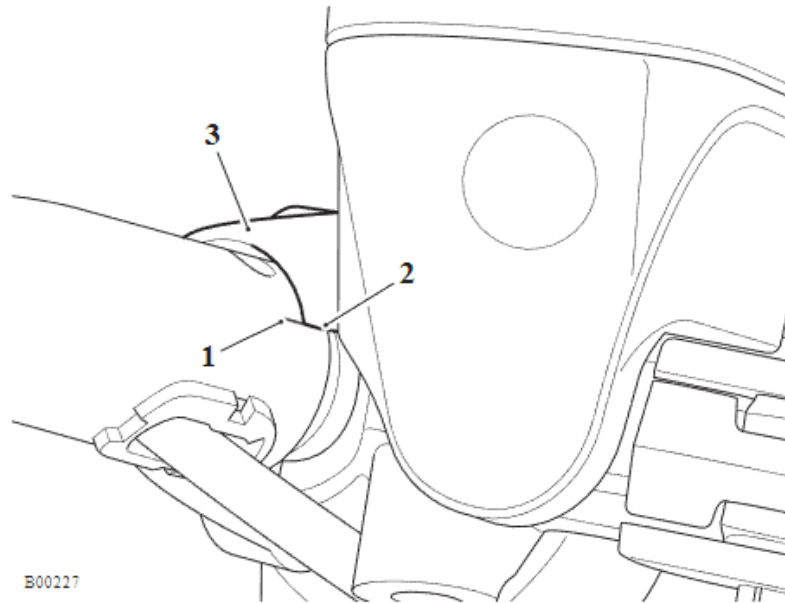
21. Locate the clutch master cylinder to the handlebars and fit the clamp, do not fully tighten at this stage.

#### **NOTICE**

When fitting the clutch master cylinder, care must be taken to avoid trapping switch housing harness between handlebar and reservoir clamp.

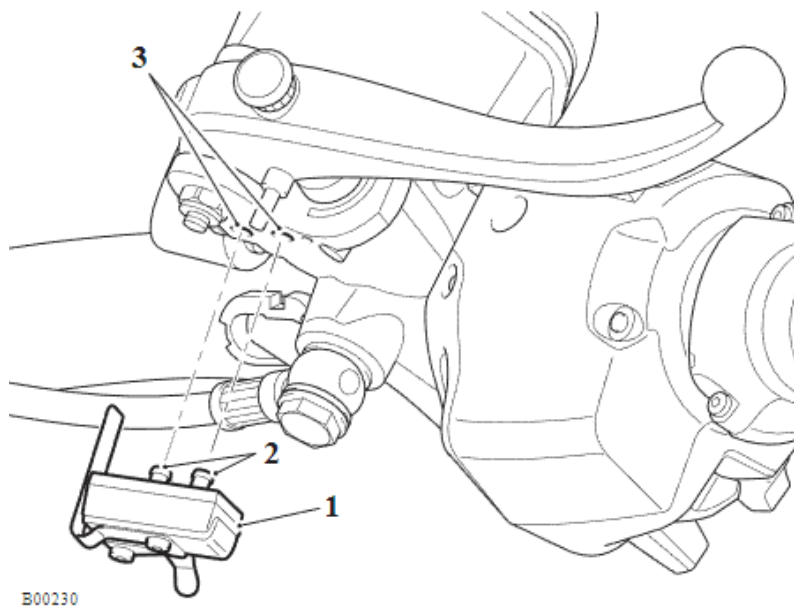
When fitting the clutch master cylinder, pull clutch lever fully in and check that it clears the high beam trigger.

22. Align the straight edge on the clamp to the alignment mark on the handlebar (as shown in the illustration below) and tighten the fixings (upper one first) to 8 Nm.



- 1. Alignment mark
- 2. Straight edge
- 3. Clamp

23. Attach the clutch switch assembly to the master cylinder as noted for removal.



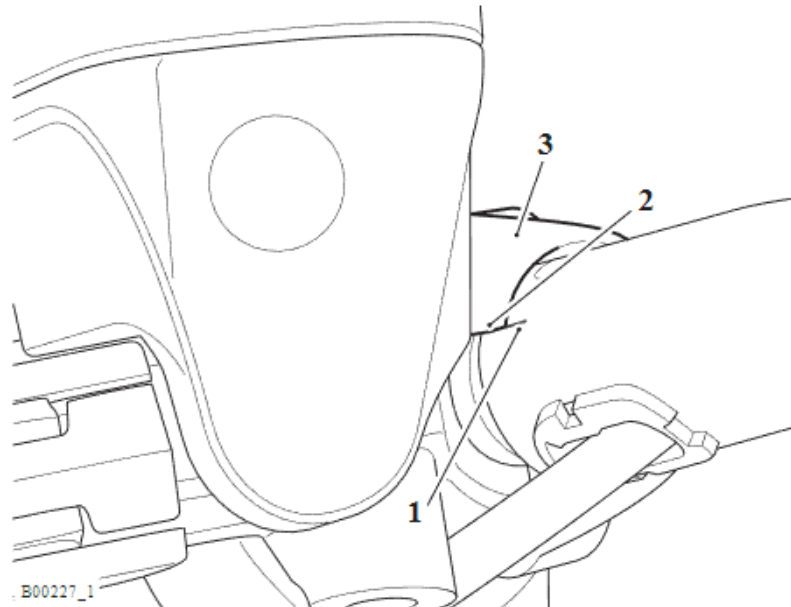
- 1. Clutch switch
- 2. Securing lugs
- 3. Location holes

24. Locate the front brake master cylinder to the handlebars and fit the clamp, do not fully tighten at this stage.

**NOTICE**

When fitting the front brake master cylinder, care must be taken to avoid trapping switch housing harness between handlebar and reservoir clamp.

25. Align the straight edge on the clamp to the alignment mark on the handlebar (as shown in the illustration below) and tighten the fixings (upper one first) to 8 Nm.



1. Alignment mark
2. Straight edge
3. Clamp

Perform the following operations:

- [Heated Grip - Installation \(if fitted\)](#)
- [Twist Grip Position Sensor - Installation](#)
- [Heated Twist Grip - Installation](#)
- [Mirrors - Installation](#)
- [Instruments - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Upper Yoke – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line. Brake hoses or lines that are not supported may become damaged or bent.

Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

### **CAUTION**

Do not allow a clutch component to hang unsupported on the clutch hose or line.

Clutch hoses or lines that are not supported may become damaged or bent.

### **CAUTION**

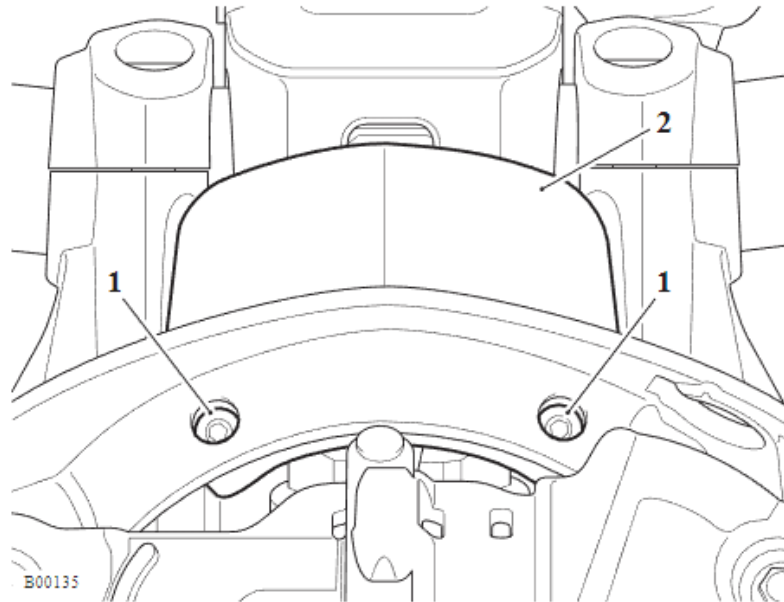
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)
- [Front Subframe - Removal](#)



1. Release the two fixings and remove the headstock harness cover.



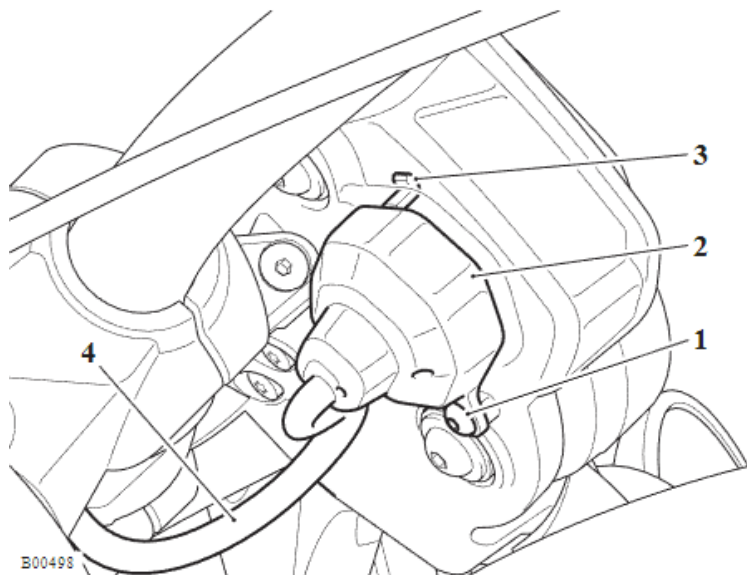
1. Fixings
2. Harness cover

### NOTICE

Note the routing of the instruments harness for installation.

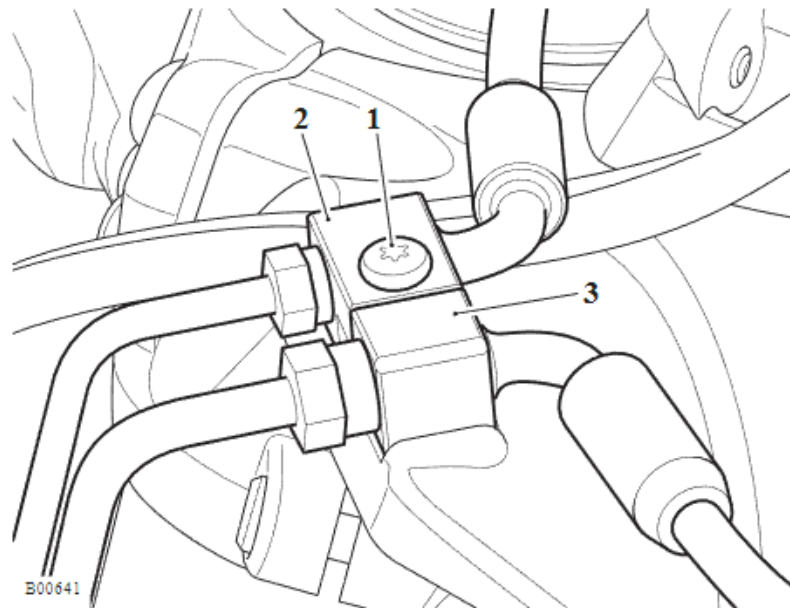
The instruments electrical connector cover is secured to the instruments with a fixing and a retaining lug.

2. Release the fixing and manoeuvre the cover to release the retaining lug and remove the cover.



1. Fixing
2. Cover
3. Retaining lug
4. Instruments harness

3. Disconnect the electrical connector from the instruments.
4. Release the fixing and detach the brake and clutch line connector block from the upper yoke. Discard the fixing.



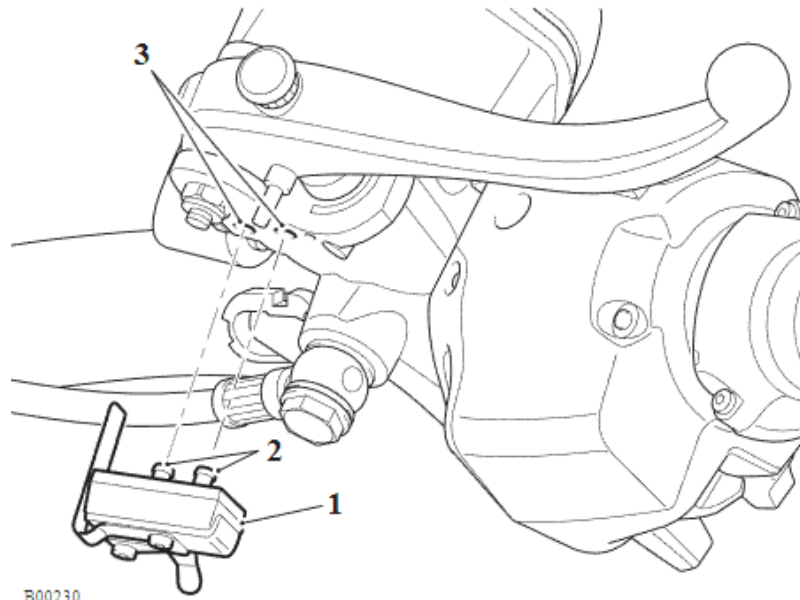
1. Fixing
2. Brake line connector
3. Clutch line connector

#### **NOTICE**

The clutch switch is secured to its housing by two fixings. The clutch switch housing is a press fit to the clutch master cylinder.

Note the orientation of the clutch switch for installation.

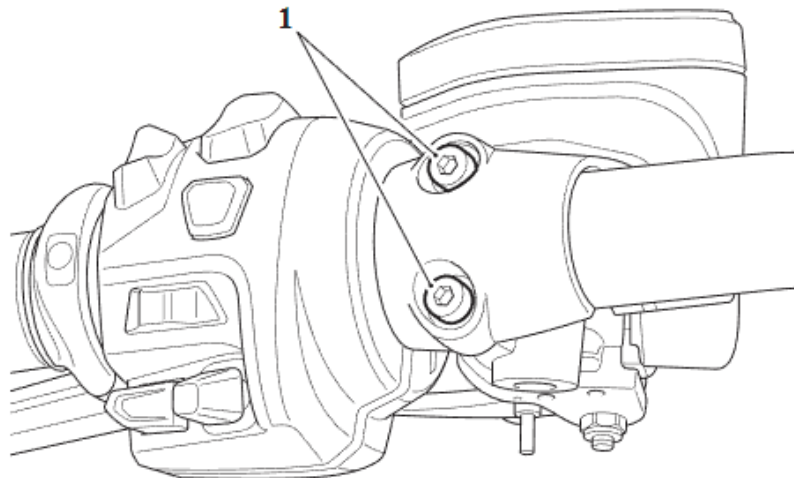
5. Carefully detach the clutch switch assembly from the master cylinder.



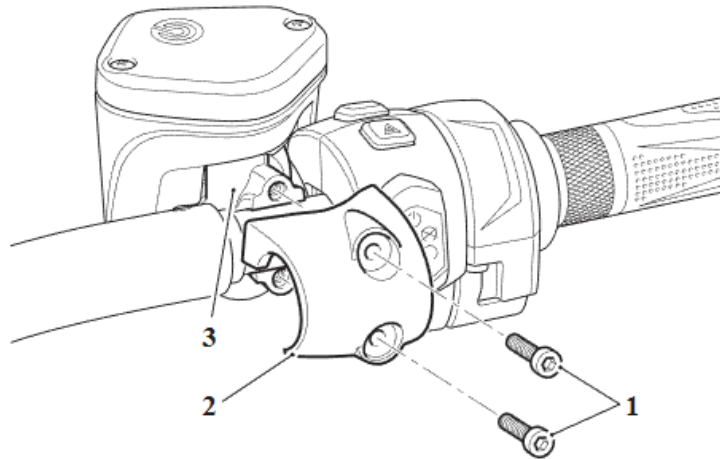
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| <ol style="list-style-type: none"><li>1. Clutch switch</li><li>2. Securing lugs</li><li>3. Location holes</li></ol> |
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6. Release the fixings, lift off the clamp then detach and support the front brake master cylinder.



7. Release the fixings, remove the clamp then detach and support the master cylinder.

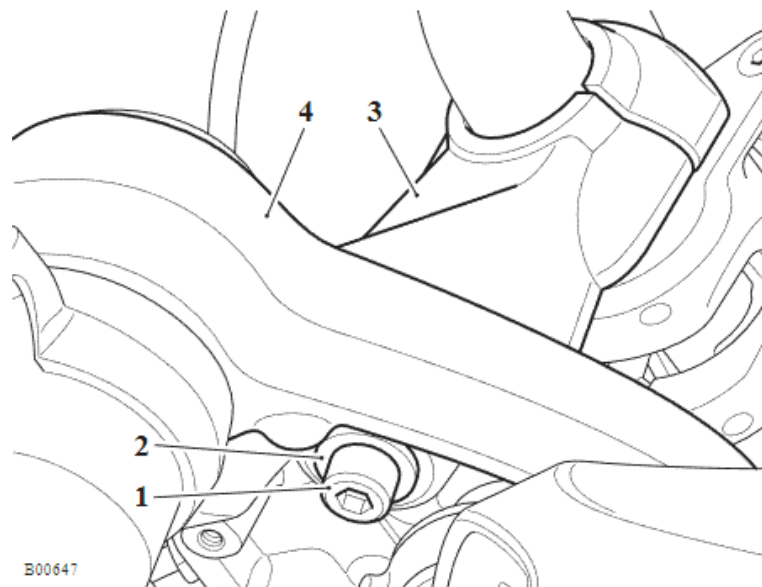


- 1. Fixings
- 2. Clamp
- 3. Master cylinder

**NOTICE**

Note the routing of the handlebar harnesses for installation.

8. Release the fixings and washer for the handlebar risers and remove the handlebar assembly.

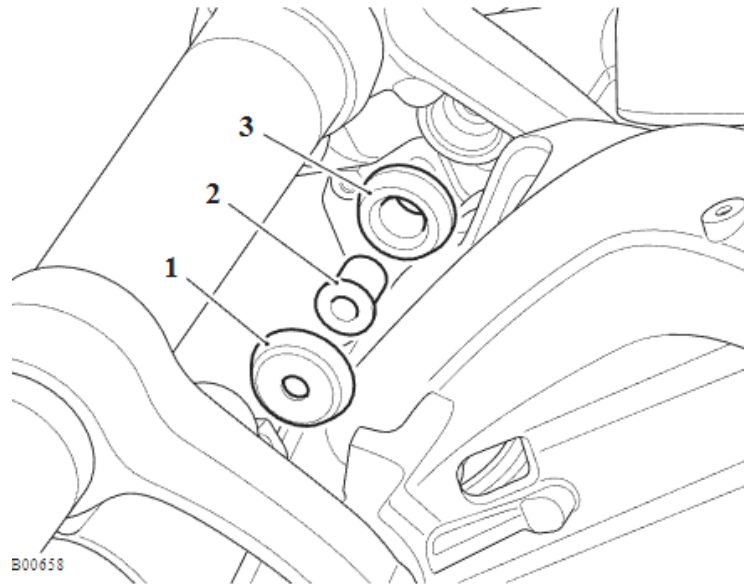


- 1. Fixing (left hand side shown)
- 2. Washer
- 3. Handlebar riser
- 4. Upper yoke

## NOTICE

Note the positions of the compression limiters, rubber grommets and caps for installation.

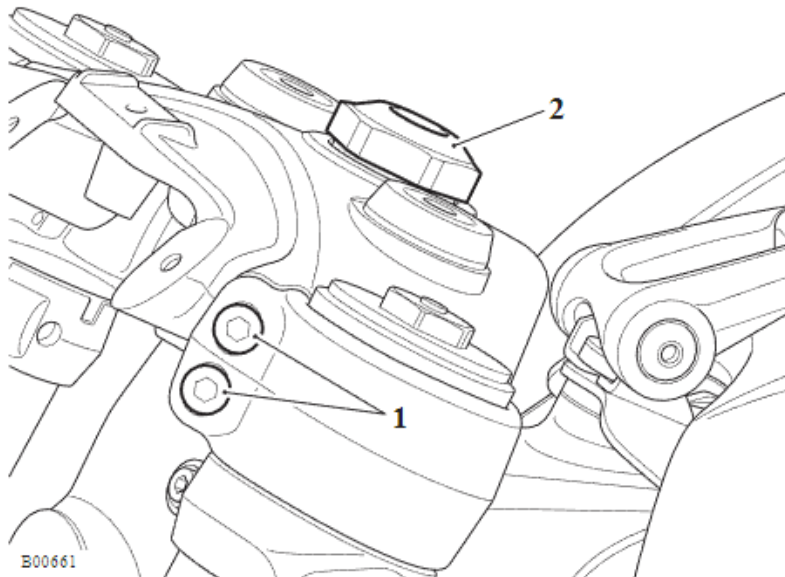
9. Remove the cap, compression limiter and rubber grommets from upper yoke.



1. Cap
2. Compression limiter
3. Rubber grommet

10. Loosen the upper yoke pinch bolts.

11. Remove the top nut and washer from the steering stem. Remove the upper yoke.



1. Upper yoke pinch bolt
2. Top nut

## Upper Yoke – Installation

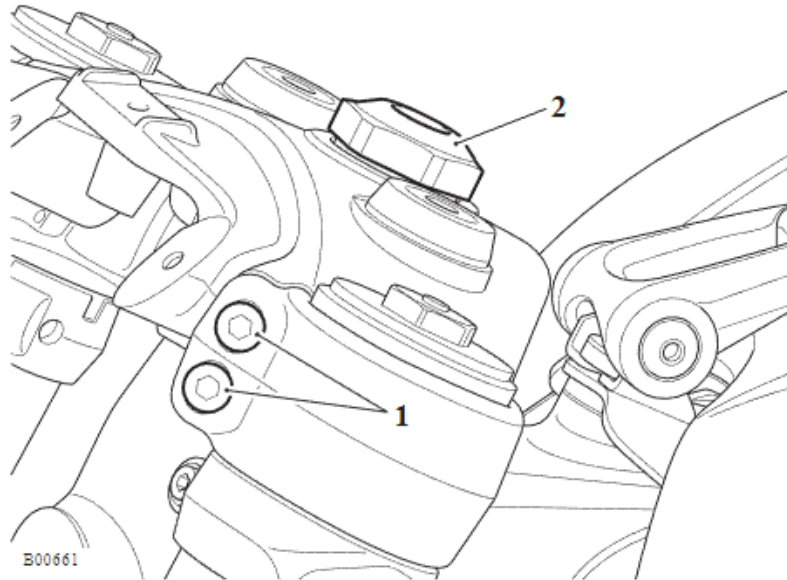
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

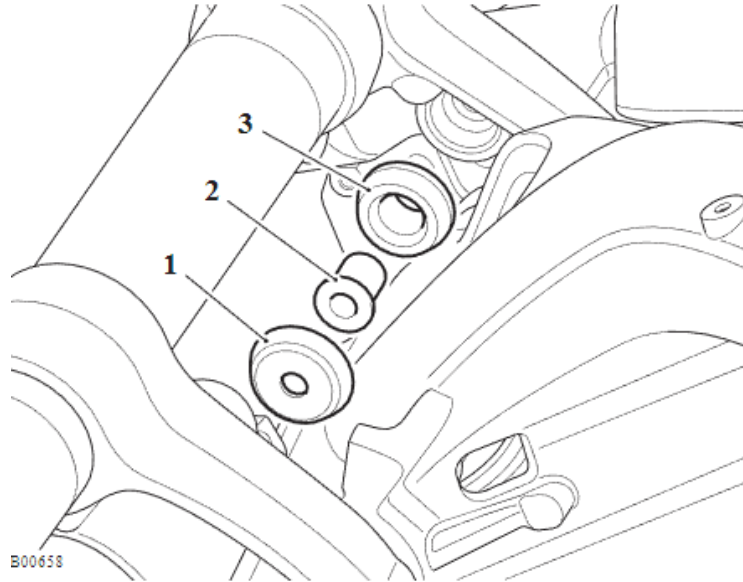
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the upper yoke to the motorcycle.
2. Fit the washer and tighten the top nut to 90 Nm.
3. Tighten the upper yoke pinch bolts to 25 Nm.



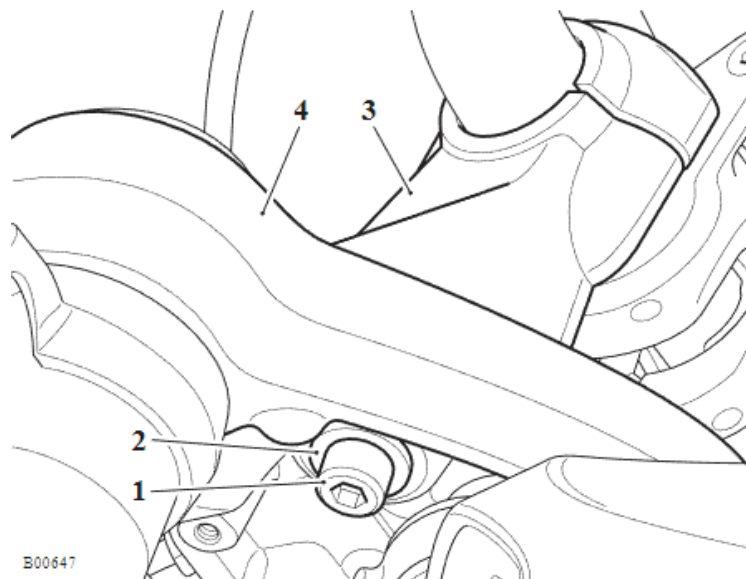
1. Upper yoke pinch bolt
2. Top nut

4. Fit the cap, compression limiter and rubber grommets to the upper yoke as noted for removal.



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| <ol style="list-style-type: none"><li>1. Cap</li><li>2. Compression limiter</li><li>3. Rubber grommet</li></ol> |
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5. Position the handlebar assembly onto the upper yoke. Fit the washer and fixings for the handlebar risers and tighten to 60 Nm.

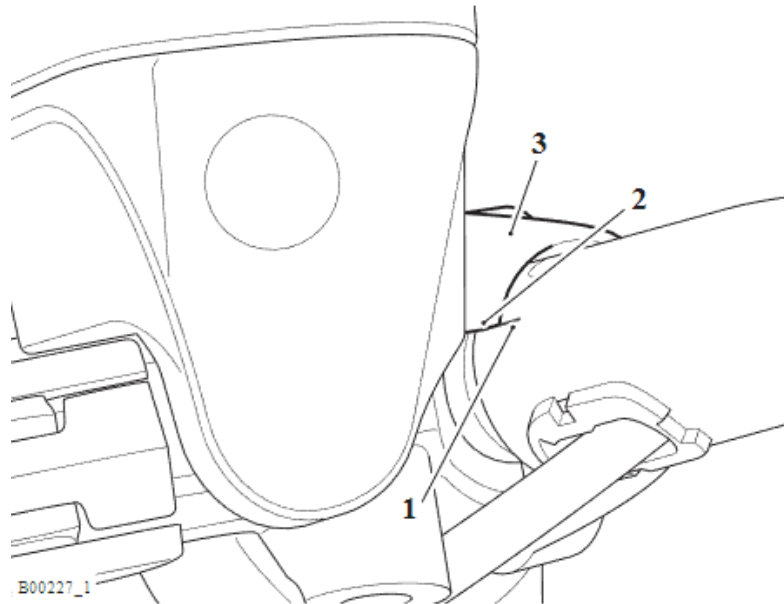


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|---|
| <ol style="list-style-type: none"><li>1. Fixing (left hand side shown)</li><li>2. Washer</li><li>3. Handlebar riser</li><li>4. Upper yoke</li></ol> |
|---|

### NOTICE

When fitting the front brake master cylinder, care must be taken to avoid trapping switch housing harness between handlebar and reservoir clamp.

6. Locate the front brake master cylinder to the handlebars and fit the clamp.
7. Align the straight edge on the clamp to the alignment mark on the handlebar (as shown in the illustration below) and tighten the fixings (upper one first) to 8 Nm.



6. Alignment mark
7. Straight edge
8. Clamp

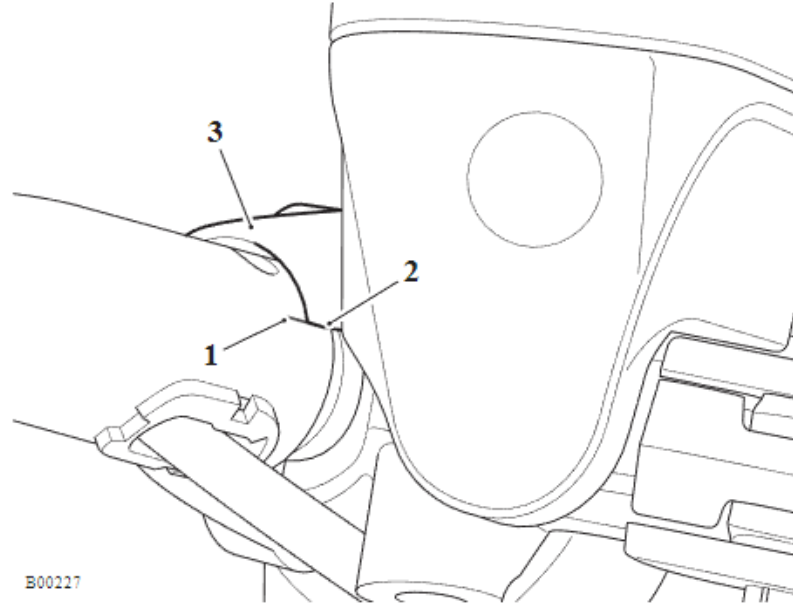
8. Locate the clutch master cylinder to the handlebars and fit the clamp.

### NOTICE

When fitting the clutch master cylinder, care must be taken to avoid trapping switch housing harness between handlebar and reservoir clamp.

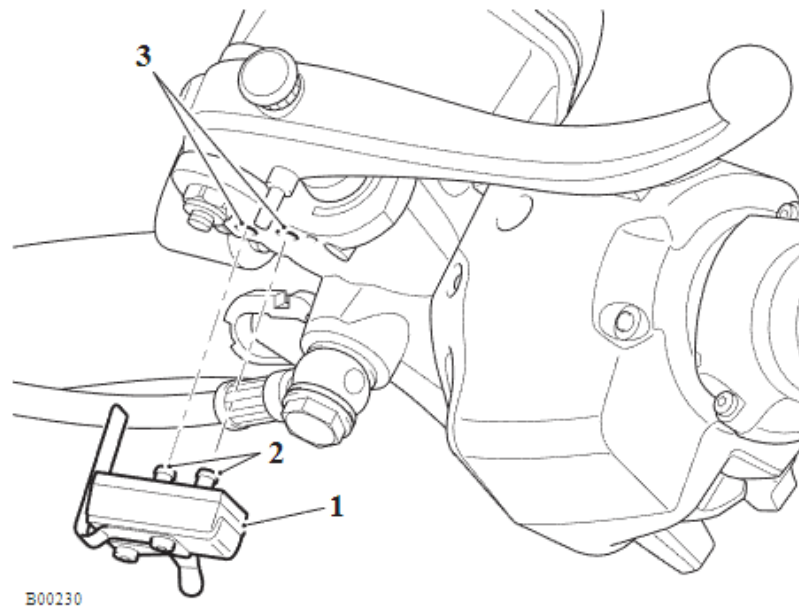


9. Align the straight edge on the clamp to the alignment mark on the handlebar (as shown in the illustration below) and tighten the fixings (upper one first) to 8 Nm.



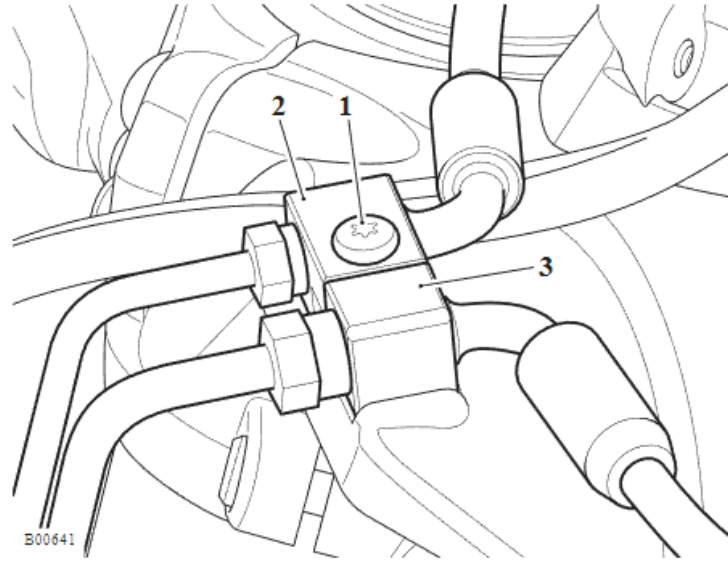
- |                   |
|-------------------|
| 8. Alignment mark |
| 9. Straight edge  |
| 10. Clamp         |

10. Attach the clutch switch assembly to the master cylinder as noted for removal.



- |                    |
|--------------------|
| 10. Clutch switch  |
| 11. Securing lugs  |
| 12. Location holes |

11. Attach the brake and clutch line connector block to the upper yoke and tighten the new fixing to 9 Nm.

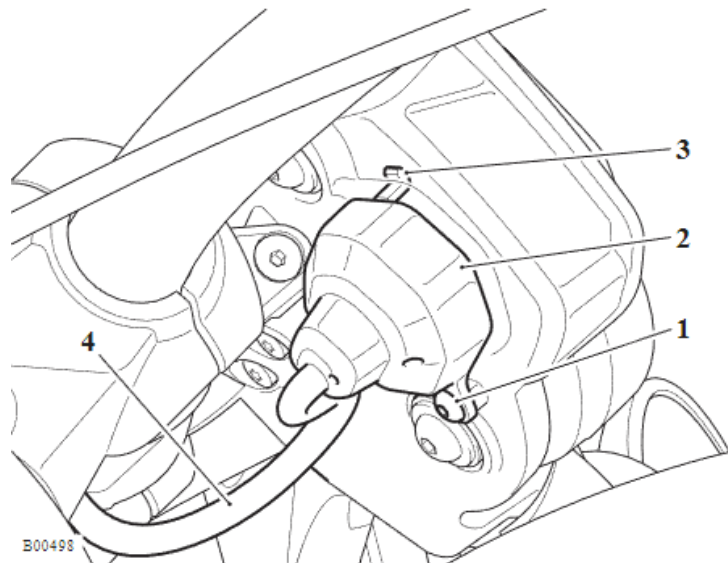


- 1. Fixing
- 2. Brake line connector
- 3. Clutch line connector

12. Connect the electrical connector to the instruments.

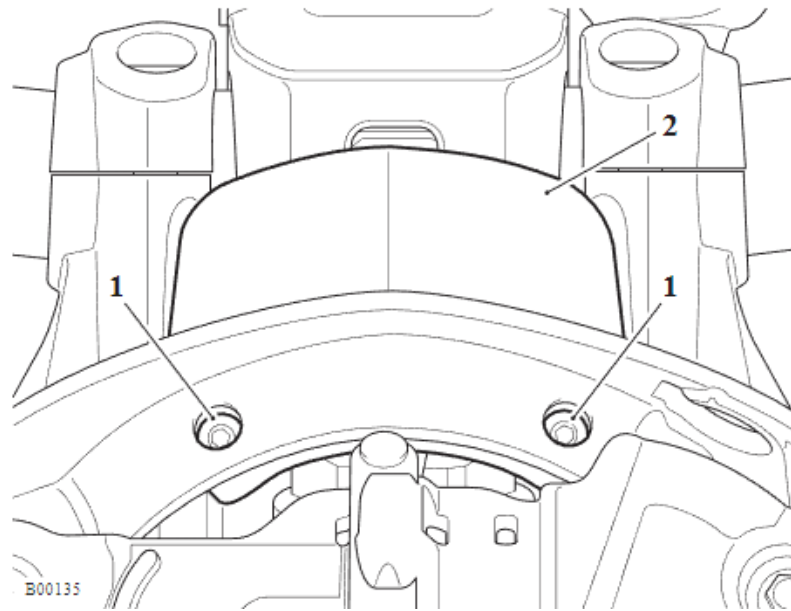
13. Fit the cover to as noted for removal and tighten the fixing to 3 Nm.

14. Attach the instruments harness to its retaining clip.



- 1. Fixing
- 2. Cover
- 3. Retaining lug
- 4. Instruments harness

15. Fit the headstock harness cover and tighten the fixings to 5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Harness cover</li></ol> |
|---|

Perform the following operations:

- [Front Subframe - Installation](#)
- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Lower Yoke and Headstock Bearings – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

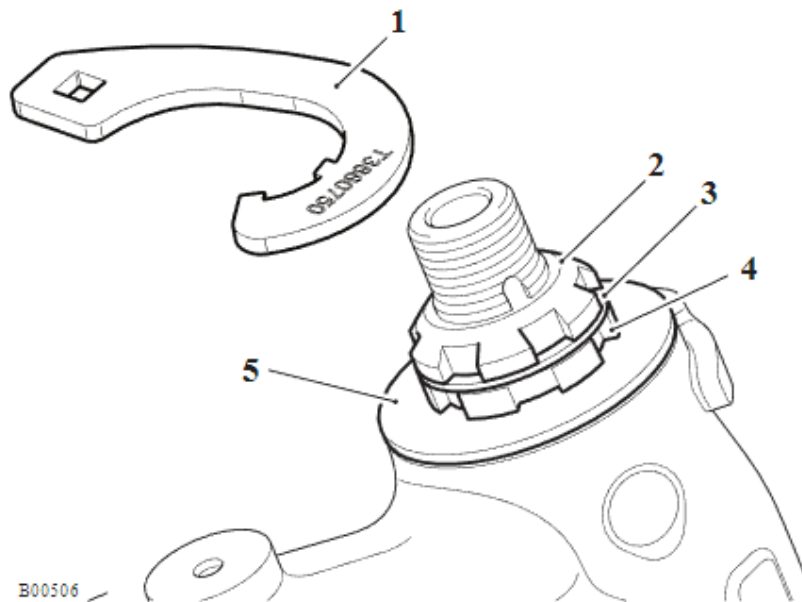
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Upper Yoke - Removal](#)
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Use service tool T3880750 to remove the lock nut.
2. Remove the tab washer.
3. Use service tool T3880750 to remove the adjuster nut.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. T3880750 - Headstock Service Tool</li><li>2. Lock nut</li><li>3. Tab washer</li><li>4. Adjuster nut</li><li>5. Dust seal</li></ol> |
|---|

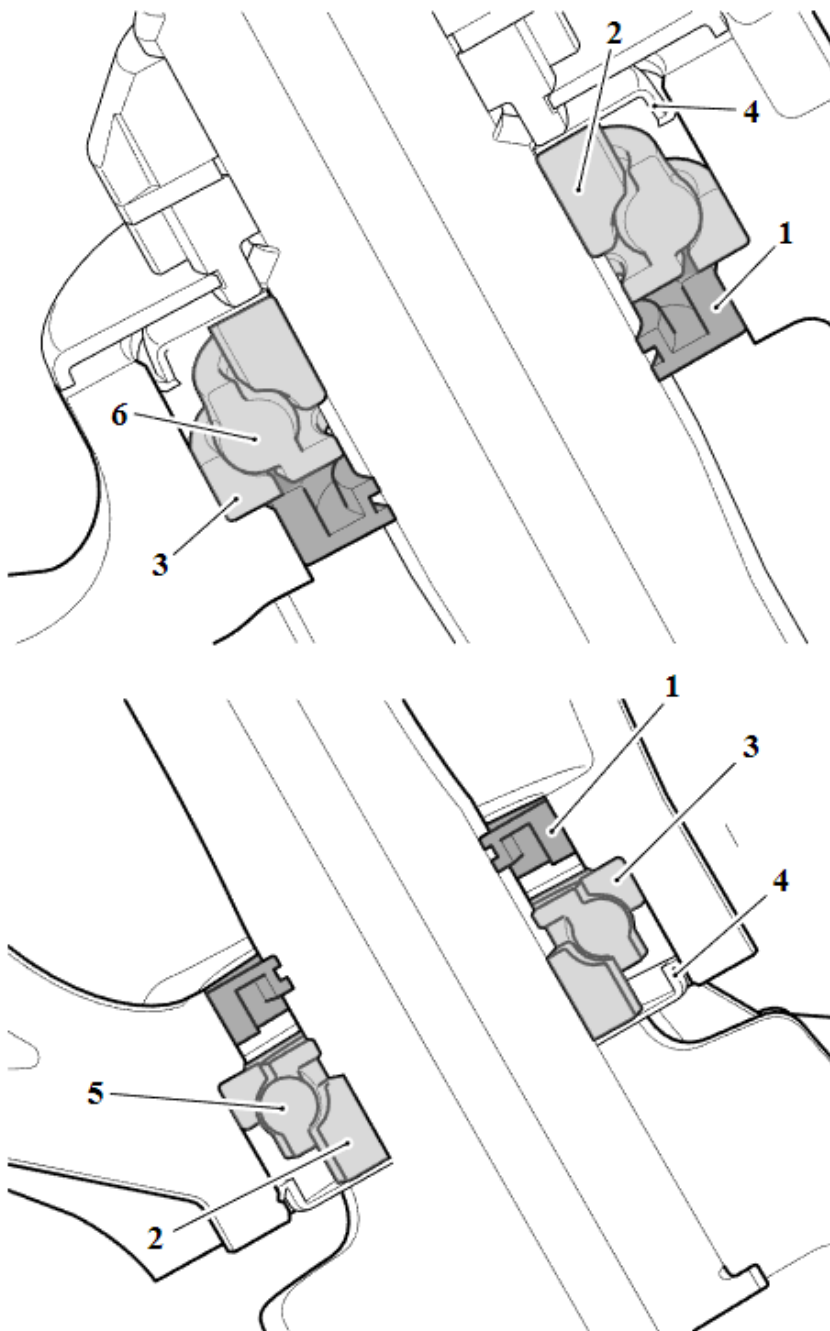
4. Remove the lower yoke from below the frame headstock.

Headstock Bearings - Removal

## WARNING

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

For this model there are two oil seals for the headstock bearings as shown in the illustration below.



1. Oil seal
2. Inner race
3. Outer race
4. Dust seal
5. Lower bearing
6. Upper bearing

## NOTICE

When removing the bearing races from the headstock, the oil seals within the headstock will get damaged and must be replaced.

Note the orientation of the dust seals for installation.

1. Remove the dust seal.
2. Remove the inner race and bearing from the headstock.
3. Using a suitable drift, evenly and progressively drive the oil seals and outer races from the frame headstock.
4. Remove the bearing from the lower yoke.
5. Remove the outer race and dust seal from the lower yoke using a press or puller.

### Headstock Bearing – Inspection

## WARNING

Only remove raised witness marks from within the frame. Removal of material below any raised areas will reduce the level of interference between the frame and the bearings. Loss of interference could cause the bearing to become loose in the frame leading to loss of motorcycle control and an accident.

1. Examine the frame for any raised witness marks caused by the removal process. Remove any such marks with fine emery paper or a suitable file.

### Lower Yoke and Headstock Bearings - Installation

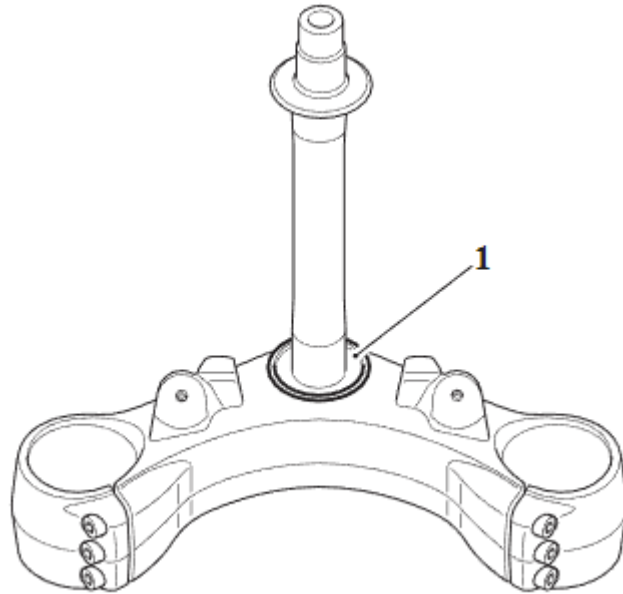
## WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new dust seal to the steering stem on the lower yoke.



1. Dust seal

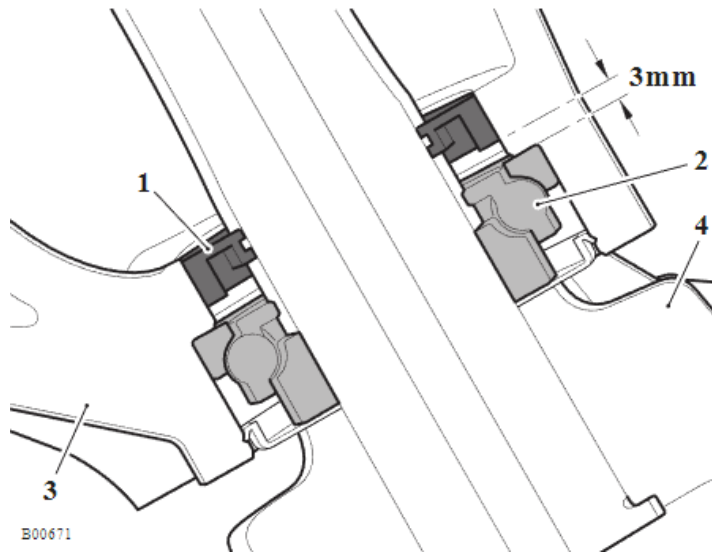
2. Press a new lower bearing inner race onto the steering stem of the lower yoke.
3. Fit the bearing to the inner race on the lower yoke.

#### **NOTICE**

The oil seal for the headstock upper bearing is to be flush with the seat for the bearing outer race.

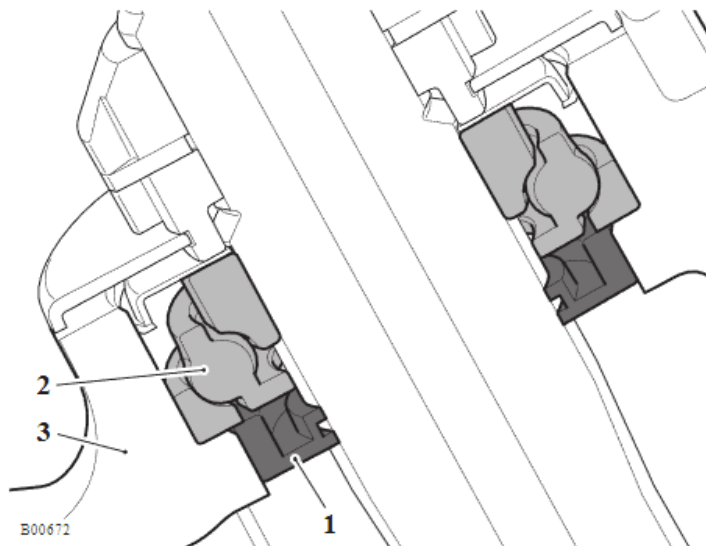
The oil seal for the headstock lower bearings is to be 3 mm past the seat for the bearing outer race.

4. Fit a new seal to the lower end of the headstock with lip of the seal facing the bearing and is 3 mm past the seat for the bearing outer race.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Oil seal</li><li>2. Bearing outer race</li><li>3. Headstock</li><li>4. Lower yoke</li></ol> |
|--|

5. Evenly and progressively drive the new bearing outer race into the lower end of the headstock.
6. Fit a new seal to the upper end of the headstock with lip of the seal facing the bearing and is flush with the seat for the bearing outer race.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Oil seal</li><li>2. Bearing outer race</li><li>3. Headstock</li></ol> |
|--|



7. Evenly and progressively drive the new bearing outer race into the upper end of the headstock.

#### Lower Yoke - Installation

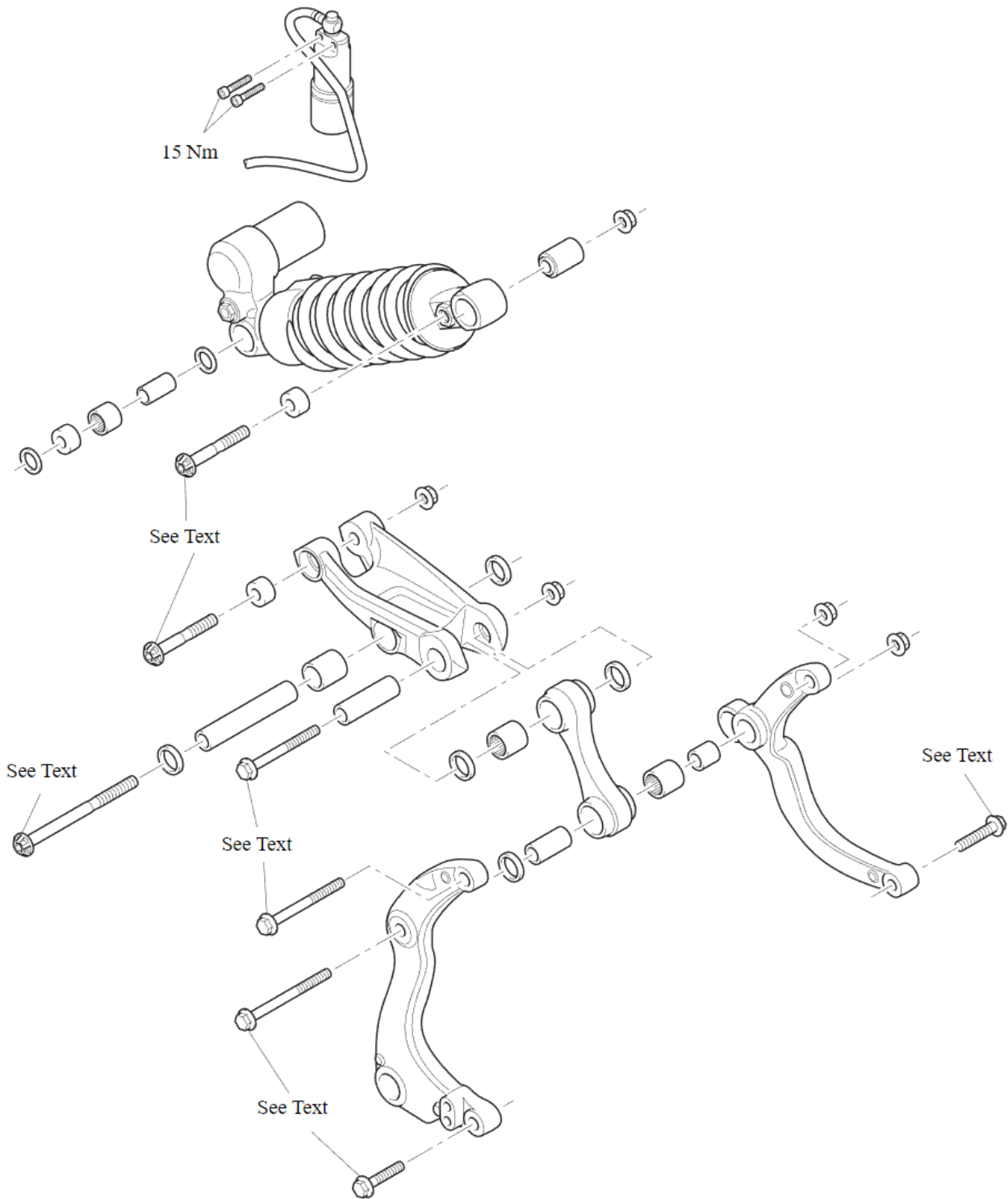
1. Lubricate the headstock bearings using Castrol LCX 222 or an equivalent heavy duty lithium based grease.
2. Fit the bearing to the bearing inner race on the steering stem.
3. Insert the lower yoke to the frame headstock, fit the upper bearing, inner race, dust seal and retain with the adjuster nut.
4. Make sure that the threads on the steering stem are free from grease and adjust the headstock bearings (see [Steering Head Bearing - Adjustment](#)).

Perform the following operations:

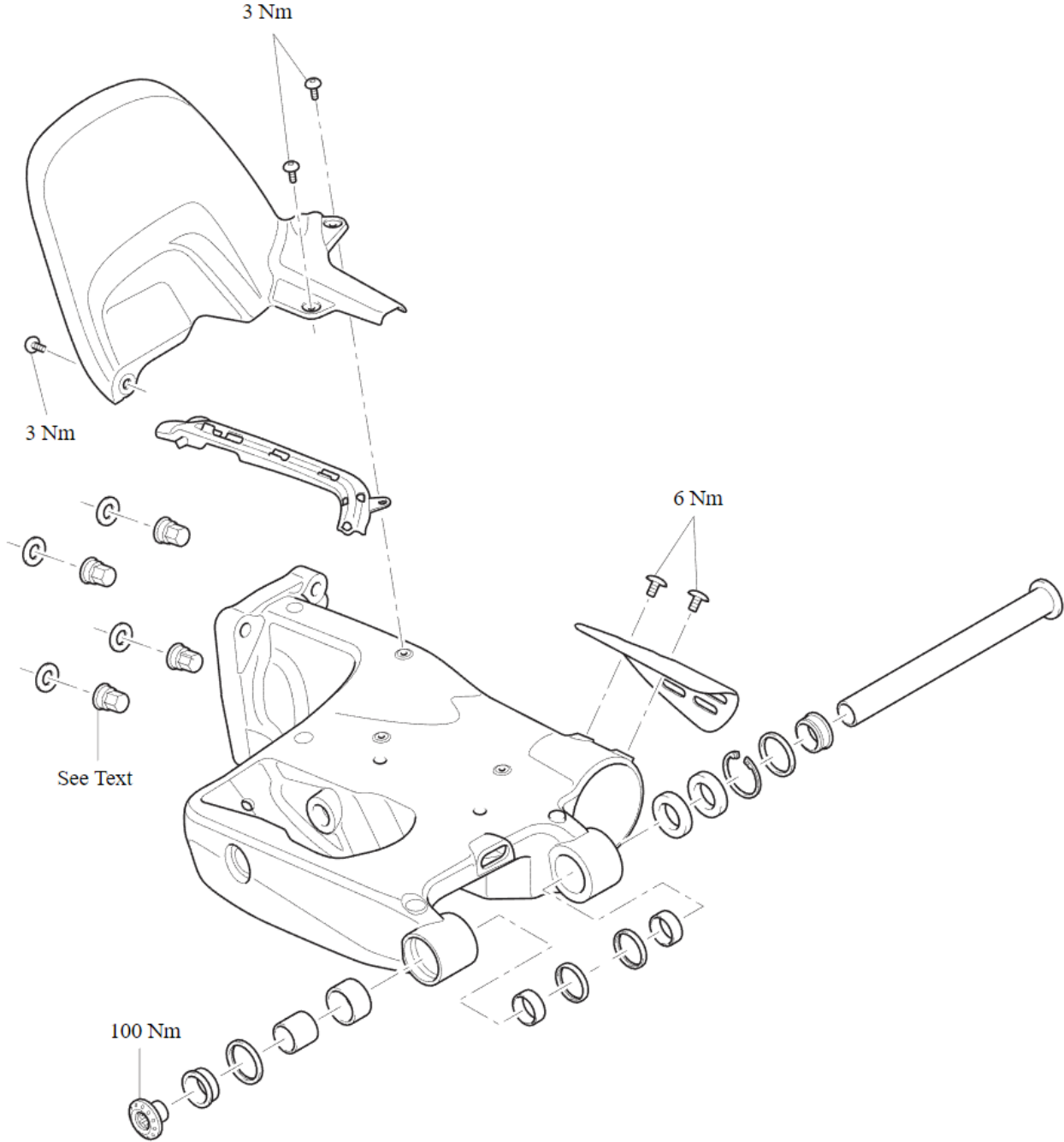
- [Upper Yoke - Installation](#)
- [Front Forks - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

# Rear Suspension and Swinging Arm

## Exploded View - Rear Suspension Unit and Linkage



Exploded View - Swinging Arm



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- Right hand [Side Panels - Removal](#)
- [Keyless ECM - Removal](#)

1. Raise and support the rear of the motorcycle under the engine. Position a block to support the rear wheel.
2. Disconnect the engine ECM connectors (see [Engine Electronic Control Module \(Engine ECM\) - Removal](#)).
3. If closed, open the passenger right hand footrest to access the rear suspension preload adjuster fixings.

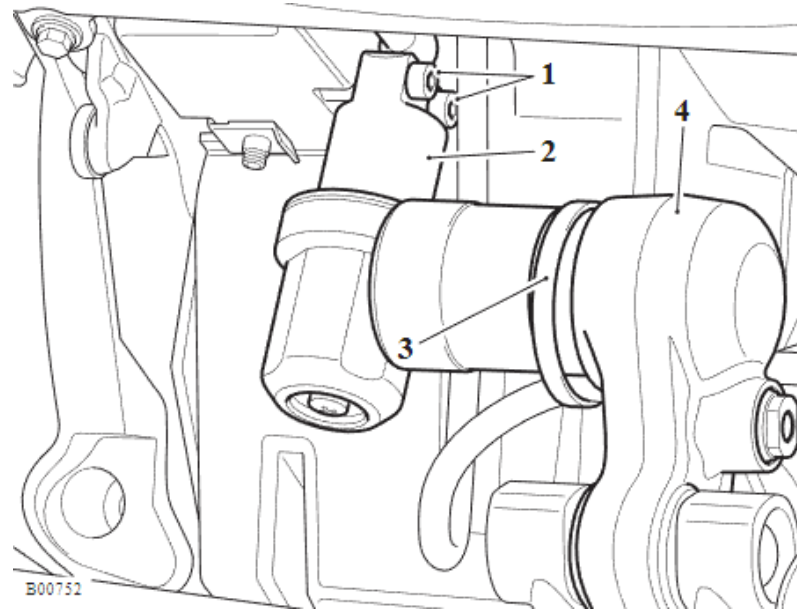
**NOTICE**

Note the routing of the preload adjuster hose and its retaining clip for installation.

There is a retaining band securing the adjuster hose to the suspension unit's body.

There is no requirement to remove retaining band.

4. Release the fixings and detach rear suspension preload adjuster from the battery box.



1. Fixings
2. Preload adjuster
3. Retaining band
4. Rear suspension unit

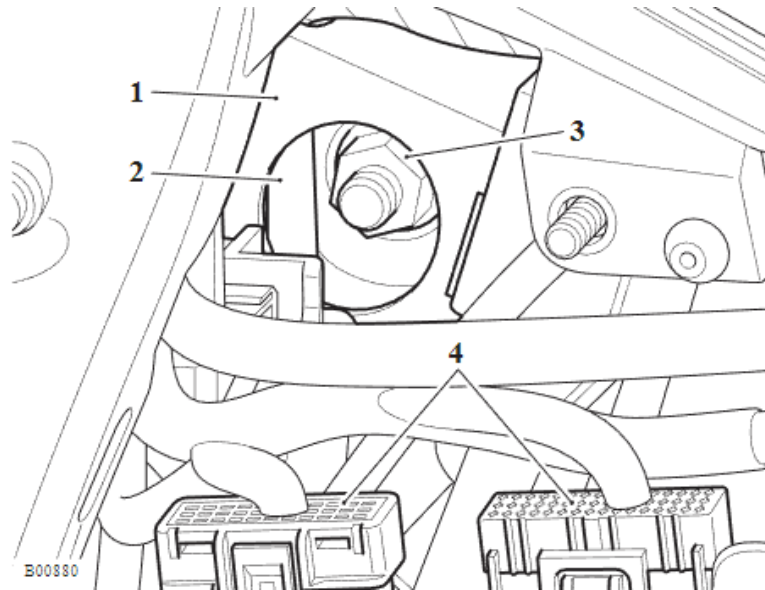
### **⚠ CAUTION**

Part of the main harness is routed near the rear suspension unit upper fixing. Care must be taken not to damage the harness when removing or installing the rear suspension unit and its fixings.

### **NOTICE**

Note the position of the harness between the battery box and rear suspension unit upper fixing for installation. There is an access hole for access to the rear suspension upper flanged lock nut. It is located at the lower front right hand corner of the battery box.

5. Remove the flanged lock nut from the upper mounting bolt. Discard the flanged lock nut.

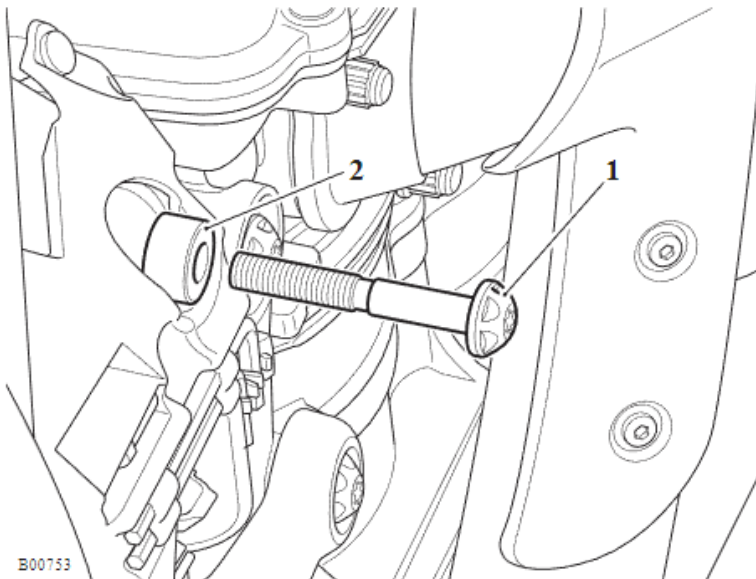


1. Battery box (rear subframe removed for clarity)
2. Harness
3. Flanged lock nut
4. Engine ECU connectors (2 off)

**NOTICE**

Note there is a sleeve fitted to the right hand outrigger for the suspension unit upper mounting bolt.

6. Remove the upper mounting bolt and sleeve.

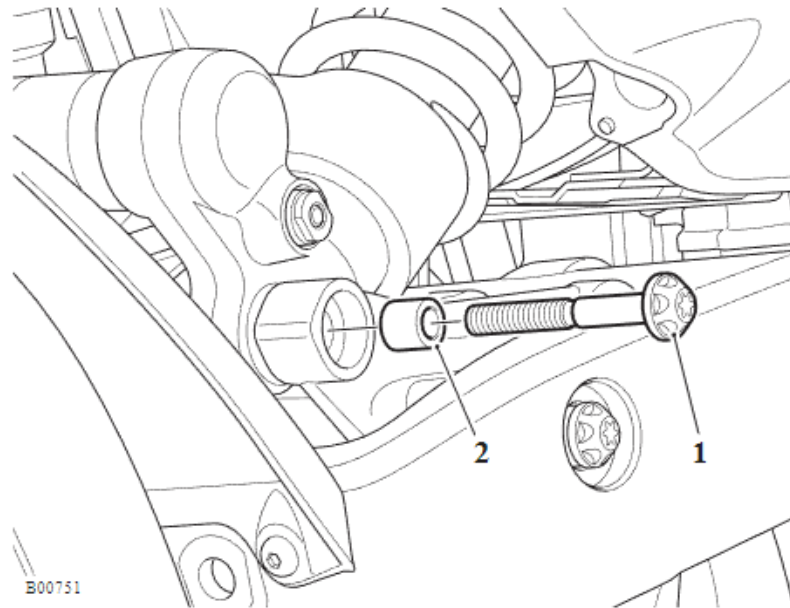


1. Bolt
2. Sleeve

## NOTICE

Note there is a sleeve fitted to the right hand side of the drag link rocker for the suspension unit lower mounting bolt.

7. Remove the bolt securing the rear suspension unit to its lower mounting. Discard the flanged lock nut.



1. Bolt
2. Sleeve

8. Manoeuvre the unit downwards and remove from the motorcycle.

## Rear Suspension Unit – Inspection

### **⚠ WARNING**

Contents under pressure. Never attempt to open this rear suspension unit. Never attempt to service this rear suspension unit. Never incinerate, puncture, or disassemble this rear suspension unit. Opening this rear suspension unit may result in severe injuries or even death.



The rear suspension units are sealed units and do not have any internally user serviceable parts.

Perform the following operations:

- **[Rear Suspension Unit - Removal](#)**

1. Clean all components and inspect for damage/wear to:
  - rear suspension unit upper bush and the lower mounting sleeve and bearing
2. Renew as necessary.

Perform the following operations:

- **[Rear Suspension Unit - Installation](#)**



## Rear Suspension Unit – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

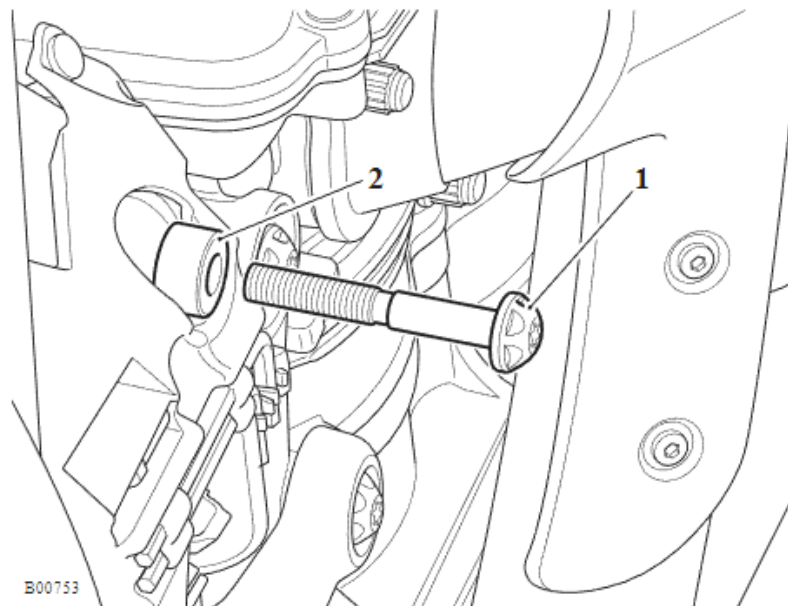
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ CAUTION**

Part of the main harness is routed near the rear suspension unit upper fixing.

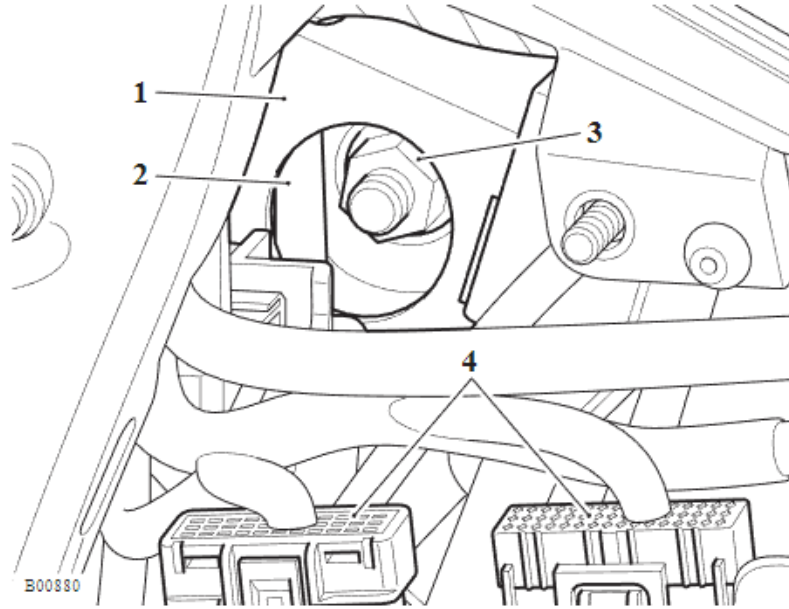
Care must be taken not to damage the harness when removing or installing the rear suspension unit and its fixings.

1. Carefully manoeuvre the rear suspension unit to its upper mounting on the frame.
2. Fit the upper mounting bolt and sleeve as noted for removal.



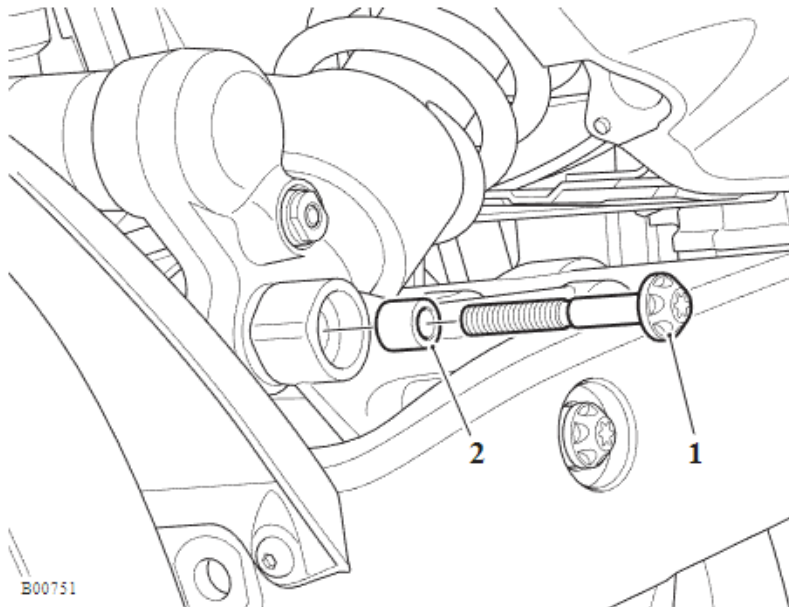
1. Bolt
2. Sleeve

3. Fit the new flanged lock nut. Do not fully tighten at this stage.



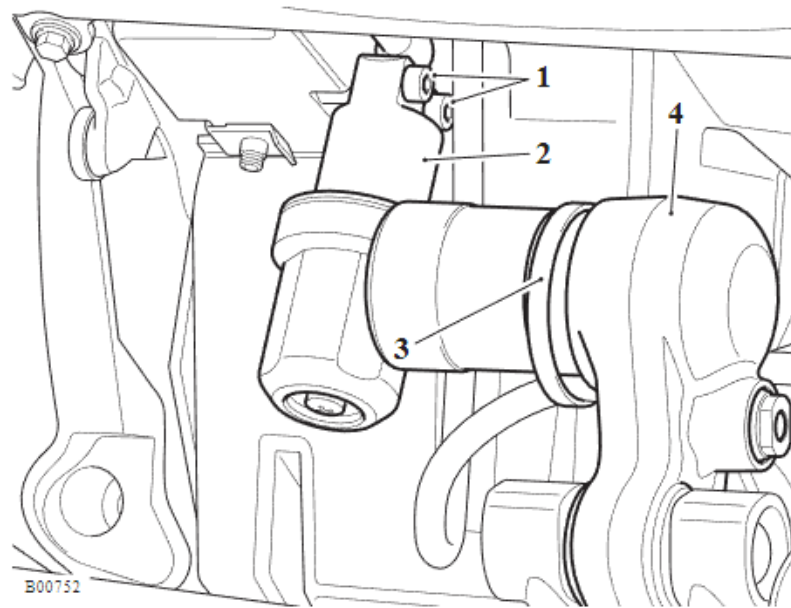
- 3. Battery box (rear subframe removed for clarity)
- 4. Harness
- 5. Flanged lock nut
- 6. Engine ECU connectors (2 off)

4. Fit the lower mounting bolt and sleeve as noted for removal.



- 1. Bolt
- 2. Rear suspension unit

5. Route the preload adjuster hose and secure to its retaining clip as noted for removal.
6. Fit the rear suspension preload adjuster to the battery box and tighten the fixings to 15 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Preload adjuster</li><li>3. Retaining band</li><li>4. Rear suspension unit</li></ol> |
|--|

7. With the weight of the motorcycle on its wheels, fit a new flanged lock nut. Hold the nut and tighten the bolt to 48 Nm.
8. Hold the flanged lock nut and tighten the upper fixing bolt to 48 Nm.
9. Connect the engine ECM connectors (see [Engine Electronic Control Module \(Engine ECM\) - Installation](#)).

Perform the following operations:

- [Keyless ECM - Installation](#)
- Right hand [Side Panels - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Rear Suspension Linkage – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

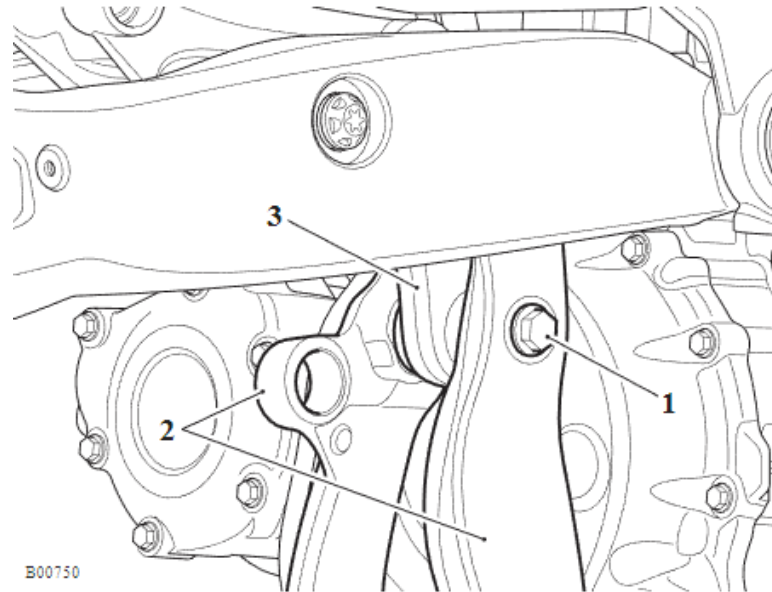
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Catalytic Converter - Removal](#)
- [Rear Suspension Unit - Removal](#)

### Drag Link and Rocker Assembly

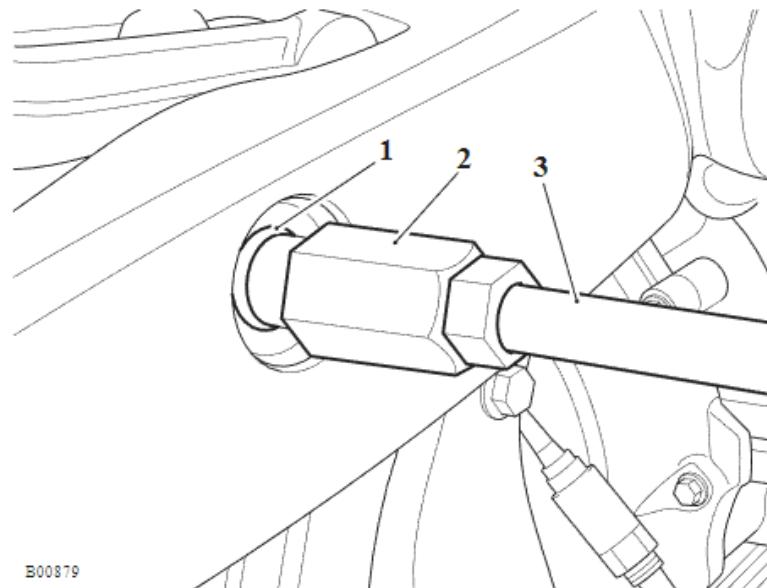
1. Remove the fixing securing the drag link to the drag link brackets. Discard the flanged lock nut.

2. Remove the sleeve from the right hand drag link bracket.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Drag link brackets</li><li>3. Drag link</li></ol> |
|--|

3. Detach the drag link and remove the sleeve from the lower mounting.
4. Remove the fixing securing the rocker to the swinging arm.
5. Fit service tool T3880209 to the rocker sleeve, fully engaging the threads.
6. Fit service tool T3880208 to service tool T3880209, fully engaging the threads.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Sleeve</li><li>2. T3880209 – Adaptor</li><li>3. T3880208 – Slide Hammer</li></ol> |
|--|

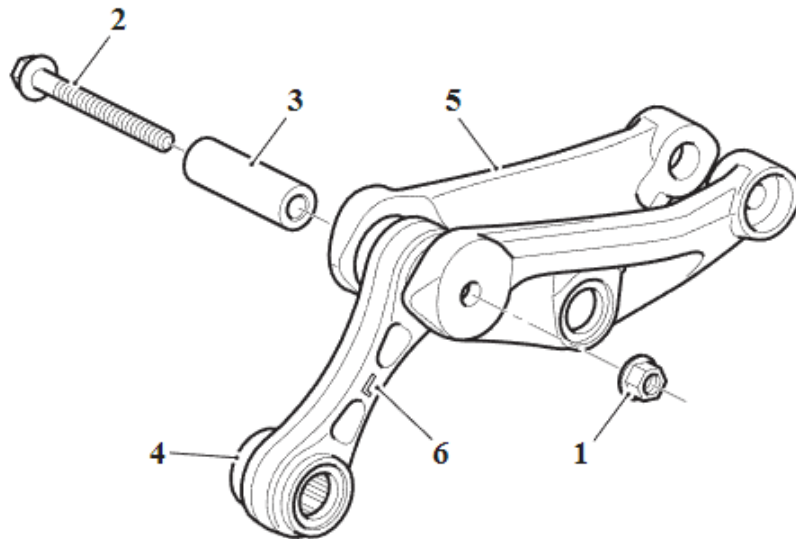
7. Draw back the slide part of the hammer swiftly to facilitate the removal of the swinging arm to rocker sleeve.
8. Manoeuvre the drag link and rocker assembly out of the swinging arm.

### NOTICE

The drag link will only fit to one end of the rocker.

Note that the drag link is fitted to the rocker with the letter L, on one side of the drag link, facing the left hand side of the motorcycle for installation.

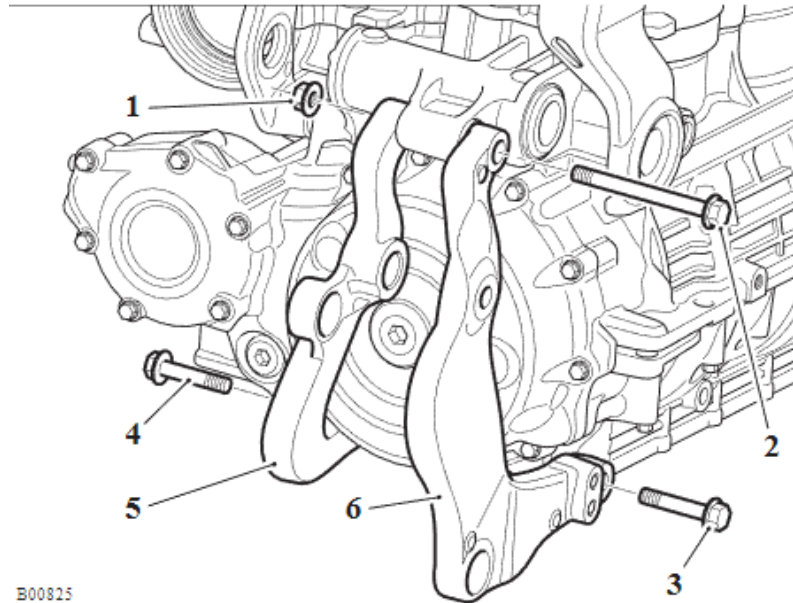
9. If required, remove the fixing securing the drag link to the rocker and remove the drag link. Discard the flanged lock nut.
10. Fit service tool T3880513 to the drag link, fully engaging the threads.
11. Fit service tool T3880208 to service tool T3880513, fully engaging the threads.
12. Draw back the slide part of the hammer swiftly to facilitate the removal of the rocker to drag link sleeve.



1. Flanged locknut
2. Bolt
3. Sleeve
4. Drag link
5. Rocker
6. Letter L

## Drag Link Brackets

1. Remove the swinging arm (see [Swinging Arm - Removal](#)).
2. Remove the fixing securing the drag link brackets to the upper crankcase. Discard the flanged lock nut.
3. Remove the fixings securing the drag link brackets to the lower crankcase and remove the brackets.



1. Flanged locknut
2. Bolt
3. Fixing (right hand bracket)
4. Fixing (left hand bracket)
5. Drag link left hand bracket
6. Drag link right hand bracket

## Rear Suspension Linkage Bearings – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **⚠ WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Perform the following operations:

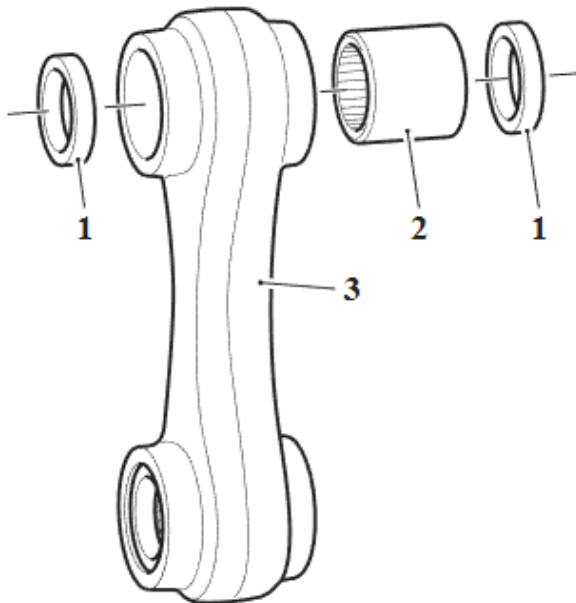
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Catalytic Converter - Removal](#)
- [Rear Suspension Unit - Removal](#)
- [Rear Suspension Linkage - Removal](#)

Bearings Removal - Drag Link

## **NOTICE**

The drag link bearings cannot be removed undamaged.

1. Secure the drag link in a soft jawed vice.
2. Remove the two seals.
3. Drift out the needle roller bearing.



1. Seals
2. Needle roller bearing
3. Drag link



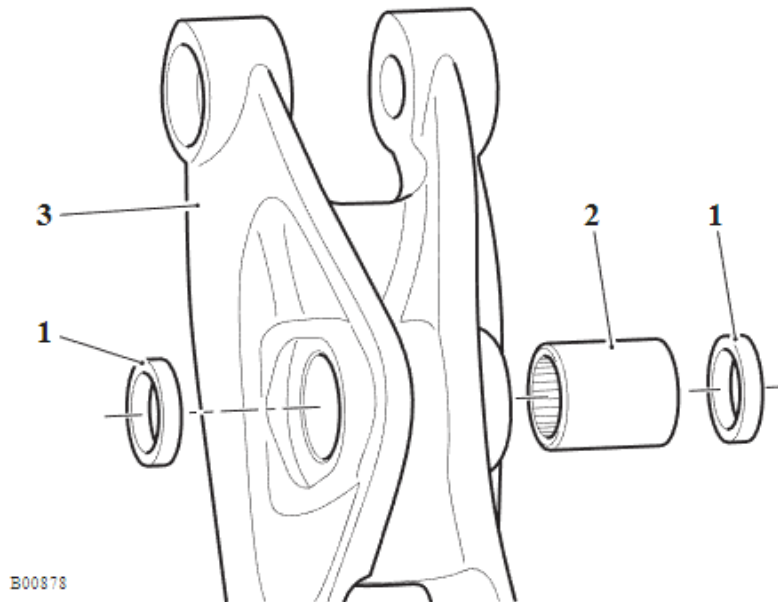
4. Repeat steps 1 to 3 for the other end

### Bearings Removal – Rocker

#### **NOTICE**

The rocker bearing cannot be removed undamaged.

1. Secure the rocker in a soft jawed vice.
2. Remove the two seals.
3. Drift out the needle roller bearing.



1. Seals
2. Needle roller bearing
3. Rocker

## Rear Suspension Linkage Bearings – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

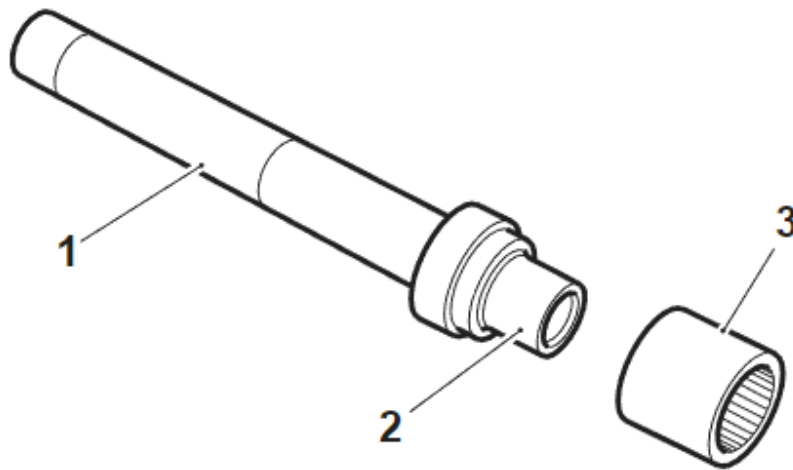
### Bearing Installation - Rocker

### **⚠ WARNING**

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing which could become trapped in the press and cause a crushing injury to the hand, arms or other parts of the anatomy.

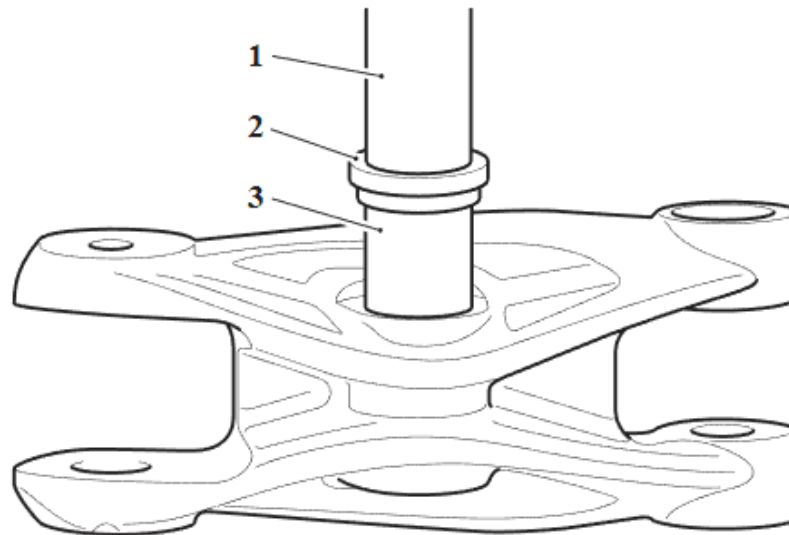
1. Make sure service tool T3880512 is clean.
2. Assemble service tool T3880629 to service tool T3880512, fully engaging the threads.



1. T3880629 - Bearing Installer Handle
2. T3880512 - Needle Bearing Installer 7.5mm
3. Needle roller bearing

3. Position the service tools and bearing (marked side facing outwards) to the rocker on a press.

4. Press in the new bearing until the service tool contacts the rocker.

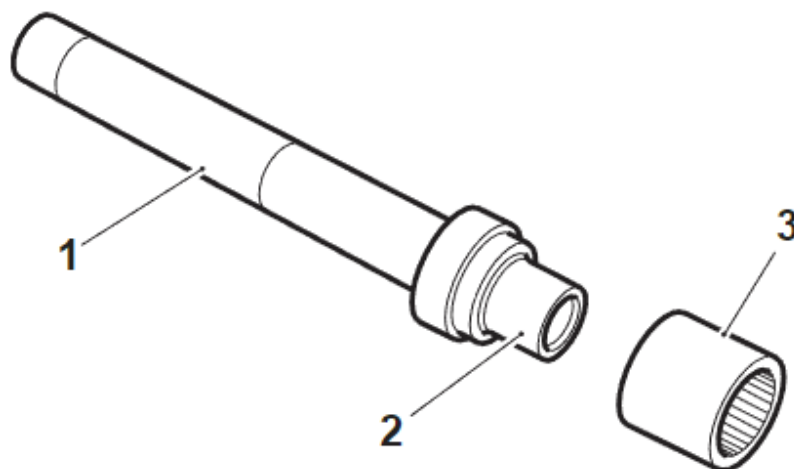


- |  |
|--|
| <ol style="list-style-type: none"><li>1. T3880629 - Bearing Installer Handle</li><li>2. T3880512 - Needle Bearing Installer 7.5mm</li><li>3. Needle roller bearing</li></ol> |
|--|

5. Using the same service tools, fit new seals to the rocker. Make sure the seals, when fitted, are below the chamfer edge.

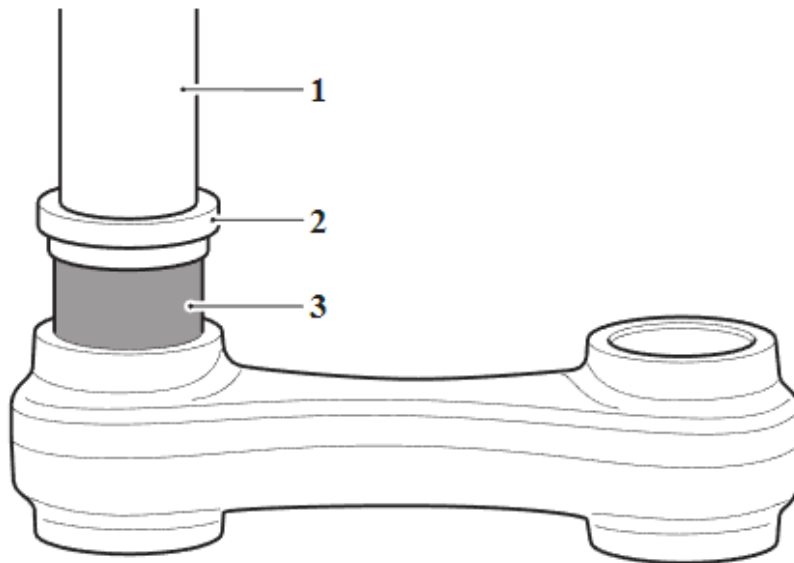
#### Bearings Installation - Drag Link

1. Make sure service tool T3880511 is clean.
2. Assemble service tool T3880629 to service tool T3880511, fully engaging the threads.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. T3880629 - Bearing Installer Handle</li><li>2. T3880511 - Needle Bearing Installer 6.5mm</li><li>3. Needle roller bearing</li></ol> |
|--|

3. Position the service tools and bearing (marked side facing outwards) to the drag link on a press.
4. Press in the new bearing until the service tool contacts the drag link.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. T3880629 - Bearing Installer Handle</li><li>2. T3880511 - Needle Bearing Installer 6.5mm</li><li>3. Needle roller bearing</li></ol> |
|--|

5. Using the same service tools, fit new seals to the drag link. Make sure the seals, when fitted, are below the chamfer edge. 6. Repeat steps 4 to 5 for the other end.

Perform the following operations:

- [Rear Suspension Linkage - Installation](#)
- [Rear Suspension Unit - Installation](#)
- [Catalytic Converter - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Rear Suspension Linkage – Installation

### **⚠ WARNING**

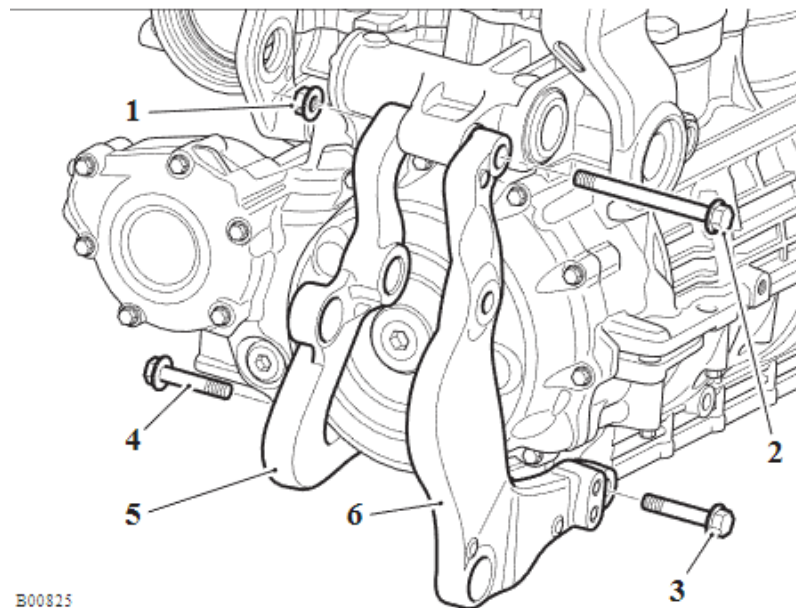
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

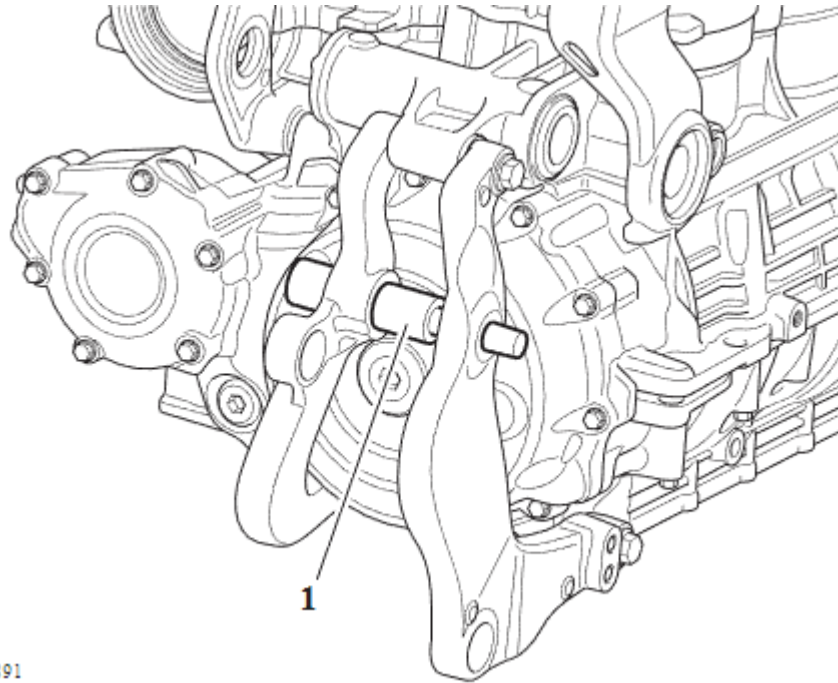
### Drag Link Brackets

1. Position the drag link brackets to the lower crankcase. Fit the fixings but do not fully tighten at this stage.
2. Position the drag link brackets to the upper crankcase. Fit the bolt from the right hand side, fit a new flanged lock nut but do not fully tighten at this stage.



1. Flanged locknut
2. Bolt
3. Fixing (right hand bracket)
4. Fixing (left hand bracket)
5. Drag link left hand bracket
6. Drag link right hand bracket

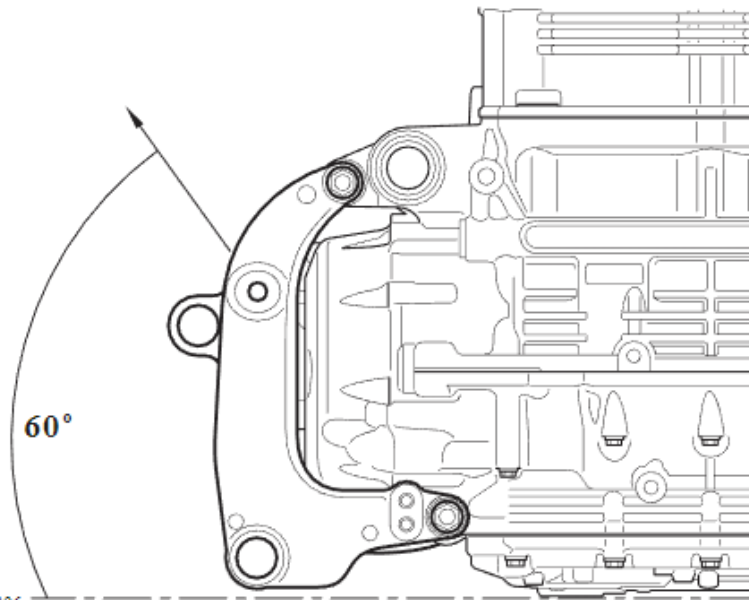
3. Fit service tool T3880503 to the drag link brackets as shown in the illustration below.



B00891

1. T3880503 - Drop link alignment pin

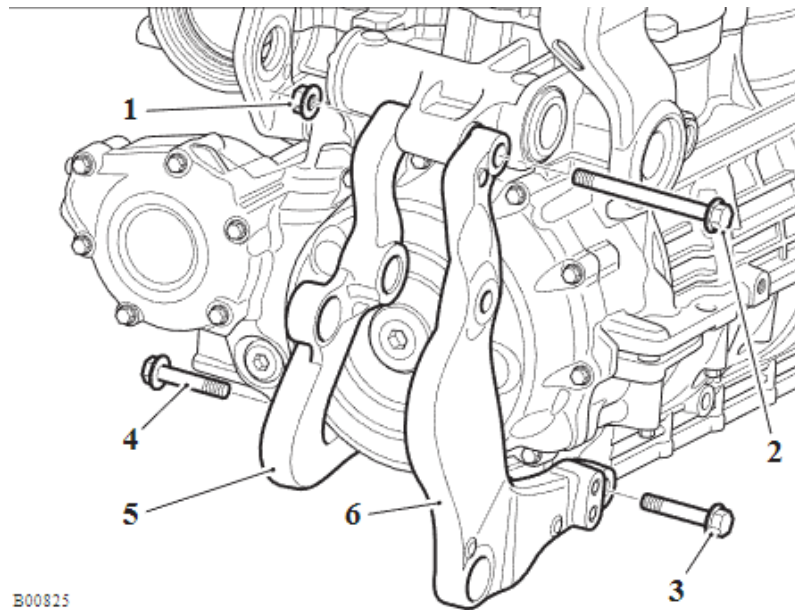
4. Lift the drag link brackets in the direction shown in the illustration below.



B00896

Lift Angle for Brackets

5. Tighten the drop link bracket fixings in the following sequence.
  - Hold the flanged lock nut and tighten the upper bolt to 48 Nm.
  - Right hand bracket lower fixing to 48 Nm.
  - Left hand bracket lower fixing to 48 Nm.

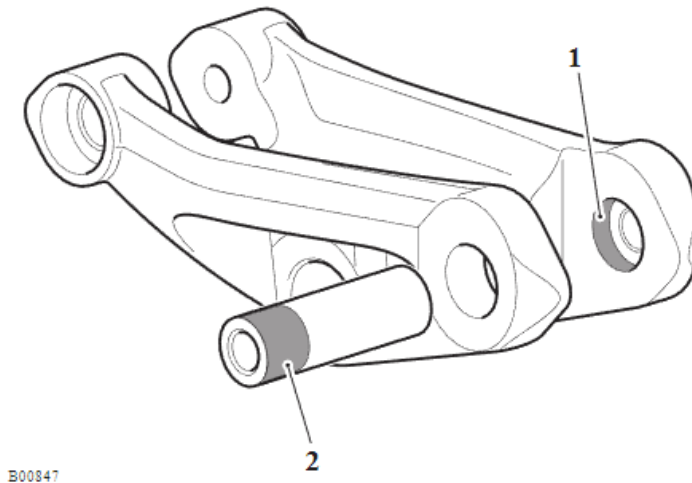


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Flanged locknut</li><li>2. Bolt</li><li>3. Fixing (right hand bracket)</li><li>4. Fixing (left hand bracket)</li><li>5. Drag link left hand bracket</li><li>6. Drag link right hand bracket</li></ol> |
|--|

6. Remove service tool T3880503 from the drag link brackets.
7. Fit the swinging arm (see Swinging Arm - Installation).

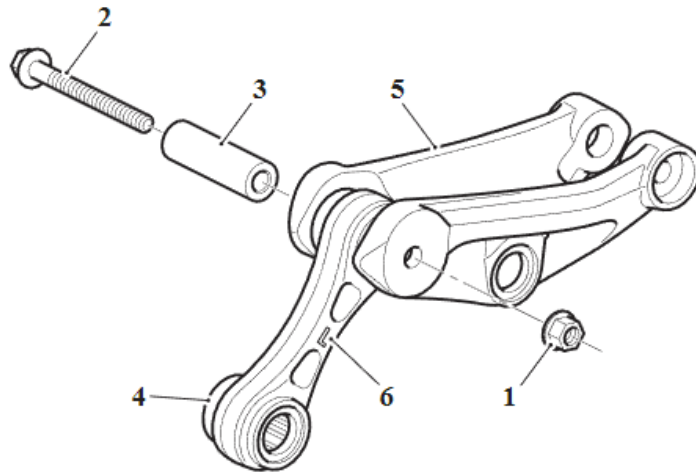
## Drag Link and Rocker Assembly

1. Apply a smear of proprietary copper based grease to the areas of the rocker and sleeve as shown in the illustration below.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Copper grease area for rocker</li><li>2. Copper grease area for sleeve</li></ol> |
|---|

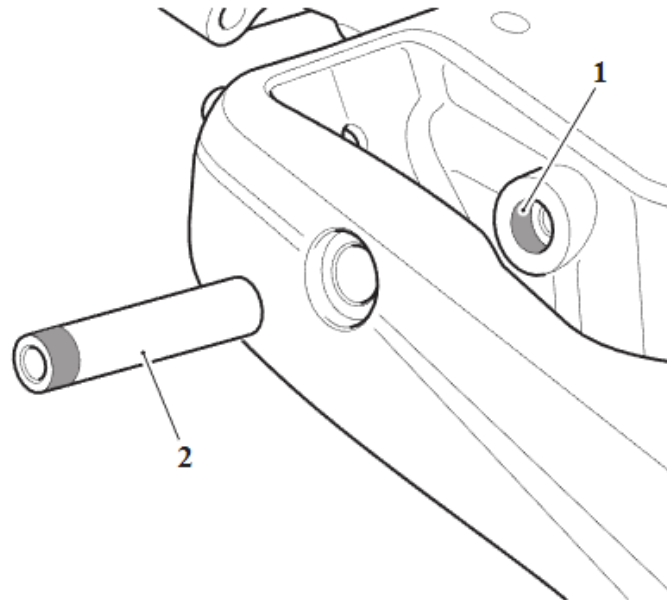
2. Position the drag link to the rocker as noted for removal with the L on the drag link facing the left hand side of the motorcycle, when fitted.
3. Fit the sleeve, bolt and new flanged lock nut.
4. Hold the flanged lock nut and tighten the bolt to 48 Nm.



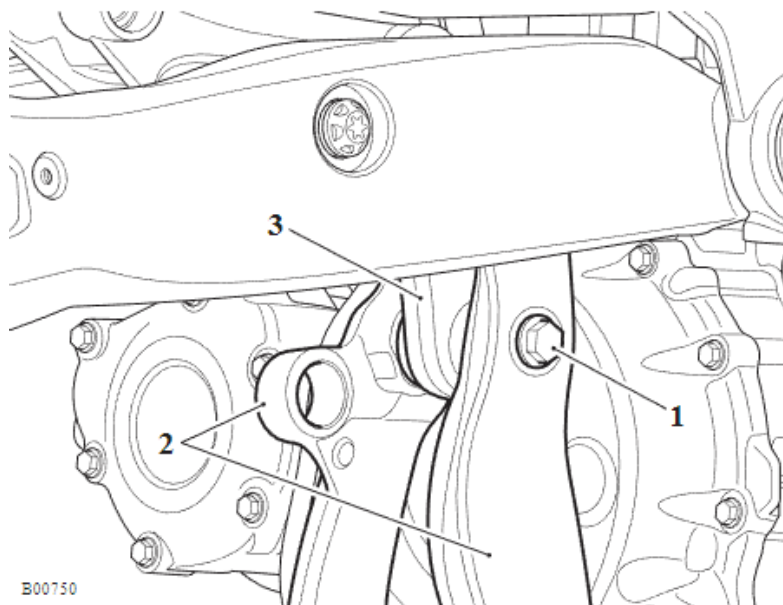
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Flanged locknut</li><li>2. Bolt</li><li>3. Sleeve</li><li>4. Drag link</li><li>5. Rocker</li><li>6. Letter L</li></ol> |
|---|



5. Apply a smear of proprietary copper based grease to the areas of the swinging arm and sleeve as shown in the illustration below.



6. Position the drag link and rocker assembly to the swinging arm with the drag link to the front of the swinging arm.
7. Fit the sleeve and bolt.
8. Tighten the bolt to 48 Nm.
9. Position the drag link to the drag link brackets, fit the bolt and new flanged lock nut.
10. Fit the sleeve to the right hand drag link bracket.
11. Lift the swinging arm, hold the flanged lock nut and tighten the bolt to 48 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Drag link brackets</li><li>3. Drag link</li></ol> |
|--|

B00750

Perform the following operations:

- [Rear Suspension Unit - Installation](#)
- [Catalytic Converter - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Swinging Arm – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

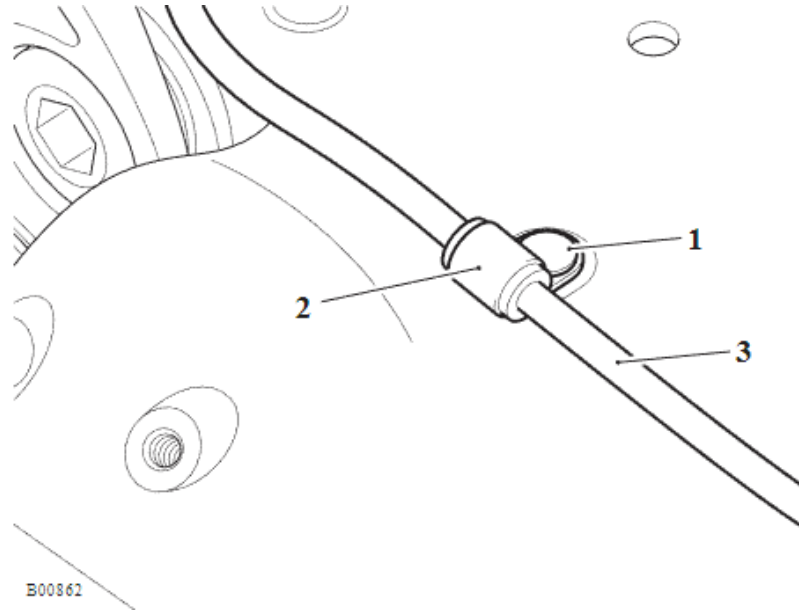
**⚠ WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Perform the following operations:

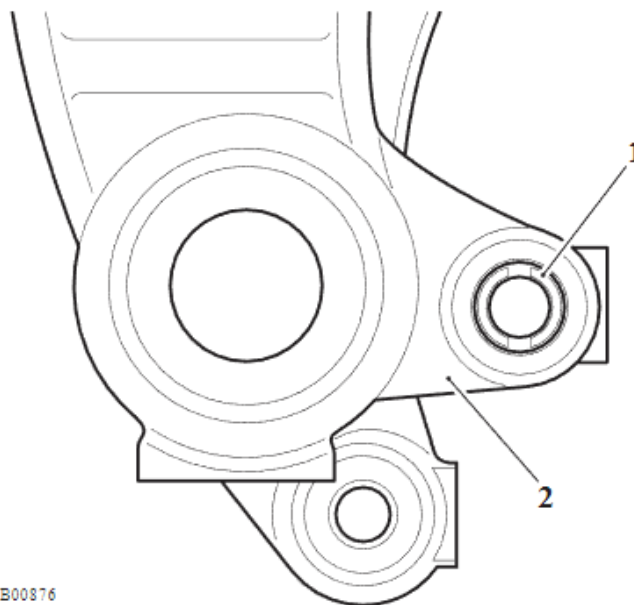
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Wheel - Removal](#)
- [Catalytic Converter - Removal](#)
- [Starter Motor - Removal](#)
- [Rear Suspension Unit - Removal](#)
- [Rear Suspension Linkage - Removal](#)
- [Rear Bevel Box - Removal](#) with the final drive shaft

1. Remove the fir tree clip and detach the rear brake hose from the swinging arm.



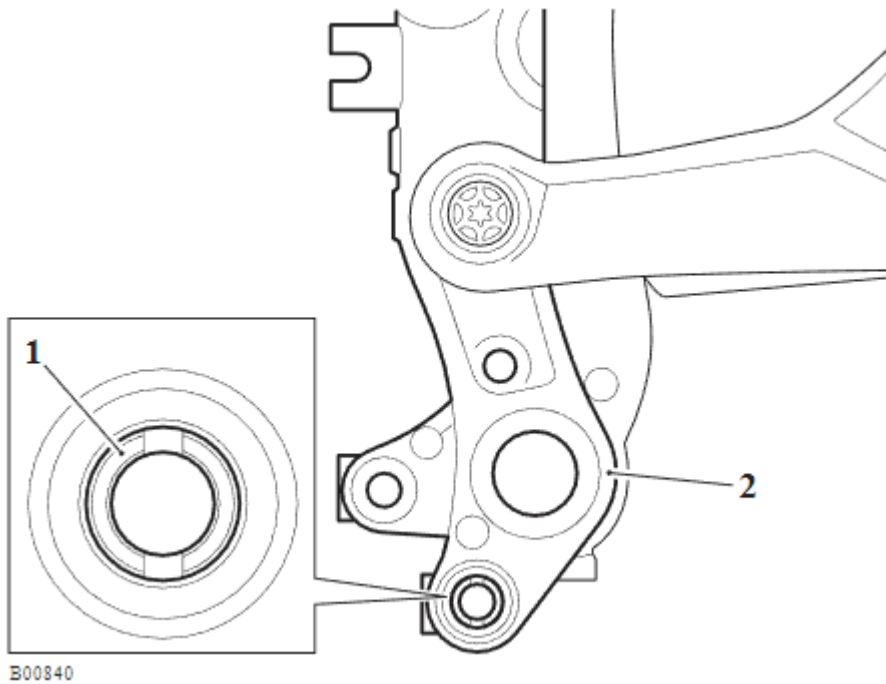
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fir tree clip</li><li>2. P-clip</li><li>3. Rear brake hose</li></ol> |
|---|

2. Remove the bolt and washer securing the right hand outrigger to the upper crankcase.
3. Engage service tool T3880181 into the slots of the frame adjuster and rotate anticlockwise to fully loosen the frame adjuster.



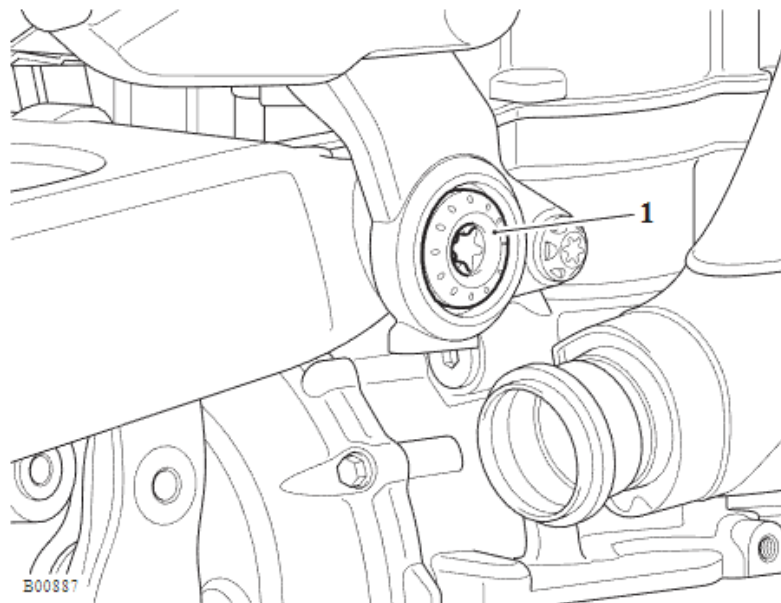
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Frame adjuster</li><li>2. Right hand outrigger</li></ol> |
|---|

4. Remove the bolt and washer securing the left hand outrigger to the upper crankcase.
5. Engage service tool T3880181 into the slots of the frame adjuster and rotate anticlockwise to fully loosen the frame adjuster.



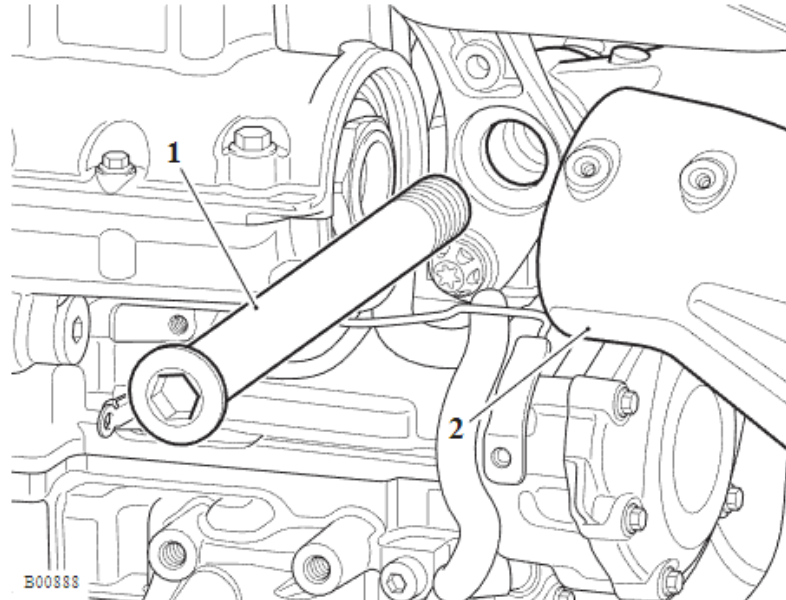
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Frame adjuster</li><li>2. Left hand out rigger</li></ol> |
|---|

6. Hold the swinging arm pivot bolt on the left hand side and remove the swinging arm bolt from the right hand side of the swinging arm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Bolt</li></ol> |
|---|

7. Support the swinging arm, remove the swinging arm pivot from the left hand side and remove the swinging arm.



1. Pivot
2. Swinging arm

#### Swinging Arm – Disassembly

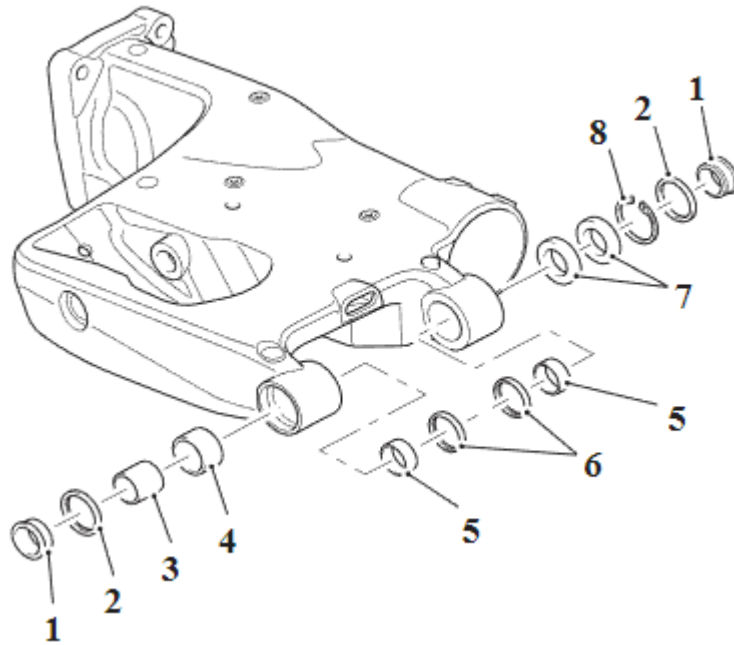
1. Remove the flanged spacer and seal, 32 x 42 x 4mm from the left and right hand side outer edges.
2. Remove the seal, 30 x 37 x 4mm and spacer from the left and right hand side inner edges.

#### **NOTICE**

The bearings cannot be removed undamaged.

3. Remove the sleeve and needle roller bearing (item 4) by drifting through from the right hand side

4. Release the circlip and remove the two ball bearings by drifting through from the right hand side.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Flanged spacer</li><li>2. Seal, 32 x 42 x 4mm</li><li>3. Sleeve</li><li>4. Needle roller bearing</li><li>5. Spacer</li><li>6. Seal, 30 x 37 x 4mm</li><li>7. Ball bearings</li><li>8. Circlip</li></ol> |
|--|

### Swinging Arm – Inspection

1. Check the swinging arm bearings for damage, pitting, and cracks. Replace as necessary.
2. Inspect the swinging arm spindle for damage and deformation. Replace as necessary.
3. Check the swinging arm for damage. Replace as necessary.
4. Check all bearing seals for damage, splits etc. Replace as necessary.

## Swinging Arm – Assembly

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

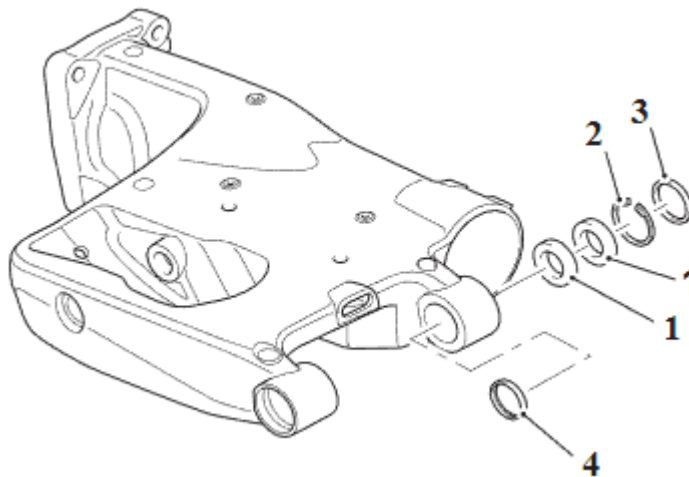
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

Use new bearings, seals and a new circlip.

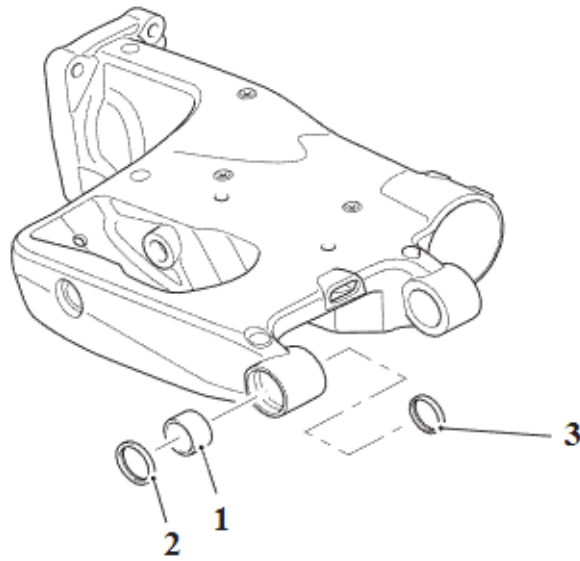
1. Fully press the two roller bearings to the shoulder in the left hand pivot housing of the swinging arm.
2. Fit a new circlip.
3. Fit a new 32 x 42 x 4mm seal to the outside edge and a new 30 x 37 x 4mm to the inside edge until they are flush.



1. Ball bearing
2. Circlip
3. Seal, 32 x 42 x 4mm
4. Seal, 30 x 37 x 4mm

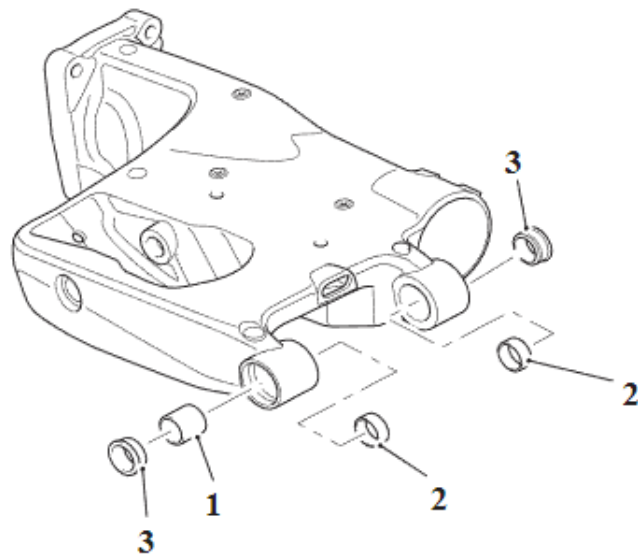
4. Press the needle roller bearing 15mm +/- 1mm in to the right hand pivot housing of the swinging arm.

5. Fit a new 32 x 42 x 4mm seal to the outside edge and a new 30 x 37 x 4mm to the inside edge until they are flush.



- |  |
|--|
| <ol style="list-style-type: none"><li>4. Needle roller bearing</li><li>5. Seal, 32 x 42 x 4mm</li><li>6. Seal. 30 x 37 x 4mm</li></ol> |
|--|

6. Fit the bearing sleeve to the needle roller bearing.
7. Fit the spacers to the inner edges.
8. Fit the flanged spacers to the outer edges



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Sleeve</li><li>2. Spacer</li><li>3. Flanged spacer</li></ol> |
|---|



## Swinging Arm – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

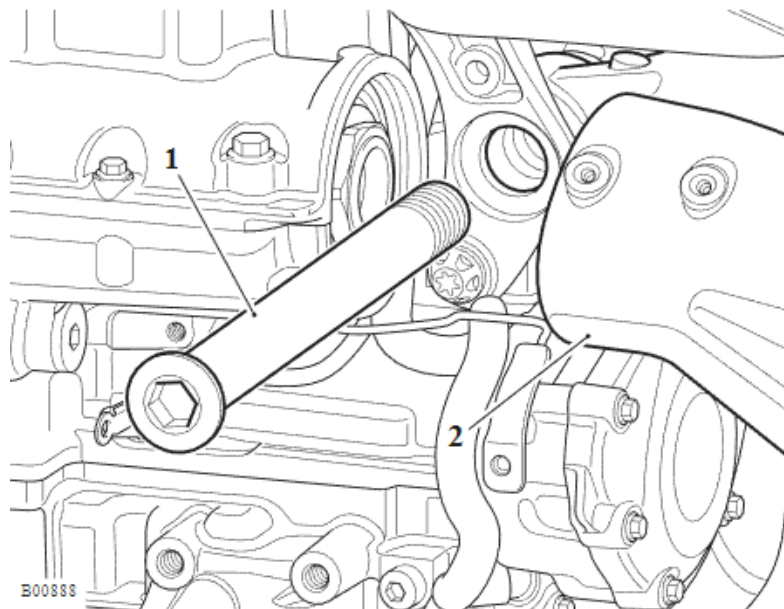
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ WARNING**

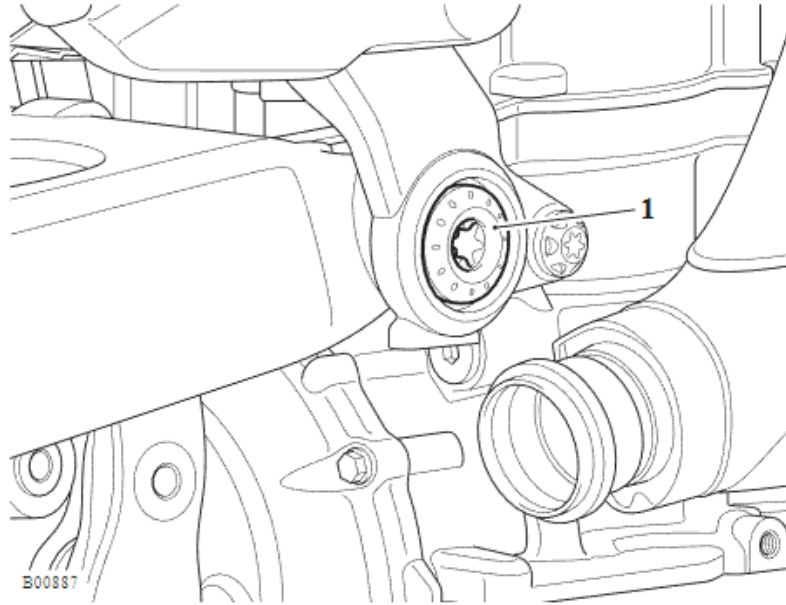
If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

1. Position the swinging arm to the frame.
2. Fit the swinging arm spindle from the left hand side.



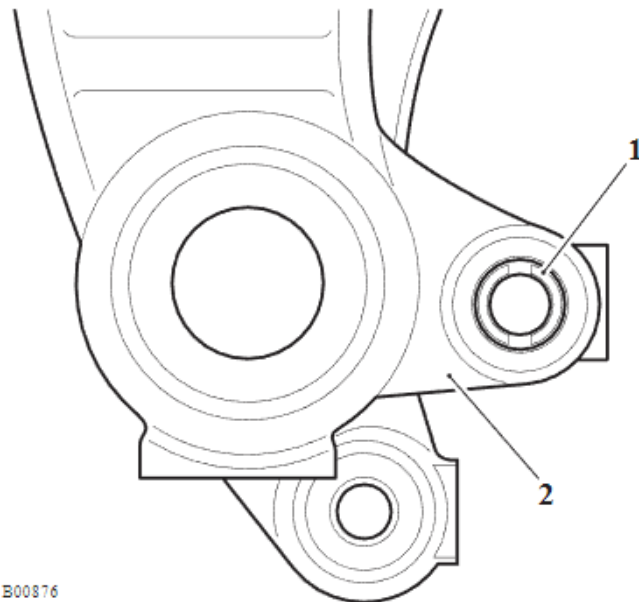
1. Pivot
2. Swinging arm

3. Fit the swinging arm bolt to the right hand side. Hold the swinging arm spindle and tighten the bolt to 100 Nm.



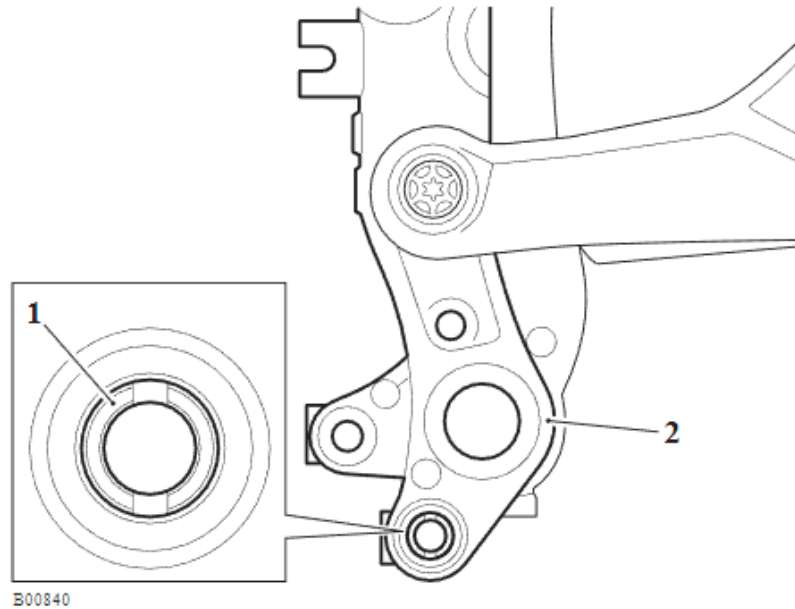
1. Bolt

4. Engage service tool T3880103 into the slots of the crankcase right hand frame adjuster and tighten to 3 Nm.



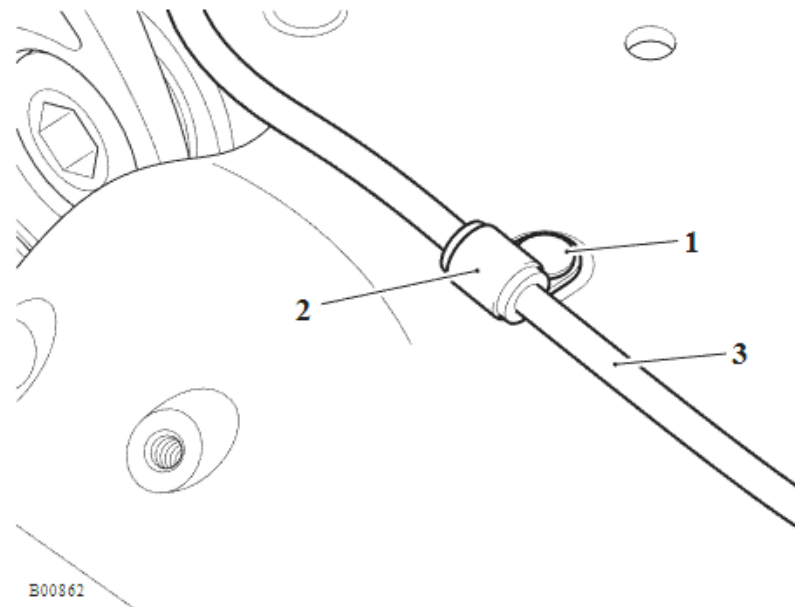
1. Frame adjuster  
2. Right hand outrigger

- Engage service tool T3880103 into the slots of the crankcase left hand frame adjuster and tighten to 3 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>Frame adjuster</li><li>Left hand outrigger</li></ol> |
|--|

- Fit the crankcase right hand rear mounting bolt and tighten to 48 Nm.
- Fit the crankcase left hand rear mounting bolt and tighten to 48 Nm.
- Attach the rear brake hose P-clip to the swinging arm with a new fir tree clip.



- |  |
|--|
| <ol style="list-style-type: none"><li>Fir tree clip</li><li>P-clip</li><li>Rear brake hose</li></ol> |
|--|

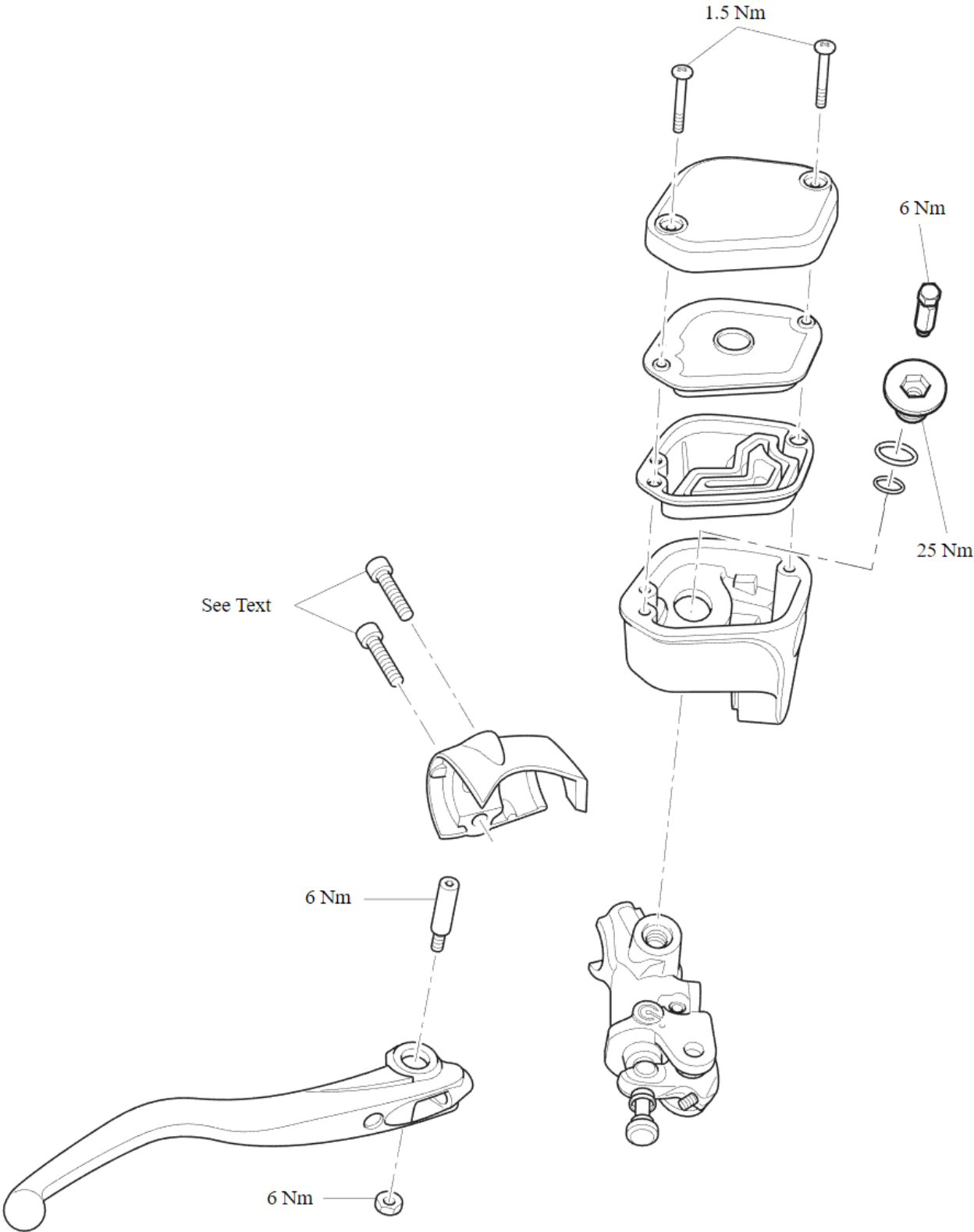
Perform the following operations:

- [Rear Suspension Linkage - Installation](#)
- [Rear Suspension Unit - Installation](#)
- [Rear Bevel Box - Installation](#) with the final drive shaft.
- [Catalytic Converter - Installation](#)
- [Rear Wheel - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

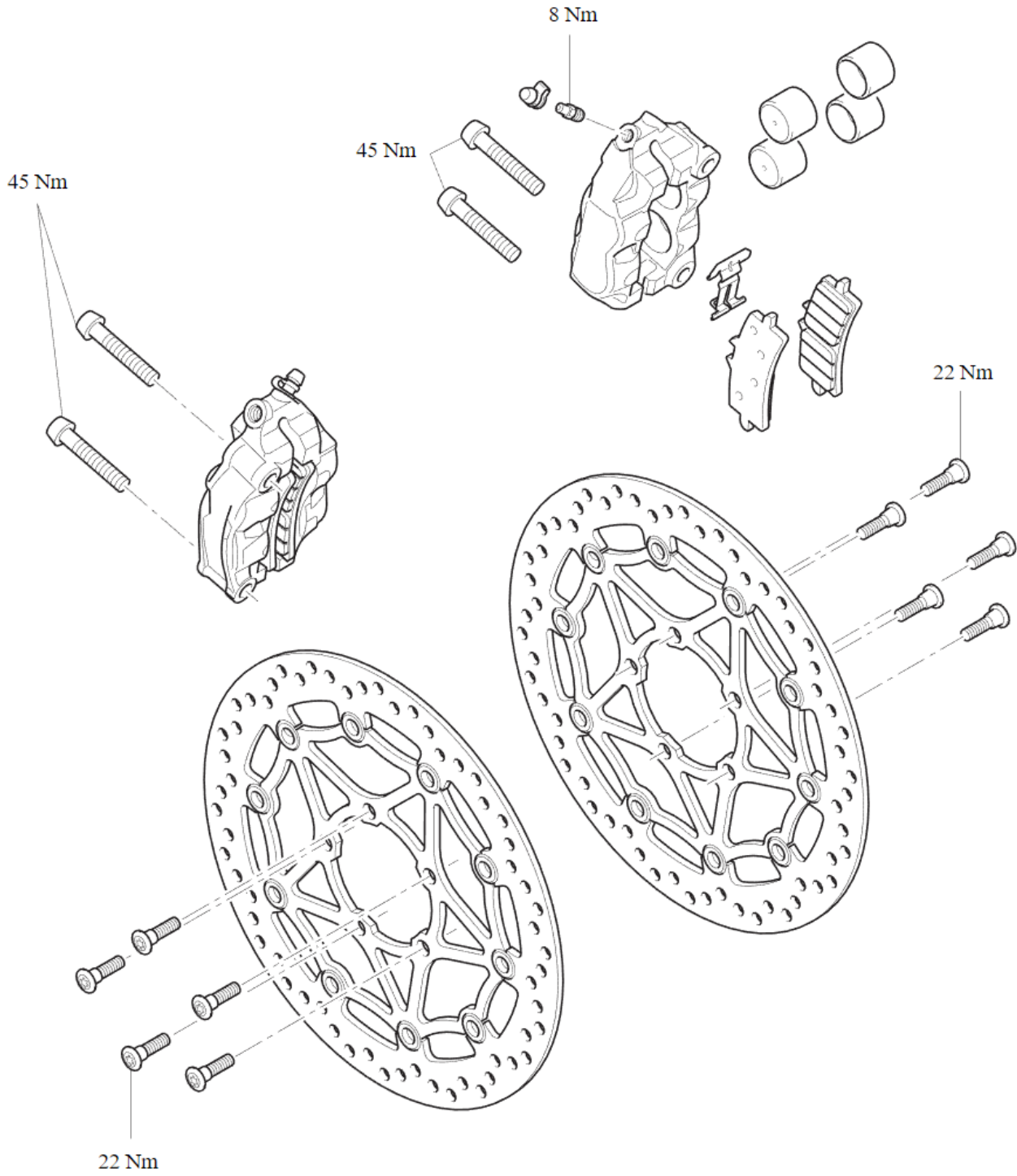
# Brakes

## Exploded Views

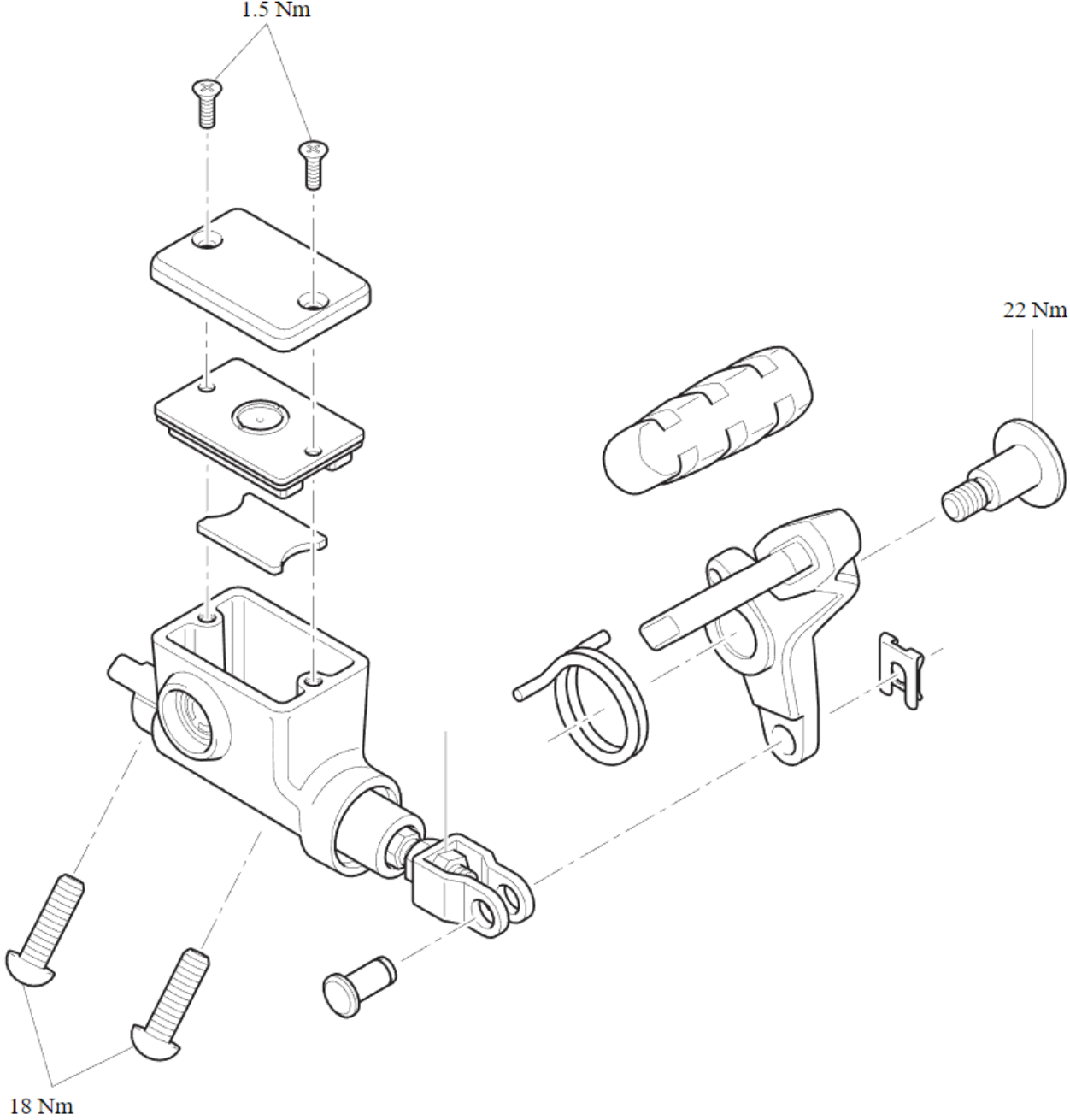
### Exploded View - Front Brake Master Cylinder



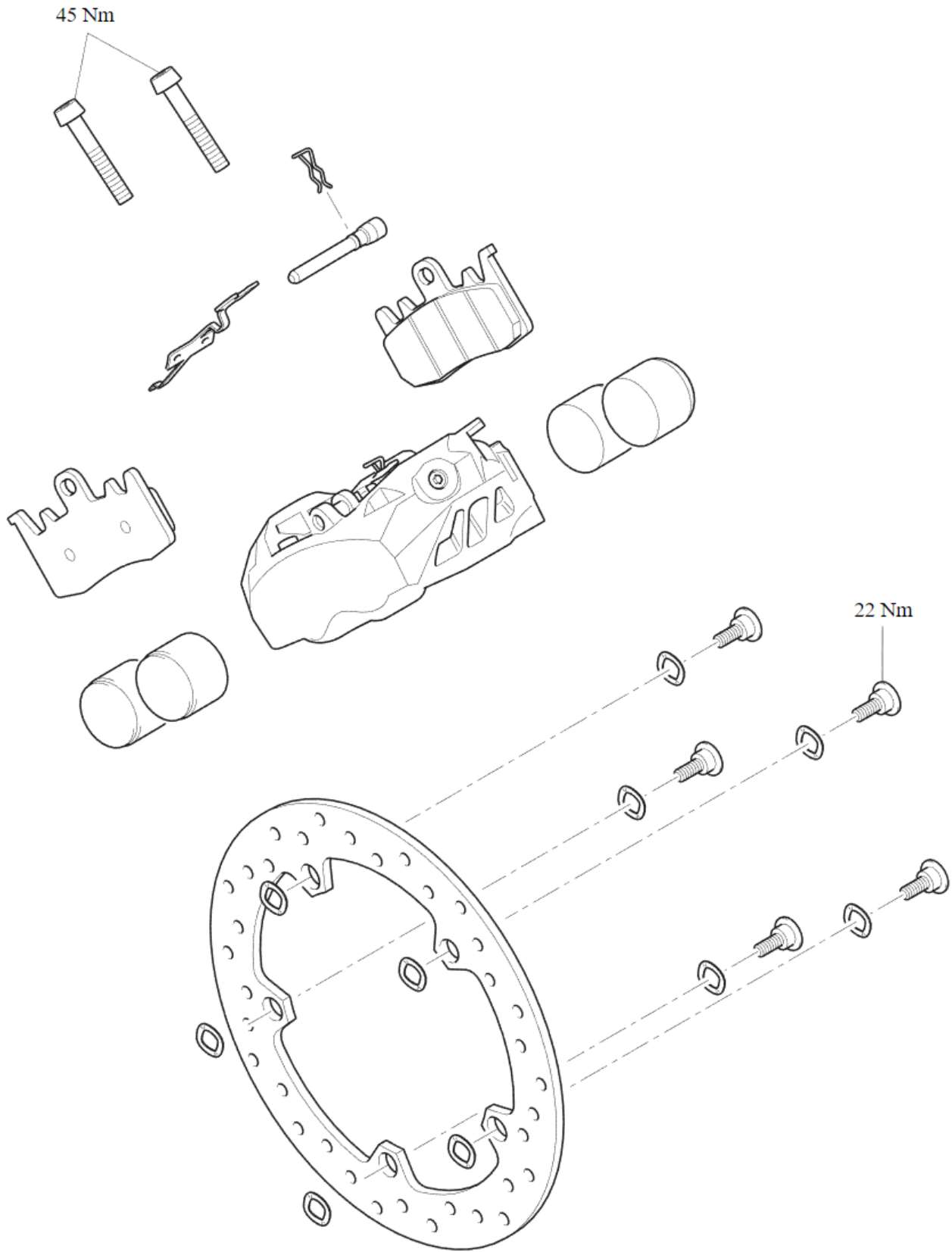
Exploded View - Front Brake Calipers and Discs



Exploded View - Rear Brake Master Cylinder

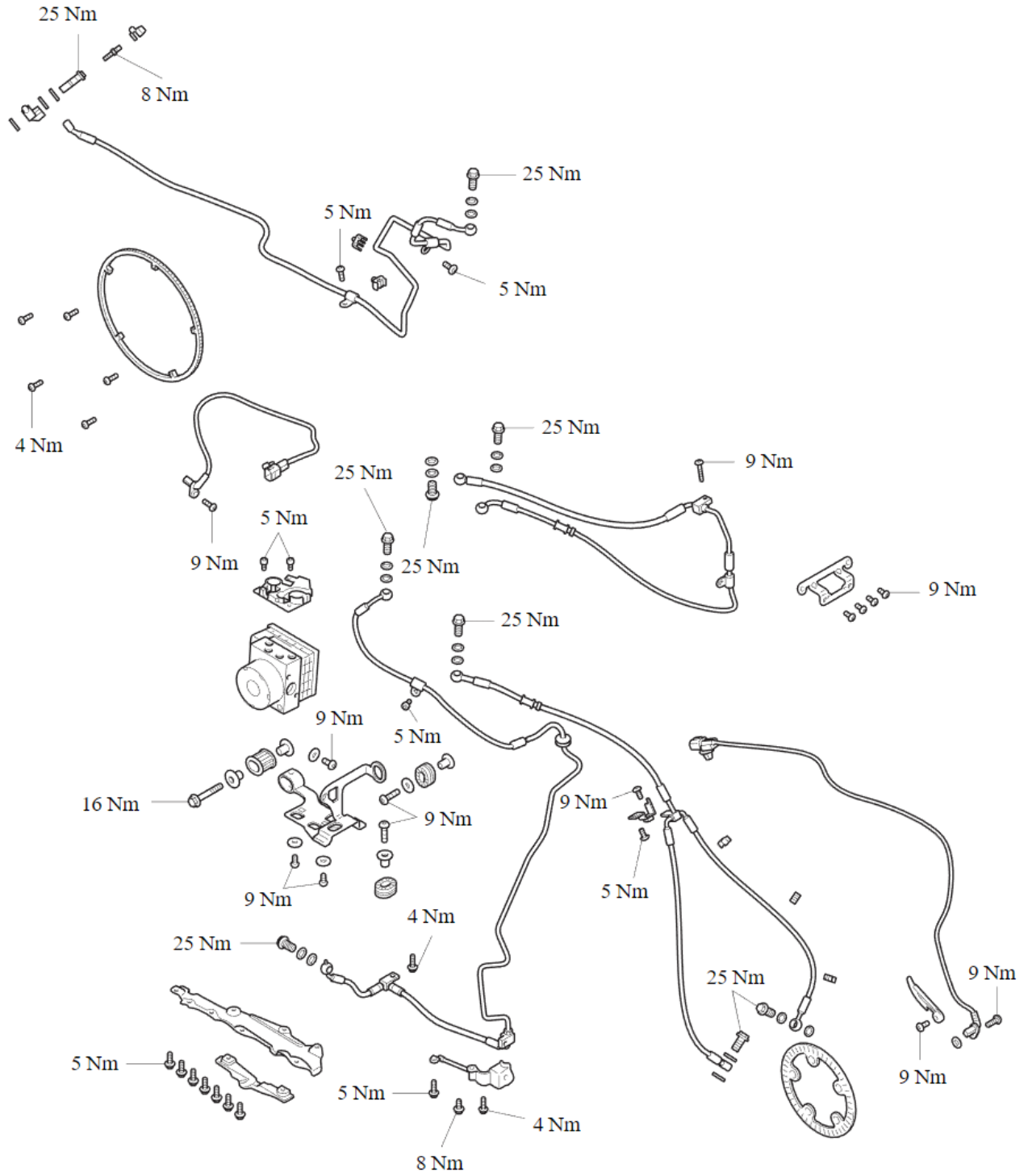


Exploded View - Rear Brake Caliper and Disc





# Exploded View - ABS System



**⚠ WARNING**

Brake fluid is hygroscopic which means it will absorb moisture from the air. The absorbed moisture will greatly reduce the boiling point of the brake fluid causing a reduction in braking efficiency.

Replace brake fluid in line with the Scheduled Maintenance chart. A dangerous riding condition could result if this important maintenance item is neglected.

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake fluid from a sealed container and never use fluid from an unsealed container or from one that has been previously opened.

Do not mix different brands of fluid. Check for fluid leakage around brake fittings, seals and joints.

Check regularly for brake hose damage.

**FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY REDUCE BRAKING EFFICIENCY LEADING TO LOSS OF MOTORCYCLE CONTROL AND AN ACCIDENT.**

**⚠ WARNING**

If there has been an appreciable drop in the level of the fluid in either brake fluid reservoir, consult your authorised Triumph dealer before riding.

If the brake lever or pedal feels soft when it is applied, or if the lever/pedal travel becomes excessive, there may be air in the brake lines or the brake may be defective.

It is dangerous to operate the motorcycle under such conditions and you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

**⚠ WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Failure to change the brake fluid at the interval specified in the Scheduled Maintenance chart may reduce braking efficiency resulting in loss of motorcycle control and an accident.

**⚠ WARNING**

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

**⚠ WARNING**

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

## WARNING

A magnetised brake disc and/or a magnetised ABS pulser ring may cause problems with the ABS sensor which will illuminate the ABS warning light and disable the ABS.

To prevent these parts becoming magnetised, we strongly recommend that magnets, and items that contain magnets, must not be stored near or placed on brake discs or ABS pulser rings.

This includes parts fitted to motorcycles, parts removed during motorcycle service and new parts in dealer stores.

Examples of items that may contain magnets, are listed below:

- Alternator rotor
- Magnetic fuel tank bags
- Audio speakers
- Magnetic dial test indicator stand
- Magnetic parts tray.

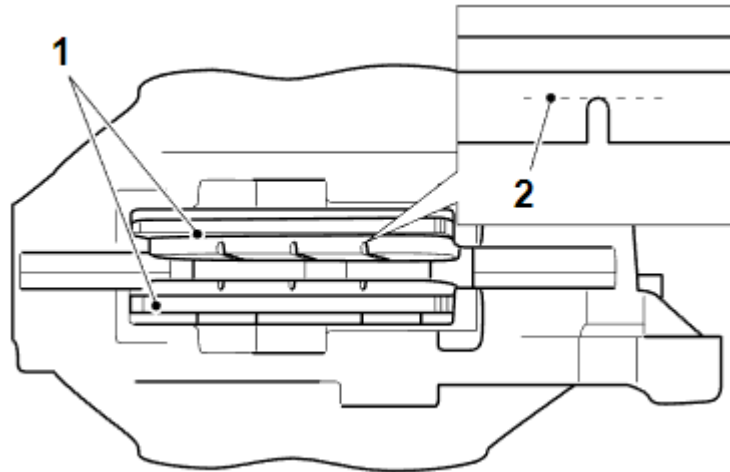
If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

### Brake Pads Wear

Front and rear brake pad wear is automatically compensated for and has no effect on brake lever or pedal action.

## Brake Wear Inspection

In accordance with the Scheduled Maintenance chart, inspect the brake pads for wear. The minimum thickness of lining material for any front or rear brake pad is 1.5 mm. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



1. Brake pads
2. Minimum thickness line

### **⚠ WARNING**

Do not replace individual brake pads; replace both pads in the brake caliper. On the front where two calipers are mounted on the same wheel, all the pads in both calipers must be replaced simultaneously. Replacing individual pads will reduce braking efficiency and may cause loss of motorcycle control and an accident.

## Breaking-in New Brake Pads and Discs

After replacement brake discs and/or pads have been fitted to the motorcycle, we recommend a period of careful breaking-in that will optimise the performance and longevity of the discs and pads. The recommended distance for breaking in new pads and discs is 200 miles (300 km).

After fitting new brake discs and/or pads avoid extreme braking, ride with caution and allow for greater braking distances during the breaking-in period.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

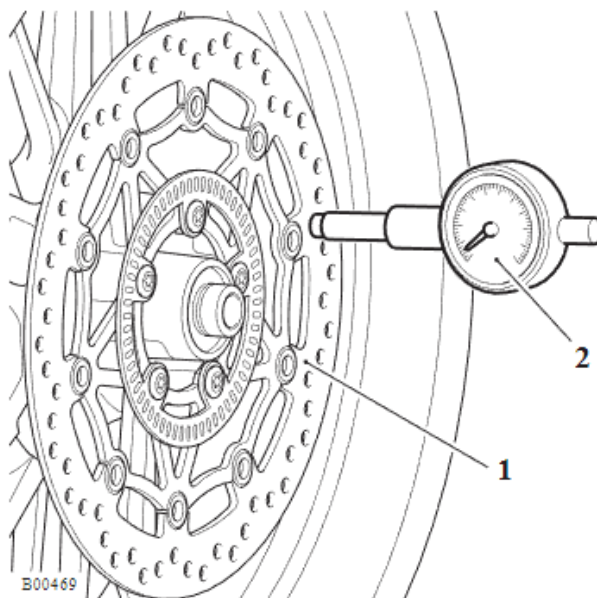
**Wear**

1. Replace any brake disc if it is worn beyond the service limit or exceeds the disc run-out limit.

| <b>Front Brake Disc Thickness</b> |                        |
|-----------------------------------|------------------------|
| Standard                          | 4.5 mm (standard)      |
| Service Limit                     | 4.0 mm (service limit) |

| <b>Brake Disc Run-out</b> |         |
|---------------------------|---------|
| Service Limit             | 0.25 mm |

Measure disc run out using an accurate dial gauge mounted on a surface plate.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Disc</li><li>2. Dial gauge</li></ol> |
|---|

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Wear

Perform the following operation:

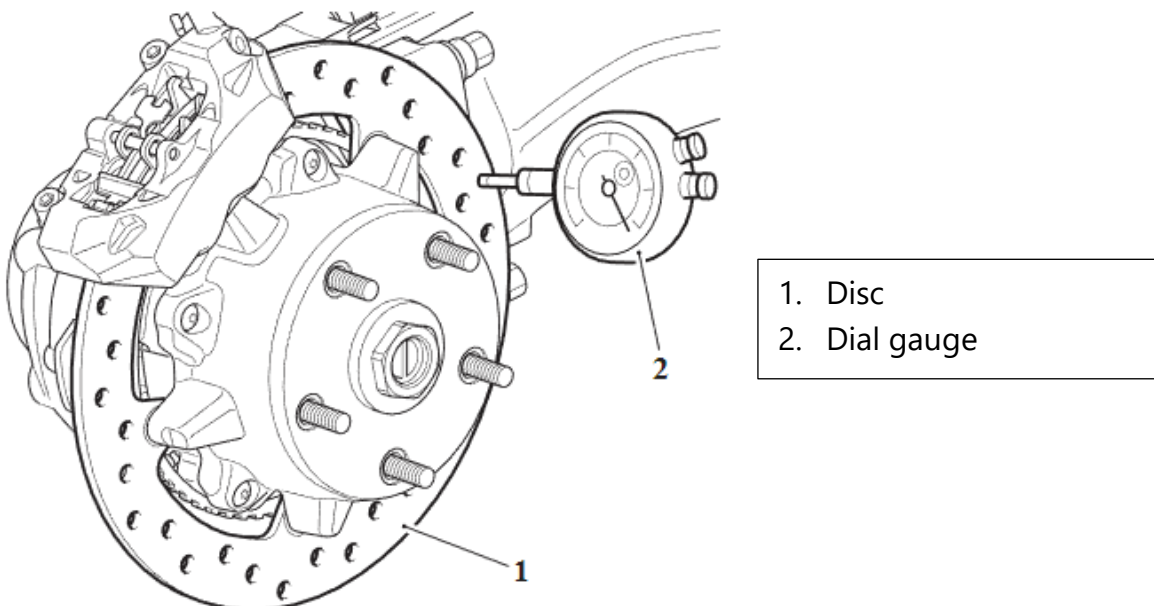
- [Rear Wheel - Removal](#)

1. Replace any brake disc if it is worn beyond the service limit or exceeds the disc run-out limit.

| <b>Rear Brake Disc Thickness</b> |                    |
|----------------------------------|--------------------|
| Standard                         | 6 mm (standard)    |
| Service Limit                    | 4.4 mm (min limit) |

| <b>Brake Disc Run-out</b> |         |
|---------------------------|---------|
| Service Limit             | 0.25 mm |

Measure disc run out using an accurate dial gauge mounted on a surface plate.



## Bleeding the Front Brakes

### Brake Fluid Replacement - Routine Maintenance

Braking performance reduces as brake fluid ages, Repeated stops cause brake fluid to heat and cool rapidly reducing braking performance. Brake fluid absorbs moisture over a period of time and becomes contaminated as it ages.

Therefore brake fluid should be replaced at specified intervals as instructed in the routine maintenance schedule, see [Brake Fluid - Renew](#).

### Brake Bleeding

When removing or replacing brake components and the brake line is opened air will enter as fluid escapes.

If the brake bleed procedure is not carried out air can become trapped in the brake fluid.

A consequence of air being trapped in the brake system is that the brake can feel soft/spongy and the performance of the brakes will be reduced.

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

#### **WARNING**

Brake fluid is hygroscopic which means it will absorb moisture from the air.

Only use new DOT 4 brake fluid from a sealed container, do not mix different brands of brake fluid and never use brake fluid from an unsealed container or from one that has been previously opened.

Any absorbed moisture will greatly reduce the boiling point of the brake fluid.

Moisture in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.



** WARNING**

Do not allow dirt or debris to enter the braking system when adding brake fluid to the brake fluid reservoir.

Always maintain absolute cleanliness as this will adversely affect the brake fluid's properties.

Contaminated brake fluid may cause a reduction in brake performance leading to loss of motorcycle control and an accident.

** WARNING**

During bleeding, do not allow the brake fluid level to fall below the lower level mark in the reservoir.

If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

Trapped air in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

** WARNING**

Check for fluid leakage around brake fittings, seals and joints.

Leaks around fittings and joints may allow air to enter the brake system.

Air entering the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

**⚠ CAUTION**

Do not attempt to maintain brake fluid pressure by securing the brake lever to the handlebar or the brake pedal using a band or strap. Banding or strapping the brake lever or pedal may deform the piston seals in the caliper.

Lever or pedal travel that is increased or reduced may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

**⚠ CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork.

Close the brake reservoir and wash any spilled brake fluid immediately with warm soapy water.

Spilled brake fluid, if left, will damage painted and plastic surfaces.

**⚠ CAUTION**

Pressure applied to the brake lever or caliper pistons during the bleeding process must be applied and removed smoothly and slowly.

It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to follow these instructions can allow air to be drawn in to the system through the bleed screw threads.

**NOTICE**

An additional technician is required to monitor the fluid level and operate the brake lever or pedal when bleeding the brakes.

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

The following table indicates the procedure to follow when carrying out repairs or replacement of the following brake components.

Brake Bleed Procedure Table

| When replacing/fitting hte | <b>Bleed the brakes as follows:</b> |                         |  |  |                            |                            |                              |                              |                              |
|----------------------------|-------------------------------------|-------------------------|--|--|----------------------------|----------------------------|------------------------------|------------------------------|------------------------------|
| <b>ABS Modulator</b>       | Front Brake Lever Setting           | Brake Fluid Cap Removal | Back bleed master cylinder               | Brake master cylinder bleed <sup>1</sup> | Bleed brake caliper(s)     | Final Bleed procedure      | Brake caliper conditioning   | Front Brake Lever Setting    | Brake Fluid Cap Installation |
| <b>Master Cylinder</b>     | Front Brake Lever Setting           | Brake Fluid Cap Removal | Back bleed master cylinder               | Brake master cylinder bleed <sup>1</sup> | Final Bleed procedure      | Brake caliper conditioning | Front Brake Lever Setting    | Brake Fluid Cap Installation | -                            |
| <b>Brake Caliper(s)</b>    | Front Brake Lever Setting           | Brake Fluid Cap Removal | Bleed brake caliper(s)                   | Final Bleed procedure                    | Brake caliper conditioning | Front Brake Lever Setting  | Brake Fluid Cap Installation | -                            | -                            |
| <b>Brake Hose/line(s)</b>  | Front Brake Lever Setting           | Brake Fluid Cap Removal | Brake master cylinder bleed <sup>1</sup> | Bleed brake caliper(s)                   | Final Bleed procedure      | Brake caliper conditioning | Front Brake Lever Setting    | Brake Fluid Cap Installation | -                            |

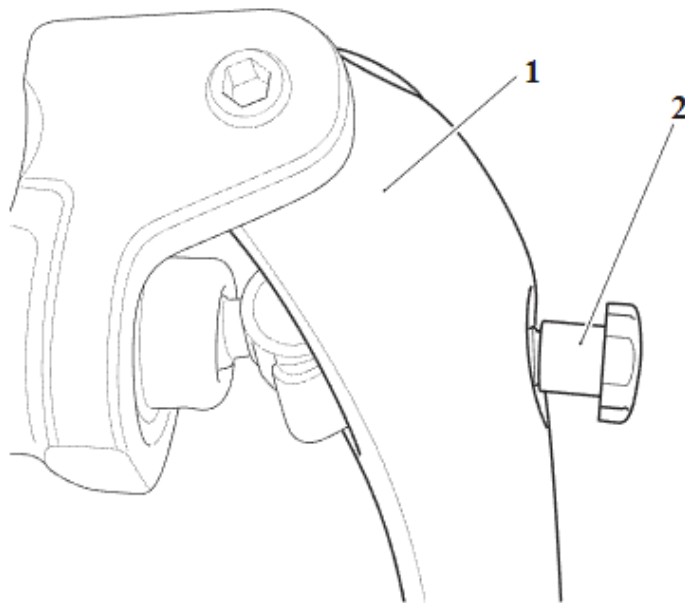
<sup>1</sup> For models with a front brake master cylinder bleed screw only.

## Front Brake Lever Setting

### NOTICE

Note the original setting of the brake lever adjuster in order that it can be returned to the same position when the bleeding operation is complete.

1. Turn the brake lever adjuster fully in to give maximum lever span.



1. Brake lever
2. Adjusting screw

## Master Cylinder Back Bleed (Radial Master Cylinder)

### ⚠ WARNING

During bleeding, do not allow the brake fluid level to fall below the lower level mark in the reservoir.

If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

Trapped air in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

## CAUTION

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose above the handlebars.

Allowing the brake hose to fall below the handlebar height will allow an excessive amount of air to enter into the brake system.

Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

## NOTICE

The master cylinder back bleed is to be used when a brake master cylinder or ABS modulator has been removed from the braking system and then refitted or replaced.

The front caliper should be detached from the motorcycle with the pistons pumped out against a suitable flat metal plate as described in [Front Brake Master Cylinder - Removal](#).

1. Depress the brake lever to the handlebar. This will make sure the reservoir port is closed and brake fluid flows to the bleed screw.

## WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

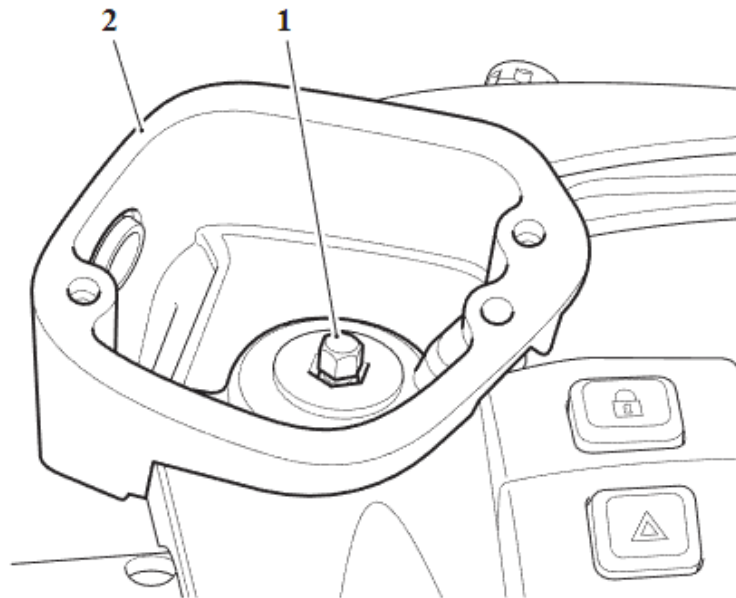
Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Being careful not to damage the brake pad material, use the metal plate against the brake pads to push the caliper pistons in evenly.
3. Push the pistons into the caliper to apply pressure to the system.

## NOTICE

The master cylinder bleed screw should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

4. Open the master cylinder bleed screw slightly to let fluid flow but still feel resistance to pushing the caliper pistons in.



1. Bleed screw
2. Fluid reservoir

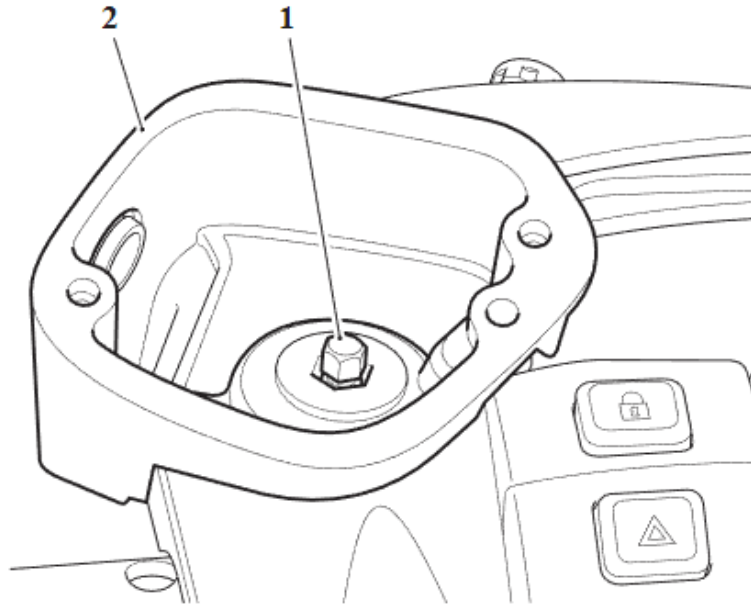
5. With pressure still applied in the caliper, close the master cylinder bleed screw.
6. Tighten the master cylinder bleed screw to 6 Nm.

Perform the following operations:

- [Front Brake Caliper - Installation](#)
- Bleed the front brakes (see [Bleeding the Front Brakes](#)).

## Front Brake Master Cylinder Bleed

1. Slowly apply then slowly release pressure to the brake lever five times, maintaining pressure on the final application.
2. Open the bleed screw slightly.
3. Close the bleed screw once the lever has come to a stop against the handlebar.



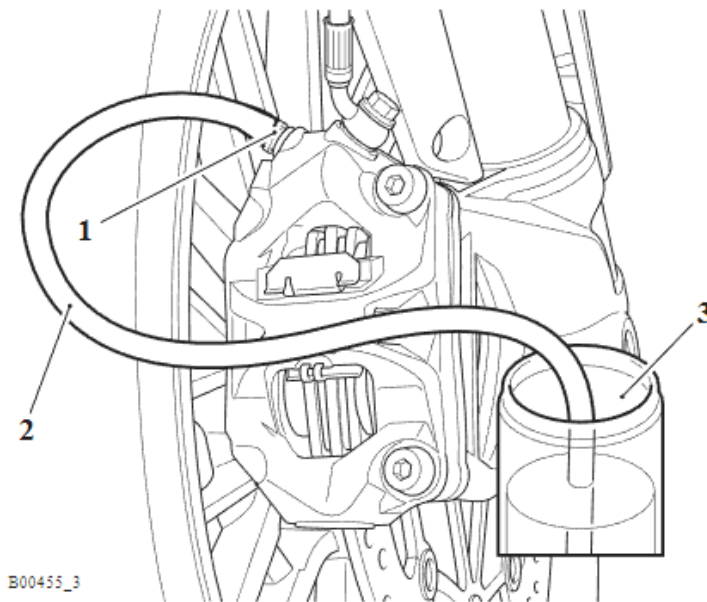
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Bleed screw</li><li>2. Fluid reservoir</li></ol> |
|---|

4. Slowly apply and slowly release pressure to the brake lever another five times, maintaining pressure on the final application.
5. Open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake lever.
6. Leave the bleed screw slightly open and slowly release the brake lever.
7. Slowly apply and release pressure to the brake lever another five times, closing the bleed screw on the final application.
8. Repeat steps 4 to 10 until no more air appears from the bleed screw.
9. With the brake lever still applied, tighten the master cylinder bleed screw to 6 Nm.
10. Fill the reservoir to the upper level with new DOT 4 fluid.

## Front Brake Caliper(s) Bleed

1. Remove the rubber cap from the caliper bleed screw.
2. Attach a transparent tube to the bleed screw.

3. Place the other end of the tube in a suitable container containing new brake fluid.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Bleed screw</li><li>2. Bleed tube</li><li>3. Container</li></ol> |
|---|

#### **NOTICE**

The bleed screw should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

4. Slowly apply and slowly release pressure to the brake lever five times, maintaining pressure on the final application.
5. Counter hold the brake hose union bolt and open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake lever.
6. Counter hold the brake hose union bolt and close the bleed screw.
7. Slowly apply and slowly release pressure to the brake lever another five times, maintaining pressure on the final application.
8. Counter hold the brake hose union bolt and open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake lever.
9. Leave the bleed screw slightly open and slowly release the brake lever.
10. Slowly apply and slowly release pressure to the brake lever five times.



11. Counter hold the brake hose union bolt and close the bleed screw.
12. Repeat steps 4 to 11 until no more air appears in the bleed tube/container.
13. With the brake lever still applied, counter hold the brake hose union bolt and tighten the bleed screw to 8 Nm.
14. Fill the reservoir to the upper level with new DOT 4 fluid.
15. Repeat the front brake caliper bleed for the remaining brake caliper (if fitted).
16. Remove the transparent bleed tube.

#### Final Bleed Procedure

1. Repeat the bleed procedure as detailed in [Bleeding the Front Brakes](#).
2. If brake lever travel is unacceptably high, repeat [Bleeding the Front Brakes](#).
3. If brake lever travel is acceptable, fit the reservoir diaphragm, reservoir cap insert (if fitted) and reservoir cap. Tighten the fixings to 1.5 Nm.

### WARNING

Always return the lever adjuster to the rider's preferred setting. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of motorcycle control and an accident.

### WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

4. Check that the brakes operate correctly. Rectify as necessary.

## Front Brake Caliper Conditioning

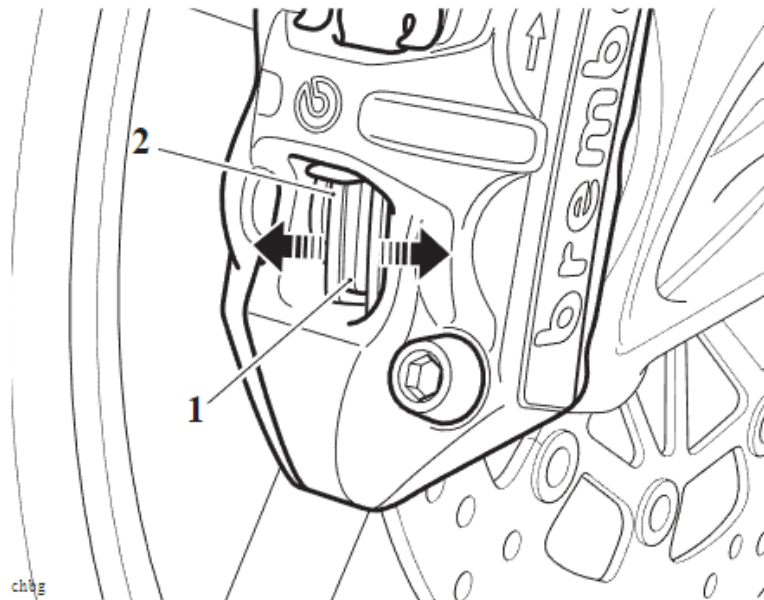
### **⚠ WARNING**

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

1. Using a suitable tool, on one brake caliper, push the front brake caliper pistons 1-2 mm into the caliper body by forcing the brake pads apart.



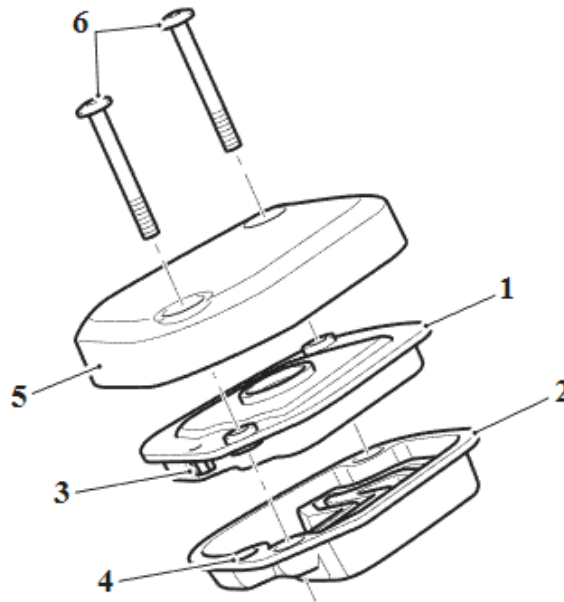
1. Brake pad
2. Brake pad backing plate

2. Complete the piston movement for the other piston pair within the same caliper.
3. Operate the brake lever to pump the pistons back out until the brake pads come into contact with the brake disc.
4. Repeat steps 1 to 3 on the same caliper until the pistons have been pushed in and out three times.
5. Repeat steps 1 to 4 on the other front brake caliper.

6. Slowly apply front brake lever to the handlebar and maintain that pressure for approximately five seconds. Slowly release the lever, and leave for 30 seconds. Repeat three times.

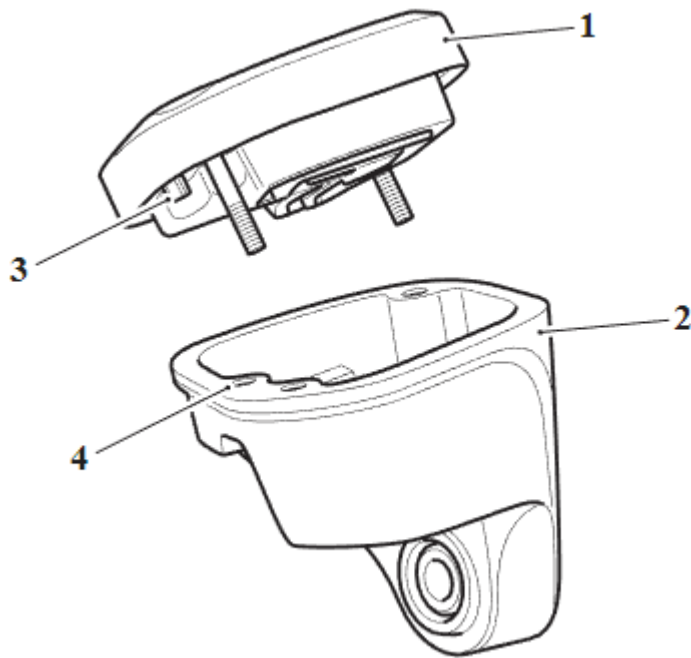
#### Brake Fluid Cap - Installation

1. Fit the insert to the diaphragm seal. Make sure the locating lug on the insert fits into its hole in the diaphragm.
2. Fit the diaphragm and insert assembly to the reservoir cap. Make sure the holes for the fixings are correctly aligned.
3. Fit the diaphragm and insert (if fitted) to the reservoir cap. Make sure the holes for the fixings are correctly aligned.
4. Fit the fixings into the cap and diaphragm seal assembly.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Insert</li><li>2. Diaphragm seal</li><li>3. Locating lug</li><li>4. Hole for locating lug</li><li>5. Reservoir cap</li><li>6. Fixings</li></ol> |
|--|

5. Hold the assembled parts together and position the cap, insert (if fitted) and diaphragm seal and fixings onto the reservoir.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Reservoir cap</li><li>2. Reservoir</li><li>3. Locating lug</li><li>4. Hole for locating lug</li></ol> |
|--|

**⚠ WARNING**

Do not over tighten the brake reservoir cap fixings  
Over tightening the master cylinder reservoir fixings may damage the diaphragm, cap or reservoir.

Damage to the brake fluid reservoir may result in loss of brake fluid, reduced braking efficiency leading to loss of motorcycle control and an accident.

6. Tighten the fixings to 1.5 Nm.

## Bleeding the Rear Brake

### Brake Fluid Replacement - Routine Maintenance

Braking performance reduces as brake fluid ages, Repeated stops cause brake fluid to heat and cool rapidly reducing braking performance.

Brake fluid absorbs moisture over a period of time and becomes contaminated as it ages.

Therefore brake fluid should be replaced at specified intervals as instructed in the routine maintenance schedule, see [Brake Fluid - Renew](#).

### Brake Bleeding

When removing or replacing brake components and the brake line is opened air will enter as fluid escapes.

If the brake bleed procedure is not carried out air can become trapped in the brake fluid.

A consequence of air being trapped in the brake system is that the brake can feel soft/spongy and the performance of the brakes will be reduced.

#### **NOTICE**

Always renew the brake fluid at the interval specified in the routine maintenance schedule.

#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## WARNING

Brake fluid is hygroscopic which means it will absorb moisture from the air. Only use new DOT 4 brake fluid from a sealed container, do not mix different brands of brake fluid and never use brake fluid from an unsealed container or from one that has been previously opened.

Any absorbed moisture will greatly reduce the boiling point of the brake fluid. Moisture in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

## WARNING

Do not allow dirt or debris to enter the braking system when adding brake fluid to the brake fluid reservoir.

Always maintain absolute cleanliness as this will adversely affect the brake fluid's properties.

Contaminated brake fluid may cause a reduction in brake performance leading to loss of motorcycle control and an accident.

## WARNING

During bleeding, do not allow the brake fluid level to fall below the lower level mark in the reservoir.

If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

Trapped air in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

## **WARNING**

Check for fluid leakage around brake fittings, seals and joints.  
Leaks around fittings and joints may allow air to enter the brake system.  
Air entering the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

## **CAUTION**

Do not attempt to maintain brake fluid pressure by securing the brake lever to the handlebar or the brake pedal using a band or strap.  
Banding or strapping the brake lever or pedal may deform the piston seals in the caliper.  
Lever or pedal travel that is increased or reduced may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

## **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork.  
Close the brake reservoir and wash any spilled brake fluid immediately with warm soapy water.  
Spilled brake fluid, if left, will damage painted and plastic surfaces.

## **CAUTION**

Pressure applied to the brake lever or caliper pistons during the bleeding process must be applied and removed smoothly and slowly.  
It must take a minimum of five seconds between lever positions (from fully released to stop).  
Failure to follow these instructions can allow air to be drawn in to the system through the bleed screw threads.

***NOTICE***

An additional technician is required to monitor the fluid level and operate the brake lever or pedal when bleeding the brakes.

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

***NOTICE***

Always renew the brake fluid at the interval specified in the routine maintenance schedule.

The following table indicates the procedure to follow when carrying out repairs or replacement of the following brake components.



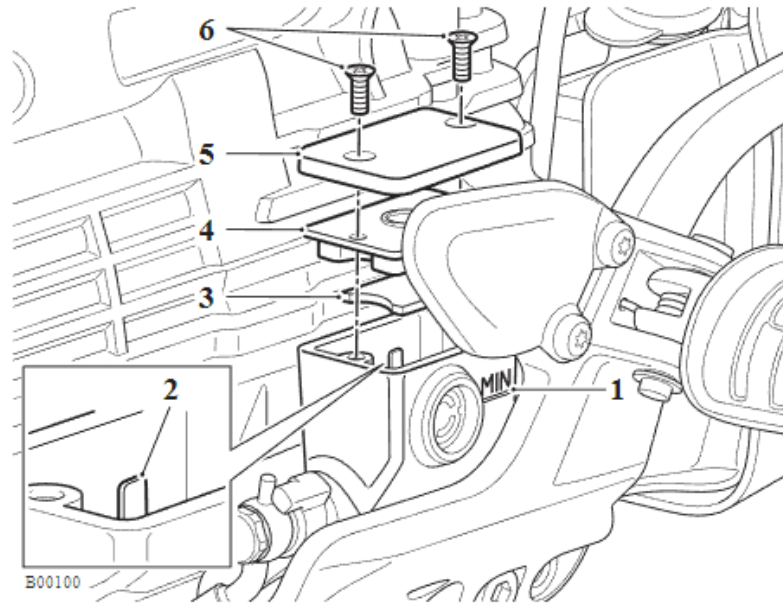
Rear Brake Bleed Procedure Table

|                                     |                              |                              |                              |                              |
|-------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <b>Bleed the brakes as follows:</b> | Brake Fluid Cap Installation | Brake Fluid Cap Installation | -                            | Brake Fluid Cap Installation |
|                                     | Brake caliper conditioning   | Brake caliper conditioning   | Brake Fluid Cap Installation | Brake caliper conditioning   |
|                                     | Final Bleed procedure        | Final Bleed procedure        | Brake caliper conditioning   | Final Bleed procedure        |
|                                     | Bleed brake caliper(s)       | Bleed brake caliper(s)       | Final Bleed procedure        | Bleed brake caliper(s)       |
|                                     | Back bleed master cylinder   | Back bleed master cylinder   | Bleed brake caliper(s)       | Back bleed master cylinder   |
|                                     | Brake Fluid Cap Removal      | Brake Fluid Cap Removal      | Brake Fluid Cap Removal      | Brake Fluid Cap Removal      |
| <b>When replacing/fitting the</b>   | <b>ABS Modulator</b>         | <b>Master Cylinder</b>       | <b>Brake Caliper(s)</b>      | <b>Brake Hose/line(s)</b>    |

Brake Fluid Cap Removal

1. Remove the two fixings.
2. Remove the reservoir cap and the diaphragm seal.
3. Check the condition of the diaphragm seal. Replace if necessary.

|  |
|--|
| <b>NOTICE</b>  |
| It is not necessary to remove the float when adding brake fluid to the rear brake master cylinder. |



1. MIN mark
2. MAX mark
3. Float
4. Seal
5. Reservoir cap
6. Fixings

### Rear Brake Master Cylinder Back Bleed

#### **⚠ CAUTION**

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose above the height of the rear brake master cylinder. Allowing the brake hose to fall below the rear brake master cylinder height will allow an excessive amount of air to enter into the brake system.

Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

### NOTICE

The master cylinder back bleed is to be used when a brake master cylinder or ABS modulator has been removed from the braking system and then refitted or replaced.

The rear caliper should be detached from the motorcycle with the pistons pumped out against a suitable flat metal plate as described in [Rear Brake Master Cylinder - Removal](#).

1. Depress the brake pedal to its stop. This will make sure the reservoir port is closed and brake fluid flows to the fluid reservoir.

### WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Being careful not to damage the brake pad material, use the metal plate against the brake pads to push the caliper pistons in evenly. 3. Push the pistons into the caliper.

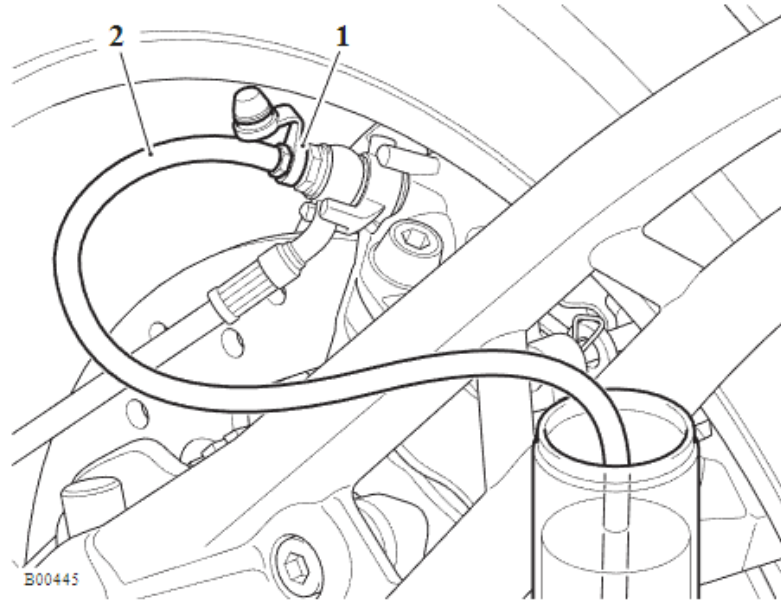
Perform the following operations:

- [Rear Brake Caliper - Installation](#)
- Bleed the rear brakes (see [Bleeding the Rear Brake](#)).

#### Rear Brake Caliper Bleed

1. Remove the rubber cap from the caliper bleed screw.
2. Attach a transparent tube to the bleed screw.

3. Place the other end of the tube in a suitable container containing new brake fluid.



1. Bleed screw
2. Bleed tube

#### **NOTICE**

The bleed screw should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

4. Slowly apply and slowly release pressure to the brake pedal five times, maintaining pressure on the final application.
5. Counter hold the brake hose union bolt and open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake pedal.
6. Slowly apply and slowly release pressure to the brake pedal until the brake fluid in the reservoir reduces down to the MIN level, maintaining pressure on the final application.
7. Close the bleed screw.
8. Top up the brake fluid in the reservoir to the MAX level.
9. Slowly apply and slowly release pressure to the brake pedal five times, maintaining pressure on the final application.
10. Counter hold the brake hose union bolt and open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake pedal.

11. Slowly apply and slowly release pressure to the brake pedal until the brake fluid in the reservoir reduces down to the MIN level, maintaining pressure on the final application.
12. Close the bleed screw.
13. Top up the brake fluid in the reservoir to the MAX level.
14. Repeat steps 4 to 13 until no more air appears in the bleed tube/container.
15. With the brake lever still applied tighten the bleed screw to 6 Nm.
16. Fill the reservoir to the upper level with new DOT 4 fluid.
17. Remove the transparent bleed tube.
18. Fit the rubber cap to the caliper bleed screw.

### **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

#### Rear Brake Final Bleed

4. Repeat the bleed procedure as detailed in [Bleeding the Rear Brake](#).
5. If brake pedal travel is unacceptably high, bleed the rear brake as detailed in [Bleeding the Rear Brake](#).
6. If brake pedal travel is acceptable, refit the rear brake reservoir cover.

### **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

7. Check that the brakes operate correctly. Rectify as necessary.

## Rear Brake Caliper Conditioning

### **⚠ WARNING**

Make sure no damage is made to the brake pad material when moving the brake pads.

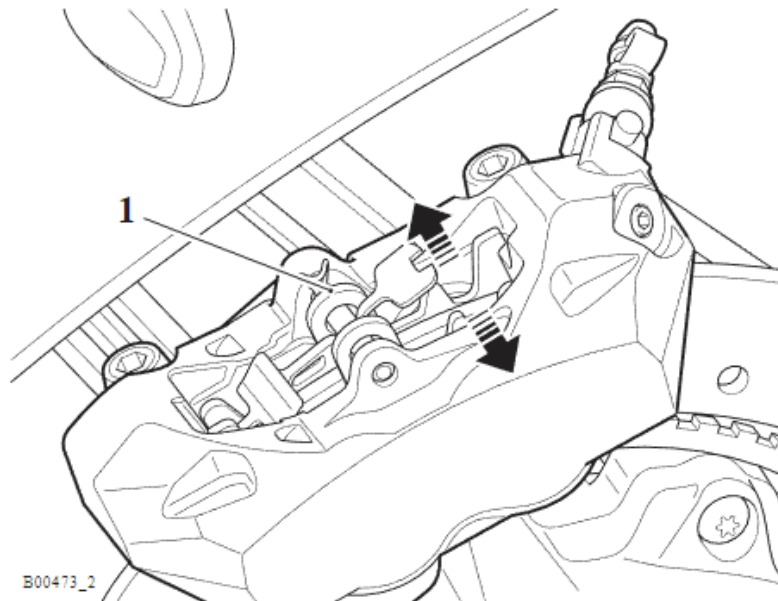
Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Perform the following operations:

- **Rear Wheel - Removal**

1. Using a suitable tool, push the rear brake caliper pistons 1-2 mm into the caliper body by forcing the brake pads apart.



1. Brake pad backing plate

2. Operate the rear brake pedal to pump the pistons back out until the brake pads come into contact with the brake disc.
3. Repeat steps 1 to 3 until the pistons have been pushed in and out three times.

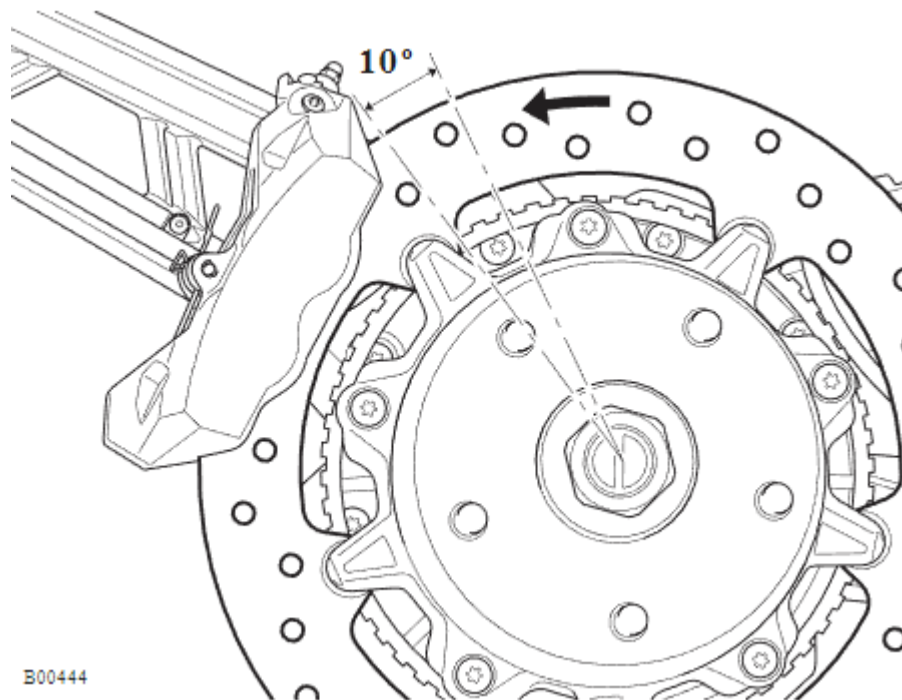
4. Slowly apply rear brake pedal and maintain that pressure for approximately five seconds. Slowly release the lever, and leave for 30 seconds. Repeat three times.

Perform the following operations:

- [Rear Wheel - Installation](#)

Additional Bleeding (if required)

1. Remove the rear wheel (see [Rear Wheel - Removal](#)).
2. Remove the rear caliper fixings and move the caliper 10° anticlockwise on the brake disc.



Rear Brake Caliper Moved 10° Anticlockwise

3. Remove the rubber cap from the rear bleed screw.
4. Attach a transparent tube to the bleed screw.
5. Place the other end of the tube in a suitable receptacle containing new brake fluid.
6. Slowly apply and slowly release pressure to the brake pedal five times, maintaining pressure on the final application.

## CAUTION

During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

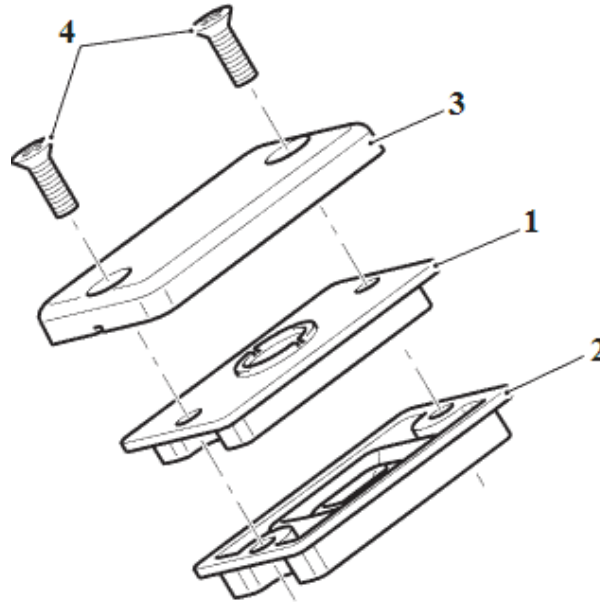
7. Partially open and close the caliper bleed screw slightly.
8. Repeat steps 6 to 7.
9. Slowly apply and slowly release pressure to the brake pedal five times, maintaining pressure on the final application.
10. Open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake pedal.
11. Leave the bleed screw slightly open and slowly release the brake pedal.
12. Slowly apply and slowly release pressure to the brake pedal five times, closing the bleed screw on the final application.
13. Repeat steps 7 to 13 until no more air appears in the bleed tube.
14. When all air has been expelled from the system, apply pressure to the brake pedal and close the bleed screw and tighten it to 6 Nm.
15. Remove the bleed tube.
15. Fit the rubber cap to the rear bleed screw.

### Brake Fluid Cap Installation

1. Fit the insert to the diaphragm seal.
2. Fit the diaphragm and insert assembly to the reservoir cap. Make sure the holes for the fixings are correctly aligned.



3. Fit the fixings into the cap and diaphragm seal assembly.



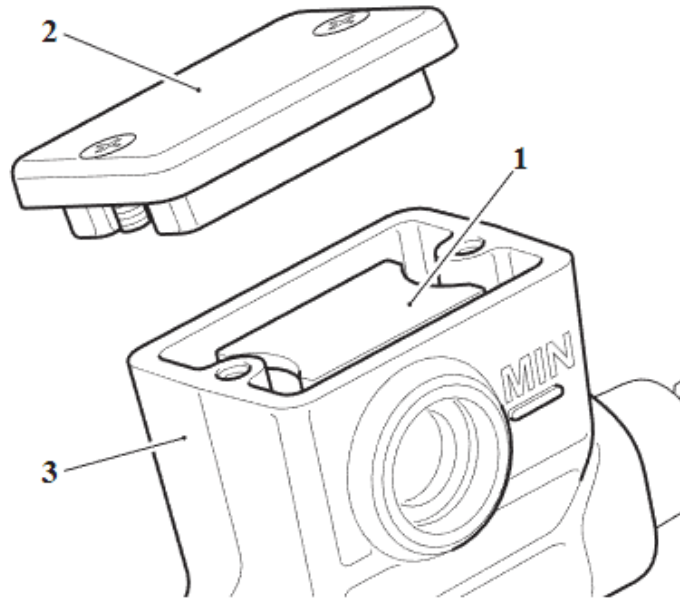
1. Insert
2. Diaphragm seal
3. Reservoir cap
4. Fixings

### **⚠ WARNING**

If the master cylinder reservoir cap screws are over tightened this can result in a brake fluid leak.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

4. Hold the assembly together and position the cap and diaphragm seal assembly onto the reservoir. Tighten the fixings to 1.5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Float</li><li>2. Reservoir cap assembly</li><li>3. Reservoir</li></ol> |
|---|

5. Check the operation of the rear brake. Rectify as necessary.

### **⚠ WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

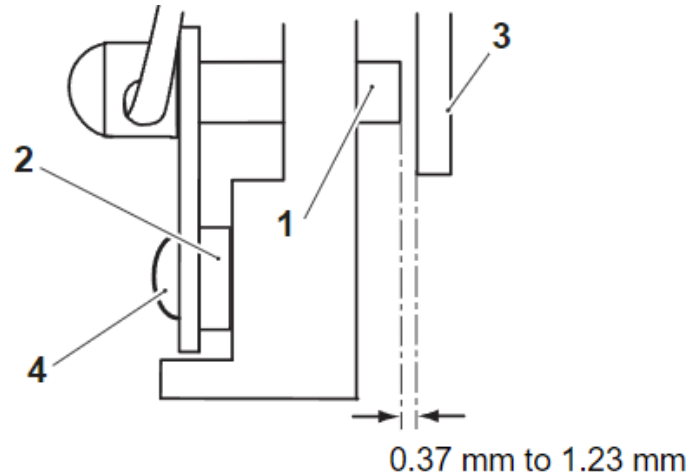
#### Air Gap Measurement

### **NOTICE**

This air gap measurement is for the front wheel speed sensor only. The rear wheel speed sensor air gap is fixed and not adjustable.

If adjustment is required, use the original fixing for the selection of the shim. Fit a new fixing when the new shim has been selected and fitted.

1. Using feeler gauges, measure the air gap between the wheel speed sensor and the pulser ring.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. ABS sensor (front sensor shown)</li><li>2. Shim</li><li>3. Pulser ring</li><li>4. Fixing</li></ol> |
|---|

2. Rotate the wheel and repeat the measurement in several places to make sure that the pulser ring is not distorted or bent. Renew a damaged pulser ring.
3. Adjust the air gap using the correct shim to achieve an air gap between 0.37 mm and 1.23 mm.
4. Shims are available in the following sizes:
  - shims - 0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm and 2.5 mm.
5. If necessary, remove the wheel speed sensor, fit the correct thickness shim and refit the wheel speed sensor and tighten the original fixing to 9 Nm.
6. Repeat the air gap measurement. Readjust as necessary.
7. When the air gap measurement is between 0.37 mm and 1.23 mm, remove the original fixing, fit a new fixing and tighten to 9 Nm.

## Anti-lock Brake System (ABS) Management

### Anti-lock Brake System (ABS)

#### System Description

This model is equipped with a partially integrated braking system, combined with the Anti-lock Braking System (ABS). This increases the braking efficiency when riding the motorcycle.

When the front brake is applied, a small amount of rear brake is also applied, allowing for balanced braking. The amount of rear brake application is related to the level of braking force applied by the rider through the front brake lever. Use of the rear brake pedal alone will only apply the rear brake.

#### Partially Intergrated Braking System

##### ABS

This model is fitted with an electronic anti-lock brake system which is designed to prevent the wheels from locking or skidding by reducing braking effort to the front or rear brake caliper as required.

The system consists of a hydraulic modulator and ECM assembly mounted to a bracket beneath the fuel tank, a front wheel speed sensor mounted to the front fork, and a rear wheel speed sensor mounted to the final drive.

The front wheel has a pulser ring mounted on to the wheel hub. The rear wheel pulser ring is mounted to the cush drive.

The front and rear master cylinders are connected via lines to the modulator and from the modulator the lines connect to the brake calipers.

The ABS modulator ECM continuously calculates the front and rear wheel speeds, and from these inputs the ECM calculates the estimated motorcycle speed, wheel deceleration/acceleration, the wheel speed difference and the wheel slip (skid) rate. This is calculated by comparing the calculated wheel speeds with the calculated vehicle speed, so that if one wheel speed deviates significantly from the other two readings, this wheel is calculated to be slipping (skidding).

Under braking, if the modulator detects that either wheel is slipping, due to the brake force exceeding the available traction between the tyre and road surface (the wheel will

begin to slip or 'skid'), the ECM very rapidly releases and reapplies the brake pressure to prevent the wheel from slipping.

This is felt through the brake pedal or lever as a rapid 'pulsing'.

If the rider reduces braking effort, or traction increases (so that traction exceeds braking force, the wheel will rotate once more) the wheel will no longer lock up. The ABS system will detect this and stop controlling brake pressure, and return to its monitoring state.

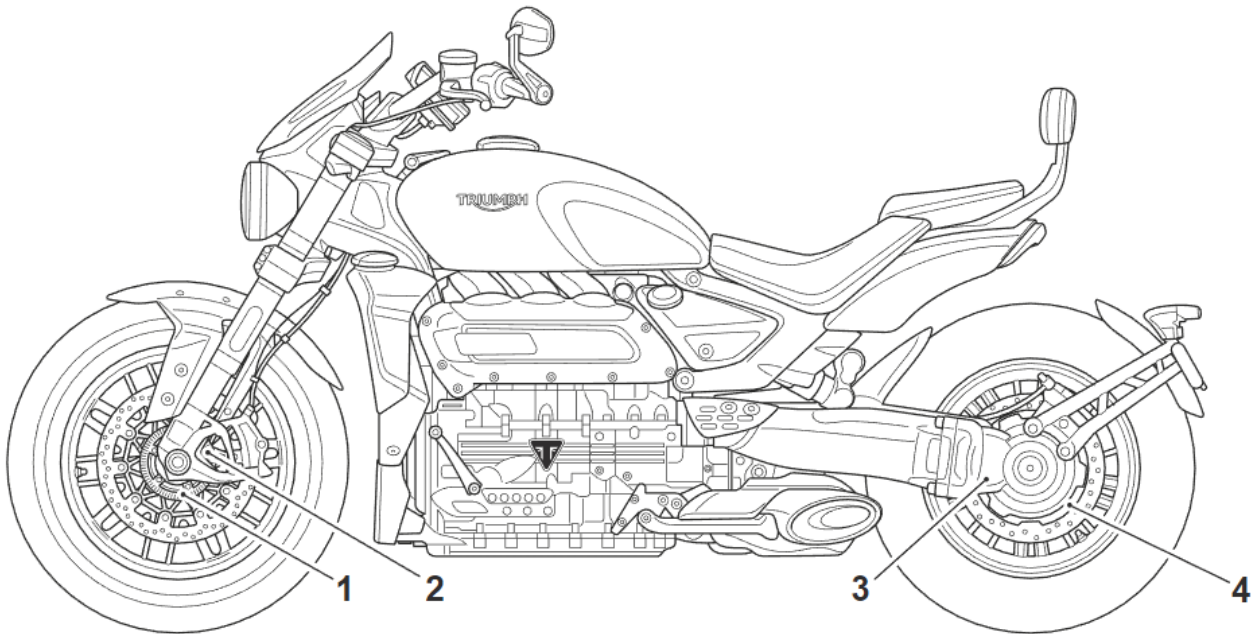
The system has a self diagnostic function built-in which monitors the fail safe relay, solenoid valves, motor relay, wheel speed sensors, power supply and ground, as well as internal ECM functions. In the event of a malfunction being detected, the ECM will illuminate the ABS warning light, and store a diagnostic trouble code in the system memory. This stored data can then be recovered using the Triumph Diagnostic Tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

Under normal operation, the ABS warning light will flash on and off after the ignition is switched on and until the vehicle speed exceeds 6 mph (10 km/h). The ABS performs a self check and if no faults are found the light is extinguished. If a trouble code is stored the ABS warning light will stay illuminated and the ABS will not function, however the brakes will operate normally. If the ABS warning light does not extinguish, or illuminates whilst the motorcycle is being ridden, refer to the ABS system diagnostics (see Diagnostic Trouble Codes).

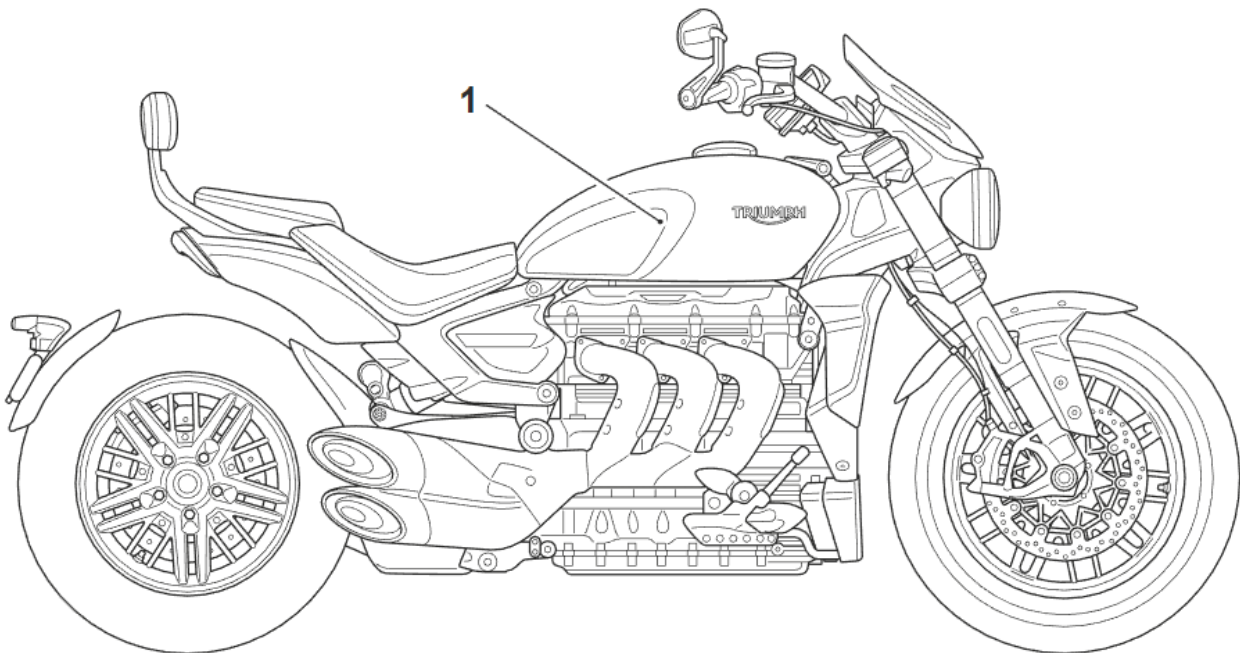
### Brake Light Switch

The brake light switch is incorporated in the hydraulic modulator and ECM assembly for both the front lever and rear brake pedal operation.

## Component Locations

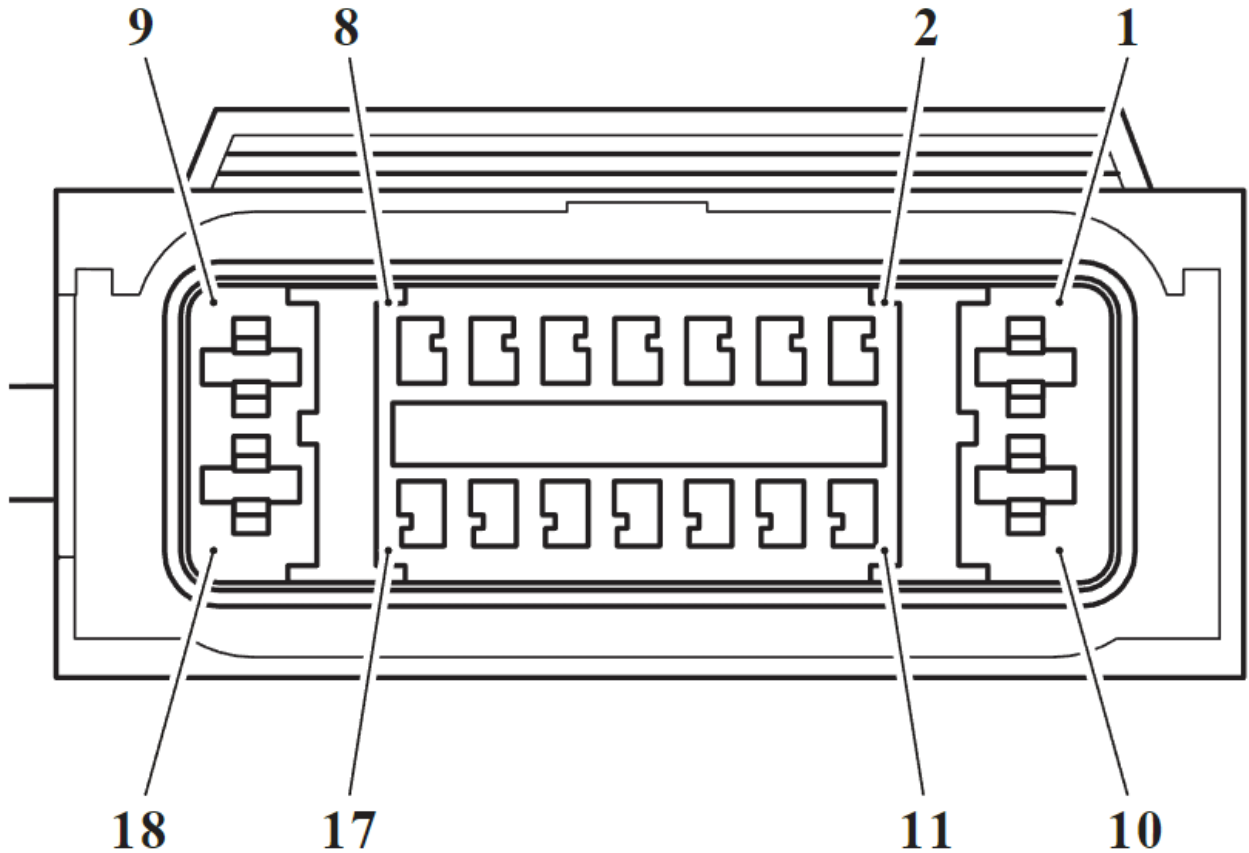


1. Front Wheel Pulser Ring
2. Front Wheel Speed Sensor
3. Rear Wheel Speed Sensor
4. Rear Wheel Pulser Ring



1. ABS Modulator (incorporating the front and rear brake light switch)

### ABS ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from right to left with number one in the top right hand corner.

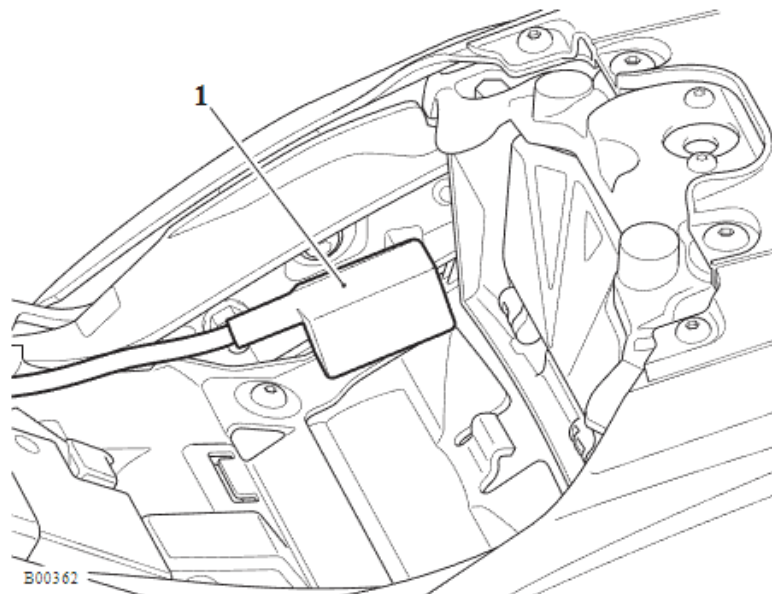
The ABS system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the left hand side panel. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

#### Diagnostic Tool Connection

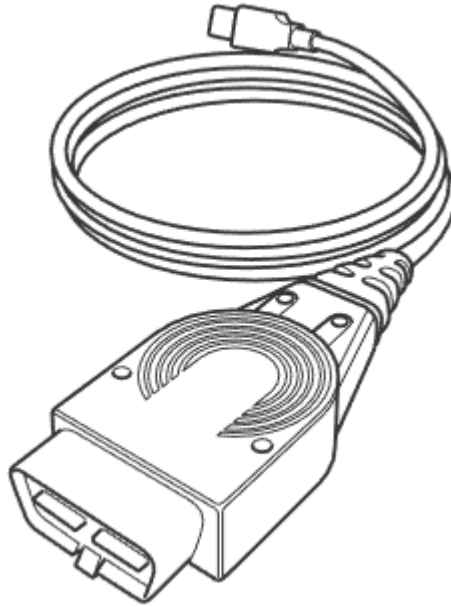
1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see [Seat - Removal](#)) and release the diagnostic connector from its locating tang.



1. Diagnostic connector



2. Plug the diagnostic interface directly into the diagnostic connector.



Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see page [Seat - Installation](#)).

Described on the following pages is the range of information which can be retrieved from the ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

**NOTICE**

Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from [www.triumphonline.net](http://www.triumphonline.net).

Build Data

The **Build Data** screen will display the following information:

| Function Examined       |
|-------------------------|
| ECM type                |
| ECM ID number           |
| Software version number |

Current Data

The **Current Data** screen will display the following information:

| Function Examined        | Result Reported (Scale) |
|--------------------------|-------------------------|
| Front wheel speed        | km/h                    |
| Rear wheel speed         | km/h                    |
| Brake switch status      | On/Off                  |
| ABS warning light status | On/Off                  |

## Diagnostic Trouble Codes

Diagnostic Trouble Codes (DTCs) are logged in the ABS ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic tool as a four digit code.

DTCs can be removed at any time using the Triumph diagnostic tool.

The system will log the diagnostic trouble codes listed below:

| <b>Diagnostic Trouble Code (DTC)</b> | <b>Fault Description</b>  | <b>Pinpoint test Page Number</b>   |
|--------------------------------------|---|--|
| C1611                                | Front wheel sensor short circuit to ground or open circuit          | <a href="#"><u>Front Wheel Sensor Open Circuit/Short Circuit</u></a>           |
| C1612                                | Front wheel sensor incorrect or missing signal                      | <a href="#"><u>Front Wheel Sensor Abnormal Input/Losing Contact</u></a>        |
| C1613                                | Rear wheel sensor short circuit to ground or open circuit           | <a href="#"><u>Rear Wheel Sensor Open Circuit/Short Circuit</u></a>            |
| C1614                                | Rear wheel sensor incorrect or missing signal                       | <a href="#"><u>Rear Wheel Sensor Abnormal Input/Losing Contact</u></a>         |
| C1621                                | Front wheel pulser ring missing teeth                               | <a href="#"><u>Front Wheel Pulser Ring Missing Teeth</u></a>                   |
| C1623                                | Rear wheel pulser ring missing teeth                                | <a href="#"><u>Rear Wheel Pulser Ring Missing Teeth</u></a>                    |
| C1631                                | Front wheel input solenoid short circuit to ground or open circuit  | <a href="#"><u>Front and Rear Input/Output Solenoid Open/Short Circuit</u></a> |
| C1632                                | Front wheel output solenoid short circuit to ground or open circuit | <a href="#"><u>Front and Rear Input/Output Solenoid Open/Short Circuit</u></a> |
| C1633                                | Rear wheel input solenoid short circuit to ground or open circuit   | <a href="#"><u>Front and Rear Input/Output Solenoid Open/Short Circuit</u></a> |
| C1634                                | Rear wheel output solenoid short circuit to ground or open circuit  | <a href="#"><u>Front and Rear Input/Output Solenoid Open/Short Circuit</u></a> |

| <b>Diagnostic Trouble Code (DTC)</b> | <b>Fault Description</b>  | <b>Pinpoint test Page Number</b>   |
|--------------------------------------|---|--|
| C1635                                | Low pressure feed valve short circuit to ground or open circuit | <a href="#"><u>Front and Rear Input/Output Solenoid Open/Short Circuit</u></a>     |
| C1636                                | Low pressure feed valve short circuit to ground or open circuit | <a href="#"><u>Front and Rear Input/Output Solenoid Open/Short Circuit</u></a>     |
| C1641                                | Front Wheel Actuator (Hydraulic Control) Wheel Lock             | <a href="#"><u>Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock</u></a> |
| C1643                                | Rear Wheel Actuator (Hydraulic Control) Wheel Lock              | <a href="#"><u>Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock</u></a> |
| C1651                                | Motor - Circuit fault   | <a href="#"><u>Motor - Lock; Motor Does Not Run; Motor Runs Continually</u></a>    |
| C1652                                | Motor - Does not run  | <a href="#"><u>Motor - Lock; Motor Does Not Run; Motor Runs Continually</u></a>    |
| C1653                                | Motor - Runs continually  | <a href="#"><u>Motor - Lock; Motor Does Not Run; Motor Runs Continually</u></a>    |
| C1661                                | Power source voltage too low                                    | <a href="#"><u>Power Source Voltage Too Low/Voltage Too High</u></a>               |
| C1662                                | Power source voltage too high                                   | <a href="#"><u>Power Source Voltage Too Low/Voltage Too High</u></a>               |
| C1681                                | ABS ECM internal error  | <a href="#"><u>ABS ECM Internal Error</u></a>                                      |
| C1682                                | CAN fault - lost communication with engine ECM                  | <a href="#"><u>CAN Fault</u></a>   |
| C1683                                | CAN fault - lost communication with instrument panel            | <a href="#"><u>CAN Fault</u></a>   |
| C1684                                | CAN fault - all communication lost                              | <a href="#"><u>CAN Fault</u></a>   |

## Diagnostic Trouble Codes

Dependant on the DTC stored, the ABS ECM will act in one of two ways:

1. Inhibit ABS operation immediately, irrespective of the ABS operating mode;
- or
2. Allow the ABS operation to complete before inhibiting the ABS.

Once the ABS ECM has inhibited ABS function, the ECM will act in one of three ways:

1. Allow the ABS to resume operation if the fault clears;
- or
2. Allow ABS operation after an ignition cycle if the fault clears;
- or
3. Inhibit the ABS function until the fault is rectified and the DTC erased. The ABS system will act on the DTC stored according to the table:

### **NOTICE**

ABS is Active means that the ABS system is completing an ABS manoeuvre.

## ABS Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

### **NOTICE**

A major cause of hidden electrical faults can be traced to faulty electrical connectors.

For example:

- Dirty/corroded terminals
- Damp terminals
- Broken or bent cable pins within multiplugs.

For example, the ABS electronic control module (ABS ECM) relies on the supply of accurate information to enable it to monitor and control the brake system. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

#### Before Disconnection:

- If testing with a voltmeter, the voltage across a connector battery supply and ground pins should be virtually battery volts with a small deviation allowable for usual voltage drop within wiring circuits. If there is a noticeable change, suspect faulty/dirty connections. Refer to the ABS circuit diagram within this Service Manual for pin numbers.

#### When Disconnecting a Connector:

- Check for a security device that must be released before the connector can be separated e.g. barb, hook and eye etc.

#### When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

#### When Connecting a Connector:

- Make sure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

#### Disconnection of ABS ECM Connector

## **⚠ CAUTION**

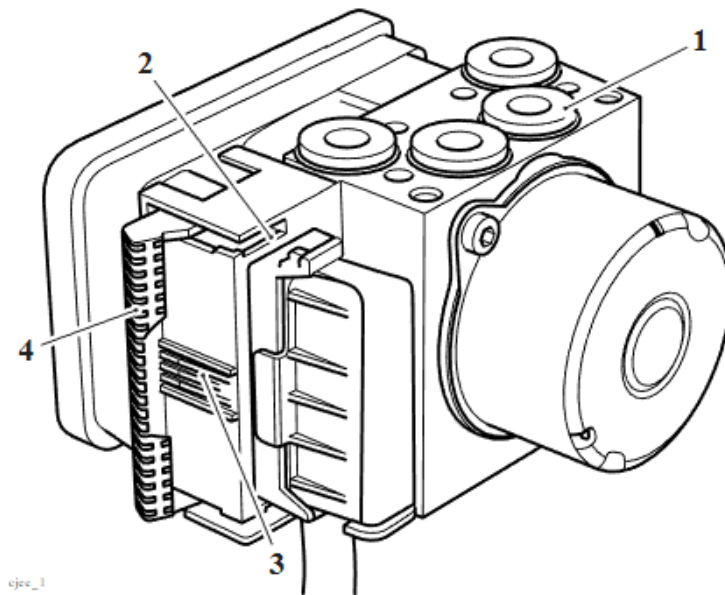
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

## **⚠ CAUTION**

Never disconnect the ABS ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

Always disconnect the battery negative (black) lead before disconnecting the ABS ECM.

1. Press the locking device and move the lever to the rear of the connector while disconnecting it from the ABS ECM.
2. When disconnected, ensure the lever is fully to the rear of the connector. An audible click can be heard when it is locked in position.



1. ABS modulator (shown removed for clarity)
2. Connector
3. Locking device
4. Lever

## ⚠ CAUTION

The ABS ECM is an integral part of the ABS modulator. Under no circumstances should the ECM be removed from the ABS modulator.

If a new ECM is required, repair is by replacement of the ABS modulator and ECM as an assembly only.

### Reconnection of the ABS ECM Connector

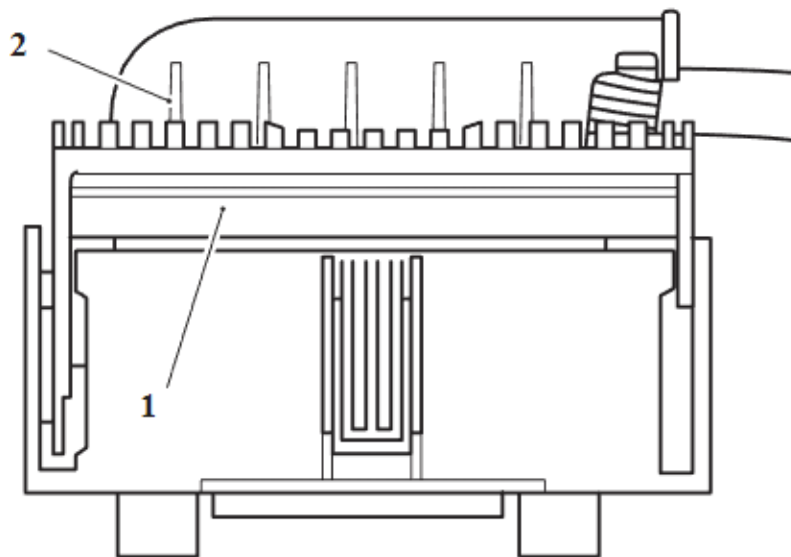
## ⚠ CAUTION

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

## ⚠ CAUTION

If the lever is not fully over to the rear position, it is possible that the connector may not fully engage into its socket.

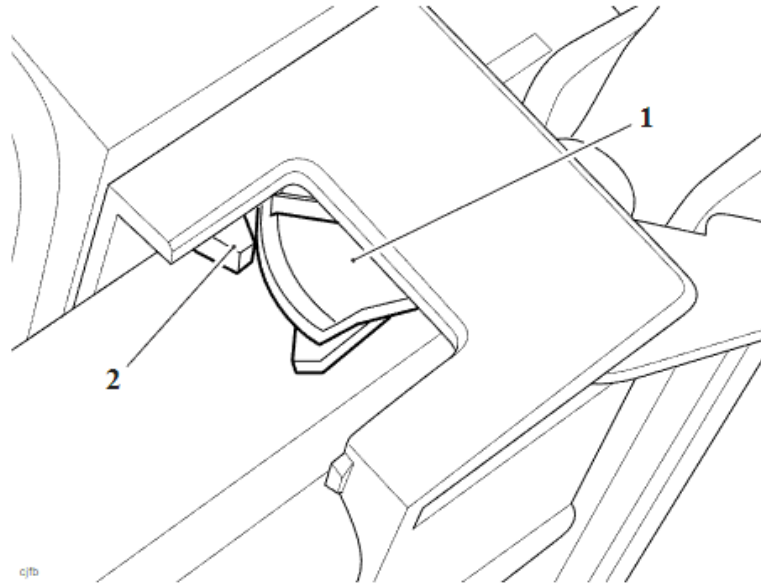
1. Ensure the lever on the connector is fully over to the unlocked position, as shown below:



1. Lever
2. Connector

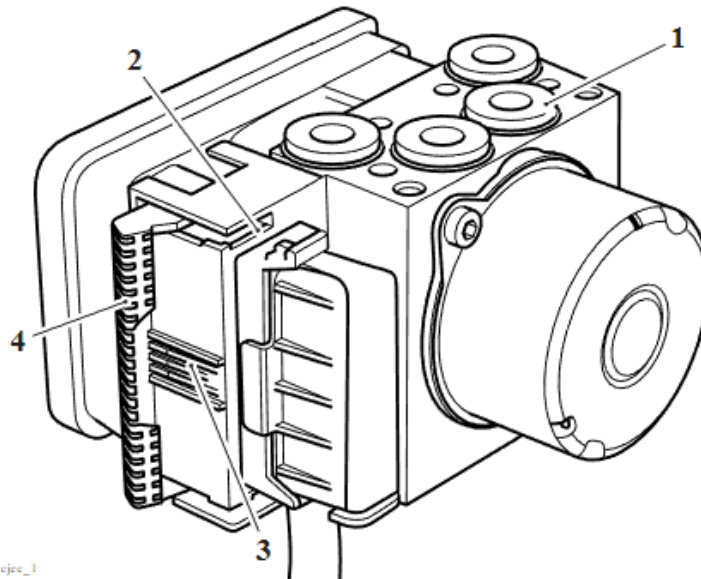


2. Align the connector to its socket on the ABS modulator such that the end of the lever aligns with the lug on the socket.



1. Lever end
2. Lug

3. Release the lever by pushing it towards the front of the connector. At the same time, push the connector into its socket until the lever is fully forward and locked in position. An audible click can be heard when locked.



1. ABS modulator (shown removed for clarity)
2. Connector
3. Locking device
4. Lever

## Pinpoint Tests

Pin point tests, if used correctly, help to diagnose a fault in the system once a diagnostic trouble code has been stored.

Before Starting Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.

### **WARNING**

If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If the DTC is not repeated, this indicates the DTC may have been stored due to external influences such as bad road surfaces or electrical interference.

After Completion of Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If a DTC is stored, there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

## Pinpoint Tests

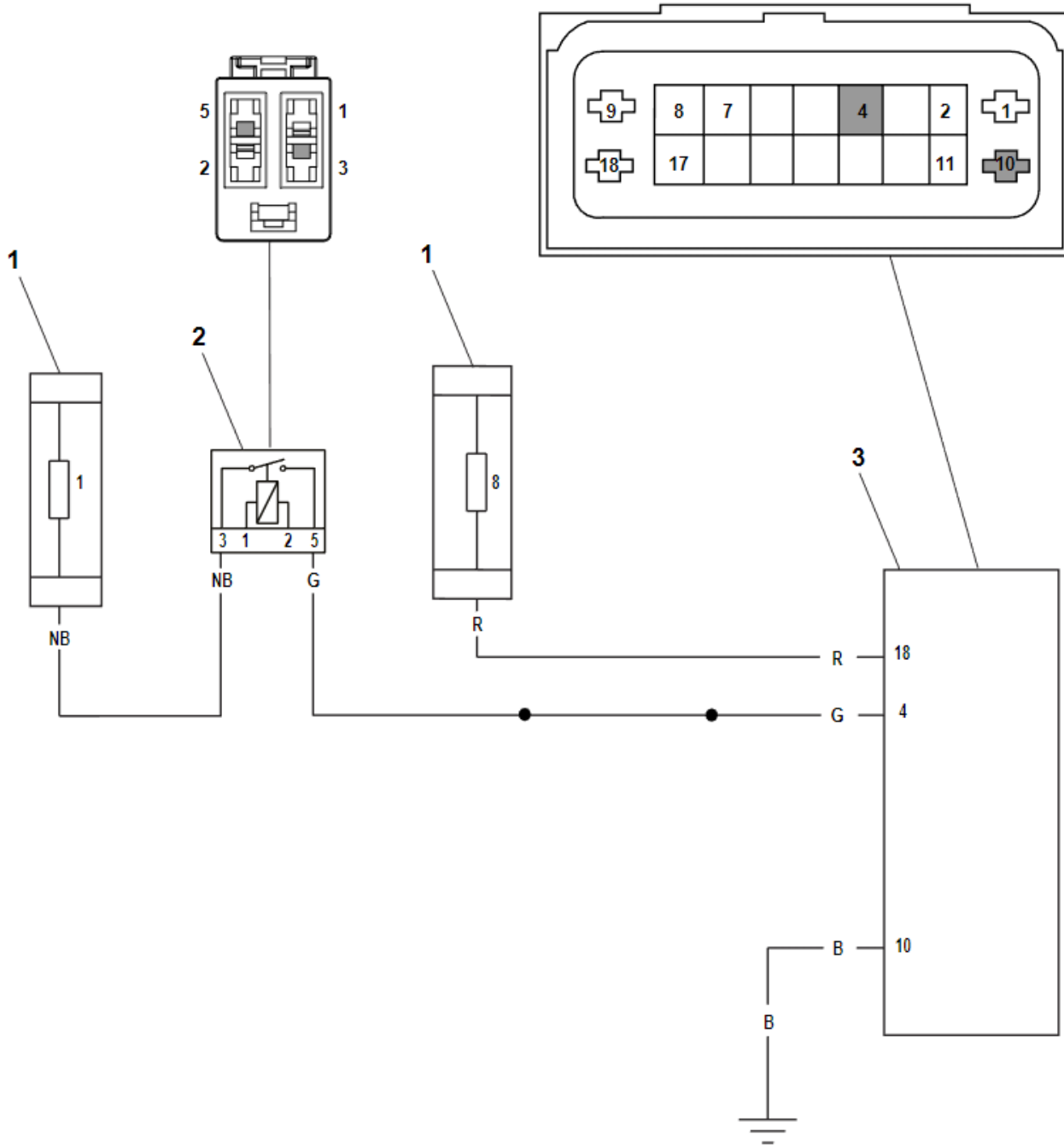
### ABS Warning Light ON (No DTCs Stored)

| Fault Code                            | Possible cause                         | Action   |
|---------------------------------------|--|--|
| ABS Warning Light ON (No DTCs Stored) | ABS Ignition supply fuse/circuit fault | Make sure ABS ECM connector is secure.<br>Disconnect ABS ECM connector and proceed to pinpoint test 1: |
|                                       | ABS Warning light circuit fault        | Refer to <a href="#">CAN Fault</a> .   |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- ABS ECM connector pin 4<br>- ABS ECM connector pin 10   | OK<br>Proceed to test 2                            |
|      | Faulty   | Rectify fault, proceed to test 3                   |
| 2    | Check cable continuity of the ABS ignition supply circuit: With the ignition 'ON', check voltage between:<br>- ABS ECM connector pin 4 and ground pin 10 | Voltage greater than 10 V<br>Proceed to test 3     |
|      | Voltage less than 10 V   | Locate and rectify wiring fault, proceed to test 3 |
| 3    | Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.  | OK<br>Action complete - quit test                  |
|      | Fault still present  | Contact Triumph service                            |

# Circuit Diagram



- 1. Fuse Box
- 2. Ignition Relay
- 3. ABS Control Module

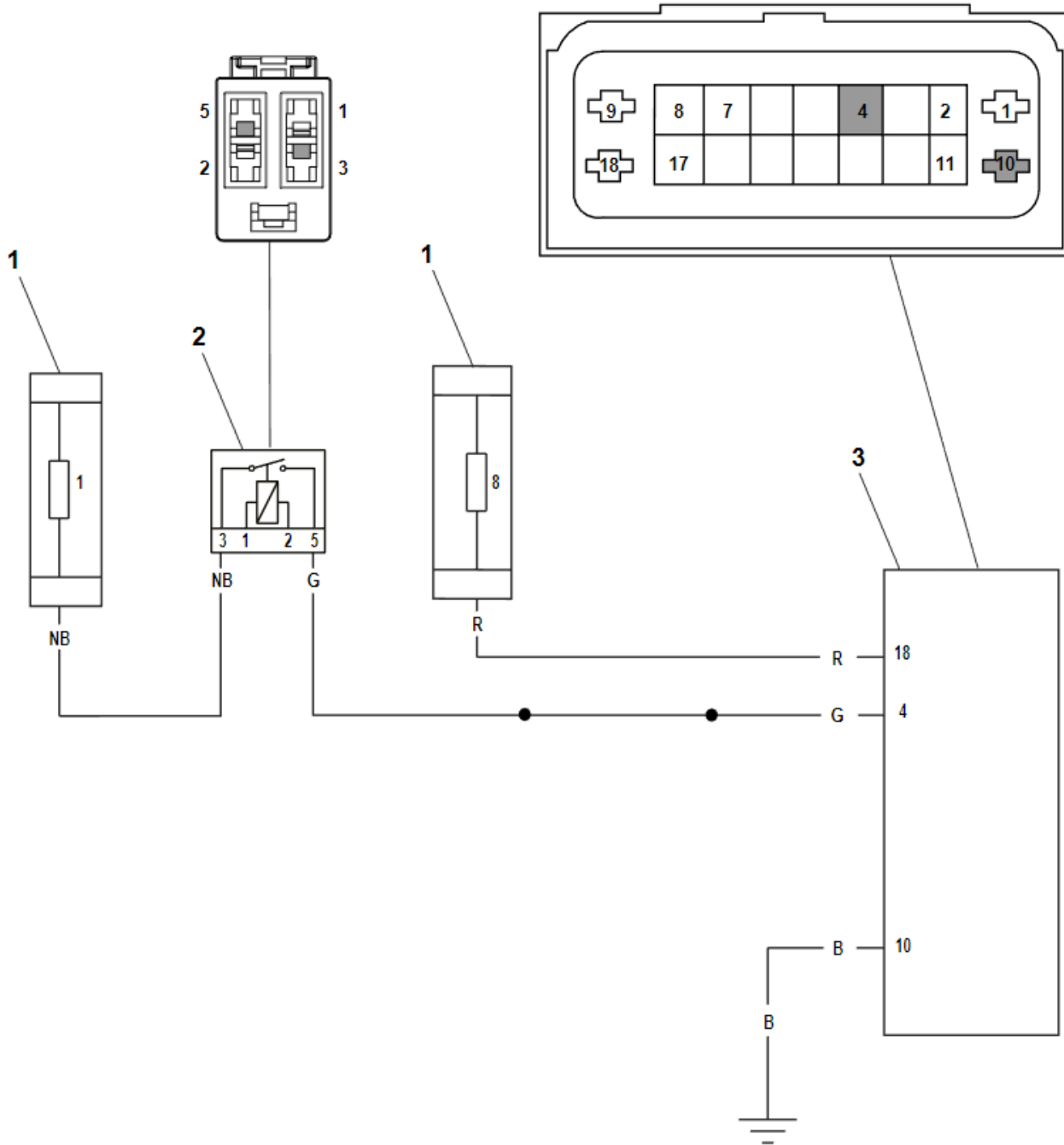
ABS Warning Light Does not Illuminate (No DTCs Stored)

| Fault Code                             | Possible cause               | Action   |
|--|------------------------------|--|
| ABS Warning Light OFF (No DTCs Stored) | ABS ECM ground circuit fault | Make sure ABS ECM connector is secure.<br>Make sure ABS ECM ground connection is secure.<br>Disconnect ABS ECM connector and proceed to pinpoint test 1: |
|  | Warning light circuit fault  | Refer to <b>CAN Fault</b> .  |

Pinpoint Tests

| Test  | Result              | Action   |
|---|---------------------|--|
| 1<br>Check the ABS warning light circuit and ignition fuses - fuse 1 and fuse 8   | OK                  | Proceed to test 2                                  |
|   | Faulty              | Replace fuse, proceed to test 3                    |
| 2<br>Check cable and terminal integrity:<br>- ABS ECM connector pin 4<br>- ABS ECM connector pin 10<br>- ABS ECM connector pin 18 | OK                  | Proceed to test 3                                  |
|   | Faulty              | Rectify fault, proceed to test 5                   |
| 3<br>Check cable for short to voltage: With ignition 'OFF', check voltage between:<br>- ABS ECM connector pin 4 and ground        | 0 V                 | Proceed to test 4                                  |
|   | Above 3V            | Locate and rectify wiring fault, proceed to test 5 |
| 4<br>Check cable for continuity:<br>- ABS ECM connector pin 10 and ground:  | OK                  | Proceed to test 5                                  |
|   | Faulty              | Locate and rectify fault, proceed to test 5        |
| 5<br>Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.  | OK                  | Action complete - quit test                        |
|   | Fault still present | Contact Triumph service                            |

# Circuit Diagram



- 1. Fuse Box
- 2. Ignition Relay
- 3. ABS Control Module

## Front Wheel Sensor Open Circuit/Short Circuit

| Fault Code | Possible cause   | Action   |
|------------|--|--|
| C1611      | Front wheel sensor short circuit to ground or open circuit | <p>Make sure ABS ECM connector is secure.</p> <p>Make sure wheel speed sensor connector is secure.</p> <p>Disconnect ABS ECM connector and proceed to pinpoint test 1:</p> |

## Pinpoint Tests

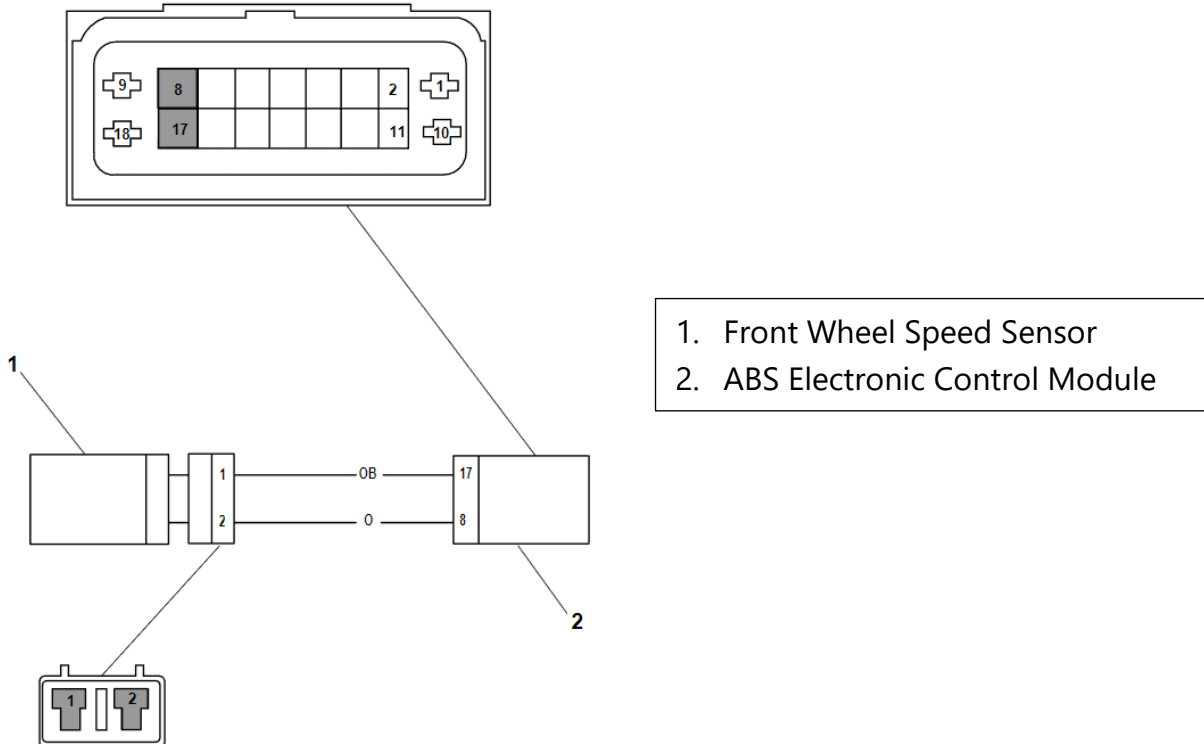
| Test | Result   | Action   |   |
|------|--|--|---|
| 1    | Check cable and terminal integrity:<br>- ABS ECM connector pin 17 and<br>- ABS ECM connector pin 8<br>- Sensor connector pin 1<br>- Sensor connector pin 2     | OK   | Proceed to test 2                                 |
|      | Faulty   | Replace fuse, proceed to test 9                            |   |
| 2    | Check cable for short circuit:<br>- ABS ECM connector pin 8 and ground   | OK   | Proceed to test 4                                 |
|      | Short Circuit  | Proceed to test 3  |   |
| 3    | Disconnect the front wheel speed sensor connector. Check cable for short circuit:<br>- Wheel speed sensor connector pin 2 (motorcycle harness side) and ground | OK   | Replace the Wheel speed sensor, proceed to test 9 |
|      | Short Circuit  | Locate and rectify wiring harness fault, proceed to test 9 |   |
| 4    | Check cable for short circuit:<br>- ABS ECM connector pin 17 and ground  | OK   | Proceed to test 6                                 |
|      | Short Circuit  | Proceed to test 5  |   |
| 5    | Check cable for short circuit:<br>- Wheel speed sensor connector pin 1 (motorcycle harness side) and ground  | OK   | Replace the wheel speed sensor, proceed to test 9 |
|      | Short Circuit  | Locate and rectify wiring harness fault, proceed to test 9 |   |
| 6    | Check cable continuity:<br>- ABS ECM connector pin 8 and wheel speed sensor connector pin 2 (motorcycle harness side)  | OK   | Proceed to test 7                                 |
|      | Open Circuit   | Locate and rectify wiring harness fault, proceed to test 9 |   |

| Test | Result   | Action   |
|------|--|--|
| 7    | Check cable continuity:<br>- ABS ECM connector pin 17 and wheel speed sensor connector pin 1 (motorcycle harness side)   | OK<br>Proceed to test 8                                    |
|      | Open Circuit   | Locate and rectify wiring harness fault, proceed to test 9 |
| 8    | Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation:<br>- Connect a suitable voltage supply between 10 V and 16 V between ABS ECM connector pin 8 (positive) and pin 17 (negative), and measure the current consumption of the wheel speed sensor | 1.8 mA to 16.8 mA<br>Proceed to test 9                     |
|      | Faulty   | Replace the wheel speed sensor, proceed to test 9          |
| 9    | Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.  | OK<br>Action complete - quit test                          |
|      | Fault still present  | Contact Triumph service                                    |

### Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

| Supply Voltage | Min    | Typical | Max     |
|----------------|--------|---------|---------|
| 10-16 V        | 1.8 mA | 7.5 mA  | 16.8 mA |





## Rear Wheel Sensor Open Circuit/Short Circuit

| Fault Code | Possible cause  | Action   |
|------------|---|--|
| C1613      | Rear wheel sensor short circuit to ground or open circuit | <p>Make sure ABS ECM connector is secure.</p> <p>Make sure wheel speed sensor connector is secure.</p> <p>Disconnect ABS modulator/ECM connector and proceed to pinpoint test 1:</p> |

## Pinpoint Tests

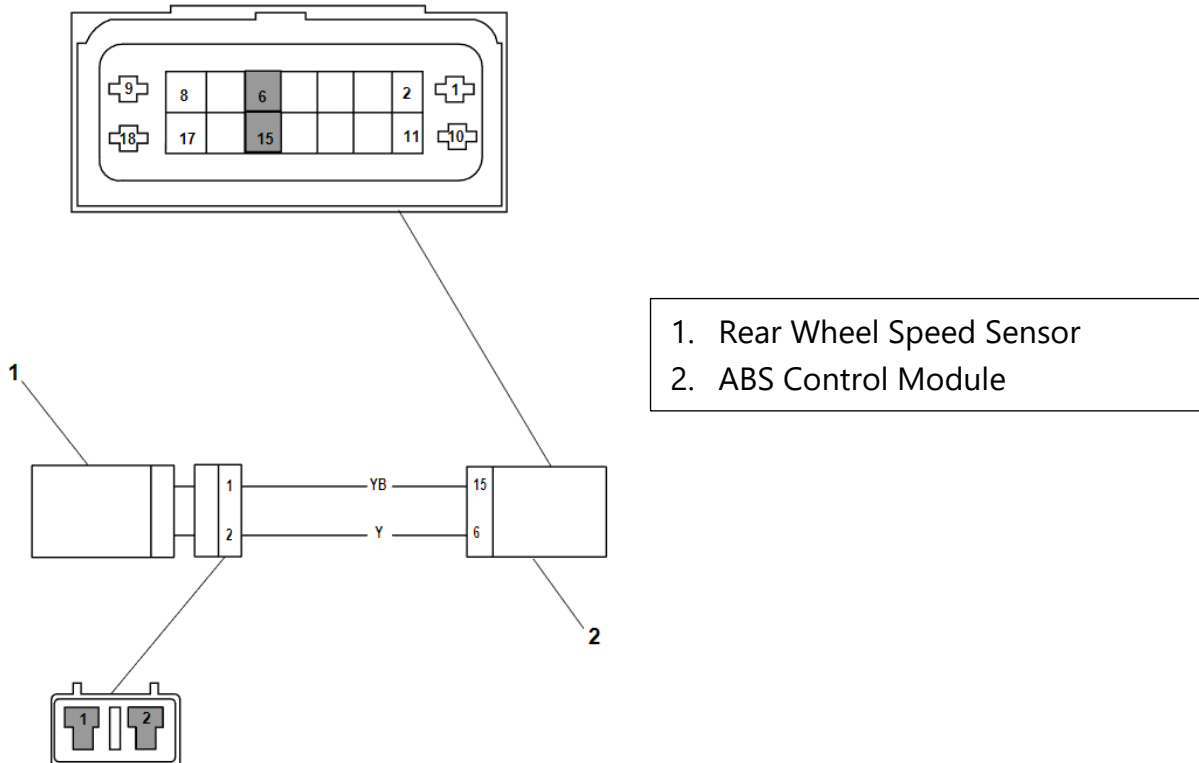
| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity:<br>- ABS modulator/ECM connector pin 6<br>- ABS ECM connector pin 15<br>- Sensor connector pin 1<br>- Sensor connector pin 2 | OK<br>Proceed to test 2                                    |
|      | Faulty   | Rectify fault, proceed to test 9                           |
| 2    | Check cable for short circuit:<br>- ABS ECM connector pin 6 and ground   | OK<br>Proceed to test 4                                    |
|      | Short Circuit  | Proceed to test 3  |
| 3    | Disconnect the front wheel speed sensor connector. Check cable for short circuit:<br>- Wheel speed sensor connector pin 2 (motorcycle harness side) and ground   | OK<br>Replace the Wheel speed sensor, proceed to test 9    |
|      | Short Circuit  | Locate and rectify wiring harness fault, proceed to test 9 |
| 4    | Check cable for short circuit:<br>- ABS ECM connector pin 15 and ground  | OK<br>Proceed to test 6                                    |
|      | Short Circuit  | Proceed to test 5  |
| 5    | Check cable for short circuit:<br>- Wheel speed sensor connector pin 1 (motorcycle harness side) and ground  | OK<br>Replace the wheel speed sensor, proceed to test 9    |
|      | Short Circuit  | Locate and rectify wiring harness fault, proceed to test 9 |
| 6    | Check cable continuity:<br>- ABS/ECM connector pin 6 and wheel speed sensor connector pin 2 (motorcycle harness side)  | OK<br>Proceed to test 7                                    |
|      | Open Circuit   | Locate and rectify wiring harness fault, proceed to test 9 |

| Test | Result  | Action   |
|------|---|--|
| 7    | Check cable continuity:<br>- ABS ECM connector pin 15 and wheel speed sensor connector pin 1 (motorcycle harness side)  | OK<br>Proceed to test 8                                    |
|      | Open Circuit  | Locate and rectify wiring harness fault, proceed to test 9 |
| 8    | Reconnect the rear wheel speed sensor connector. Check the wheel speed sensor operation:<br>- Connect a suitable voltage supply between 10 V and 16 V between ABS ECM connector pin 6 (positive) and pin 15 (negative), and measure the current consumption of the wheel speed sensor | 1.8 mA to 16.8 mA<br>Proceed to test 9                     |
|      | Faulty  | Replace the wheel speed sensor, proceed to test 9          |
| 9    | Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.   | OK<br>Action complete - quit test                          |
|      | Fault still present   | Contact Triumph service                                    |

### Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

| Supply Voltage | Min    | Typical | Max     |
|----------------|--------|---------|---------|
| 10-16 V        | 1.8 mA | 7.5 mA  | 16.8 mA |



## Front Wheel Sensor Abnormal Input/Losing Contact

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| C1612      | Front wheel sensor incorrect or missing signal<br>Incorrect wheel speed sensor air gap<br>Damaged or dirty pulser ring<br>Loose or incorrectly installed wheel speed sensor | Make sure ABS ECM connector is secure.<br>Make sure wheel speed sensor connector is secure. Proceed to pinpoint test 1: |

## Pinpoint Tests

| Test |  | Result              | Action  |
|------|--|---------------------|---|
| 1    | Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring:<br>- Air gap between 0.37 mm and 1.23 mm | OK                  | Proceed to test 2                                       |
|      |  | Faulty              | Rectify the fault and proceed to test 5                 |
| 2    | Check the pulser ring for damage or contamination by road grime or ferrous metal filings   | OK                  | Proceed to test 3                                       |
|      |  | Faulty              | Clean or replace the ABS pulser ring, proceed to test 5 |
| 3    | Check the wheel speed sensors for correct installation, and the fixings for correct torque   | OK                  | Proceed to test 4                                       |
|      |  | Faulty              | Rectify the fault, proceed to test 5                    |
| 4    | Check the wheel speed sensor circuit (see <a href="#">Front Wheel Sensor Open Circuit/Short Circuit</a> )                            | OK                  | Proceed to test 5                                       |
|      |  | Faulty              | Rectify the fault, proceed to test 5                    |
| 5    | Clear fault code and test ABS to verify fault cleared.   | OK                  | Action complete - quit test                             |
|      |  | Fault still present | Contact Triumph service                                 |

## Rear Wheel Sensor Abnormal Input/Losing Contact

| Fault Code | Possible cause   | Action  |
|------------|--|---|
| C1614      | Rear wheel speed sensor incorrect or missing signal<br>Incorrect wheel speed sensor air gap<br>Damaged or dirty pulser ring<br>Loose or incorrectly installed wheel speed sensor | Make sure ABS ECM connector is secure.<br>Proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring:<br>- Air gap between 0.37 mm and 1.23 mm | OK<br>Proceed to test 2                                 |
|      | Faulty   | Clean or replace the ABS pulser ring, proceed to test 4 |
| 2    | Check the pulser ring for damage or contamination by road grime or ferrous metal filings   | OK<br>Proceed to test 3                                 |
|      | Faulty   | Clean or replace the ABS pulser ring, proceed to test 5 |
| 3    | Check the wheel speed sensors for correct installation, and the fixings for correct torque   | OK<br>Proceed to test 4                                 |
|      | Faulty   | Rectify the fault, proceed to test 5                    |
| 4    | Check the wheel speed sensor circuit (see <a href="#">Rear Wheel Sensor Open Circuit/Short Circuit</a> )                             | OK<br>Proceed to test 5                                 |
|      | Faulty   | Rectify the fault, proceed to test 5                    |
| 5    | Clear fault code and test ABS to verify fault cleared.   | OK<br>Action complete - quit test                       |
|      | Fault still present  | Contact Triumph service                                 |

## Front Wheel Pulser Ring Missing Teeth

| Fault Code | Possible cause   | Action  |
|------------|--|---|
| C1621      | Incorrect wheel speed sensor air gap<br>Front wheel pulser ring missing teeth<br>Damaged or dirty pulser ring<br>Loose or incorrectly installed wheel speed sensor<br>Damaged/incorrect wheels | Make sure ABS modulator/ECM connector is secure.<br>Proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result   | Action              |   |
|------|--|---------------------|---|
| 1    | Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring:<br>- Air gap between 0.37 mm and 1.23 mm | OK                  | Proceed to test 2                                       |
|      |  | Faulty              | Rectify the fault and proceed to test 5                 |
| 2    | Check the pulser ring for damage or contamination by road grime or ferrous metal filings   | OK                  | Proceed to test 3                                       |
|      |  | Faulty              | Clean or replace the ABS pulser ring, proceed to test 5 |
| 3    | Check the wheel speed sensors for correct installation, and the fixings for correct torque   | OK                  | Proceed to test 4                                       |
|      |  | Faulty              | Rectify the fault, proceed to test 5                    |
| 4    | Check the motorcycle wheel for damage/incorrect size.  | OK                  | Proceed to test 5                                       |
|      |  | Faulty              | Rectify the fault, proceed to test 5                    |
| 5    | Clear fault code and test ABS to verify fault cleared.   | OK                  | Action complete - quit test                             |
|      |  | Fault still present | Contact Triumph service                                 |

## Rear Wheel Pulser Ring Missing Teeth

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| C1623      | Rear wheel pulser ring missing teeth<br>Damaged or dirty pulser ring<br>Loose or incorrectly installed wheel speed sensor<br>Damaged/incorrect wheels | Make sure ABS modulator/ECM connector is secure.<br>Proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring:<br>- Air gap between 0.37 mm and 1.23 mm | OK<br>Proceed to test 2                                 |
|      | Faulty   | Rectify the fault and proceed to test 5                 |
| 2    | Check the pulser ring for damage or contamination by road grime or ferrous metal filings   | OK<br>Proceed to test 3                                 |
|      | Faulty   | Clean or replace the ABS pulser ring, proceed to test 5 |
| 3    | Check the wheel speed sensors for correct installation, and the fixings for correct torque   | OK<br>Proceed to test 4                                 |
|      | Faulty   | Rectify the fault, proceed to test 5                    |
| 4    | Check the motorcycle wheel for damage/incorrect size.  | OK<br>Proceed to test 5                                 |
|      | Faulty   | Rectify the fault, proceed to test 5                    |
| 5    | Clear fault code and test ABS to verify fault cleared.   | OK<br>Action complete - quit test                       |
|      | Fault still present  | Contact Triumph service                                 |

## Front and Rear Input/Output Solenoid Open/Short Circuit

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| C1631      | Front wheel input solenoid short circuit to ground or open circuit      | Make sure ABS ECM connector is secure.<br>Proceed to pinpoint test 1: |
| C1632      | Front wheel output solenoid short circuit to ground or open circuit     |   |
| C1633      | Rear wheel input solenoid short circuit to ground or open circuit       |   |
| C1634      | Rear wheel output solenoid short circuit to ground or open circuit      |   |
| C1635      | Master cylinder isolation valve short circuit to ground or open circuit |   |
| C1636      | Low pressure feed valve short circuit to ground or open circuit         |   |

## Pinpoint Tests

| Test | Result  | Action  |
|------|---|---|
| 1    | Check cable and terminal integrity:<br>- ABS ECM connector pin 18<br>- ABS ECM connector pin 10           | OK<br>Proceed to test 2   |
|      |   | Faulty<br>Proceed to test 2   |
| 2    | Check cable continuity: With Ignition ON, check Voltage between:<br>- ABS ECM connector pin 18 and pin 10 | Voltage greater than 11 V<br>Proceed to test 3                        |
|      |   | Voltage less than 11 V<br>Locate and rectify fault, proceed to test 5 |
| 3    | Check cable continuity:<br>- ABS ECM connector pin 10 and ground  | OK<br>Proceed to test 4   |
|      |   | Faulty<br>Locate and rectify fault, proceed to test 5                 |
| 4    | Check the ABS fuse 8  | OK<br>Proceed to test 5   |
|      |   | Faulty<br>Replace fuse, proceed to test 5                             |
| 5    | Clear fault code and test ABS to verify fault cleared.  | OK<br>Action complete - quit test                                     |
|      |   | Fault still present<br>Contact Triumph service                        |

## Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| C1641      | Front wheel actuator (hydraulic control) wheel lock<br>Binding brake<br>Incorrect Wheel speed sensor air gap<br>Loose or incorrectly installed wheel speed sensor | Make sure ABS modulator/ECM connector is secure.<br>Proceed to pinpoint test 1: |
| C1643      | Rear wheel actuator (hydraulic control) wheel lock<br>Binding brake<br>Incorrect Wheel speed sensor air gap<br>Loose or incorrectly installed wheel speed sensor  |   |

## Pinpoint Tests

| Test | Result  | Action              |                                      |
|------|---|---------------------|--------------------------------------|
| 1    | Check the relevant wheel for brake bind caused by caliper or master cylinder faults, or other mechanical causes.              | OK                  | Proceed to test 2                    |
|      |   | Faulty              | Rectify the fault, proceed to test 4 |
| 2    | Measure the air gap of the wheel speed sensor between the sensor and the pulser ring:<br>- Air gap between 0.37 mm to 1.23 mm | OK                  | Proceed to test 3                    |
|      |   | Faulty              | Rectify the fault, proceed to test 4 |
| 3    | Check the wheel speed sensors for correct installation, and the fixings for correct torque.                                   | OK                  | Proceed to test 4                    |
|      |   | Faulty              | Rectify the fault, proceed to test 4 |
| 4    | Clear fault code and test ABS to verify fault cleared.  | OK                  | Action complete - quit test          |
|      |   | Fault still present | Contact Triumph service              |



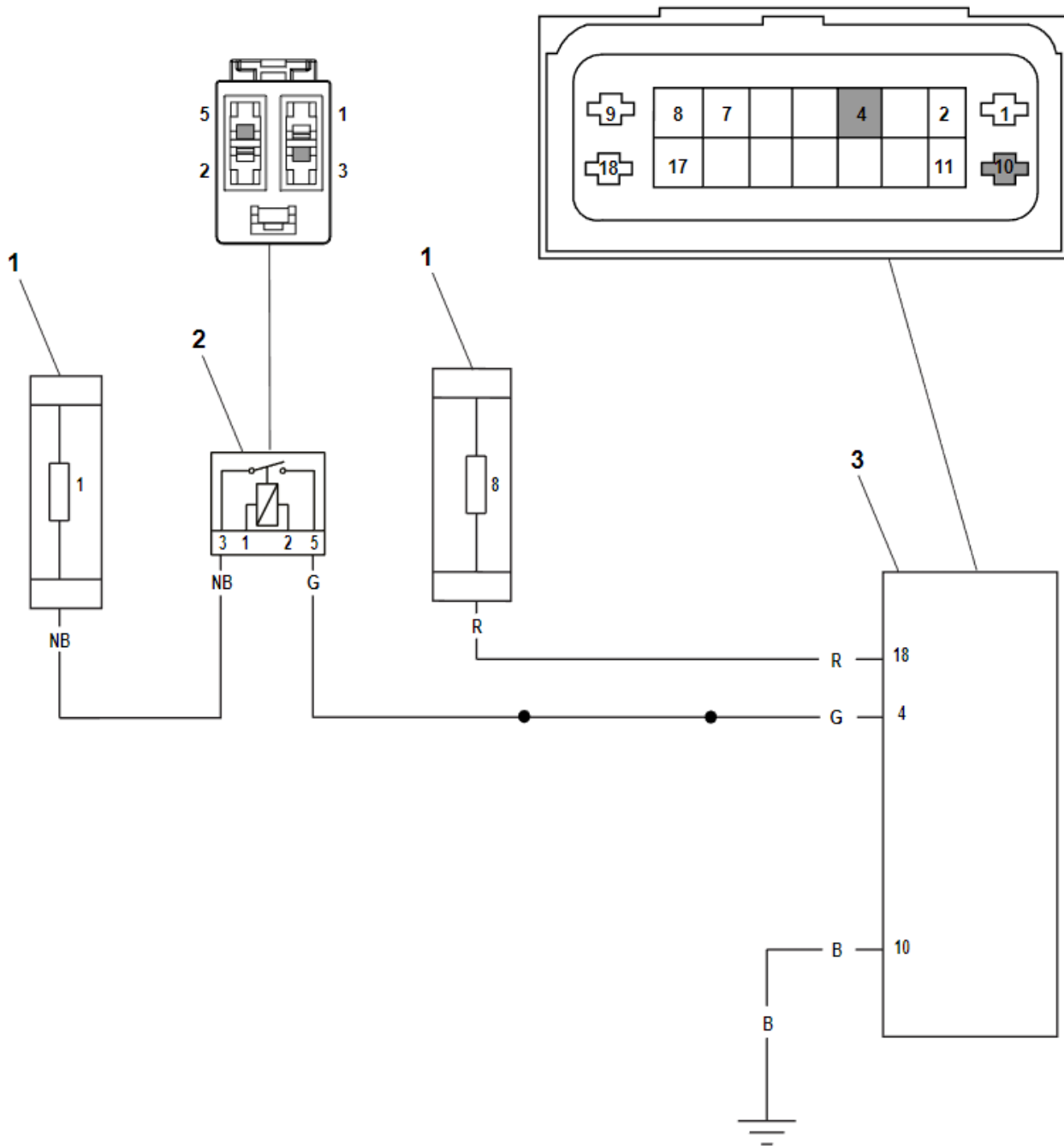
Motor - Lock; Motor Does Not Run; Motor Runs Continually

| Fault Code | Possible cause           | Action   |
|------------|--------------------------|--|
| C1651      | Motor circuit fault      | Make sure ABS ECM connector is secure.<br>Turn the ignition 'ON'.<br>Proceed to pinpoint test 1: |
| C1652      | Motor - does not run     |  |
| C1653      | Motor - runs continually |  |

Pinpoint Tests

| Test | Result   | Action                    |  |
|------|--|---------------------------|--|
| 1    | Check the ABS main fuse 8  | OK                        | Proceed to test 2                                  |
|      |  | Faulty                    | Replace fuse and proceed to test 5                 |
| 2    | Check the motor function:<br>Check that with the motorcycle stationary and the ABS ECM connected, the motor does not operate | OK                        | Proceed to test 3                                  |
|      |  | Motor runs continually    | Contact Triumph service                            |
| 3    | Check cable continuity: With ignition 'ON', check voltage between:<br>- ABS ECM connector pin 18 and ground pin 10           | Voltage greater than 11 V | Proceed to test 4                                  |
|      |  | Voltage less than 11 V    | Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable for continuity:<br>- ABS ECM connector pin 10 and ground   | OK                        | Proceed to test 5                                  |
|      |  | Faulty                    | Locate and rectify fault, proceed to test 5        |
| 5    | Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.  | OK                        | Action complete - quit test                        |
|      |  | Fault still present       | Contact Triumph service                            |

Circuit diagram



- 1. Fuse box
- 2. Ignition relay
- 3. ABS control module

Power Source Voltage Too Low/Voltage Too High

| Fault Code | Possible cause                | Action   |
|------------|-------------------------------|--|
| C1661      | Power source voltage too low  | Make sure ABS ECM connector is secure.                       |
| C1632      | Power source voltage too high | Disconnect ABS ECM connector and proceed to pinpoint test 1: |

Pinpoint Tests

| Test | Result   | Action                        |   |
|------|--|-------------------------------|---|
| 1    | Check cable and terminal integrity:<br>- ABS control module connector pin 4<br>- ABS control module connector pin 10   | OK                            | Proceed to test 2   |
|      |  | Faulty                        | Rectify fault and proceed to test 5   |
| 2    | Check the cable for continuity:<br>- ABS control module connector pin 10 and ground<br>- ABS control module connector pin 4 and ignition relay pin 5                   | OK                            | Proceed to test 3   |
|      |  | Faulty                        | Rectify wiring harness fault, proceed to test 5                                 |
| 3    | Check battery Voltage: With ignition ON, check the Voltage between:<br>- ABS control module connector pin 4 and ground pin 10  | Voltage greater than 11 V     | Proceed to test 4   |
|      |  | Voltage less than 11 V        | Locate and rectify fault, proceed to test 5                                     |
| 4    | Check battery Voltage: Reconnect ABS ECM connector and start the engine, check the voltage between:<br>- Battery positive (red) terminal and negative (black) terminal | Voltage between 11 V and 16 V | Proceed to test 5   |
|      |  | Voltage greater than 16 V     | Check the battery charging circuit. Locate and rectify fault, proceed to test 5 |
| 5    | Reconnect the ABS control module harness, clear fault code and test ABS to verify fault cleared  | OK                            | Action complete - quit test   |
|      |  | Fault still present           | Contact Triumph service   |



## ABS ECM Internal Error

| Fault Code | Possible cause  | Action  |
|------------|---|---|
| C1641      | ABS ECM internal error<br>Incorrect wheel speed sensor air gap<br>Damaged or dirty pulser ring<br>Loose or incorrectly installed wheel speed sensor | Make sure ABS modulator/ECM connector is secure.<br>Proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Measure the air gap of the wheel speed sensors between the sensor and the pulser ring:<br>- Air gap between 0.37 mm to 1.23 mm | OK<br>Proceed to test 2                                 |
|      | Faulty   | Rectify the fault, proceed to test 4                    |
| 2    | Check the pulser rings for damage or contamination by road grime or ferrous metal filings.                                     | OK<br>Proceed to test 3                                 |
|      | Faulty   | Clean or replace the ABS pulser ring, proceed to test 4 |
| 3    | Check the wheel speed sensors for correct installation, and the fixings for correct torque.                                    | OK<br>Proceed to test 4                                 |
|      | Faulty   | Rectify the fault, proceed to test 4                    |
| 4    | Clear fault code and test ABS to verify fault cleared.   | OK<br>Action complete - quit test                       |
|      | Fault still present  | Contact Triumph service                                 |

## CAN Fault

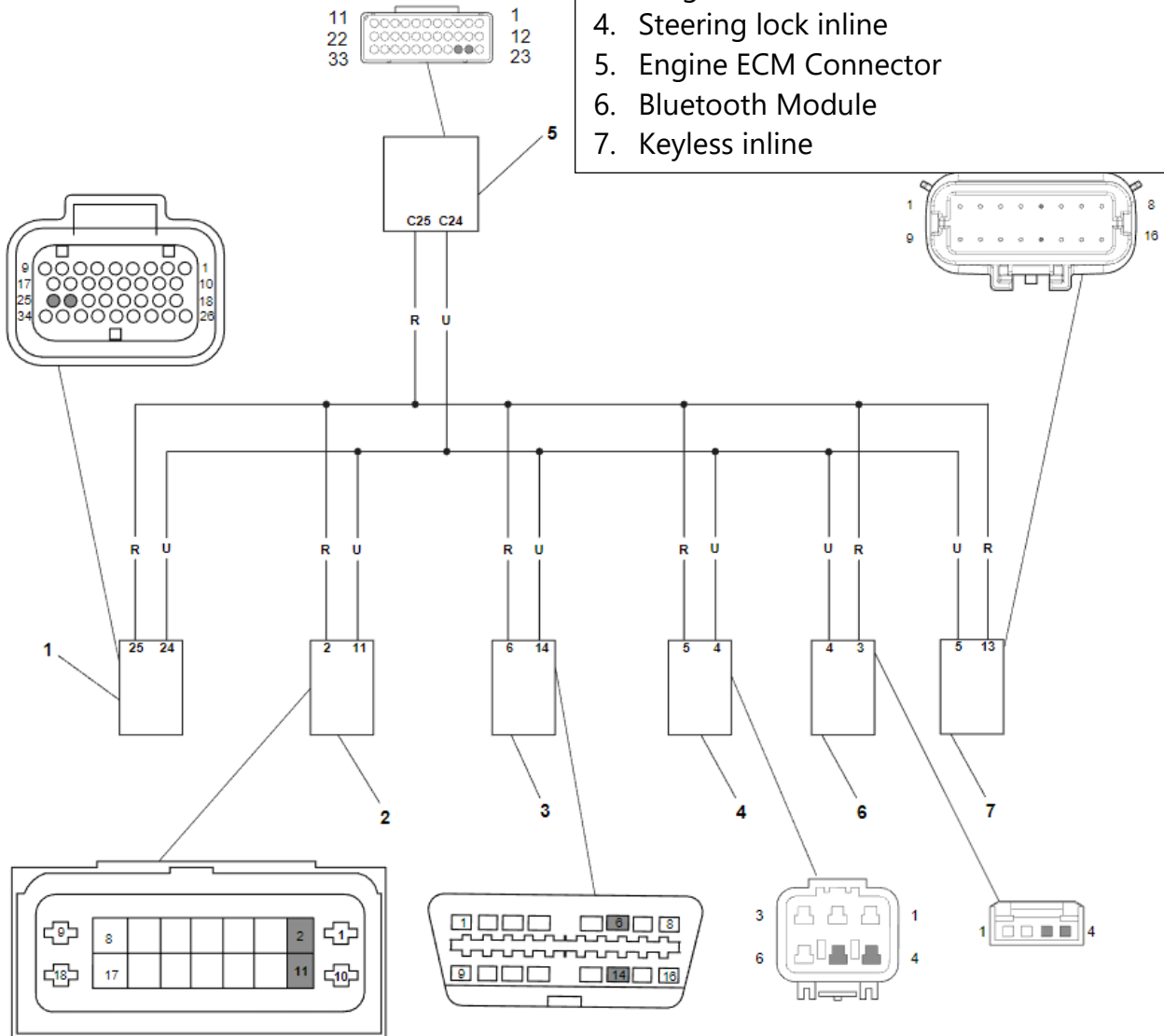
| Fault Code | Possible cause                                       | Action  |
|------------|--|---|
| C1682      | CAN fault - lost communication with engine ECM       | Make sure ABS ECM connector is secure.<br>Proceed to pinpoint test 1: |
| C1683      | CAN fault - lost communication with instrument panel |   |
| C1684      | CAN fault - all communication lost                   |   |

## Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- ABS ECM connector pin 2<br>- ABS ECM connector pin 11  | OK<br>Proceed to test 2  |
|      |   | Faulty<br>Rectify fault and proceed to test 5                    |
| 2    | Check the cable for short circuit:<br>- ABS ECM pin 2 to ground<br>- ABS ECM pin 11 to ground   | OK<br>Proceed to test 3  |
|      |   | Short Circuit<br>Rectify wiring harness fault, proceed to test 5 |
| 3    | Check cable continuity:<br>- ABS ECM pin 2 to ECM pin C25<br>- ABS ECM pin 11 to ECM pin C24<br>- ABS ECM pin 2 to Instruments pin 25<br>- ABS ECM pin 11 to Instruments pin 24<br>- ABS ECM pin 2 to Diagnostic connector pin 6<br>- ABS ECM pin 11 to Diagnostic connector pin 14<br>- ABS ECM pin 2 to Keyless module connector pin 13<br>- ABS ECM pin 11 to Keyless module connector pin 5<br>- ABS ECM pin 2 to Steering Lock connector pin 5<br>- ABS ECM pin 11 to Steering Lock connector pin 4<br>- ABS ECM pin 2 to Bluetooth® module pin 3<br>- ABS ECM pin 11 to Bluetooth® module pin 4 | OK<br>Proceed to test 4  |
|      |   | Open Circuit<br>Locate and rectify fault, proceed to test 5      |

| Test   | Result              | Action  |
|--|---------------------|---|
| 4<br>Check cable for short circuit:<br>- ABS ECM pin 2 to ABS ECM pin 11 | OK                  | Proceed to test 5   |
|  | Short Circuit       | Check the battery charging circuit. Locate and rectify fault, proceed to test 5 |
| 5<br>Clear fault code and test ABS to verify fault cleared.              | OK                  | Action complete - quit test   |
|  | Fault still present | Contact Triumph service   |

Circuit diagram



C1690, C1691, C1692-ABS Modulator Malfunction

| Fault Code | Possible cause  | Action                  |
|------------|---|-------------------------|
| C1690      | Modulator - active pressure control malfunction               | Contact Triumph service |
| C1691      | Modulator input (master cylinder) pressure sensor malfunction |                         |
| C1692      | Modulator output (wheel) pressure sensor malfunction          |                         |

Removal and Installation - Front Brake Components

Front Brake Pads – Removal

**⚠ WARNING**

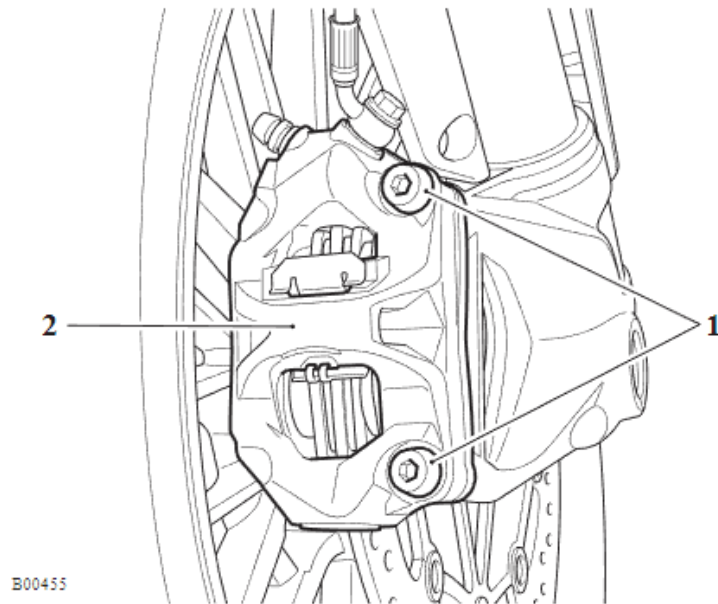
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line.  
Brake hoses or lines that are not supported may become damaged or bent.  
Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

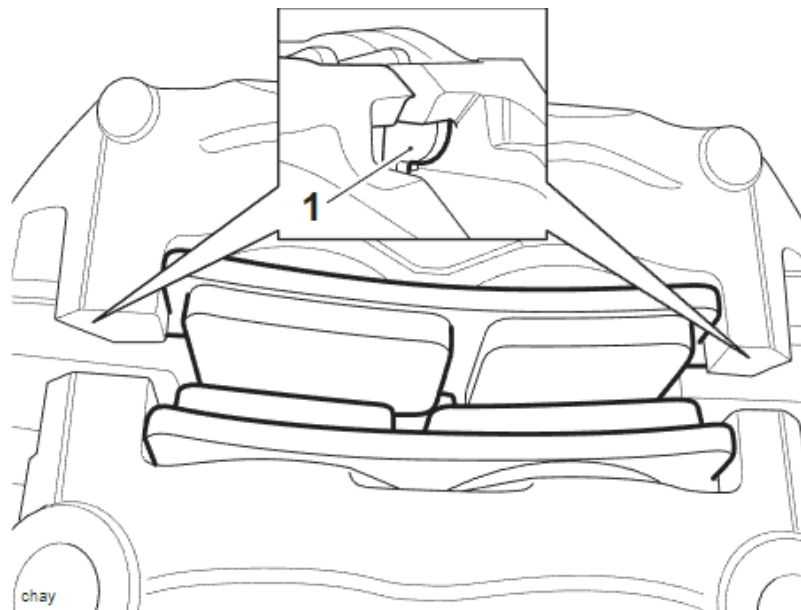


1. Remove the caliper mounting bolts and slide the caliper off the brake disc.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Caliper mounting bolts</li><li>2. Caliper</li></ol> |
|--|

2. Release the brake pad retaining lugs from its mounting in the caliper and remove the brake pad.

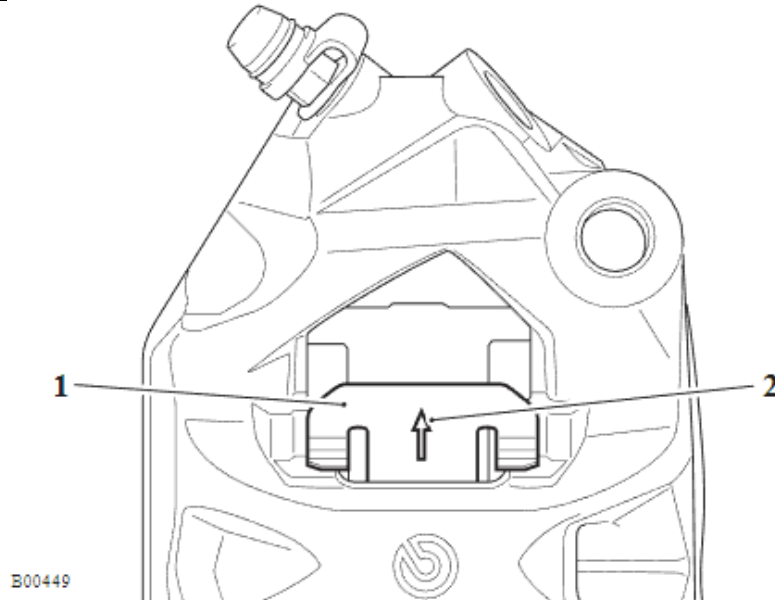


- |  |
|--|
| <ol style="list-style-type: none"><li>1. Brake pad retaining lug</li></ol> |
|--|

3. Repeat for the other brake pad.

### NOTICE

Note the position and orientation of the anti-rattle spring for installation.



1. Anti-rattle spring
2. Arrow (orientation mark)

4. Complete the assembly of the brake pads to one caliper (see [Front Brake Pads - Installation](#)) before removing the pads from the other caliper.

#### Front Brake Pads – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

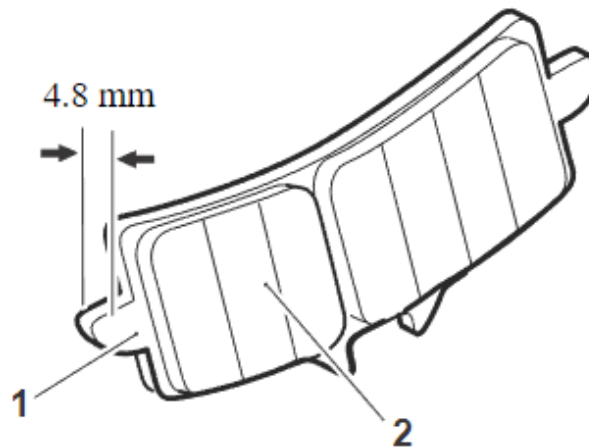
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **⚠ WARNING**

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

1. Brake pads for this model supplied by Triumph will have the carrier plate at least 4.8 mm thick. Always have replacement brake pads supplied and fitted by your Triumph dealer.



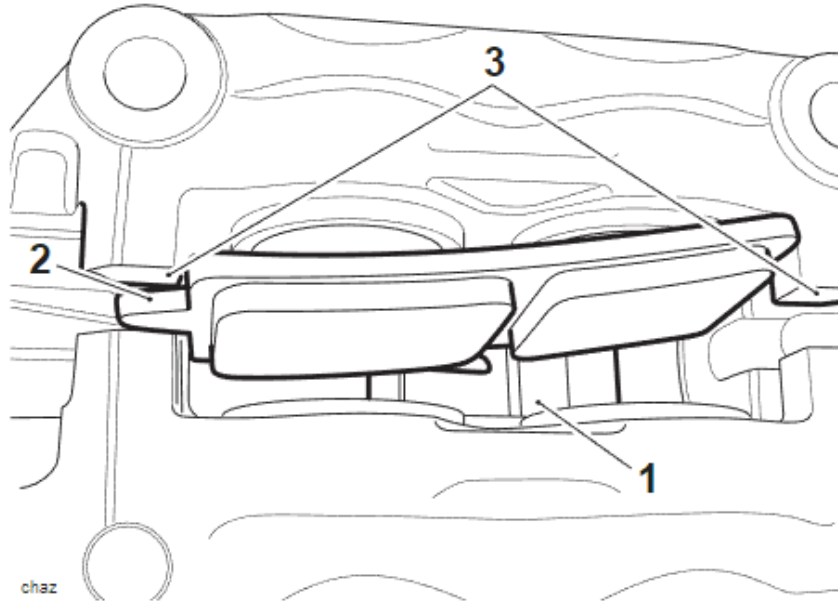
1. Carrier plate
2. Brake pad

## **⚠ CAUTION**

Never lever directly against the disc, caliper or the pad lining material as this will damage these components. Always use a levering tool made from a soft material which will not cause damage to the load bearing surfaces.

Brake fluid will be displaced as the caliper pistons are compressed. To prevent body damage, make sure that the displaced fluid does not come into contact with any part of the bodywork.

2. If new pads are being installed, push the pistons fully back into the caliper body. Keep an eye on the fluid level in the reservoir whilst retracting the pistons to prevent fluid spillage.
3. Make sure that the anti-rattle spring position and orientation is as noted for removal.
4. Fit one of the brake pad's retaining lugs into its mounting in the caliper with its friction material surfaces facing the other side of the caliper.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Anti-rattle spring</li><li>2. Retaining lug</li><li>3. Retaining lug mounting</li></ol> |
|--|

5. Using finger pressure only, fit the pad's other retaining lug into its mounting of the caliper. Make sure that both retaining lugs are fully fitted into their mountings.
6. Repeat steps 2 to 5 for the other brake pad.
7. Fit the front brake caliper (see [Front Brake Caliper - Installation](#)).

**⚠ WARNING**

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

8. Check the front brake fluid level and top up as required with new DOT 4 fluid.
9. Check for correct brake operation. Rectify as necessary.
10. Check the front brake fluid level and top up as required with new DOT 4 fluid.

**⚠ WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Caliper – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line. Brake hoses or lines that are not supported may become damaged or bent. Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

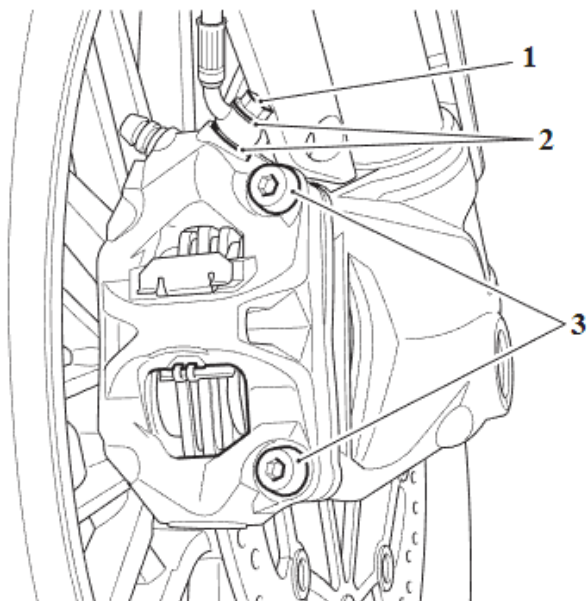
**⚠ CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

## NOTICE

Note the orientation of brake hose to the front brake caliper for installation.

1. Disconnect the brake hose at the front brake caliper and place the free end of the hose in a suitable container to collect the brake fluid. Discard the two sealing washers.
2. Remove the brake caliper mounting fixings and slide the caliper off the brake disc.



1. Brake hose fixing
2. Sealing washers
3. Fixings

3. If required, remove the brake pads (see [Front Brake Pads - Removal](#)).
4. Repeat for the other brake caliper.

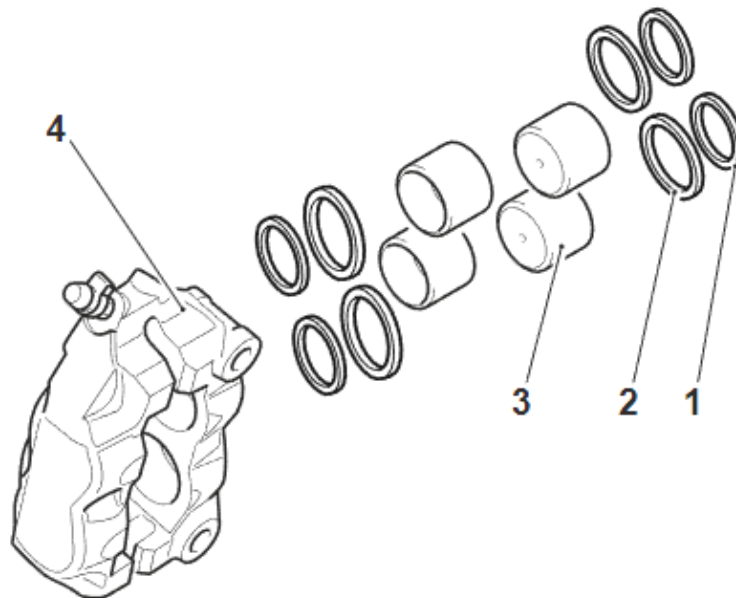
**⚠ WARNING**

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

**⚠ WARNING**

Make sure the seal grooves in the caliper bores are not damaged during the removal of the seals. Damage to the seal grooves may allow brake fluid to leak past the seals resulting in a dangerous riding condition leading to loss of motorcycle control and an accident.

1. Cover the caliper opening with a clean heavy cloth and using either compressed air or by reconnecting the master cylinder and pumping the brake lever, remove the pistons one at a time.

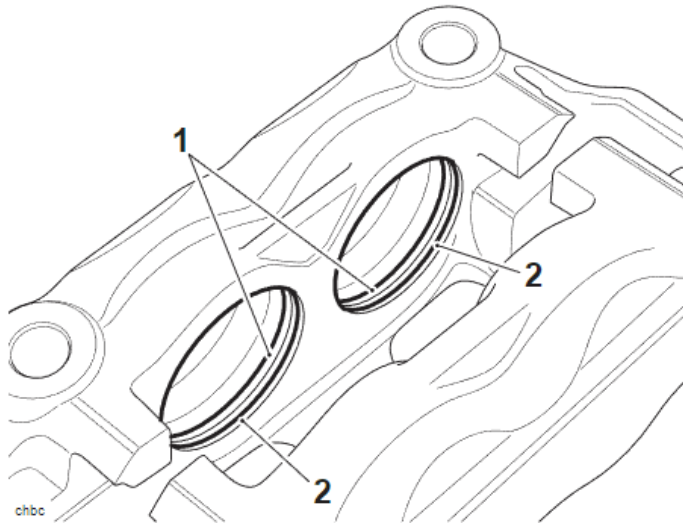


1. Dust seal
2. Piston seal
3. Pistons
4. Caliper

2. Extract the dust seals and piston seals, taking care not to damage the caliper bores. Discard the old seals, these must not be reused.

### NOTICE

The piston seals are slightly thicker than the dust seals.



1. Piston seals
2. Dust seals

3. Check the pistons, caliper and mounting bracket for signs of damage, paying particular attention to the caliper bores and pistons. If damage is present, renew the worn component or the complete caliper assembly.

#### Front Brake Caliper – Inspection

### **⚠ WARNING**

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

A dangerous riding condition leading to loss of control of the motorcycle or an accident could result if this warning is ignored.

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.



2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

#### Front Brake Caliper – Assembly

### **WARNING**

Ensure that the caliper bores do not become scratched during piston removal and assembly. Ensure that the pistons remain square to their bores during fitment otherwise damage to the caliper could result.

A dangerous riding condition leading to an accident could result if this warning is ignored.

### **WARNING**

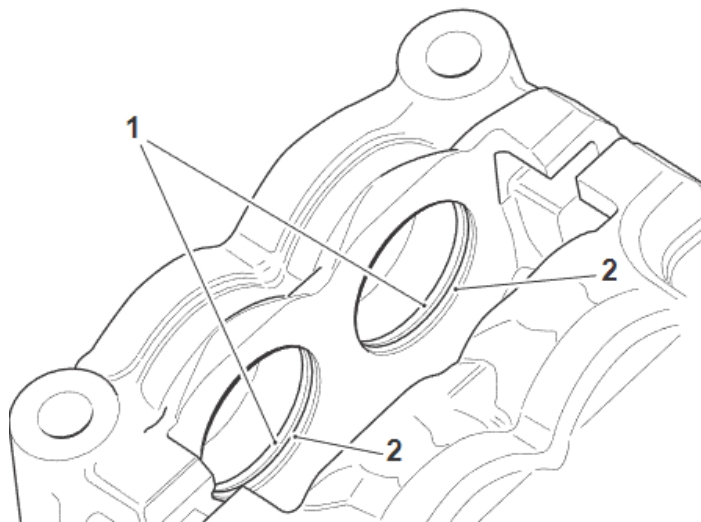
Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

If the caliper body is serviceable, obtain a piston and seal kit and reassemble the caliper as follows:

1. Fit the piston seals and the dust seals to the caliper bores as shown below.



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Piston Seals</li> <li>2. Dust Seals</li> </ol> |
|--|

2. Lubricate the fluid seals, caliper bore and the outside of the pistons with clean DOT 4 brake fluid.
3. Ease the pistons squarely into the bores, taking care not to displace the seals.

#### Front Brake Caliper – Installation

### ⚠ WARNING

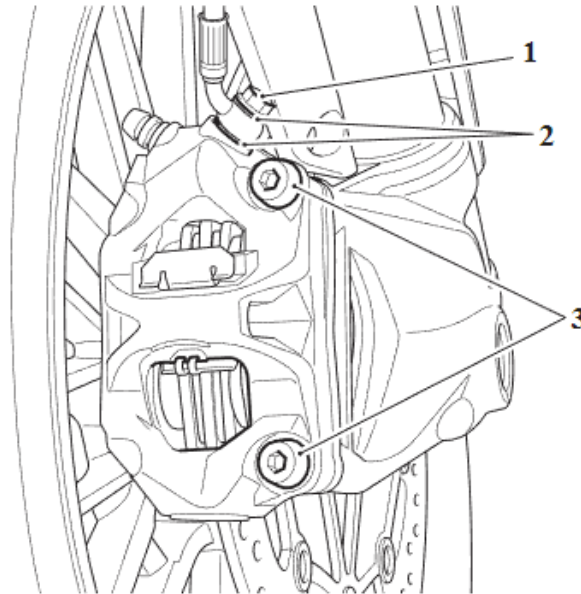
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, install the front brake pads (see [Front Brake Pads - Installation](#)).
2. Thoroughly clean the threaded fixing holes for both front fork brake caliper fixings.
3. Thoroughly clean the threaded part of the fixings and smear the first four threads with a proprietary copper based grease.
4. Position the left and right hand calipers over the disc.
5. Secure the brake calipers with the fixings and tighten sufficiently to bring the calipers into contact their mounting points, while allowing a small amount of lateral movement. Do not fully tighten at this stage.
6. Connect the brake hoses to the calipers incorporating new sealing washers on each side of the hose connections.

7. Make sure the orientation of the brake hoses are as noted for removal and tighten the union bolt to 25 Nm.



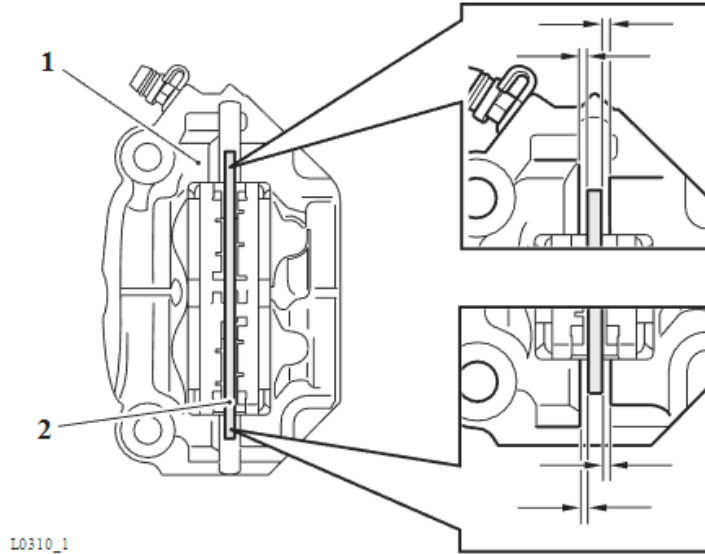
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Brake hose fixing</li><li>2. Sealing washers</li><li>3. Fixings</li></ol> |
|--|

8. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
9. Bleed the front brake calipers (see [Bleeding the Front Brakes](#)).

**NOTICE**

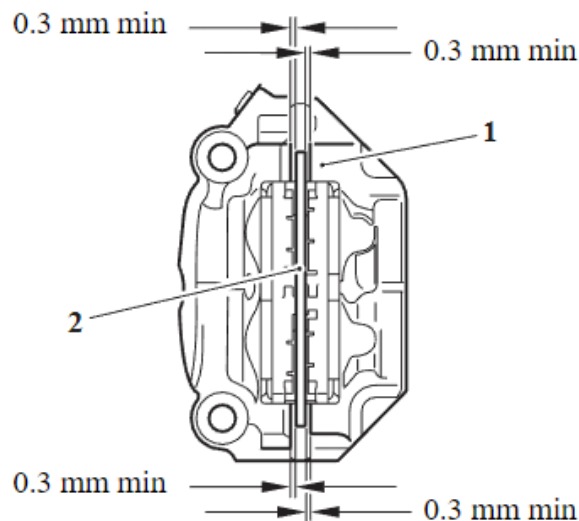
When the brake calipers are fitted, there must be a minimum gap of 0.3 mm between the caliper and brake disc.

10. Visually check the clearances between the calipers body and brake disc in the four locations shown below.



- 1. Caliper body
- 2. Brake disc

11. Slide the calipers body inwards or outwards against their fixings as required to achieve the most equal clearances possible on either side of the brake disc.
12. Holding the calipers in position against their mounting fixings, tighten the fixings to 45 Nm.
13. Using feeler gauges, measure the gap between the front brake calipers and the brake disc at the four measurement points shown in the following illustration. Minimum gap to be 0.3 mm.



- 1. Front brake caliper
- 2. Front brake disc

14. If necessary, loosen the caliper bolts and adjust the caliper alignment to achieve the minimum gap of 0.3 mm on all four measurement points. Retighten the bolts to 45 Nm.

** WARNING**

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

15. Check for correct brake operation.

** WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Disc – Removal

** WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **⚠ WARNING**

Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable.

A dangerous riding condition leading to an accident could result if this warning is ignored.

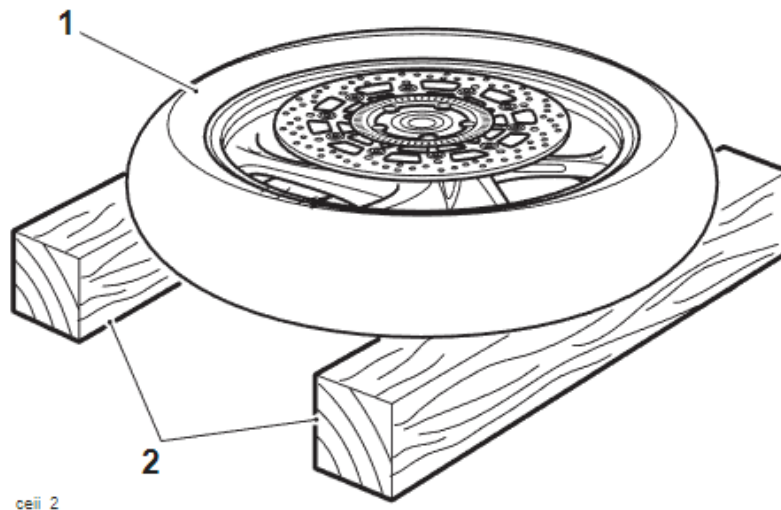
## **NOTICE**

The fixings securing the left hand brake disc to the wheel also secure the ABS pulser ring. Note the orientation of the brake discs and the ABS pulser ring for installation.

Perform the following operations:

- **Front Wheel - Removal**

1. Support the wheel on blocks as illustrated to avoid damage to the brake discs and wheel centre.



ceii\_2

1. Wheel
2. Support blocks

## NOTICE

Note that the disc carrier has the text OUTSIDE on it. This must be facing outwards when the disc is fitted to wheel.

2. Remove and discard the five fixings and remove the brake disc.
3. Repeat for the other brake disc.
4. Collect the ABS pulser ring from the left hand brake disc.

### Front Brake Disc – Installation

## WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the left hand brake disc and ABS pulser ring to the wheel as noted for removal.
2. Fit new fixings and tighten to 22 Nm.
3. Repeat for the other brake disc.

Perform the following operations:

- [Front Wheel - Installation](#)
- Check, and if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see [Air Gap Measurement](#)).
- Check for correct brake operation. Rectify as necessary.

## WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

## Front Brake Lever – Removal

The new brake lever kit should have the following components:

- Brake lever
- Spring
- Pivot sleeve
- Grease

### NOTICE

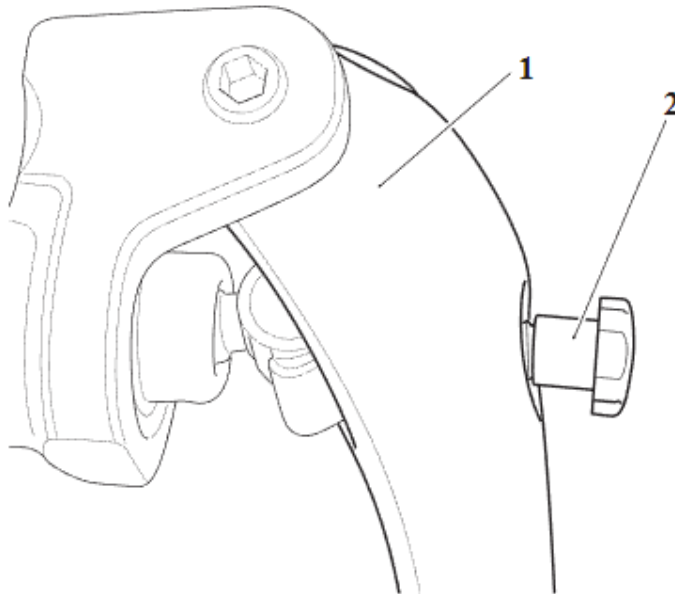
Only disassemble the lever if it is to be replaced.

If the lever is to be replaced, The pivot assembly and push rod for the master cylinder must be removed from the original lever and fitted to the new lever.

Note the setting of the lever adjuster to ensure it is returned to the same position on installation.

The master cylinder does not need to be removed from the motorcycle for the brake lever removal.

- Turn the brake lever adjuster fully in to give maximum lever span.

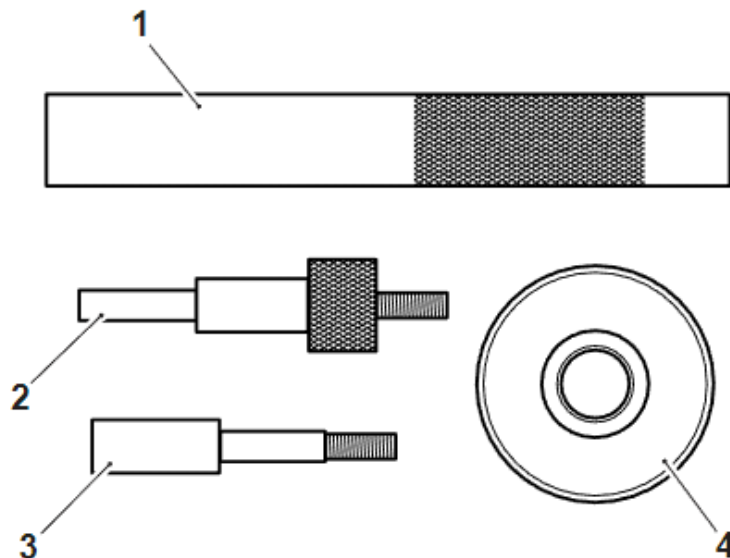


1. Brake lever
2. Adjusting screw



## NOTICE

The service tool T3880636 is required to remove the front brake lever pivot sleeve.



T3880636 - Kit, Brake Lever Pivot Sleeve

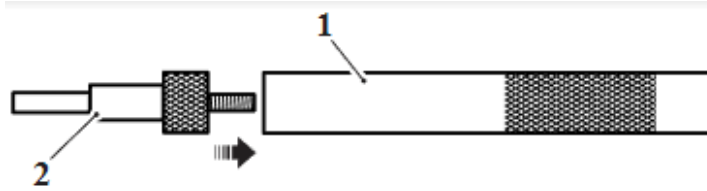
1. Mandrel
2. Extractor
3. Installer piece
4. Support piece

## ⚠ WARNING

When removing the brake lever pivot sleeve, always wear overalls, eye, face and hand protection. The brake lever sleeve is hardened and liable to splinter if broken. Debris from broken components could cause injury to eyes, face and any unprotected parts of the body.

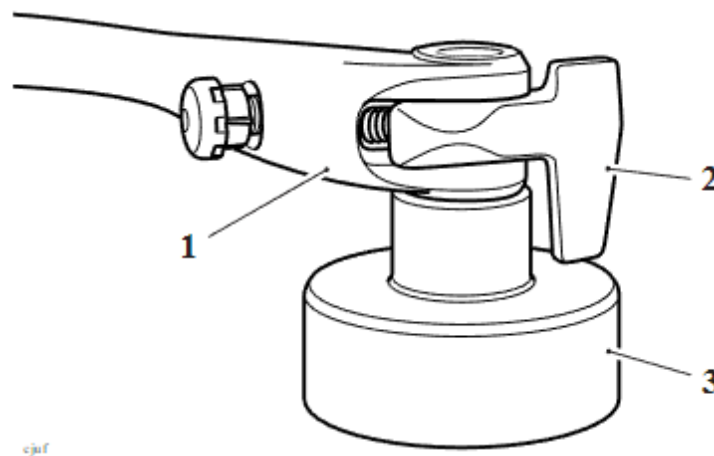
1. Remove the lock nut from the lever pivot bolt.
2. Remove the lever pivot bolt.
3. Release the lever from the master cylinder assembly and remove the dust seal.

4. Fit the extractor to the mandrel as shown.



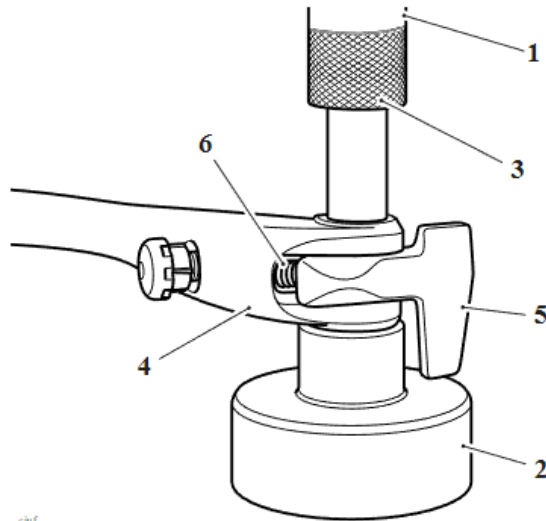
- 1. Mandrel
- 2. Extractor

5. Position the brake lever assembly with the pivot facing towards the support piece as shown.



- 1. Brake lever
- 2. Pivot assembly
- 3. Support piece

6. Position the mandrel and extractor to the brake lever and press out the pivot sleeve from the brake lever assembly.



1. Mandrel
2. Support piece
3. Extractor
4. Front brake lever
5. Pivot assembly
6. Return spring

7. Retain the brake lever pivot sleeve for reuse during assembly.

### **⚠ WARNING**

Always wear eye, hand and face protection when separating brake lever components. Uncontrolled release of the brake lever components may cause the spring to become detached during dismantling. Flying springs may cause injury to eyes, face and any unprotected parts of the body.

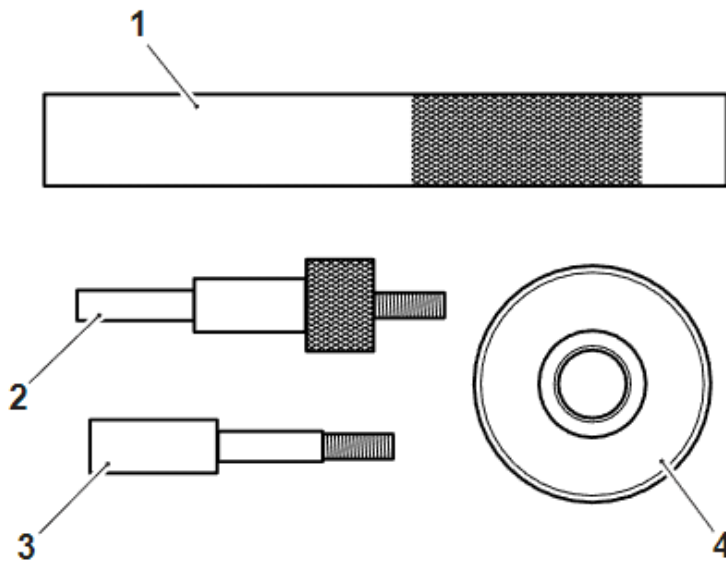
### **NOTICE**

Note the orientation of the return spring, push rod and brake lever pivot for installation.

8. Carefully remove the extractor from the brake lever assembly.
9. Collect the brake lever pivot sleeve from the support piece.
10. Carefully detach the lever from the pivot assembly.

**NOTICE**

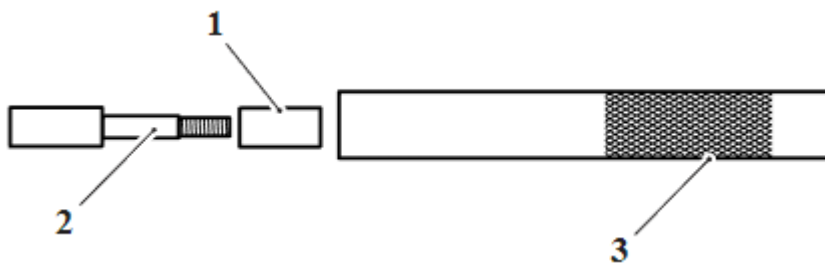
The service tool T3880636 is required to fit the lever pivot sleeve.



T3880636 - Kit, Brake Lever Pivot Sleeve

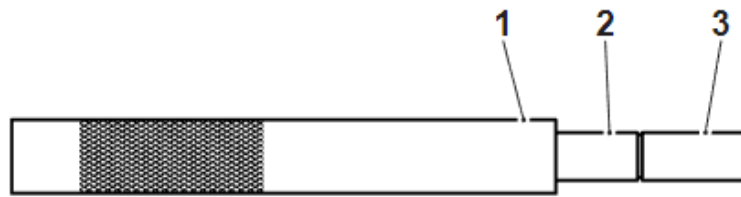
- 1. Mandrel
- 2. Extractor
- 3. Installer piece
- 4. Support piece

1. Locate the pivot sleeve over the shank of the installer piece.



- 1. Pivot sleeve
- 2. Installer piece
- 3. Mandrel

2. Screw the installer piece into the mandrel.

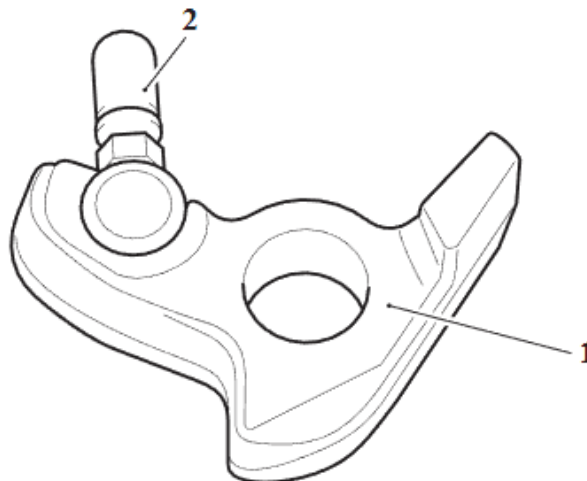


1. Mandrel
2. Pivot sleeve
3. Installer piece

## **⚠ WARNING**

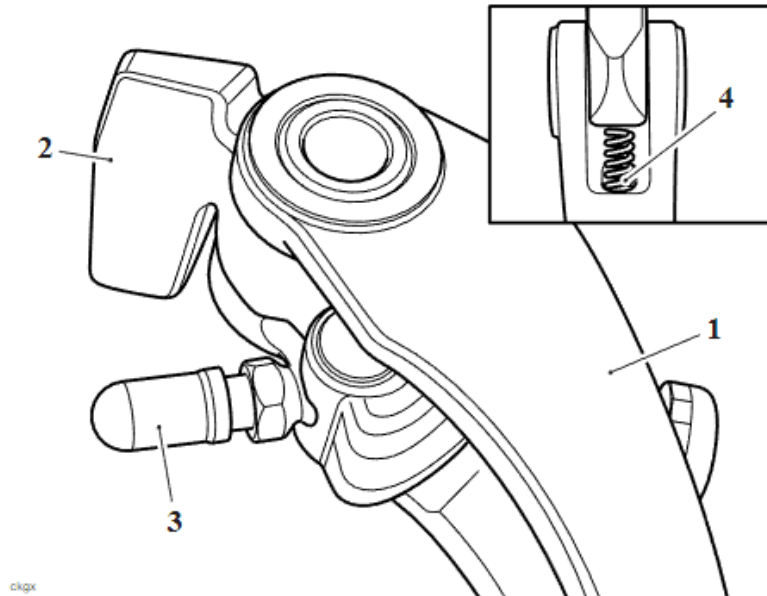
Do not attempt to adjust the push rod. The push rod is pre-set at the factory and is not adjustable. If for any reason the threaded part of the push rod is adjusted the brake master cylinder assembly must be replaced. Adjusting the push rod affects the braking characteristics of the front brakes when applied leading to loss of motorcycle control and an accident.

3. Apply grease, from the kit, to the push rod.
4. Make sure the push rod is fitted to the pivot.



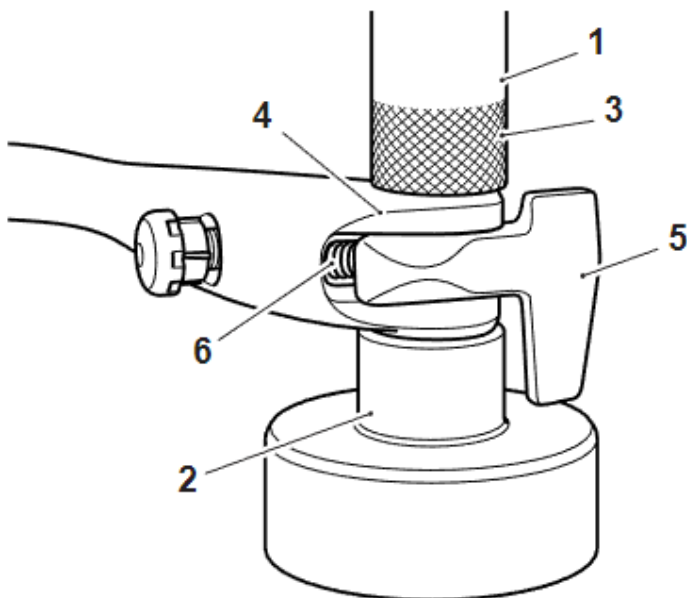
1. Pivot
2. Push rod

- Align the brake lever to the brake lever pivot assembly ensuring the return spring and push rod are located as noted during removal.



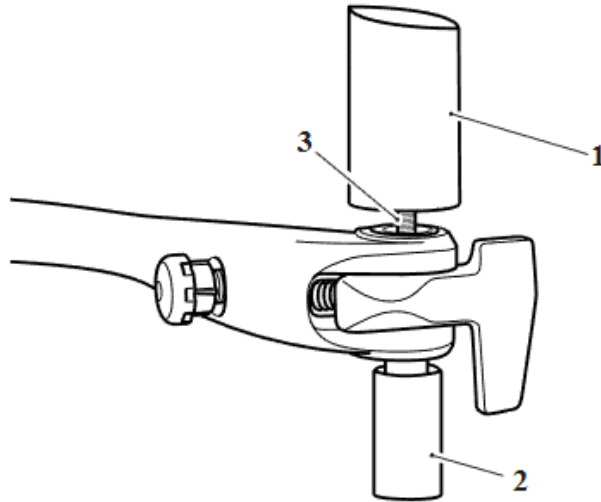
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Brake lever</li><li>2. Pivot assembly</li><li>3. Push rod</li><li>4. Spring</li></ol> |
|--|

- Using the service tool align the installer piece to the brake lever and gently push down on the mandrel locating the installer piece, through the lever and pivot.
- Place the lower surface of the brake lever onto the support piece, and then using a press push the pivot sleeve through the brake lever pivot until the mandrel touches the upper brake lever surface.



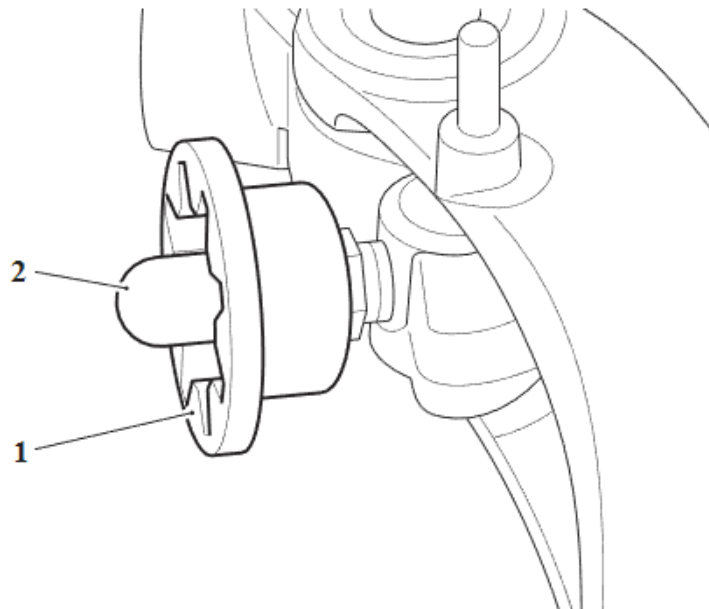
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Mandrel</li><li>2. Support piece</li><li>3. Installer piece</li><li>4. Front brake lever</li><li>5. Pivot assembly</li><li>6. Return spring</li></ol> |
|--|

8. Support the brake lever, hold the mandrel and turn the installer piece anticlockwise to release it from the mandrel.



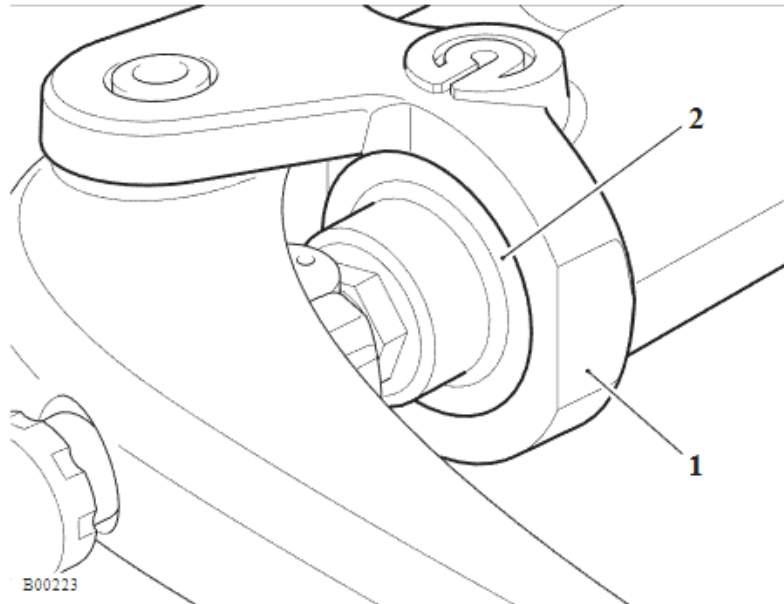
- |                    |
|--------------------|
| 1. Mandrel         |
| 2. Installer piece |
| 3. Thread          |

9. Visually check the pivot sleeve, return spring, brake lever pivot and push rod are installed as noted during removal.
10. Fit the dust cover to the push rod on the clutch lever.



- |               |
|---------------|
| 1. Dust cover |
| 2. Push rod   |

11. Apply grease, from the kit, to the push rod that is attached to the master cylinder.
12. Apply grease, from the kit, to the shank of the pivot bolt.
13. Line up the holes of the brake lever and master cylinder, and insert the pivot bolt.  
Tighten the pivot bolt to 1 Nm.
14. Fit the pivot bolt lock nut and tighten to 6 Nm.
15. Fit the dust seal into its recess in the master cylinder.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Dust cover</li><li>2. Master cylinder</li></ol> |
|--|

16. Check lever operation and make sure the rubber seal is still correctly seated.



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

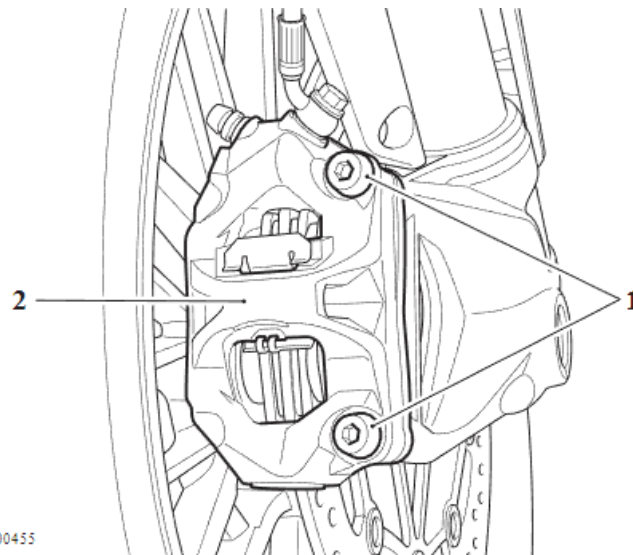
**⚠ CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork.  
Spilled brake fluid will damage paintwork.

**NOTICE**

One of the brake calipers will require removing and the pistons pushed out to back bleed the master cylinder as part of the brake bleeding procedure, see [Bleeding the Front Brakes](#).

1. Remove the caliper mounting bolts and slide the caliper off the brake disc.



1. Caliper mounting bolts
2. Caliper

## **⚠ WARNING**

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the front brake lever until the plate is held by the brake pads.

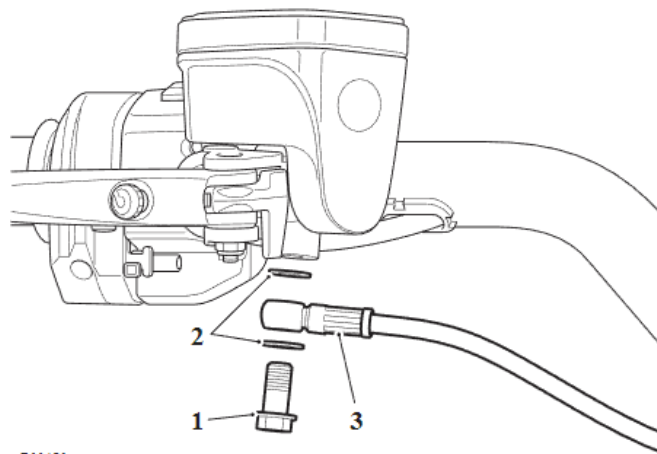
## **⚠ CAUTION**

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose above the handlebars.

Allowing the brake hose to fall below the handlebar height will allow an excessive amount of air to enter into the brake system.

Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

3. Noting it's orientation for installation, disconnect the brake hose from the master cylinder, discard the washers and allow the brake fluid to drain from the master cylinder outlet into a suitable container.



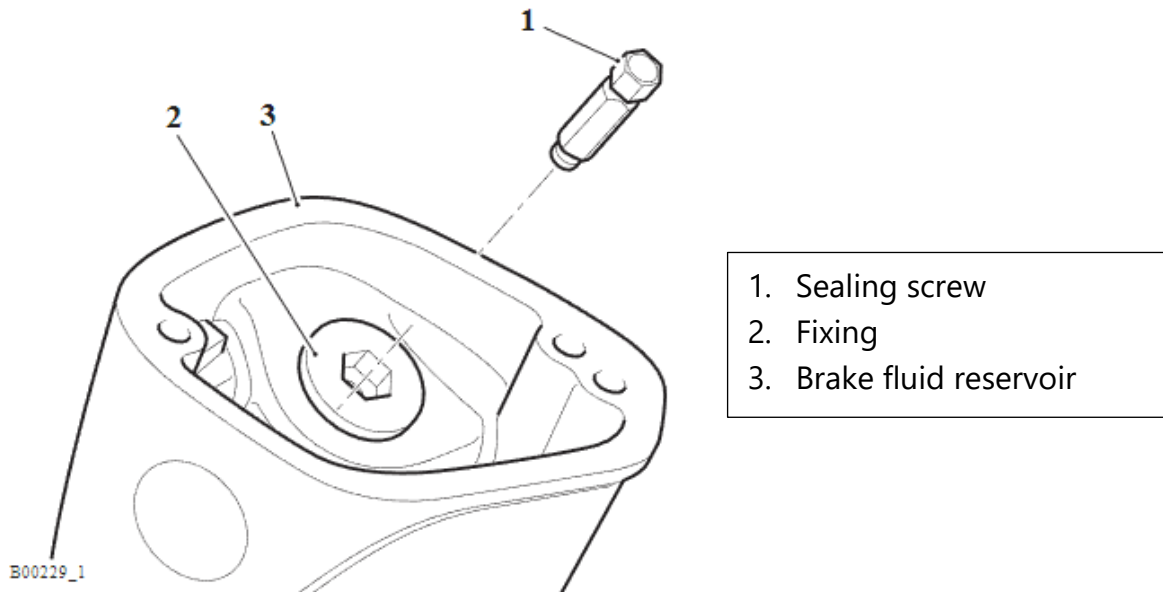
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1. Union bolt
2. Sealing washers
3. Brake hose

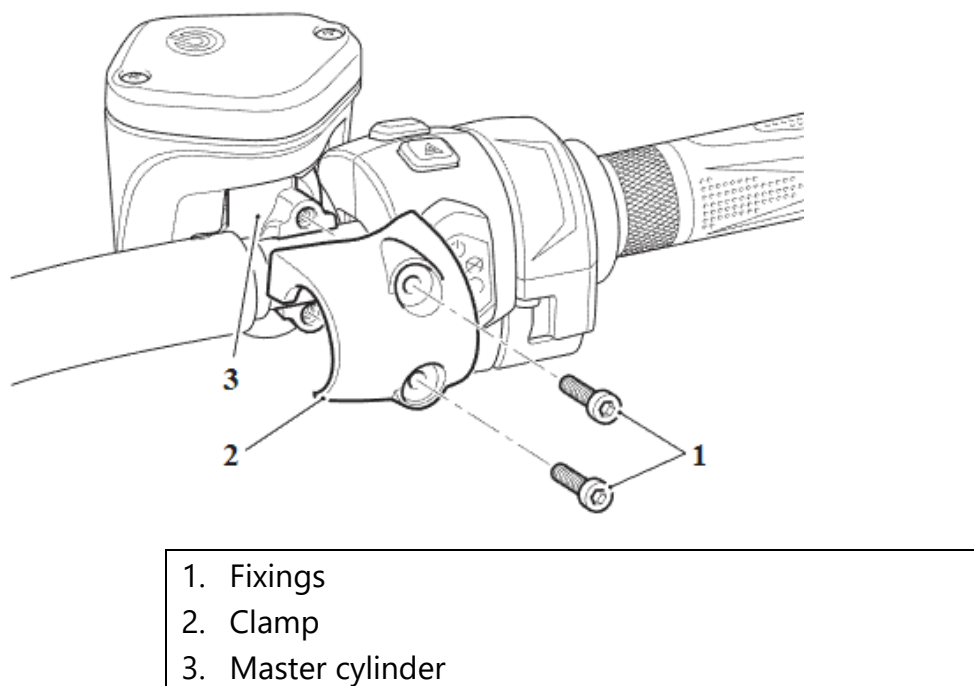
## NOTICE

If the brake fluid reservoir is NOT to be removed, omit steps 4 to 6.

4. Release the fixings and remove the reservoir cap, reservoir cover and diaphragm seal.
5. Remove the sealing screw from the reservoir mounting fixing.
6. Loosen the mounting fixing.



7. Release the fixings, lift off the clamp and remove the front brake master cylinder.



## Front Brake Master Cylinder-Disassembly

The following items can be replaced on the front brake master cylinder:

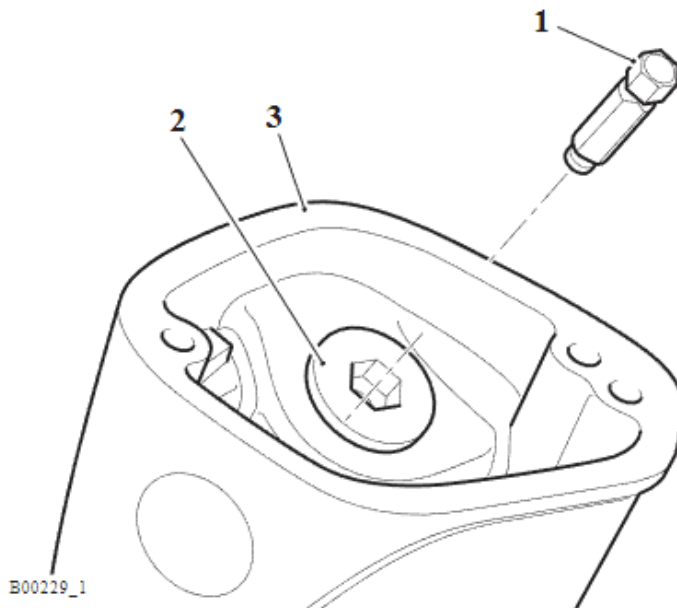
- Brake lever (see [Front Brake Lever - Removal](#))
- Bleed screw
- Brake fluid reservoir

### Bleed Screw

#### NOTICE

The bleed screw within the master cylinder does not have a drilling through it and does not require a bleed tube.

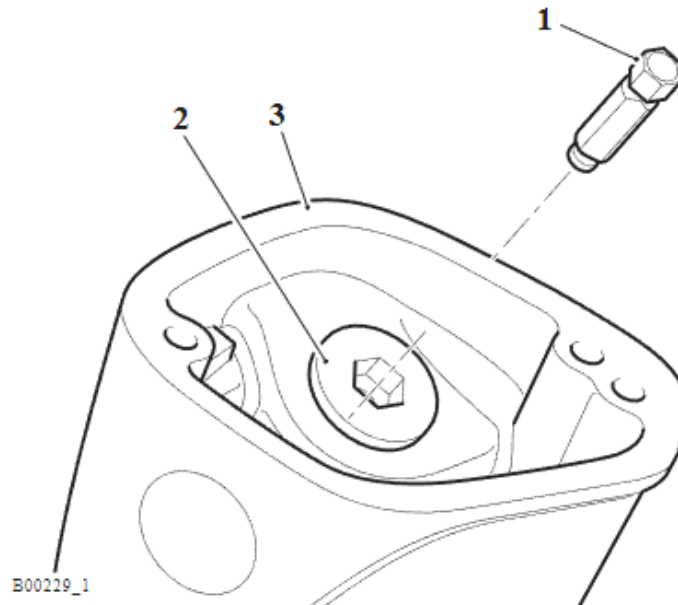
1. Release the fixings and remove the reservoir cap, reservoir cover and diaphragm seal.
2. Remove the bleed screw from the reservoir mounting fixing.



1. Bleed screw
2. Fixing
3. Brake fluid reservoir

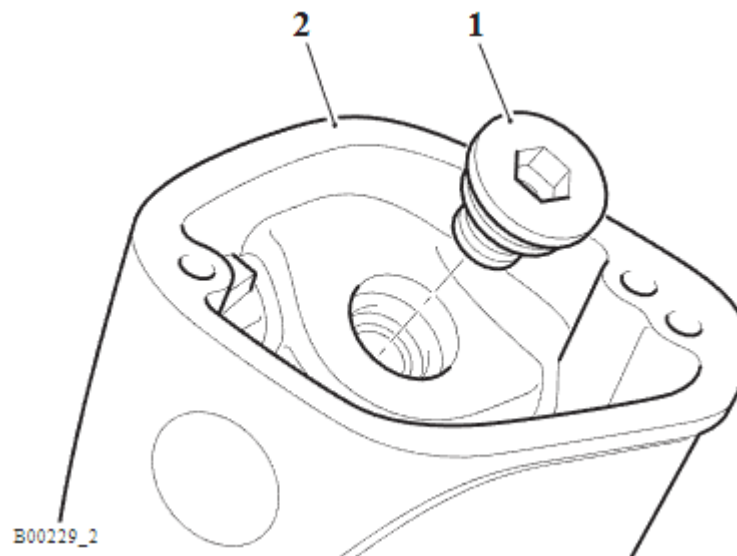
## Brake Fluid Reservoir

1. Remove the master cylinder (see [Front Brake Master Cylinder - Removal](#)).
2. Release the fixings and remove the reservoir cap, reservoir cover and diaphragm seal.
3. Remove the bleed screw from the reservoir mounting fixing.

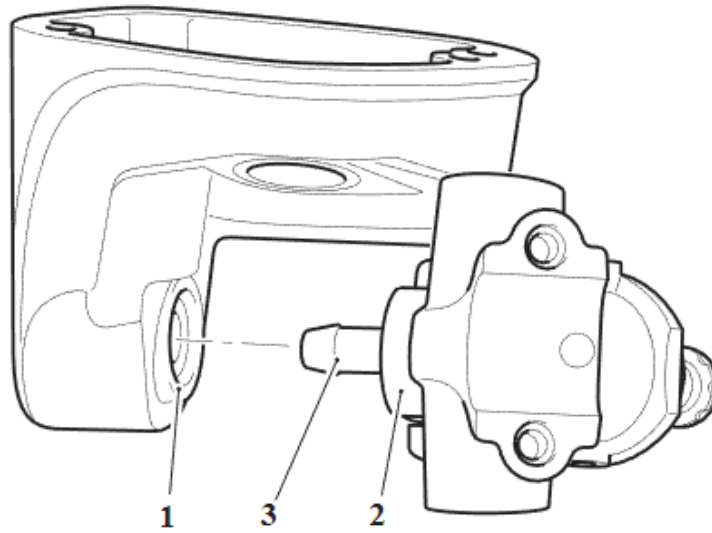


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Bleed screw</li><li>2. Fixing</li><li>3. Brake fluid reservoir</li></ol> |
|---|

4. Remove the mounting fixing with its two O-rings.



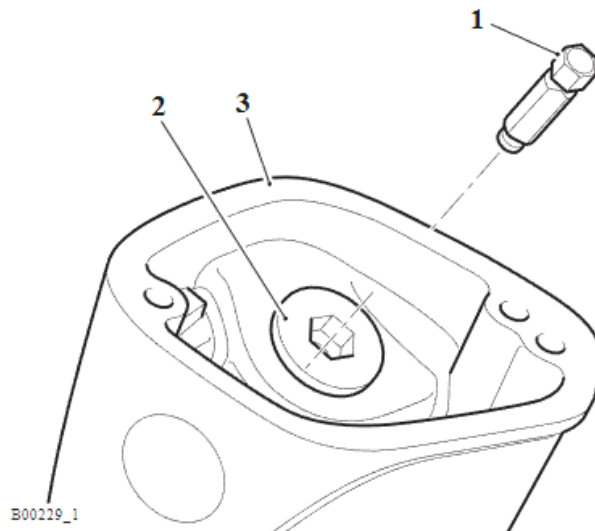
5. Carefully detach the fluid reservoir from the master cylinder spigot.



- 1. Reservoir
- 2. Master cylinder
- 3. Spigot

Front Brake Master Cylinder -Assembly  
Bleed Screw

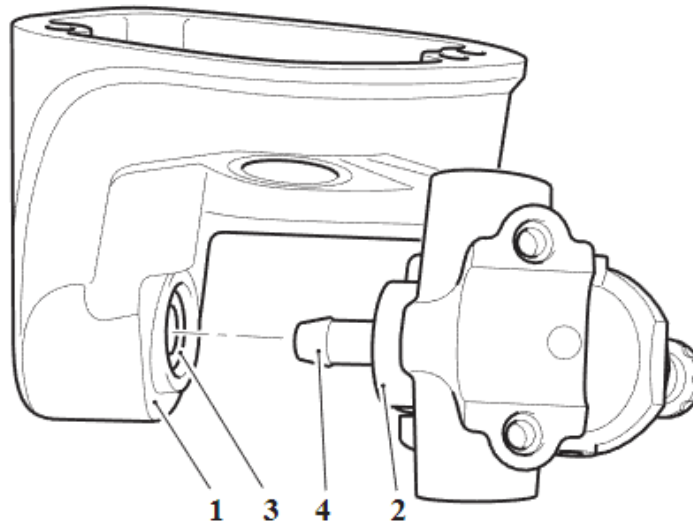
2. Fit the bleed screw and tighten to 6 Nm.



- 1. Bleed screw
- 2. Fixing
- 3. Brake fluid reservoir

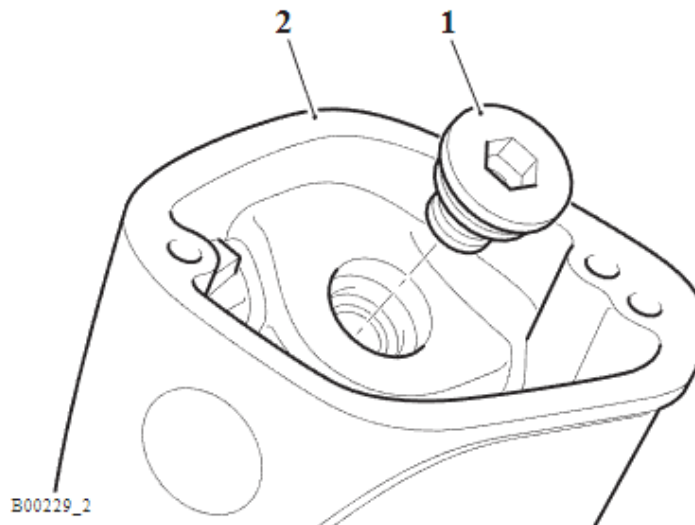
## Brake Fluid Reservoir

2. Check the condition of the spigot seal in the reservoir. Replace if damaged.
3. Fit the reservoir onto the master cylinder spigot.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Reservoir</li><li>2. Master cylinder</li><li>3. Seal</li><li>4. Spigot</li></ol> |
|---|

4. Check the two O-rings on the reservoir fixing. Replace if damaged.
5. Check the front brakes for correct operation and fluid leaks. Rectify as necessary.
6. Fit the reservoir fixing. Do not fully tighten at this stage.



7. Fit the master cylinder to the motorcycle (see [Front Brake Master Cylinder - Installation](#)).

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

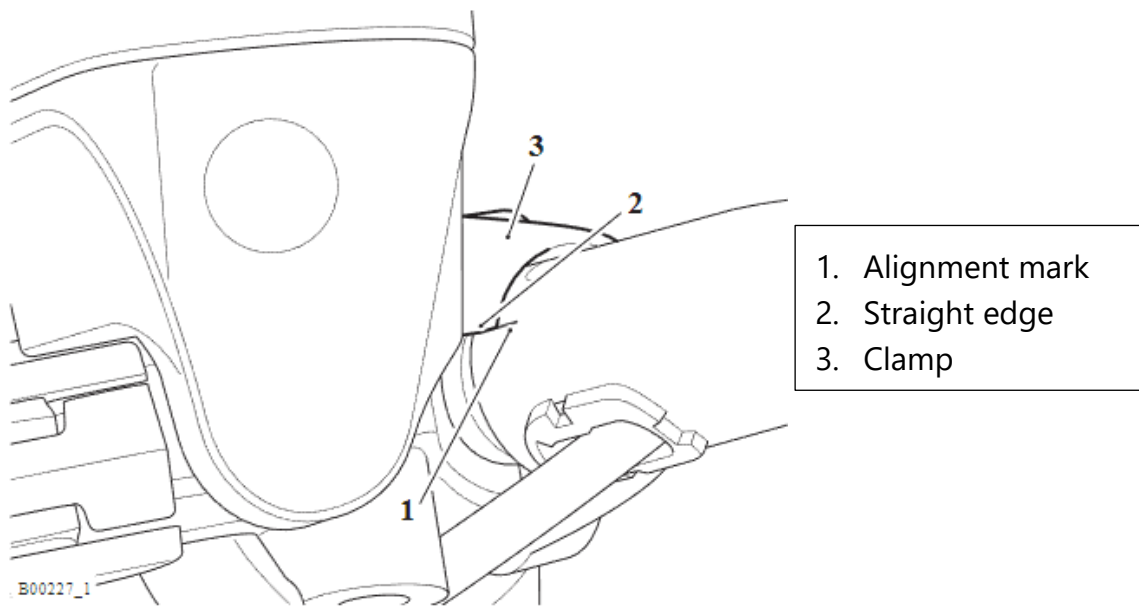
1. Locate the front brake master cylinder to the handlebars and fit the clamp, do not fully tighten at this stage.

**NOTICE**

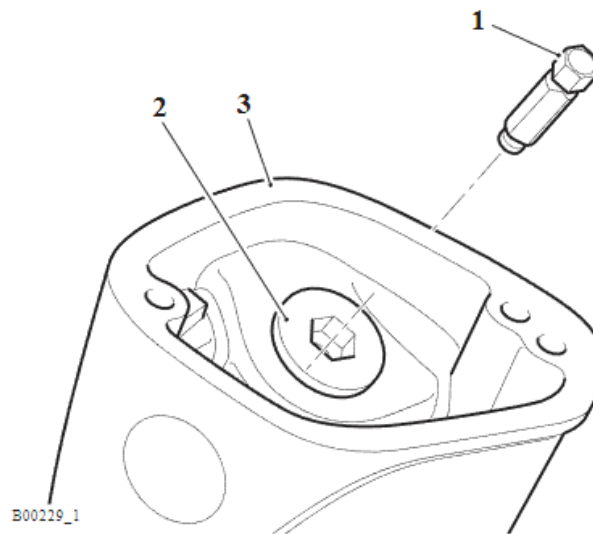
When fitting the front brake master cylinder, care must be taken to avoid trapping switch housing harness between handlebar and reservoir clamp.

2. Align the straight edge on the clamp to the alignment mark on the handlebar (as shown in the illustration below) and tighten the fixings (upper one first) to 8 Nm.



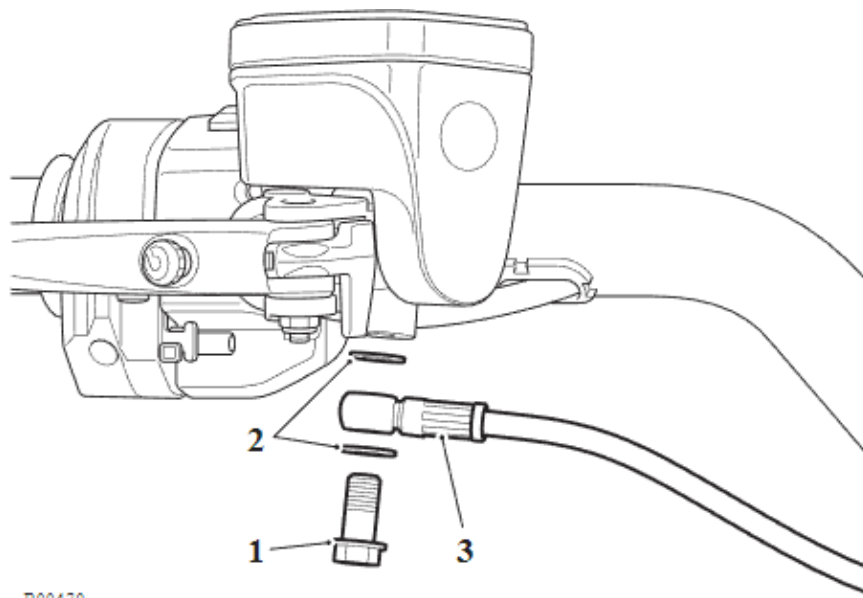


3. If loosened, tighten the brake fluid reservoir fixing to 25 Nm.
4. If removed fit the bleed screw and tighten to 6 Nm.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Bleed screw</li> <li>2. Fixing</li> <li>3. Brake fluid reservoir</li> </ol> |
|---|

5. Incorporating new sealing washers connect the brake hose to the master cylinder and tighten the union bolt to 25 Nm.



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- |  |
|--|
| <ol style="list-style-type: none"><li>1. Union bolt</li><li>2. Sealing washers</li><li>3. Brake hose</li></ol> |
|--|

6. Back bleed the front brake master cylinder (see Master Cylinder Back Bleed in [Bleeding the Front Brakes](#)).
7. Bleed the front brakes (see [Bleeding the Front Brakes](#)).
8. Check the front brakes for correct operation and fluid leaks. Rectify as necessary.

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

## Removal and Installation - Rear Brakes Components

### Rear Brake Pads – Removal

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

#### **WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line. Brake hoses or lines that are not supported may become damaged or bent.

Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

Perform the following operations:

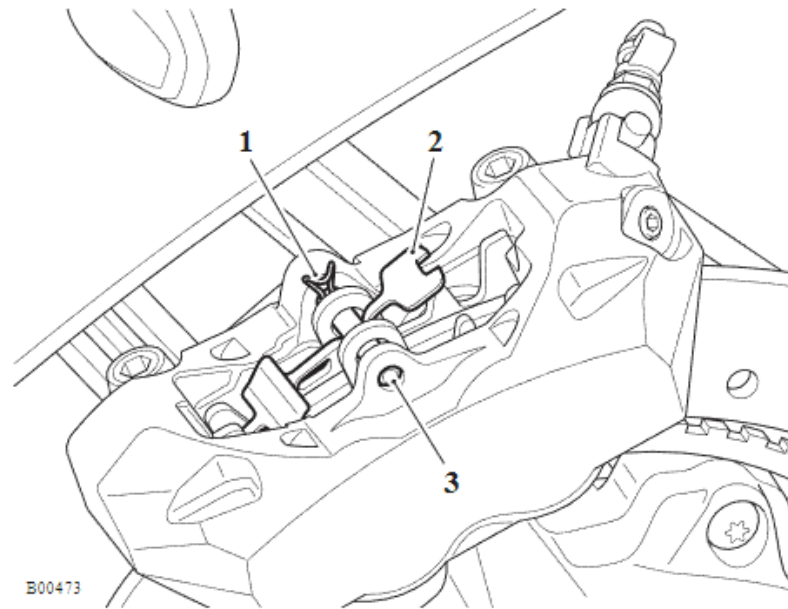
- [Rear Wheel - Removal](#)

#### **NOTICE**

Note the position and orientation of the pad retaining pin clip, anti-rattle spring and brake pads for installation.

5. Remove the clip from the brake pad retaining pin.

6. While pressing down on the anti-rattle spring, remove the brake pad retaining pin from the left hand side.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Clip</li><li>2. Anti-rattle spring</li><li>3. Brake pad retaining pin</li></ol> |
|--|

7. Remove the anti-rattle spring.

**⚠ CAUTION**

In the following operation, never lever directly against the disc, caliper or pad lining material. Always use a levering tool made from a soft material that will not cause damage to the load bearing surfaces.

Brake fluid will be displaced as the caliper pistons are compressed. To prevent body damage, ensure that the displaced fluid does not come into contact with any part of the bodywork.

4. Carefully push the brake pads apart to force the caliper pistons back to allow withdrawal of the pads.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

**⚠ WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident. Observe the brake fluid handling warnings given in the General Information section.

**⚠ CAUTION**

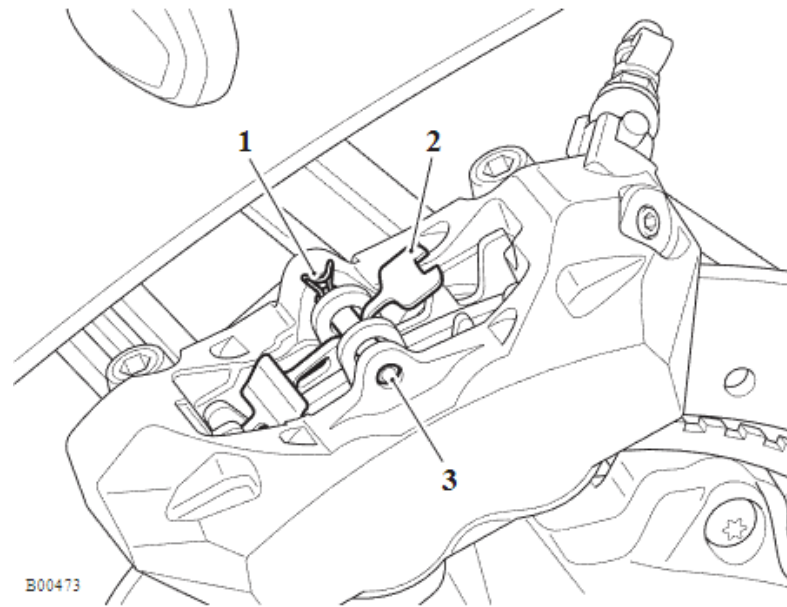
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

5. If new pads are being installed, push the pistons fully back into the caliper body.  
Keep an eye on the fluid level in the reservoir whilst retracting the pistons to prevent fluid spillage.

## **WARNING**

Do not apply more than a minimum coating of grease to the brake pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Fit the brake pads as noted for removal.
3. Lubricate the brake pad retaining pins using a minimum amount of proprietary high temperature brake grease.
4. Fit the anti-rattle spring over the brake pads as noted for removal and push down to allow the brake pad retaining pin to slide across the top of the spring.
5. Fit the brake pad retaining pin as noted for removal and tighten to 6 Nm.
6. Fit the brake pad retaining pin clip.



1. Clip
2. Anti-rattle spring
3. Brake pad retaining pin

7. Pump the brake lever to correctly position the caliper pistons.

8. Check the front brake fluid level and top up as required with new DOT 4 fluid (see Brake Fluid Level Inspection).
9. Check for correct brake operation. Rectify as necessary.

** WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Perform the following operations:

- [Rear Wheel - Installation](#)

Rear Brake Caliper – Removal

** WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

** WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line.  
Brake hoses or lines that are not supported may become damaged or bent.  
Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

Perform the following operations:

- [Rear Wheel - Removal](#)

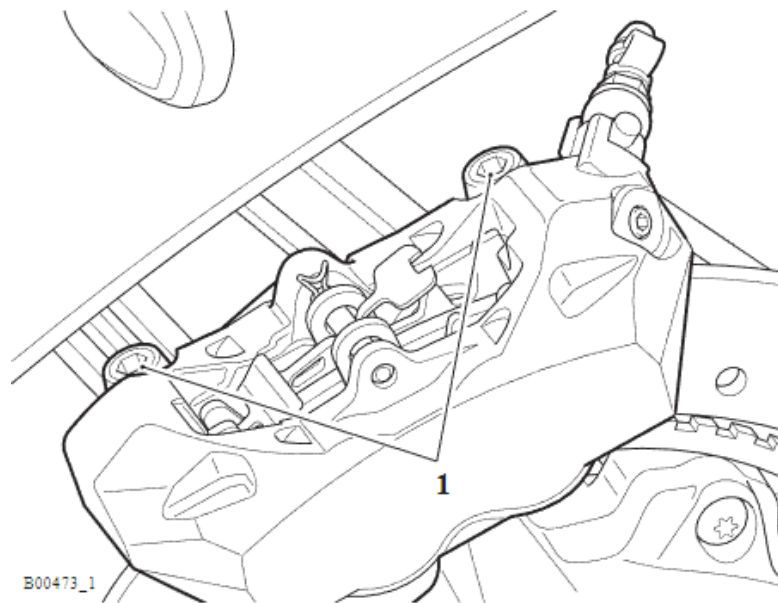
## **⚠ CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

## **NOTICE**

The brake caliper is detached and the pistons pumped out to a suitable metal plate for the master cylinder back bleed as described in [Bleeding the Rear Brake](#).

1. Remove the caliper mounting bolts and slide the caliper off the brake disc.



1. Caliper mounting bolts

## **⚠ WARNING**

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.



- Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the rear brake pedal until the plate is held by the brake pads.

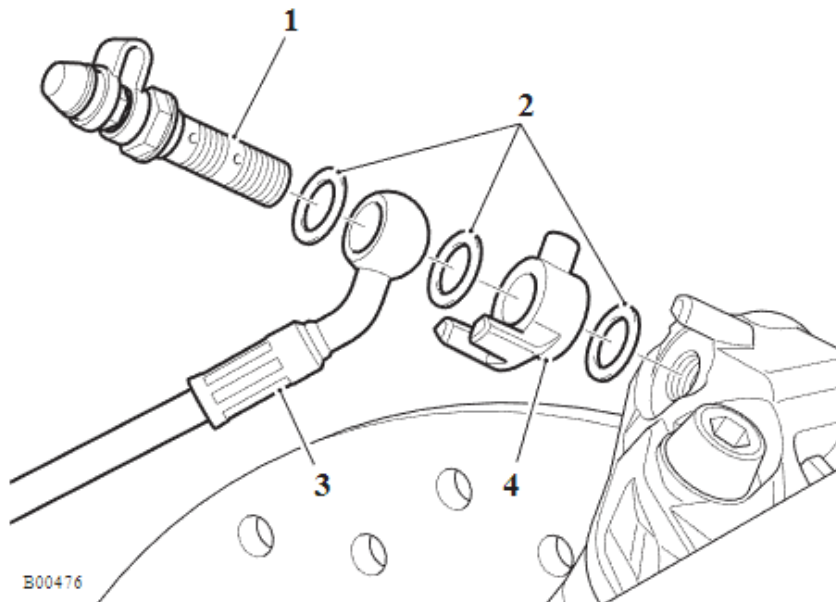
### NOTICE

Note the bleed screw is fitted to the rear brake hose union.

Note the position and orientation of the anti-rotation spacer at the caliper for installation.

Note the orientation of the rear brake hose at the caliper for installation.

- Disconnect the brake hose at the caliper and place the free end of the hose in a suitable container to collect the brake fluid.
- Collect the anti-rotation spacer and discard the three sealing washers.



- Brake hose union
- Sealing washers
- Brake hose
- Anti-rotation spacer

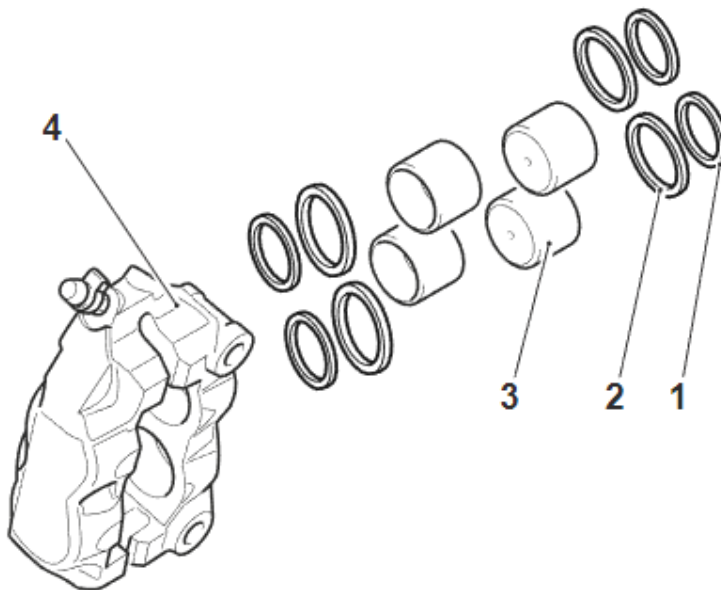
**⚠ WARNING**

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

**⚠ WARNING**

Make sure the seal grooves in the caliper bores are not damaged during the removal of the seals. Damage to the seal grooves may allow brake fluid to leak past the seals resulting in a dangerous riding condition leading to loss of motorcycle control and an accident.

1. Cover the caliper opening with a clean heavy cloth and using either compressed air or by reconnecting the master cylinder and pumping the brake lever, remove the pistons one at a time.

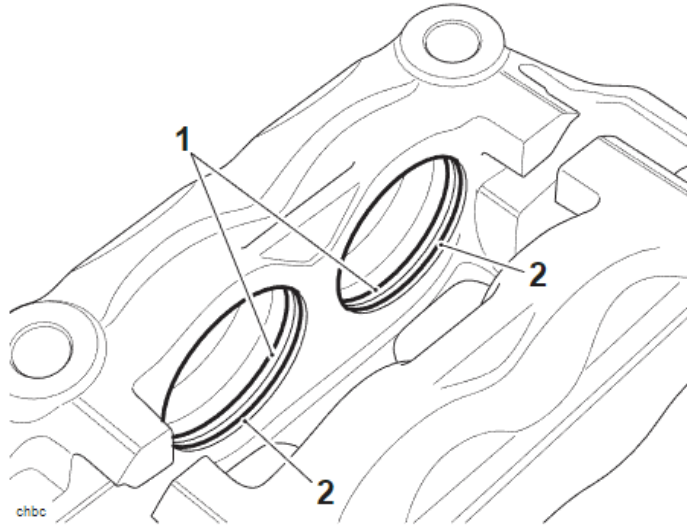


1. Dust seal
2. Piston seal
3. Pistons
4. Caliper

2. Extract the dust seals and piston seals, taking care not to damage the caliper bores. Discard the old seals, these must not be reused.

### NOTICE

The piston seals are slightly thicker than the dust seals.



1. Piston seals
2. Dust seals

3. Check the pistons, caliper and mounting bracket for signs of damage, paying particular attention to the caliper bores and pistons. If damage is present, renew the worn component or the complete caliper assembly.

#### Rear Brake Caliper – Inspection

### **⚠ WARNING**

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

A dangerous riding condition leading to loss of control of the motorcycle or an accident could result if this warning is ignored.

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

**⚠ WARNING**

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

**⚠ WARNING**

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

If all components are serviceable, obtain a piston seal kit and reassemble the caliper as follows:

1. Make sure all components are clean, then fit the new seals to their grooves in the caliper bores.
2. Lubricate the fluid seals, caliper bore and the outside of the pistons with clean DOT 4 brake fluid.
3. Ease the pistons squarely back into the bores, taking care not to displace the seals.

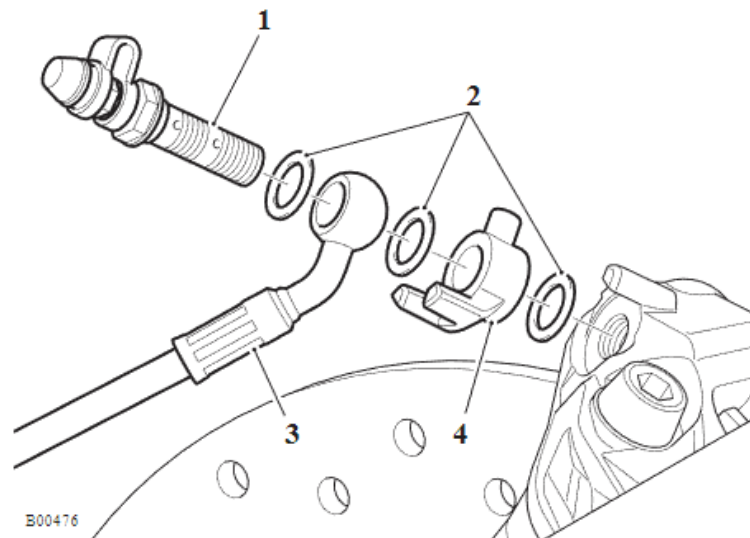
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the threaded fixing holes for the brake caliper fixings.
2. Thoroughly clean the threaded part of the fixings and smear the first four threads with a proprietary copper based grease.
3. Position the caliper over the disc.
4. Secure the brake caliper with the fixings and tighten sufficiently to bring the caliper into contact its mounting points, while allowing a small amount of lateral movement. Do not fully tighten at this stage.
5. With the anti-rotation spacer and the rear brake hose positioned as noted for removal, connect the brake hose to the caliper incorporating new sealing washers on each side of the hose connections.
6. Make sure the orientation of the brake hoses are as noted for removal. Make sure that the lug on the anti-rotation spacer is positioned against the lug on the caliper when tightening the union bolt. Tighten the union bolt to 25 Nm.



1. Brake hose union
2. Sealing washers
3. Brake hose
4. Anti-rotation spacer

7. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
8. Bleed the rear brake caliper (see [Bleeding the Rear Brake](#)).
9. Pump the brake pedal to correctly position the caliper pistons.
10. Tighten the rear caliper bolts to 45 Nm.

** WARNING**

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

11. Check for correct brake operation.

** WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Perform the following operations:

- [Rear Wheel - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

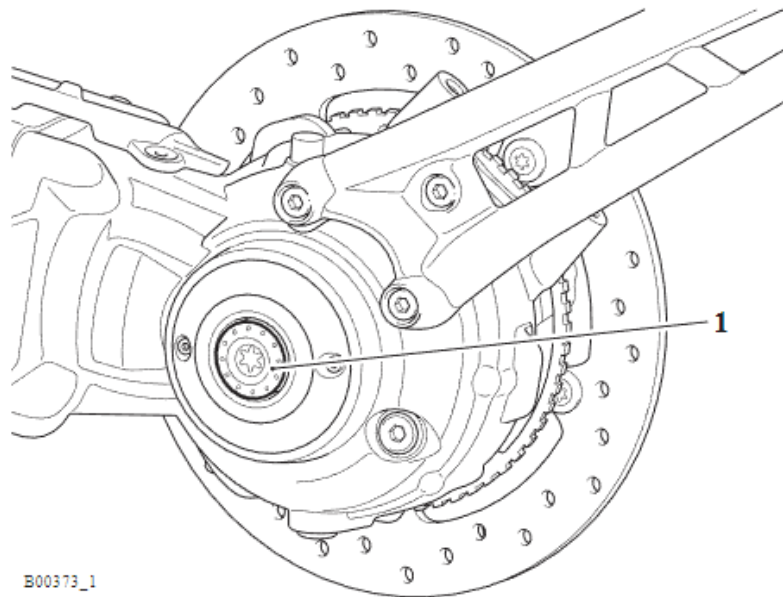
**⚠ WARNING**

Do not allow a brake component to hang unsupported on the brake hose or line.

Brake hoses or lines that are not supported may become damaged or bent.

Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

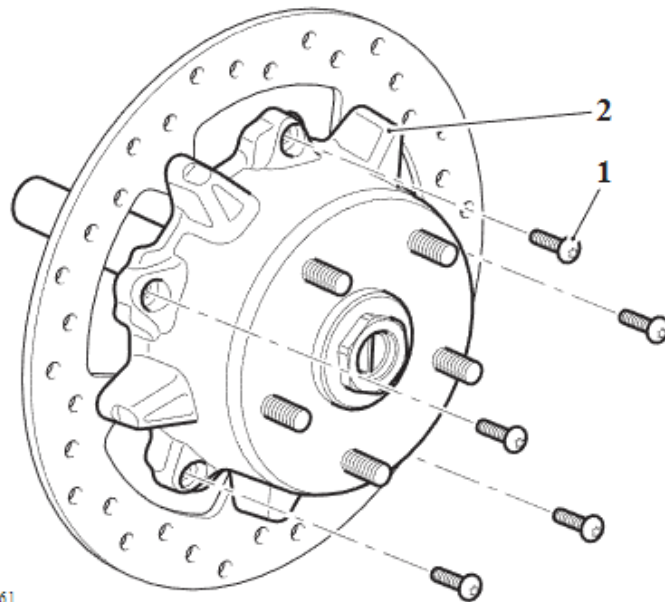
1. Loosen the rear wheel spindle bolt.
2. Remove the rear wheel (see [Rear Wheel - Removal](#)).
3. Detach and support the rear brake caliper such that the weight of the caliper is not supported by the brake hose.
4. Remove the rear wheel spindle bolt.



B00373\_1

1. Bolt

5. Release the fixings and remove the cush drive outer. Discard the fixings.



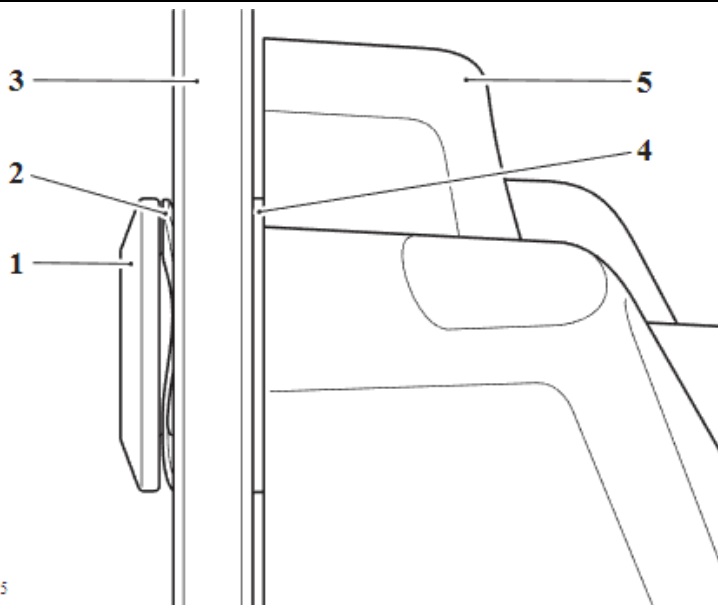
B00361

- 1. Fixings
- 2. Cush drive outer

### NOTICE

Note there is a flat washer between the brake disc and the cush drive outer for installation.

Note there is a wave washer between the head of the fixings and the brake disc for installation.

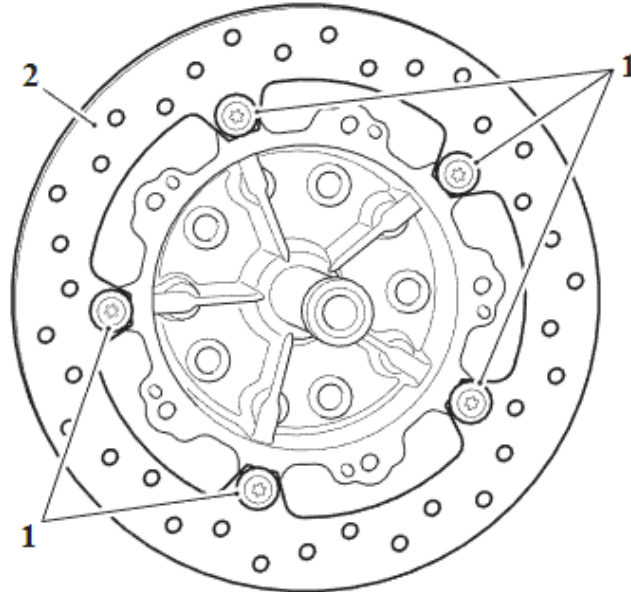


- 1. Fixing
- 2. Wavy washer
- 3. Brake disc
- 4. Flat washer
- 5. Cush drive outer

B00475



6. Release the fixings, remove the brake disc and collect the wavy and flat washers. Discard the fixings.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Brake disc</li></ol> |
|--|

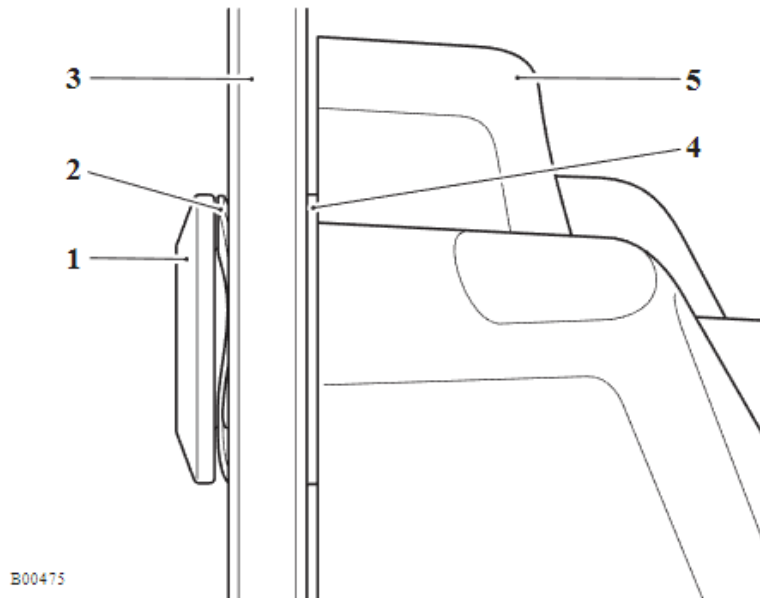
#### Rear Brake Disc – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

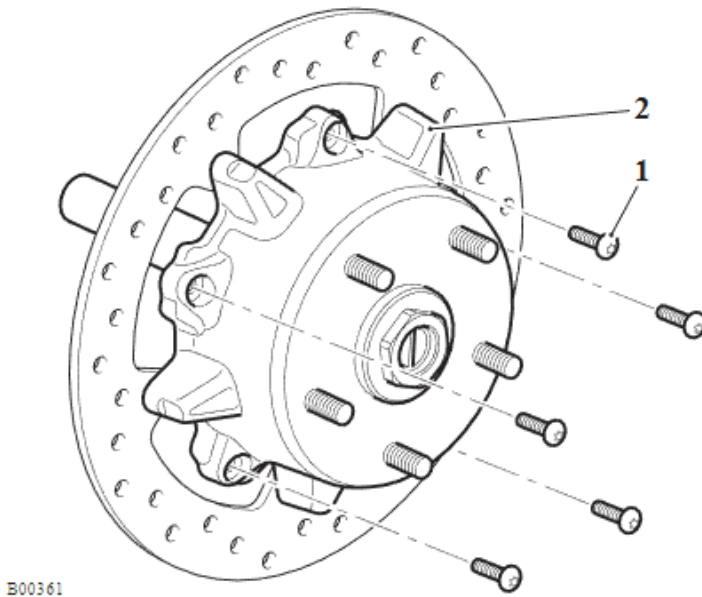
1. Fit the wavy washers to the new fixings, fit the fixings to the brake disc then fit the flat washers to the fixings.

2. Fit the brake disk to the cush drive outer and tighten the fixings to 22 Nm.



- 1. Fixing
- 2. Wavy washer
- 3. Brake disc
- 4. Flat washer
- 5. Cush drive outer

3. Fit the cush drive outer to the rear bevel box and tighten the new fixings to 20 Nm.



- 1. Fixings
- 2. Cush drive outer

4. Fit the rear wheel spindle bolt.
5. Fit the rear brake caliper and tighten the caliper bolts to 45 Nm.
6. Fit the rear wheel (see [Rear Wheel - Installation](#)).
7. Lower the motorcycle to the ground.
8. Tighten the rear wheel spindle bolt to 70 Nm.

#### Rear Brake Master Cylinder – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

### **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

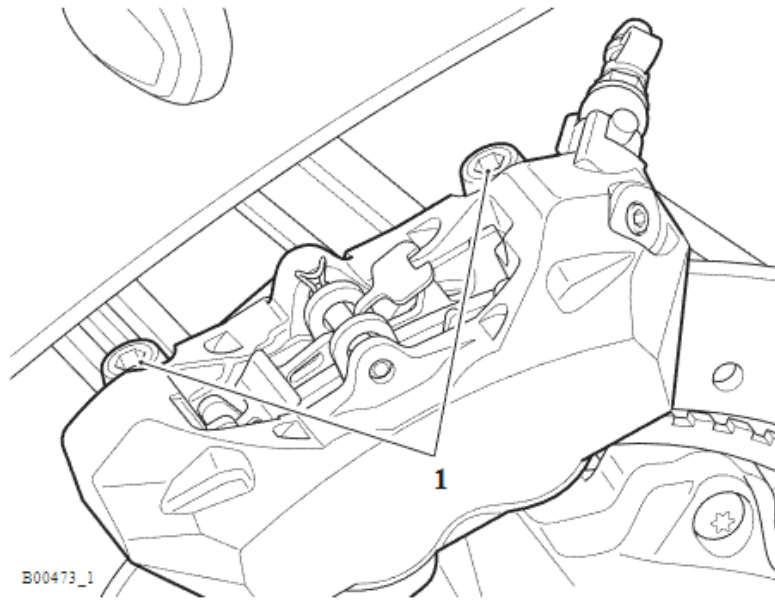
Perform the following operations:

- [Rear Wheel - Removal](#)

## NOTICE

The brake caliper will require removing and the pistons pushed out to back bleed the master cylinder as part of the brake bleeding procedure, see [Bleeding the Rear Brake](#).

1. Release the caliper mounting bolts and slide the caliper off the brake disc.



1. Caliper mounting bolts

## ⚠ WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the rear brake pedal until the plate is held by the brake pads.

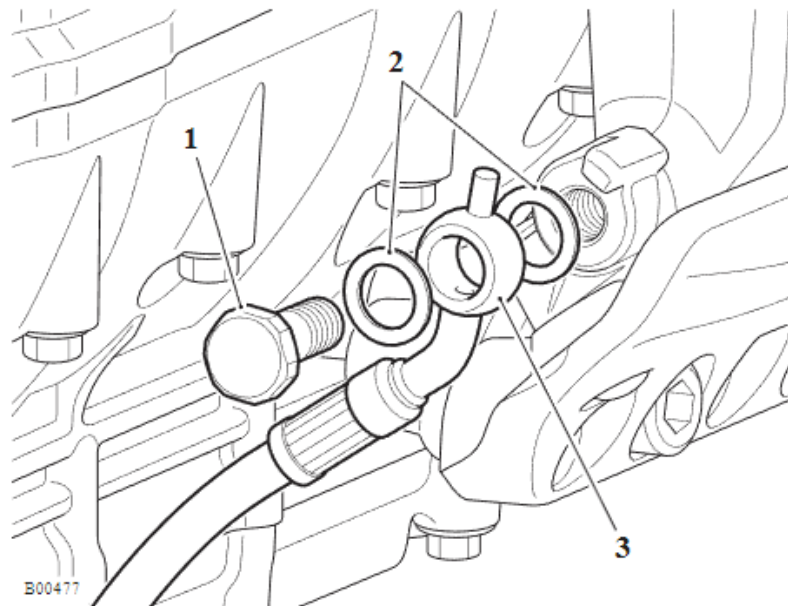
## NOTICE

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose in an upright position.

Allowing the brake hose to fall downwards will allow an excessive amount of air to enter into the brake system.

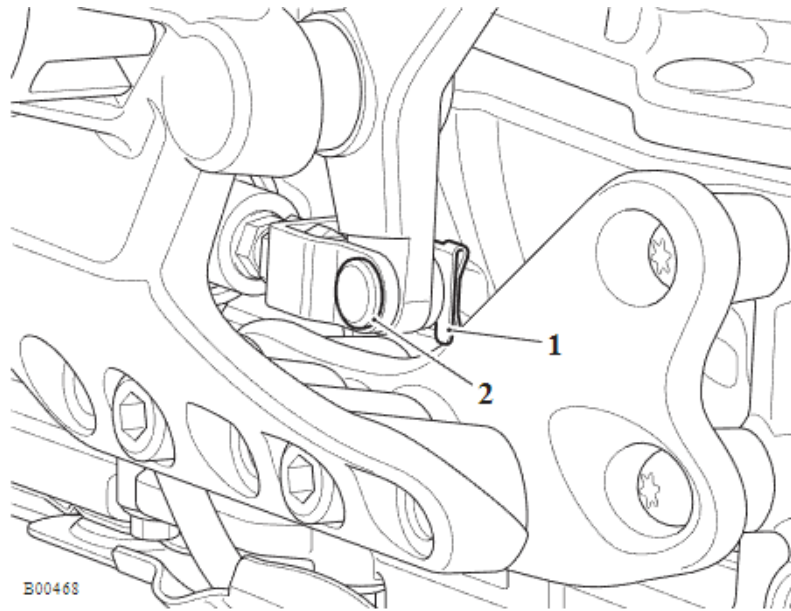
Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

3. Noting its orientation for installation, disconnect the brake hose from the master cylinder, discard the washers and allow the brake fluid to drain from the master cylinder outlet into a suitable container.



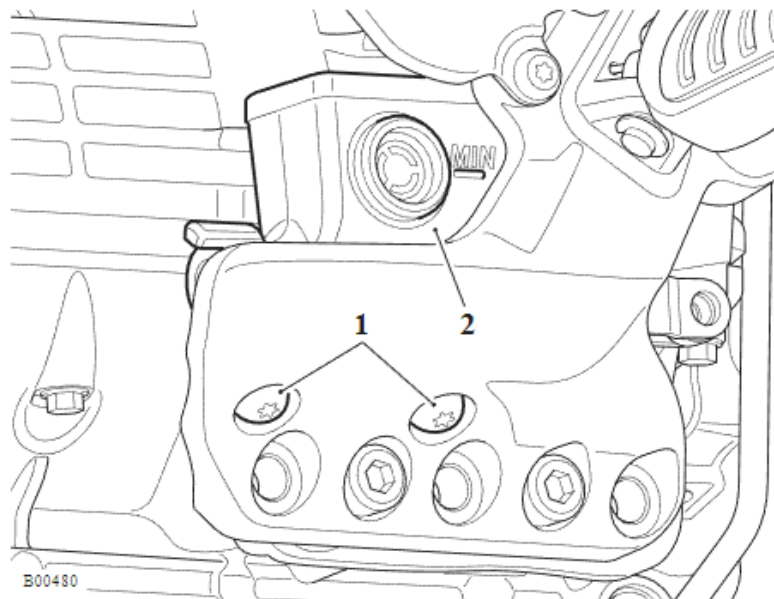
1. Union bolt
2. Sealing washers
3. Brake hose

4. Remove the clip and clevis pin and detach the brake push rod from the brake pedal. Discard the clip.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Clip</li><li>2. Clevis pin</li></ol> |
|---|

5. Release the fixings and remove the rear brake master cylinder.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Rear brake master cylinder</li></ol> |
|--|

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

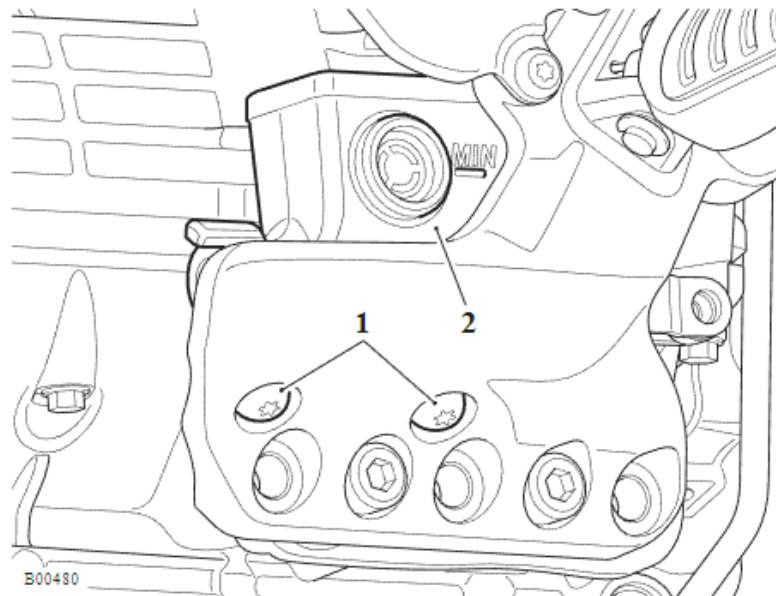
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ CAUTION**

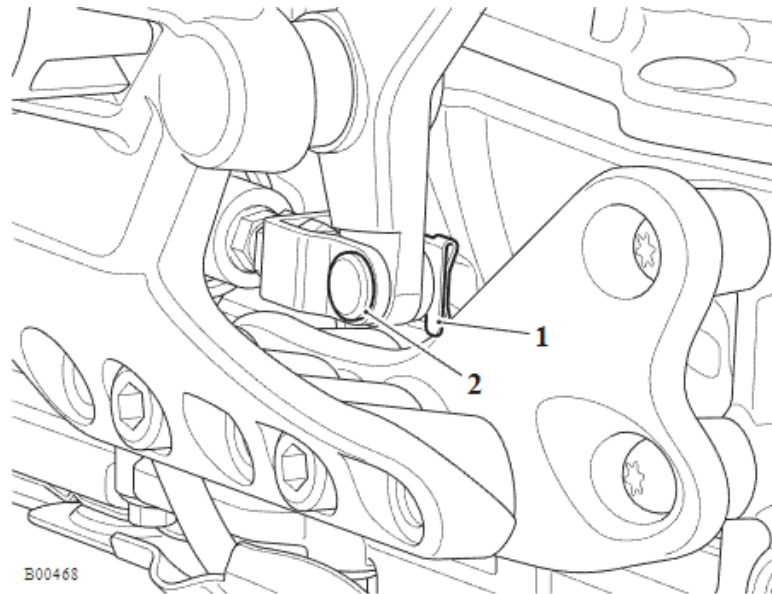
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Fit the master cylinder to the rider right hand control plate and tighten the fixings to 18 Nm.



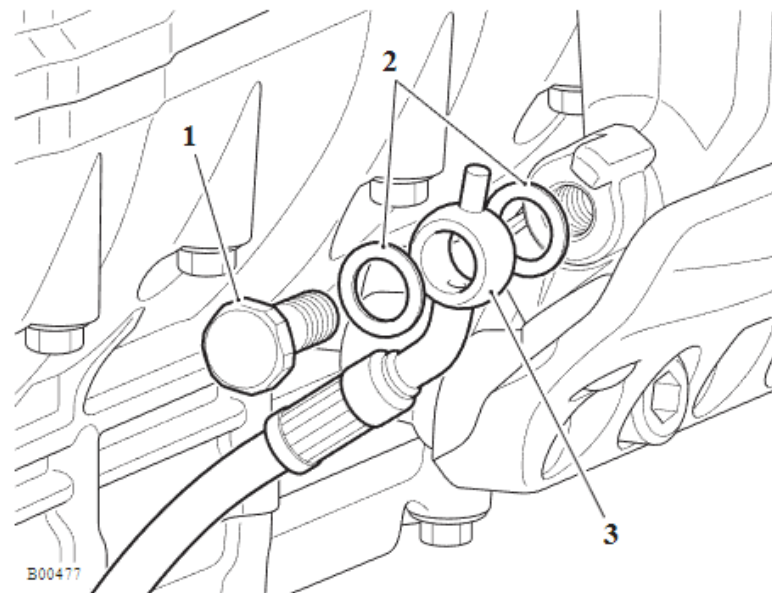
1. Fixings
2. Rear brake master cylinder

2. Attach the brake push rod to the brake pedal. Fit the clevis pin and secure with a new clip.



1. Clip
2. Clevis pin

3. Incorporating new sealing washers connect the brake hose to the master cylinder, as noted for removal, and tighten the union bolt to 25 Nm.



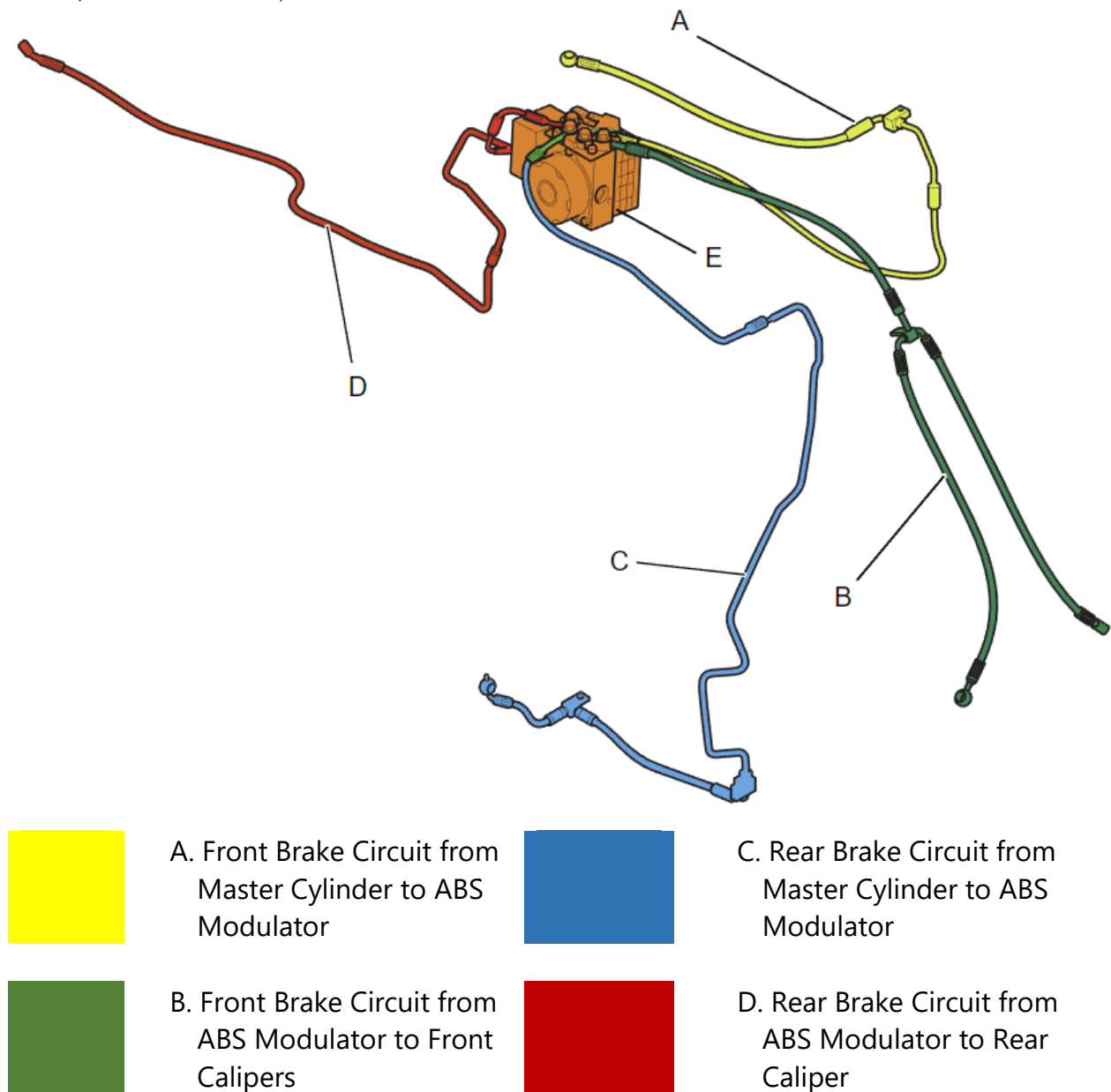
1. Union bolt
2. Sealing washers
3. Brake hose



4. Back bleed the rear brake master cylinder (see Master Cylinder Back Bleed in [Bleeding the Rear Brake](#)).
5. Bleed the rear brakes (see [Bleeding the Rear Brake](#)).
6. Check the front brakes for correct operation and fluid leaks. Rectify as necessary.

## Removal and Installation - ABS Components

### ABS Hydraulic Circuit Layout



## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

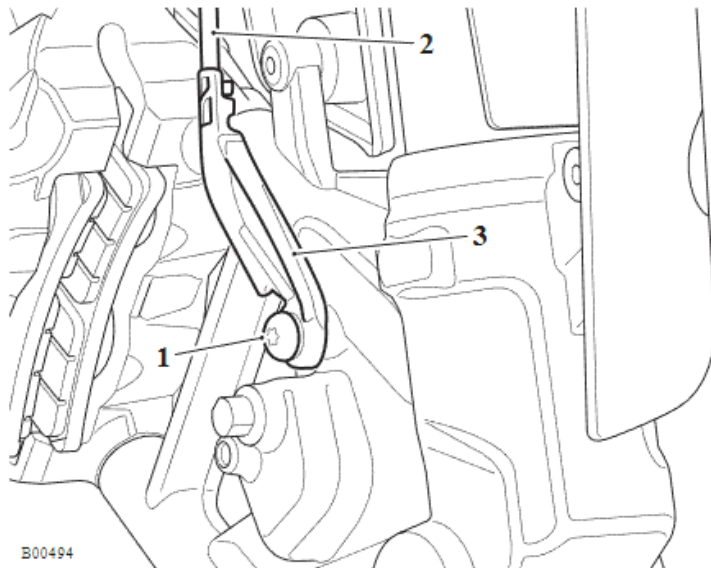
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Front Wheel - Removal](#)
- [Fuel Tank - Removal](#)

## **NOTICE**

Note the routing of the front ABS wheel speed sensor harness and its retaining clips for installation.

The front ABS wheel speed sensor multiplug is identified as the white connector located above the camshaft cover, near the left hand side.

1. Disconnect the front ABS wheel speed sensor multiplug from the main harness.
2. Route the sensor harness down to the front brake caliper.
3. Detach the sensor harness from the clips on the left front brake line.
4. Release the fixing, detach the wheel speed sensor harness and remove its conduit. Discard the fixing.



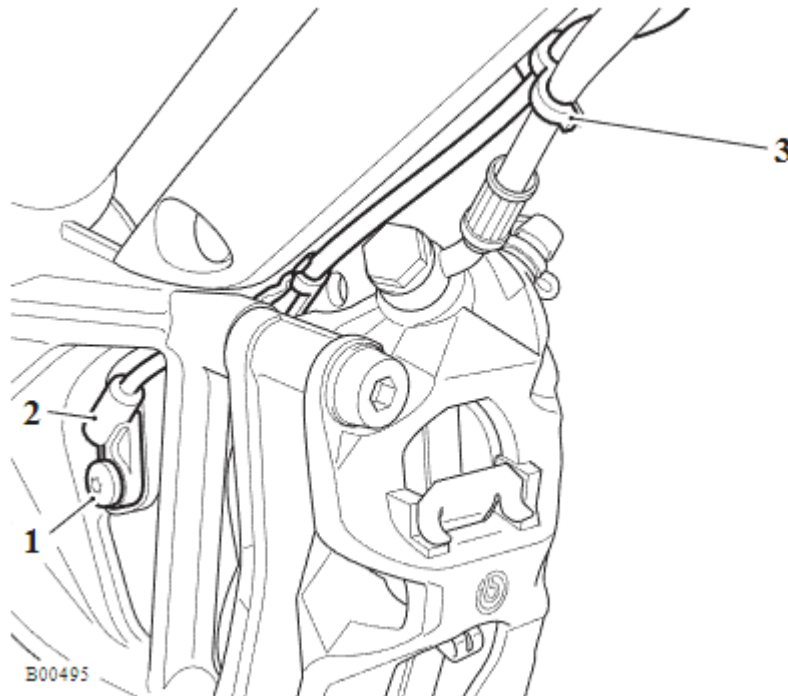
B00494

1. Fixing
2. Harness
3. Conduit

## NOTICE

There is a shim between the wheel speed sensor and the front fork leg.

5. Release the fixing securing the sensor to the fork leg.
6. Remove the sensor and collect the shim.



1. Fixing
2. Shim
3. Clip (one of three)

### Front ABS Wheel Speed Sensor – Installation

## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

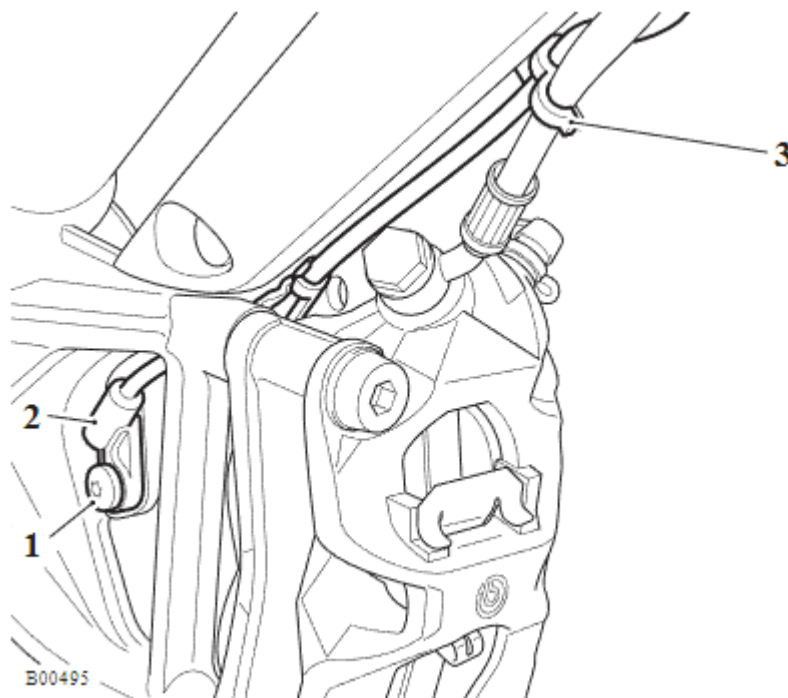
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## NOTICE

If adjustment is required, use the original fixing for the selection of the shim. Fit a new fixing when the new shim has been selected and fitted.

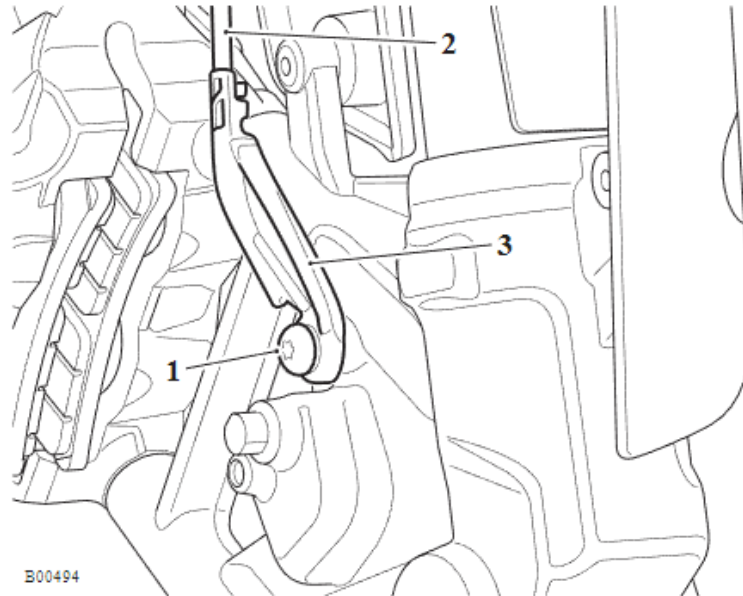
1. Position the wheel speed sensor and shim to the fork leg, as noted for removal. Fit the original fixing and tighten to 9 Nm.
2. Route the harness as noted for removal and connect the wheel speed sensor electrical connector to the main harness.
3. Attach the sensor harness to its clips on the left front brake line.



1. Fixing
2. Shim
3. Clip (one of three)

4. The air gap between the wheel speed sensor and the pulser ring must be between 0.37 mm and 1.23 mm. Check, and if necessary, adjust the air gap (see Air Gap Measurement).
5. If the air gap measurement is between 0.37 mm and 1.23 mm, remove the original fixing, fit a new fixing and tighten to 9 Nm.

6. Attach the wheel speed sensor conduit to the harness fit a new fixing and tighten to 9 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Harness</li><li>3. Conduit</li></ol> |
|---|

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Front ABS Pulsar Ring – Removal

### **⚠ WARNING**

Before starting work, make sure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

### **NOTICE**

The front ABS pulser ring is mounted on the front left hand brake disc.

1. Remove front brake disc and pulser ring (see [Front Brake Disc - Removal](#)).

## Front ABS Pulsar Ring – Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

## Front ABS Pulsar Ring – Installation

### **WARNING**

Before starting work, make sure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the front brake disc and pulser ring (see [Front Brake Disc - Installation](#)).

## Rear ABS Wheel Speed Sensor – Removal

### **WARNING**

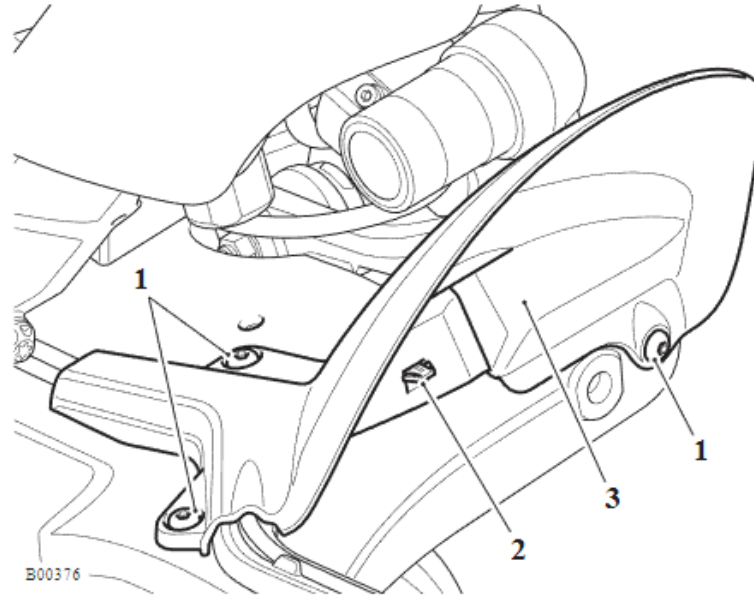
Before starting work, make sure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Wheel - Removal](#)

1. Release the three fixings and detach the hugger from the swinging arm.

2. Detach the rear wheel speed sensor connector and remove the hugger.

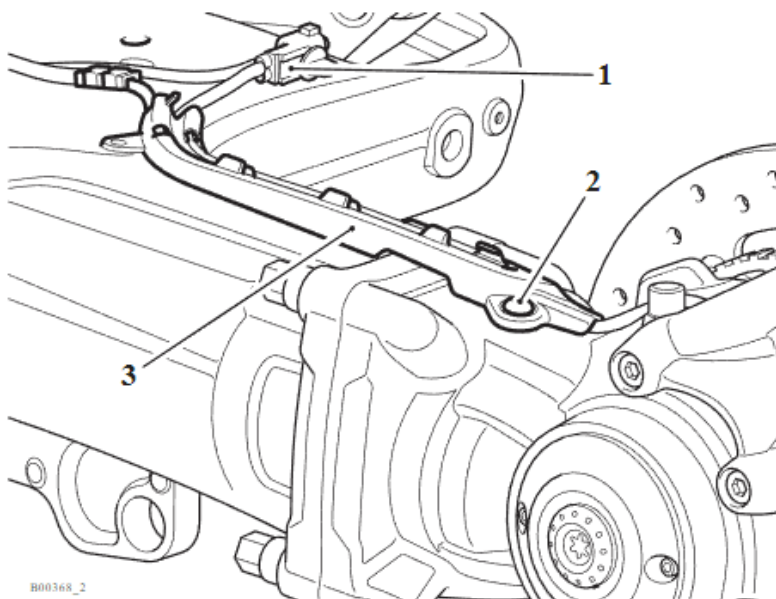


1. Fixings
2. Connector
3. Hugger

### NOTICE

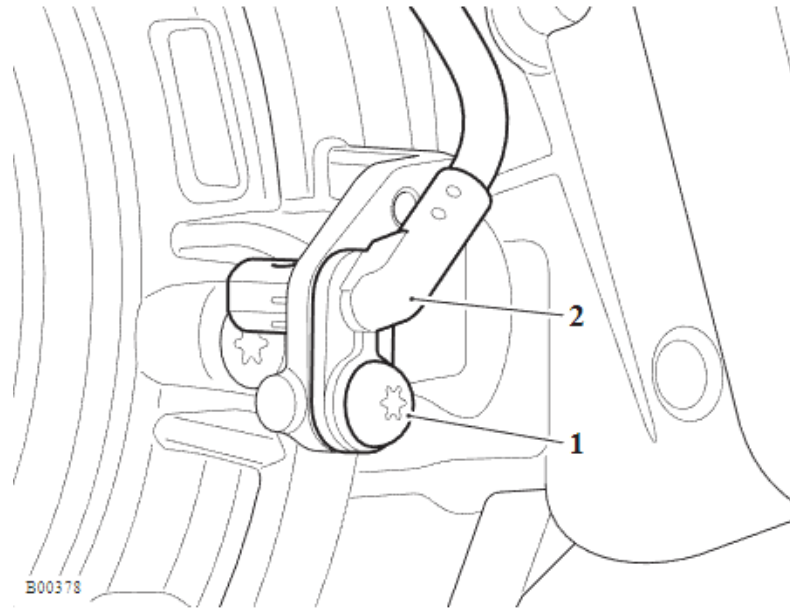
Note the routings of the harnesses and brake line on the harness guide for installation.

3. Disconnect the rear ABS wheel speed sensor from the main harness.
4. Release the fixing and remove the harness guide.



1. ABS wheel speed sensor connector
2. Fixing
3. Harness guide

5. Release the fixing and remove the rear ABS wheel speed sensor. Discard the fixing.



- 1. Fixing
- 2. Wheel speed sensor

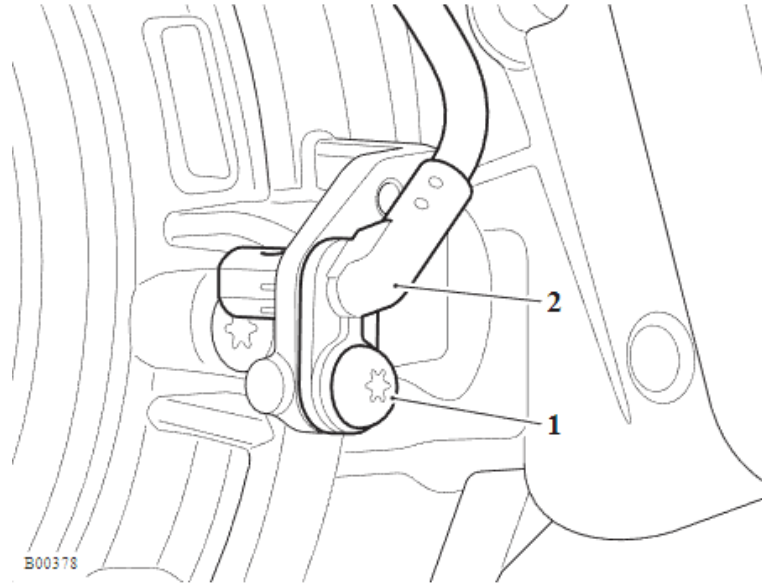
#### Rear ABS Wheel Speed Sensor – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

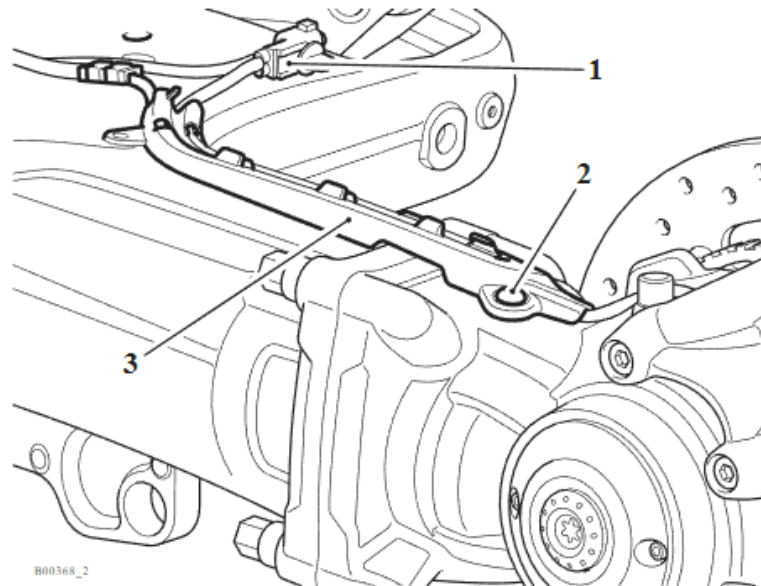


1. Fit the rear wheel speed sensor and tighten its new fixing to 9 Nm.



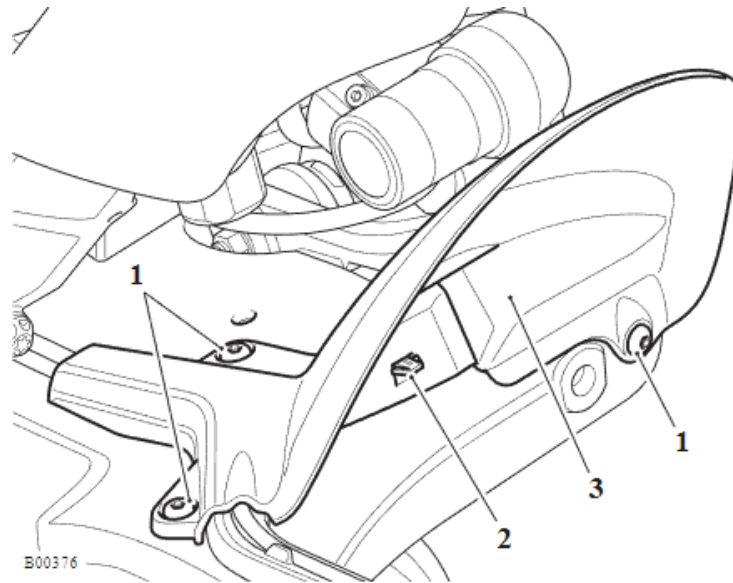
1. Fixing
2. Wheel speed sensor

2. Connect the rear ABS wheel speed sensor to the main harness.
3. With the harnesses and brake line routed as noted for removal, fit the harness guide and secure with a new fixing. Do not fully tighten at this stage.
4. Attach the rear brake line to the harness guide on the swinging arm.



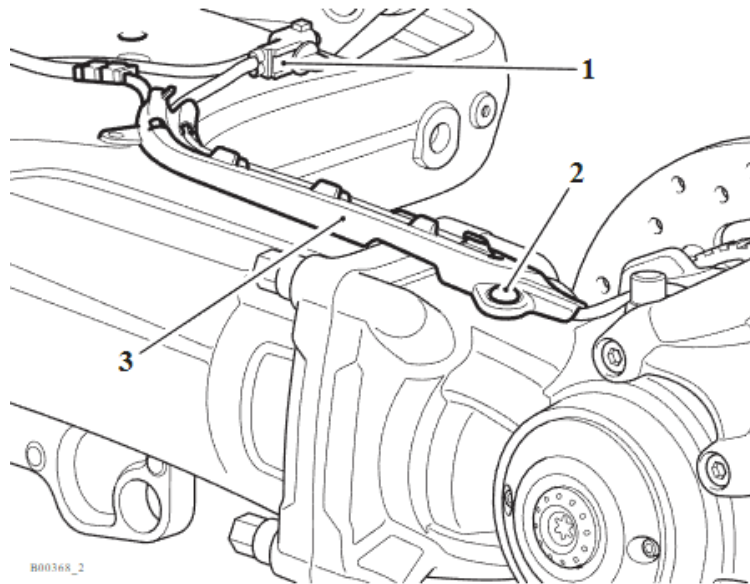
1. ABS wheel speed sensor connector
2. Fixing
3. Harness guide

5. Attach the rear wheel speed sensor connector to the hugger.
6. Position the hugger to the swinging arm. Make sure the left hand fixing hole aligns with the harness guide fixing hole.
7. Fit the new fixings and tighten to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Connector</li><li>3. Hugger</li></ol> |
|---|

8. Tighten the harness guide rear fixing to 3 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. ABS wheel speed sensor connector</li><li>2. Fixing</li><li>3. Harness guide</li></ol> |
|--|

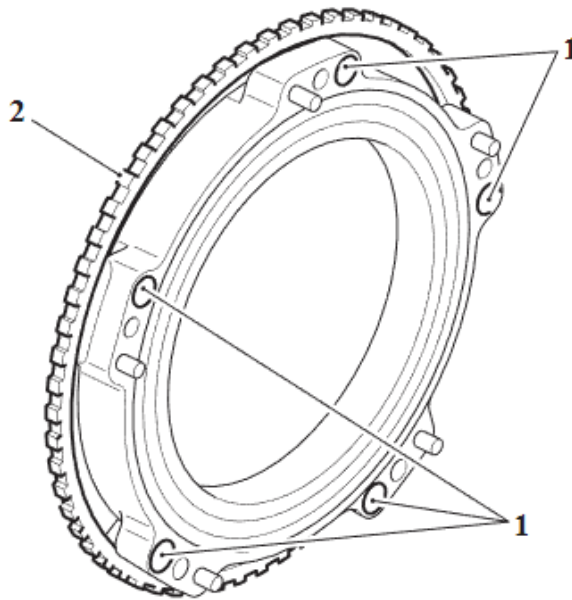
**⚠ WARNING**

Before starting work, make sure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Cush Drive - Removal**

1. Release the five fixings and remove the pulser ring. Discard the fixings.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Pulser ring</li></ol> |
|---|

## Rear ABS Pulsar Ring – Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

## Rear ABS Pulsar Ring – Installation

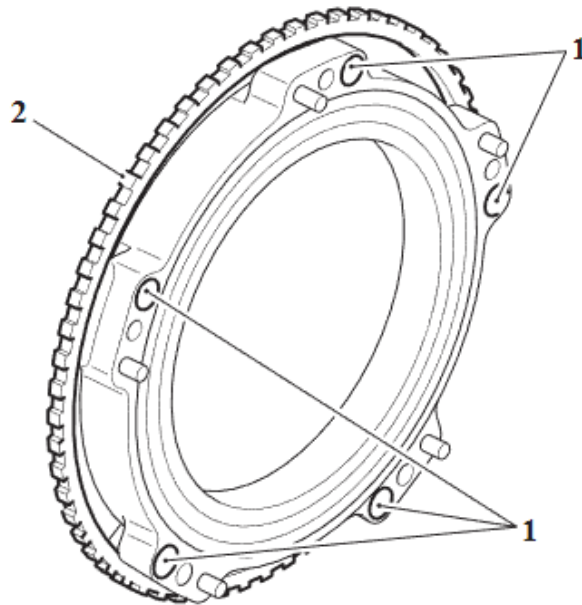
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the pulser ring to the bearing housing and tighten the new fixings to 4 Nm.



1. Fixings
2. Pulsar ring

Perform the following operations:

- [Cush Drive - Installation](#)

## **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

- Check for correct brake operation.

### ABS Hydraulic Modulator/ECM – Removal

## **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

## **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Evaporative Canister - Removal](#)
- [Rear Wheel - Removal](#)

## NOTICE

The brake caliper will require removing and the pistons pushed out to back bleed the master cylinder as part of the brake bleeding procedure, see [Bleeding the Front Brakes](#) and [Bleeding the Rear Brake](#).

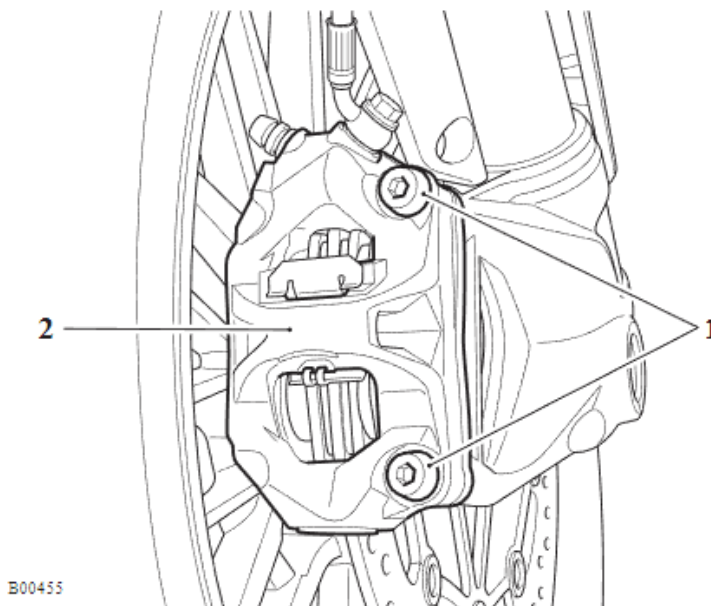
## ⚠ WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

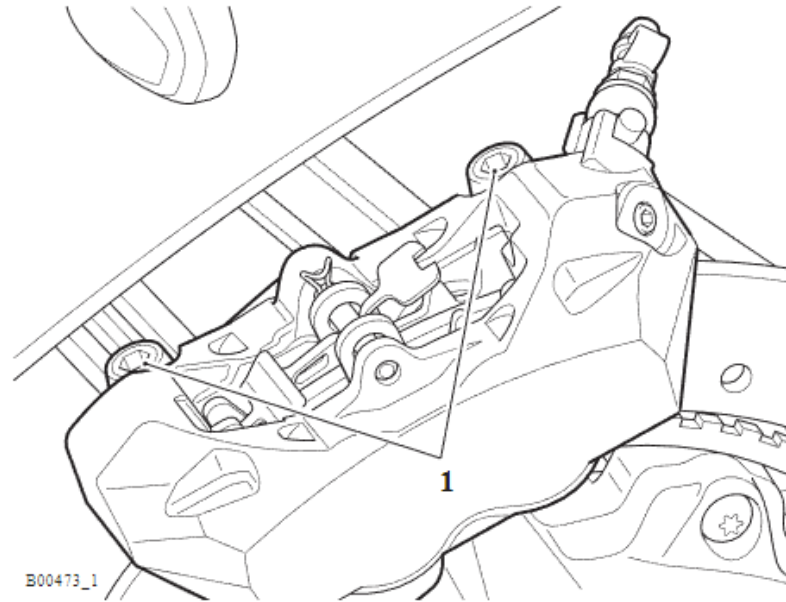
1. Remove the front brake caliper mounting bolts and slide the caliper off the brake disc.



1. Caliper mounting bolts
2. Caliper

2. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the front brake lever until the plate is held by the brake pads.

3. Release the rear brake caliper mounting bolts and slide the caliper off the brake disc.



1. Caliper mounting bolts

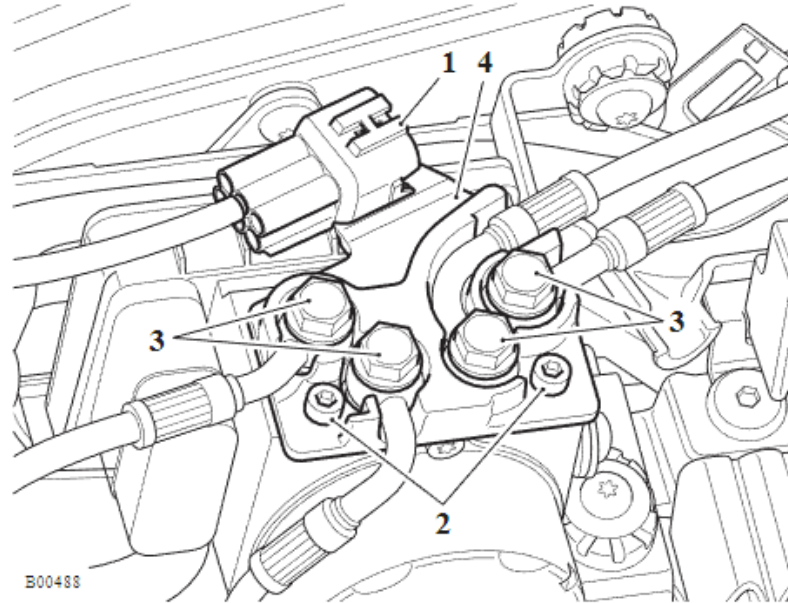
4. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the rear brake pedal until the plate is held by the brake pads.

**NOTICE**

Note the position of the four brake lines on the ABS modulator for installation.

5. Disconnect the ABS modulator multiplug (see [ABS Electrical Connectors](#)).
6. Detach the fuel tank electrical connector from the anti-rotation moulding.
7. Remove and discard the fixings for the anti-rotation moulding.

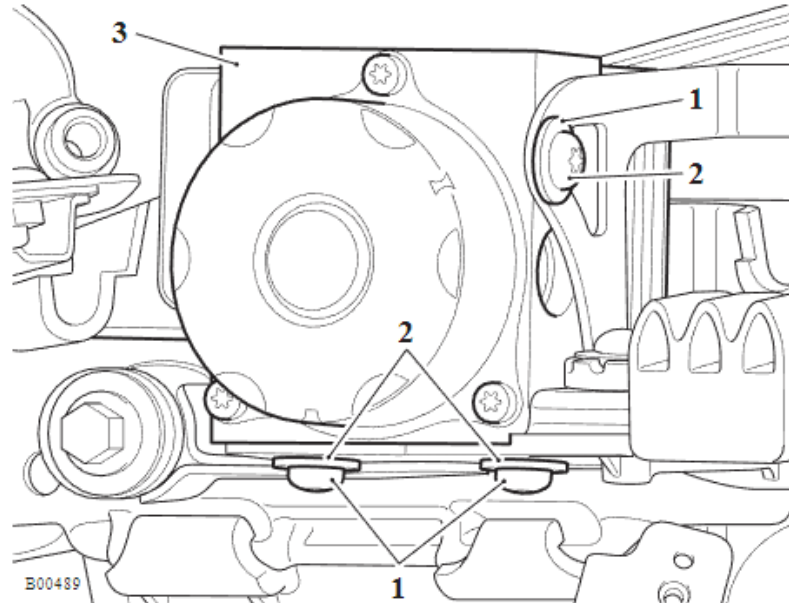
8. Remove the four brake line unions and the anti-rotation moulding. Discard the sealing washers.



- |   |
|---|
| <ol style="list-style-type: none"><li>2. Fuel tank electrical connector</li><li>3. Fixings</li><li>4. Brake line unions</li><li>5. Anti-rotation moulding</li></ol> |
|---|



9. Release the three fixings, collect the washers and remove the ABS modulator. Discard the fixings.



1. Fixings
2. Washers
3. ABS modulator

#### ABS Hydraulic Modulator/ECM - Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

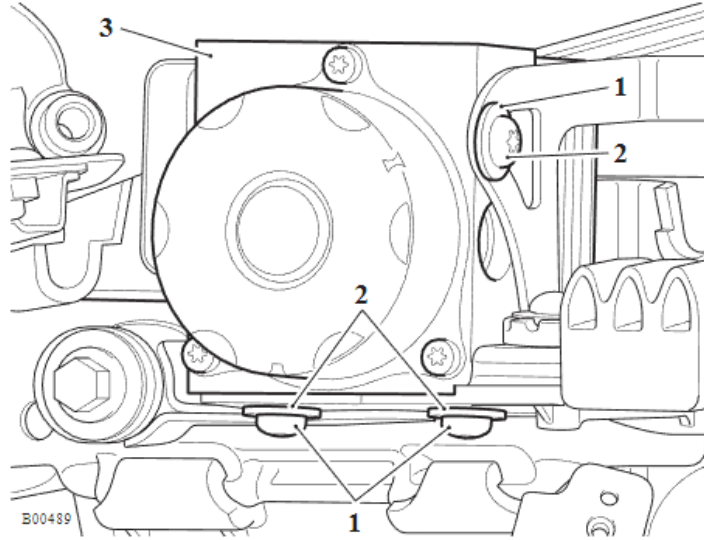
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ CAUTION**

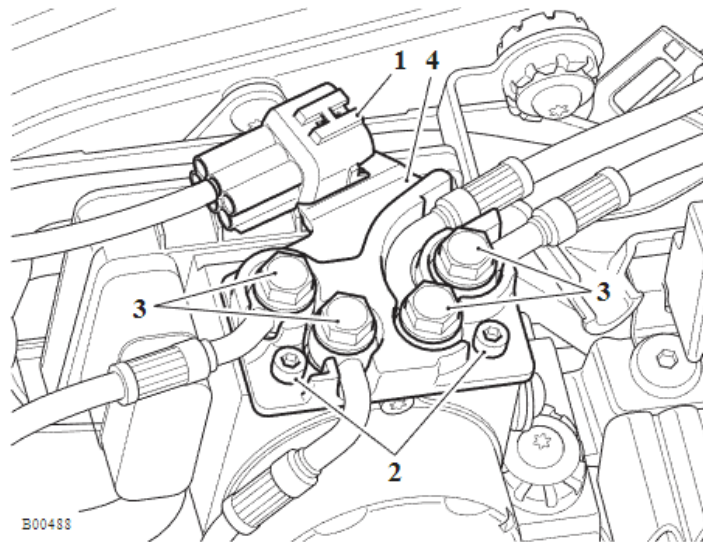
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Position the ABS modulator onto its bracket. Fit the washers and tighten the new fixings to 9 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Washers</li><li>3. ABS modulator</li></ol> |
|--|

2. Fit the anti-rotation moulding and tighten the new fixings to 5 Nm.
3. Incorporating new sealing washers to either side of the unions, fit the brake lines to the ABS modulator as noted for removal. Tighten the brake line unions to 25 Nm.
4. Attach the fuel tank electrical connector to the anti-rotation moulding.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fuel tank electrical connector</li><li>2. Fixings</li><li>3. Brake line unions</li><li>4. Anti-rotation moulding</li></ol> |
|---|

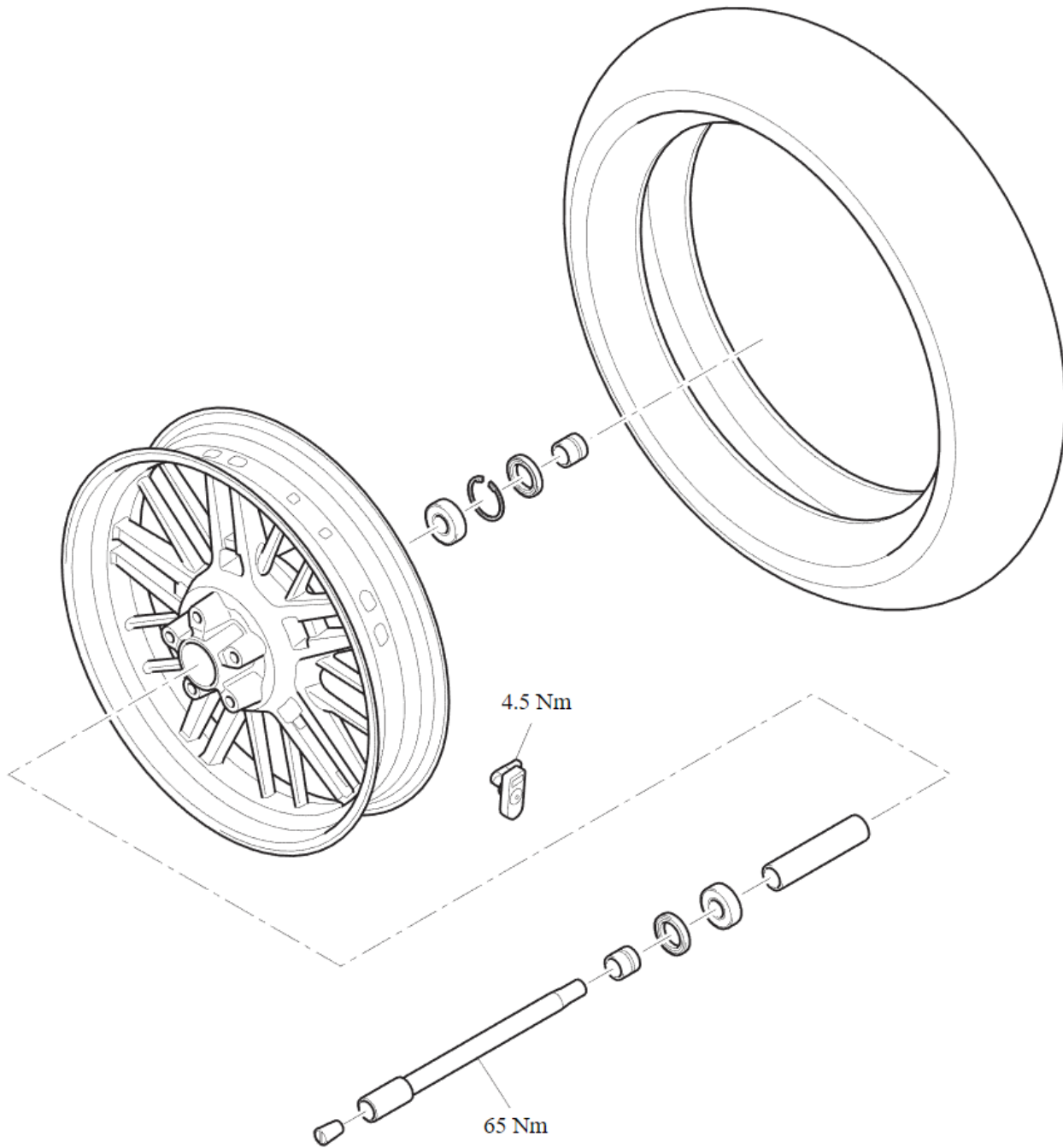
5. Connect the ABS modulator multiplug (see [ABS Electrical Connectors](#)).
6. Back bleed the front brake master cylinder (see Master Cylinder Back Bleed in [Bleeding the Front Brakes](#)).
7. [Front Brake Caliper - Installation](#)
8. Bleed the front brakes (see [Bleeding the Front Brakes](#)).
9. [Rear Brake Caliper - Installation](#)
10. Back bleed the rear brake master cylinder (see Master Cylinder Back Bleed in [Bleeding the Rear Brake](#)).
11. Bleed the rear brakes (see [Bleeding the Rear Brake](#)).
12. Check the front and rear brakes for correct operation and fluid leaks. Rectify as necessary.

Perform the following operations:

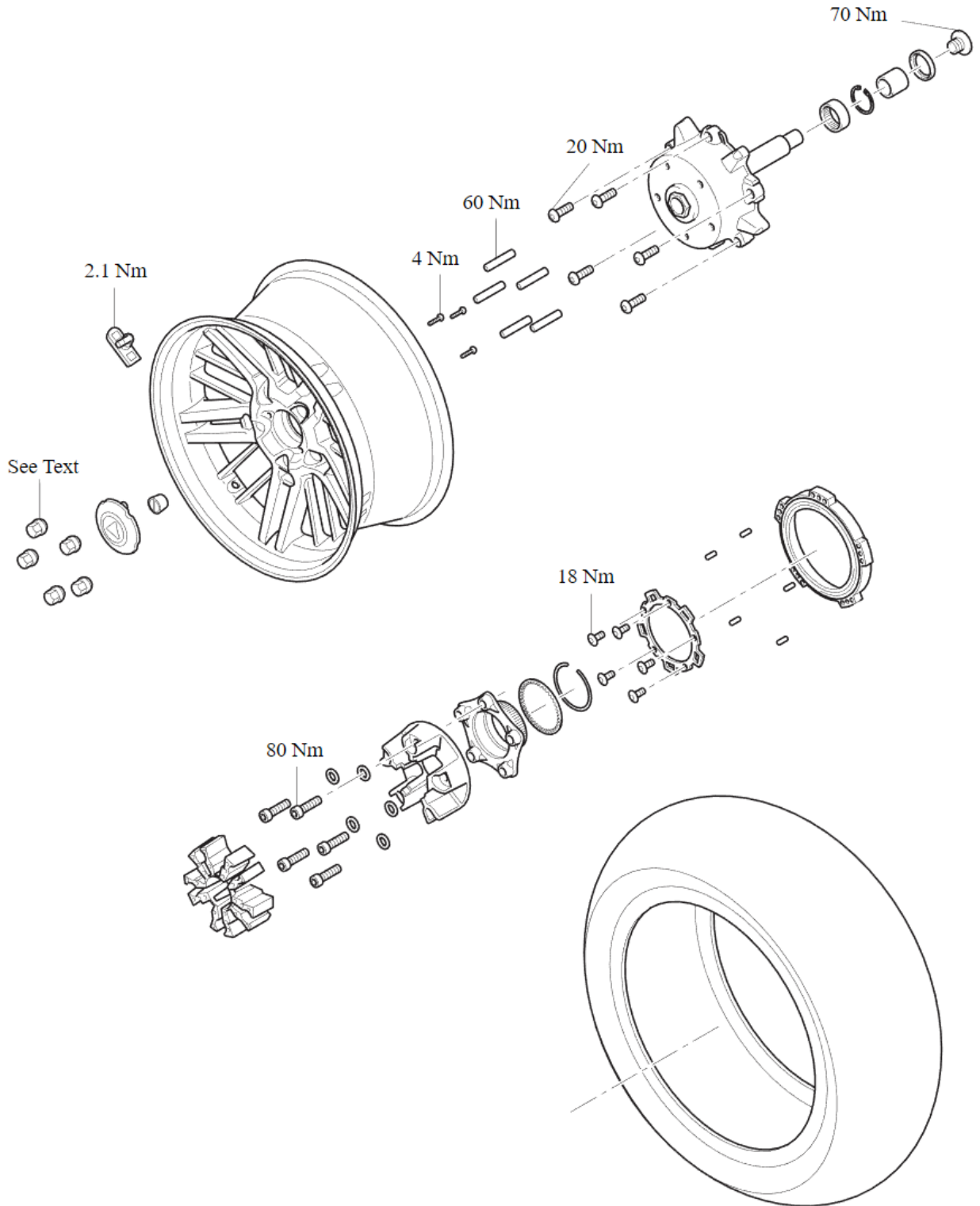
- [Evaporative Canister - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

# Wheels and Tyres

## Exploded View - Front Wheel



# Exploded View - Rear Wheel



## Tyres

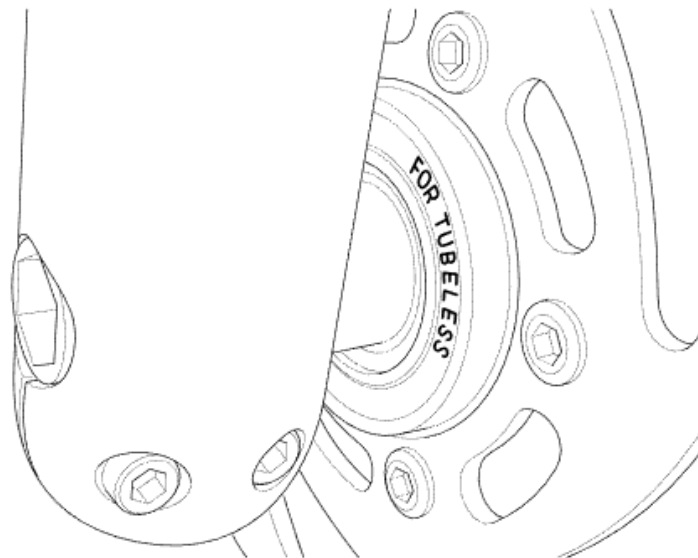
This model is fitted with tubeless tyres, valves and wheel rims. Use only tyres marked 'TUBELESS' and tubeless valves on rims marked 'SUITABLE FOR TUBELESS TYRES'.

### **⚠ WARNING**

Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing rapid tyre deflation that may result in a loss of vehicle control and an accident. Never install an inner tube inside a tubeless tyre. This will cause friction inside the tyre and the resulting heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.



Typical Tyre Marking -Tubeless Tyre



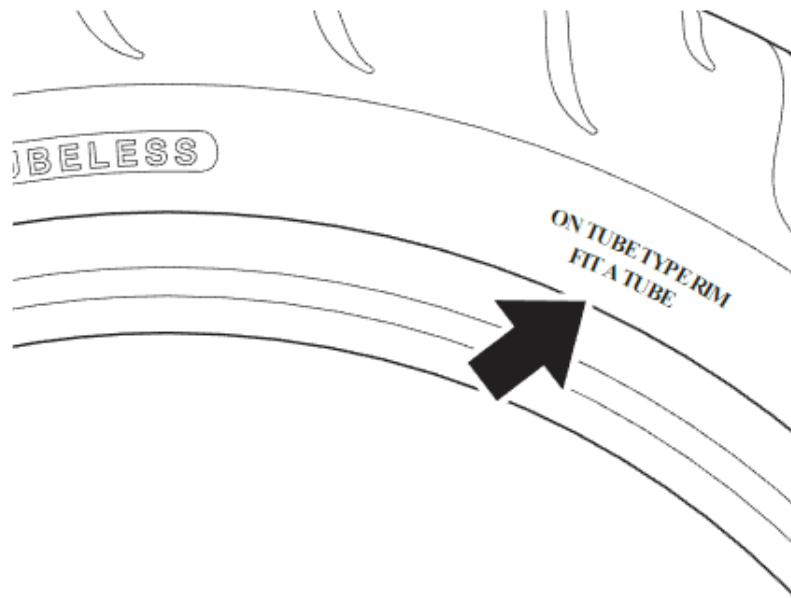
## Typical Wheel Marking - Tubeless Tyre

### **⚠ WARNING**

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE TYPE'.

Some brands of approved tyres marked 'TUBELESS' may be suitable for use with an inner tube. Where this is the case, the tyre wall will be marked with text permitting the fitment of an inner tube (see illustration below).

Use of an inner tube with a tyre marked 'TUBELESS', and NOT marked as suitable for use with an inner tube, or use of an inner tube on an alloy wheel marked 'SUITABLE FOR TUBELESS TYRES' will cause deflation of the tyre resulting in loss of motorcycle control and an accident.



Typical Tyre Marking - Tubeless Tyre Suitable For Use With An Inner Tube

**⚠ WARNING**

Incorrect tyre inflation will cause abnormal tread wear and instability problems that may lead to loss of control and an accident.

Under inflation may result in the tyre slipping on, or coming off the rim. Overinflation will cause instability and accelerated tread wear.

Both conditions are dangerous as they may cause loss of control leading to an accident.

**⚠ WARNING**

Tyre pressures which have been reduced for off-road riding will impair on-road stability.

Always make sure that the tyre pressures are set as described in the Specification section for on-road use.

Operation of the motorcycle with incorrect tyre pressures may cause loss of motorcycle control and an accident.

Correct inflation pressure will provide maximum stability, rider comfort and tyre life. Always check tyre pressures before riding when the tyres are cold. Check tyre pressures daily and adjust if necessary. See the Specification section for details of the correct inflation pressures.



## Minimum Recommended Tread Depth

### **WARNING**

Riding with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control and an accident.

When tubeless tyres, used without a tube, become punctured, leakage is often very slow. Always inspect tyres very closely for punctures. Check the tyres for cuts, embedded nails or other sharp objects. Riding with punctured or damaged tyres will adversely affect motorcycle stability and handling which may lead to loss of control or an accident.

Check the rims for dents or deformation. Riding with damaged or defective wheels or tyres is dangerous and may lead to loss of control and an accident.

Always consult your authorised Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

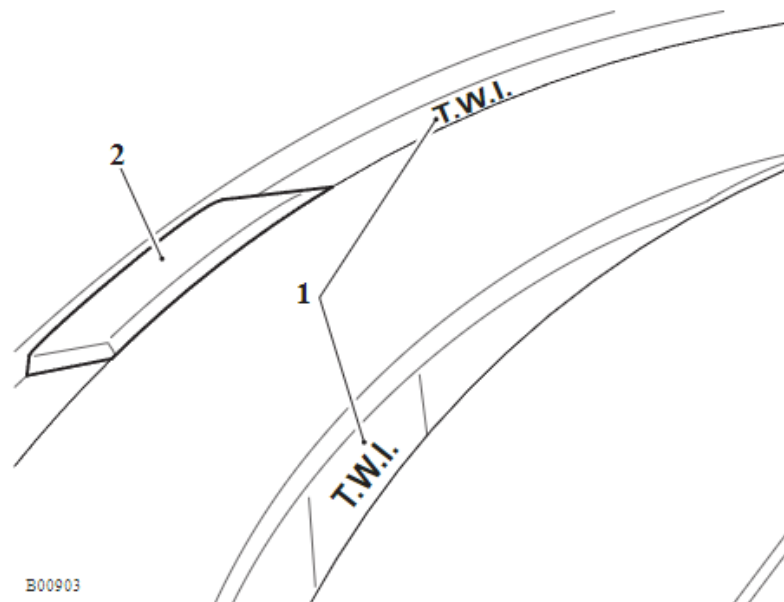
In accordance with the periodic maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum allowable tread depth specified in the table below:

|                         |  |
|-------------------------|--|
| Under 80 mph (130 km/h) | 2 mm (0.08 in)                           |
| Over 80 mph (130 km/h)  | Front 2 mm (0.08 in) Rear 3 mm (0.12 in) |

### **NOTICE**

Triumph recommends the use of a tyre depth gauge to measure the depth of the tread.

For this model the part of the rear tyre tread pattern looks like a tyre wear indicator. The actual tyre wear indicator has the letters T.W.I. on it, see illustration below.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Tyre wear indicator (TWI)</li><li>2. Tread pattern</li></ol> |
|---|

### Important Tyre Information

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the internet at [www.triumph.co.uk](http://www.triumph.co.uk).

### **⚠ WARNING**

The ABS computer operates by comparing the relative speed of the front and rear wheels. Use of non-recommended tyres can affect wheel speed and cause the ABS function not to operate, potentially leading to loss of motorcycle control and an accident in conditions where the ABS would normally function.

**⚠ WARNING**

Always check tyre pressures before riding when the tyres are cold. Operation with incorrectly inflated tyres may affect handling leading to loss of control and an accident.

**⚠ WARNING**

Operation with excessively worn or damaged tyres will adversely affect handling and control leading to loss of control or an accident.

**⚠ WARNING**

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE-TYPE' unless marked otherwise.

Use of an inner tube with a tyre marked 'TUBELESS' without appropriate marking and/or on an alloy wheel can lead to loss of motorcycle control and an accident.

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the internet at [www.triumph.co.uk](http://www.triumph.co.uk).

## WARNING

If a tyre or inner tube sustains a puncture, the tyre and inner tube must be replaced together. Failure to replace a punctured tyre and inner tube together, or operation with a repaired tyre or inner tube can lead to instability, loss of motorcycle control or an accident.

If tyre or inner tube damage is suspected, such as after striking the kerb, ask your authorised Triumph dealer to inspect the tyre both internally and externally and to also inspect the inner tube. Remember, tyre damage may not always be visible from the outside. Operation of the motorcycle with damaged tyres could lead to loss of motorcycle control and an accident.

When replacing a 'TUBE-TYPE' tyre on a spoked wheel, always inspect the rim tape (rim protection band) to ensure that it is correctly protecting the tube from the spoke threads. A damaged rim tape may lead to rapid tyre deflation causing loss of control and an accident.

## WARNING

Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing tyre deflation that may result in a loss of motorcycle control and an accident.

Do not install an inner tube inside a tubeless tyre unless it is clearly marked on the side wall that you can do so. This may cause instability and excessive heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.

## WARNING

The use of tyres other than those listed at your authorised Triumph dealer, or on the internet, at [www.triumph.co.uk](http://www.triumph.co.uk), may adversely affect handling leading to loss of motorcycle control or an accident. Use the recommended tyre options only in the combinations listed at your authorised Triumph dealer, or on the internet at [www.triumph.co.uk](http://www.triumph.co.uk). Do not mix tyres from different manufacturers or tyres from the same manufacturer but from another option.

## **WARNING**

Accurate wheel balance is important for safe, stable handling of the motorcycle. Do not remove or change any wheel balance weights. Incorrect wheel balance may cause instability leading to loss of motorcycle control and an accident.

When wheel balancing is required, such as after tyre replacement, see your authorised Triumph dealer.

Only use self-adhesive weights. Clip-on weights will damage the wheel and tyre potentially resulting in tyre deflation, loss of motorcycle control and an accident.

## **WARNING**

When replacement tyres are required, consult your authorised Triumph dealer who will arrange for the tyres to be fitted according to the tyre manufacturer's instructions.

When tyres are replaced, allow time for the tyre to seat itself to the rim (approximately 24 hours). During this seating period, ride cautiously as an incorrectly seated tyre could cause loss of motorcycle control or an accident. Initially, the new tyre will not produce the same handling characteristics as the worn tyre and the rider must allow adequate riding distance (approximately 100 miles/160 km) to become accustomed to the new handling characteristics.

After both 24 hours and 100 miles (160 km), the tyre pressures should be checked and adjusted and the tyre examined for correct seating and rectified as necessary.

Use of a motorcycle when not accustomed to its handling characteristics, with incorrect tyre pressures or an incorrectly seated tyre is dangerous and may lead to loss of motorcycle control and an accident.

## Front Wheel – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **WARNING**

Do not allow the brake caliper to hang on the brake hose as this may damage the hose.

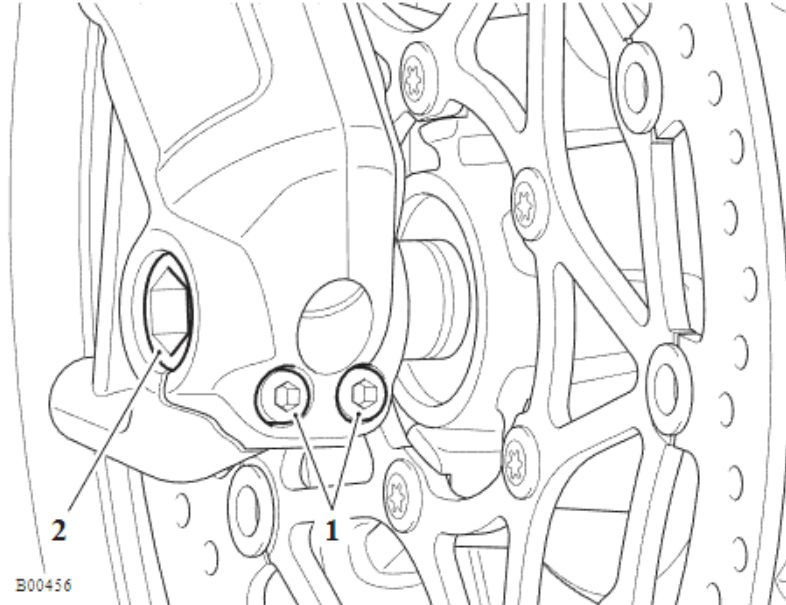
Damaged hoses could cause brake failure leading to loss of motorcycle control and an accident.

### **NOTICE**

It is not necessary to disconnect the brake hoses.

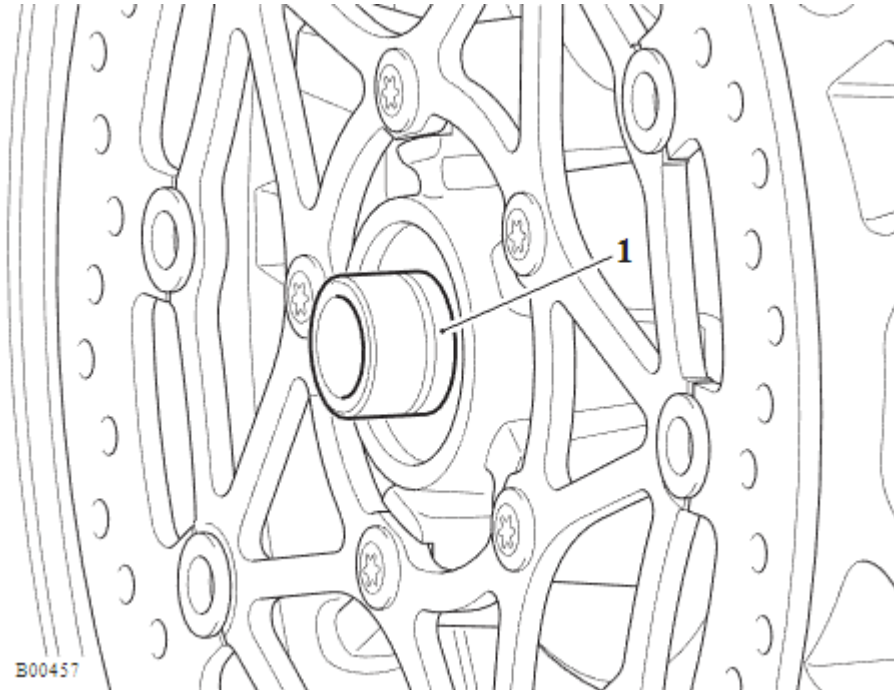
1. Raise and support the front of the motorcycle to allow removal of the front wheel.
2. Detach and support the front brake calipers (see [Front Brake Pads - Removal](#)).
3. Loosen the pinch bolts at the lower end of the right hand fork.

4. Working from the right hand side, release and remove the wheel spindle which is threaded into the left hand fork.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Pinch bolts</li><li>2. Wheel spindle</li></ol> |
|---|

5. Remove the wheel, recovering the spacers from both sides.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Spacer (right hand shown)</li></ol> |
|--|

## **⚠ WARNING**

Do not allow the wheel to rest on the brake disc as this may damage the disc leading to loss of motorcycle control and an accident.

## **⚠ CAUTION**

To prevent wheel and wheel bearing damage, ensure dirt and debris are not allowed to enter the wheel bearings.

6. Place the wheel on wooden blocks to prevent damage to the brake discs.
7. Thoroughly clean all components and inspect for wear or damage.

### Front Wheel – Installation

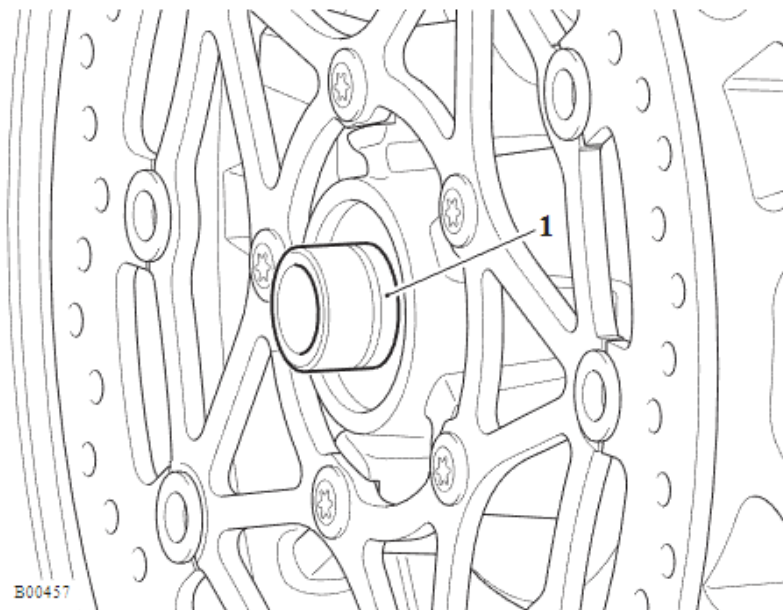
## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Lightly smear the spacers with grease and locate into the left hand and right hand sides of the hub.



1. Spacer (right hand shown)



2. Position the wheel between the forks.
3. Raise the wheel until it is in alignment with the spindle holes in both forks. Take care to not dislodge the spacers.
4. Refit the wheel spindle from the right hand side and tighten to 65 Nm.
5. Thoroughly clean and degrease the brake discs.
6. Refit the front brake calipers (see [Front Brake Pads - Installation](#)).
7. Check the operation of the front brake. Rectify as necessary.

### **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

#### Front Wheel Bearings – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **CAUTION**

Do not allow the wheel to rest on the brake discs, as this may damage the discs. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake discs are raised above the ground.

Perform the following operations:

- [Front Wheel - Removal](#)

1. Place the wheel on wooden blocks to prevent damage to the brake discs.
2. Remove and discard the seals.

- Remove and discard the bearing circlip on the left hand side of the wheel.

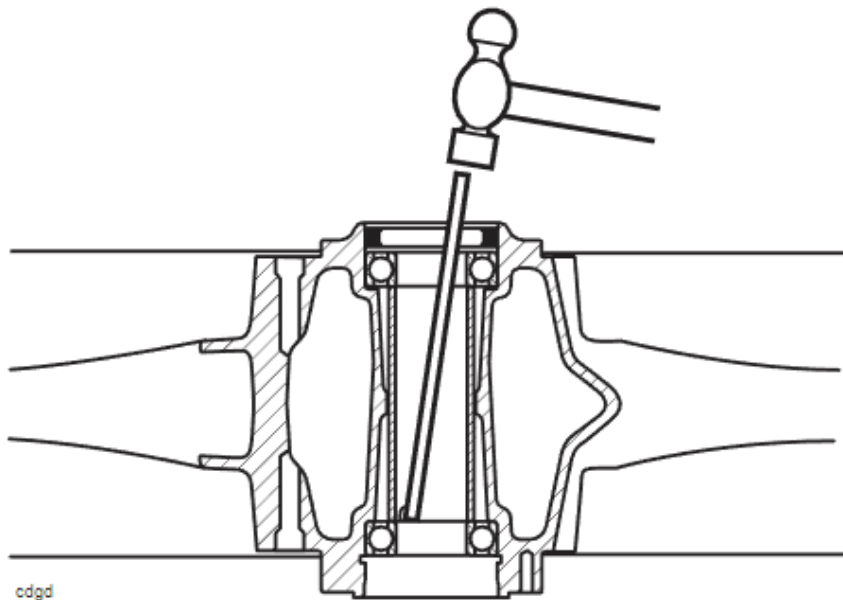
**⚠ WARNING**

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

**⚠ CAUTION**

To prevent wheel damage and to aid bearing removal, always apply force evenly on both sides of the bearing to prevent it from 'tipping' and becoming stuck. Application of uneven force will lead to difficulty in removing the bearing and to a damaged wheel.

- Using a suitable pin punch, through the centre of the wheel, drift out the wheel bearings. Collect the centre sleeve.



Wheel Bearing Removal

## Wheels – Inspection

### **WARNING**

Only remove raised witness marks from within the wheel. Removal of material below any raised areas will reduce the level of interference between the wheel and the bearings. Loss of interference could cause the bearing to become loose in the wheel leading to loss of motorcycle control and an accident.

1. Examine the wheel for any raised witness marks caused by the bearing removal process. Remove any such marks with fine emery paper or a gentle file.

## Wheel Bearings – Inspection

1. Check the wheel bearings spin smoothly with no signs of play. If not, renew the bearings.

## Front Wheel Bearings – Installation

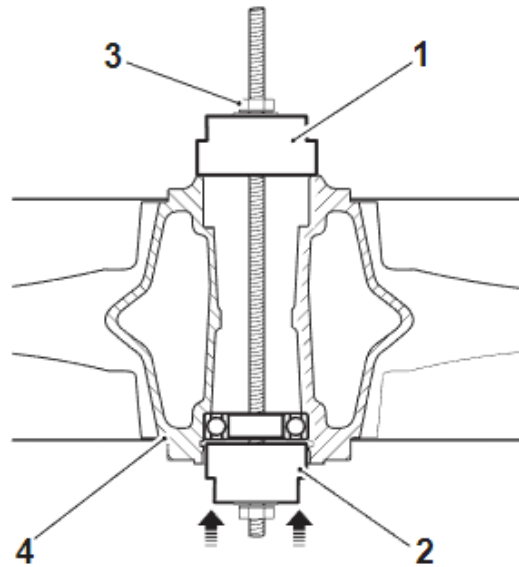
### **NOTICE**

Bearings are inserted by means of a draw bolt acting on the insertion tool. A support tool is located on the opposite side of the wheel to the insertion tool and as the bolt is tightened, the bearing is drawn into the wheel.

Always fit a new bearing circlip and seals.

1. Assemble the wheel bearing to the side of the wheel with the circlip groove and the installation tools as noted in the diagram below.

- Support the wheel and tighten the nut (3) drawing in the bearing until it is fully located against the inner face of the wheel.

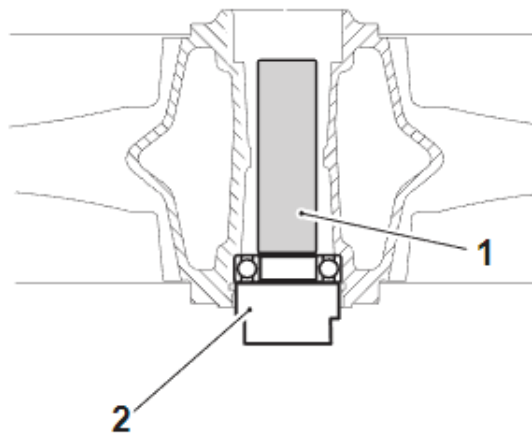


- 1. T3880075 - Bearing Installer
- 2. T3880053 - Wheel Bearing Extraction Kit
- 3. Nut and washer
- 4. Wheel

**NOTICE**

Check that the spacer is centrally positioned against the inner wheel bearing race.

- Support the previously installed wheel and bearing using service tool T3880053 and fit the spacer.



- 1. Spacer
- 2. T3880053 – Wheel Bearing Extraction Kit

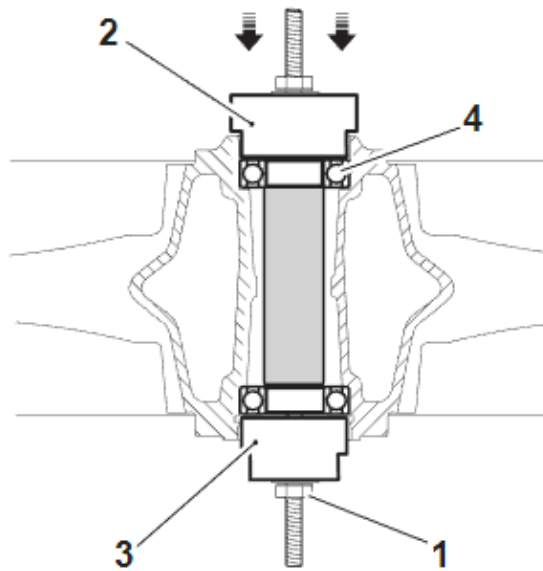
## **⚠ CAUTION**

Do not allow the spacer to become misaligned.

A misaligned spacer may cause the wheel bearings inner and outer races to be misaligned during installation.

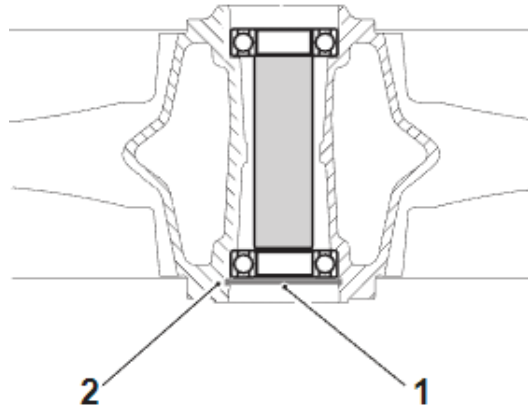
Premature wear and irreparable damage to components may be caused by incorrectly installed wheel bearings.

4. Support the previously installed wheel bearing using service tool T3880053 and using service tool T3880070, tighten the nut to draw the remaining wheel bearing into the wheel until it is fully seated.



1. Nut and washer
2. T3880070 - Bearing Installer
3. T3880053 - Wheel Bearing Extraction Kit
4. Wheel bearing

5. Fit a new circlip into the groove on the opposite side of the wheel.

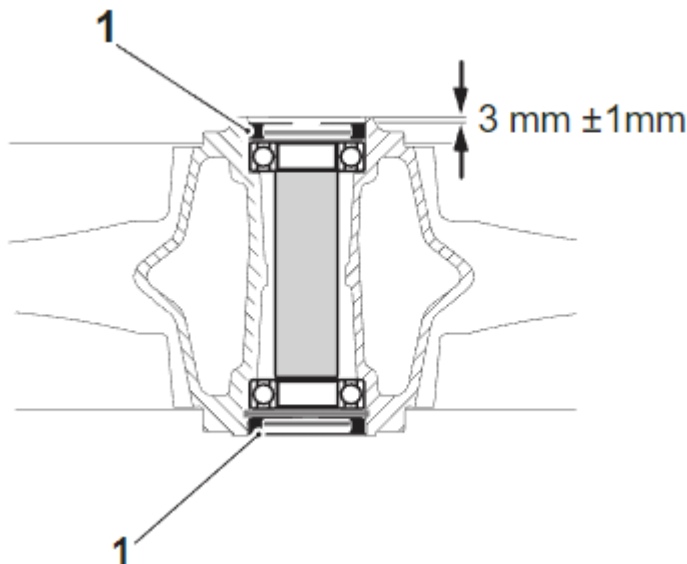


- 1. Circlip
- 2. Circlip groove

**NOTICE**

Circlip side: Install the seal until its outer circumference just touches the circlip.  
Chamfered side: Install the dust seal until the outer surface is positioned 3mm below the surface of the wheel edge.

6. Lubricate and fit new dust seals to the front wheel. Lubricate the seal's knife-edge with grease to NLGI 2 specification.



- 1. Dust seal

## Rear Wheel – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

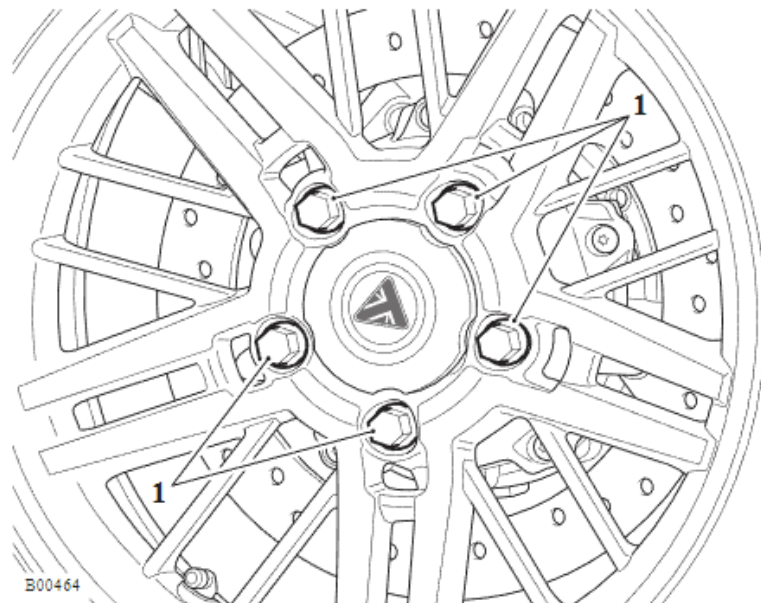
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ WARNING**

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries

1. Raise and support the rear of the motorcycle to allow removal of the rear wheel.
2. Release the five nuts and remove the rear wheel.



1. Wheel nuts

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

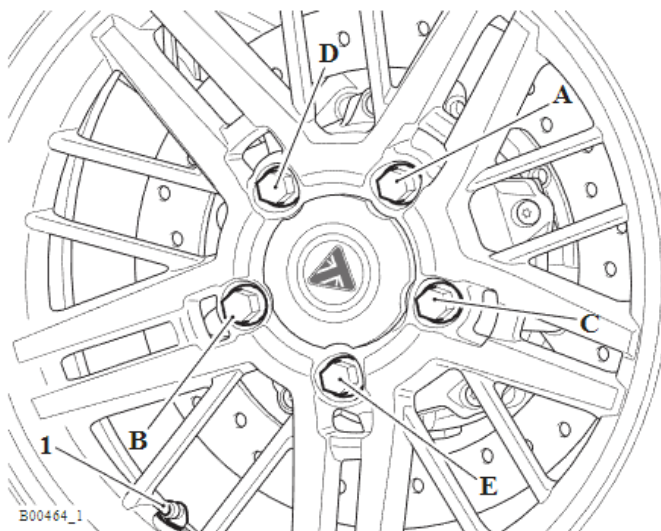
1. Lift the rear wheel into position, aligning the wheel, onto the five studs on the final drive unit.
2. Loosely fit the wheel nuts.
3. Using the tyre valve as a reference point, tighten the wheel nuts in the following two stages:

**Stage 1**

4. Tighten the fixings A to E in the sequence shown to 25 Nm.

**Stage 2**

4. Tighten the fixings A to E in the sequence shown to 100 Nm.



**Rear Wheel Nut Tightening Sequence**  
1. Tyre valve location



5. Lower the motorcycle to the ground.
6. Check the operation of the rear brake. Rectify as necessary.
7. Inform the owner to check and, if necessary, tighten the rear wheel nuts to 100 Nm.

#### Tyre Pressure Sensor - Removal - (if fitted)

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

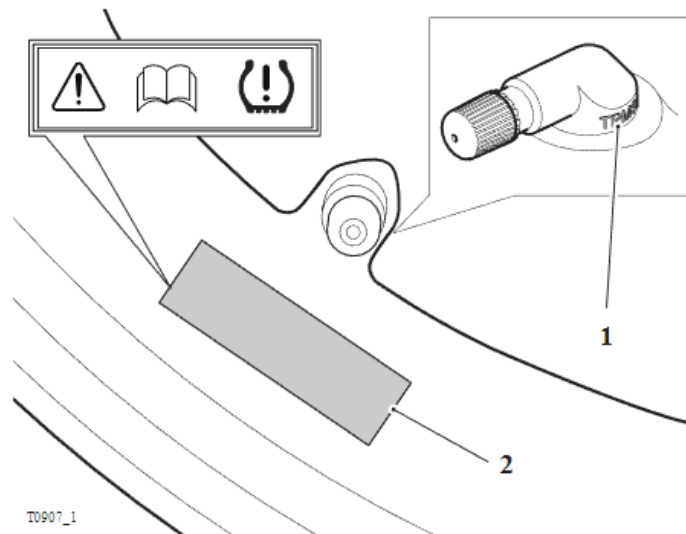
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

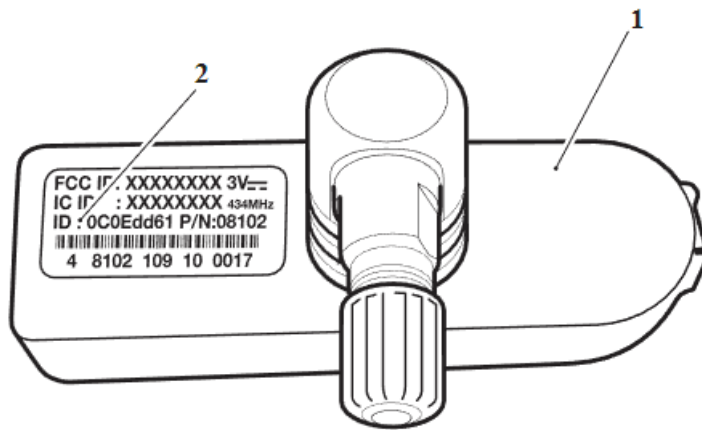
The method for the removal of the tyre pressure sensor is the same for the front and rear wheels.

Wheels fitted with a tyre pressure sensor can be identified with the letters TPMS on the side of the tyre valve and/or with a warning label near the tyre valve, as shown in the illustration below.



1. TPMS on tyre valve
2. Warning label

If fitting new wheels and using the original tyre pressure sensors, make a note of the front and rear pressure sensor serial numbers to ensure they are fitted to the correct wheel.



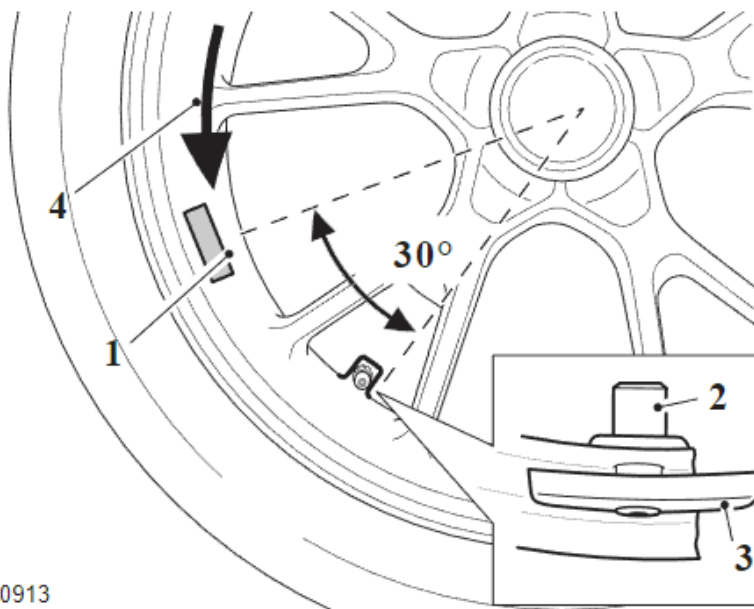
- 1. Tyre pressure sensor
- 2. ID number

Perform the following operations:

- [Front Wheel - Removal](#)
- [Rear Wheel - Removal](#)

1. For the removal of the tyre note the following:

- The tyre lever/removal tool must start 30° away from the tyre valve and move away from the tyre valve.



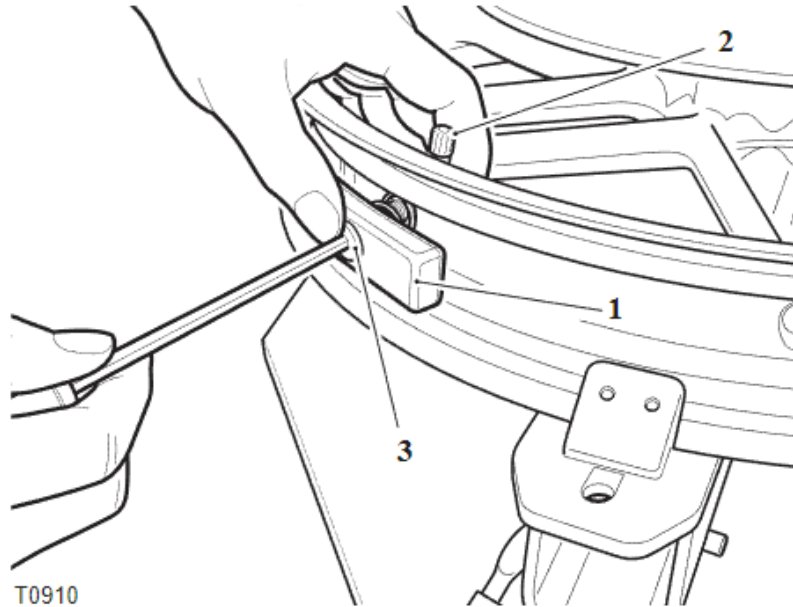
- 1. Position for tyre lever/removal tool
- 2. Tyre valve
- 3. Tyre pressure sensor
- 4. Direction of wheel rotation

T0913

## NOTICE

Note the orientation of the tyre valve for installation.

2. Release the fixing and remove the tyre pressure sensor and the tyre valve.



1. Tyre pressure sensor
2. Tyre valve
3. Fixing

Tyre Pressure Sensor - Installation - (if fitted)

## WARNING

When the tyre valve is removed, the seal on the tyre valve must be replaced. Failure to change the seal may result in tyre pressure loss leading to loss of motorcycle control and an accident.

### NOTICE

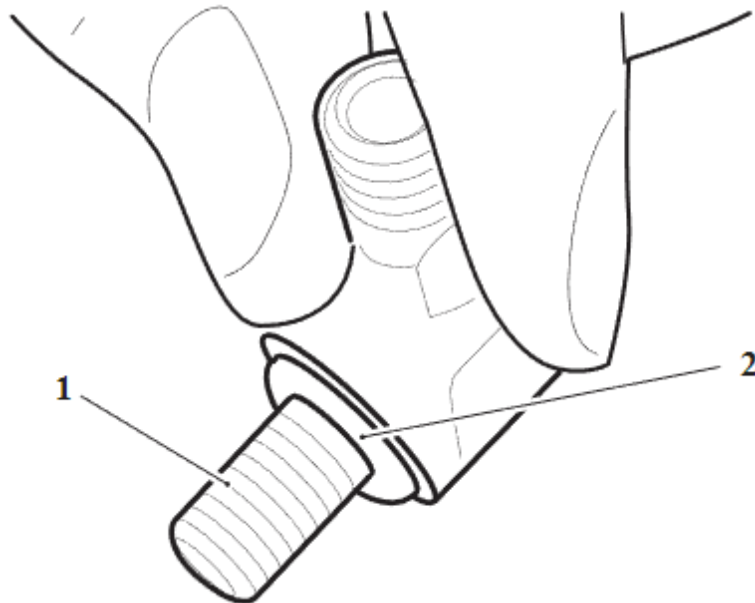
If fitting the original tyre pressure sensors, make sure they are fitted to the correct wheel using the serial number on the sensor as noted for removal.

If fitting new tyre pressure sensors, record the serial numbers of the front and rear tyre pressure sensors in the spaces provided on the relevant page of the Owner's Handbook.

### NOTICE

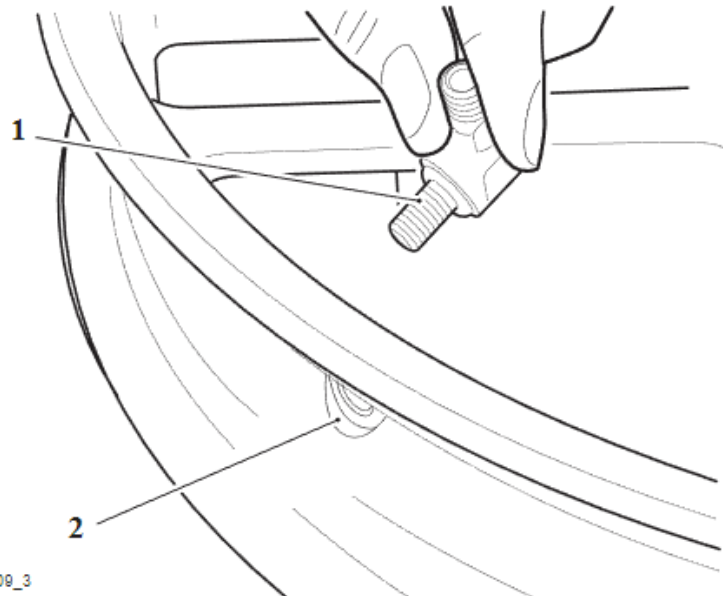
The method for the installation of the tyre pressure sensor is the same for the front and rear wheels.

1. Make sure the mounting hole on the wheel rim and the area around it is free from any dirt or grease.
2. Make sure a new seal is fitted to the tyre valve.



1. Tyre valve
2. Seal

3. Align the tyre valve to its mounting hole in the wheel rim. Make sure the tyre valve orientation is the same as noted for removal.

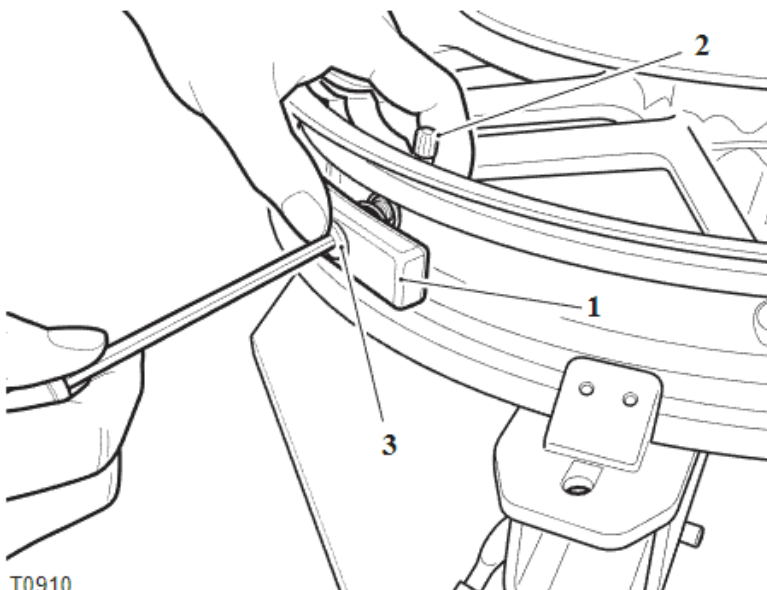


1. Tyre valve
2. Hole

### **⚠ CAUTION**

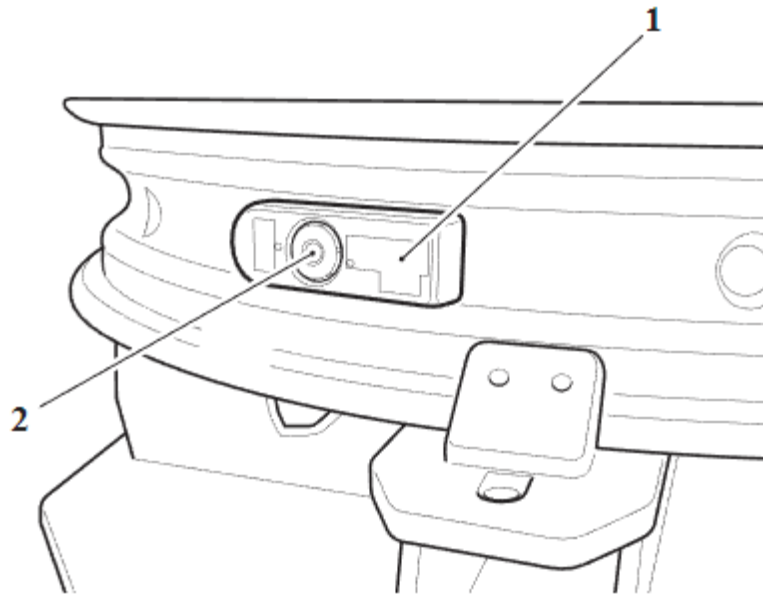
The edges of the tyre pressure sensor must be parallel to the walls of the wheel well. Damage to the sensor may result if the sensor is not correctly installed.

4. Fit the sensor to the tyre valve and tighten the fixing of the sensor to 2.1 Nm. Make sure that the sensor is not forced against the walls of the wheel well while tightening.



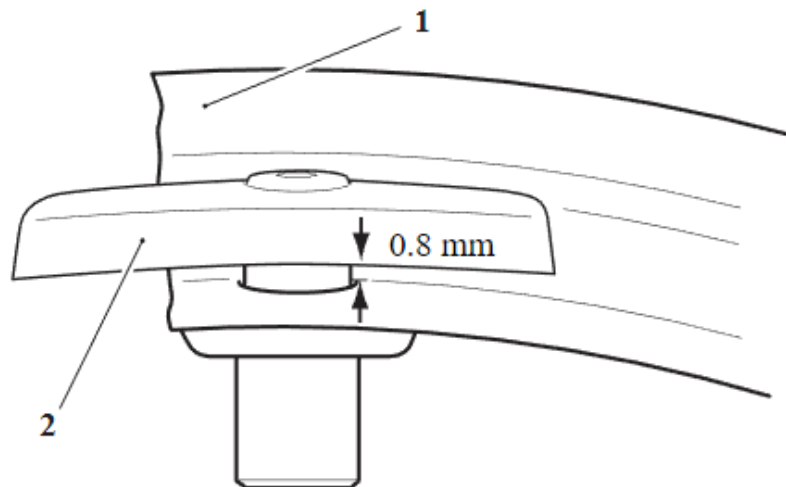
1. Tyre pressure sensor
2. Tyre valve
3. Fixing

5. Make sure that the position of the sensor is parallel to the walls of the wheel rim, as shown in the illustration below.



- 1. Tyre pressure sensor
- 2. Fixing

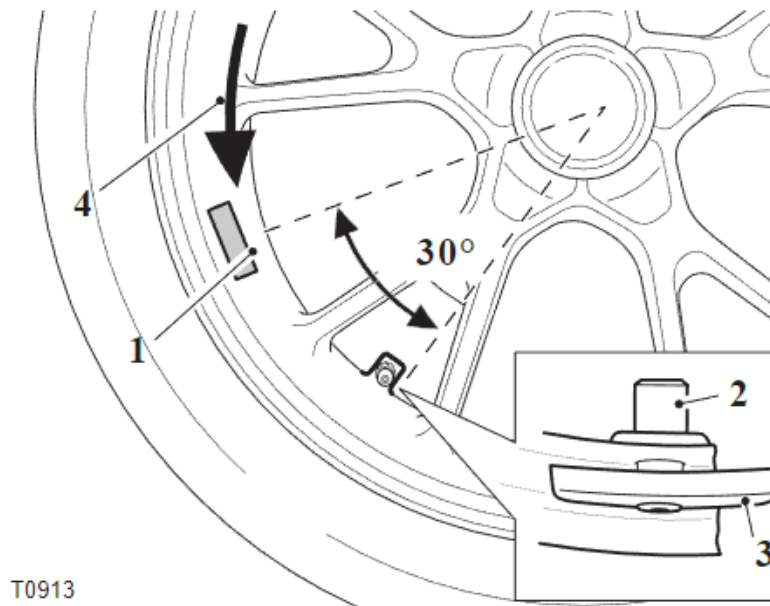
6. When secure, the gap between the sensor and the wheel rim must be a minimum of 0.8 mm and must have a limited twist movement around its fixing.



- 1. Wheel rim
- 2. Fixing

7. Refit the tyre noting the following:

- The tyre lever/installation tool must start 30° away from the tyre valve and move away from the tyre valve.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Position for tyre lever/installation tool</li><li>2. Tyre valve</li><li>3. Tyre pressure sensor</li><li>4. Direction of wheel rotation</li></ol> |
|---|

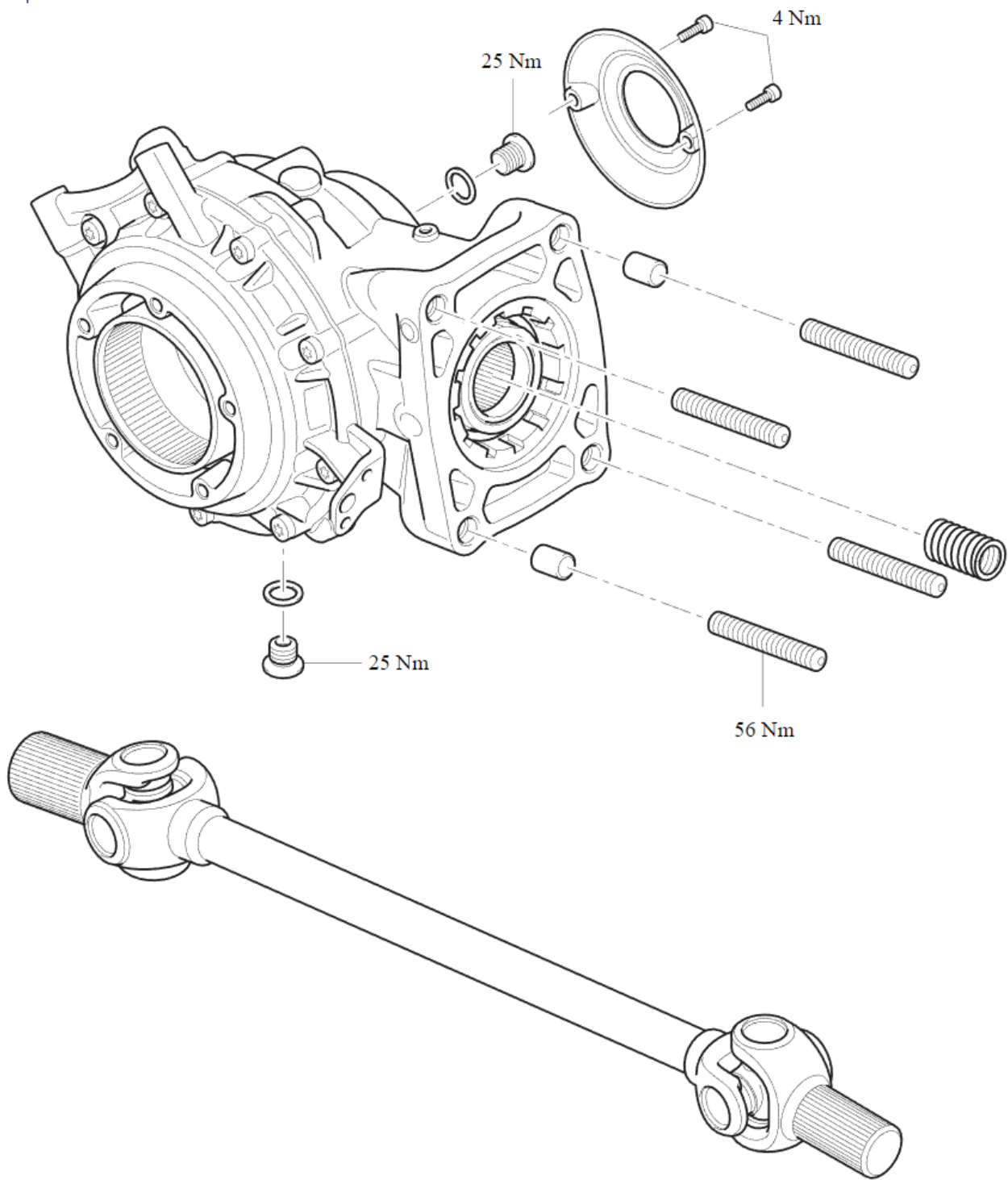
8. Check and, if necessary, adjust the balance of the wheel.

Perform the following operations:

- [Front Wheel - Installation](#)
- [Rear Wheel - Installation](#)

# Final Drive

## Exploded View - Final Drive





## Rear Bevel Box and Drive Shaft Specification

### **WARNING**

Under no circumstance should the rear bevel box be disassembled beyond what is described in this section of the Service Manual.

Failure to observe the above warning could lead to a malfunction of the rear bevel box causing lock-up of the rear wheel leading to loss of motorcycle control and an accident.

This model is fitted with a drive shaft coupling the transmission to the rear bevel box. The drive shaft is fitted with single Hookes universal joints which require no maintenance.

The rear bevel box consists of a crown wheel and pinion arrangement that has no dealer serviceable parts.

Maintenance of the rear bevel box consists solely of the following:

- Oil change - at the first 600 mile (1,000 km) and 20,000 mile (32,000 km) services only
- Oil level checks

## Cush Drive – Removal

### **WARNING**

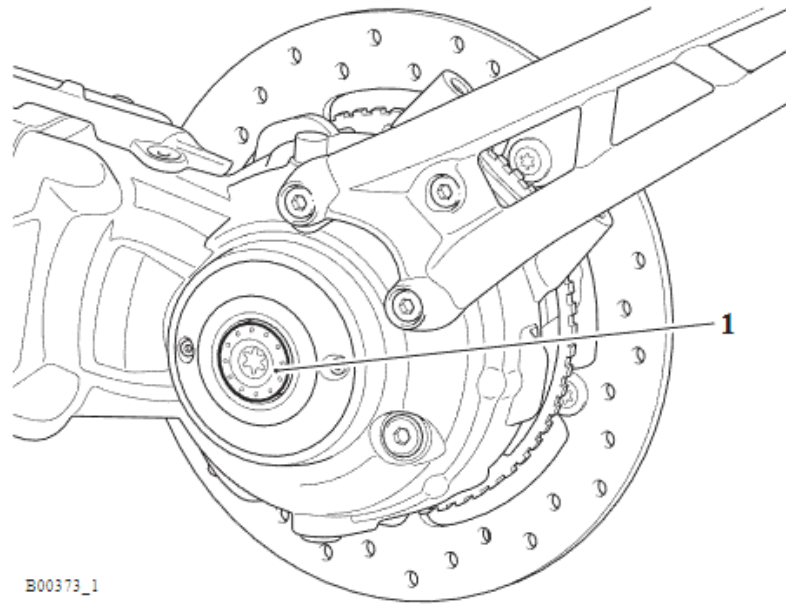
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

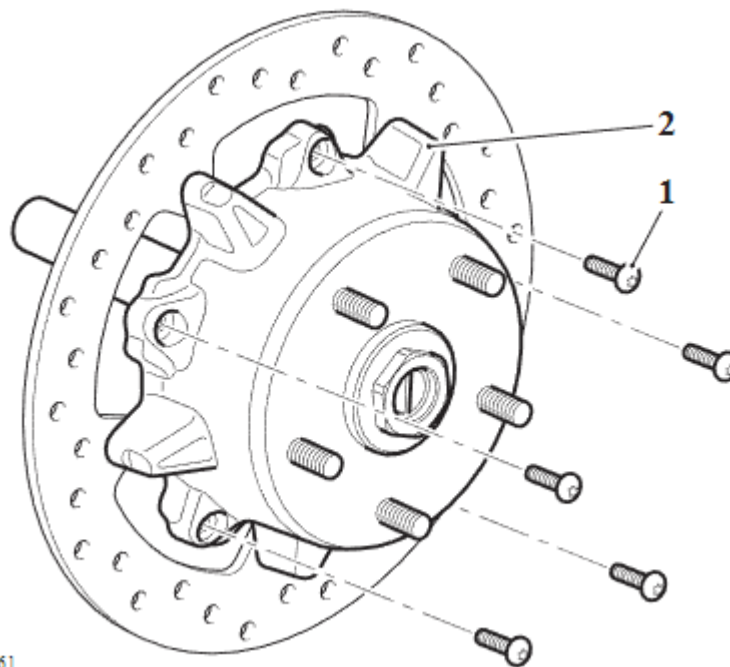
1. Loosen the rear wheel spindle bolt.
2. Remove the rear wheel (see Rear Wheel - Removal).
3. Remove the rear brake caliper (see Rear Brake Caliper – Removal)

4. Remove the rear wheel spindle bolt.



1. Bolt

5. Release the fixings and remove the cush drive outer. Discard the fixings.



1. Fixings  
2. Cush drive outer

## NOTICE

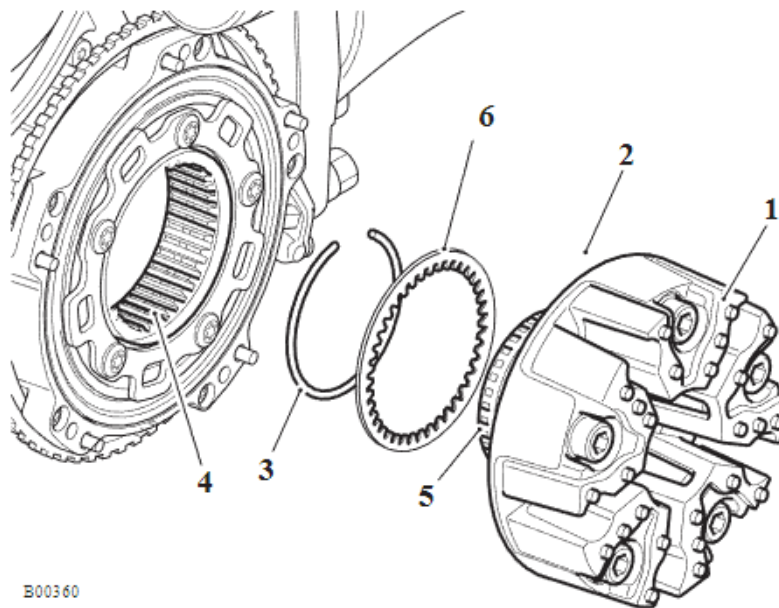
Note there is a snap ring that secures the splines of the cush drive to the splines of the bevel box.

Note the orientation of the cush drive rubber for installation.

Note the position of the conical washer for installation.

Note that there are five dowels on the bearing housing for installation.

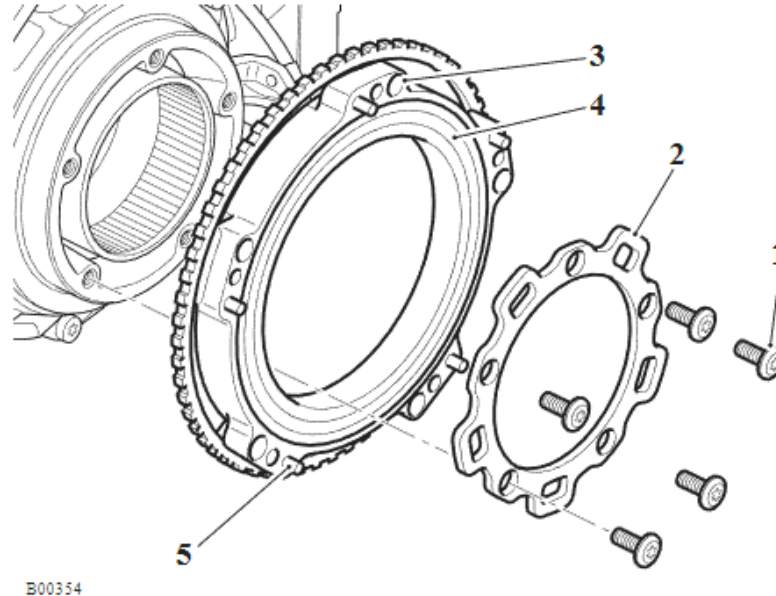
6. Remove the cush drive rubber.
7. Pull the cush drive inner out from the bevel box.
8. Collect the conical washer from the cush drive.



1. Cush drive rubber
2. Cush drive inner
3. Snap ring
4. Splines (bevel box)
5. Splines (cush drive)
6. Conical washer

9. Release the fixings and remove the bearing retaining plate. Discard the fixings.

10. Taking care not to damage the pulser ring and bearing housing, use a rubber faced mallet to gradually and evenly remove the bearing housing assembly.



- 1. Fixing
- 2. Bearing retaining plate
- 3. Bearing housing
- 4. Bearing
- 5. Dowel (one of five)

#### Cush Drive – Installation

### **⚠ WARNING**

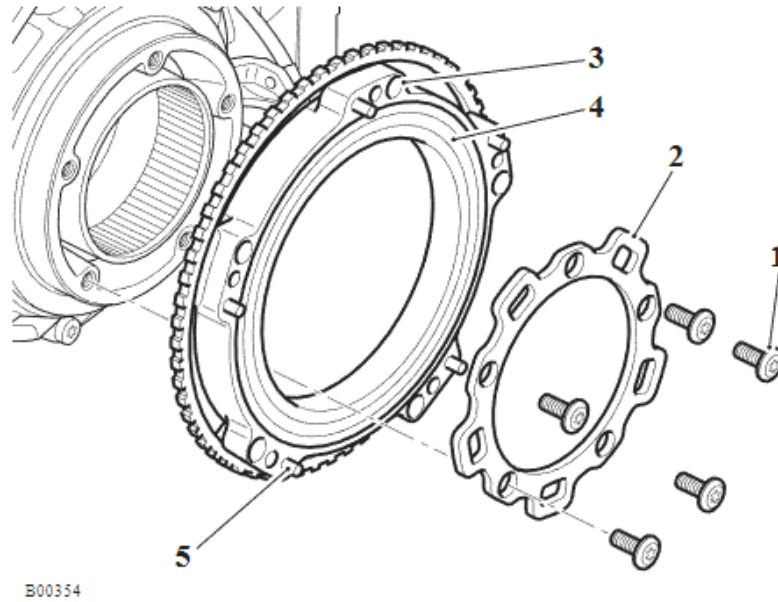
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Taking care not to damage the pulser ring and bearing housing, use a rubber faced mallet to gradually and evenly fit the bearing housing assembly.

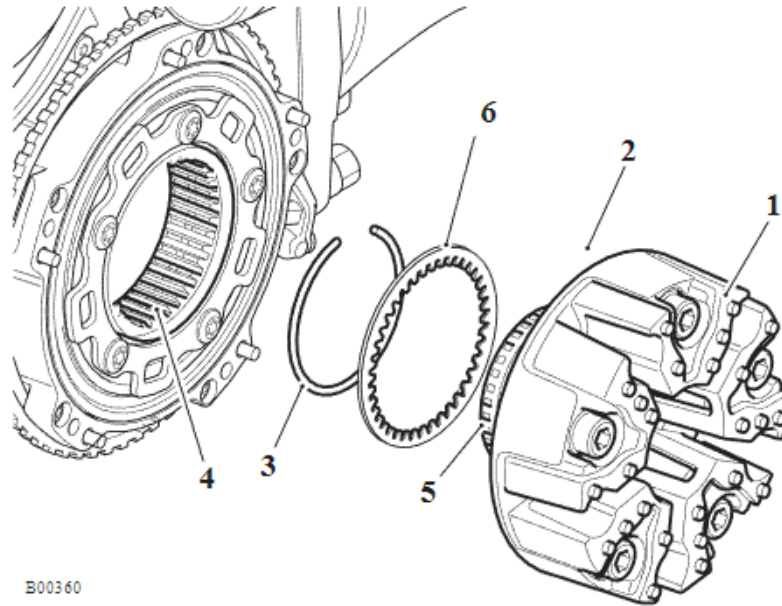
2. Fit the rear wheel bearing retainer plate and tighten the fixings to 18 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Bearing retaining plate</li><li>3. Bearing housing</li><li>4. Bearing</li><li>5. Dowel (one of five)</li></ol> |
|---|

3. Fit the conical washer to the cush drive, as noted for removal.
4. Fit the snap ring to the groove in the cush drive splines.
5. Push fit the cush drive inner into the bevel box, make sure the snap ring also fits into the groove of rear bevel box.

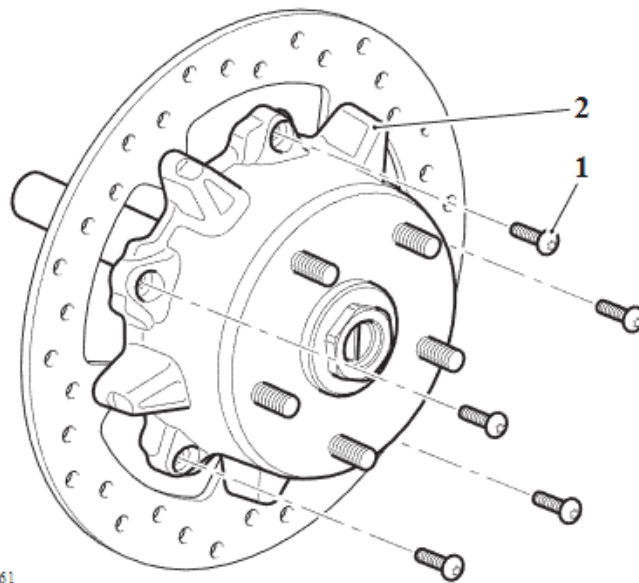
6. Fit the cush drive rubber as noted for removal.



B00360

- 1. Cush drive rubber
- 2. Cush drive inner
- 3. Snap ring
- 4. Splines (bevel box)
- 5. Splines (cush drive)
- 6. Conical washer

7. Fit the cush drive outer to the rear bevel box and tighten the new fixings to 20 Nm.



B00361

- 1. Fixings
- 2. Cush drive outer

8. Fit the rear wheel spindle bolt.
9. Fit the rear wheel (see [Rear Wheel - Installation](#)).
10. Lower the motorcycle to the ground.
11. Tighten the rear wheel spindle bolt to 70 Nm.

#### Rear Bevel Box – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

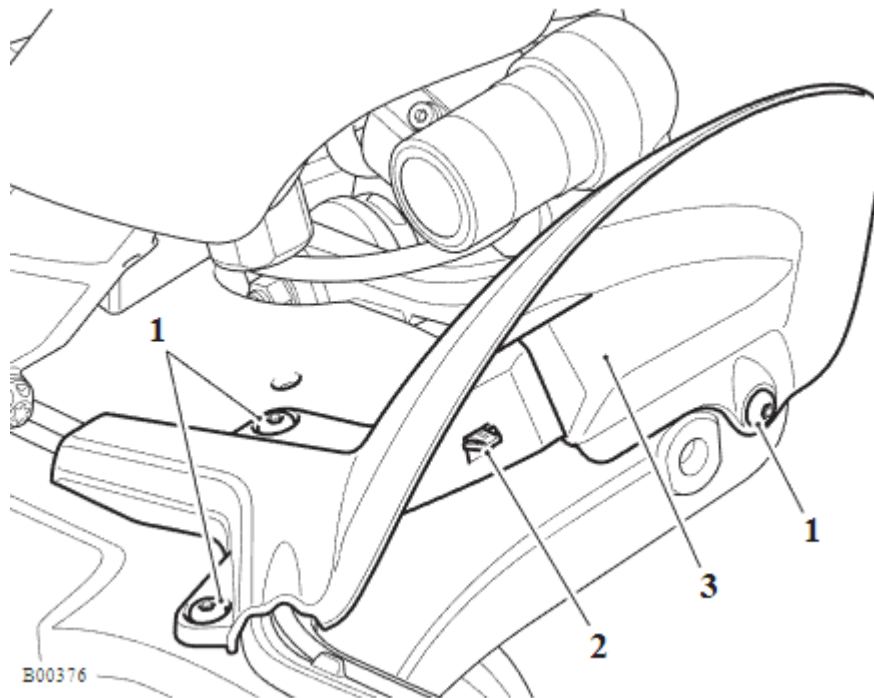
If fitting a new rear bevel box, remove the cush drive before removing it from the swinging arm.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Wheel - Removal](#)
- If required, [Cush Drive - Removal](#)

1. Release the three fixings and detach the hugger from the swinging arm.

2. Detach the rear wheel speed sensor connector and remove the hugger.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Connector</li><li>3. Hugger</li></ol> |
|---|

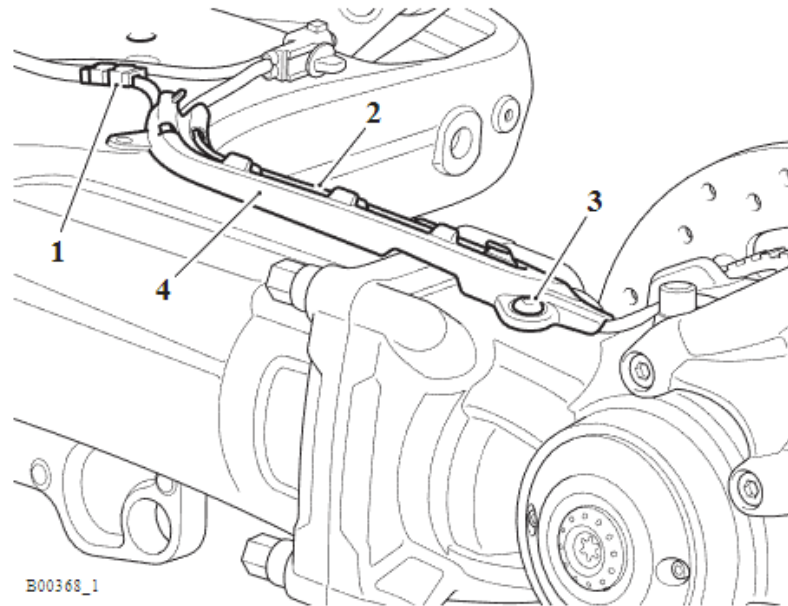
**NOTICE**

Note the routing of the harnesses and brake line on the harness guide for installation.

3. Disconnect the rear light from the main harness.
4. Detach the rear brake hose from the harness guide.



5. Release the fixing and remove the harness guide.



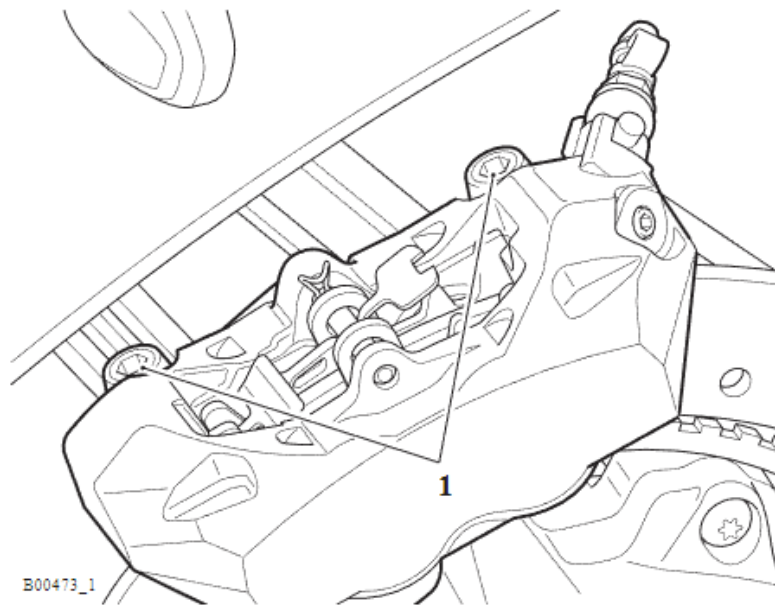
1. Rear light connector
2. Rear brake hose
3. Fixing
4. Harness guide

**⚠ WARNING**

Do not allow the brake caliper to hang on the brake hose as this may damage the hose.

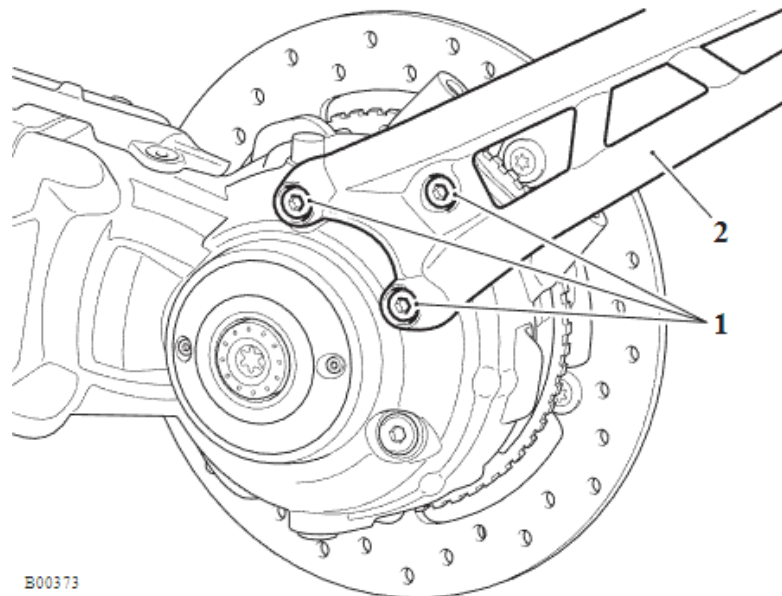
Damaged hoses could cause brake failure leading to loss of motorcycle control and an accident.

6. Release the caliper fixings and detach the brake caliper from the rear bevel box. Support the brake caliper such that the weight of the caliper is not supported by the brake hose.



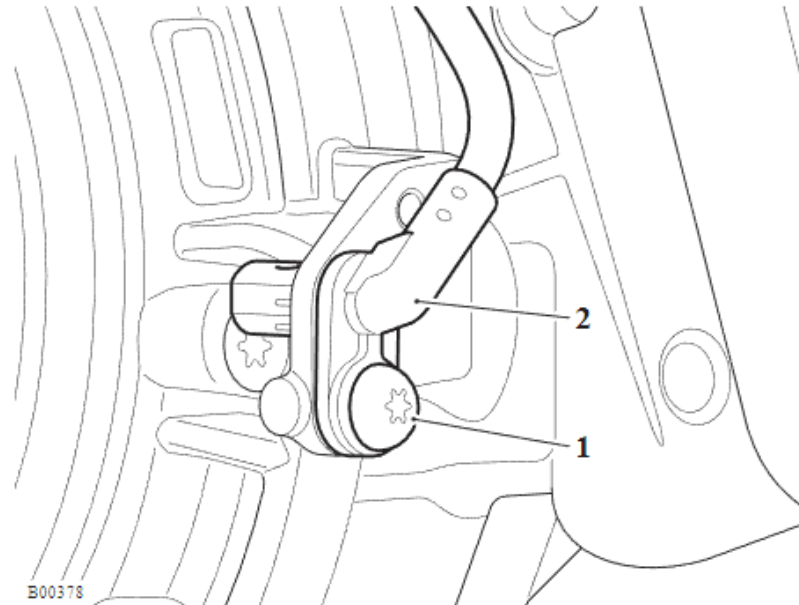
1. Fixings

7. Release the three fixings and remove the licence plate hanger.



1. Fixings  
2. Licence plate hanger

8. Release the fixing, detach the rear wheel speed sensor and position it aside. Discard the fixing.



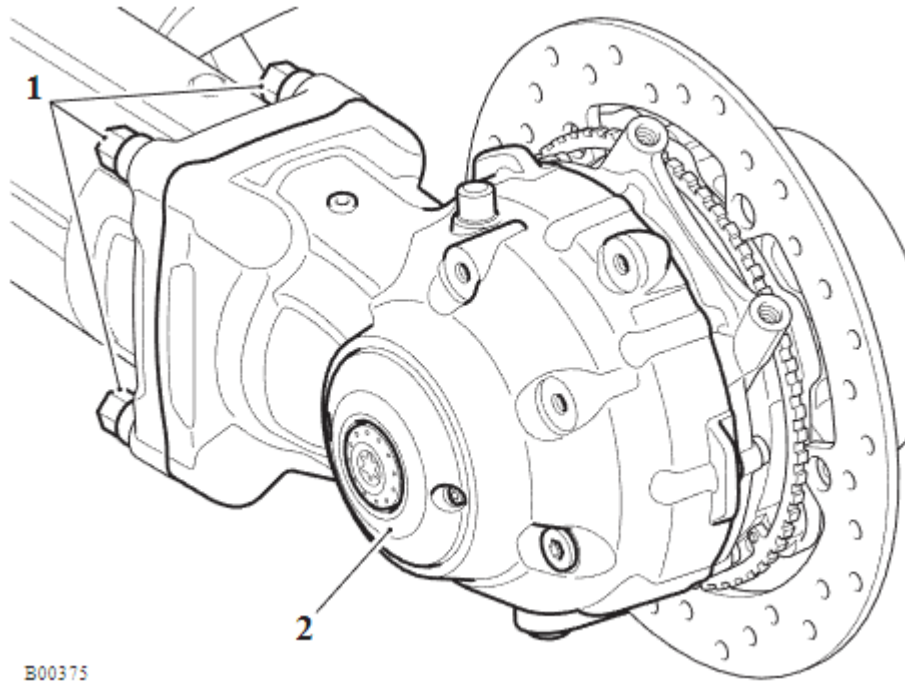
1. Fixing
2. Wheel speed sensor

9. Protect the swinging arm painted surfaces from damage, using a suitable self-adhesive tape such as masking tape.

#### **NOTICE**

If a stud fitted to the rear bevel box becomes loose when the fixings are removed, a new stud must be fitted.

10. Release the four fixings and the hardened washers. Remove the rear bevel box and discard the fixings.



- 1. Fixings (three of four shown)
- 2. Rear bevel box

#### Rear Bevel Box – Installation

### **⚠ WARNING**

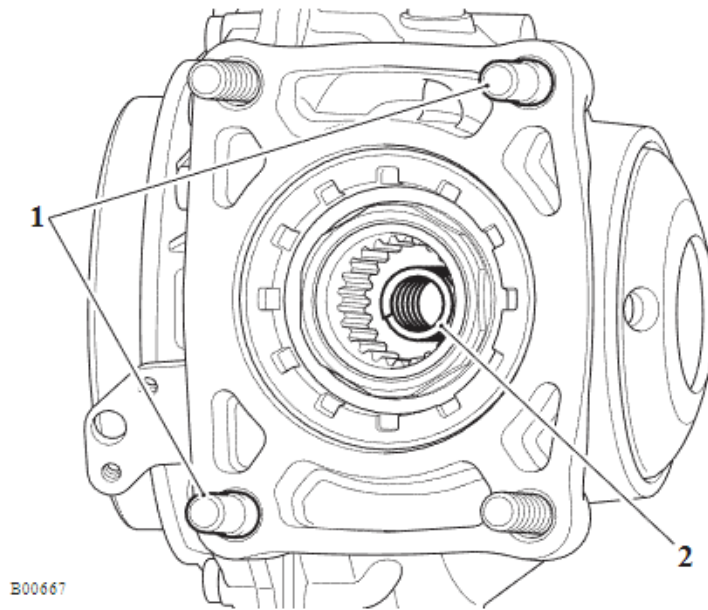
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

### **NOTICE**

If a stud fitted to the rear bevel box becomes loose when the fixings are removed, a new stud must be fitted.

1. If necessary fit new stud(s) to the rear bevel box and tighten to 56 Nm.
2. check that the two hollow dowels and the spring for the drive shaft are fitted to the final drive as shown in the illustration below.



- |                               |
|-------------------------------|
| 1. Hollow dowels<br>2. Spring |
|-------------------------------|

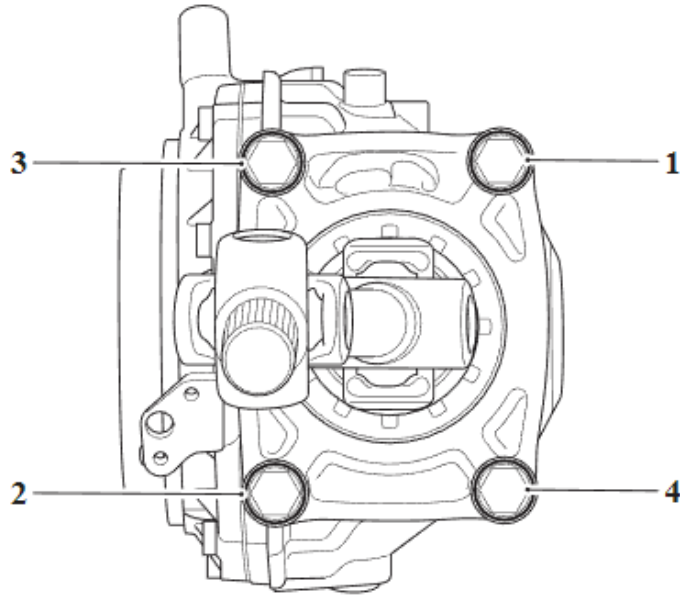
3. Align the rear bevel box to the swinging arm and the drive shaft splines. Fit the hardened washers and new fixings.
4. Tighten the rear bevel box fixings in the following two stages (swinging arm removed for clarity):

|                |
|----------------|
| <b>Stage 1</b> |
|----------------|

5. Tighten the fixings in the sequence shown to 20 Nm.

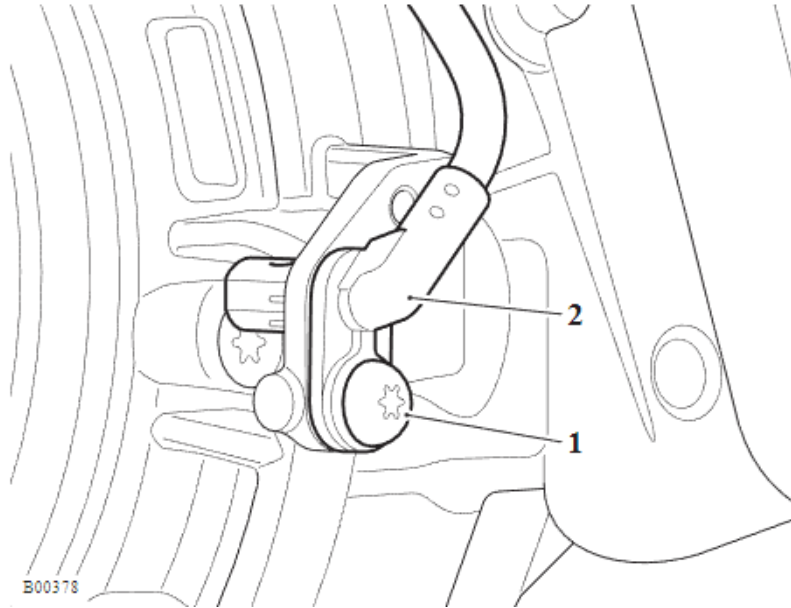
|                |
|----------------|
| <b>Stage 2</b> |
|----------------|

6. Tighten the fixings in the sequence shown to 100 Nm.



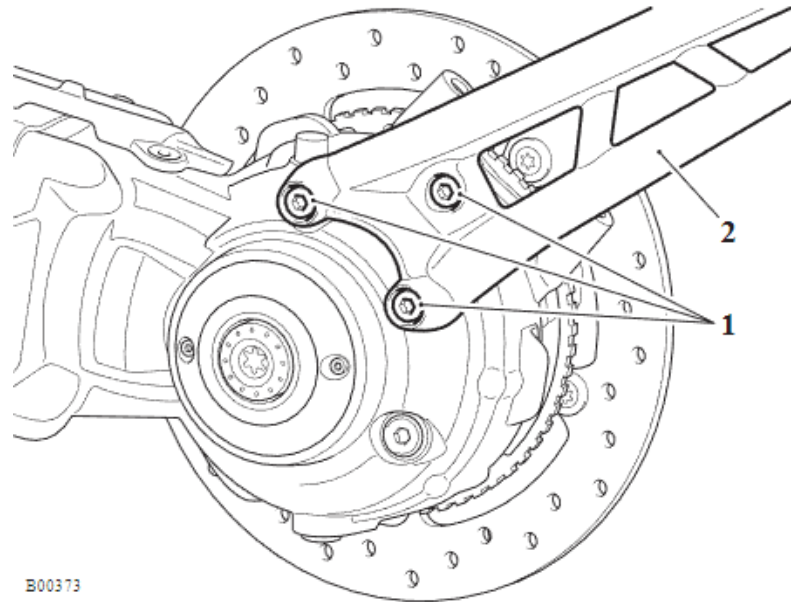
Rear Bevel Box Tightening Sequence

7. Fit the rear wheel speed sensor and tighten its new fixing to 9 Nm.



- 1. Fixing
- 2. Wheel speed sensor

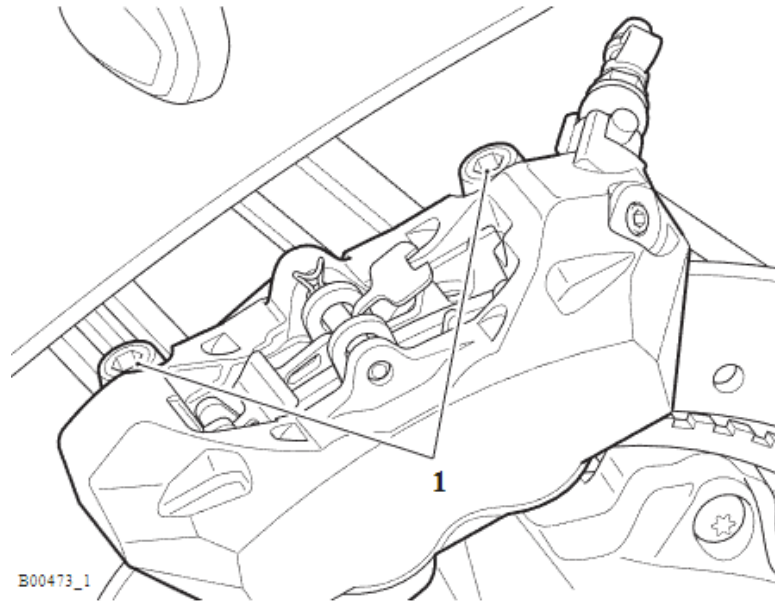
8. Fit the licence plate hanger to the bevel box and tighten its fixings to 20 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Licence plate hanger</li></ol> |
|--|

9. Thoroughly clean the threaded fixing holes for the brake caliper fixings.
10. Thoroughly clean the threaded part of the fixings and smear the first four threads with a proprietary copper based grease.
11. Position the caliper over the disc.
12. Secure the brake caliper with the fixings and tighten sufficiently to bring the caliper into contact its mounting points, while allowing a small amount of lateral movement. Do not fully tighten at this stage.
13. Pump the brake pedal to correctly position the caliper pistons.

14. Tighten the rear caliper bolts to 45 Nm.

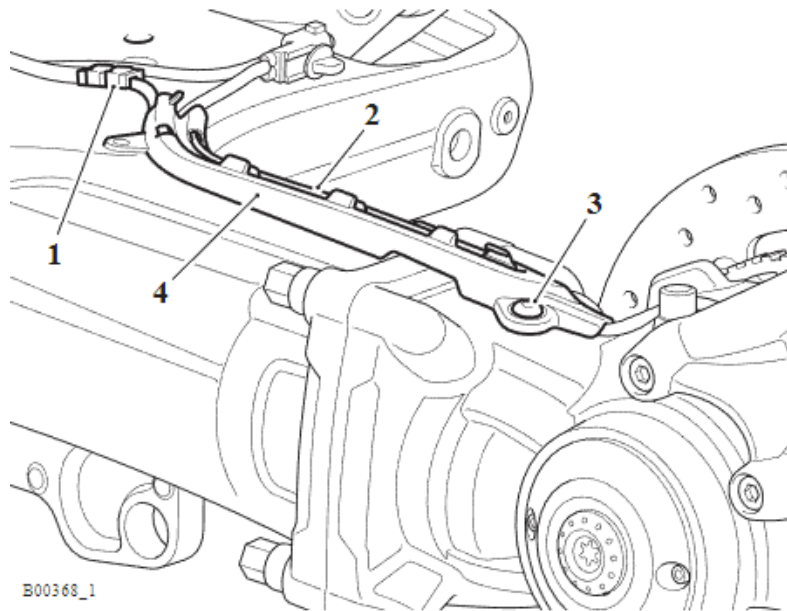


1. Fixings

15. Connect the rear light to the main harness.

16. With the harnesses and brake line routed as noted for removal, fit the harness guide and secure with a new fixing. Do not fully tighten at this stage.

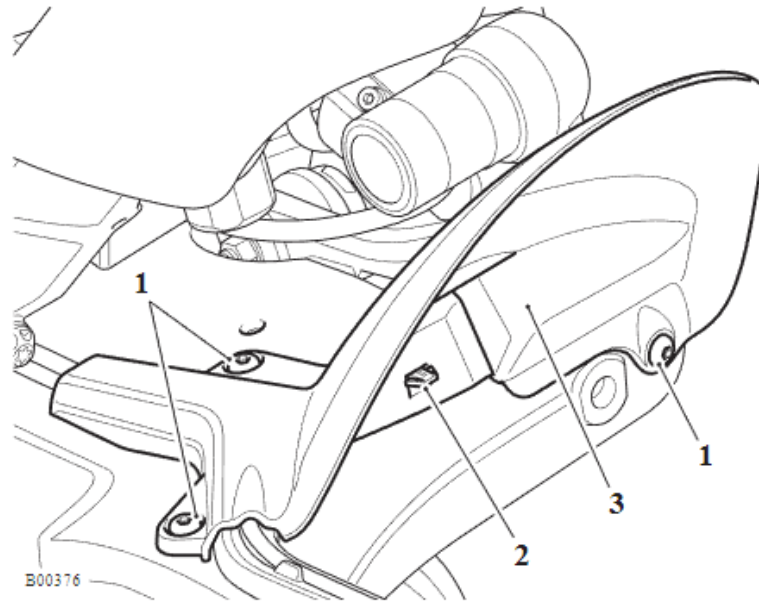
17. Attach the rear brake line to the harness guide on the swinging arm.



- 1. Rear light connector
- 2. Rear brake hose
- 3. Fixing
- 4. Harness guide

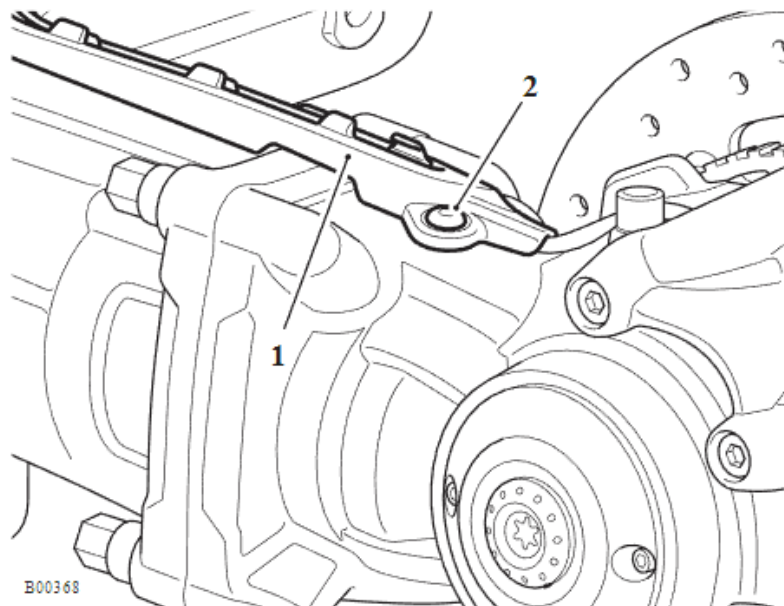


18. Attach the rear wheel speed sensor connector to the hugger.
19. Position the hugger to the swinging arm, make sure the left hand fixing hole aligns with the harness guide fixing hole.
20. Fit the new fixings and tighten to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Connector</li><li>3. Hugger</li></ol> |
|---|

21. Tighten the harness guide rear fixing to 3 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Harness guide</li><li>2. Fixing</li></ol> |
|--|

22. Check the oil level in the bevel box and, if necessary, top up (see [Rear Bevel Box Oil Level Check](#)).

- If removed [Cush Drive - Installation](#)
- [Rear Wheel - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Final Drive Shaft – Removal

** WARNING**

Make sure the motorcycle is stabilised and adequately supported.

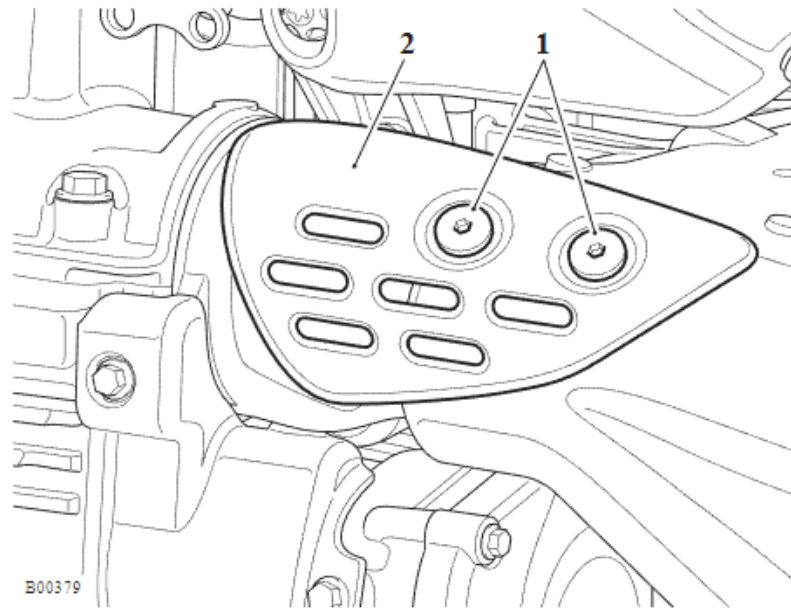
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. Release the fixings and remove the swinging arm guard.

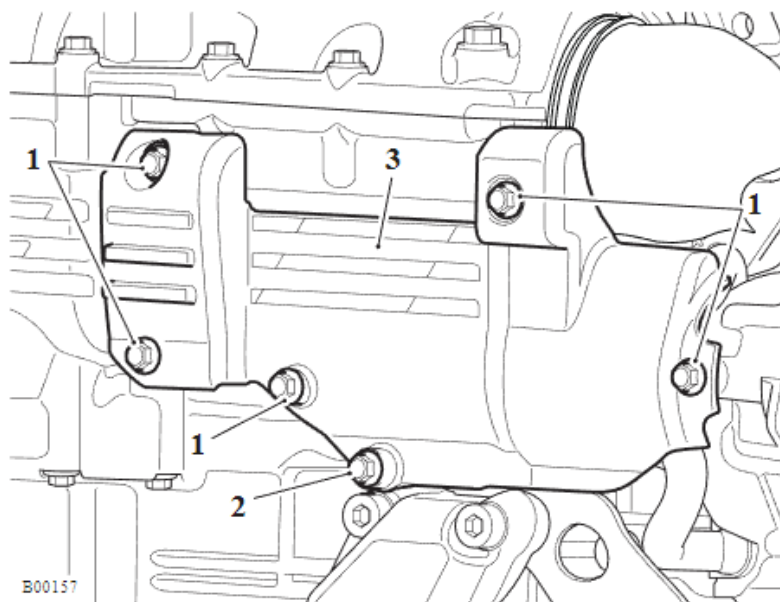


1. Fixings
2. Guard

### NOTICE

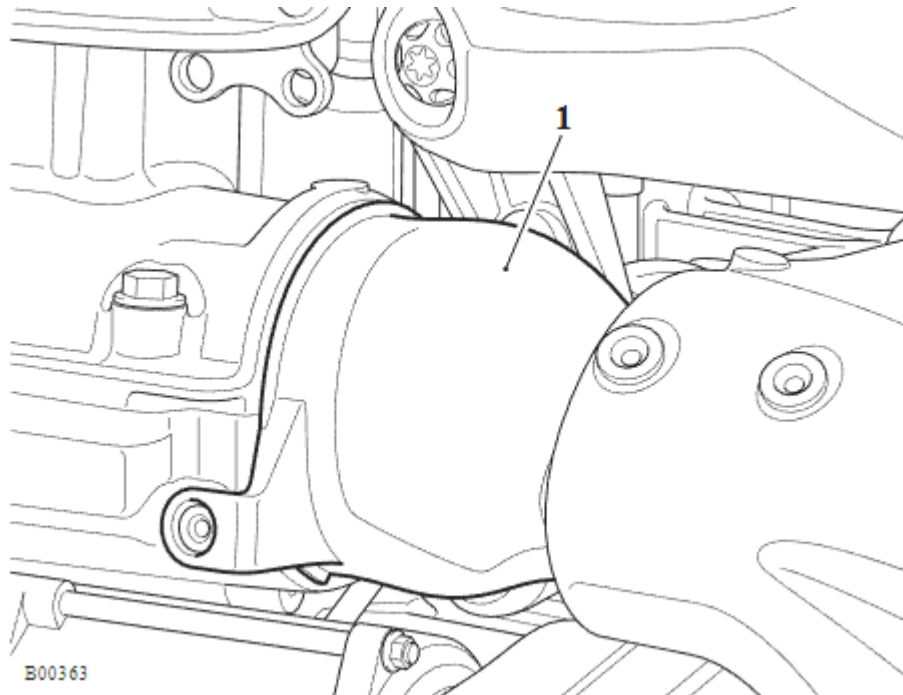
The front upper fixing also secures the drive shaft cover.  
Note the positions of the M6 x 20mm and M6 x 42mm fixings for installation.

2. Release the fixings and remove the starter motor cover.



1. Fixings M6 x 20mm
2. Fixing M6 x 42mm
3. Starter motor cover

3. Remove the drive shaft cover.



1. Cover

4. Remove the rear bevel box (see [Rear Bevel Box - Removal](#)).
5. Detach the drive shaft from the torsional damper and remove it from the swinging arm.

#### Final Drive Shaft – Installation

### **⚠ WARNING**

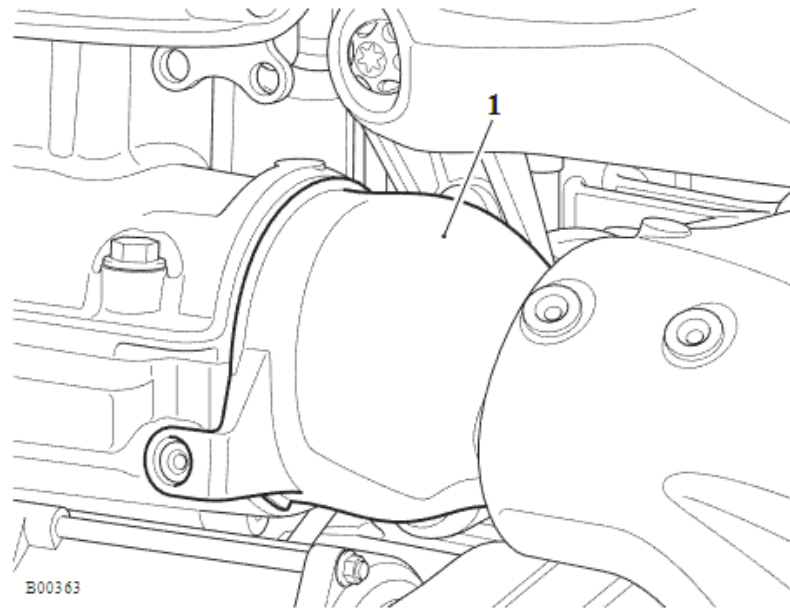
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

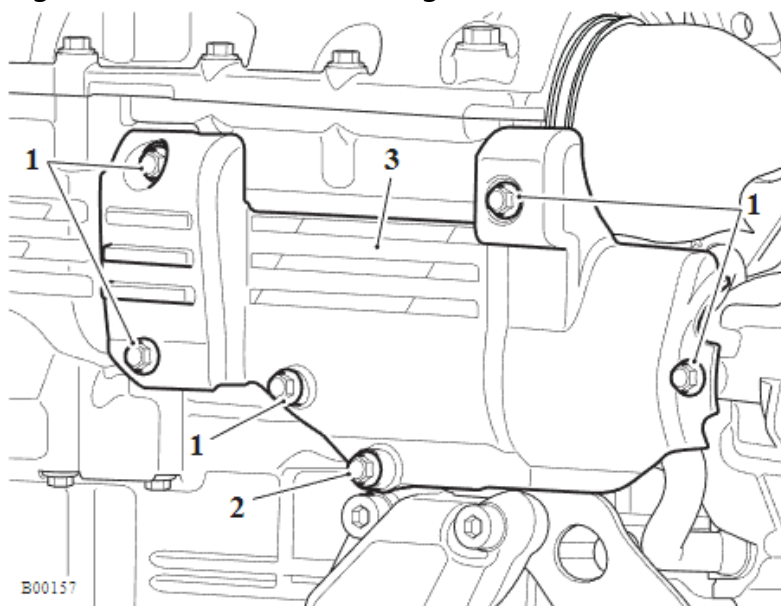
Perform the following operations:

1. Fit the drive shaft through the swinging arm and attach it to the torsional damper.
2. Fit the drive shaft cover between the transmission cover and the swinging arm.



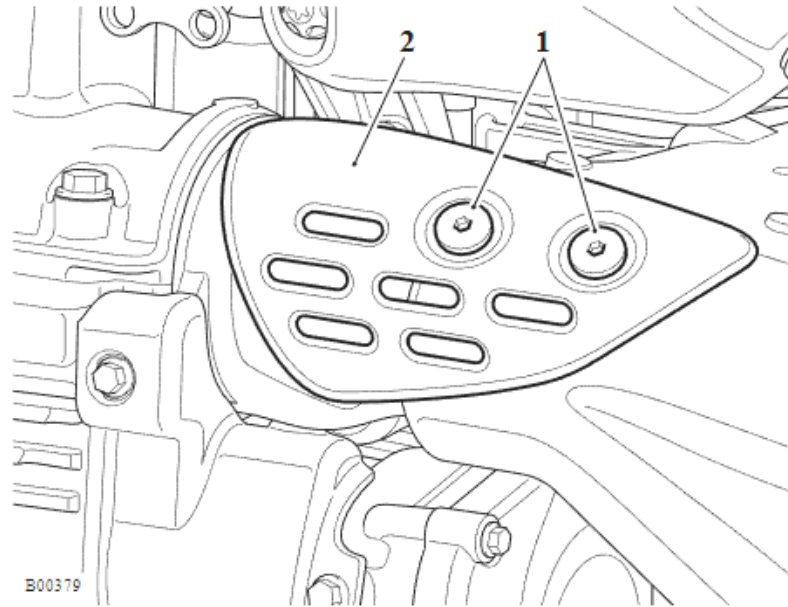
1. Cover

3. Fit the starter motor cover tighten the M6 x 20 mm fixings to 9 Nm.
4. Tighten the M6 x 42 mm fixings to 7 Nm.



1. Fixings M6 x 20mm
2. Fixing M6 x 42mm
3. Starter motor cover

5. Fit the swinging arm guard and tighten its fixings to 6 Nm.

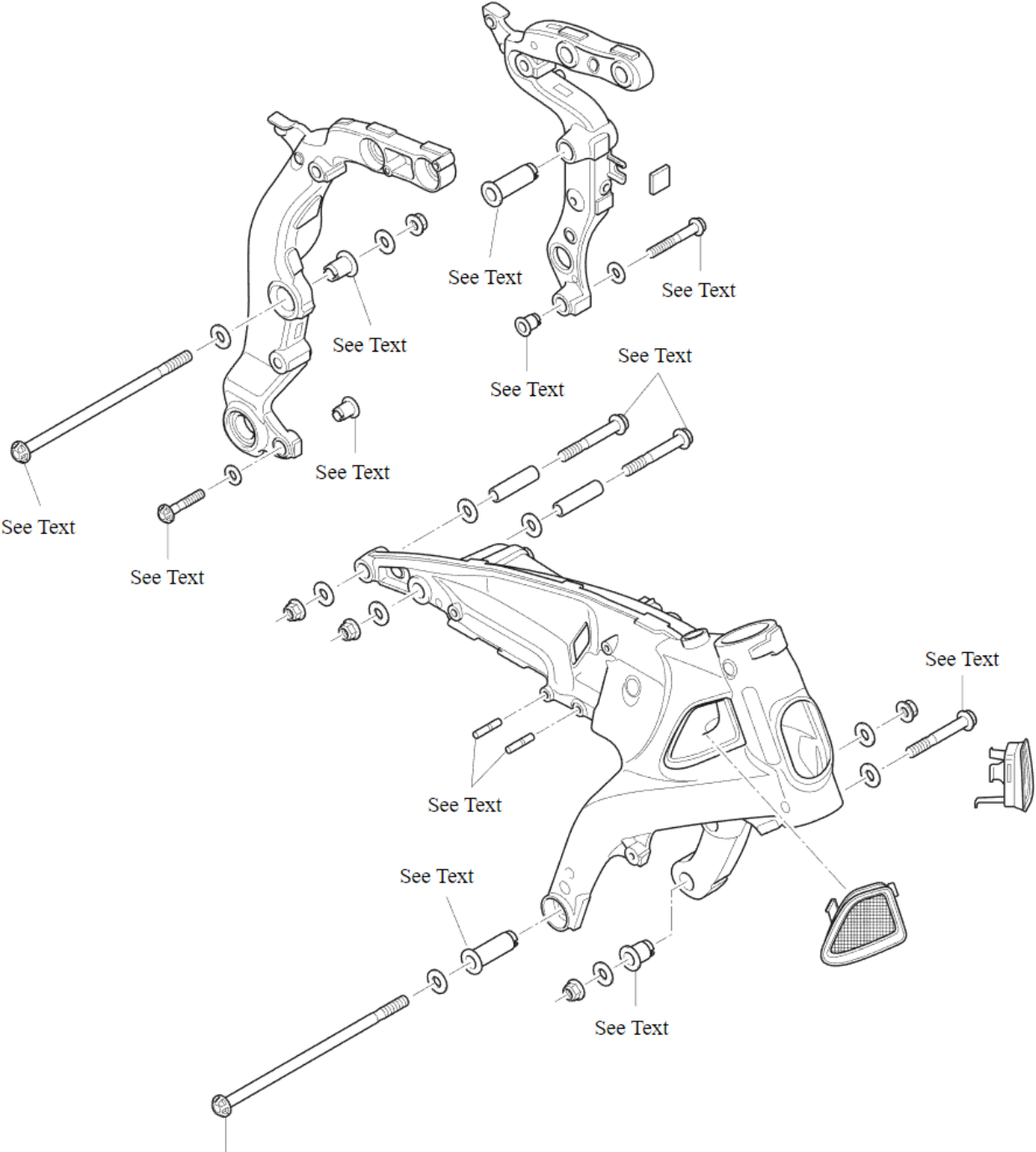


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Guard</li></ol> |
|---|

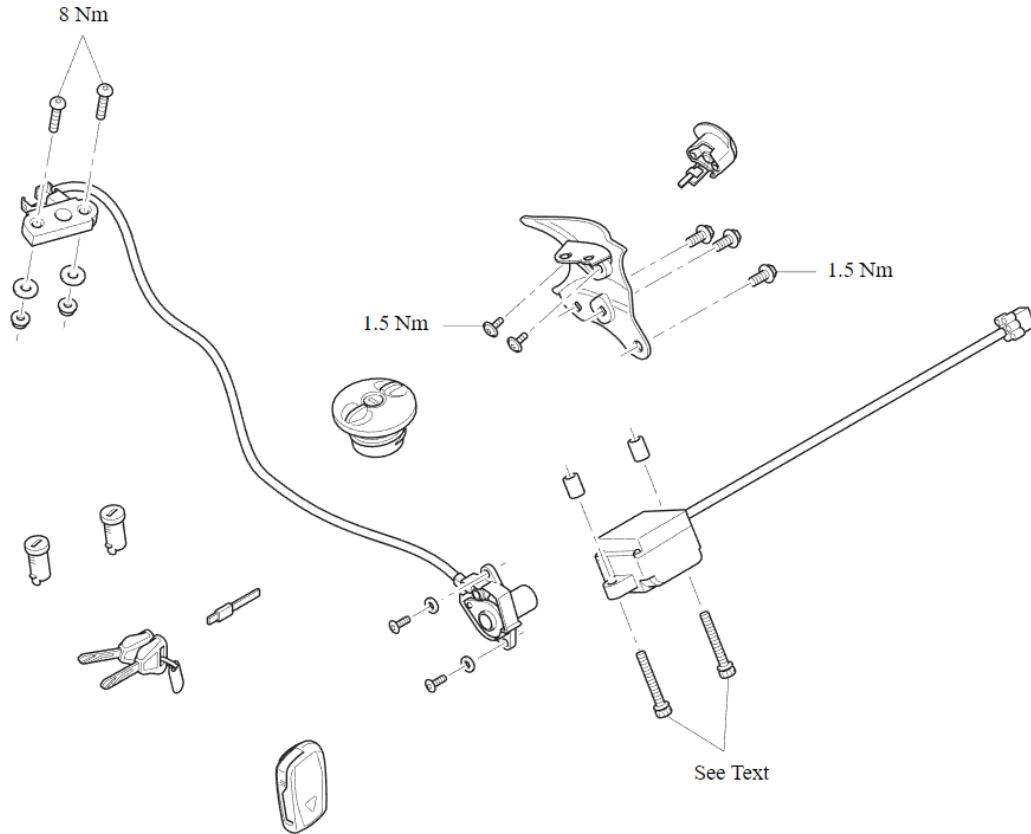
- [Rear Bevel Box - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

# Frame and Bodywork

## Exploded View – Frame

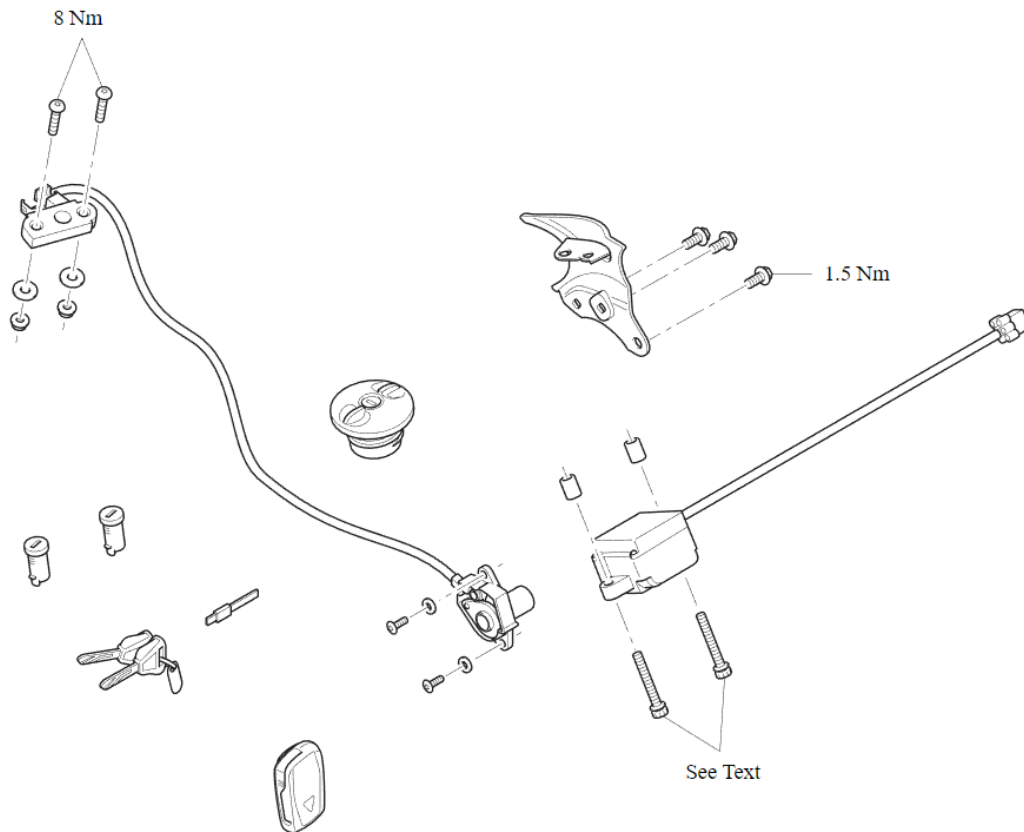


Exploded View - Steering Lock, Lockset and Keyless ECM (US markets only)

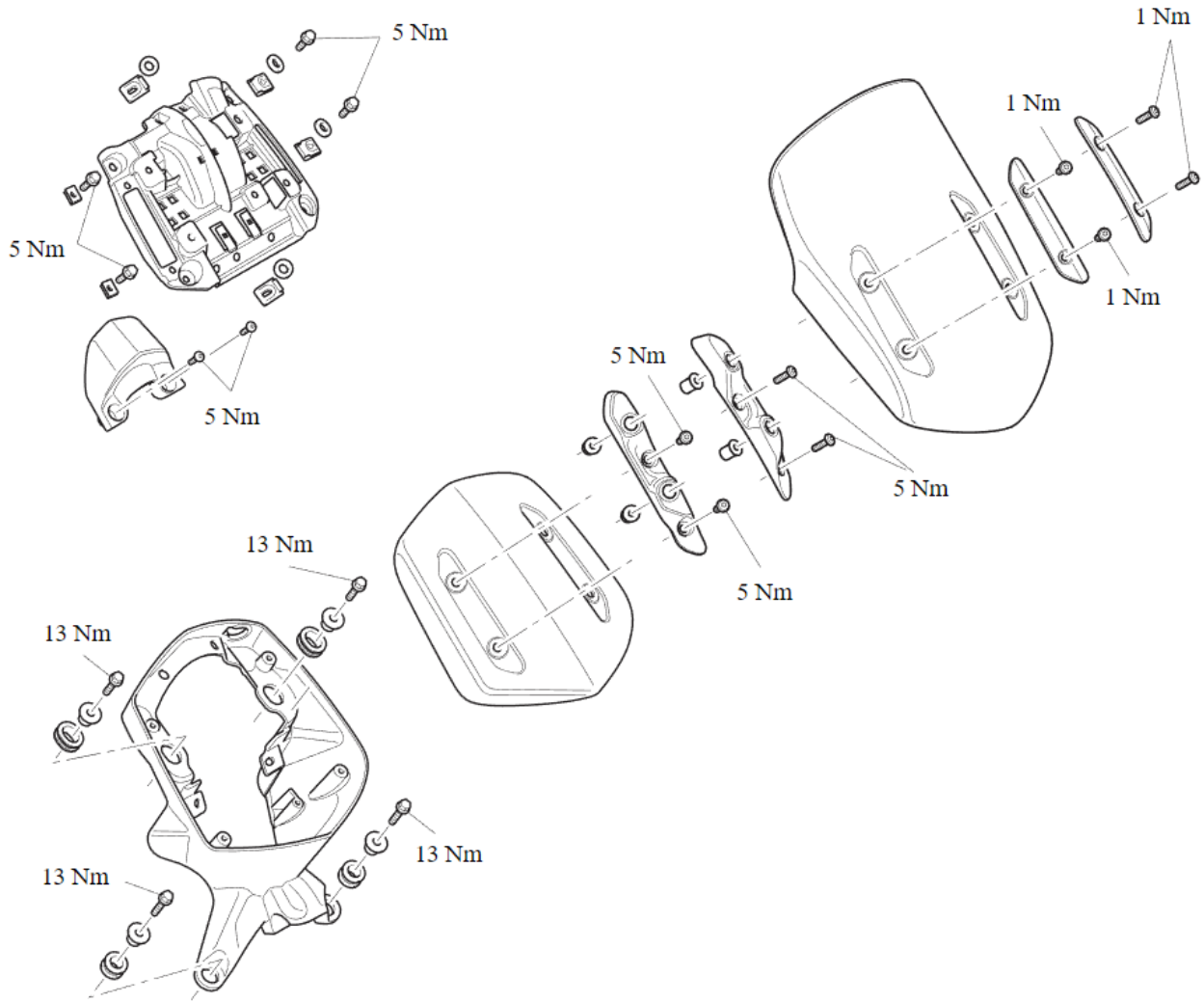




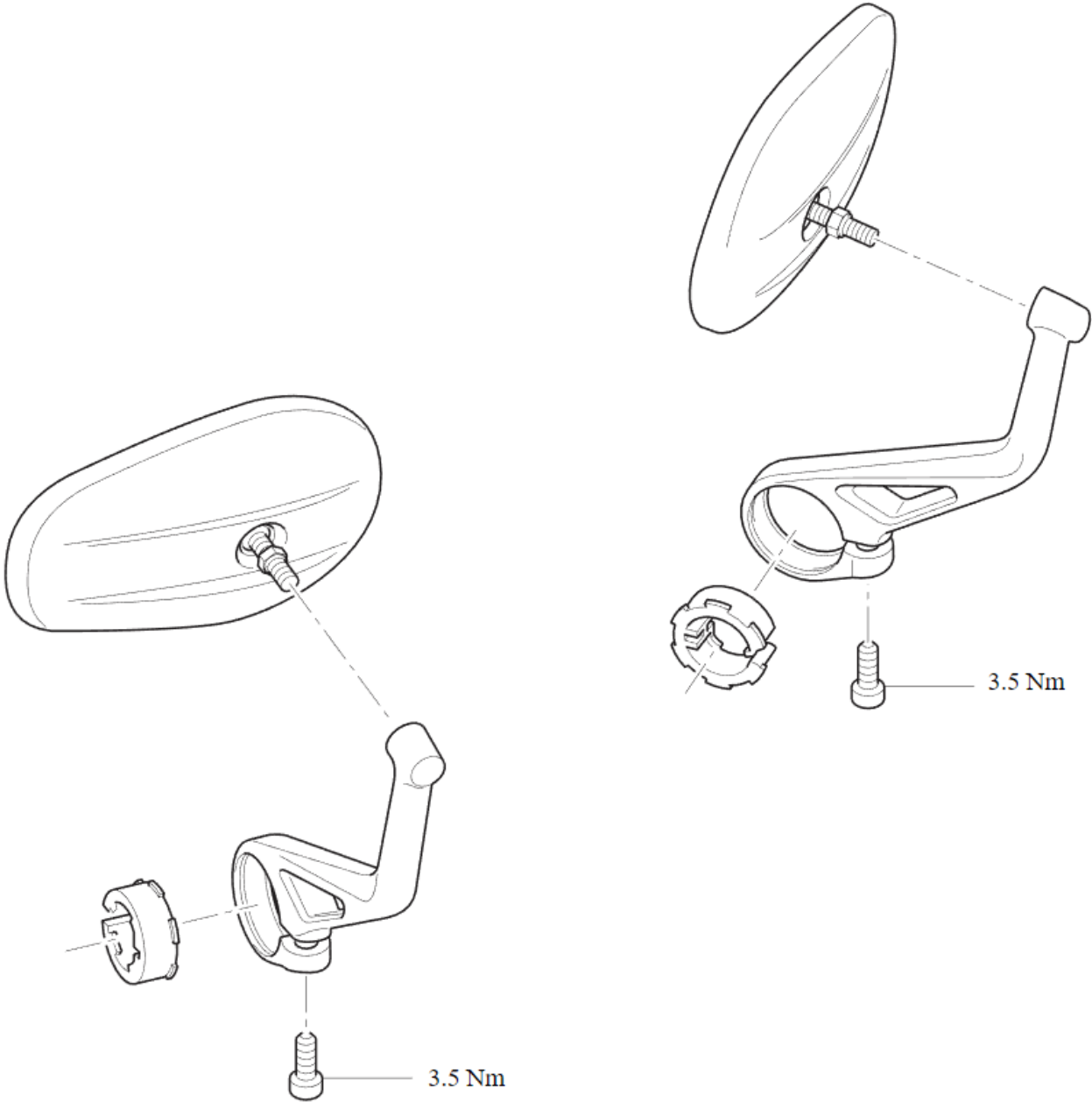
Exploded View - Steering Lock, Lockset and Keyless ECM (All markets except US)



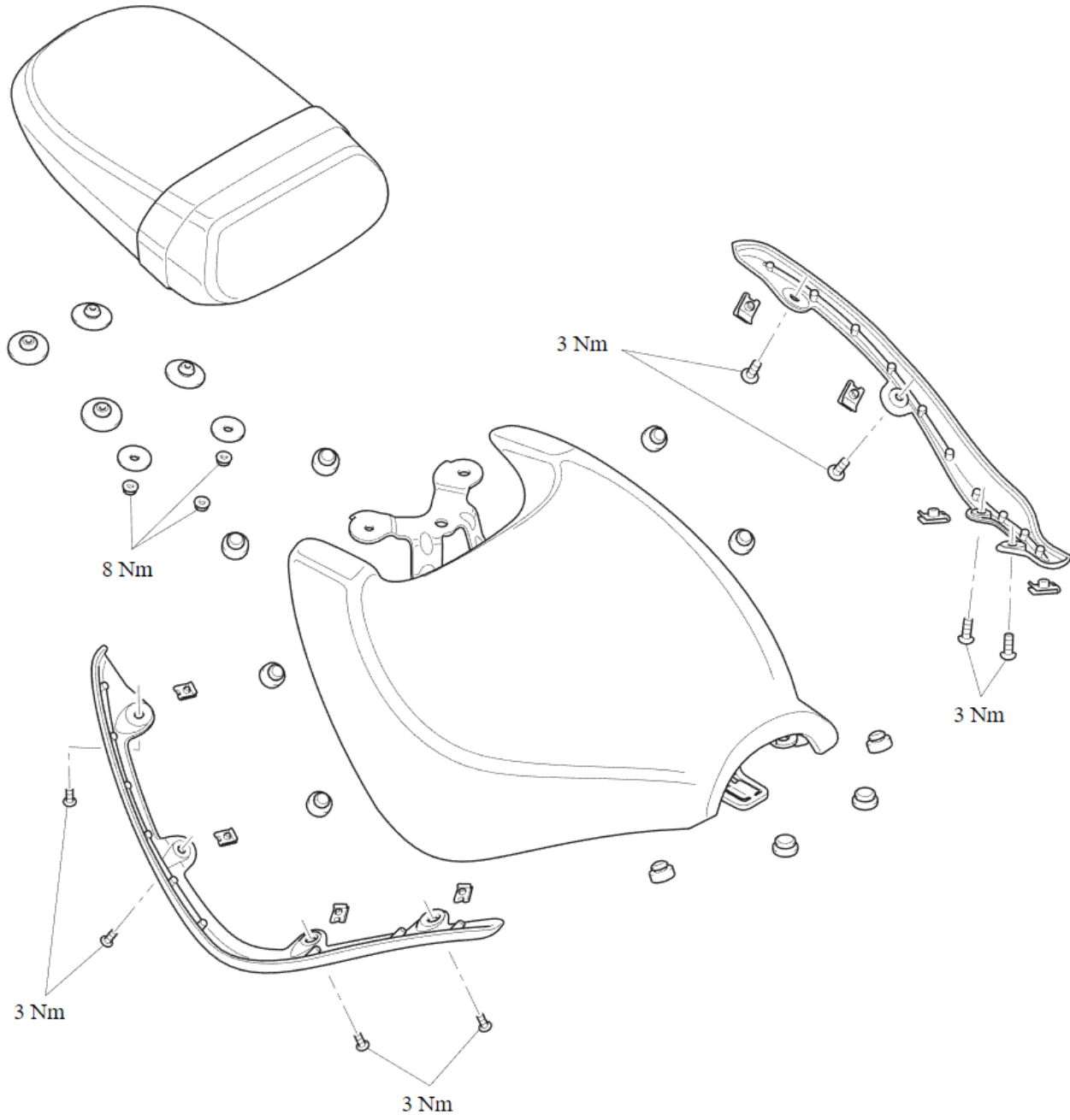
# Exploded View – Flyscreen



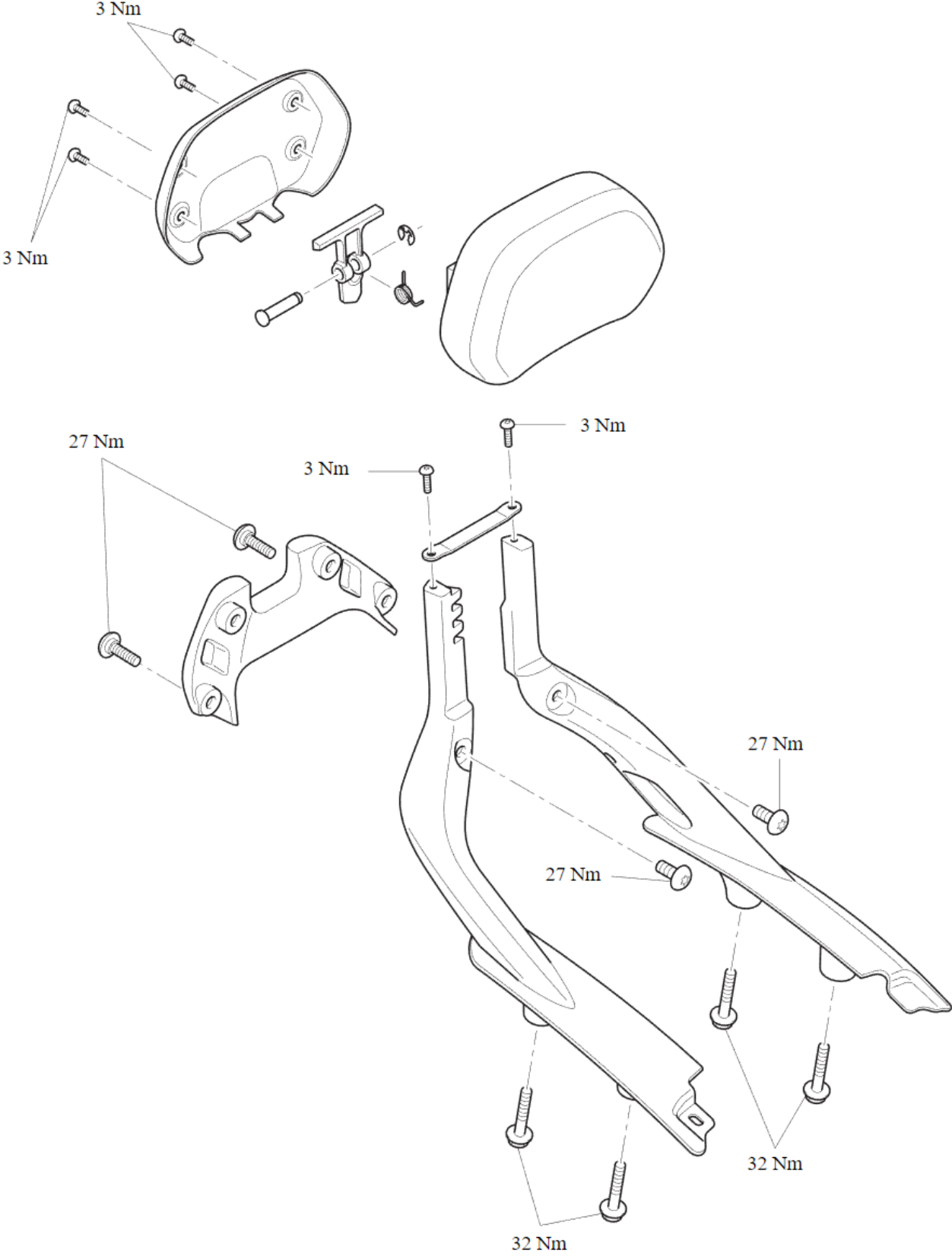
Exploded View – Mirrors



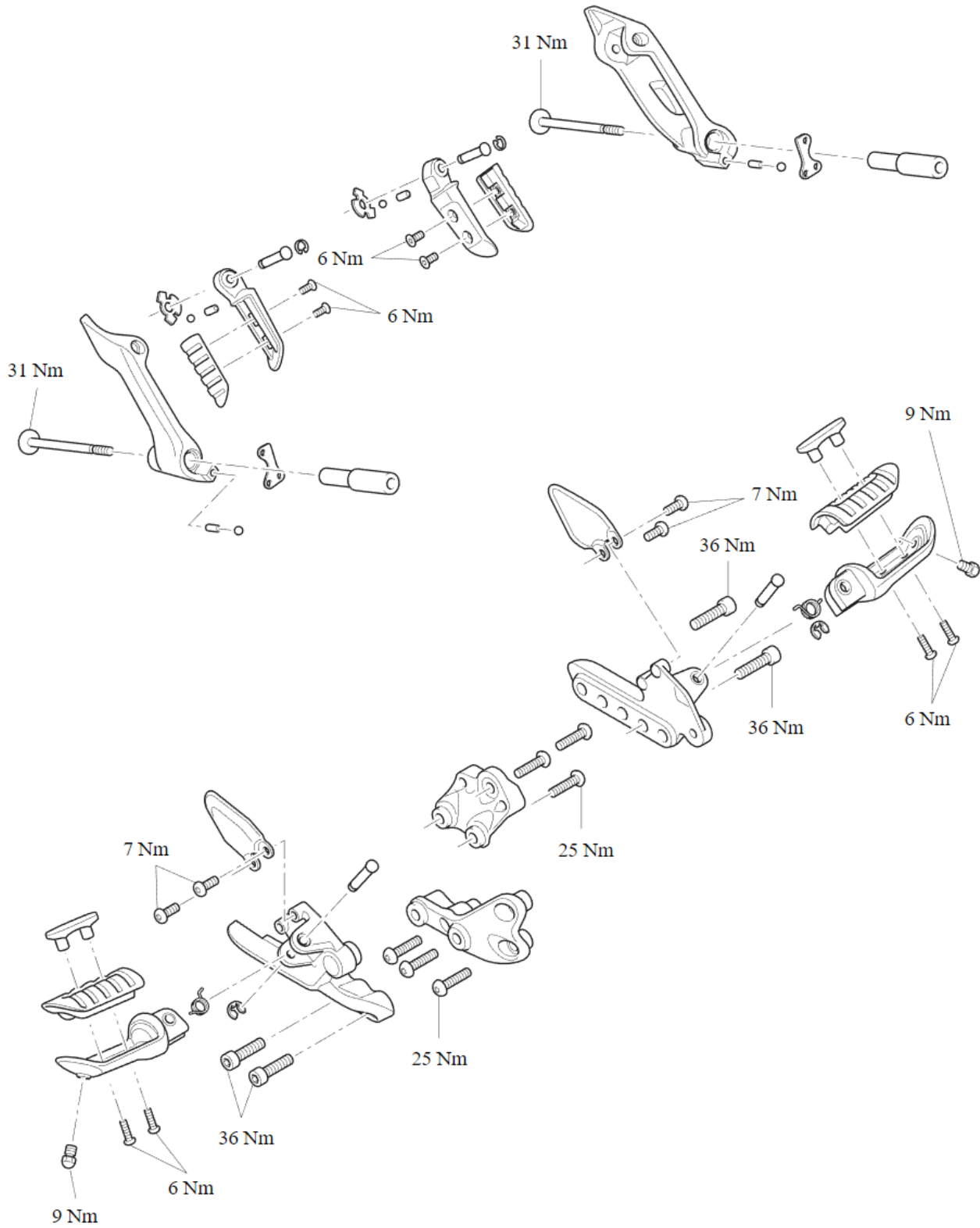
Exploded View – Seats



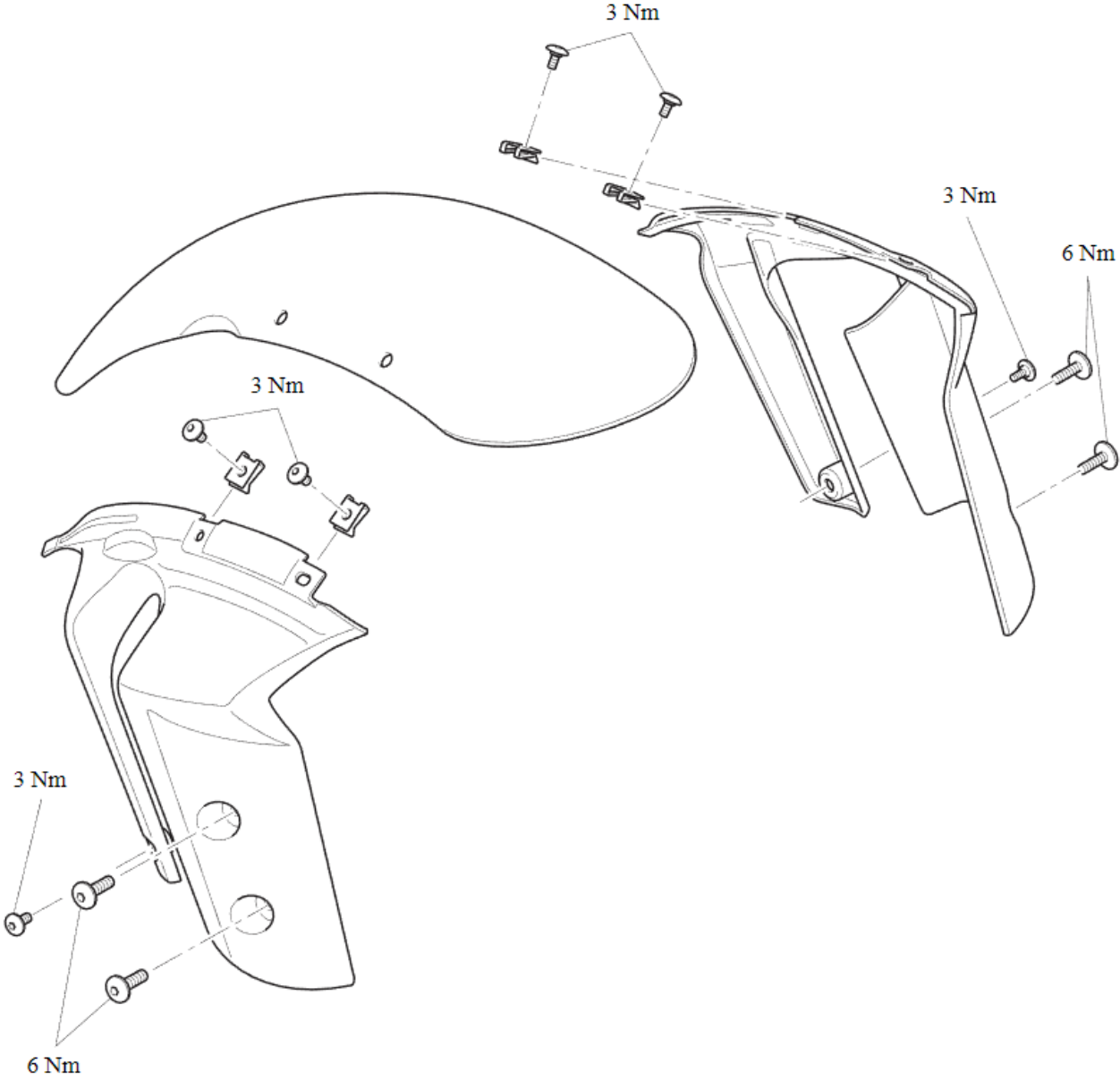
Exploded View - Passenger Back Rest



# Exploded View – Footrests



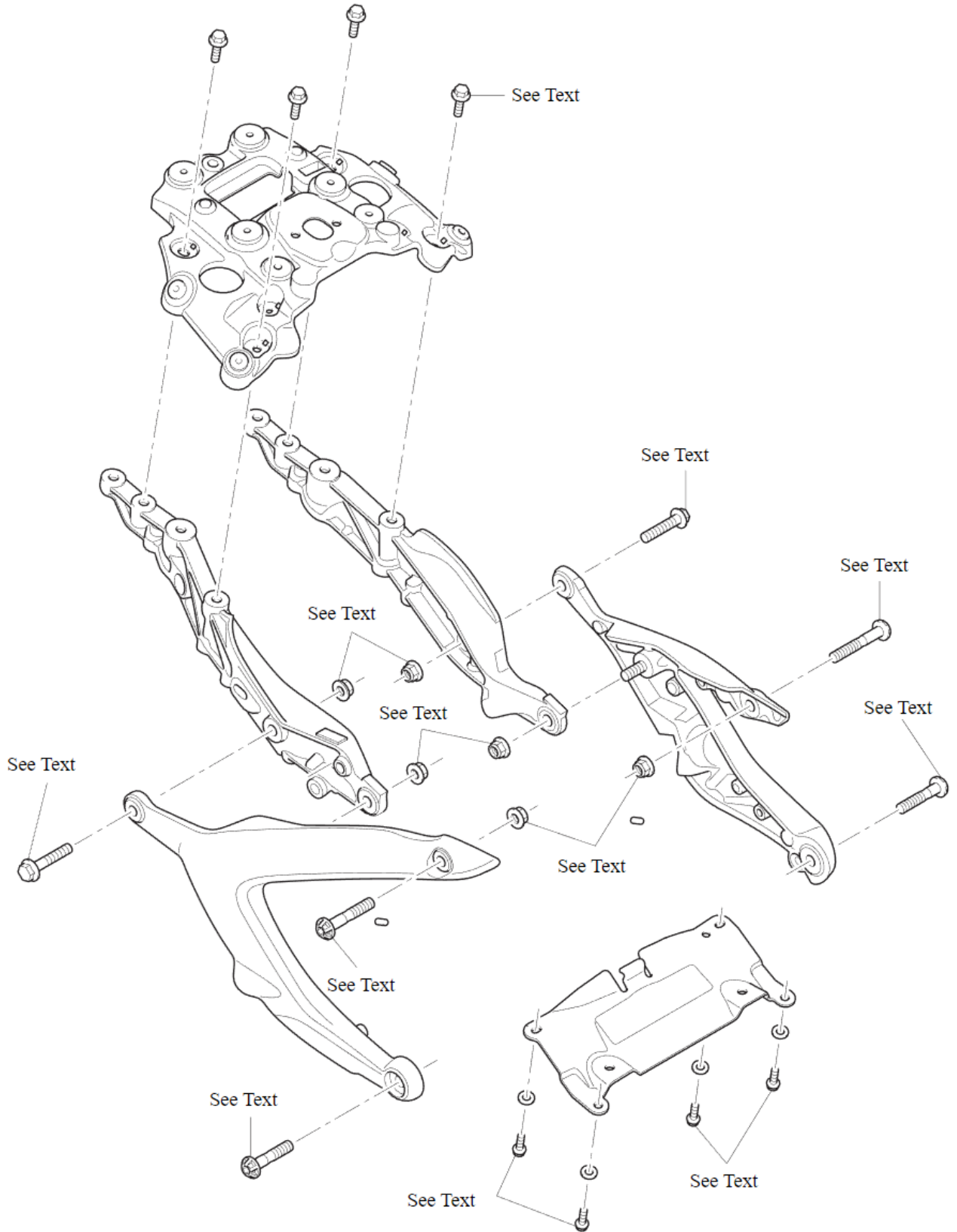
Exploded View - Front Mudguard



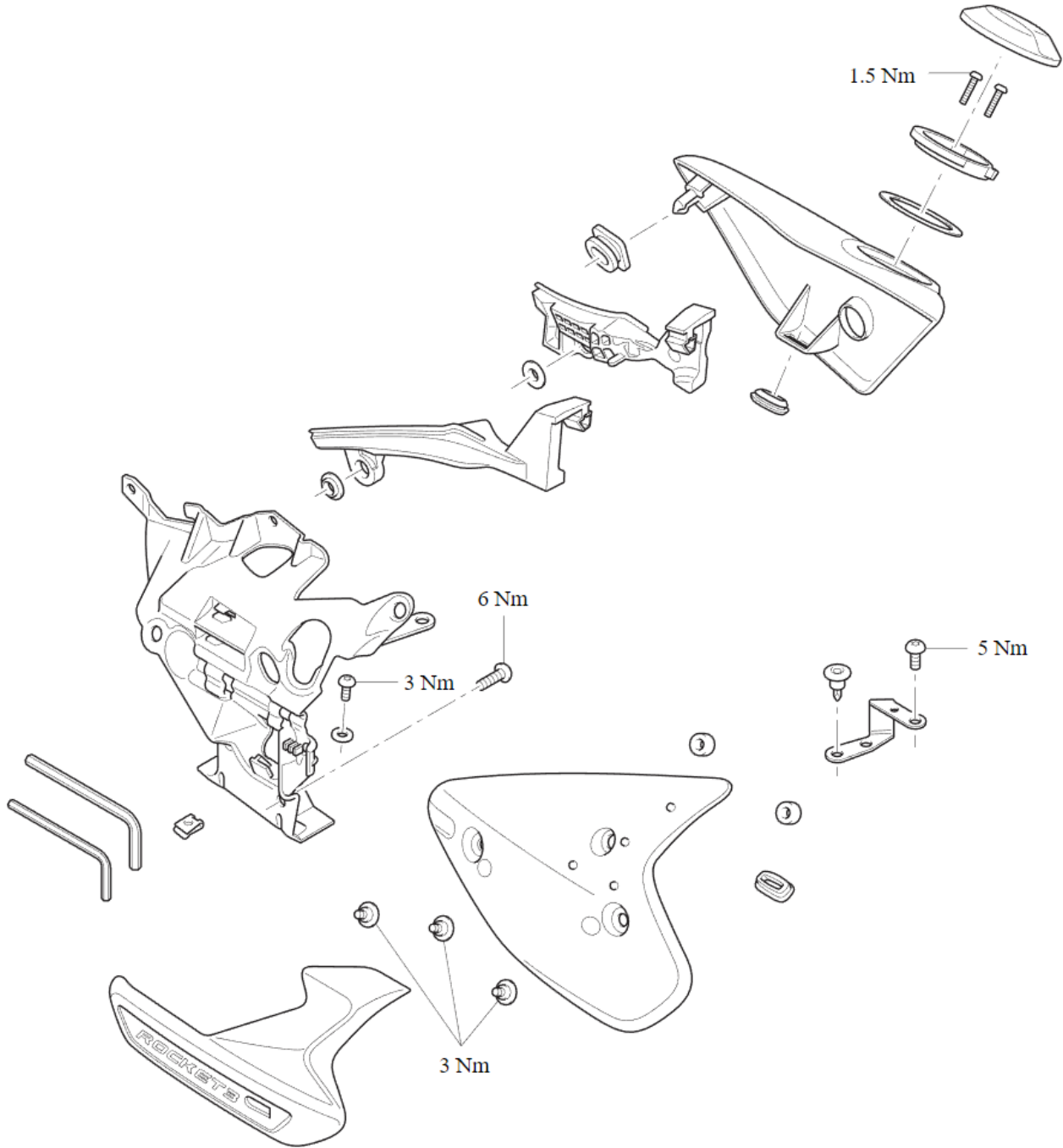




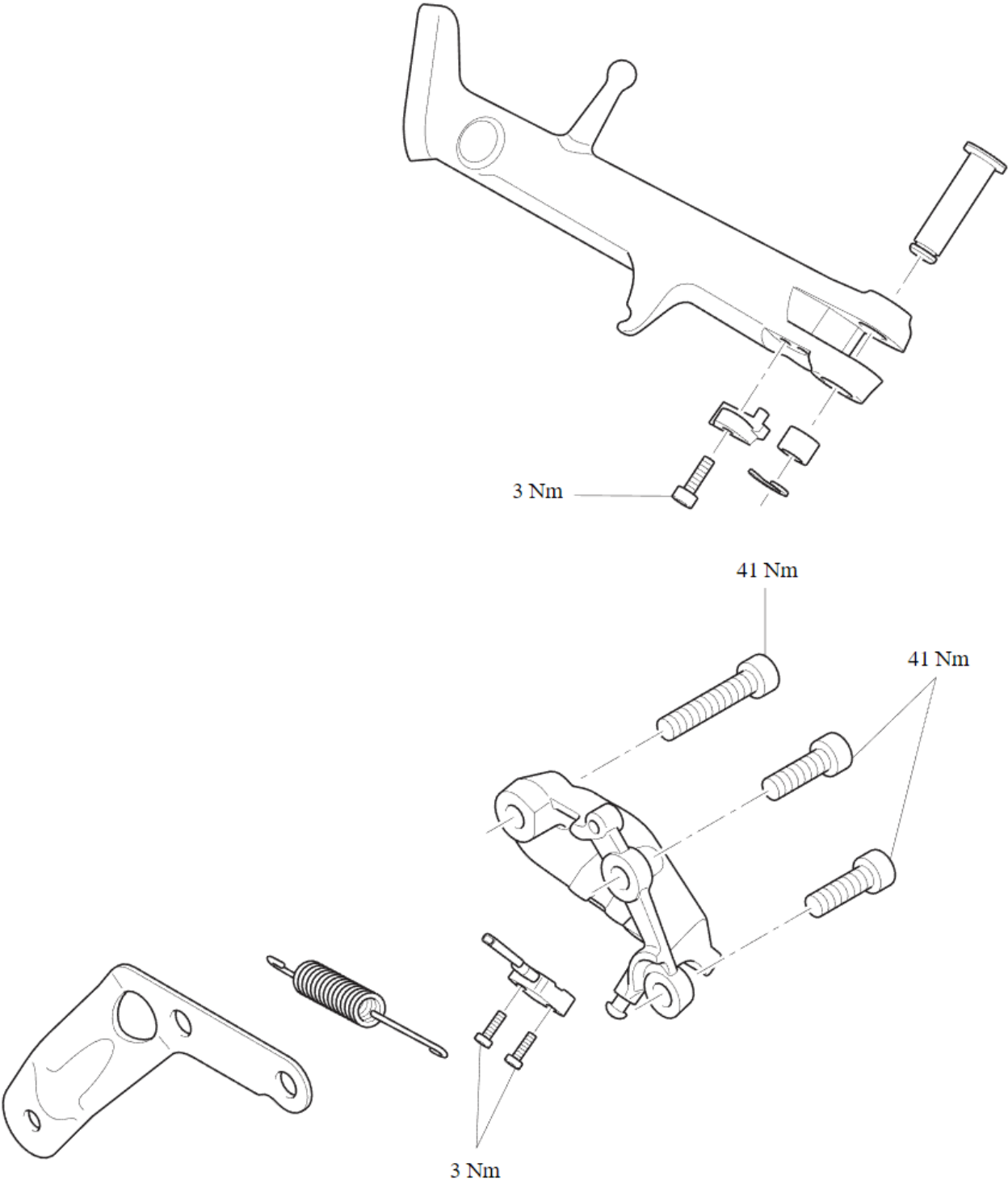
# Exploded View - Rear Subframe



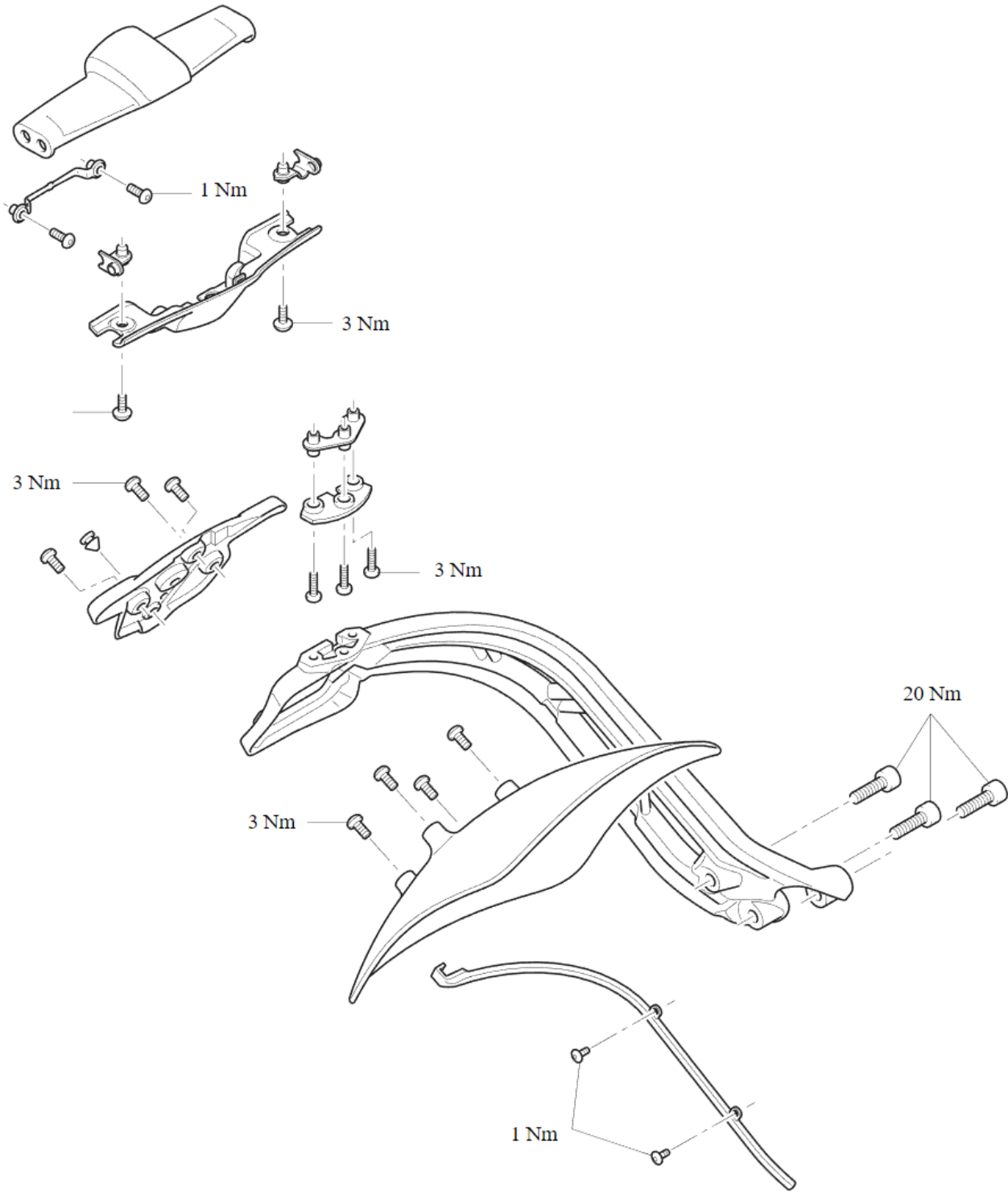
Exploded View - Side Panels



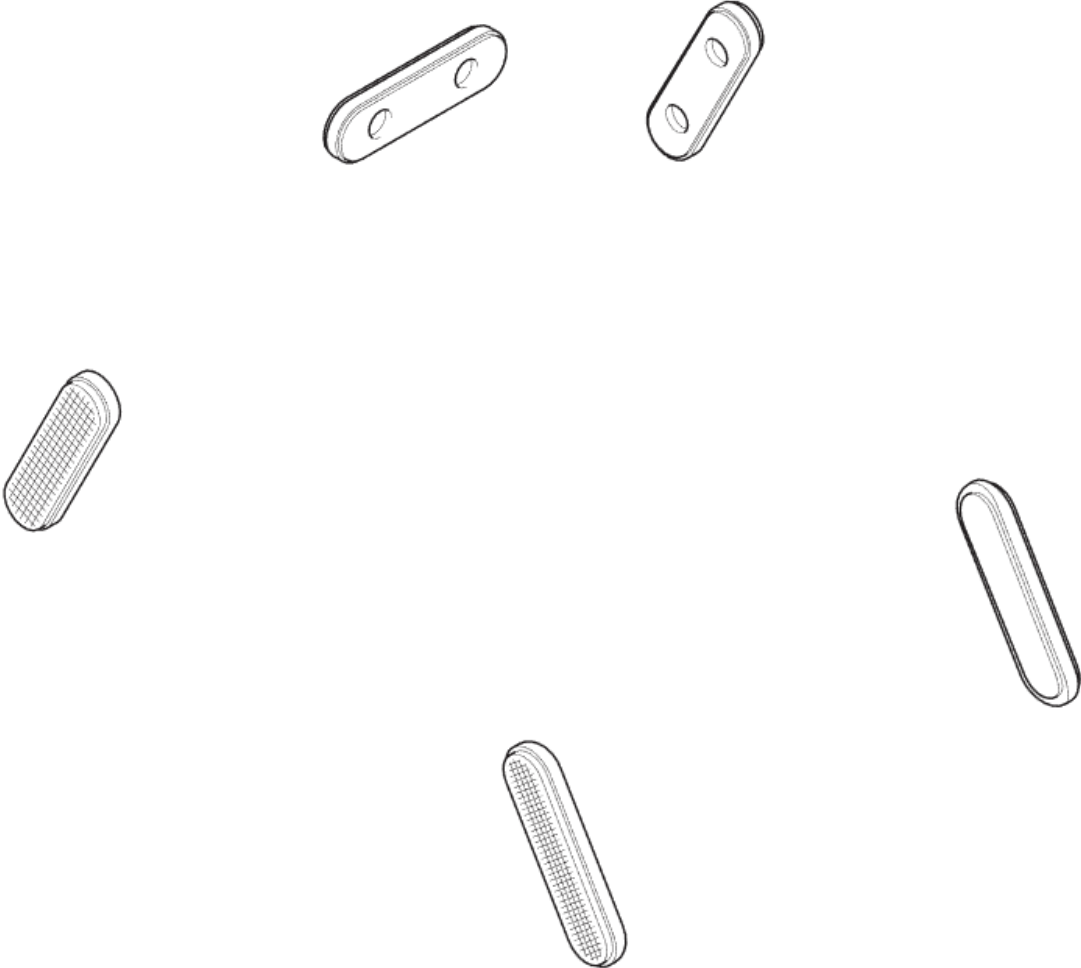
Exploded View - Side Stand



# Exploded View - Rear Licence Plate Hanger



Exploded View - Reflectors (all markets except CA and UC)



## General Frame Inspection

Inspect the frame, bodywork and footrests for accident and other damage, cracks, splits and general dilapidation. Check all fixings for security. If any faults are found, rectify as necessary. If any faults with the frame are found, the frame must be replaced; repairs to the frame are not permitted.

### **WARNING**

The frame must not be modified in any way. Any modification to the frame, such as welding or drilling, may weaken the structure causing an unsafe riding condition leading to loss of motorcycle control and an accident.

### **WARNING**

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for inspection and repair before it is ridden again.

## Models With a Side Stand Fitted

Check the operation of the side stand to make sure it is securely held in the retracted position by the spring. Rectify any faults.

### **WARNING**

If the return spring is faulty, the side stand could extend whilst the motorcycle is being ridden. This will cause an unsafe riding condition, which could lead to loss of motorcycle control and an accident.

## Bank Angle Indicators

### **⚠ WARNING**

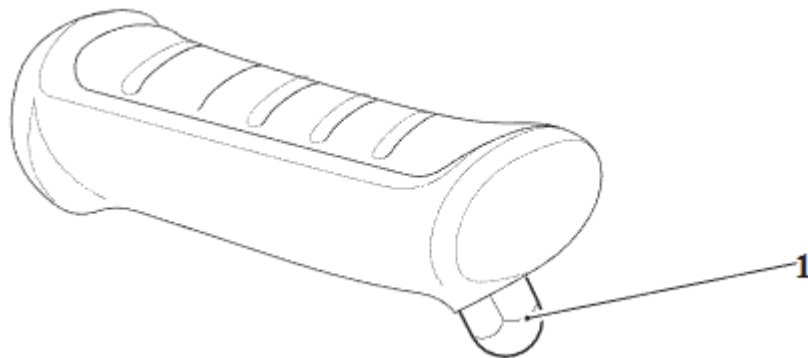
Use of a motorcycle with bank angle indicators worn beyond the maximum limit will allow the motorcycle to be banked to an unsafe angle.

Banking to an unsafe angle may cause instability, loss of motorcycle control and an accident.

Inspect the bank angle indicators on the rider's footrests for wear. The bank angle indicators are worn out when 5.0 mm of the bank indicator remains.

### Replacement

1. Remove and discard the bank angle indicator from the front footrest.
2. Fit the new bank angle indicator and tighten to 9 Nm.
3. Repeat for the opposite side.



1. Bank angle indicator

## Seat – Removal

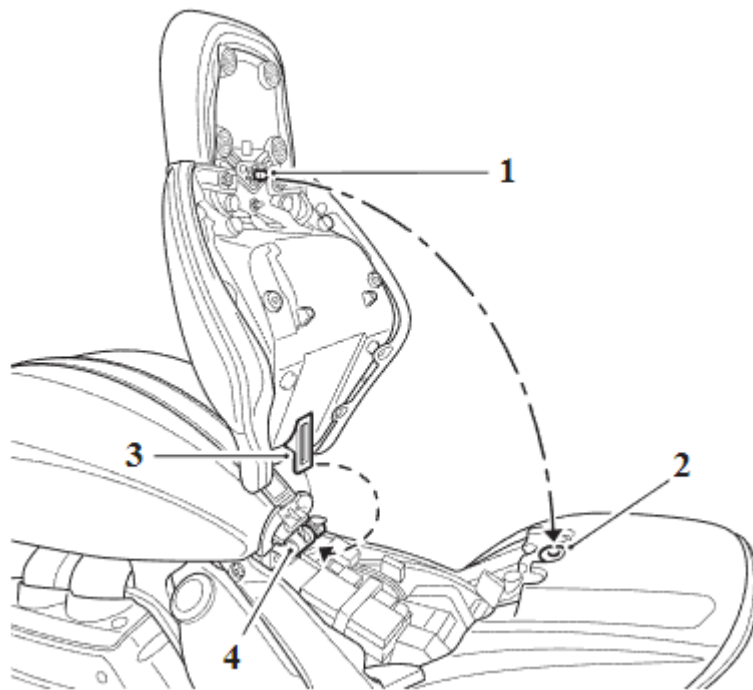
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Insert the ignition key into the seat lock and turn it anticlockwise while pressing down on the rear of the seat.
2. This will release the rider seat from its lock.
3. Lift the seat up from the rear, and slide the seat rearwards to remove it from the motorcycle.



1. Locating peg
2. Locating peg lock
3. Seat bracket
4. Fuel tank hinge



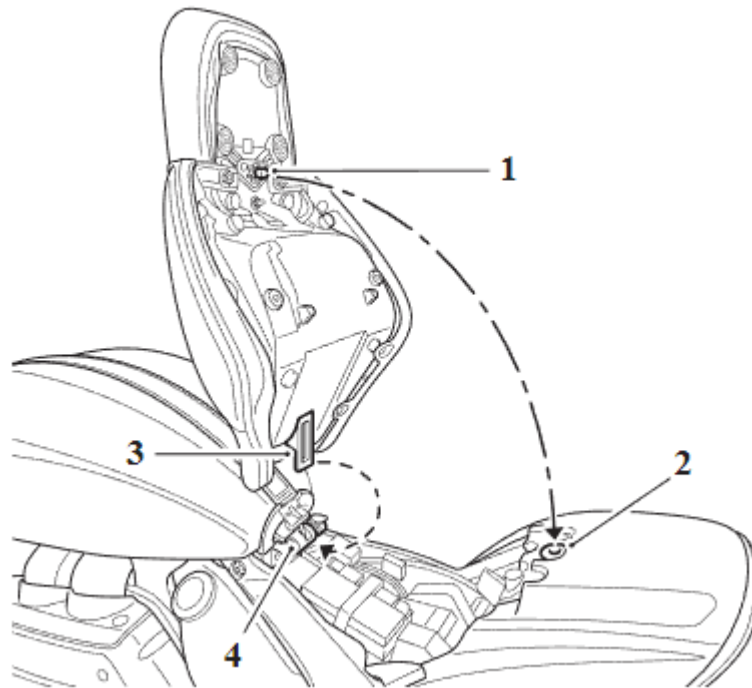
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the seat's front bracket under the fuel tank hinge.
2. Align the locating peg to the lock.
3. Press the seat down engaging the locating peg in the lock. An audible click can be heard when the seat is fully engaged.



1. Locating peg
2. Locating peg lock
3. Seat bracket
4. Fuel tank hinge

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

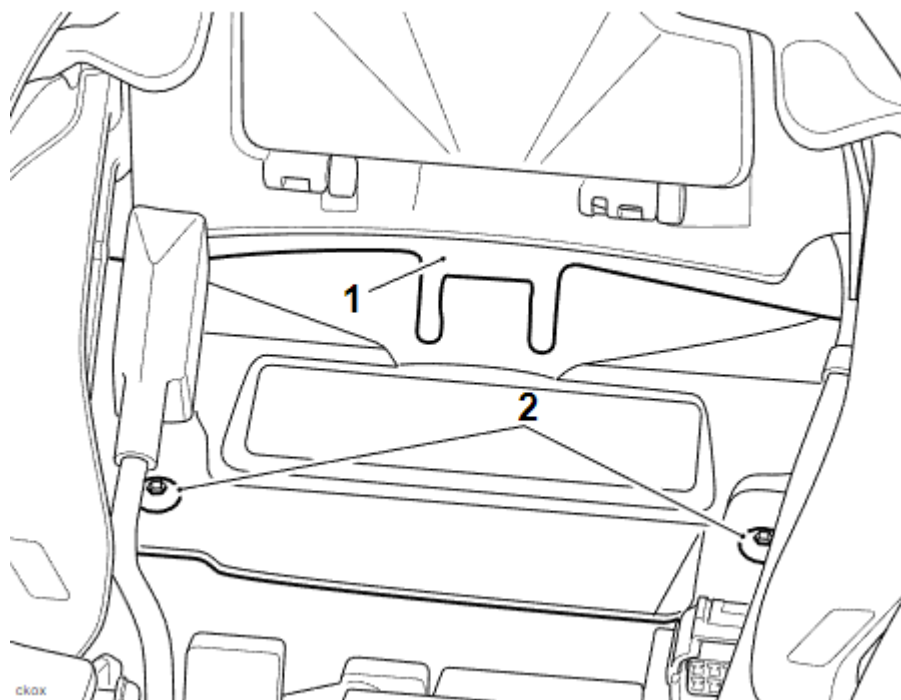
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. If closed, open the passenger left and right hand footrests.
2. Remove the fixings securing the undertray to the battery box.



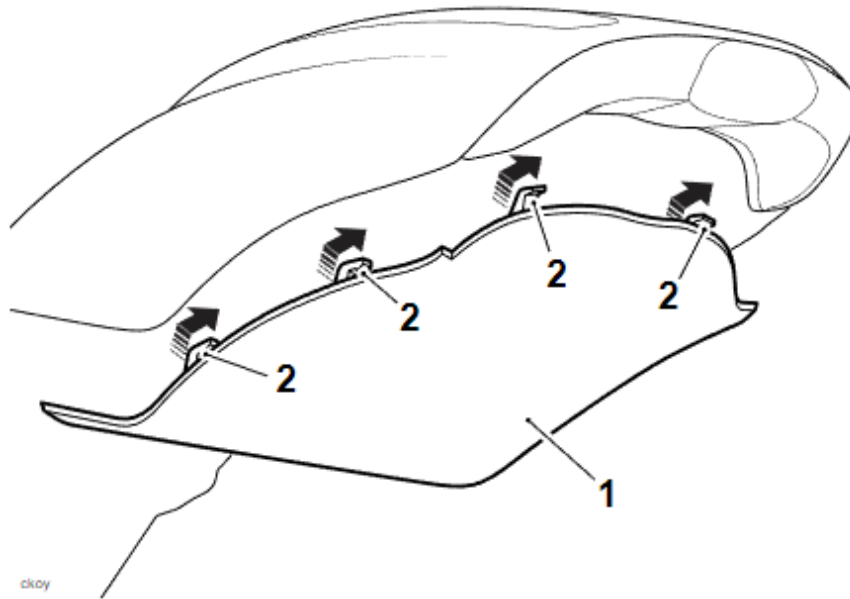
1. Undertray
2. Fixings

### NOTICE

There are two retaining lugs on the either side of the undertray that locate into the rear mudguard left and right hand carriers.

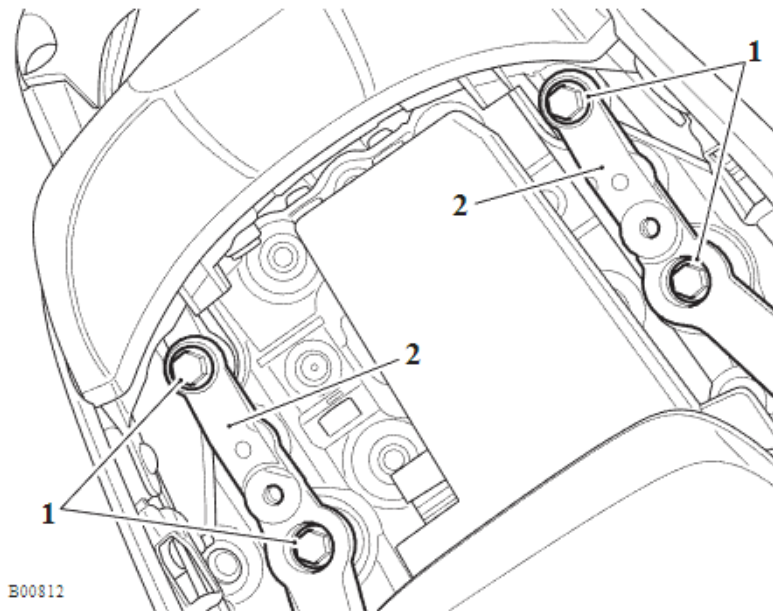
There are two retaining lugs at the rear of the undertray that locate into the rear light.

3. Lower the front of the under tray and slide forwards to release the retaining tabs and remove the tray.



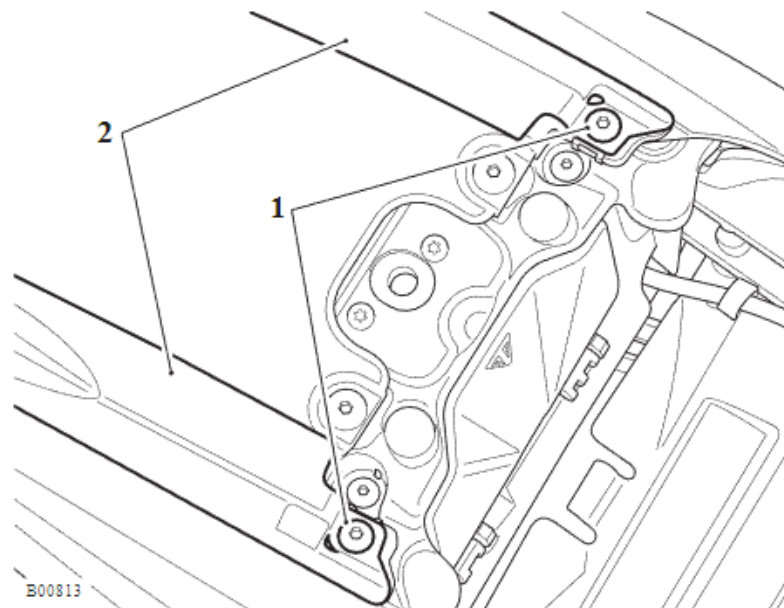
1. Rear undertray
2. Tabs

4. From the underside, remove the four fixings securing the backrest to the rear subframe.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Rear subframe</li></ol> |
|---|

5. Support the backrest, release the two fixings and remove the backrest.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Backrest</li></ol> |
|--|

## Passenger Seat Backrest – Installation

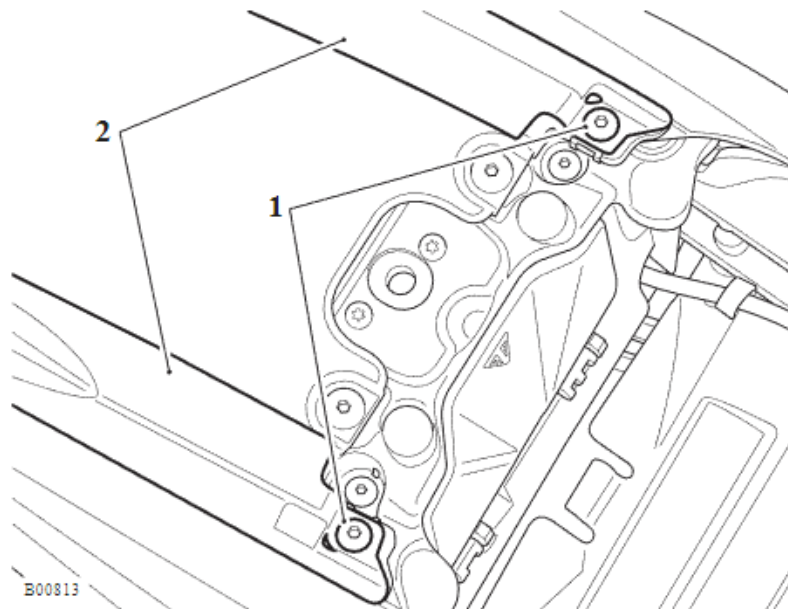
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

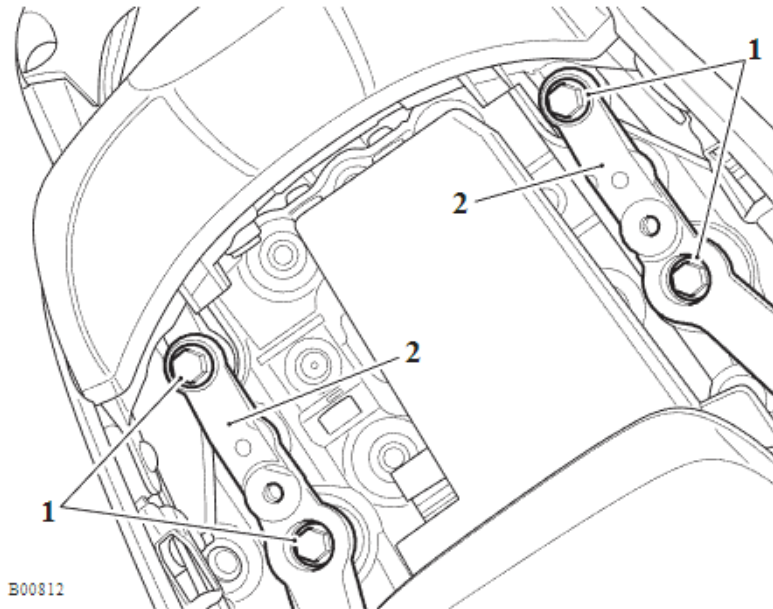
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the backrest onto the rear mudguard. Fit the fixings but do not fully tighten at this stage.



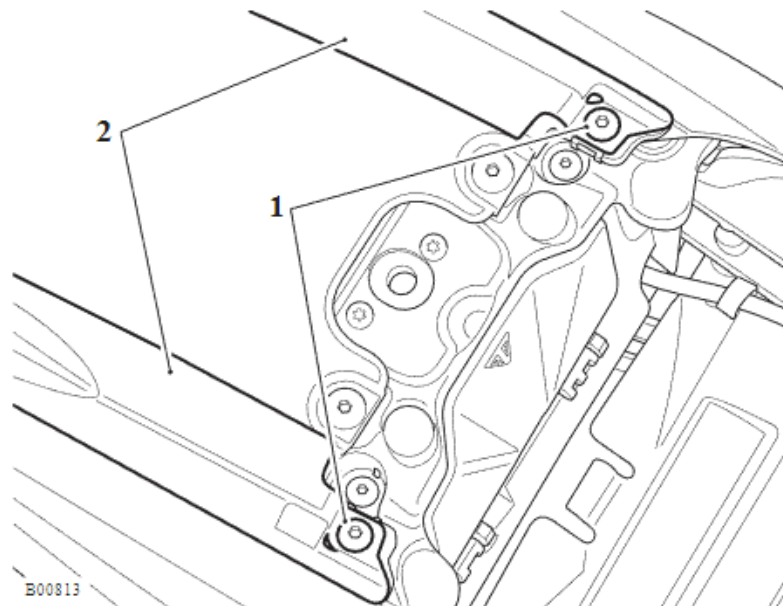
1. Fixings
2. Backrest

2. From the underside, fit the four fixings to secure the backrest to the rear subframe. Tighten the fixings to 32 Nm.



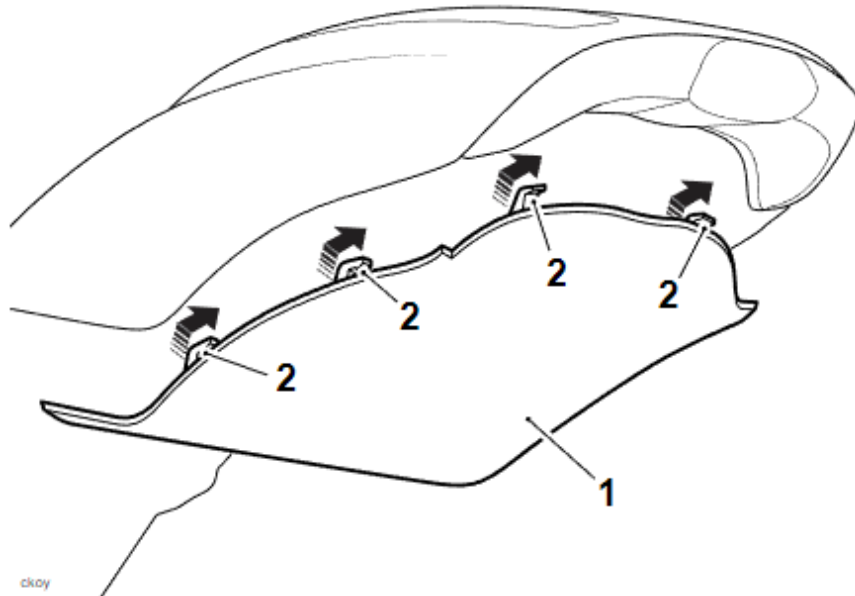
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Rear subframe</li></ol> |
|---|

3. Tighten the backrest front fixings to 3 Nm.



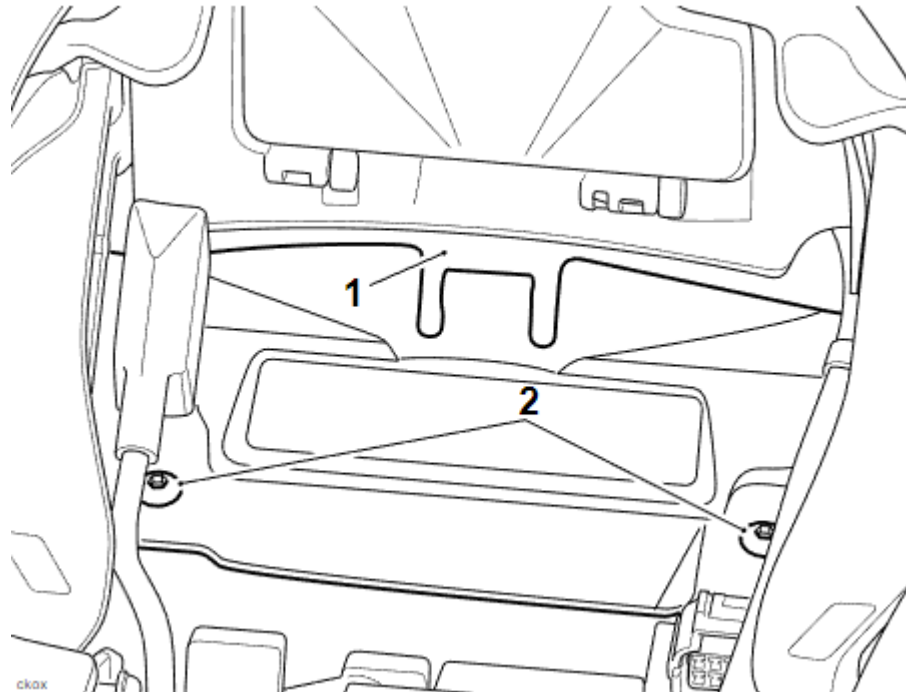
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Backrest</li></ol> |
|--|

4. Position the rear undertray tabs to the slots in the rear panel. push rearwards to locate fully into the slots.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Rear undertray</li><li>2. Tabs</li></ol> |
|---|

5. Secure the undertray to the battery box and tighten the fixings to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Undertray</li><li>2. Fixings</li></ol> |
|---|

6. Close the passenger left and right hand footrests.

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

### Front Mudguard – Removal

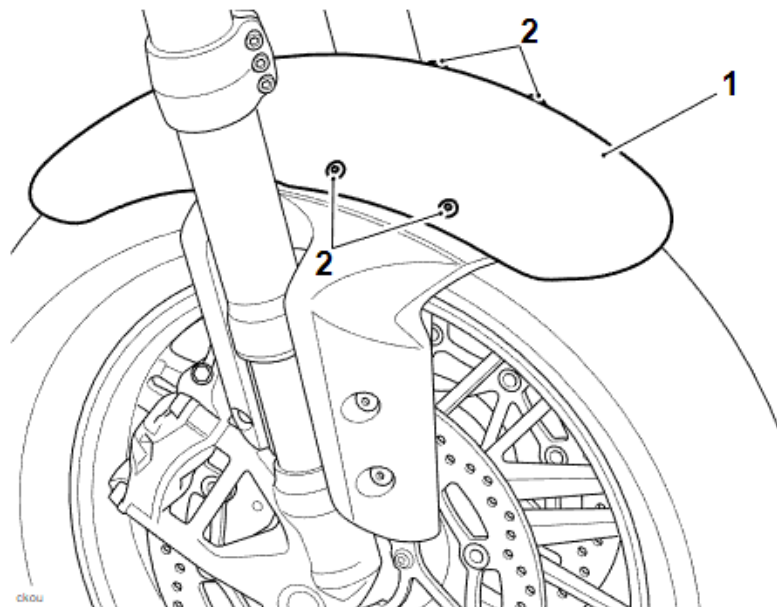
#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

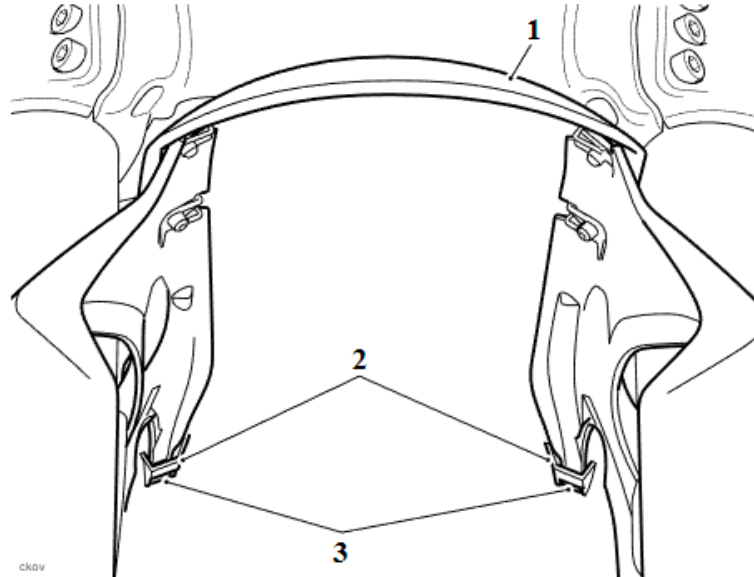
1. Remove the four mudguard fixings



1. Front mudguard
2. Fixings

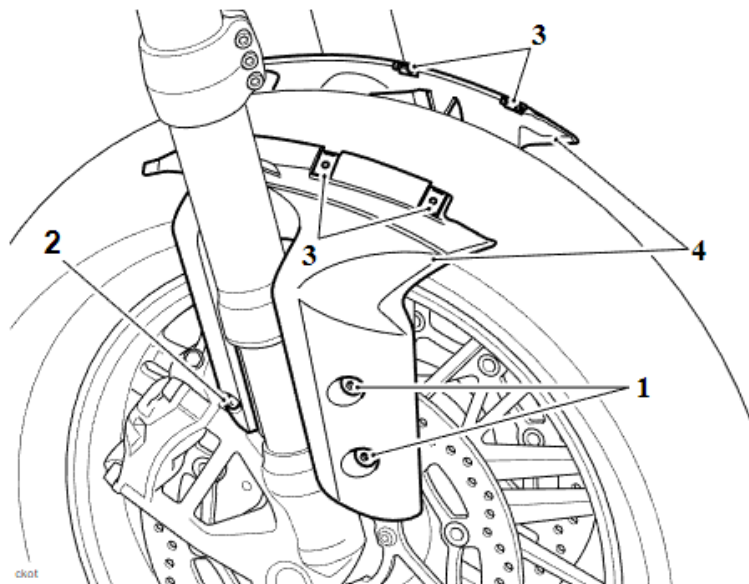


1. Slide the front mudguard rearward and release the tangs from the slots on the mudguard brackets.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Front mudguard</li><li>2. Slots</li><li>3. Tangs</li></ol> |
|---|

1. Remove the fixings and remove the mudguard brackets.
2. If required remove the captive nuts.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Front fixing (right hand shown)</li><li>2. Rear Fixing (right hand shown)</li><li>3. Captive nuts</li><li>4. Front mudguard bracket (right hand shown)</li></ol> |
|---|

## Front Mudguard – Installation

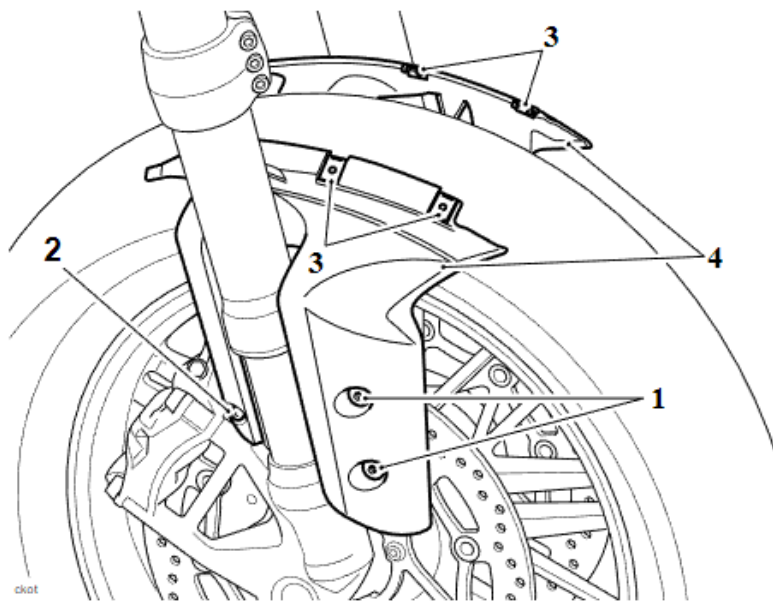
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, fit the captive nuts to the left and right hand mudguard brackets.
2. Position the right hand mudguard bracket to the right hand fork, fit the fixings but do not fully tighten at this stage.
3. Position the left hand mudguard bracket to the left hand fork, fit the fixings but do not fully tighten at this stage.

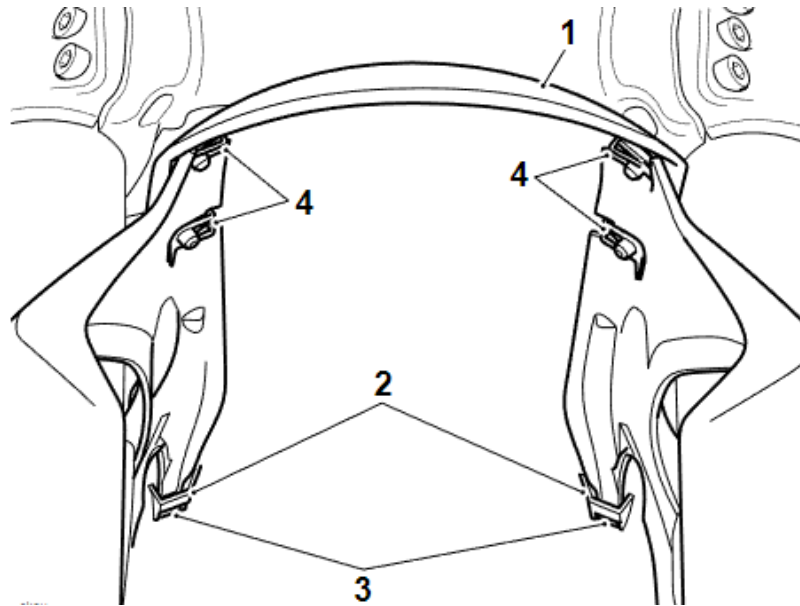


1. Front fixing (right hand shown)
2. Rear Fixing (right hand shown)
3. Captive nuts
4. Front mudguard bracket (right hand shown)

### **NOTICE**

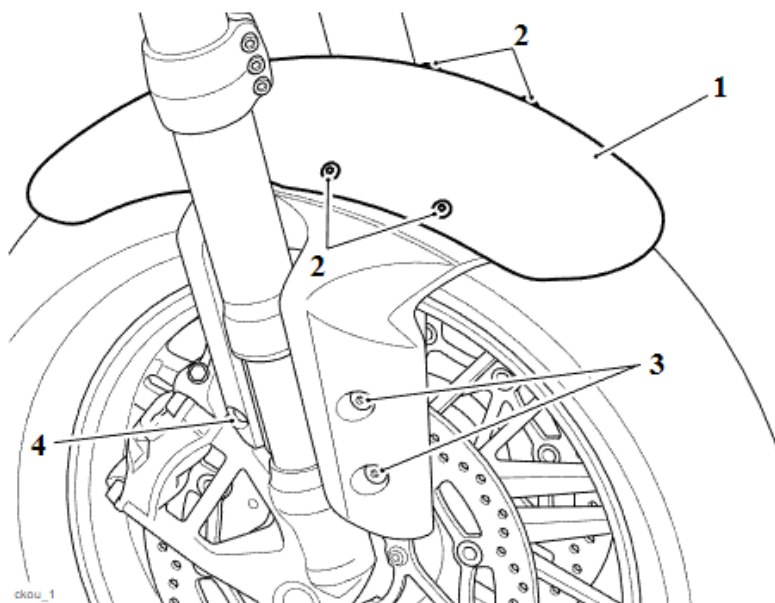
Alignment slots are positioned at the rear underside of the front mudguard.

4. Slide the mudguard forward onto the brackets. Make sure the slots on the underside of the mudguard fit on to the brackets tangs.
5. Position the mudguard to the brackets and fit the fixings to the captive nuts, do not fully tighten at this stage.



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Front mudguard</li> <li>2. Slots</li> <li>3. Tangs</li> <li>4. Captive nuts</li> </ol> |
|--|

6. Tighten the mudguard fixings to 3 Nm.
7. Tighten the left and right hand mudguard brackets front fixings to 6 Nm and the rear fixing to 3 Nm.



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Front mudguard</li> <li>2. Fixings (mudguard)</li> <li>3. Front fixings (right hand bracket shown)</li> <li>4. Rear fixing (right hand bracket shown)</li> </ol> |
|--|

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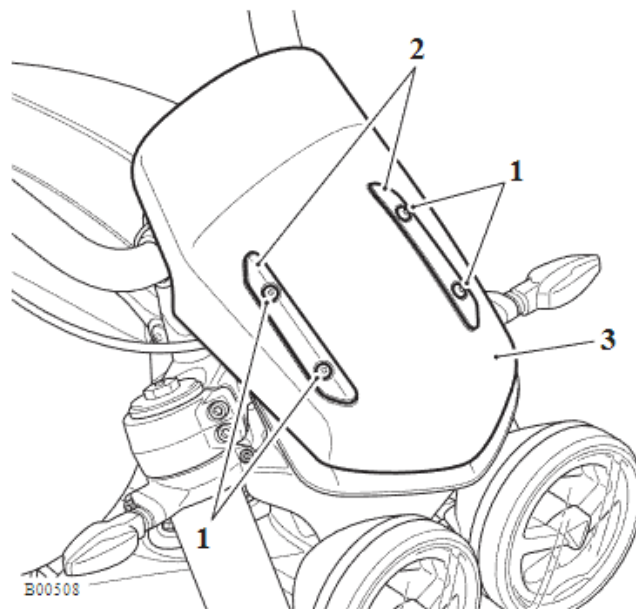
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

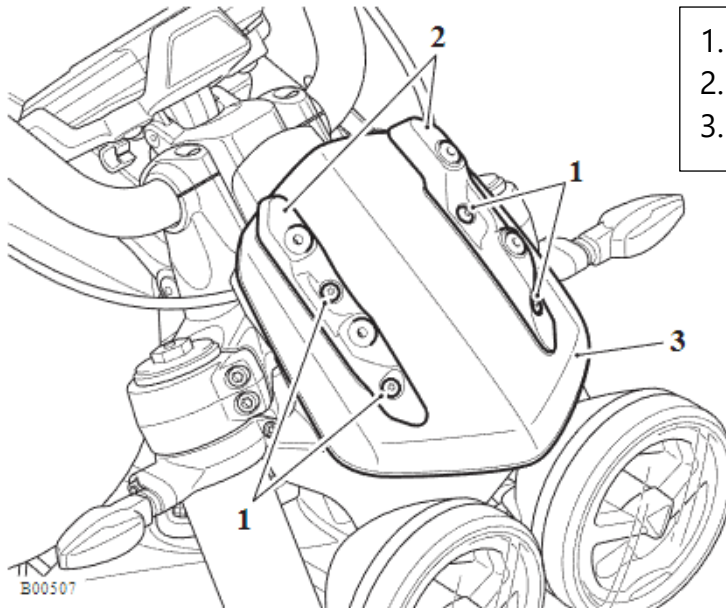
The flyscreen finishers are left and right handed. The underside of the finisher will have the letter L or R for left or right.

1. Release the fixings and remove the windscreen and its finishers.



1. Fixings
2. Finishers
3. Windscreen

2. Release the fixings remove the windscreen mountings and the flyscreen.



- |    |                      |
|----|----------------------|
| 1. | Fixings              |
| 2. | Windscreen mountings |
| 3. | Flyscreen            |

#### Flyscreen – Installation

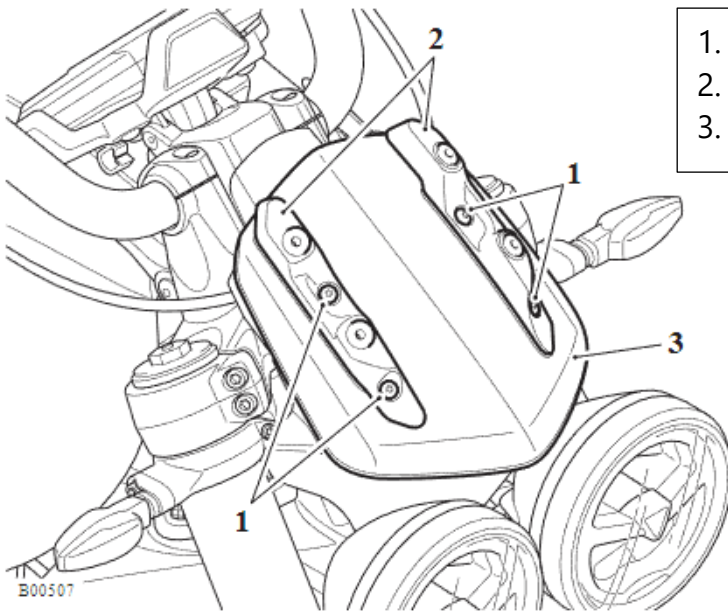
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the flyscreen and the windscreen mountings to the front subframe and tighten the fixings to 5 Nm.

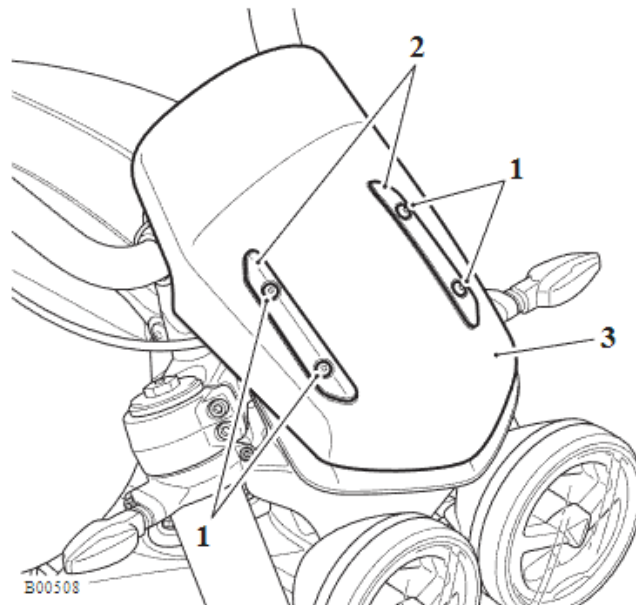


- 1. Fixings
- 2. Windscreen mountings
- 3. Flyscreen

**NOTICE**

The flyscreen finishers are left and right handed. The underside of the finisher will have the letter L or R for left or right.

2. Position the flyscreen and finishers to the windscreen mountings and tighten the fixings to 1 Nm.



- 1. Fixings
- 2. Finishers
- 3. Windscreen

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

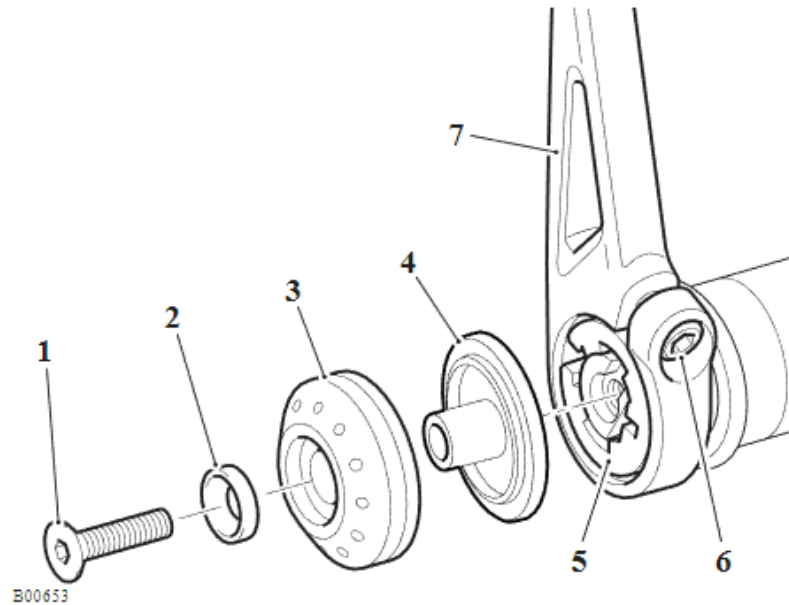
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Remove the handlebar end weight. Discard the fixing.
2. Remove the spacer from the handlebar end weight.

**NOTICE**

Note the orientation of the mirror and its friction ring for installation.

3. Loosen the mirror pinch bolt and remove the mirror.



1. Fixing
2. Finisher cap
3. Bar end finisher
4. Spacer
5. Friction ring
6. Pinch bolt
7. Mirror

## Mirrors – Installation

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **NOTICE**

Make sure the friction ring fully fitted to the handlebar and is flush with the end of the handlebar.

Make sure the mirror is completely on the the friction ring when tightening the pinch bolt.

1. Fit the mirror and its friction ring as noted for removal and tighten the pinch bolt to 3.5 Nm.

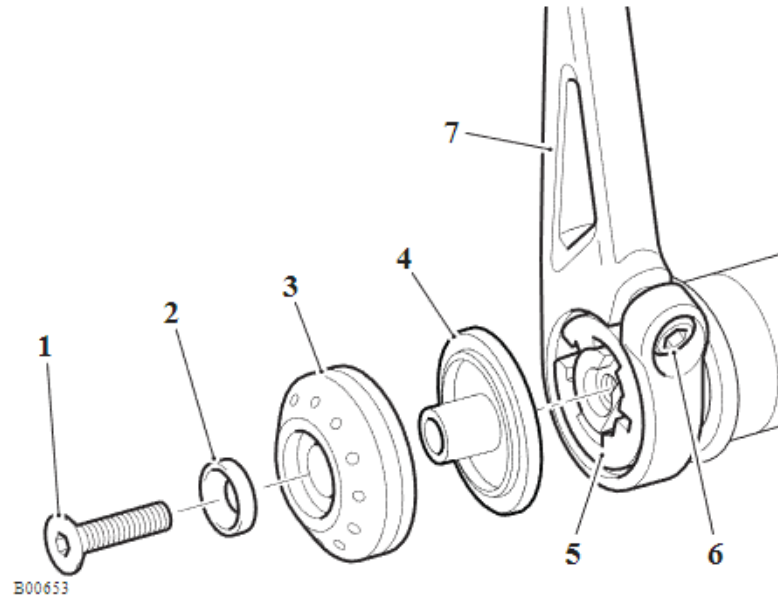
### **NOTICE**

When fitted, make sure there is a gap between the handlebar end weight and the mirror.

2. Fit the spacer to the handlebar end weight assembly.

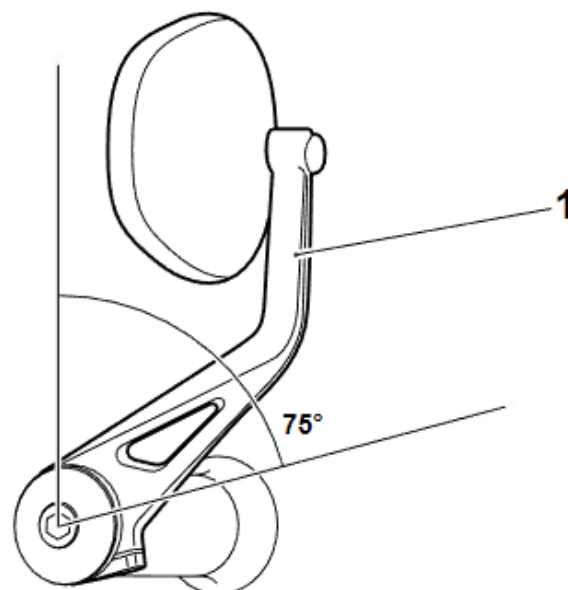


3. Fit the handlebar end weight assembly and tighten the new fixing to 5 Nm.



1. Fixing
2. Finisher cap
3. Bar end finisher
4. Spacer
5. Friction ring
6. Pinch bolt
7. Mirror

4. Position the mirrors to give rear visibility in the riding position. Do not rotate the mirror beyond 75°, measured from the vertical section of the mirror arm.



## 1. Fixing (bar end weight)

### Front Subframe – Removal

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

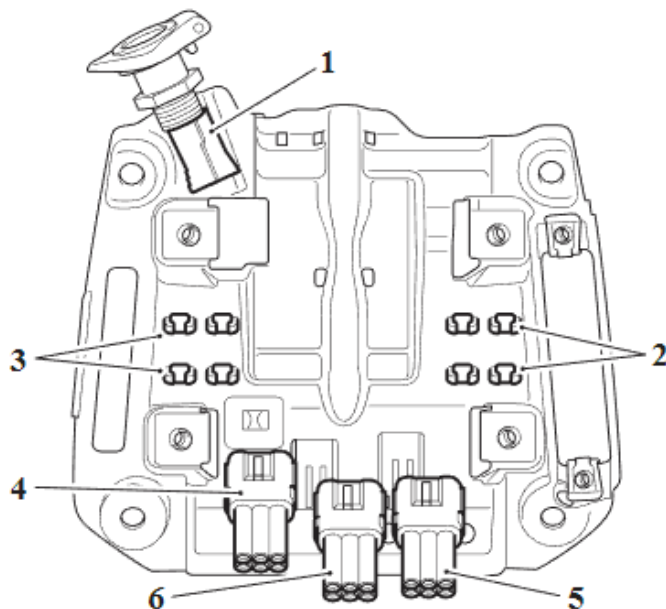
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)
- [Headlight Assembly - Removal](#)

#### **NOTICE**

Note the positions of the connectors on the under side of the flyscreen mounting for installation.

1. Turn the flyscreen mounting over and detach the connectors from it.

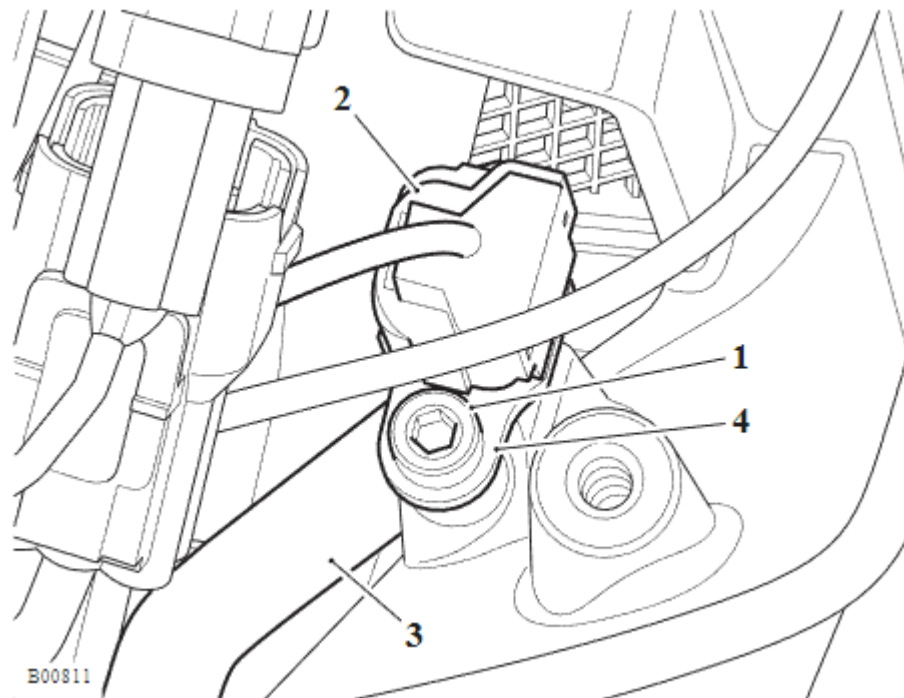


1. Accessory socket
2. Right hand front direction indicator (identified with red tape on harness)
3. Left hand front direction indicator
4. Left hand headlight
5. Right hand headlight
6. Electronic steering lock

## NOTICE

Note the routing of the hose connected to the temperature sensor for installation.

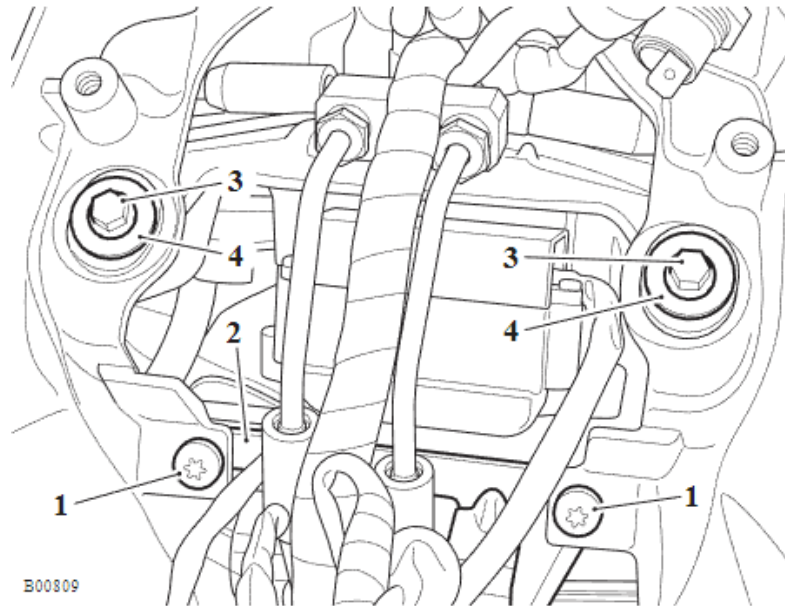
2. Remove the fixing and detach the ambient temperature sensor from the subframe.



1. Fixing
2. Electrical connector
3. Hose
4. Temperature sensor

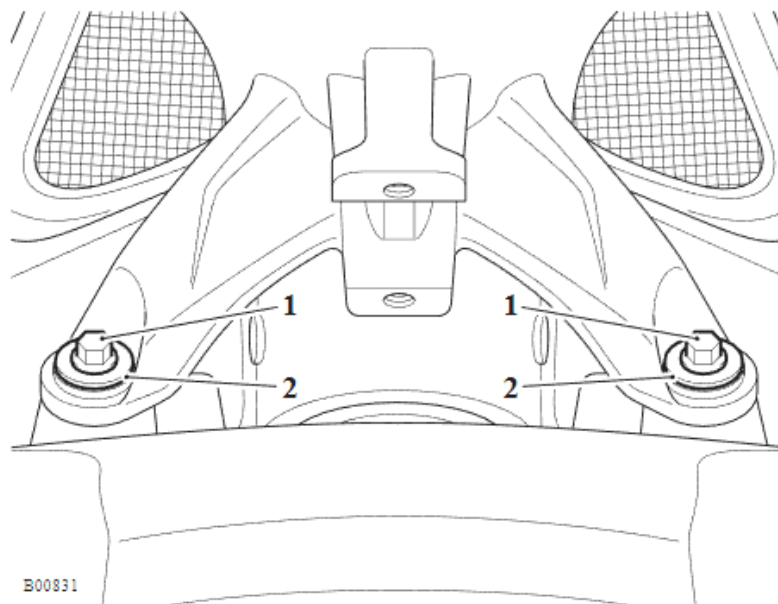
3. Remove the fixings and detach the ABS brake line bracket from the subframe.

4. Remove the upper fixings and flanged sleeves from the front subframe.



- 1. Fixings
- 2. ABS bracket
- 3. Fixings
- 4. Flanged sleeves

5. Remove the lower fixings, flanged sleeves and manouevre the front subframe off the motorcycle.



- 1. Fixings
- 2. Flanged sleeves

## Front Subframe – Installation

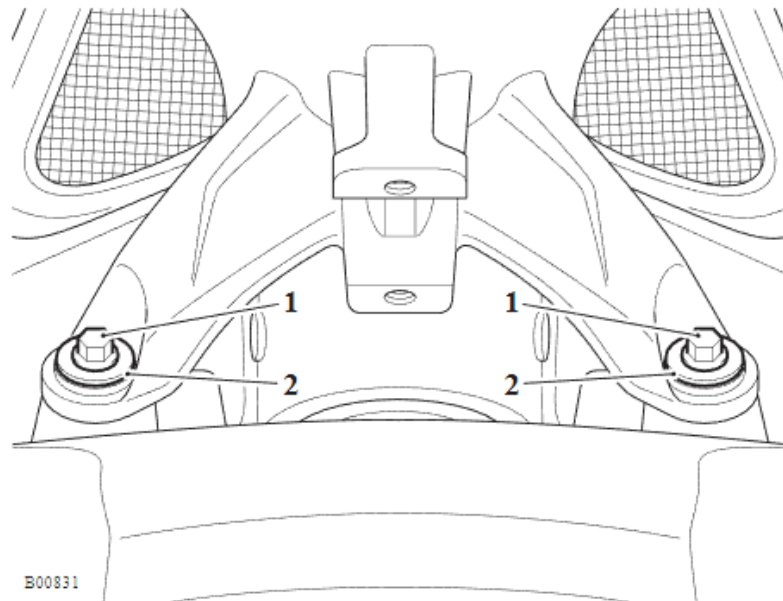
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

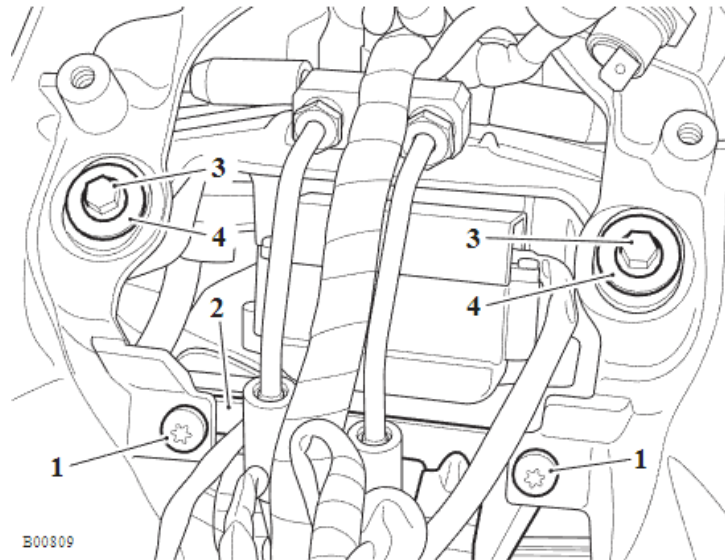
1. Position the front subframe to the motorcycle, fit the lower flanged sleeves and fixings. Do not fully tighten at this stage.



1. Fixings
2. Flanged sleeves

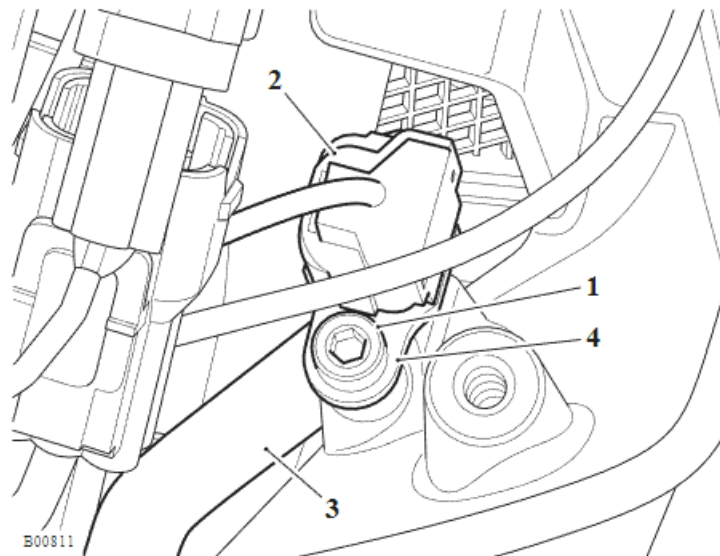
2. Fit the upper flanged sleeves and fixings. Tighten the upper and lower fixings to 13 Nm.

3. Attach the ABS brake line bracket to the subframe and tighten the fixings to 9 Nm.



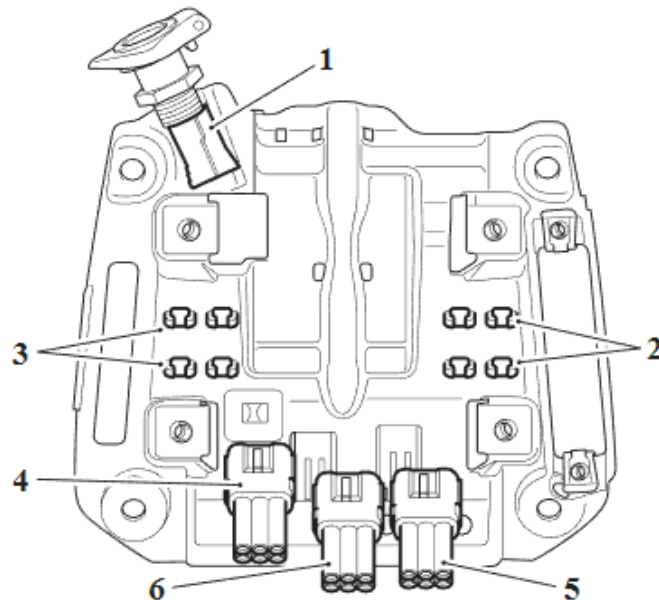
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. ABS bracket</li><li>3. Fixings</li><li>4. Flanged sleeves</li></ol> |
|---|

4. If removed, fit the hose to the temperature sensor as noted for removal.
5. Connect the electrical connector and position the temperature sensor with the hose routed as for removal. Fit and tighten the fixing to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Electrical connector</li><li>3. Hose</li><li>4. Temperature sensor</li></ol> |
|---|

6. Attach the connectors to the underside of the flyscreen mounting as noted for removal.



1. Accessory socket
2. Right hand front direction indicator (identified with red tape on harness)
3. Left hand front direction indicator
4. Left hand headlight
5. Right hand headlight
6. Electronic steering lock

Perform the following operations:

- [Headlight Assembly - Installation](#)
- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## Left Hand Control Plate – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

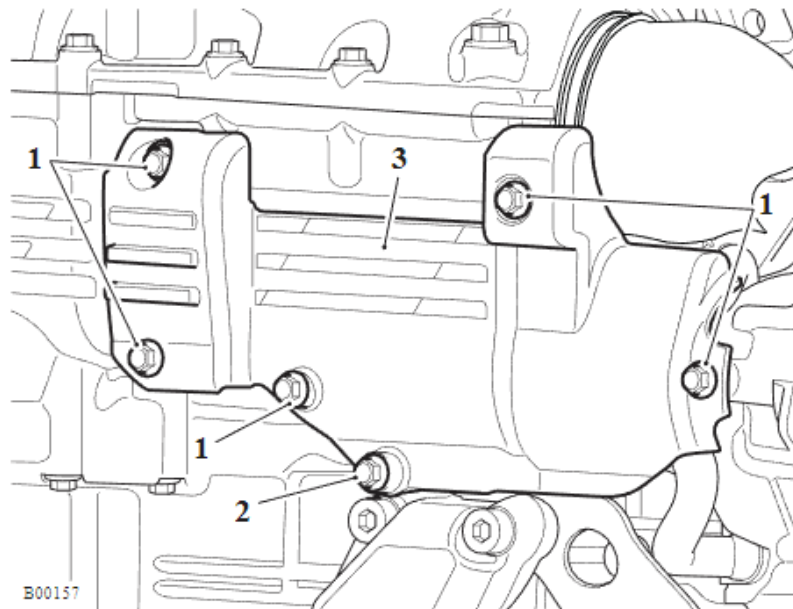
Perform the following operations:

- If fitted with the Triumph shift assist [Seat - Removal](#)
- If fitted with the Triumph shift assist [Battery - Removal](#)

### **NOTICE**

The front upper fixing also secure the drive shaft cover.

1. If fitted with the Triumph shift assist, release the fixings and remove the starter motor cover.



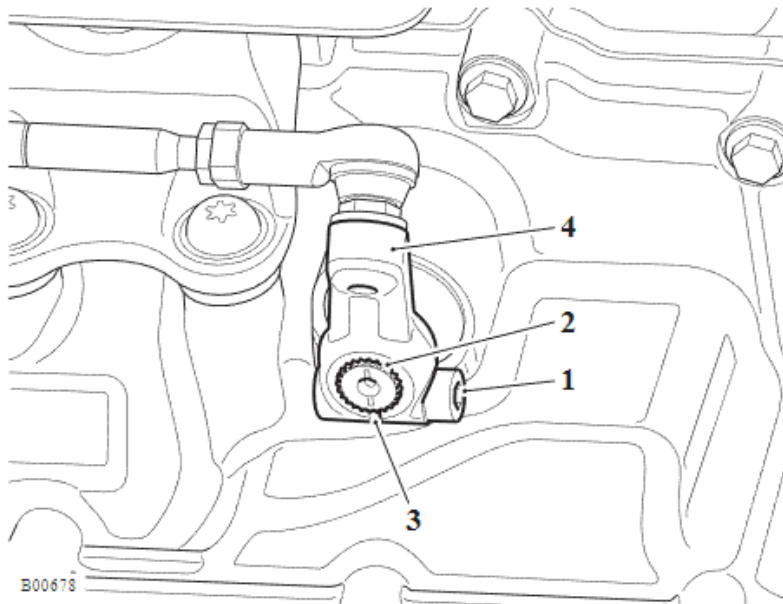
1. Fixings
2. Starter motor cover



## NOTICE

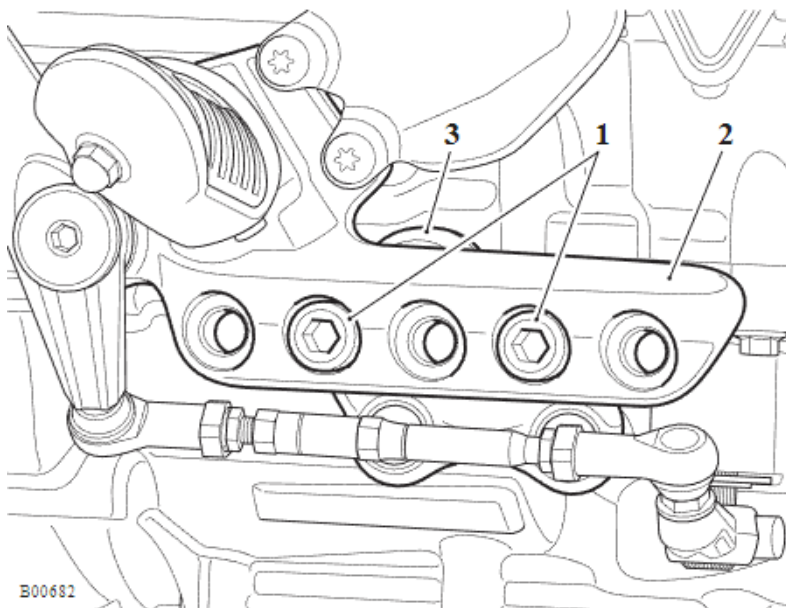
Note the position of the split line on the gear change actuator arm with the alignment mark on the gear change shaft for installation.

2. Release the fixing and disconnect the gear change actuator arm from the gear change shaft.



1. Fixing
2. Alignment mark
3. Split line
4. Actuator arm

3. Release the two fixings and detach the left hand control plate from its mounting.

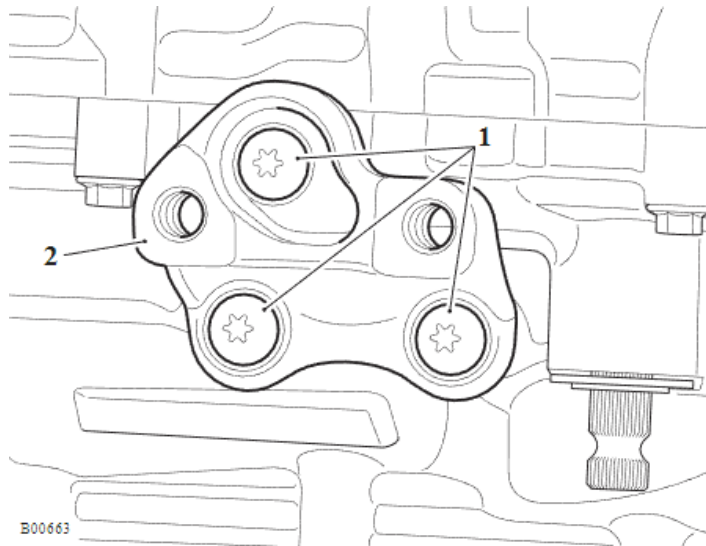


1. Fixings
2. Left hand control plate
3. Control plate mounting

## NOTICE

If fitted, note the routing of the Triumph shift assist harness for installation.

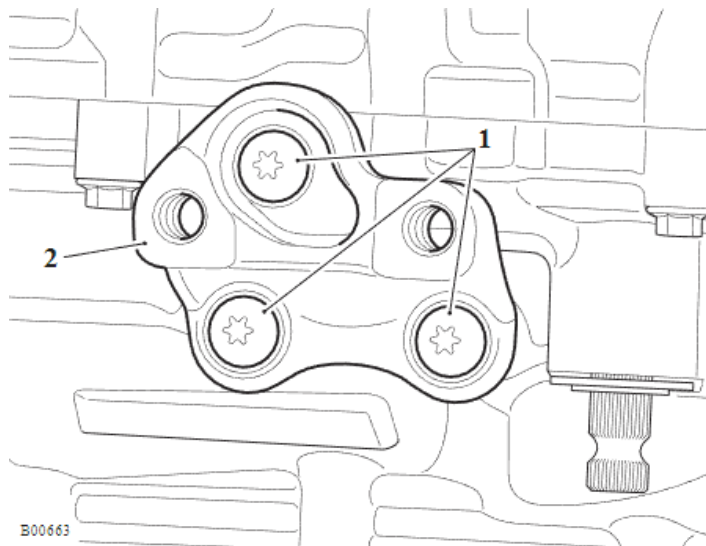
4. If fitted, disconnect the Triumph shift assist from the main harness and remove the control plate.
5. Release the three fixings and remove the control plate mounting.



1. Fixings
2. Control plate mounting

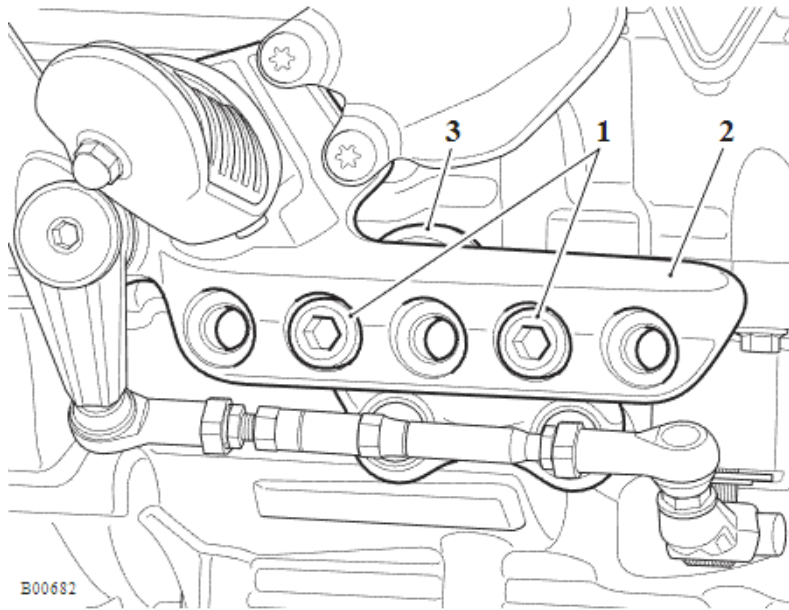
### Left Hand Control Plate – Installation

1. Fit the control plate mounting to the crankcase and tighten the fixings to 25 Nm.



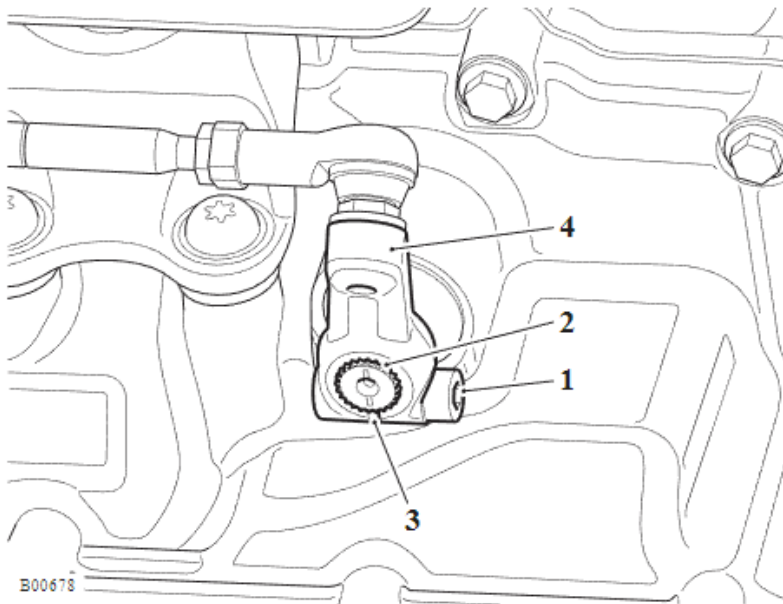
1. Fixings
2. Control plate mounting

2. If fitted, route the Triumph shift assist harness as noted for removal and connect to the main harness.
3. Fit the left hand control plate to its mounting and tighten the fixings to 36 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Left hand control plate</li><li>3. Control plate mounting</li></ol> |
|---|

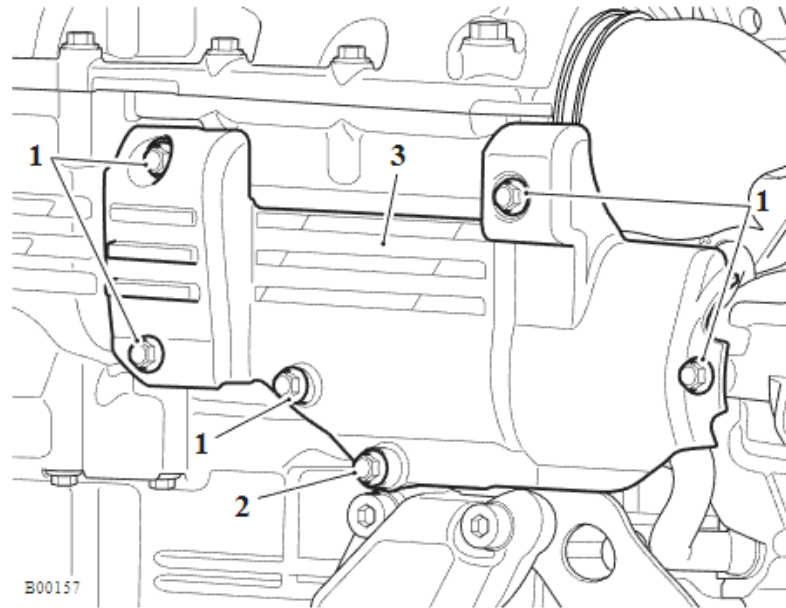
4. Fit the gear change actuator arm from to gear change shaft as noted for removal. Fit the pinch bolt and tighten to 8 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Alignment mark</li><li>3. Split line</li><li>4. Actuator arm</li></ol> |
|---|

5. If fitted with the Triumph shift assist, fit the starter motor cover tighten the M6 x20 mm fixings to 9 Nm.

6. Tighten the M6 x 42 mm fixings to 7 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings M6 x 20mm</li><li>2. Fixings M6 x 42mm</li><li>3. Starter motor cover</li></ol> |
|--|

Perform the following operations:

- If fitted with the Triumph shift assist [Battery - Installation](#)
- If fitted with the Triumph shift assist [Seat - Installation](#)

#### Radiator Cowl – Removal

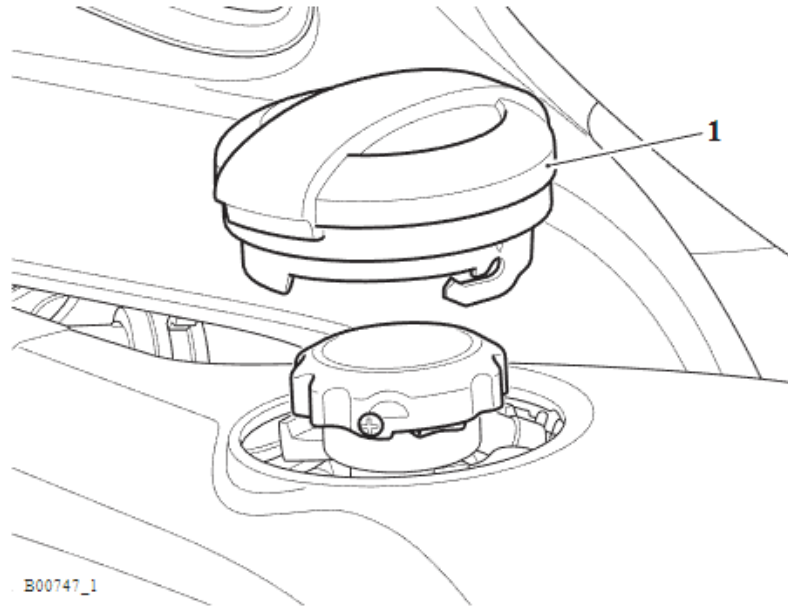
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

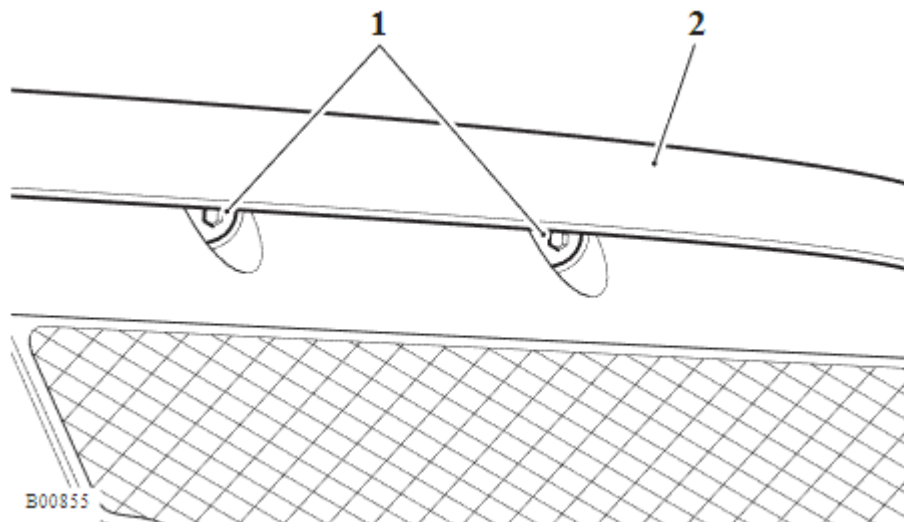
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Turn the radiator cap cover anticlockwise and remove.



1. Cover

2. Remove the four upper fixings for the radiator left and right hand cowls.

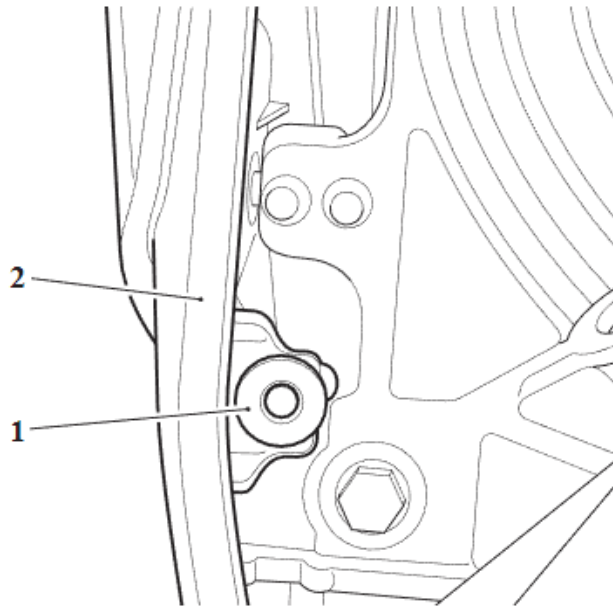


1. Fixings  
2. Radiator cowl (left hand side shown)

### **NOTICE**

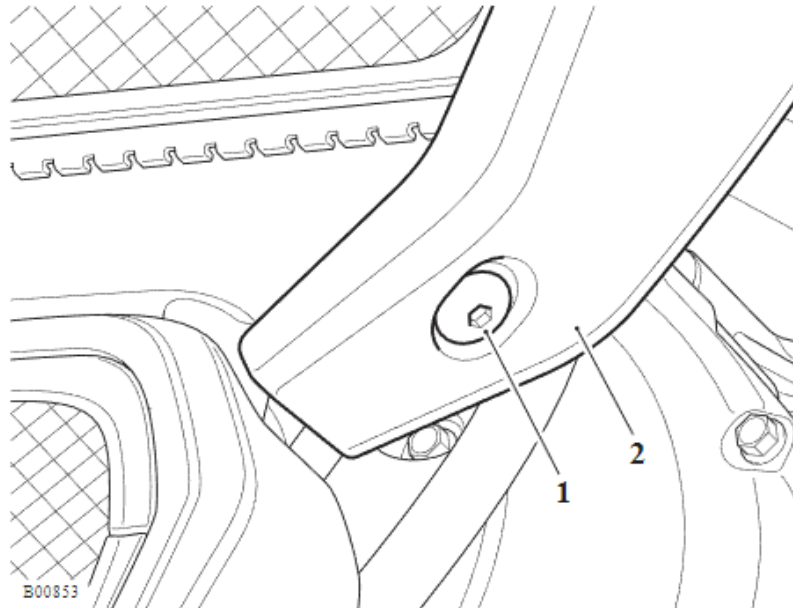
Reposition the coolant expansion hose to access the push release plastic rivet on the left hand cowl.

3. Remove the push release plastic rivet from the left and right hand cowls.



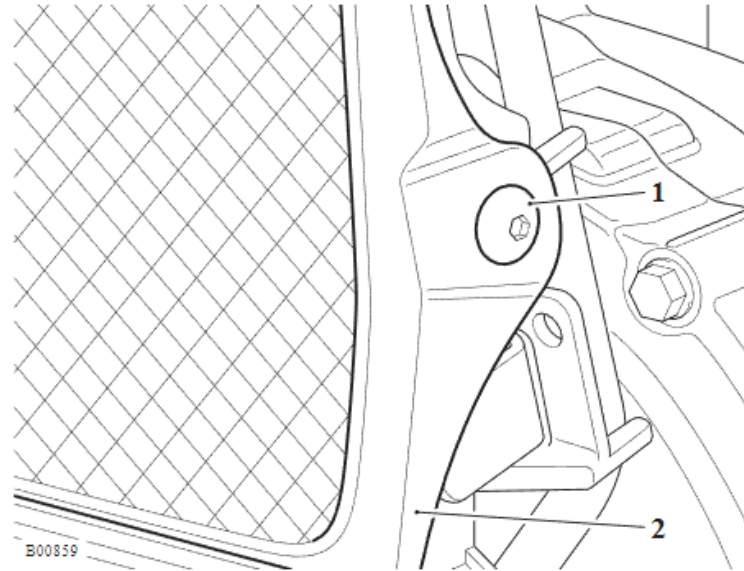
- 1. Push release plastic rivet
- 2. Cowl (left hand side)

4. Remove the lower fixing and remove the left and right hand radiator cowls.



- 1. Fixing
- 2. Cowl (left hand side)

5. Remove the side fixings for the radiator grille.

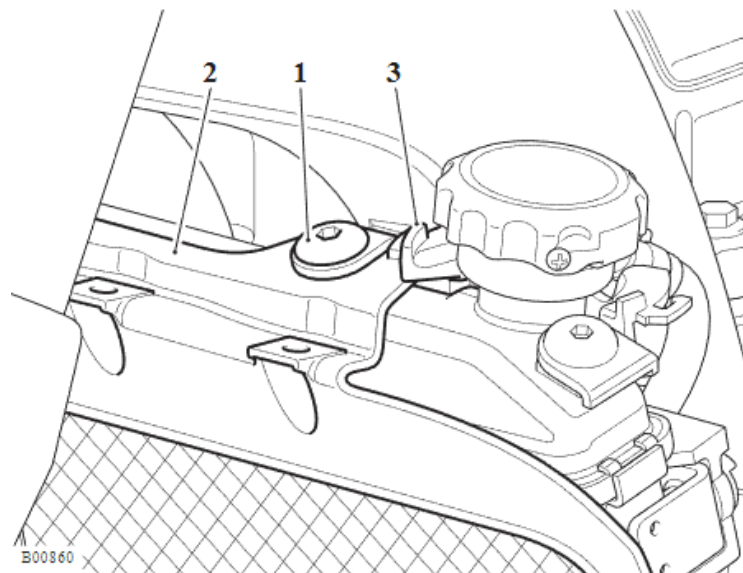


1. Fixing
2. Grille (left hand side)

#### NOTICE

The left hand upper fixing for the radiator grille also secures the bracket for the radiator cap cover.

6. Remove the upper fixings and remove the grille.



1. Fixing
2. Grille (left hand side)
3. Bracket

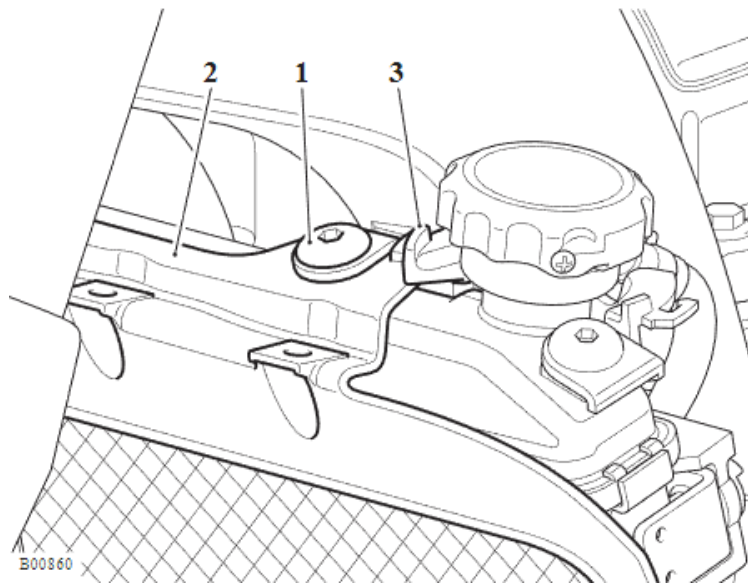
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

The left hand upper fixing for the radiator grille also secures the bracket for the radiator cap cover.

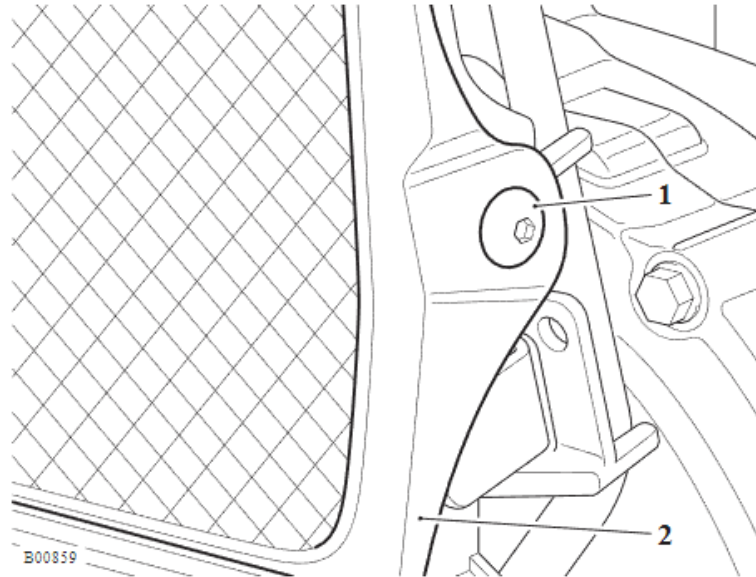
1. Position the grille to the radiator, fit the upper fixings and tighten to 5 Nm.



1. Fixing
2. Grille (left hand side)
3. Bracket

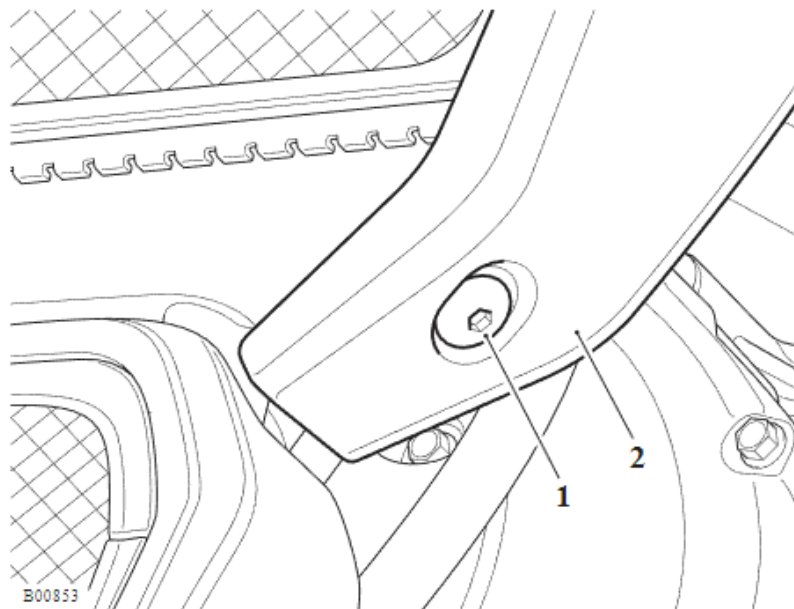


2. Fit the side fixings for the radiator grille and tighten to 3 Nm.



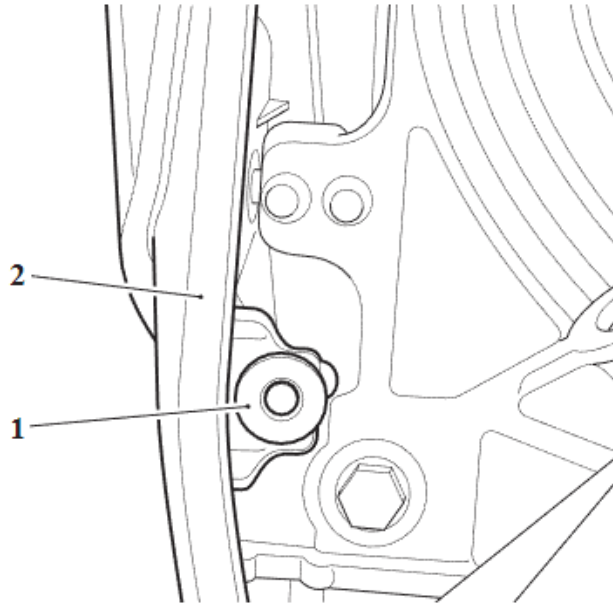
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Grille (left hand side)</li></ol> |
|--|

3. Position the radiator cowls to the radiator and secure with the lower fixing. Do not fully tighten at this stage.



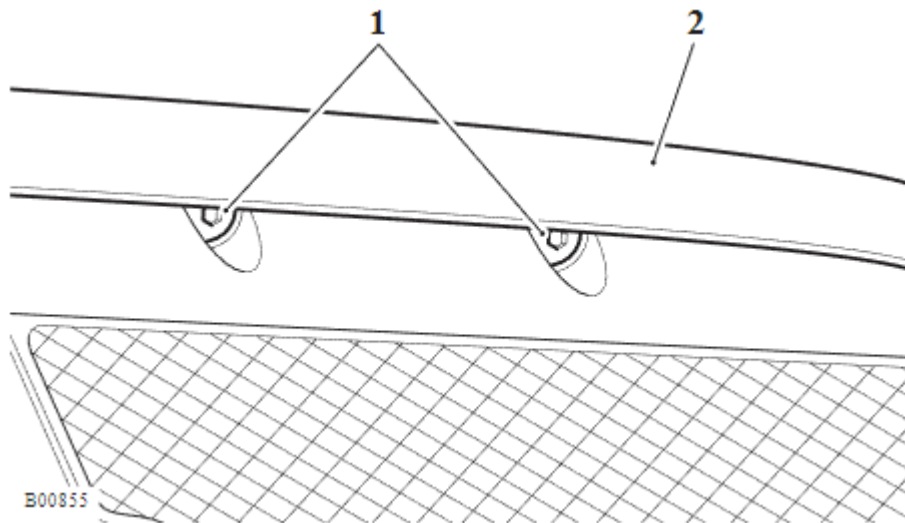
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Cowl (left hand side)</li></ol> |
|--|

- Secure the radiator cowls to the radiator mounting frame with the push release plastic rivet.



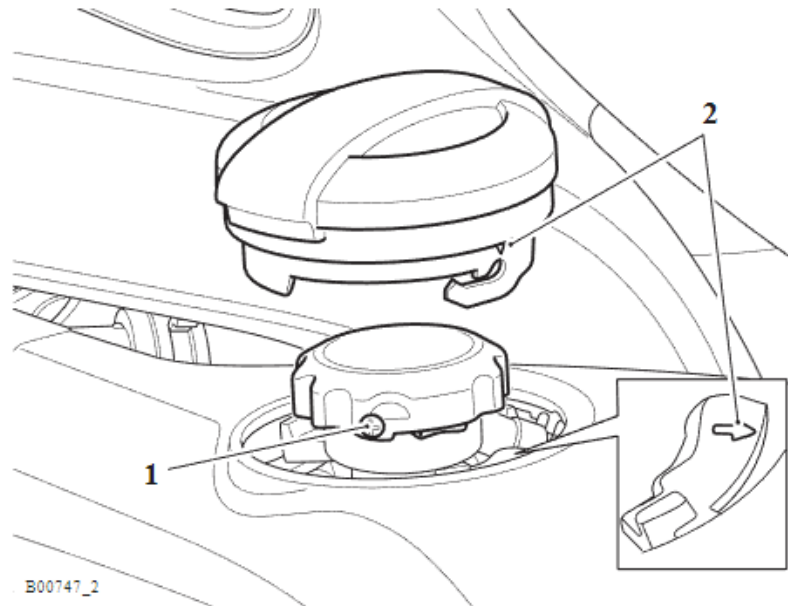
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Push release plastic rivet</li><li>2. Cowl (left hand side)</li></ol> |
|--|

- Fit the four upper fixings to the radiator left and right hand cowls and tighten to 3 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Radiator cowl (left hand side shown)</li></ol> |
|--|

6. Tighten the radiator cowl lower fixing to 5 Nm.
7. Align the alignment mark on the radiator cap cover to alignment mark on the radiator cowl and it the radiator cap cover. Turn the cap cover clockwise to secure.



1. Cover
2. Alignment mark

### Side Panels – Removal

#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

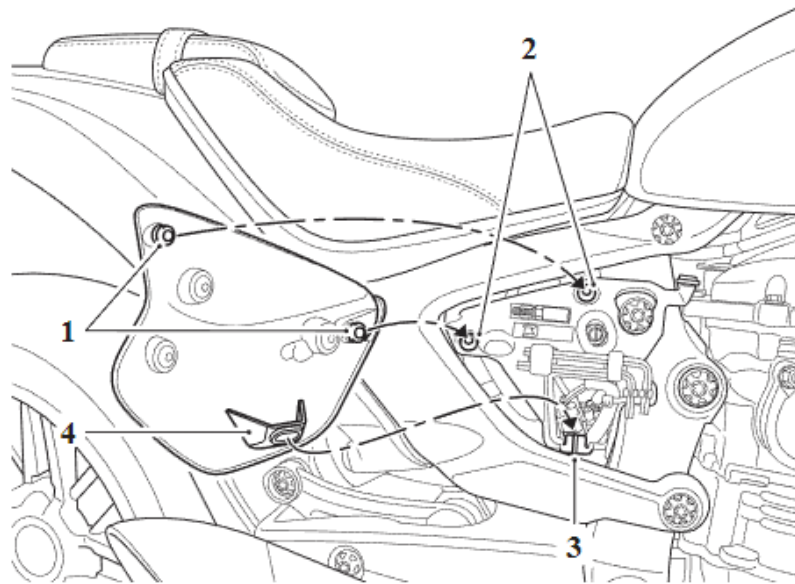
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### Right Hand Side Panel

1. Grasp the panel firmly in both hands and gently pull the top edge of the panel away from the motorcycle until the spigots are away from the retaining grommets (leaving the grommets in place).

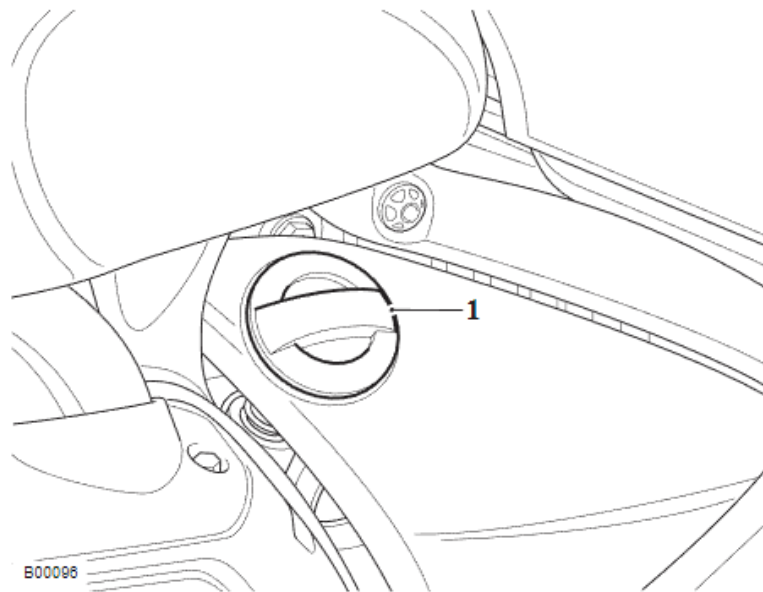
2. Slide the side panel upwards and lift the side panel away from the side panel locating tang.



1. Spigots
2. Grommets
3. Side panel locating tang
4. Side panel locating slot

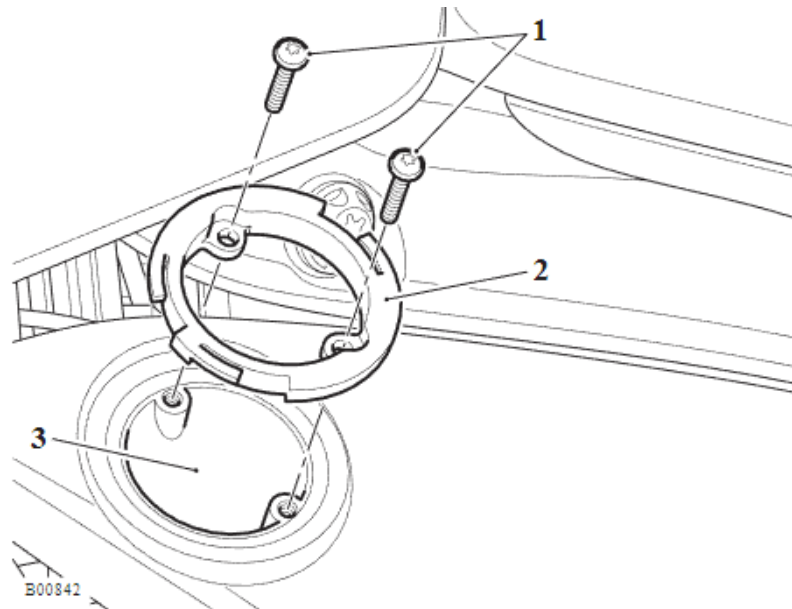
#### Left Hand Side Panel

1. Turn the oil filler cap anticlockwise and remove it. Test



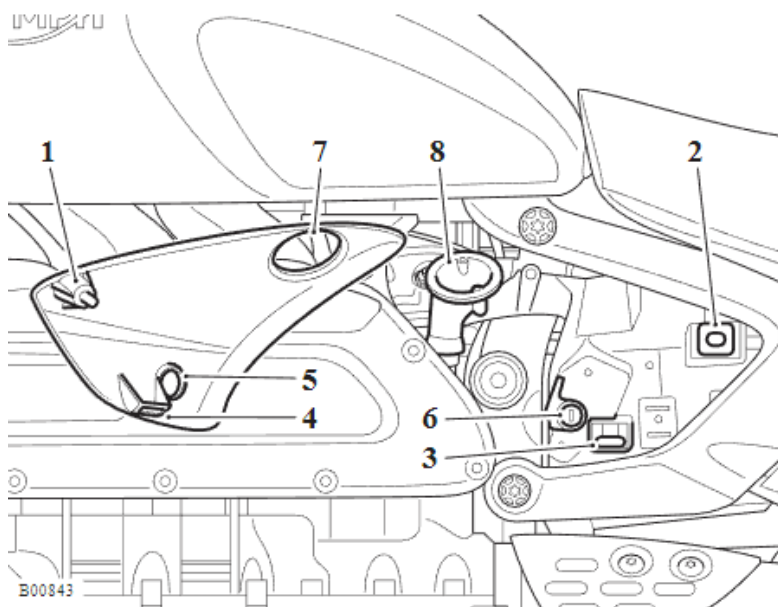
1. Oil filler cap

2. Remove the engine oil dipstick.
3. Release the fixings and remove oil filler tube clip.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Fixings</li> <li>2. Clip</li> <li>3. Oil filler tube</li> </ol> |
|---|

4. Grasp the panel firmly in both hands and gently pull the rear edge of the panel away from the motorcycle until the spigot is away from the retaining grommets (leaving the grommets in place).
5. Move the side panel clear of the seat lock and lift upwards away from the side panel locating tang.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Spigot</li> <li>2. Grommet</li> <li>3. Side panel locating tank</li> <li>4. Side panel locating slot</li> <li>5. Seat lock hole</li> <li>6. Seat lock</li> <li>7. Oil filler tube hole</li> <li>8. Oil filler tube</li> </ol> |
|---|

## Side Panels – Installation

### **⚠ WARNING**

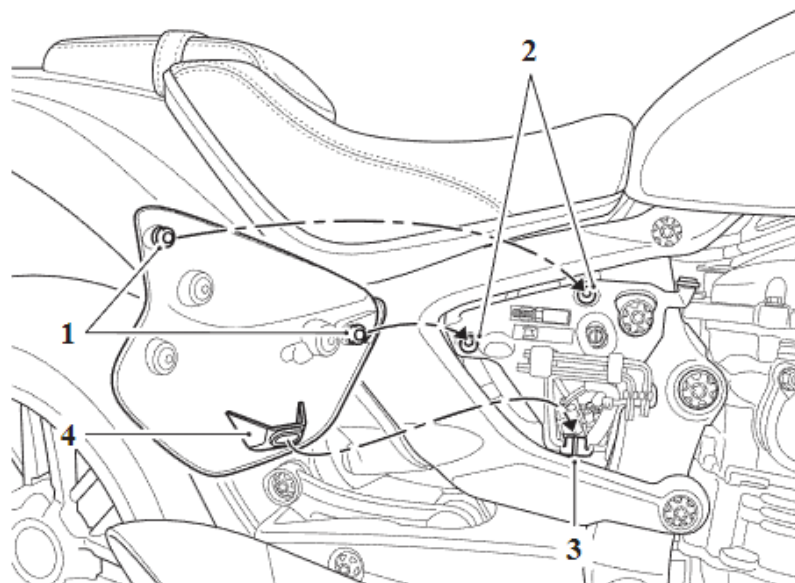
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### Right Hand Side Panel

1. Slide the side panel downwards while placing the side panel locating tang into the side panel locating slot.
2. Position the spigots to the grommets.
3. Press firmly to secure the panel.
4. Grasp the panel and make sure that it is fully retained.

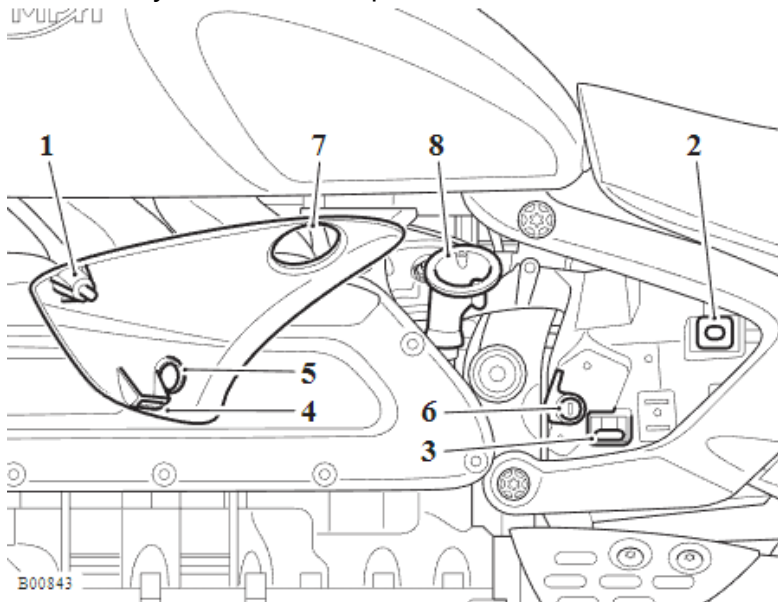


1. Spigots
2. Grommets
3. Side panel locating tang
4. Side panel locating slot

### Left Hand Side Panel

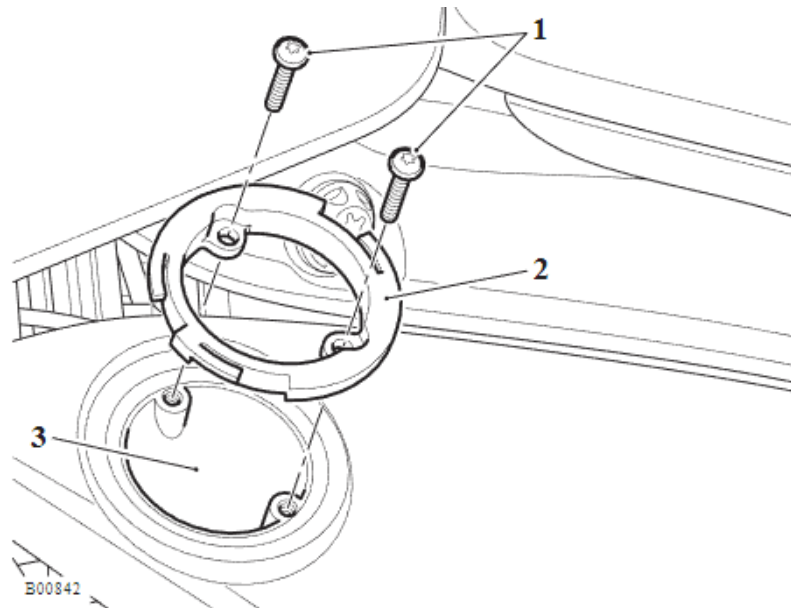
1. Slide the side panel downwards while placing the side panel locating tang into the side panel locating slot.

2. Position the spigot to the grommet.
3. Press firmly to secure the panel.



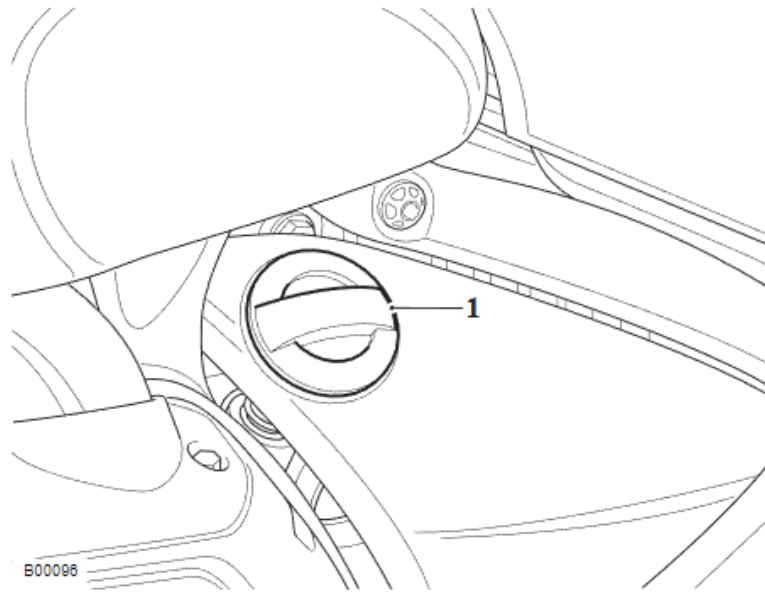
1. Spigot
2. Grommet
3. Side panel locating tank
4. Side panel locating slot
5. Seat lock hole
6. Seat lock
7. Oil filler tube hole
8. Oil filler tube

4. Fit the oil filler tube clip and tighten the fixings to 1.5 Nm.



1. Fixings
2. Clip
3. Oil filler tube

5. Fit the engine oil dipstick.
6. Grasp the panel and make sure that it is fully retained.
7. Fit the oil filler cap.



1. Oil filler cap

### Battery Box – Removal

#### **⚠ WARNING**

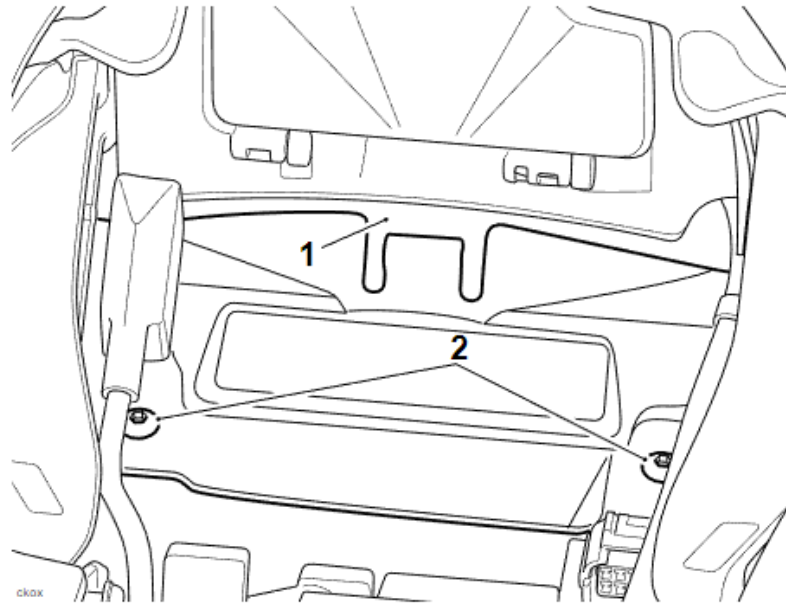
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Side Panels - Removal](#)
- [Engine Electronic Control Module \(Engine ECM\) - Removal](#)
- [Keyless ECM - Removal](#)



1. If closed, open the passenger left and right hand footrests.
2. Remove the fixings securing the undertray to the battery box.

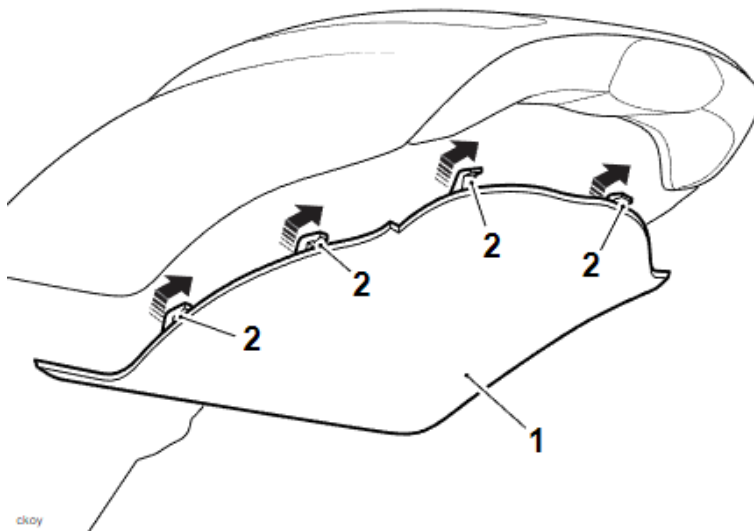


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|--|
| <ol style="list-style-type: none"> <li>1. Undertray</li> <li>2. Fixings</li> </ol> |
|--|

**NOTICE**

There are two retaining lugs on the either side of the undertray that locate into the rear mudguard left and right hand carriers.  
 There are two retaining lugs at the rear of the undertray that locate into the rear light.

3. Lower the front of the under tray and slide forwards to release the retaining tabs and remove the tray.

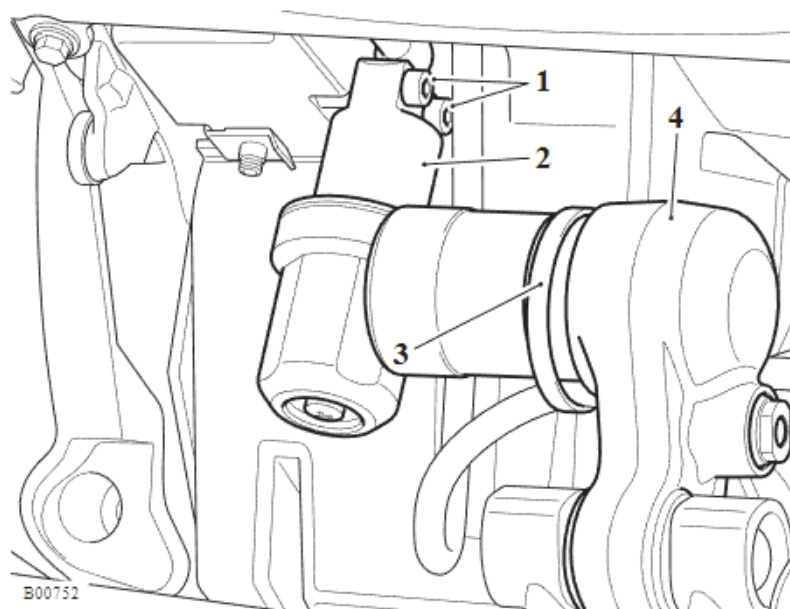


- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Rear Undertray</li> <li>2. Tabs</li> </ol> |
|--|

## NOTICE

Note the routing of the preload adjuster hose and its retaining clip for installation. There is a retaining band securing the adjuster hose to the suspension unit's body. There is no requirement to remove retaining band.

4. Release the fixings, detach and support the rear suspension preload adjuster from the battery box.



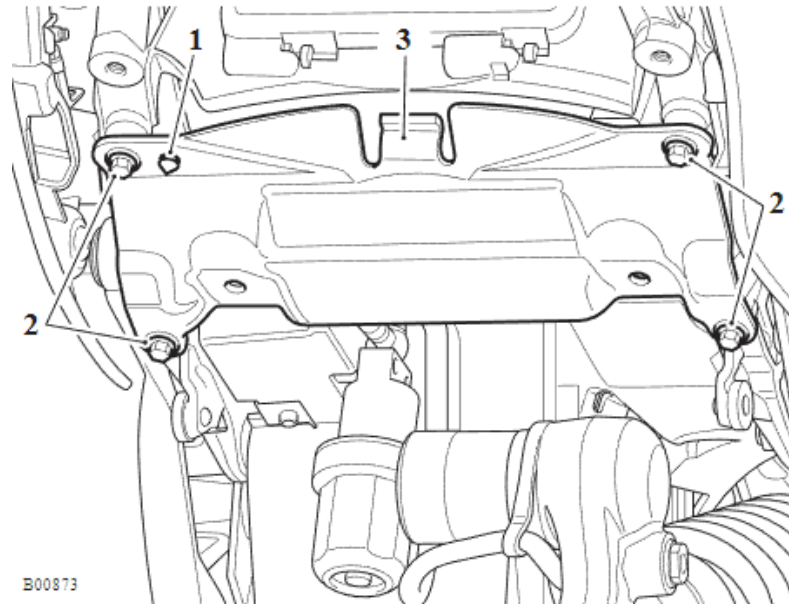
1. Fixings
2. Preload adjuster
3. Retaining band
4. Rear suspension unit

## NOTICE

Note the routing of all harnesses within the battery box for installation.

5. Detach the harness clip from the rear subframe front bridge.

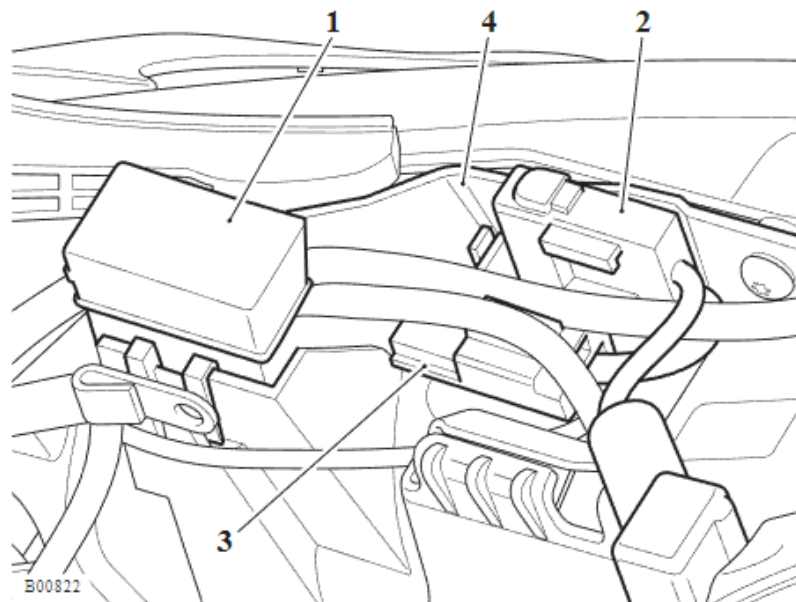
6. Release the fixings and washers, remove the rear subframe front bridge.



B00873

1. Harness clip
2. Fixings
3. Front bridge

7. Detach the fuse box, 30A fuse and the connector from the battery box.



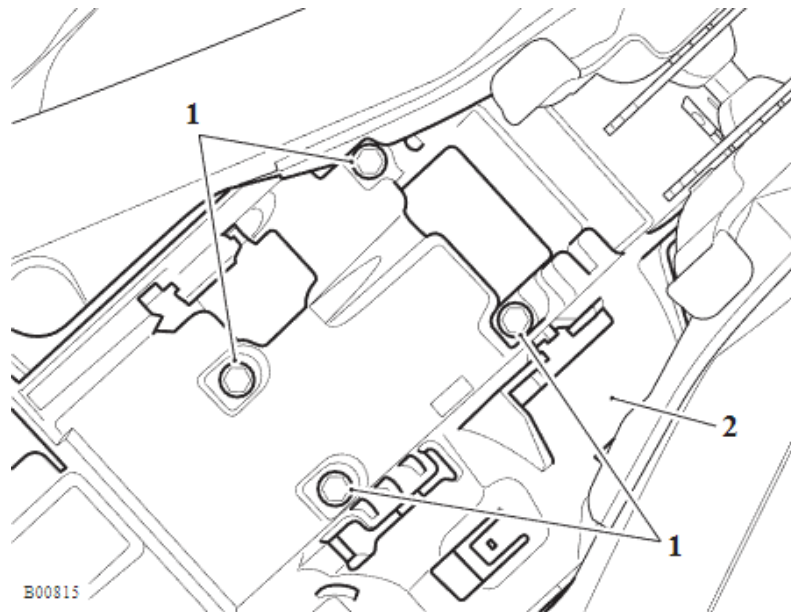
B00822

1. Fuse box
2. 30A fuse
3. Connector
4. Battery box

## NOTICE

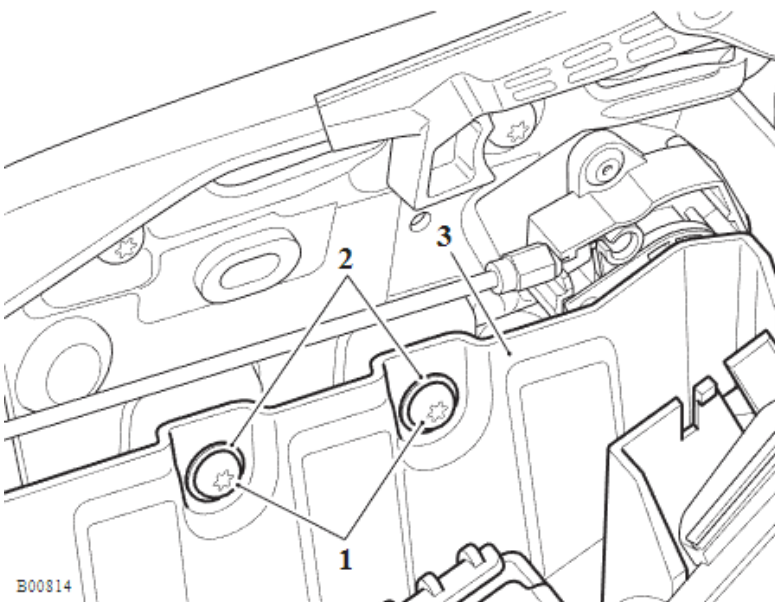
Note the position of the alarm panel under the battery box for installation. The four fixings in the base of the battery box are secured into the alarm panel. The alarm panel will drop onto the swinging arm when the four fixings are removed.

8. Support the alarm panel under the battery box and remove the four fixings from the base of the battery box. Position the alarm panel to one side.



1. Fixings
2. Battery box

9. Remove the left hand side fixings and washers. Discard the fixings.

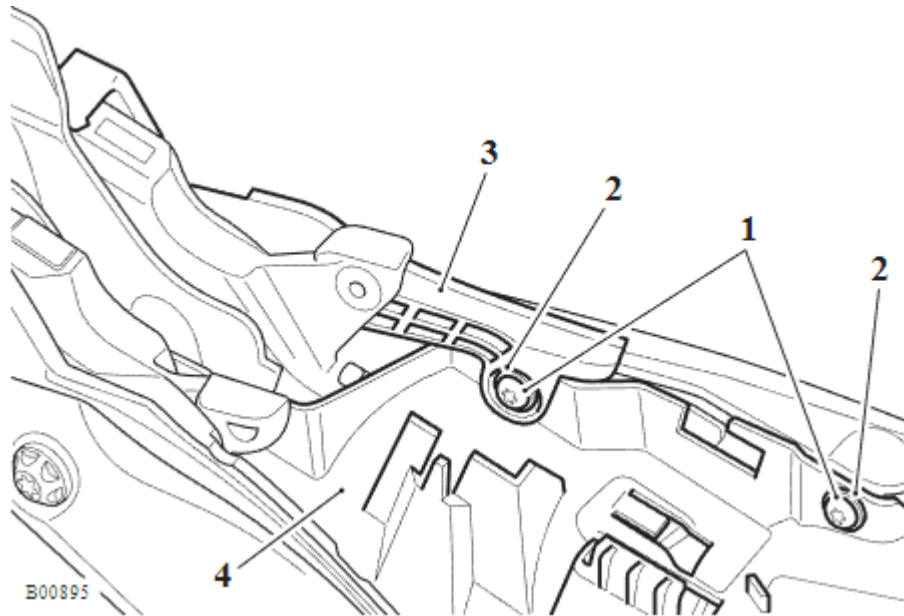


1. Fixings
2. Washers
3. Battery box

## NOTICE

The battery box right hand front fixing also secures the seat's right hand infill panel.

10. Remove the front fixing, washer and the seat's right hand infill panel. Discard the fixing.
11. Remove the rear fixing and washer. Discard the fixing.



1. Fixings
2. Washers
3. Right hand infill panel
4. Battery box

12. Manoeuvre the battery box rearwards for removal

## Battery Box – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

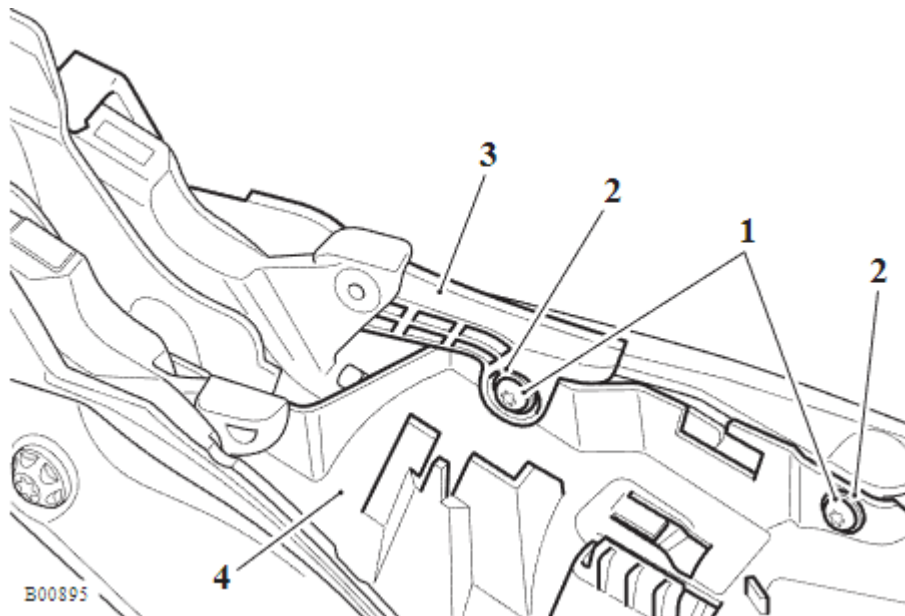
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the battery box to the frame.

### **NOTICE**

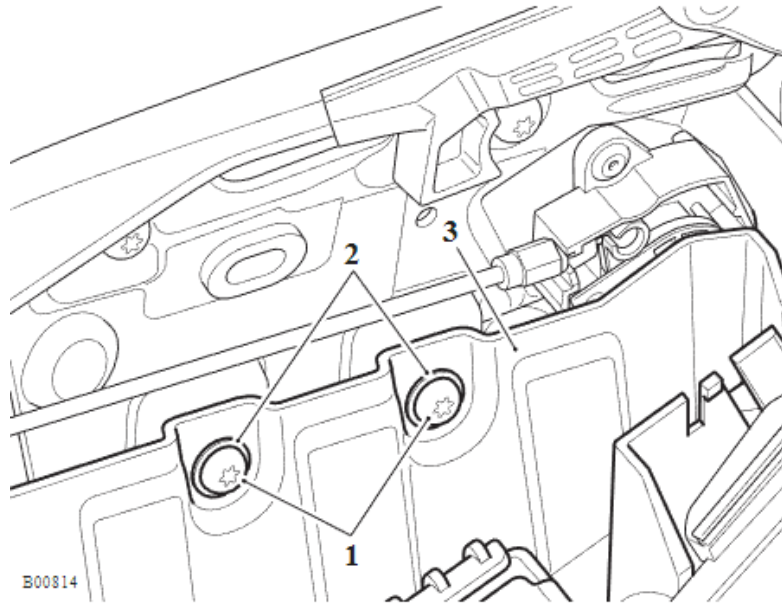
The battery box right hand front fixing also secures the seat's right hand infill panel.

2. Fit the seat's right hand infill panel. Fit a new fixing with the original washer and tighten to 6 Nm
3. Fit a new rear fixing with the original washer and tighten to 6 Nm.



1. Fixings
2. Washers
3. Right hand infill panel
4. Battery box

4. Fit new left hand side fixings with the original washers and tighten to 6 Nm.

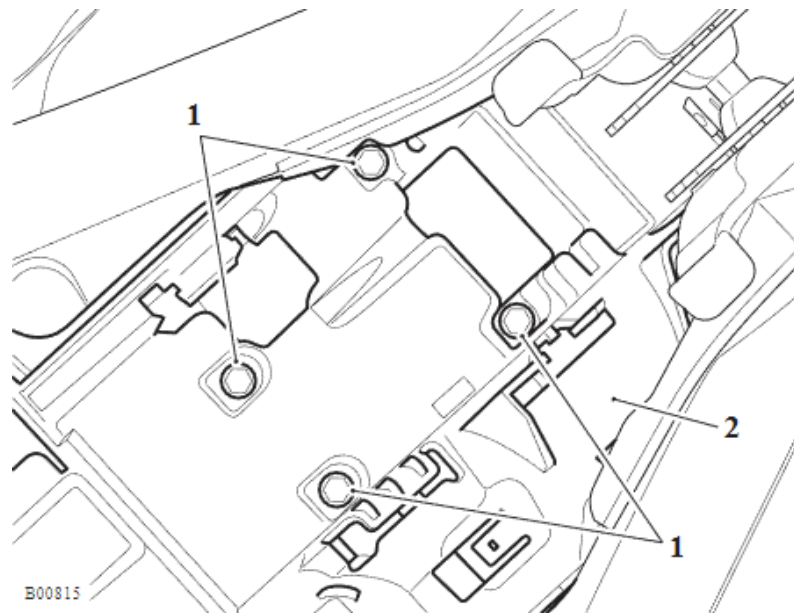


1. Fixings
2. Washers
3. Battery box

#### NOTICE

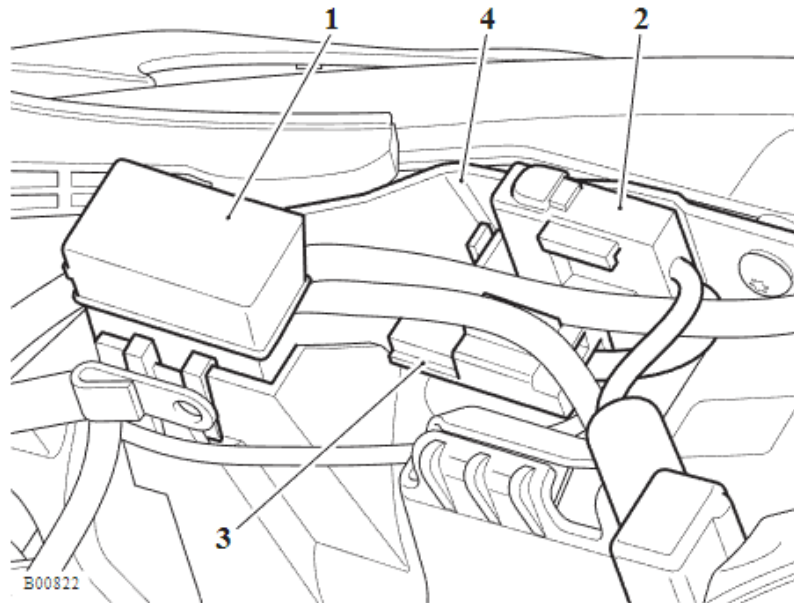
If the alarm panel is not positioned under the battery box correctly, the four fixings for the base of the battery box will not have a threaded hole to fit into.

5. Position the alarm panel under the battery box as noted for removal, fit the four fixings to the base of the battery box and tighten to 3 Nm.



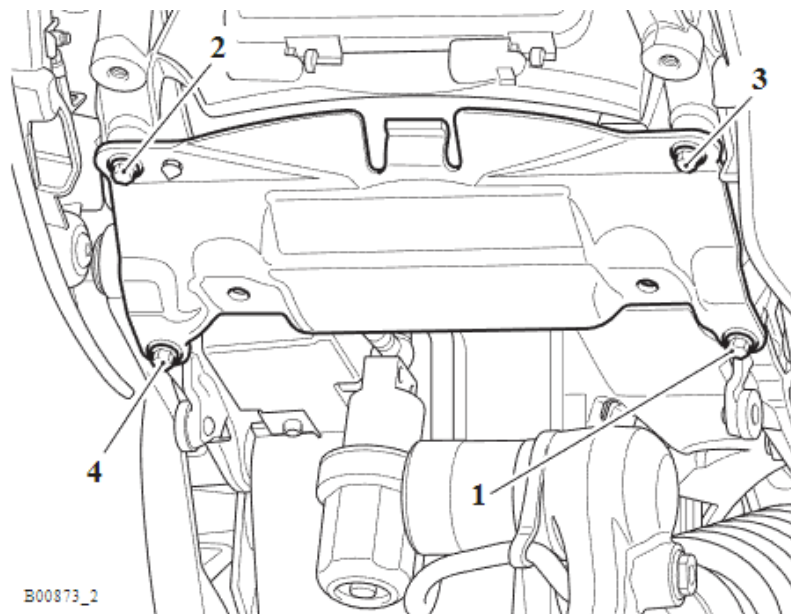
1. Fixings
2. Battery box

6. Attach the fuse box, 30A fuse and the connector to the battery box as noted for removal.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fuse box</li><li>2. 30A fuse</li><li>3. Connector</li><li>4. Battery box</li></ol> |
|---|

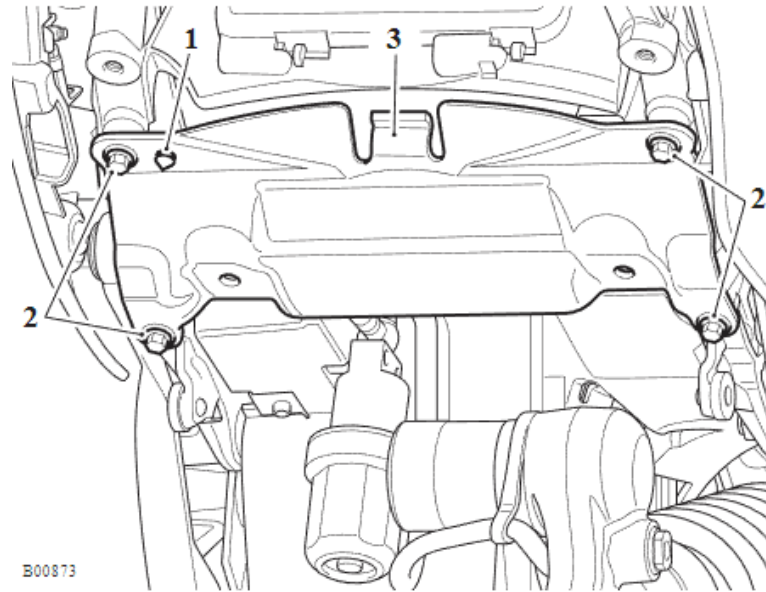
7. Fit the rear subframe front bridge with its washers and fixings. Tighten the fixings to 12 Nm in the sequence shown.



|  |
|--|
| Rear Subframe Front Bridge Tightening Sequence |
|--|



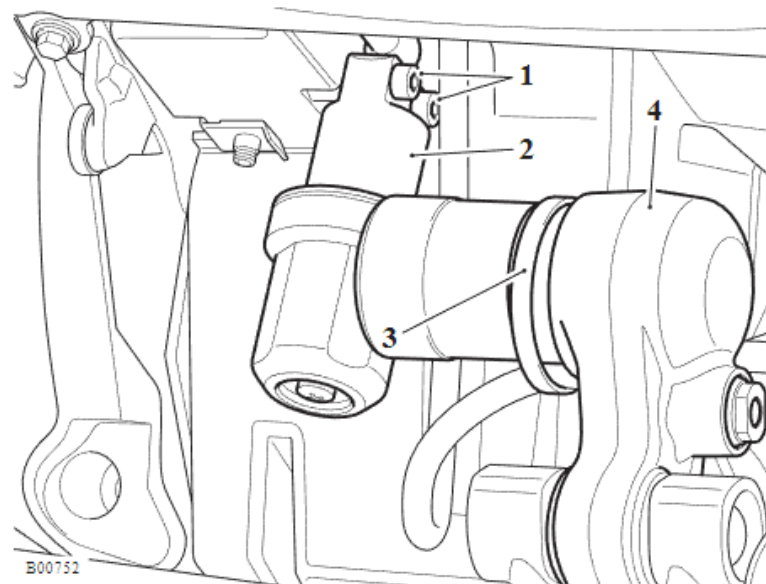
8. Attach the harness clip to the rear subframe front bridge.



- 1. Harness clip
- 2. Fixings
- 3. Front bridge

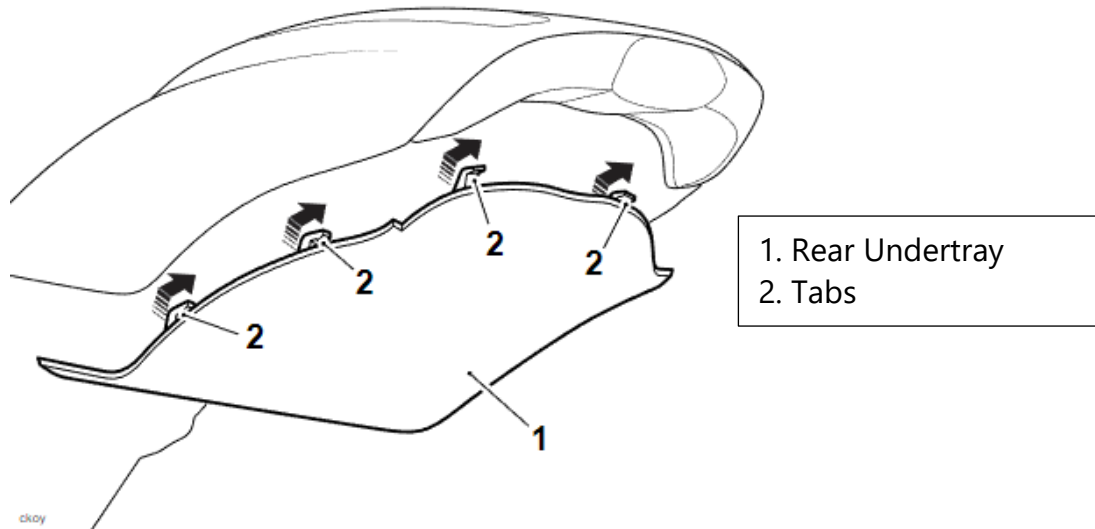
9. Route the preload adjuster hose and secure to its retaining clip as noted for removal.

10. Fit the rear suspension preload adjuster to the battery box and tighten the fixings to 15 Nm.

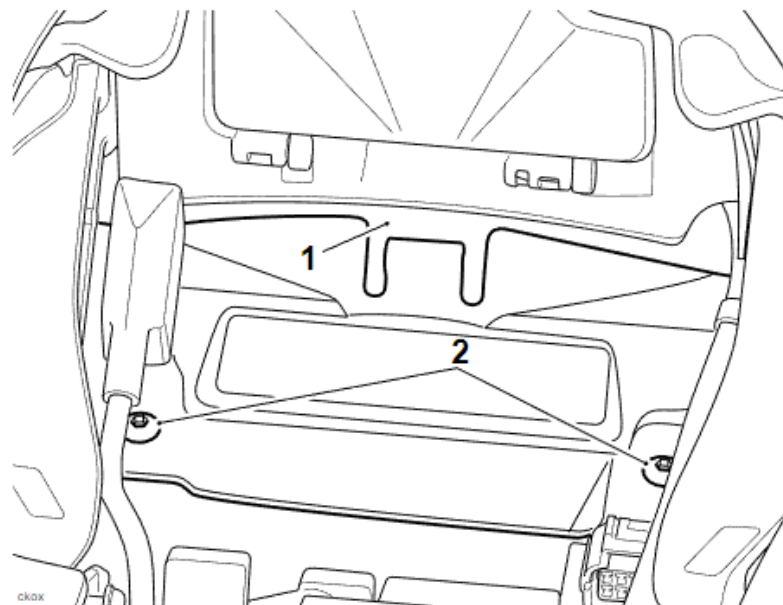


- 1. Fixings
- 2. Preload adjuster
- 3. Retaining band
- 4. Rear suspension unit

11. Position the rear undertray tabs to the slots in the rear panel. push rearwards to locate fully into the slots.



12. Secure the undertray to the battery box and tighten the fixings to 3 Nm.



13. Close the passenger left and right hand footrests.

Perform the following operations:

- [Keyless ECM - Installation](#)
- [Engine Electronic Control Module \(Engine ECM\) - Installation](#)
- [Side Panels - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Side Stand – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

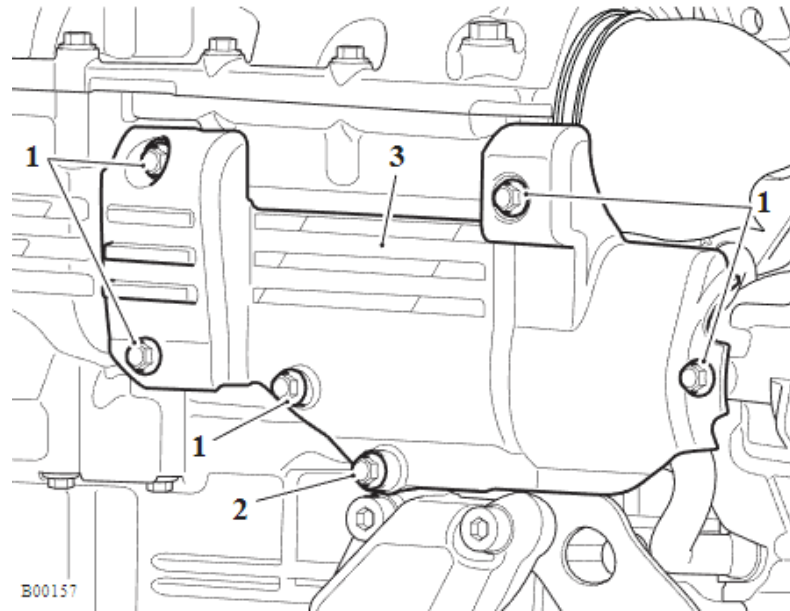
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Battery Box - Removal](#)

### **NOTICE**

The front upper fixing also secures the drive shaft cover.

Note the positions of the M6 x 20mm and M6 x 42mm fixings for installation.

1. Release the fixings and remove the starter motor cover.



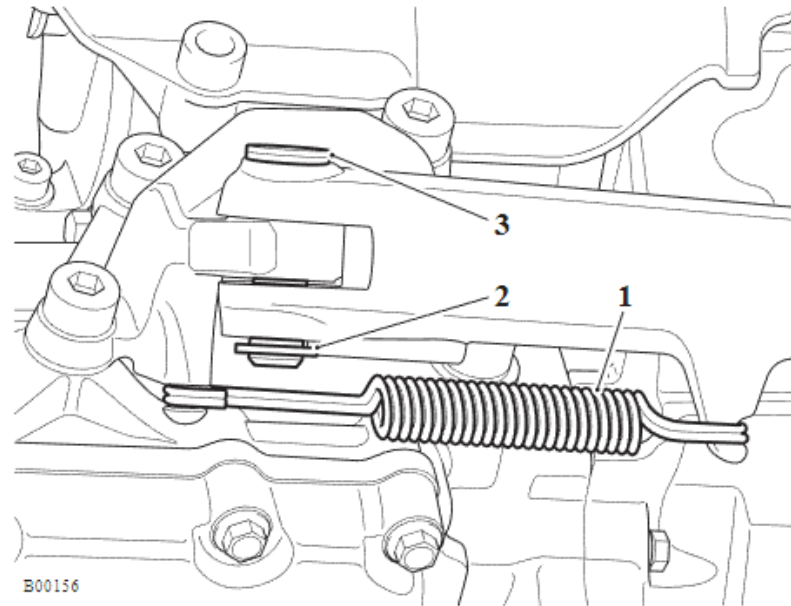
1. Fixings M6 x 20mm
2. Fixing M6 x 42mm
3. Starter motor cover

**⚠ WARNING**

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

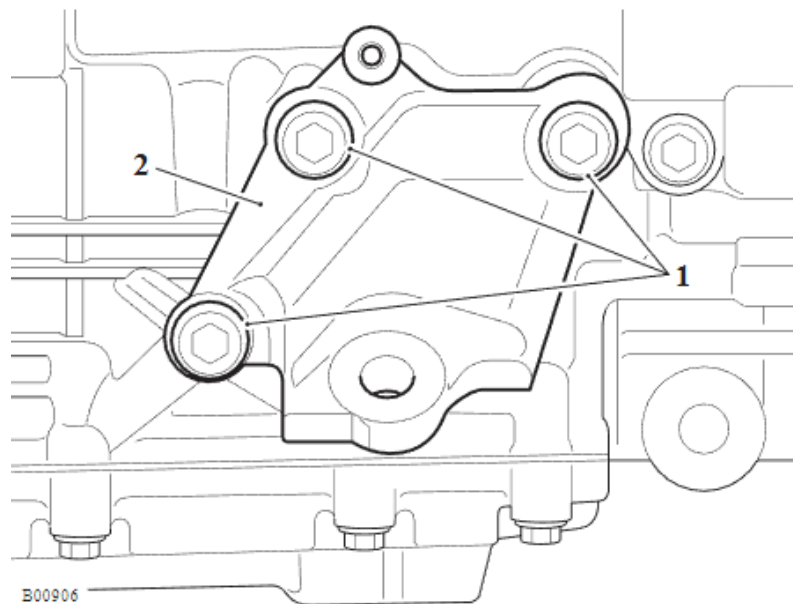
2. With the side stand in the up position, unhook the spring from the side stand and remove it from the motorcycle.
3. Remove and discard the E-clip securing the pivot pin.

4. Remove the pivot pin and remove the side stand.



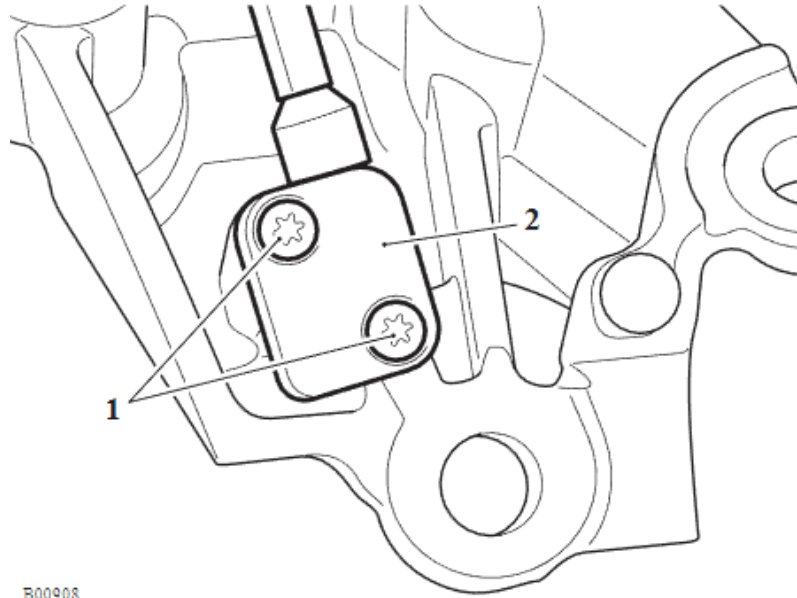
- 1. Spring
- 2. E-clip
- 3. Pivot pin

5. Release the fixings and remove the side stand mounting bracket.



- 1. Fixings
- 2. Side stand bracket

6. If required, release the fixings and remove the side stand switch. Discard the fixings.



B00903

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|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Side stand switch</li></ol> |
|---|

### Side Stand – Installation

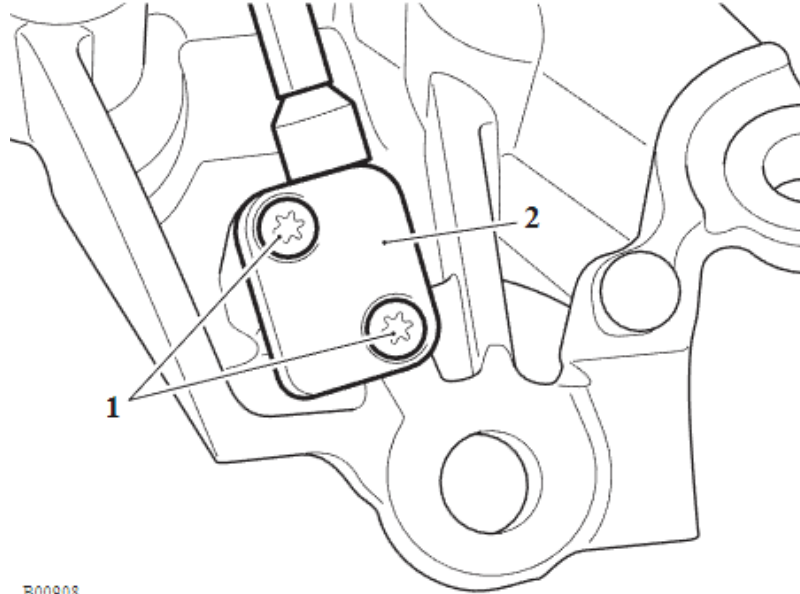
#### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

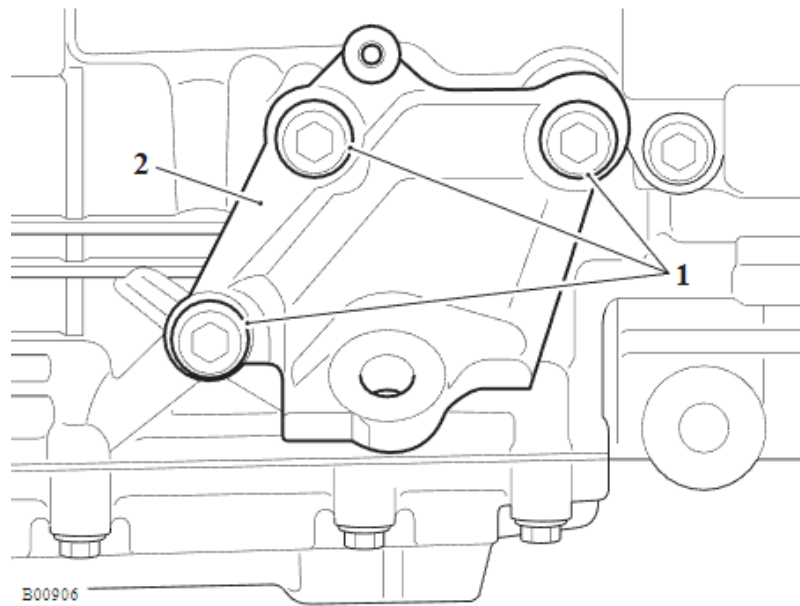
1. Fit the side stand switch to the side stand bracket and tighten the new fixings to 3 Nm.



B00908

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Side stand switch</li></ol> |
|---|

2. Fit the side stand mounting bracket to the crankcase and tighten the fixings to 41 Nm.



B00906

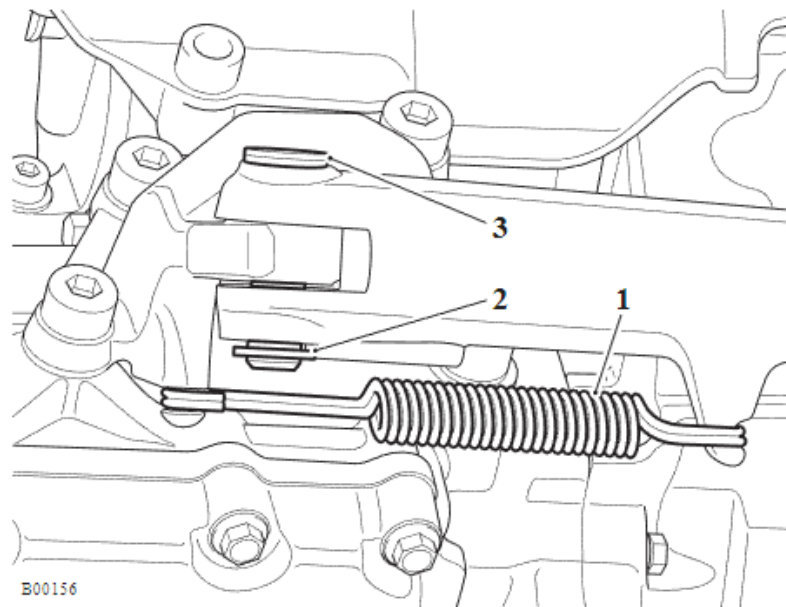
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Side stand bracket</li></ol> |
|--|

3. Prior to fitting the side stand make sure the pivot pin and the bushes in the side stand are clean and free from grease.
4. Position the side stand to its mounting bracket and insert the pivot pin.
5. Fit a new E-clip to secure the pivot pin.

**⚠ WARNING**

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

6. With the side stand in the up position, hook the spring onto its bracket lug then carefully hook it onto the side stand lug.

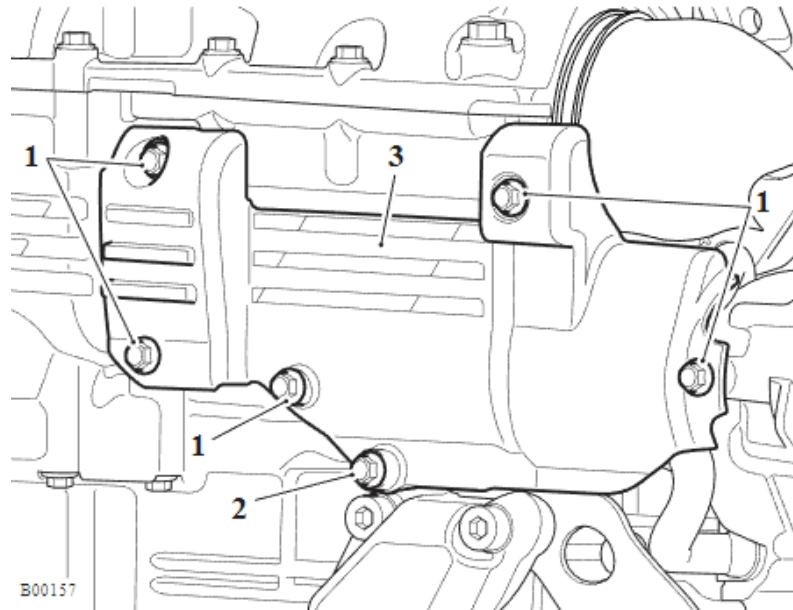


1. Spring
2. E-clip
3. Pivot pin

7. Route the side stand switch harness as noted for removal and connect to the main harness.
8. Fit the starter motor cover tighten the M6 x 20 mm fixings to 9 Nm.



9. Tighten the M6 x 42 mm fixings to 7 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings M6 x 20mm</li><li>2. Fixing M6 x 42mm</li><li>3. Starter motor cover</li></ol> |
|---|

Perform the following operations:

- [Battery Box - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Rear Mudguard – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

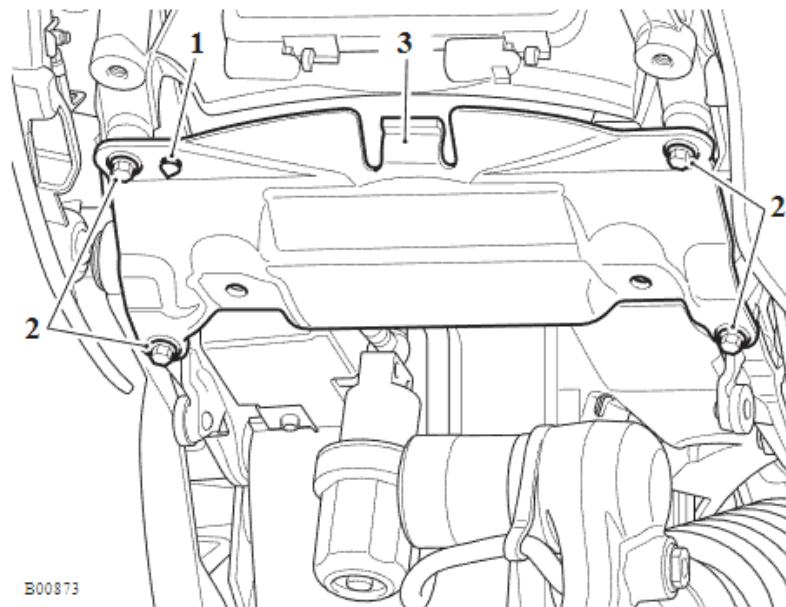
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Passenger Seat Backrest - Removal](#)

1. Detach the harness clip from the rear subframe front bridge.
2. Release the fixings and washers, remove the rear subframe front bridge.



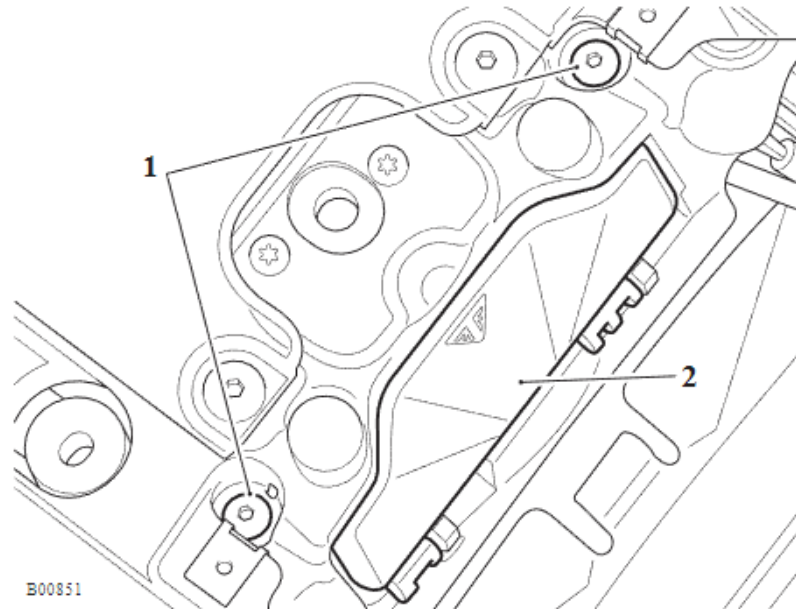
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Harness clip</li><li>2. Fixings</li><li>3. Front bridge</li></ol> |
|--|

**NOTICE**

Note that at the rear of the phone storage box there are two locating lugs that fit into the rear subframe bridge for installation.  
Note the routing of the USB harness for installation.

3. Remove the fixings.

4. Taking care not to damage the USB harness, lower the front of the storage box and move forward to release the locating lugs.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Phone storage box</li></ol> |
|---|

5. Disconnect the USB connector from the main harness and remove the phone storage box.

**NOTICE**

Note the routing of the rear light harness for installation.

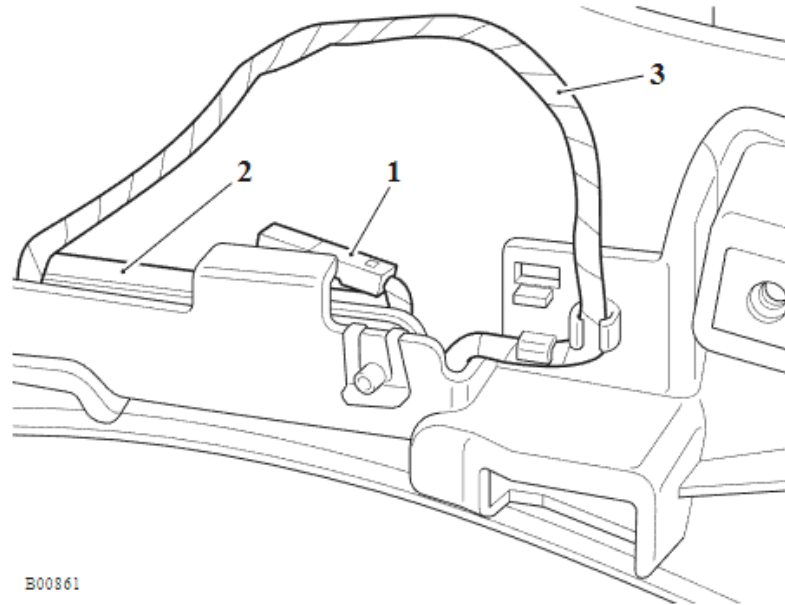
6. Disconnect the rear light from the main harness.

**NOTICE**

The rear low frequency (LF) antenna is located behind the rear mudguard on the right hand side.

Note the routing of the LF antenna harness for installation.

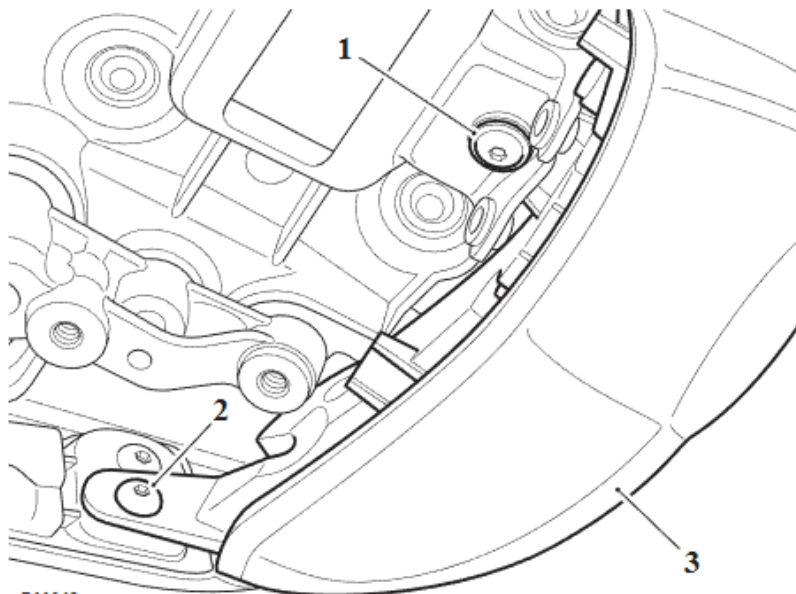
7. Disconnect the LF antenna from the main harness (rear mudguard removed for clarity).



B00861

- 1. Connector
- 2. LF antenna
- 3. Harness

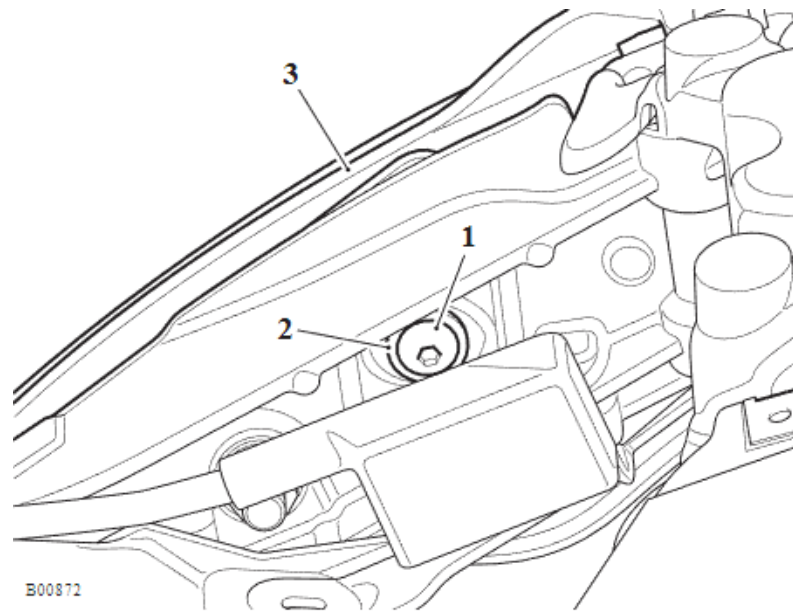
8. Remove the rear light centre fixing. 9. Loosen the rear light side fixings.
9. Loosen the rear light side fixings.



B00867

- 1. Rear light centre fixing
- 2. Rear light side fixing (right hand side shown)
- 3. Rear light

10. Remove the front fixings, washers and manouevre the mudguard rearwards for removal.



1. Fixings (one on right hand side shown)
2. Washer
3. Rear mudguard

#### Rear Mudguard – Installation

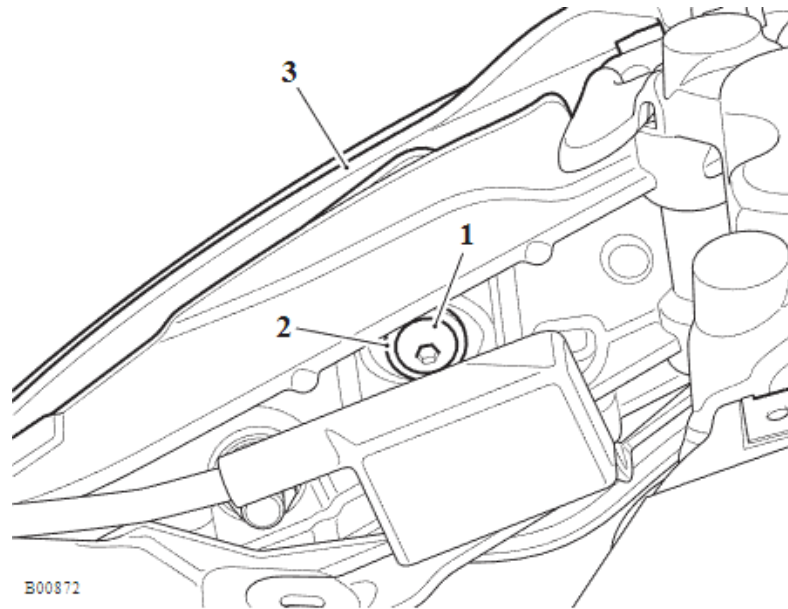
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

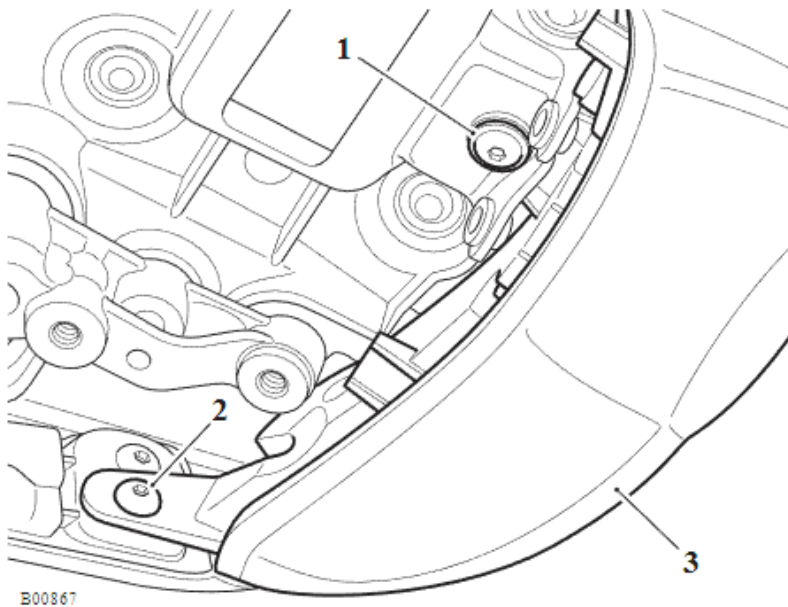
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Manoeuvre the mudguard onto the rear subframe, fit the front fixings and tighten to 3 Nm.



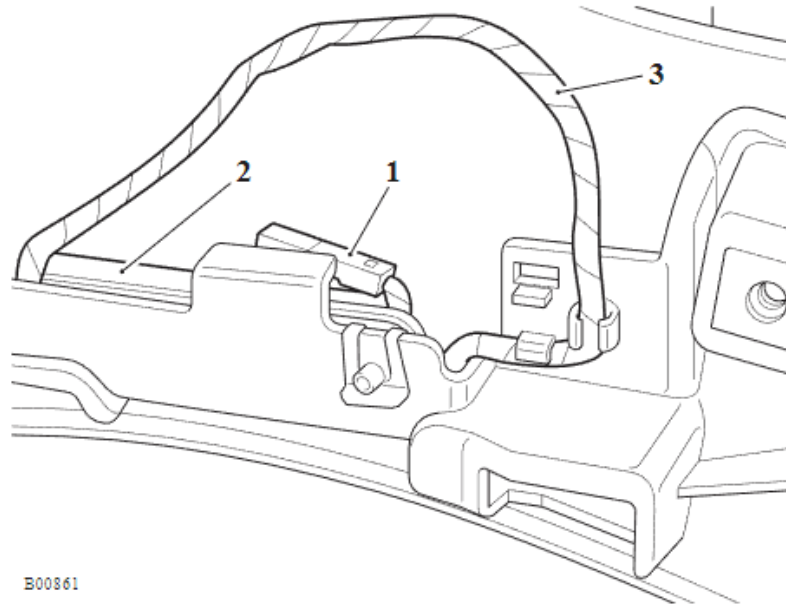
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings (one on right hand side shown)</li><li>2. Washer</li><li>3. Rear mudguard</li></ol> |
|--|

2. Fit the rear light centre fixing and washer. Tighten the fixing to 3 Nm. 3. Tighten the rear light side fixings to 3 Nm.



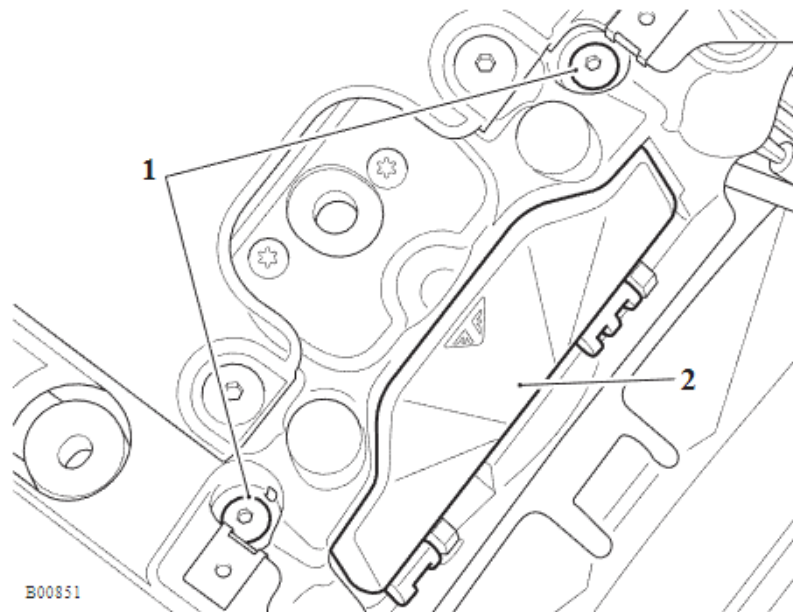
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Rear light centre fixing</li><li>2. Rear light side fixing (right hand side shown)</li><li>3. Rear light</li></ol> |
|---|

4. Route the LF antenna harness as noted for removal and connect to the main harness (rear mudguard removed for clarity).



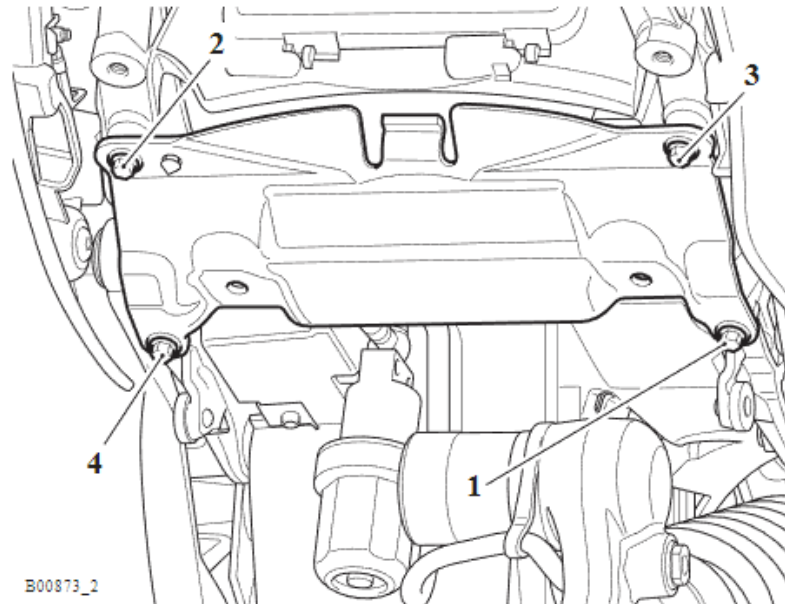
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Connector</li><li>2. LF antenna</li><li>3. Harness</li></ol> |
|---|

5. Route the rear light harness as noted for removal and connect to the main harness.
6. Taking care not to damage the USB harness, fit the phone storage box as noted for removal and tighten the fixings to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Phone storage box</li></ol> |
|---|

7. Fit the rear subframe front bridge with its washers and fixings. Tighten the fixings to 12 Nm in the sequence shown.



Rear Subframe Front Bridge Tightening Sequence

8. Fit the passenger seat backrest (see [Passenger Seat Backrest - Installation](#)).

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

#### Rear Subframe – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



## CAUTION

The frame and subframe are painted and can be damaged during removal and installation of the rear subframe. Use a suitable protective tape such as masking tape around the area of the frame and rear subframe.

Failure to protect the painted surfaces may cause irreparable damage to both components.

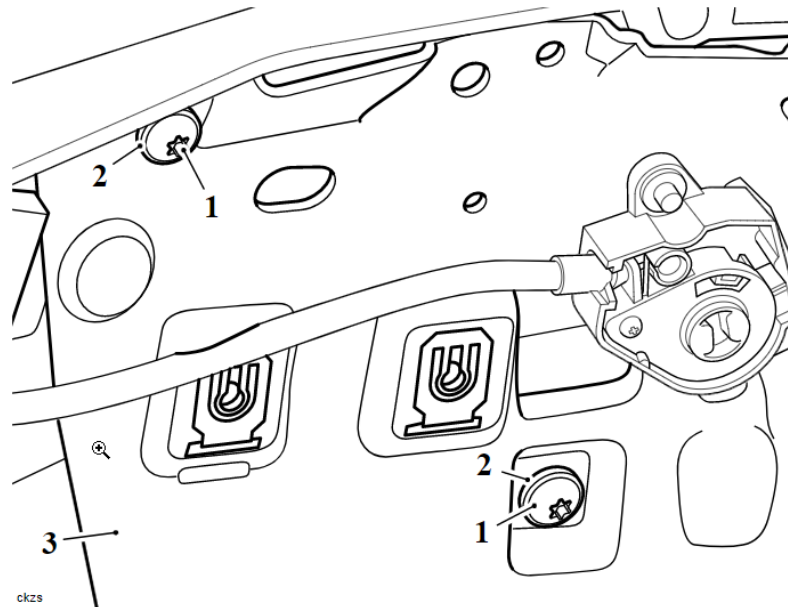
## NOTICE

Before the disconnection of any wiring, note the routing of all wiring and wiring connectors for installation.

Perform the following operations:

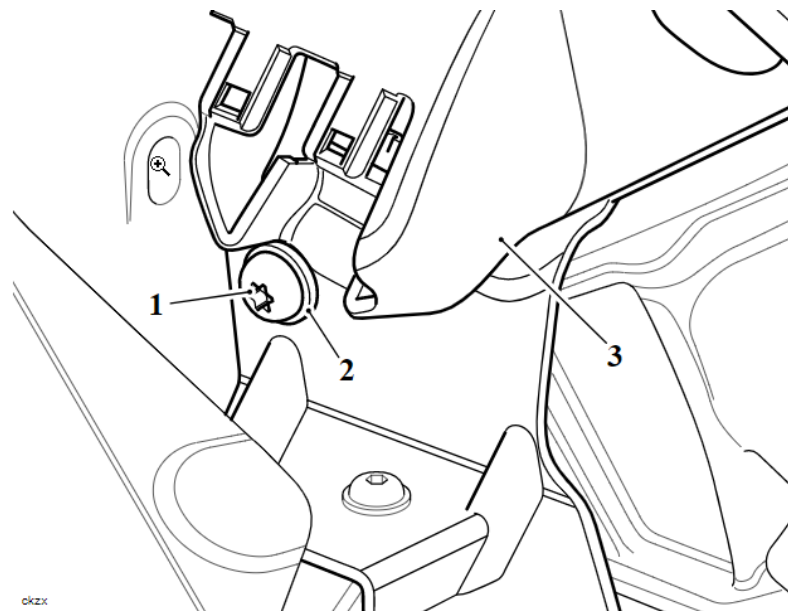
- [Seat - Removal](#)
  - [Battery - Removal](#)
  - [Fuel Tank - Removal](#)
  - [Rear Mudguard - Removal](#)
  - [Side Panels - Removal](#)
  - [Battery Box - Removal](#)
1. Remove the fixing securing the seat's left hand infill panel to the subframe front piece. Collect the shouldered washer and discard the fixing.

2. Release the two fixings to detach the outer battery box from the left hand side of the rear subframe. Collect the washer and discard the fixing.



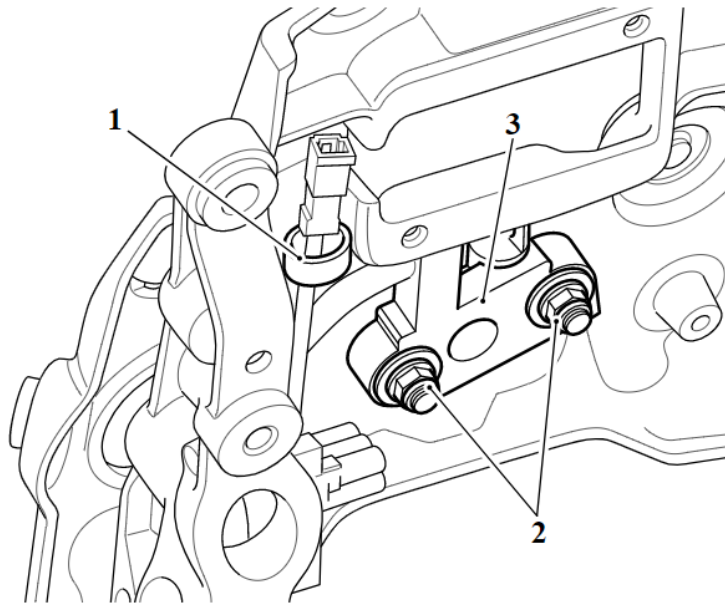
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Washers</li><li>3. Outer battery box</li></ol> |
|--|

3. Release the fixing to detach the side panel bracket from the right hand side subframe. Collect the washer and discard the fixing.



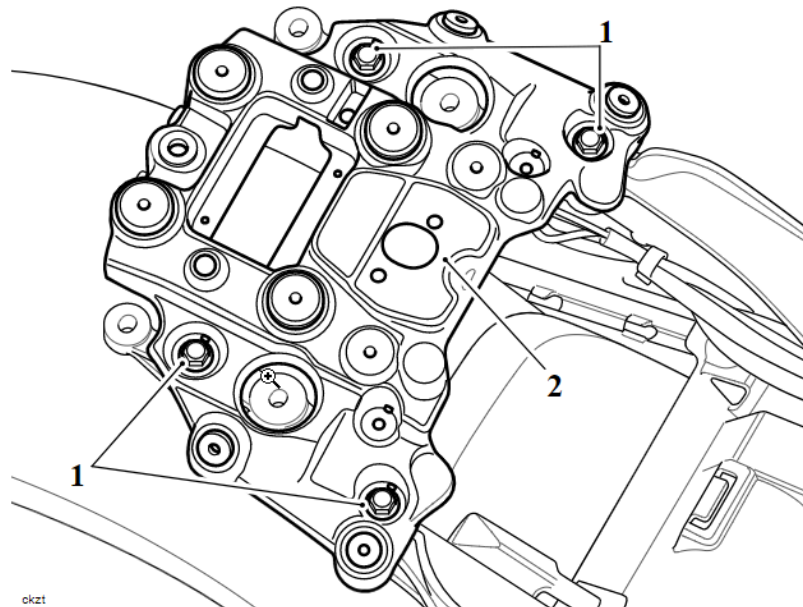
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing (harness removed for clarity)</li><li>2. Washer</li><li>3. Side panel bracket</li></ol> |
|---|

4. Detach the harness clip from the rear subframe rear bridge.
5. Release the fixings to detach the seat lock from the subframe rear bridge. Collect the washers and discard the fixings.



- |                 |
|-----------------|
| 1. Harness clip |
| 2. Fixings      |
| 3. Seat lock    |

6. Release the fixings and remove the rear bridge.



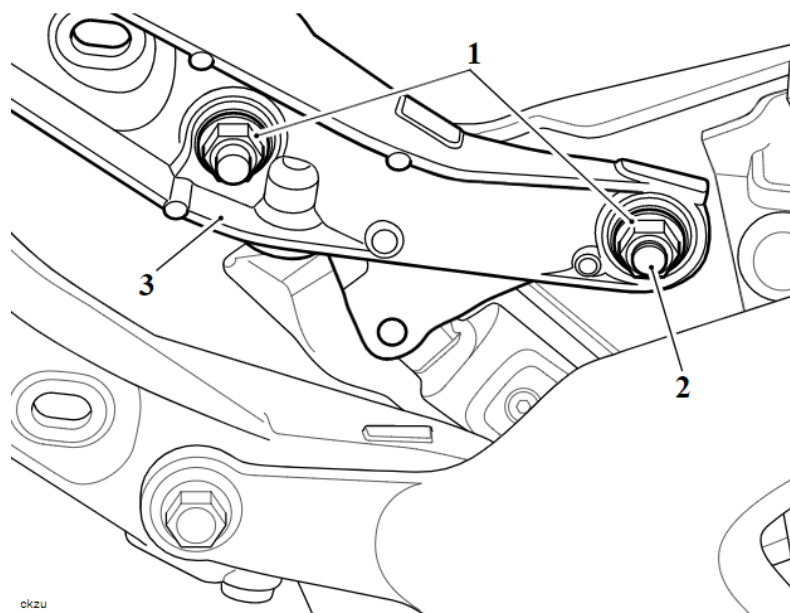
- |                |
|----------------|
| 1. Fixings     |
| 2. Rear bridge |

## NOTICE

The front lock nut for the rear subframe centre piece is fastened to an encapsulated stud.

If the stud is loosened or removed a new stud must be fitted.

7. Release the fixings and remove the rear subframe rear piece. Discard the lock nuts and the stud if it is loosened or removed.

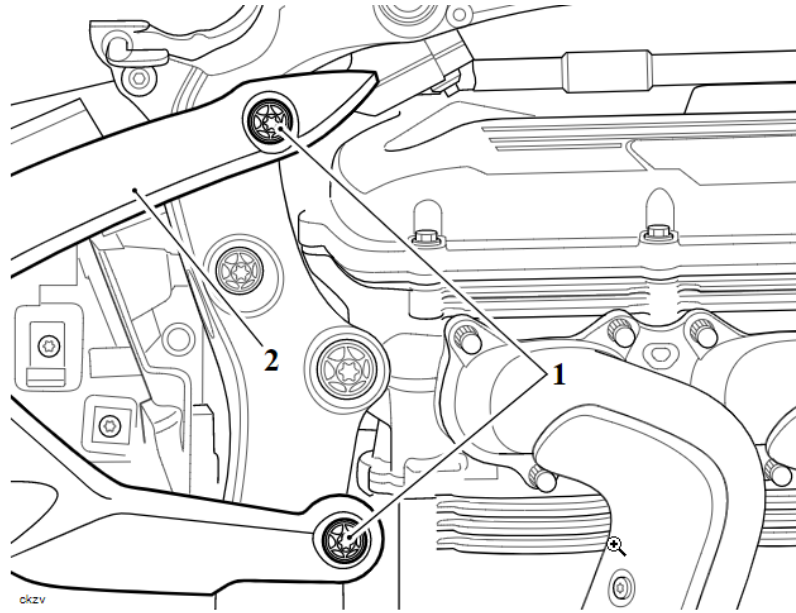


1. Lock nut
2. Stud
3. Rear piece (left hand side shown)

## NOTICE

Note that there is a lock nut fitted to the upper fixings for the subframe front pieces.

8. Release the fixings and remove the rear subframe front pieces. Discard the lock nut.



1. Fixings
2. Front pieces (right hand side shown)

#### Rear Subframe – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **⚠ CAUTION**

The frame and subframe are painted and can be damaged during removal and installation of the rear subframe.

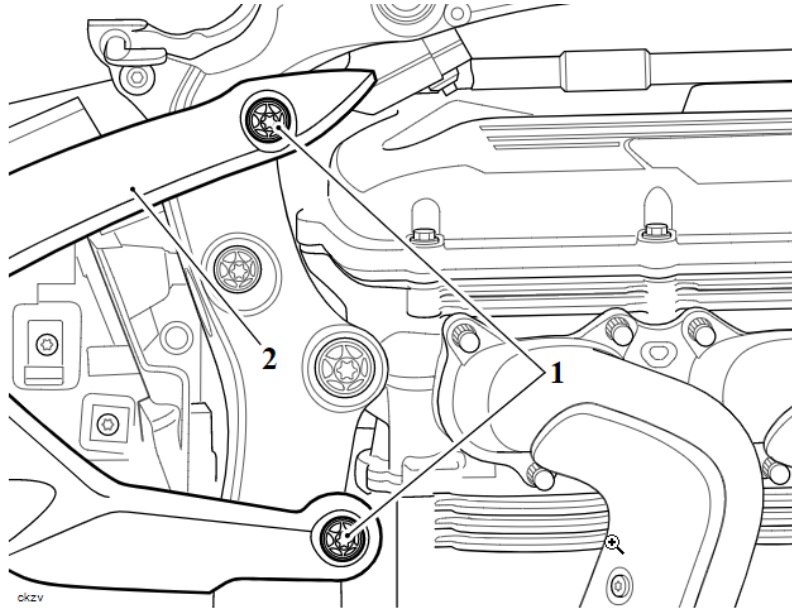
Use a suitable protective tape such as masking tape around the area of the frame and rear subframe.

Failure to protect the painted surfaces may cause irreparable damage to both components.

## NOTICE

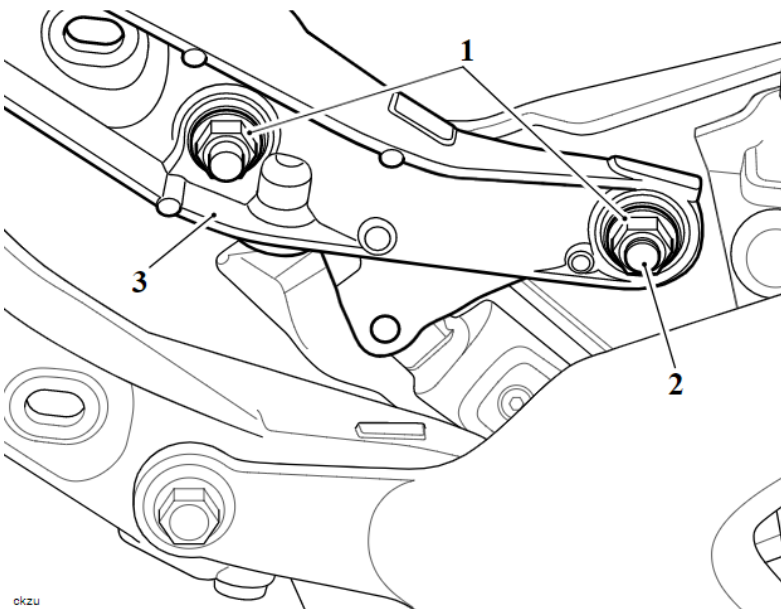
Make sure the harness and harness connectors are refitted as noted during removal.

1. Fit the rear subframe front pieces. Fit new lock nuts to the upper fixing. Do not fully tighten the fixings at this stage.



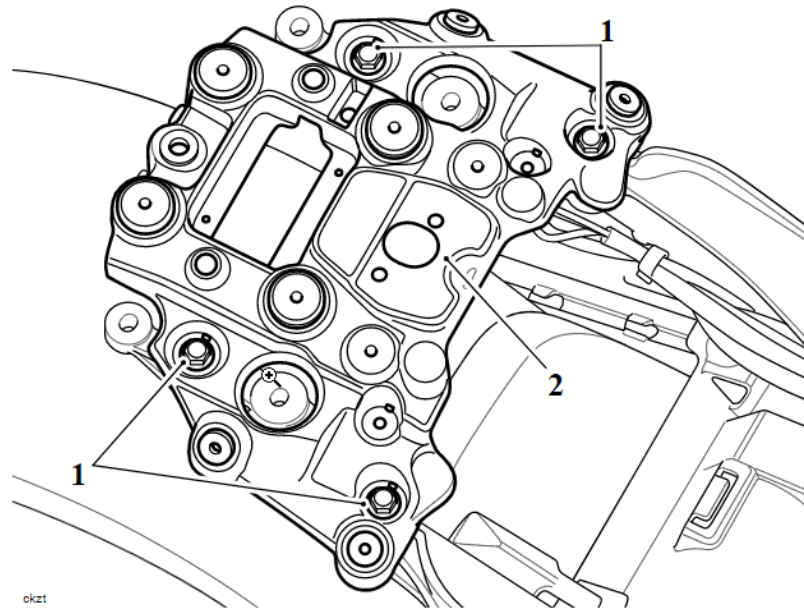
1. Fixings
2. Front pieces (right hand side shown)

2. If the stud for the rear pieces has been loosened or removed, fit new stud(s) to the front pieces and tighten to TBA.
3. Fit the rear subframe rear pieces. Do not fully tighten at this stage.



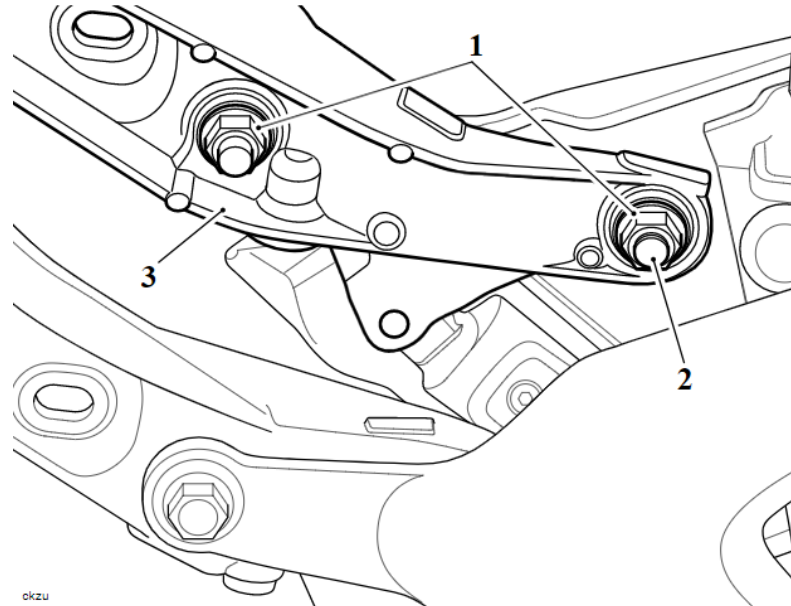
1. Lock nut
2. Stud
3. Rear piece (left hand side shown)

4. Fit the rear bridge and tighten the fixings to 22 Nm.



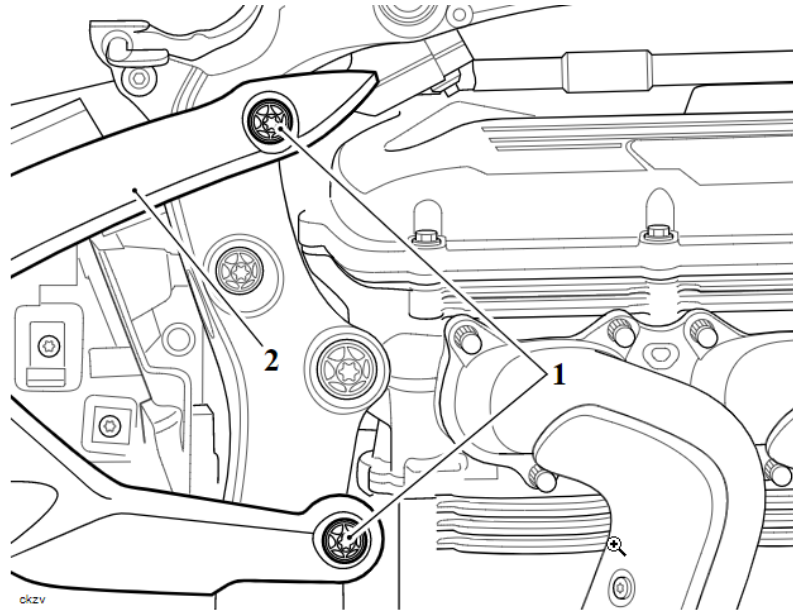
- 1. Fixings
- 2. Rear bridge

5. Tighten the rear subframe rear piece new lock nuts to 48 Nm.



- 1. Lock nut
- 2. Stud
- 3. Rear piece (left hand side shown)

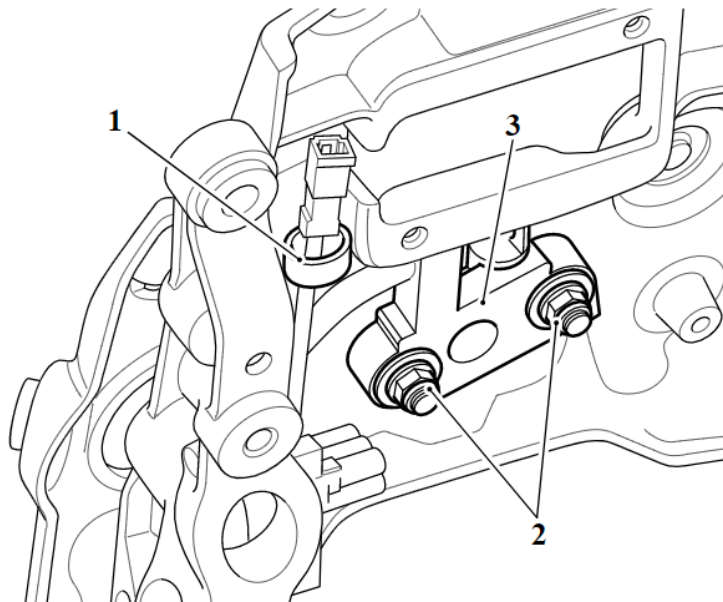
6. Tighten the rear subframe front pieces to 48 Nm.



- 1. Fixings
- 2. Front pieces (right hand side shown)

7. Fit the seat lock to the subframe rear bridge with its washers and tighten the new fixings to 8 Nm.

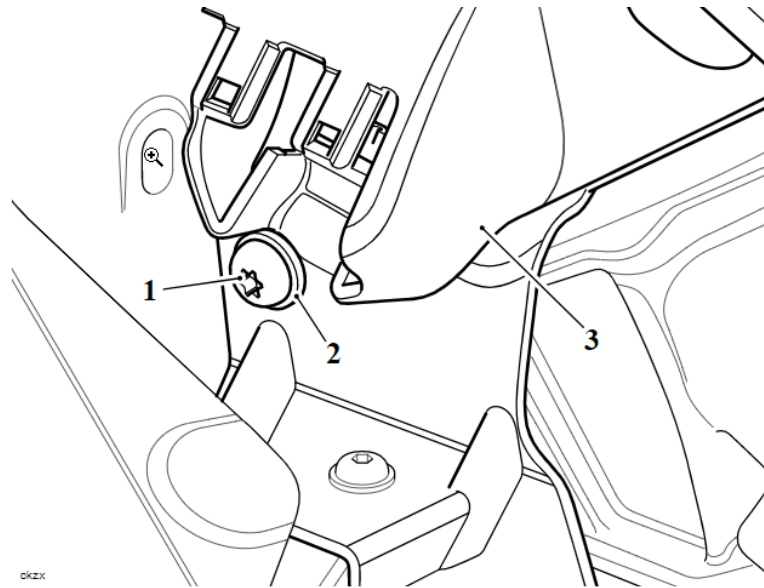
8. Attach the harness clip to the rear subframe rear bridge.



- 1. Harness clip
- 2. Fixings
- 3. Seat lock

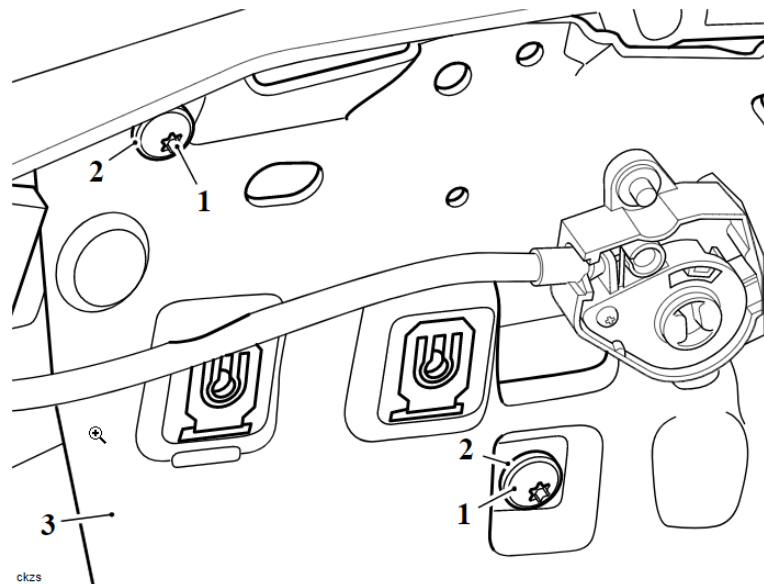


9. Attach the side panel bracket to the right hand side of the rear subframe. Tighten the new fixing to 6 Nm



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing (harness removed for clarity)</li><li>2. Washer</li><li>3. Side panel bracket</li></ol> |
|---|

10. Attach the outer battery box to the left hand side of the rear subframe. Tighten the new fixings to 3 Nm.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Washers</li><li>3. Outer battery box</li></ol> |
|--|

11. secure the seat's left hand infill panel to the subframe front piece with the shouldered washer and a new fixing. Tighten the new fixing to 6 Nm.

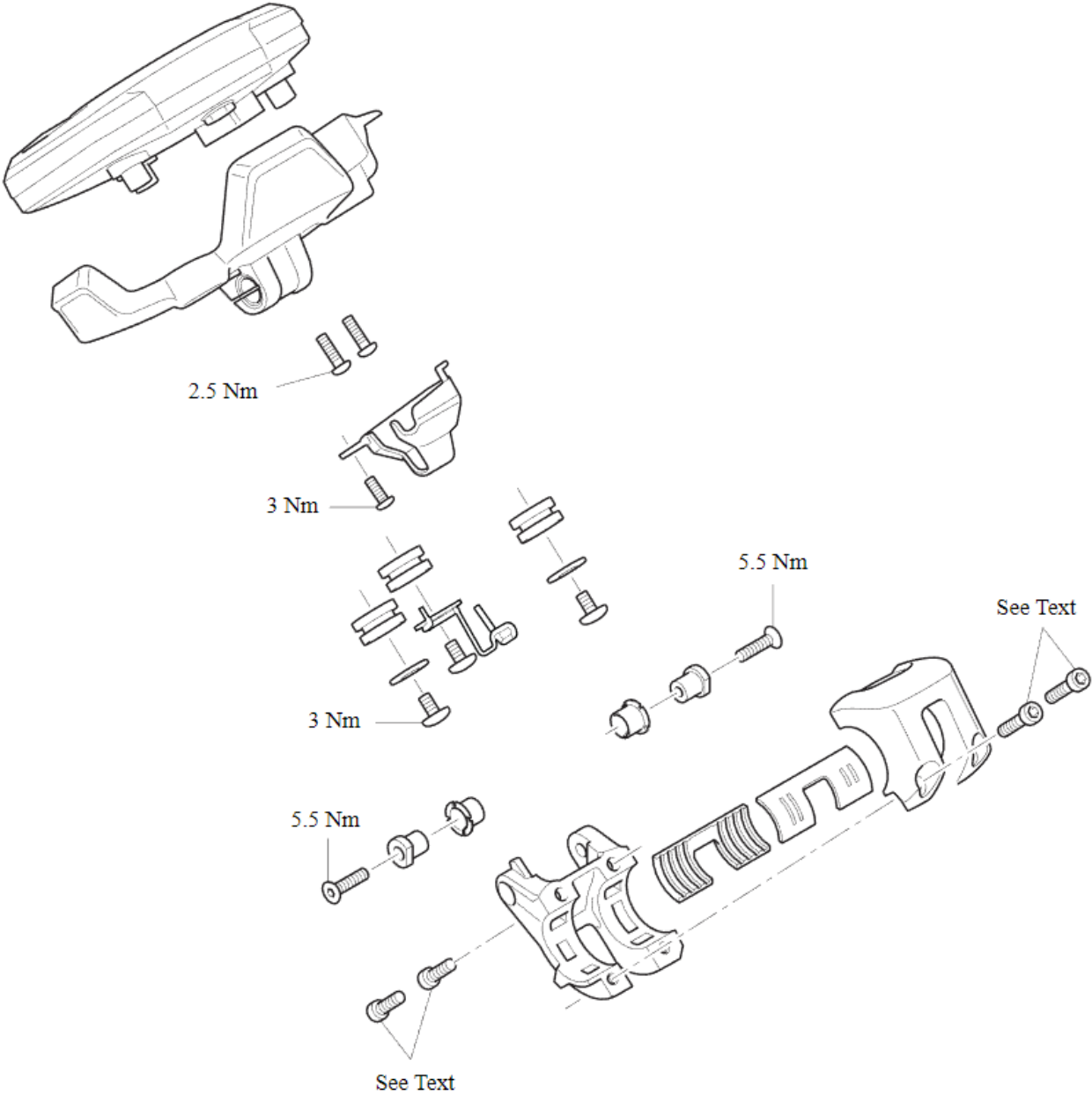
Perform the following operations:

- [Battery Box - Installation](#)
- [Side Panels - Installation](#)
- [Rear Mudguard - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

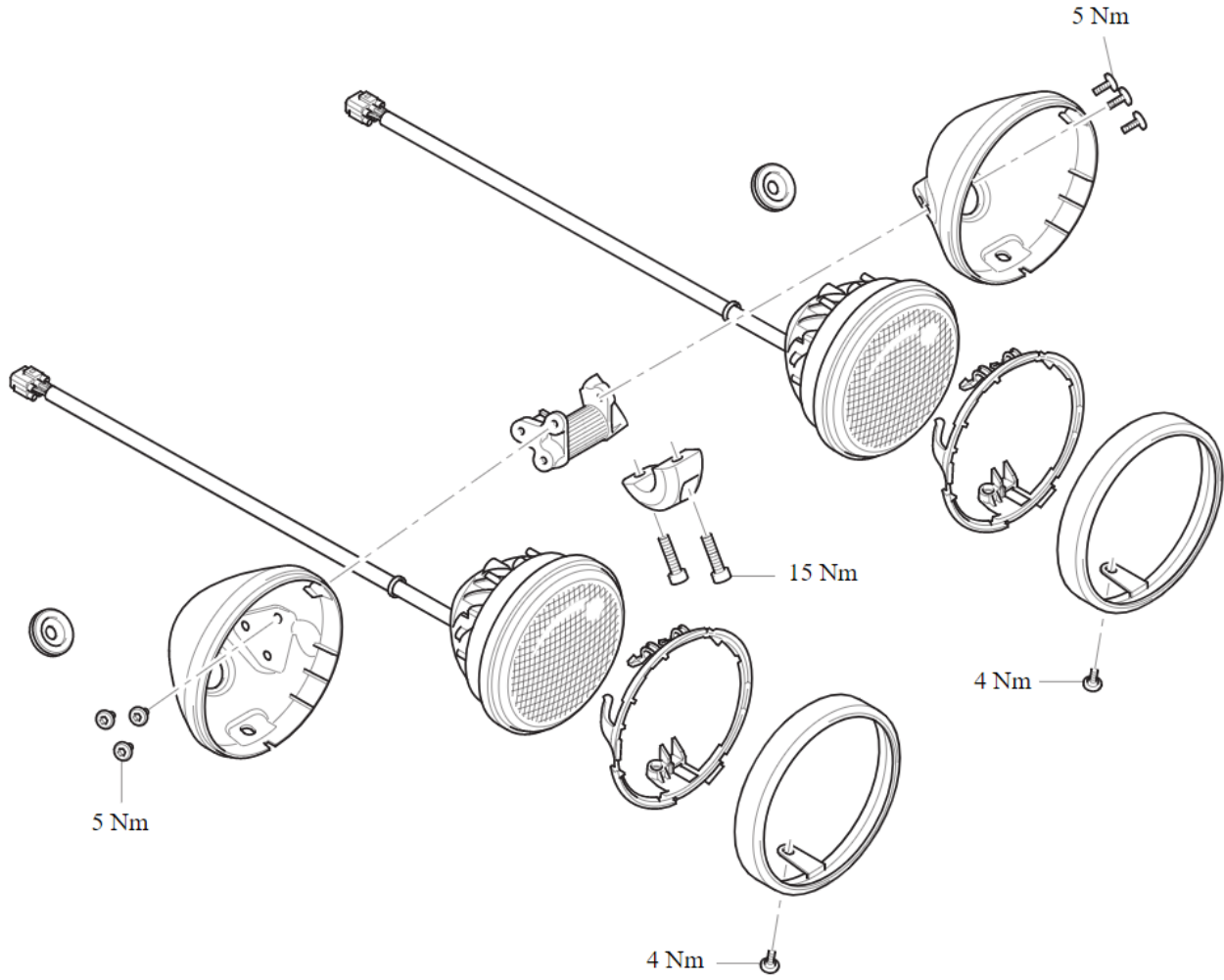
# Electrical

## Exploded Views

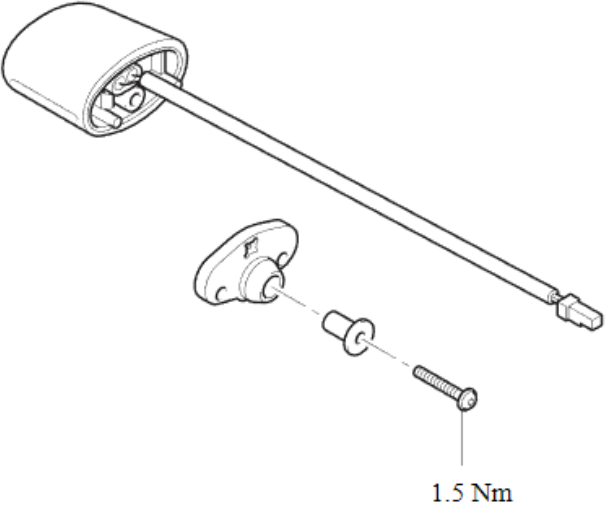
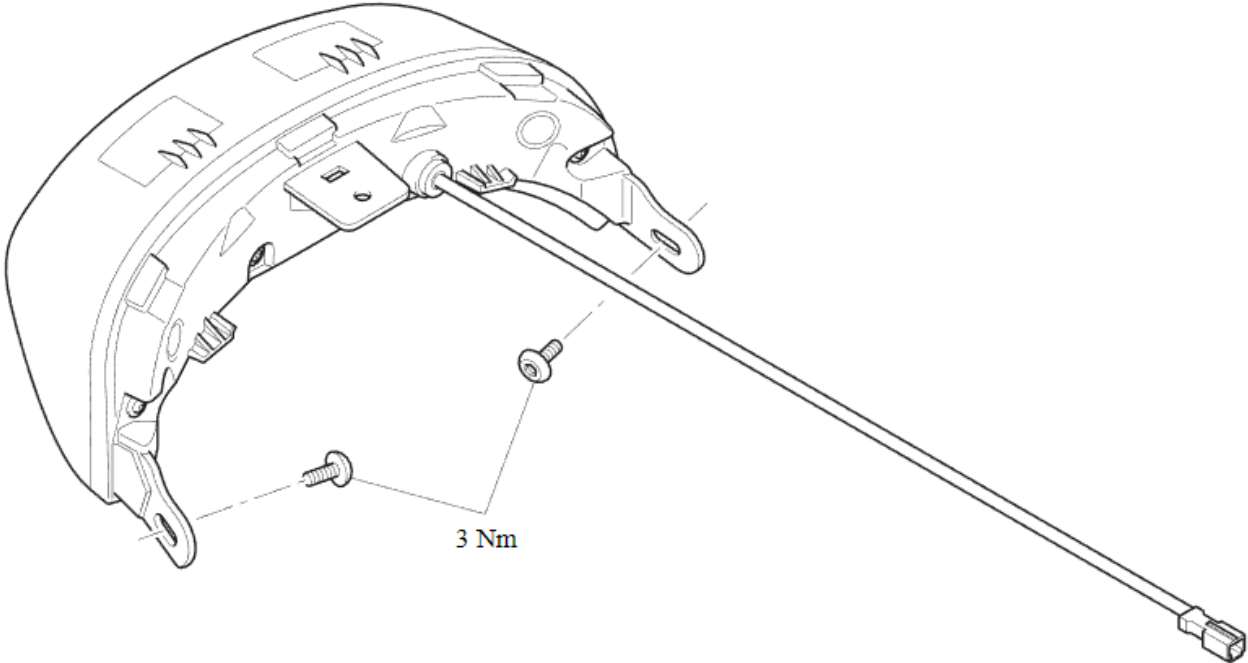
### Exploded View – Instruments



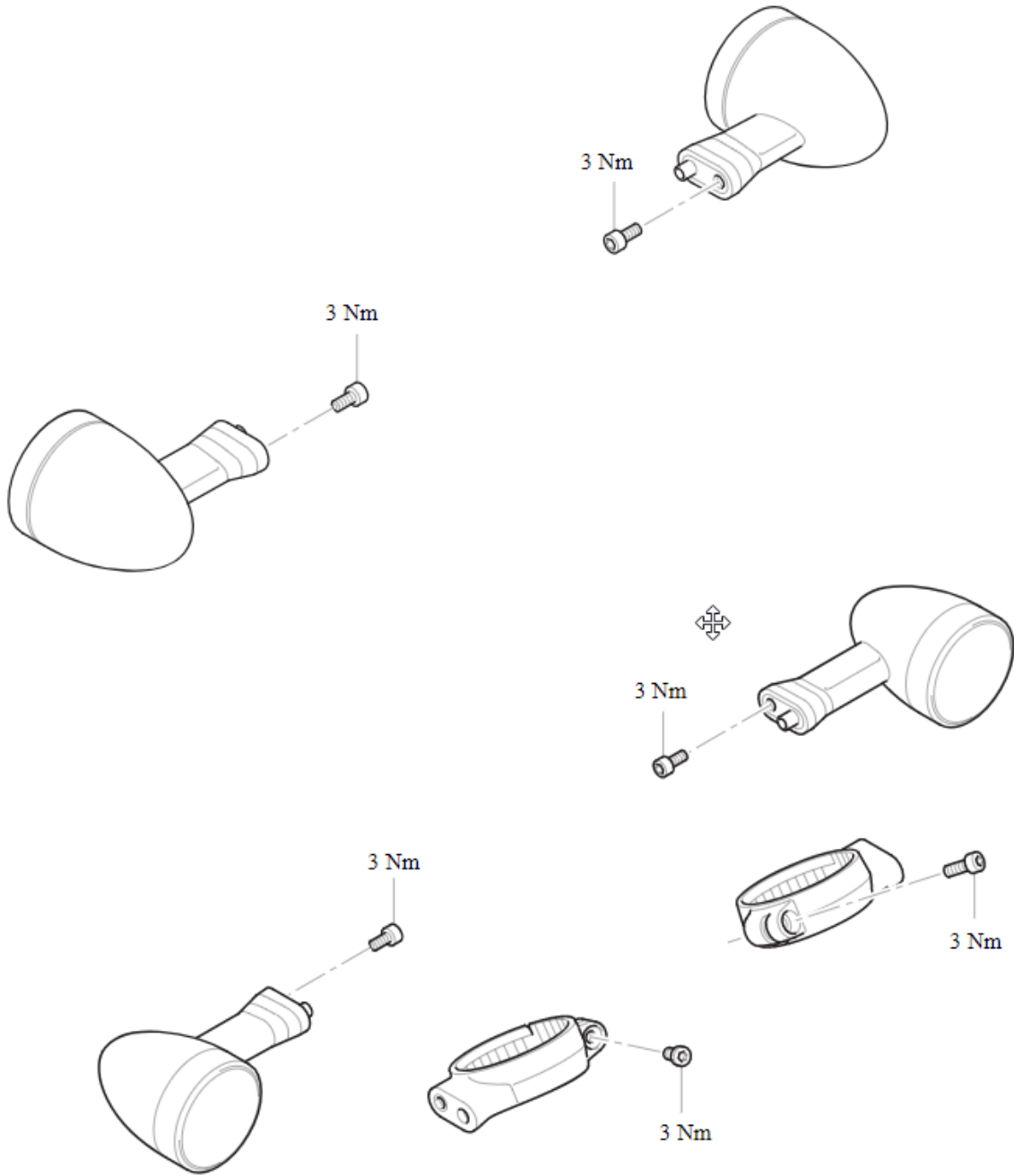
Exploded View – Headlight



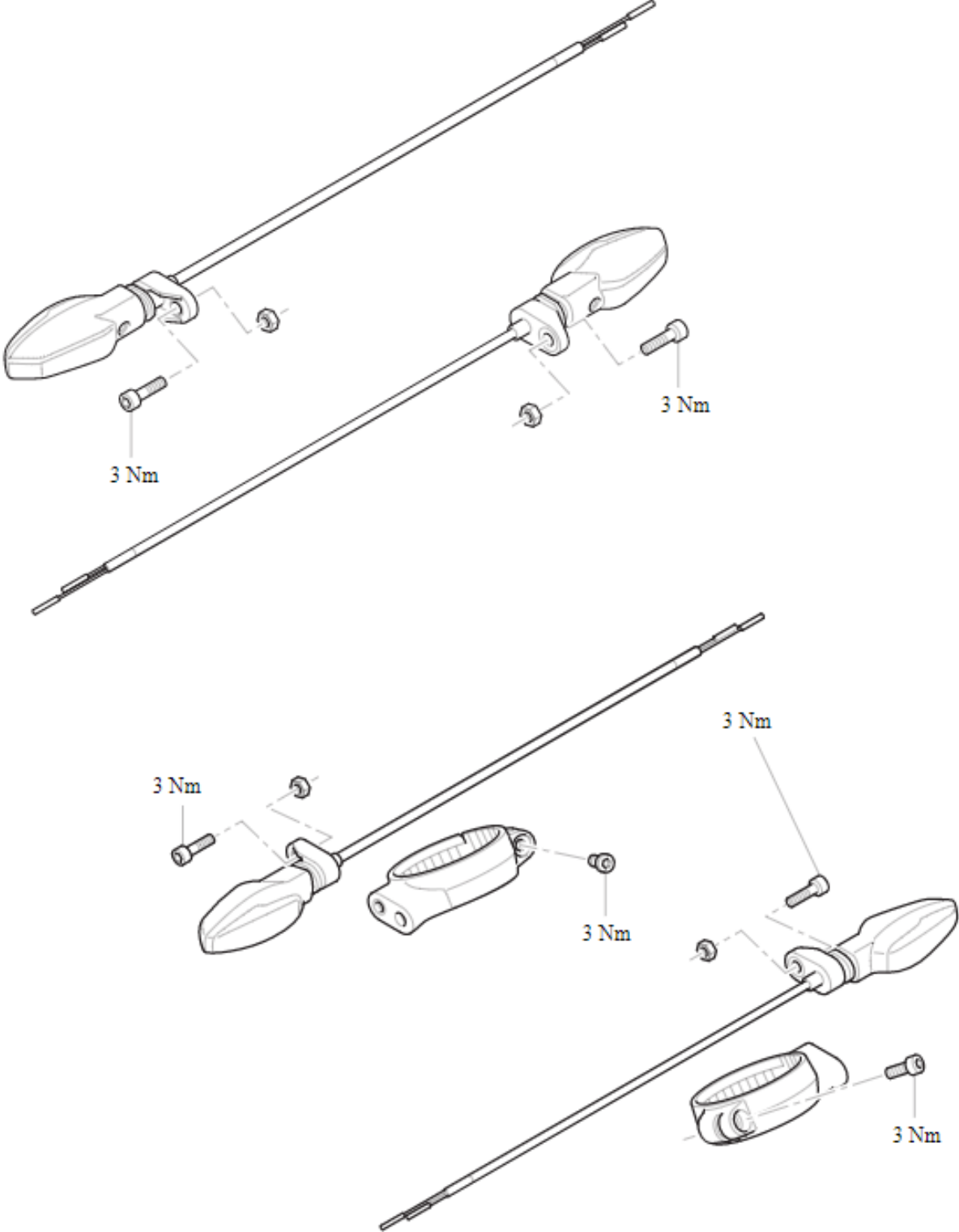
Exploded View - Rear Light



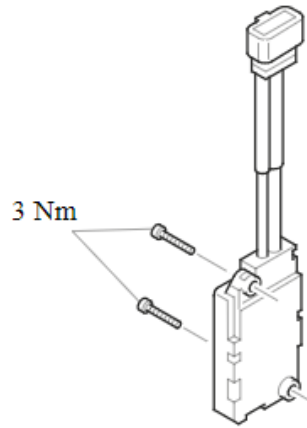
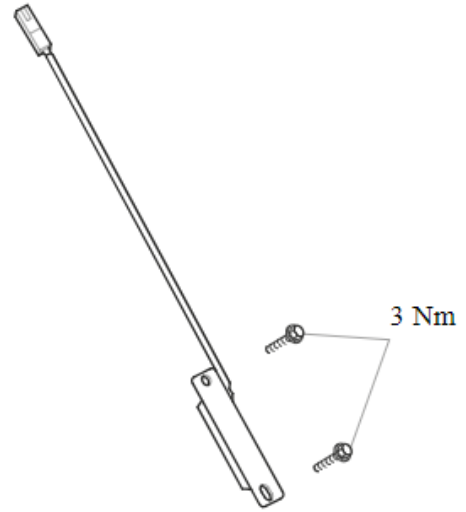
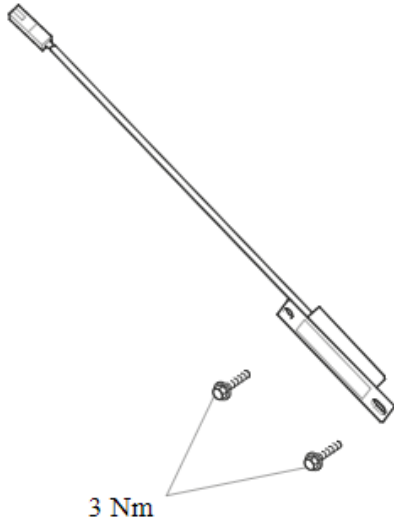
Exploded View - Direction Indicators (US markets only)



Exploded View - Direction Indicators (all markets except US)

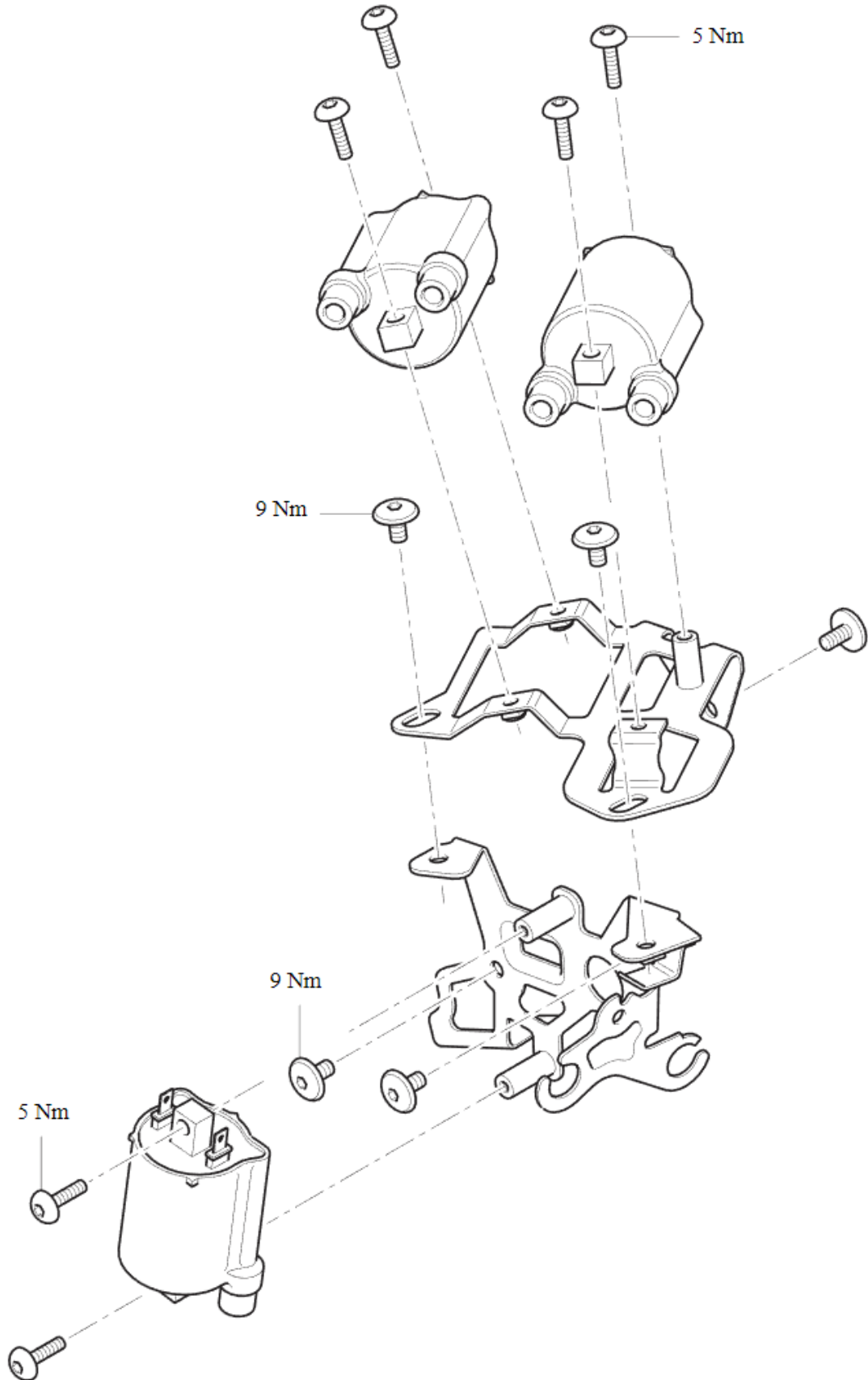


Exploded View – Keyless

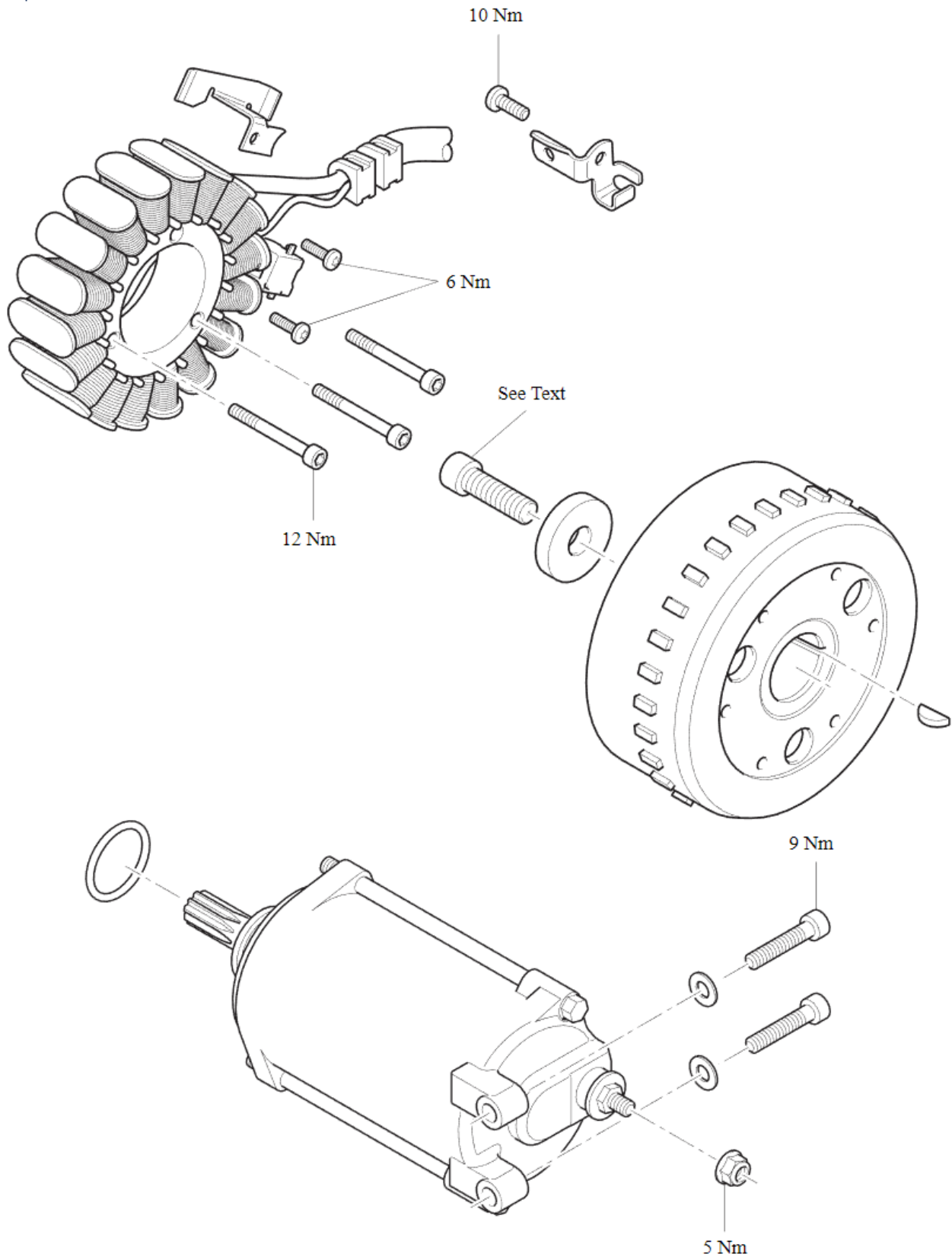




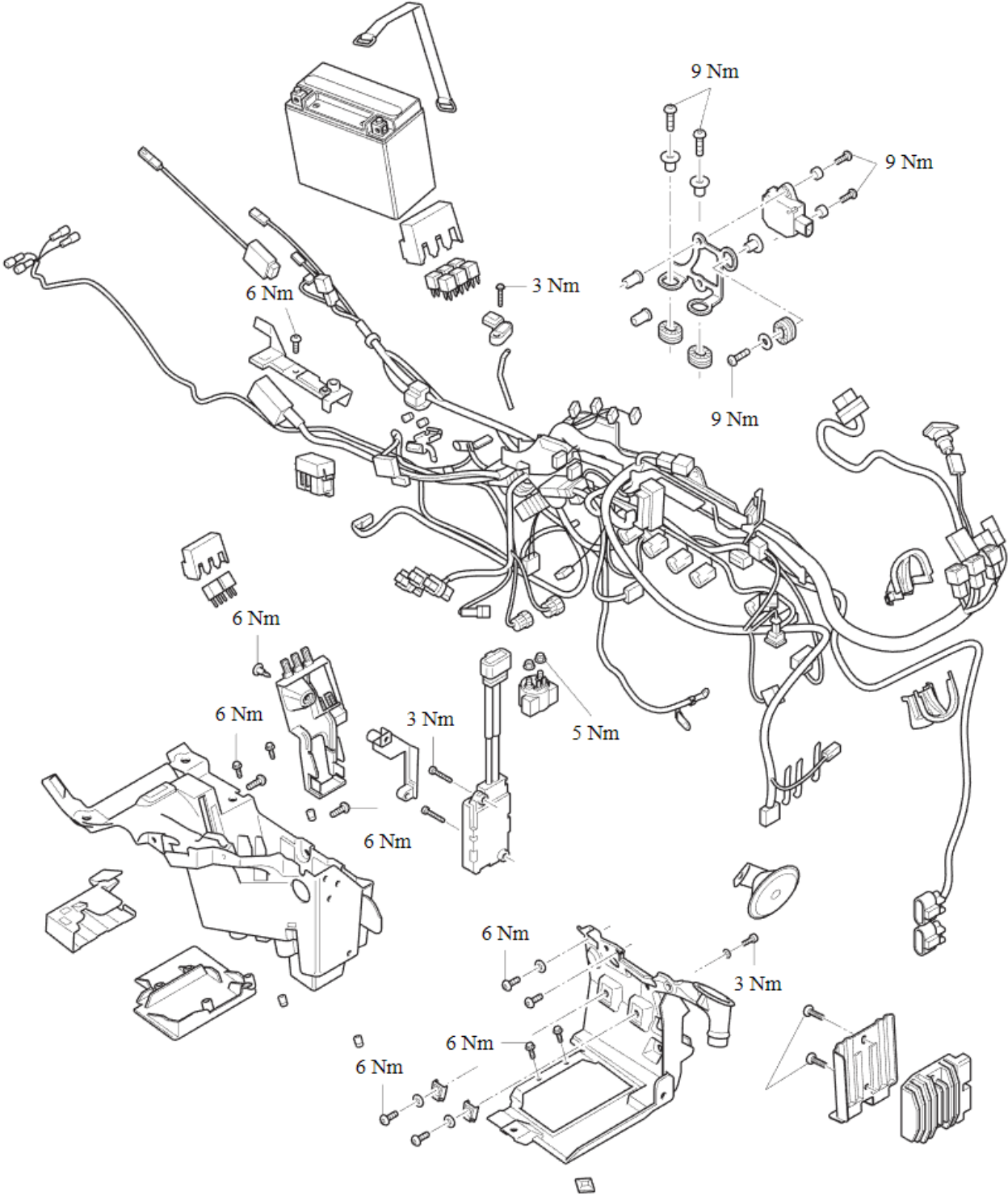
Exploded View - Ignition Coils



Exploded View - Alternator and Starter Motor



Exploded View - Battery, Horn and Wiring



## Battery, Fuses and Relays

### Battery

#### **WARNING**

Under some circumstances, the battery can give off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.

The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

If electrolyte gets on your skin, flush with water immediately.

If electrolyte gets in your eyes, flush with water for at least 15 minutes and **SEEK MEDICAL ATTENTION IMMEDIATELY.**

If electrolyte is swallowed, drink large quantities of water and **SEEK MEDICAL ATTENTION IMMEDIATELY.**

**KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.**

#### **WARNING**

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

Do not attach jump leads to the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gases causing a risk of personal injury.

### Battery Disposal

Should the battery ever require replacement, the original battery must be handed to a recycling agent who will ensure that the dangerous substances from which the battery is manufactured do not pollute the environment.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Make sure that the battery terminals do not touch the motorcycle frame.

This may cause a short circuit or spark which would ignite battery gases causing a risk of personal injury.

Perform the following operations:

- [Seat - Removal](#)

Before disconnecting the battery or removing a fuse for any reason note and record the rider's settings. Once the fuse has been refitted or the battery reconnected the rider's settings should be reset as noted.

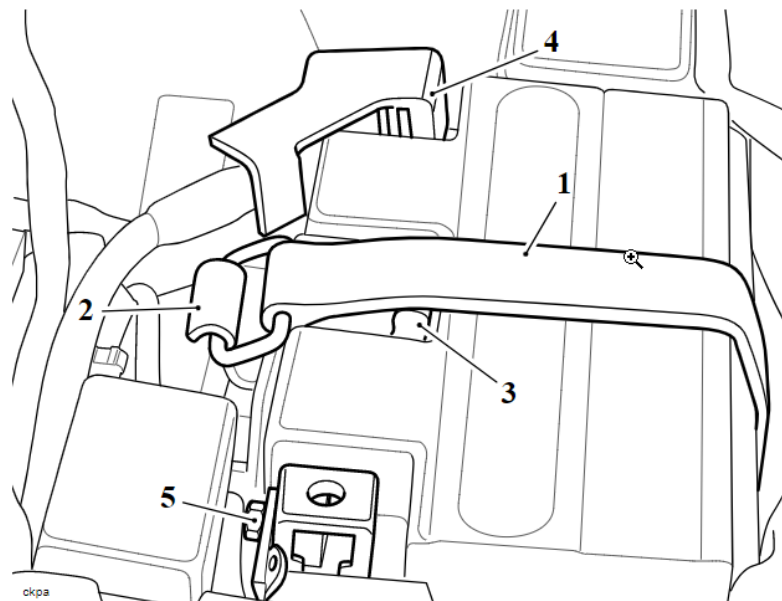
**⚠ WARNING**

If the battery has been disconnected or the fuses removed for any reason advise the rider to confirm the original mode settings have been correctly set. Failure to reset the motorcycle to the rider's preferred rider mode settings and subsequently being ridden may cause loss of motorcycle control and an accident.

**NOTICE**

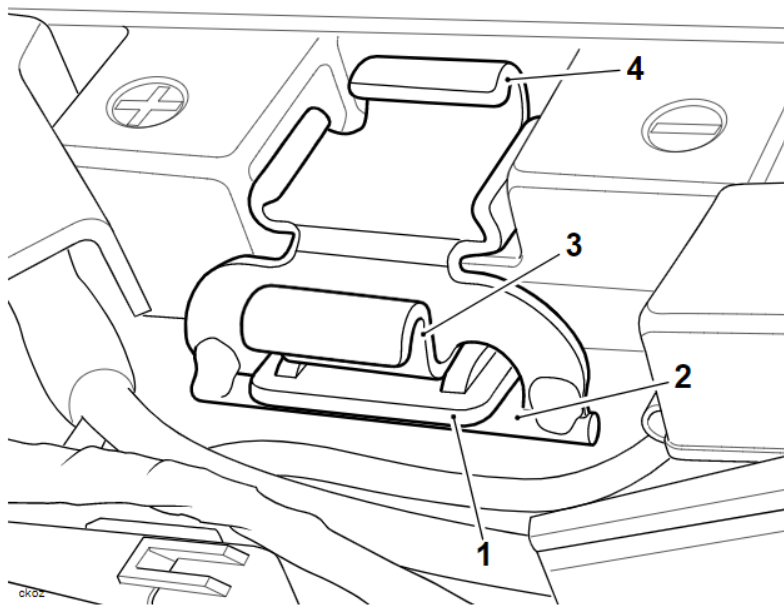
Note the fitted position of the battery strap in regards to the battery clamp prior to removal.

1. Noting its orientation for installation, remove the battery strap.
2. Detach the fuse box from the side of the battery box.
3. Disconnect the battery leads, negative (black) lead first.



- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Battery strap</li> <li>2. Battery strap hook</li> <li>3. Battery strap support</li> <li>4. Positive (red) terminal</li> <li>5. Negative (black) terminal</li> </ol> |
|---|

4. Noting its orientation for installation, remove the battery clamp.



- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Battery tray</li> <li>2. Battery clamp</li> <li>3. Battery strap hook</li> <li>4. Battery strap support</li> </ol> |
|--|

5. Remove the battery from the battery box.

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

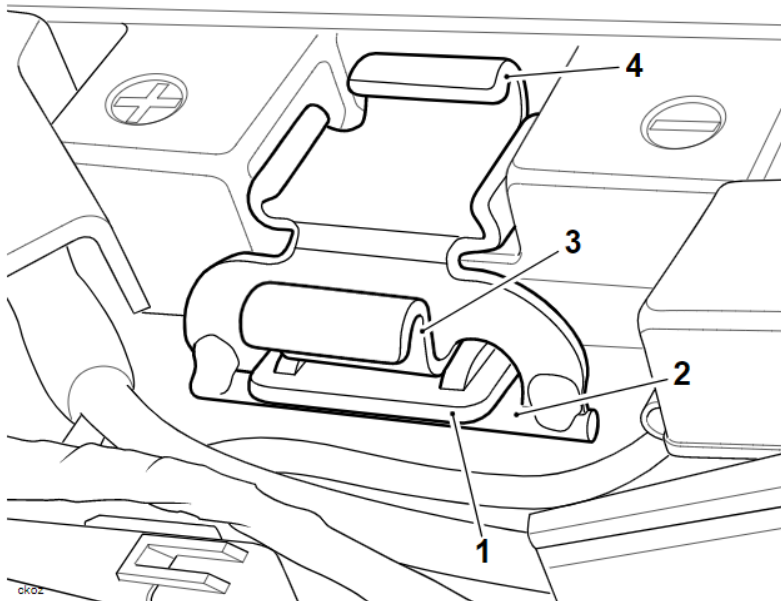
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ WARNING**

Make sure that the battery terminals do not touch the motorcycle frame.

This may cause a short circuit or spark which would ignite battery gases causing a risk of personal injury.

1. Fit the battery into the battery tray.
2. Locate the battery clamp to the battery tray and rotate until it positions into the recess of the battery.



1. Battery tray
2. Battery clamp
3. Battery strap hook
4. Battery strap support

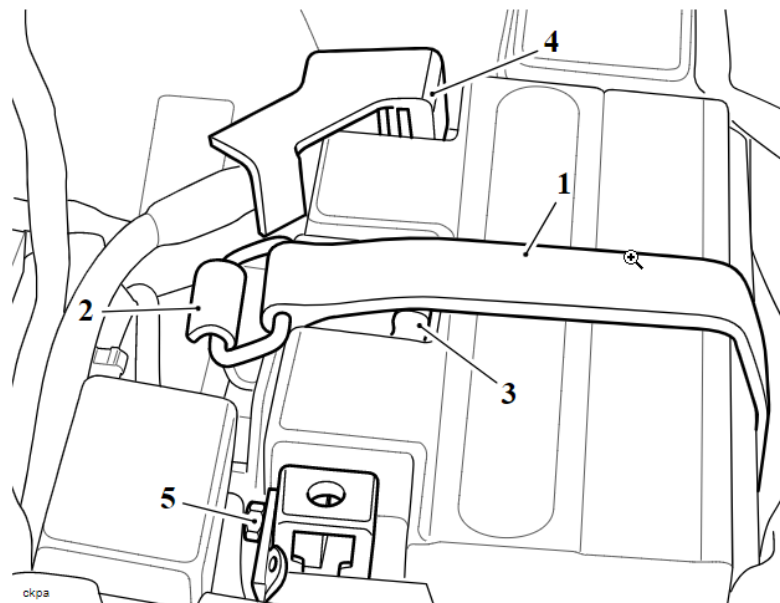
## **⚠ CAUTION**

The battery strap must be kept under tension during operation'

Failure to keep the battery strap tensioned will allow the battery to move.

Allowing the battery to move during operation could lead to damage to the battery and irreparable damage to the motorcycle.

3. Pass the battery strap over the battery strap support and locate to the hook on the battery clamp.
4. Apply a light coat of grease to the battery terminals to prevent corrosion.
5. Reconnect the battery, positive (red) lead first, tighten the battery terminal to 4.5 Nm and cover the terminal with the protective cap.
6. Reconnect the battery, negative (black) lead and tighten the battery terminal to 4.5 Nm.
7. Attach the fuse box to the side of the battery box.



1. Battery strap
2. Battery strap hook
3. Battery strap support
4. Positive (red) terminal
5. Negative (black) terminal

Perform the following operations:

1. [Seat - Installation](#)



## New Battery

In order to correctly and safely commission a new battery, the battery commissioning procedure listed below must be carefully followed. This is the only battery commissioning procedure that Triumph recommends. The procedure is designed to ensure that the battery is at its best when fitted to the motorcycle, and will provide the best possible performance and reliability.

Failure to comply with this procedure may lead to reduced battery performance and/or shorten the life of the battery.

### **WARNING**

The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space. The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield. If electrolyte gets on your skin, flush with water immediately. If electrolyte gets in your eyes, flush with water for at least 15 minutes and **SEEK MEDICAL ATTENTION IMMEDIATELY**. If electrolyte is swallowed, drink large quantities of water and **SEEK MEDICAL ATTENTION IMMEDIATELY**. **KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.**

1. Check the battery carefully for damage.

### **CAUTION**

Ensure the electrolyte container part number matches the battery part number to be filled. Battery life will be greatly reduced if the incorrect volume (either too little or too much) of acid is added to the battery.

2. Read the instructions and warnings delivered with the battery.
3. Place the battery on a flat level surface and remove the sealing foil.
4. Remove the battery sealing strip from the electrolyte container and save for later in this procedure. Place the sealing strip on a clean surface, with the upper side facing downwards to avoid contamination of the sealing strip. Do not break the seal on the electrolyte container.

5. Place the electrolyte container on the battery and fill the battery according to the manufacturers instructions.
6. After starting to fill the battery with electrolyte, allow the battery to stand for 30 minutes with the filling container in place.
7. Check that all of the electrolyte has drained from the container. Do not remove the container at this point. If the container has not completely drained, tap the sides of the container to start the electrolyte flowing again.
8. After the electrolyte has drained into the battery, allow the battery to stand with the electrolyte container in place for a further 2 hours.
9. Remove the electrolyte container carefully, and dispose of immediately.
10. Place the sealing cap strip LOOSELY over the filling holes of the battery.
11. Charge the battery using the BatteryMate Battery Charger. Refer to the instructions supplied with the BatteryMate Battery Charger.

 **CAUTION**

The caps must be fitted (after charging) within two hours of filling the battery with acid. Leaving the battery open to the atmosphere for longer than is necessary will start to reverse the chemical reaction which takes place within the battery, greatly reducing the battery's service life.

12. After charging is complete, press down firmly with both hands to seat the caps (do not use tools or force the caps into position).
13. Disconnect the charger and allow the battery to stand for 1 hour before fitting to the motorcycle.
14. Fit the battery to the motorcycle, positive (red) lead first.

## Battery Maintenance

The battery is a sealed type and does not require any maintenance other than checking the voltage and routine recharging such as during storage.

It is not possible to adjust the electrolyte level in the battery.

### **NOTICE**

The charge level in the battery must be maintained to maximise the battery life.

With normal use of the motorcycle, the charging system will keep the battery charged. If the motorcycle is unused, the battery will gradually discharge due to battery self discharge and the continuous current drain for the clock and the engine control module memory.

The rate of battery discharge can be greatly increased by the addition of electrical security systems or other accessories.

Allowing a battery to discharge, or leaving it discharged over a period of time, causes sulphation of the lead plates within the battery.

Sulphation is a normal chemical reaction inside the battery and over a period of time sulphate will crystallise on to the lead plates making charging difficult or impossible. The result is a permanently damaged battery, which would not be covered by the motorcycle warranty.

Keeping a battery at full charge reduces the chance of it freezing in cold conditions. Allowing a battery to freeze can cause serious internal damage to the battery.

When leaving the motorcycle standing for more than a few days, regularly check the battery voltage using a digital multimeter. Should the battery voltage fall below 12.8 V, charge the battery using the BatteryMate Battery Charger - see latest Parts Catalogue for part number information. Refer to the instructions supplied with the BatteryMate Battery charger.

For extended periods of storage (beyond two weeks) the battery should be removed and the battery voltage checked regularly and charged when below 12.8 V.

**NOTICE**

Before carrying out the following procedure the battery must be disconnected and removed from the motorcycle.

Use the guidelines in the table below for charging. Always verify the battery condition before charging, and 30 minutes after charging.

**NOTICE**

A fully charged battery should read 12.8 volts or higher after the battery has been off the charger for 30 minutes or more.

Table of Battery Charging Times

| State of charge | Voltage         | Action   | Charge time (using BatteryMate 150-9) |
|-----------------|-----------------|--|---------------------------------------|
| 100%            | 12.8 V – 13.0 V | None. Check at 4 months from date of delivery                  | None required                         |
| 75% - 100%      | 12.5 V – 13.0 V | Charge and check in 4 months from date of last check           | 3-6 hours                             |
| 50% - 75%       | 12.0 V – 12.5 V | Needs charge   | 5-11 hours                            |
| 25% - 50%       | 11.5 V – 12.0 V | Needs charge   | At least 13 hours                     |
| 0% - 25%        | 11.5 V or less  | Needs recovery using BatteryMate 150-9. Retest after discovery | 20 hours                              |

Needs recovery using BatteryMate 150-9. Retest after recovery

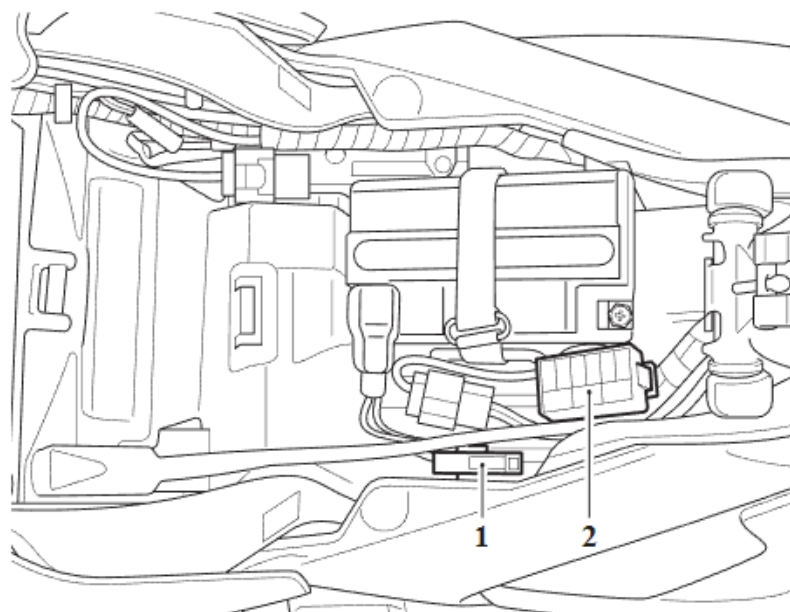
20 hours

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

A blown fuse is indicated when all of the systems protected by that fuse become inoperative. When checking for a blown fuse, use the table to establish which fuse has blown.

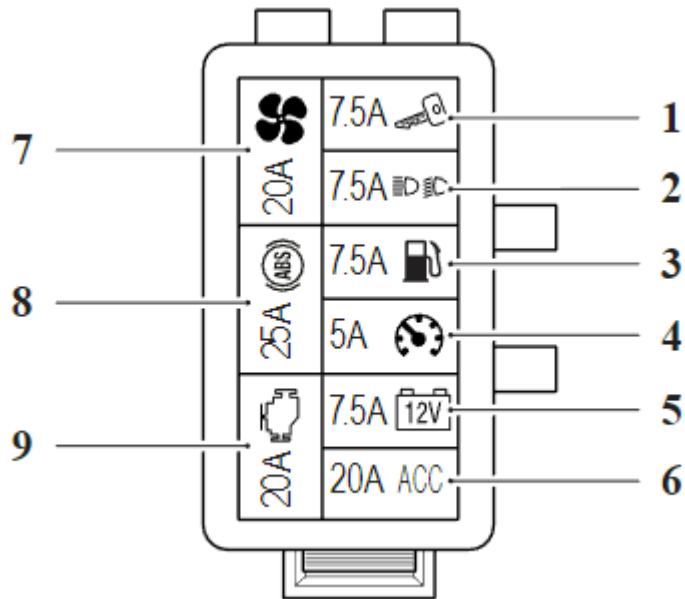
The fuse box and main fuse are located under the rider's seat. To access the fuses, the rider's seat must be removed (see [Seat - Removal](#)).



- 1. Main fuse
- 2. Fuse box

**NOTICE**

Numbers shown in the following illustration correspond to the position numbers in the fuse identification table.

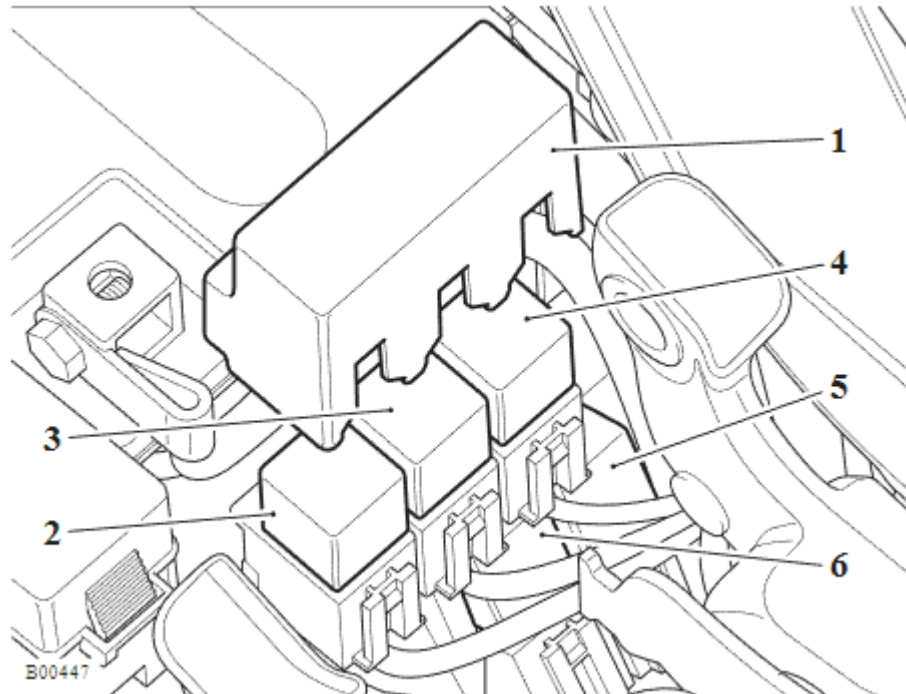


| Position | Circuit Protected               | Rating (Amps) |
|----------|---------------------------------|---------------|
| 1        | Ignition                        | 7.5           |
| 2        | lightning                       | 7.5           |
| 3        | Fuel Pump                       | 7.5           |
| 4        | Instruments                     | 5             |
| 5        | Battery                         | 7.5           |
| 6        | Accessories                     | 20            |
| 7        | Cooling fan                     | 20            |
| 8        | Anti-lock Bracking System (ABS) | 25            |
| 9        | Engine management system        | 20            |

## Relays

### Identification and Location

Five of the relays can be found in front of the battery under the seat. To gain access to these relays remove the seat, the fuel tank (see [Fuel Tank - Removal](#)) and the relay cover.



1. Relay cover
2. R13 – Accessory
3. R07 - Engine management
4. R03 - Fuel pump
5. R09 - Starter motor
6. R02 Ignition system

Three relays are located on the right hand side of the frame in front of the ABS modulator. To gain access to these relays remove the fuel tank (see [Fuel Tank - Removal](#)) and the relay cover.



1. Relay cover
2. R11 – Dipped beam
3. R12 – Main Beam
4. R05 - Horn

## Diagnosics - Starter and Charging Circuits

### Starting Circuit

All Triumph models are equipped with an electric start system. This system consists of a starter relay, starter motor, starter switch, side stand switch, engine stop switch, clutch switch and the sprag clutch. The starter motor is connected to the starter relay and the battery by heavy duty cables in order to supply the large currents required by the motor to start the engine. When the starter button is pressed, the relay is energised, which then allows current to the starter motor. The starter motor will not operate unless the clutch lever is pulled in. Also, the starter will not operate if the side stand is down, unless the transmission is in neutral. If the starter motor does not operate, the following basic checks must be carried out before further diagnosis is performed:



- Check the engine stop switch is in the 'RUN' position.
- Check the battery terminals are clean and tight.
- Check the frame and engine ground connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating.
- Using the Triumph Diagnostic Tool, check the operation of the neutral switch or gear position sensor (if fitted), side stand and clutch switches.

**NOTICE**

The engine will not crank if the instruments, ABS ECM, or immobiliser/keyless ECM (if fitted)/chassis ECM (if fitted) are disconnected.

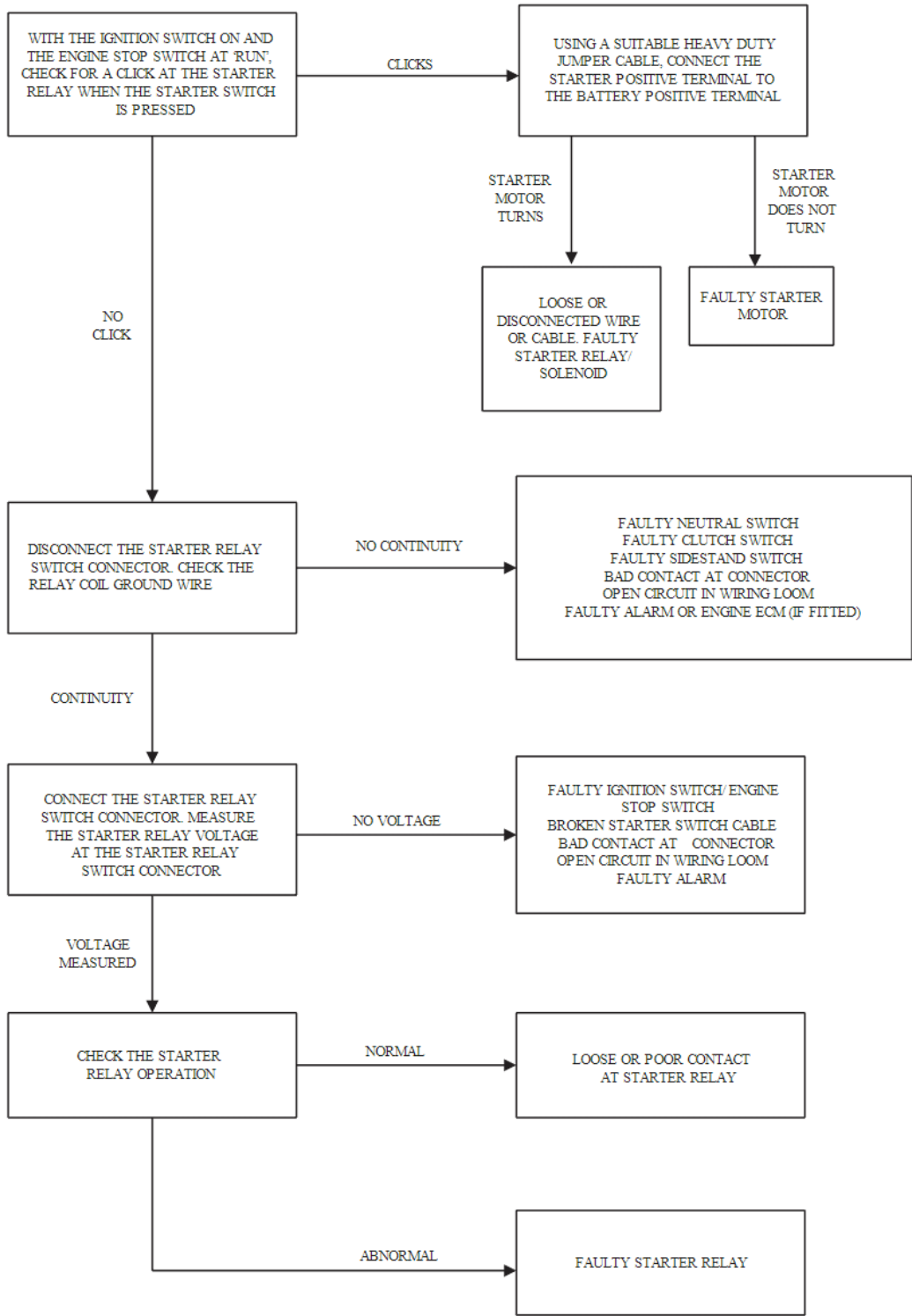
Rectify any defects as necessary.

General Fault Finding - Starter Motor and Relay

| Symptom   | Possible cause(s)  |
|---|--|
| Starter relay does not click, starter motor does not turn | Battery discharged or defective  |
|   | Blown main or starter relay fuse   |
|   | Defective starter relay wiring or starter switch   |
|   | Check that the side stand, transmission and clutch lever are positioned for engine starting i.e. transmission in neutral, clutch lever pulled in and the side stand down |
|   | Defective alarm system - ensure any alarm fitted is working correctly  |
| Starter motor turns slowly                                | Battery discharged or defective  |
|   | Loose, corroded or dirty battery connections   |
|   | Loose, corroded or dirty starter motor or starter relay connections  |
|   | Defective starter motor  |
|   | Loose, corroded or dirty battery ground connections  |
| Starter relay clicks but engine does not turn over        | Battery discharged or defective  |
|   | Crankshaft does not turn due to engine defect  |
|   | Defective starter motor  |
|   | Starter cable open circuit   |
| Starter motor turns but engine does not turn over         | Defective starter relay  |
|   | Starter motor or starter ring gear   |

**NOTICE**

Prior to carrying out the diagnosis, ensure the battery voltage is 12 - 13.5 V, the immobiliser system (if fitted) is functioning correctly, the transmission is in neutral and the clutch lever is pulled fully to the handlebar.



## Alternator/Charging System

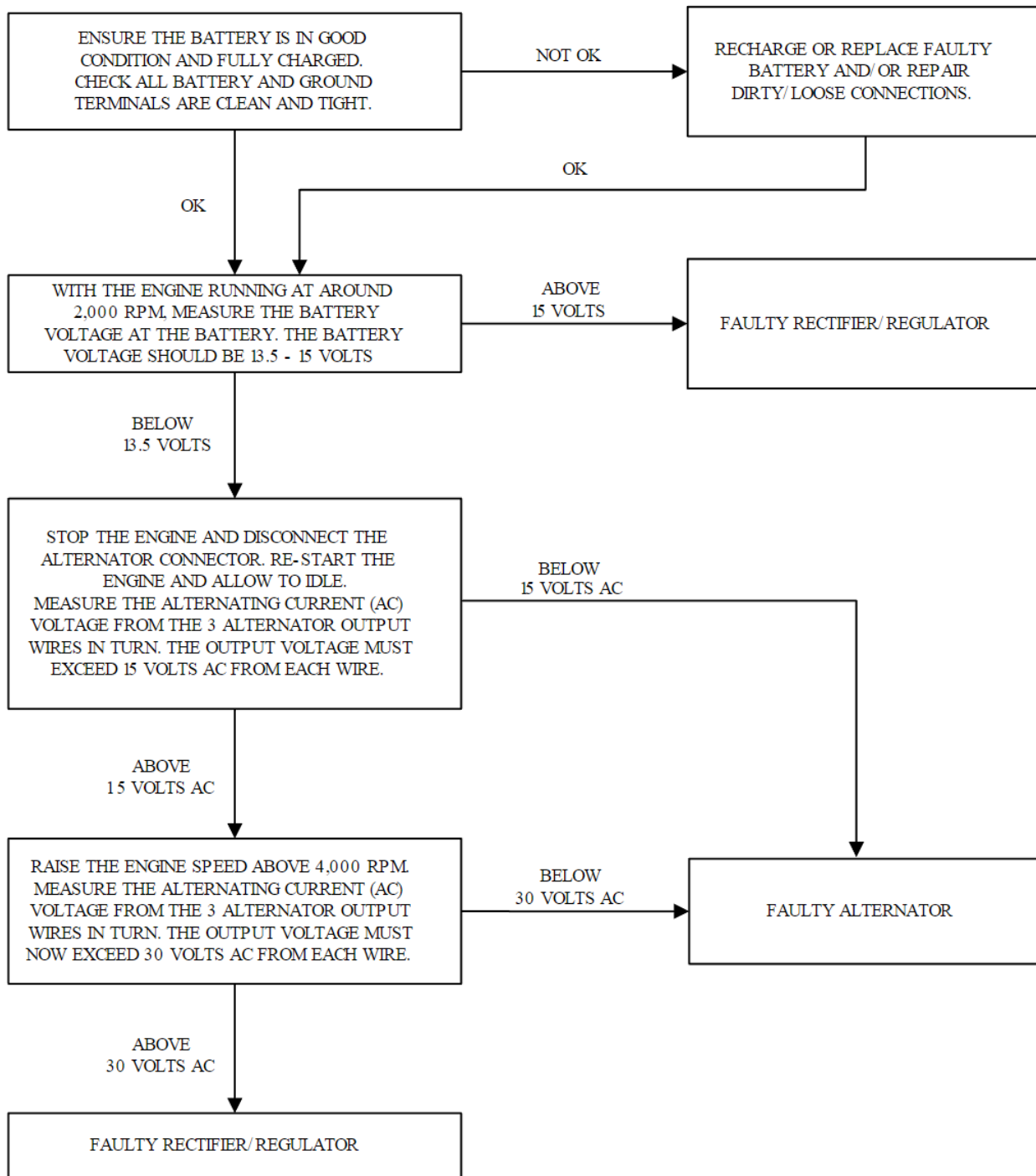
The charging system consists of an alternator, a rectifier/regulator assembly and the battery. The alternator is made up of two parts, the stator, which is mounted to the crankcase or the engine cover, and the rotor, mounted to the end of the crankshaft. The stator is an assembly of 18 coils, arranged into 3 phases. The rotor is a series of magnets mounted in the engine flywheel, which are arranged so as to be positioned around the outside of the stator coils. As the engine rotates the alternator produces an AC (alternating current) voltage in each of the three phases of the alternator, typically of around 35 to 40 volts AC at 4,000 - 5,000 rpm, although this figure varies between models. As the battery requires DC (direct current) voltage for correct charging, this AC voltage must be first rectified to DC current, and then regulated to the correct voltage for the battery of 14.5 +/- 0.5 volts. This is done by the rectifier/regulator, which uses diodes to convert the alternator output to DC Volts and limits the resulting output to the correct figure required for optimal battery charging.

If the charging circuit does not operate correctly, the following basic checks must be carried out before further diagnosis is performed:

- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating.

Rectify any defects as necessary.

## Diagnosis - Charging Circuit



## Alternator Stator

The alternator stator is an assembly of 18 coils, arranged into three phases. It is possible to check for continuity and short circuits through the coils and to ground.

### NOTICE

Only repair the stator harness between the alternator regulator/rectifier and where the harness goes into the crankcase.

Do not attempt to repair the alternator stator coils.

If the battery is not fully charged, the charging voltage may be lower than specified when checking at 2,000 rpm.

Make sure all additional accessories (auxiliary lights, heated grips etc.) are switched off.

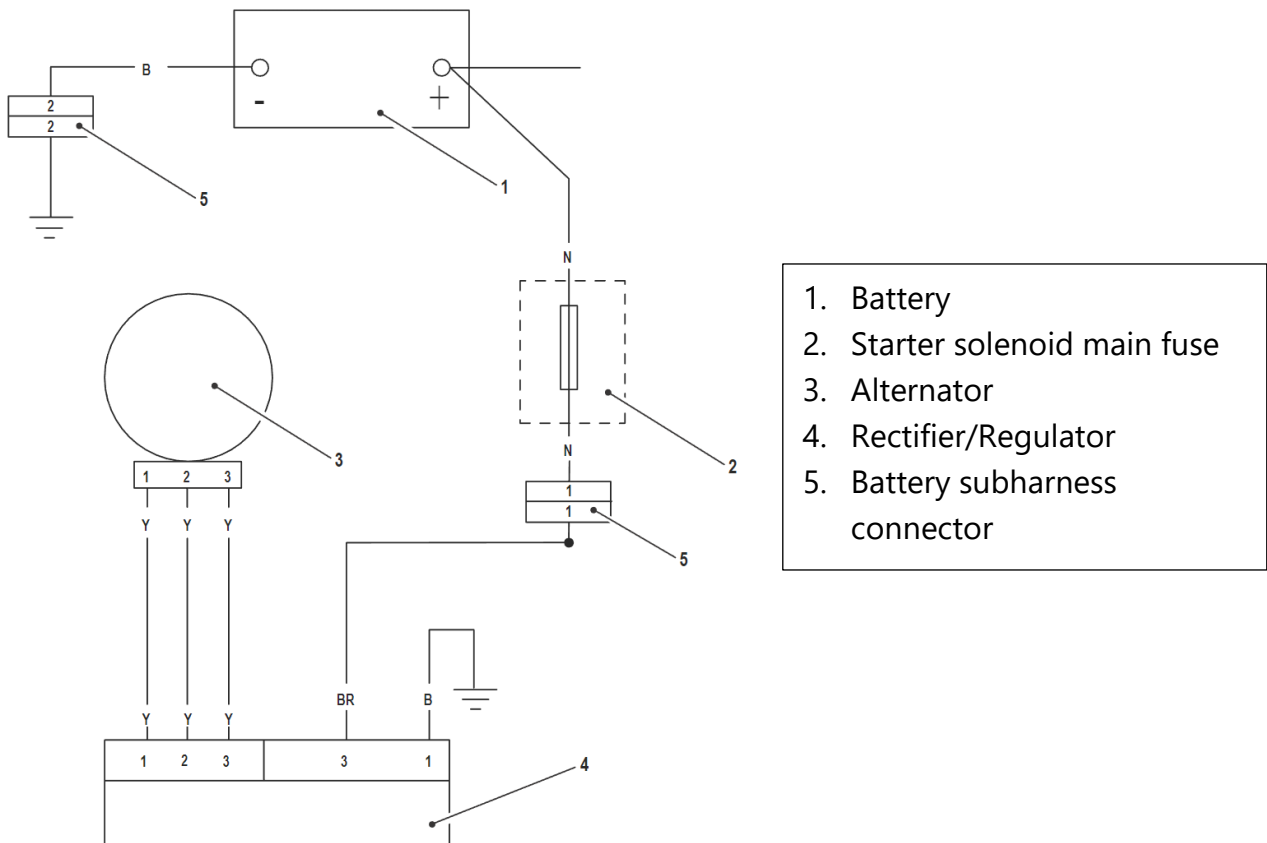
| Fault                | Possible cause      | Action  |
|----------------------|---------------------|---|
| Battery not charging | Main fuse           | Check the condition of the main 30A fuse:   |
|                      | Battery             | Check the condition of the battery. Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9. Ensure the battery is serviceable: |
|                      | Alternator          | Proceed to pinpoint test 1:   |
|                      | Regulator/Rectifier | Test the regulator/rectifier (see <a href="#">Regulator/Rectifier</a> )   |

## Pinpoint Tests

| Test | Result   | Action   |  |
|------|--|--|--|
| 1    | Check cable and terminal integrity: <ul style="list-style-type: none"> <li>- Battery positive (+)</li> <li>- Battery negative (-)</li> <li>- Regulator/rectifier black connector pin 1</li> <li>- Regulator/rectifier black connector pin 3</li> <li>- Regulator/rectifier grey connector pin 1</li> <li>- Regulator/rectifier grey connector pin 2</li> <li>- Regulator/rectifier grey connector pin 3</li> <li>- Battery subharness connector pin 1</li> <li>- Battery subharness connector pin 2</li> </ul> | OK   | Disconnect the battery leads, negative (black) lead first. Disconnect regulator/rectifier black connector and proceed to test 2  |
|      | Faulty   | Rectify fault, proceed to test 4   |  |
| 2    | Check cable continuity: <ul style="list-style-type: none"> <li>- Regulator/rectifier black connector pin 1 to battery lead negative connector</li> <li>- Regulator/rectifier black connector pin 3 to battery lead positive connector</li> </ul>   | OK   | Reconnect the battery leads, positive (red) lead first. Reconnect the regulator/rectifier black connector. Disconnect the rectifier/regulator grey connector and proceed to test 3 |
|      | Open circuit   | Locate and rectify wiring fault, proceed to test 4   |  |
| 3    | Check resistance through the coils: <ul style="list-style-type: none"> <li>- Alternator pin 1 to pin 2</li> <li>- Alternator pin 2 to pin 3</li> <li>- Alternator pin 3 to pin 1</li> </ul>  | 0.2 Ohms to 3 KOhms  | Proceed to test 4  |
|      | <0.2 Ohms - Short circuit<br>>3 KOhms<br>Open Circuit  | If the fault is between the rectifier and the crankcase, repair the harness. Proceed to test 4<br>If the fault is after the crankcase, replace the unit. Proceed to test 6 |  |

| Test | Result  | Action              |   |
|------|---|---------------------|---|
| 4    | Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:  | 13.5 V – 15 V       | Action complete - quit test   |
|      |   | Fault still present | Disconnect the regulator/rectifier grey connector and proceed to test 5 |
| 5    | Check the alternator AC output voltage at engine idle rpm by probing the 3-pin stator connector as follows:   | 15 V AC to 25 V AC  | Test regulator/rectifier (see <a href="#">Regulator/Rectifier</a> )     |
|      | <ul style="list-style-type: none"> <li>- Positive (+) probe to pin 1 negative (-) probe to pin 2</li> <li>- Positive (+) probe to pin 2 negative (-) probe to pin 3</li> <li>- Positive (+) probe to pin 3 negative (-) probe to pin 1</li> </ul> | Less than 15 V AC   | Replace unit. Proceed to pinpoint test 6                                |
| 6    | Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:  | 13.5 v – V          | Action complete - quit test   |
|      |   | Fault still present | Contact Triumph service   |

Circuit diagram



## Regulator/Rectifier

Internally the rectifier/regulator consists of three diodes, one between each input and the positive terminal, and three Field Effect Transistors (FETs), one between each input and the ground terminal.

As the voltage of the AC signal from the alternator rises, the voltage controller switches the FETS to avoid over voltage on the output.

The diodes and FETs can be checked using a multimeter on DIODE setting. Disconnect the two electrical connectors from the rectifier/regulator and check the readings as indicated below.

### NOTICE

This test does not check for voltage regulation.

| Fault                | Possible cause      | Action  |
|----------------------|---------------------|---|
| Battery not charging | Main fuse           | Check the condition of the main 30A fuse:   |
|                      | Battery             | Check the condition of the battery. Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9. Ensure the battery is serviceable: |
|                      | Regulator/Rectifier | Disconnect the black and the grey connectors from the rectifier/regulator and proceed to pinpoint test 1:   |
|                      | Alternator          | Test the alternator stator (see <a href="#">Alternator Stator</a> ).  |

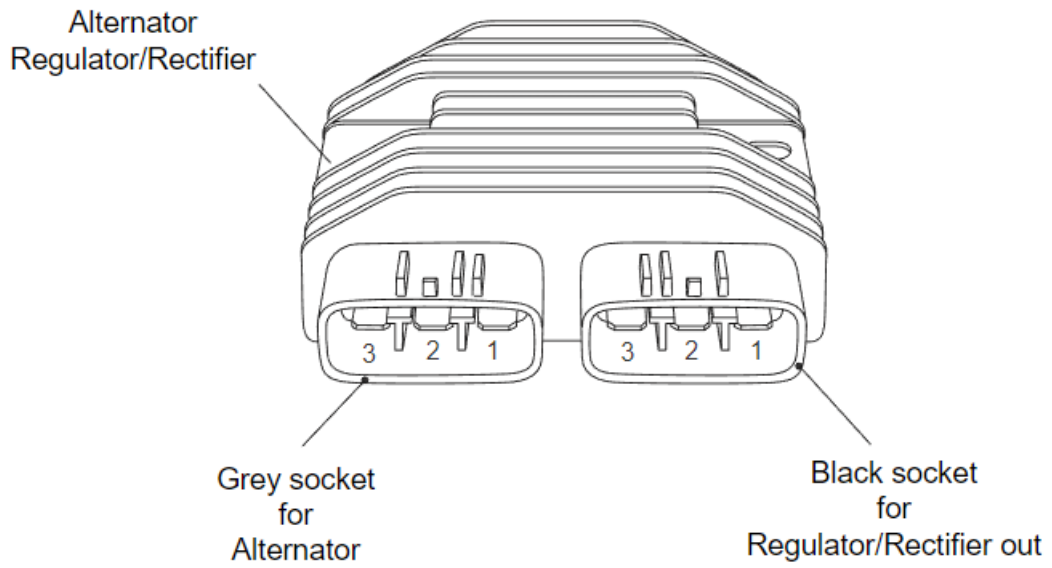
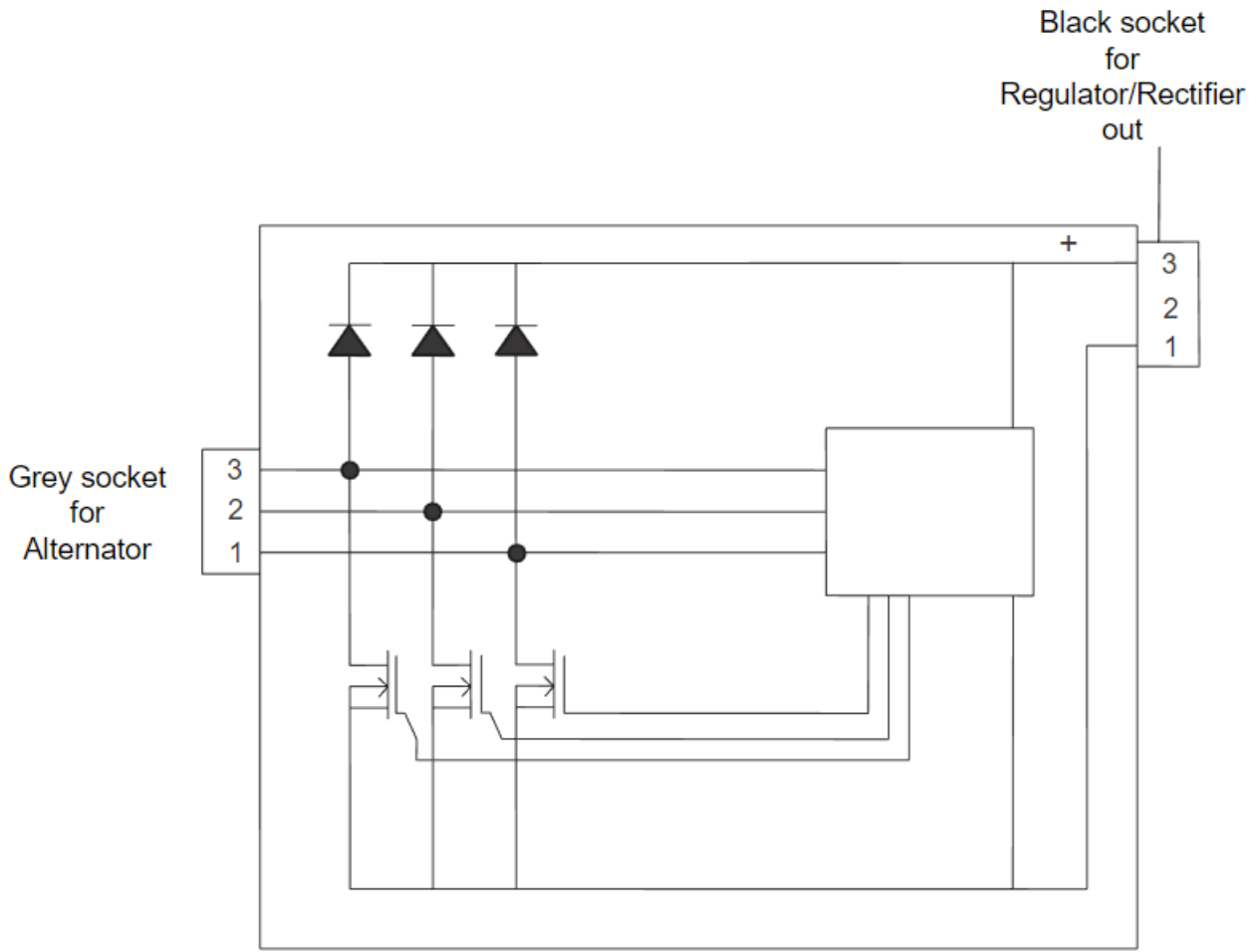
## Pinpoint Tests

| Test | Result   | Action                        |  |
|------|--|-------------------------------|--|
| 1    | Check FET forward bias:<br>Positive (+) probe to rectifier black socket pin 1 to:<br>- Negative (-) probe to rectifier grey socket pin 1 | 0.4 V to 0.7 V                | Proceed to test 2                      |
|      | - Negative (-) probe to rectifier grey socket pin 2<br>- Negative (-) probe to rectifier grey socket pin 3                               | Open circuit or short circuit | Replace the unit.<br>Proceed to test 4 |



| Test |   | Result   | Action   |
|------|---|--|--|
| 2    | Check diodes function forward bias:<br>Negative (-) probe to rectifier black socket pin 3 to: <ul style="list-style-type: none"> <li>- Positive (+) probe to rectifier grey socket pin 1</li> <li>- Positive (+) probe to rectifier grey socket pin 2</li> <li>- Positive (+) probe to rectifier grey socket pin 3</li> </ul>   | 0.1 V to 0.3 V<br><br><br><br><br><br><br><br><br><br><br>Open circuit or short circuit                    | Proceed to test 3<br><br><br><br><br><br><br><br><br><br><br>Replace the unit.<br>Proceed to test 4  |
| 3    | Check diodes reverse bias:<br>Negative (-) probe to rectifier black socket pin 1 to: <ul style="list-style-type: none"> <li>- Positive (+) probe to rectifier grey socket pin 1</li> <li>- Positive (+) probe to rectifier grey socket pin 2</li> <li>- Positive (+) probe to rectifier grey socket pin 3</li> </ul> Positive (+) probe to rectifier black socket pin 3 to: <ul style="list-style-type: none"> <li>- Negative (-) probe to rectifier grey socket pin 1</li> <li>- Negative (-) probe to rectifier grey socket pin 2</li> <li>- Negative (-) probe to rectifier grey socket pin 3</li> </ul> | More than 1.4 V or OL on meter<br><br><br><br><br><br><br><br><br><br><br>Less than 1.4 V or short circuit | Proceed to test 4<br><br><br><br><br><br><br><br><br><br><br>Replace the unit.<br>Proceed to test 4  |
| 4    | Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:  | 13 V – 15 V<br><br><br>Fault still present   | Action complete – quit test<br><br>Test alternator stator (see <a href="#">Alternator Stator</a> )<br><br>If alternator stator is serviceable, contact Triumph service |

# Circuit Diagram



The keyless ECM has an on-board diagnostics feature which allows service technicians to retrieve stored data using the Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the seat. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

#### On-board Fault Detection System

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a predetermined threshold, the fault becomes confirmed and a DTC (Diagnostic Trouble Code) will be logged in the ECM's memory. A confirmed fault may be indicated by the effected system(s) simply becoming inoperative, or by the illumination of a system warning light and/or instrument warning message. Once a fault is confirmed, the number of ignition switch cycles made is counted. If the fault clears, the ignition switch cycle counter will restore operation to the affected system(s) and extinguish any warning lights or instrument messages at a predetermined count. DTCs are then erased from the ECM memory at another (higher) count.

## Keyless ECM Diagnostic Trouble Codes

Diagnostic Trouble Codes (DTCs) are logged in the keyless ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic tool as a four digit code.

When the system detects a fault, it begins to count the number of times the fault occurs before confirming the fault and storing a fault code. A confirmed fault may be indicated by the effected system(s) simply becoming inoperative, or by the illumination of a system warning light and/or instrument warning message.

Similarly, if a fault clears, the keyless ECM also records this fact and will extinguish any warning lights or instrument messages and restore normal operation to the affected system, when sufficient no-fault ignition switch cycles have taken place. Any fault codes will remain in the keyless ECM memory until the required number of no-fault ignition switch cycles have taken place. The number of ignition switch cycles required to restore normal operation will always be less than the number required to remove a DTC from the keyless ECM memory. DTCs can be removed at any time using the Triumph diagnostic tool.

| Diagnostic Trouble Code (DTC) | Fault Description                             | Ignition switch cycles before clearing fault | Ignition switch cycles before DTC erase | Warning Light/Instrument message/Visual Indication | Pinpoint test   |
|-------------------------------|---|--|---|--|---|
| C1001                         | Main power supply overvoltage                 | 1  | 20                                      | -  | <a href="#">Power Supply Rail Overvoltage/Undervoltage</a>    |
| C1002                         | Main power supply undervoltage                | 1  | 20                                      | -  | <a href="#">Power Supply Rail Overvoltage/Undervoltage</a>    |
| C1003                         | Keyless ECM internal power supply malfunction | 1  | 20                                      | -  | <a href="#">Chassis ECM Internal Power Supply Malfunction</a> |
| C1008                         | Starter motor switch malfunction              | 1  | 20                                      | -  | <a href="#">Starter Motor Switch Malfunction</a>              |
| C1017                         | Instrument wake-up signal overcurrent         | 1  | 40                                      | -  | <a href="#">Instrument Wake-up Signal Overcurrent</a>         |

| Diagnostic Trouble Code (DTC) | Fault Description                                   | Ignition switch cycles before clearing fault | Ignition switch cycles before DTC erase | Warning Light/Instrument message/Visual Indication   | Pinpoint test  |
|-------------------------------|---|--|---|--|--|
| C1087                         | CAN fault-lost communication with instruments       | 1  | 40                                      | -  | <a href="#">Instrument Communication (CAN)</a>                       |
| C1088                         | CAN fault – lost communication with ABS module      | 1  | 40                                      | -  | <a href="#">ABS Communication (CAN)</a>                              |
| C1091                         | CAN fault – lost communication with Engine ECM      | 1  | 40                                      | -  | <a href="#">Engine ECM Communication (CAN)</a>                       |
| C1095                         | Keyless ECM internal error                          | -  | 40                                      | Motorcycle continues to run when fault logged but will not start after first ignition cycle. | <a href="#">Keyless ECM Internal Error</a>                           |
| C1097                         | Front wheel sensor unit battery alert               | 1  | 20                                      | Information message  | <a href="#">Tyre Pressure Monitoring System (TPMS) Wheel Sensors</a> |
| C1098                         | Rear wheel sensor unit battery alert                | 1  | 20                                      | Information message  | <a href="#">Tyre Pressure Monitoring System (TPMS) Wheel Sensors</a> |
| C1099                         | Front wheel sensor unit fault                       | 1  | 20                                      | TPMS light/warning message   | <a href="#">Tyre Pressure Monitoring System (TPMS) Wheel Sensors</a> |
| C1100                         | Rear wheel sensor unit fault                        | 1  | 20                                      | TPMS light/warning message   | <a href="#">Tyre Pressure Monitoring System (TPMS) Wheel Sensors</a> |
| C1101                         | Front wheel sensor unit loss of communication error | 1  | 20                                      | TPMS light/warning message   | <a href="#">Tyre Pressure Monitoring System (TPMS) Wheel Sensors</a> |
| C1102                         | Rear wheel sensor unit loss of communication error  | 1  | 20                                      | TPMS light/warning message   | <a href="#">Tyre Pressure Monitoring System (TPMS) Wheel Sensors</a> |

| Diagnostic Trouble Code (DTC) | Fault Description   | Ignition switch cycles before clearing fault | Ignition switch cycles before DTC erase | Warning Light/Instrument message/Visual Indication | Pinpoint test   |
|-------------------------------|---|--|---|--|---|
| C1103                         | Immobiliser antenna-loss of communication with key                    | 1  | 20                                      | Alarm/immobiliser light                            | <a href="#">Immobiliser Antenna</a>   |
| C1104                         | Invalid key: key authentication unsuccessful                          | 1  | 20                                      | Alarm/immobiliser light                            | <a href="#">Immobiliser Antenna</a>   |
| C1105                         | Immobiliser antenna internal error                                    | 1  | 20                                      | Alarm/immobiliser light                            | <a href="#">Immobiliser Antenna</a>   |
| C1106                         | No engine ECM immobiliser communication                               | 1  | 20                                      | Alarm/immobiliser light                            | <a href="#">Engine ECM Communication (CAN)</a>  |
| C1124                         | Keyless ECM restarted due to process time out during normal operation | 1  | 40                                      | -  | <a href="#">Keyless ECM Restarted Due to Process Time Out During Normal Operation</a> |
| C1125                         | Keyless ECM restarted due to process time out during normal operation | 1  | 40                                      | -  | <a href="#">Keyless ECM Restarted Due to Process Time Out During Normal Operation</a> |
| C1126                         | Keyless ECM restarted due to process time out during normal operation | 1  | 40                                      | -  | <a href="#">Keyless ECM Restarted Due to Process Time Out During Normal Operation</a> |
| C1127                         | Keyless ECM restarted due to calibration download                     | 1  | 40                                      | -  | <a href="#">Keyless ECM Restarted due to Calibration Download</a>                     |
| C1128                         | Unexpected keyless ECM restart  | 1  | 40                                      | -  | <a href="#">Unexpected Keyless ECM Restart</a>  |
| C1129                         | Power supply interrupted  | 1  | 40                                      | -  | <a href="#">Keyless ECM Power Supply Interrupted</a>                                  |

| Diagnostic Trouble Code (DTC) | Fault Description   | Ignition switch cycles before clearing fault | Ignition switch cycles before DTC erase | Warning Light/Instrument message/Visual Indication | Pinpoint test  |
|-------------------------------|---|--|---|--|--|
| C1130                         | Keyless ECM parameters reset to default   | 1  | 40                                      | -  | <a href="#">Keyless ECM Parameters Reset to Default</a>  |
| C1136                         | Electronic steering lock ID incompatible<br>Electronic steering lock not paired to chassis ECM                                  | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |
| C1137                         | Electronic steering lock internal Error   | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |
| C1138                         | Electronic steering lock motor fault  | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |
| C1140                         | Electronic steering lock Intermediate stop  | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |
| C1141                         | Electronic steering lock operation time out   | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |
| C1142                         | Electronic steering lock internal switch fault-both switches ON<br>Electronic steering lock has not fully engaged or disengaged | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |
| C1143                         | Electronic steering lock internal switch fault-both switches OFF<br>Electronic steering lock has not fully                      | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a> |

|                               | engaged or disengaged   |  |   |  |   |
|-------------------------------|---|--|---|--|---|
| Diagnostic Trouble Code (DTC) | Fault Description   | Ignition switch cycles before clearing fault | Ignition switch cycles before DTC erase | Warning Light/Instrument message/Visual Indication | Pinpoint test   |
| C1144                         | Electronic steering lock software fault   | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a>        |
| C1145                         | Incorrect chassis ECM calibration – electronic steering lock detected but not expected                        | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a>        |
| C1146                         | Electronic steering lock - lock conditions not correct, ABS message missing ABS fault CAN communication fault | 1  | 40                                      | -  | <a href="#">Electronic Steering Lock Internal Faults</a>        |
| C1147                         | Keyless ECM ignition output 1 over current  | -  | -                                       | -  | <a href="#">Keyless ECM Ignition Fault - Output 1</a>           |
| C1148                         | Keyless ECM ignition output 1 under current   | -  | -                                       | -  | <a href="#">Keyless ECM Ignition Fault - Output 1</a>           |
| C1149                         | Key missing during riding   | -  | -                                       | -  | <a href="#">Key Missing During Riding</a>                       |
| C1150                         | CAN fault – lost communication with electronic steering lock  | -  | -                                       | -  | <a href="#">Electronic Steering Lock Communication</a>          |
| C1151                         | Ignition ON requested with no key in range  | -  | -                                       | -  | <a href="#">Keyless Ignition Anti-Tamper Strategy Activated</a> |
| C1156                         | Right hand switch housing malfunction   | -  | -                                       | -  | <a href="#">Right Hand Switch Housing Malfunction</a>           |



| Diagnostic Trouble Code (DTC) | Fault Description                     | Ignition switch cycles before clearing fault | Ignition switch cycles before DTC erase | Warning Light/Instrument message/Visual Indication | Pinpoint test   |
|-------------------------------|---------------------------------------|--|---|--|---|
| C1157                         | Right hand switch housing malfunction | -  | -                                       | -  | <a href="#">Right Hand Switch Housing Malfunction</a> |
| C1158                         | Right hand switch housing malfunction | -  | -                                       | -  | <a href="#">Right Hand Switch Housing Malfunction</a> |

\*MIL illuminated by engine ECM in response to keyless ECM DTC being stored.

#### Further Diagnosis

#### Pinpoint Tests

Pin point tests, if used correctly, help to diagnose a fault in the system once a diagnostic trouble code has been stored.

#### Before Starting Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.

#### After Completion of Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If a DTC is stored, there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

## Pinpoint Tests - Keyless ECM

### Power Supply Rail Overvoltage/Undervoltage

| Fault          | Possible cause  | Action  |
|----------------|---|---|
| C1001<br>C1002 | Main power supply over Voltage<br>Main power supply under Voltage<br>Blown fuse<br>Short circuit to ground or open circuit<br>Charging system fault | Disconnect Keyless ECM connectors and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Check cable and terminal integrity:<br>- Keyless ECM pin 12<br>- Keyless ECM pin 4<br>- Ignition relay pin 3 | OK<br>Proceed to test 2   |
|      | - Battery subharness pin 1<br>- Battery positive terminal<br>- Battery negative terminal                     | Faulty<br>Rectify fault, proceed to test 4                            |
| 2    | Check cable for short circuit:<br>- Keyless ECM pin 12 to ground   | OK<br>Proceed to test 3   |
|      |  | Short circuit<br>Locate and rectify wiring fault, proceed to test 4   |
| 3    | Check cable continuity:<br>- Battery positive terminal to<br>Keyless ECM pin 12                              | OK<br>Reconnect harness and<br>proceed to test 4                      |
|      |  | Open Circuit<br>Locate and rectify wiring fault,<br>proceed to test 4 |
| 4    | Check fuse integrity:<br>- Fuse box, fuse 1:<br>- Main 40 Amp fuse   | OK<br>Proceed to test 5   |
|      |  | Faulty<br>Replace blown fuse(s),<br>proceed to test 5                 |
| 5    | Reconnect harness, clear fault code and run engine. Measure the battery voltage while the engine is running  | Greater than 14.6 V or<br>Less than 13.9 V<br>Contact Triumph service |
|      |  | 13.9 V –<br>14.6 V<br>Action complete – quit test                     |



### Chassis ECM Internal Power Supply Malfunction

| Fault | Possible cause                                | Action  |
|-------|---|---|
| C1003 | Chassis ECM internal power supply malfunction | If DTC C1002 is also present, rectify DTC C1002 (see <a href="#">Power Supply Rail Overvoltage/Undervoltage</a> ) then erase DTCs. Monitor for further instances. If C1002 is not present, check and record all other DTCs and contact Triumph service. |

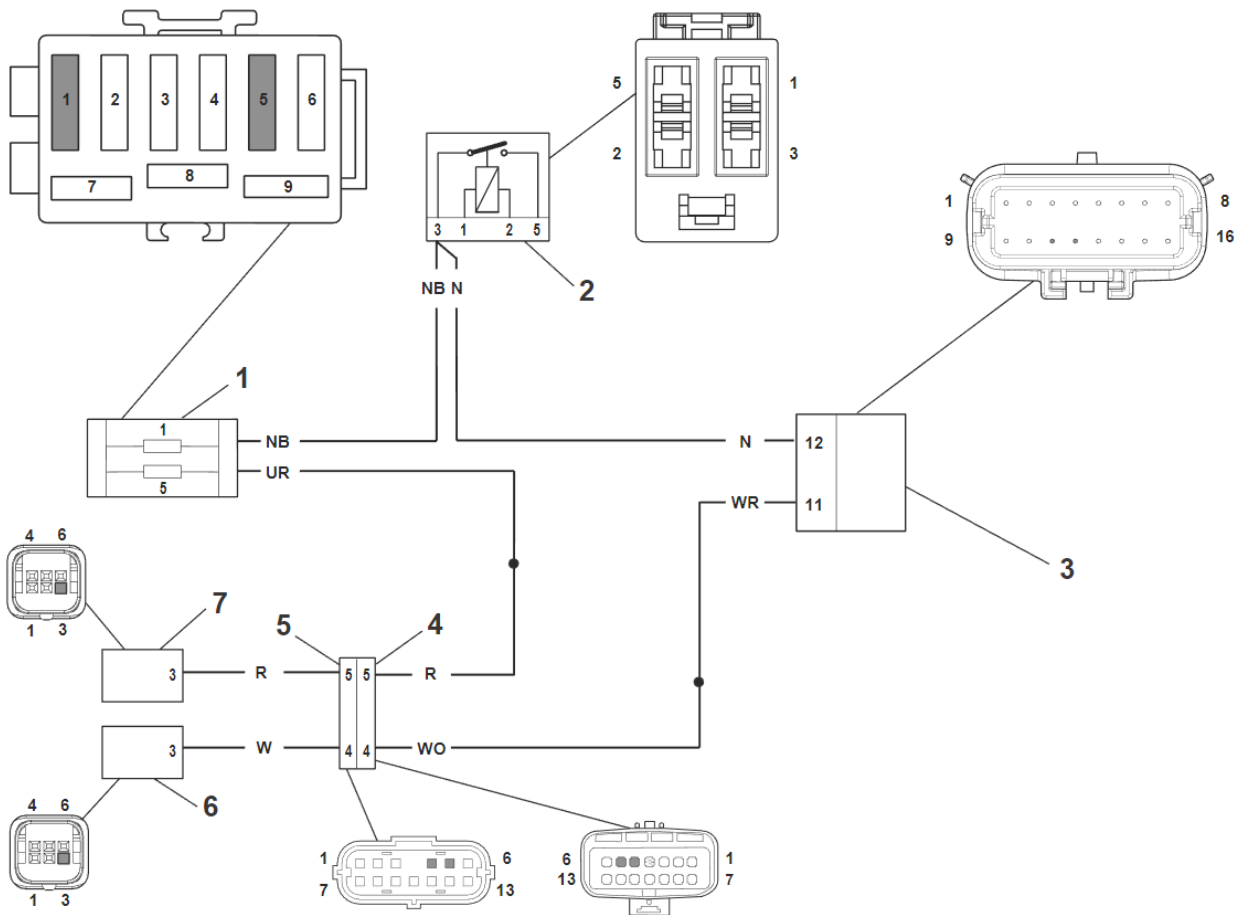
### Starter Motor Switch Malfunction

| Fault | Possible cause                   | Action   |
|-------|----------------------------------|--|
| C1008 | Starter motor switch malfunction | Disconnect chassis ECM connector A and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action  |
|------|--|---|
| 1    | Check cable and terminal integrity:<br>- Keyless ECM pin 11  | OK<br>Proceed to test 2                           |
|      |  | Faulty<br>Rectify fault, proceed to test 5        |
| 2    | Check cable for short circuit:<br>- Keyless ECM pin 11 to ground                                       | OK<br>Proceed to test 3                           |
|      |  | Short circuit<br>Rectify fault, proceed to test 5 |
| 3    | Check cable for short circuit:<br>- Keyless ECM pin 11 to keyless ECM pin 12                           | OK<br>Proceed to test 4                           |
|      |  | Short circuit<br>Rectify fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Keyless ECM pin 11 to Right Hand Switch housing connector A (Black) pin 3 | OK<br>Proceed to test 5                           |
|      | - Keyless ECM pin 11 to Starter Relay pin 1  | Open circuit<br>Rectify fault, proceed to test 5  |
| 5    | Reconnect harness, clear fault code and run engine.  | OK<br>Action complete – quit test                 |
|      |  | Fault still present<br>Contact Triumph service    |

## Circuit diagram



1. Fuse box
2. Ignition relay
3. Keyless ECM
4. Switch housing subharness (main harness side)
5. Switch housing subharness (subharness side)
6. Right hand switch housing black connector
7. Right hand switch housing grey connector

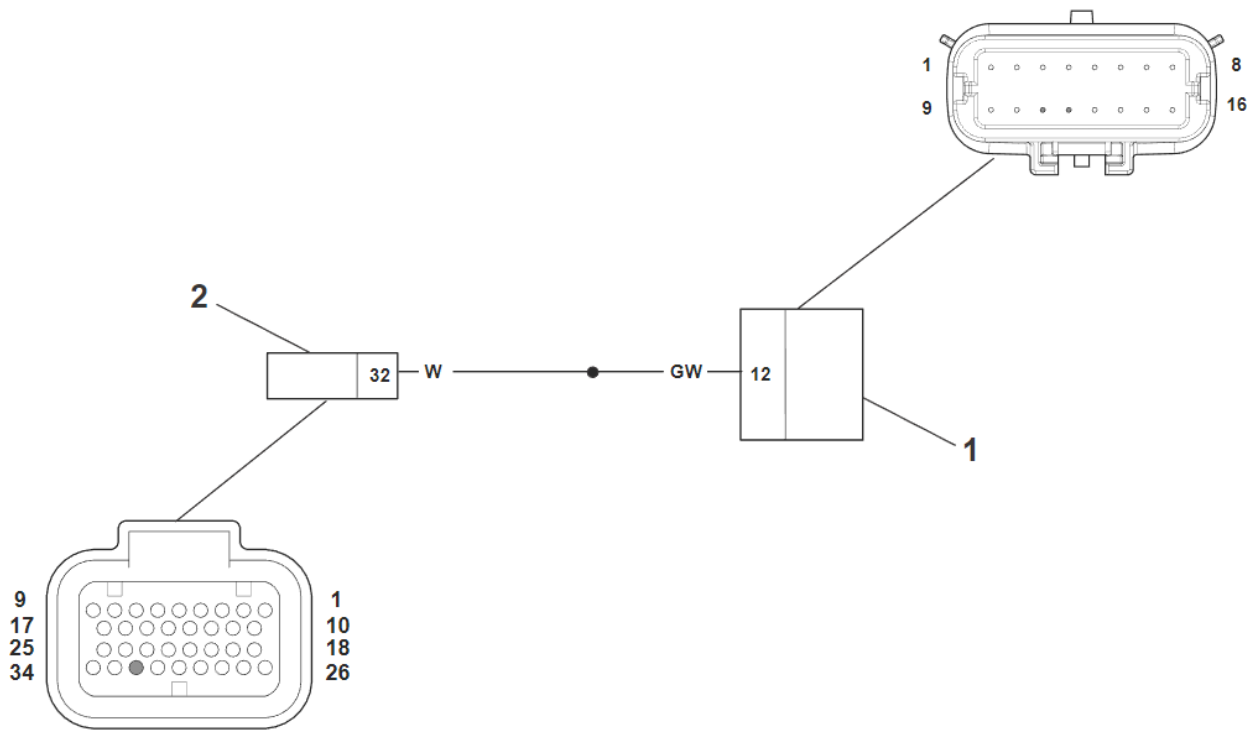
## Instrument Wake-up Signal Overcurrent

| Fault | Possible cause                        | Action   |
|-------|---------------------------------------|--|
| C1017 | Instrument wake-up signal overcurrent | Disconnect chassis ECM and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result   | Action              |  |
|------|--|---------------------|--|
| 1    | Check cable and terminal integrity:<br>- Keyless ECM pin 9<br>- Instruments pin 32 | OK                  | Disconnect instruments connector and proceed to test 2 |
|      |  | Faulty              | Rectify fault, proceed to test 5                       |
| 2    | Check cable for short circuit:<br>- Keyless ECM pin 9 to ground                    | OK                  | Proceed to test 3                                      |
|      |  | Short circuit       | Locate and rectify wiring fault, proceed to test 5     |
| 3    | Check cable for short circuit:<br>- Keyless ECM pin 9 to Keyless ECM pin 12        | OK                  | Proceed to test 4                                      |
|      |  | Short circuit       | Locate and rectify wiring fault, proceed to test 5     |
| 4    | Check cable continuity:<br>- Keyless ECM pin 9 to instrument pin 32                | OK                  | Proceed to test 5                                      |
|      |  | Open circuit        | Locate and rectify wiring fault, proceed to test 5     |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared         | OK                  | Action complete – quit test                            |
|      |  | Fault still present | Contact Triumph service                                |

## Circuit diagram



1. Keyless ECM
2. Instruments

## Instrument Communication (CAN)

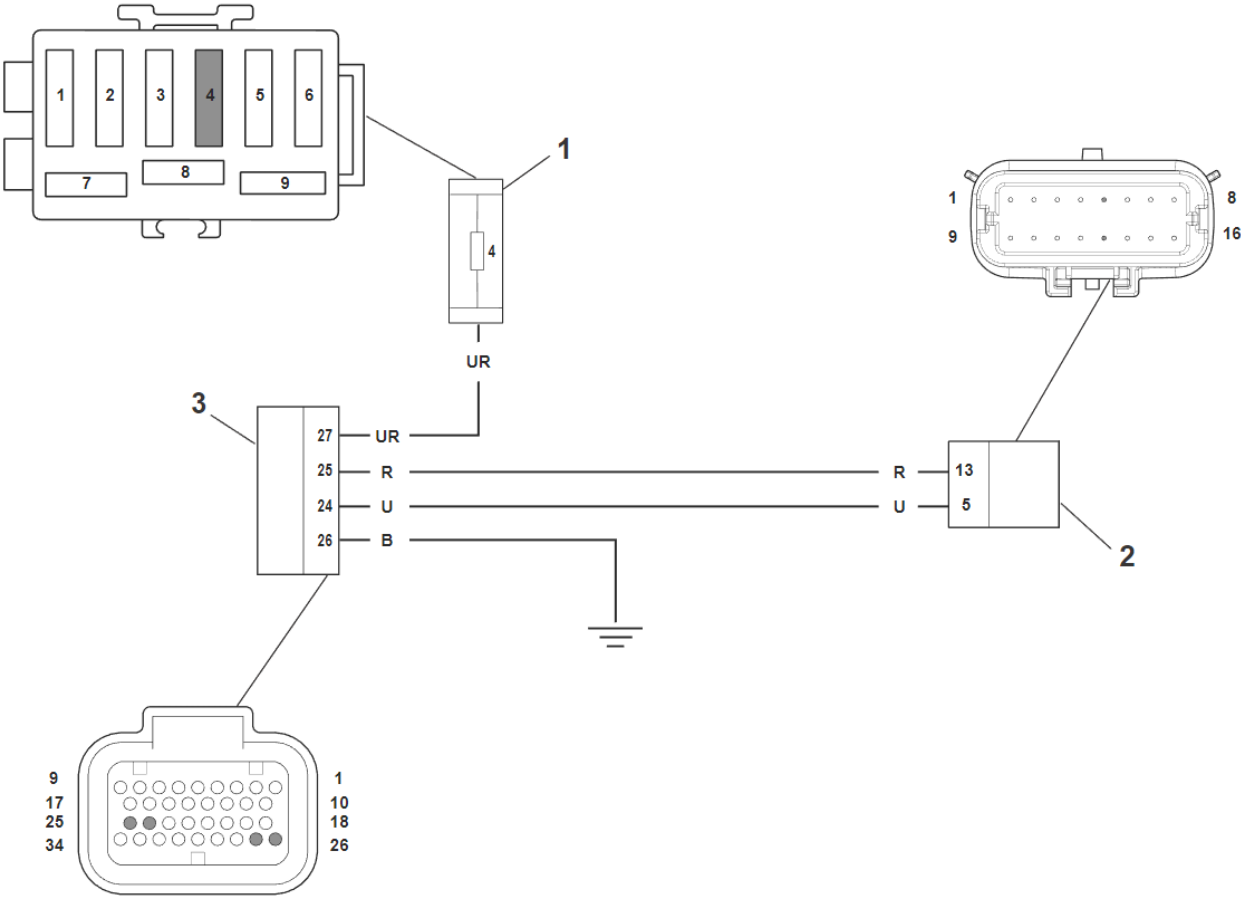
| Fault | Possible cause                                  | Action                      |
|-------|---|-----------------------------|
| C1087 | CAN fault - lost communication with instruments | Proceed to pinpoint test 1: |

## Pinpoint Tests

| Test |  | Result              | Action   |
|------|--|---------------------|--|
| 1    | Verify instrument panel is operating. Have the key close to the motorcycle to turn the ignition ON                                 | OK                  | Disconnect keyless ECM and instruments connector and proceed to test 3 |
|      |  | Faulty              | Proceed to test 2  |
| 2    | Check cable and terminal integrity:<br>- Keyless ECM pin 5<br>- Keyless ECM pin 13<br>- Instruments pin 25<br>- Instruments pin 24 | OK                  | Proceed to test 3  |
|      |  | Faulty              | Rectify fault, proceed to test 8                                       |
| 3    | Check cable for short circuit:<br>- Keyless ECM pin 5 to ground<br>- Keyless ECM pin 13 to ground                                  | OK                  | Proceed to test 4  |
|      |  | Short circuit       | Locate and rectify wiring fault, proceed to test 7                     |
| 4    | Check cable continuity:<br>- Instruments pin 27 to battery positive terminal<br>- Instruments pin 26 to ground                     | OK                  | Proceed to test 5  |
|      |  | Faulty              | Rectify fault, proceed to test 7                                       |
| 5    | Check cable continuity:<br>- Keyless ECM pin 13 to instrument pin 25<br>- Keyless ECM pin 5 to instrument pin 24                   | OK                  | Proceed to test 6  |
|      |  | Open circuit        | Locate and rectify wiring fault, proceed to test 7                     |
| 6    | Check cable for short circuit:<br>- Keyless ECM pin 13 to Keyless ECM pin 5  | OK                  | Proceed to test 7  |
|      |  | Short circuit       | Locate and rectify wiring fault, proceed to test 7                     |
| 7    | Check fuse integrity:<br>- Fuse box, fuse 4  | OK                  | Proceed to test 8  |
|      |  | Faulty              | Replace blown fuse, proceed to test 8                                  |
| 8    | Reconnect harness, clear fault code and run engine to verify fault cleared   | OK                  | Action complete – quit test  |
|      |  | Fault still present | Contact Triumph service  |



Circuit diagram



- |                  |
|------------------|
| 1. Main Fuse Box |
| 2. Keyless ECM   |
| 3. Instruments   |

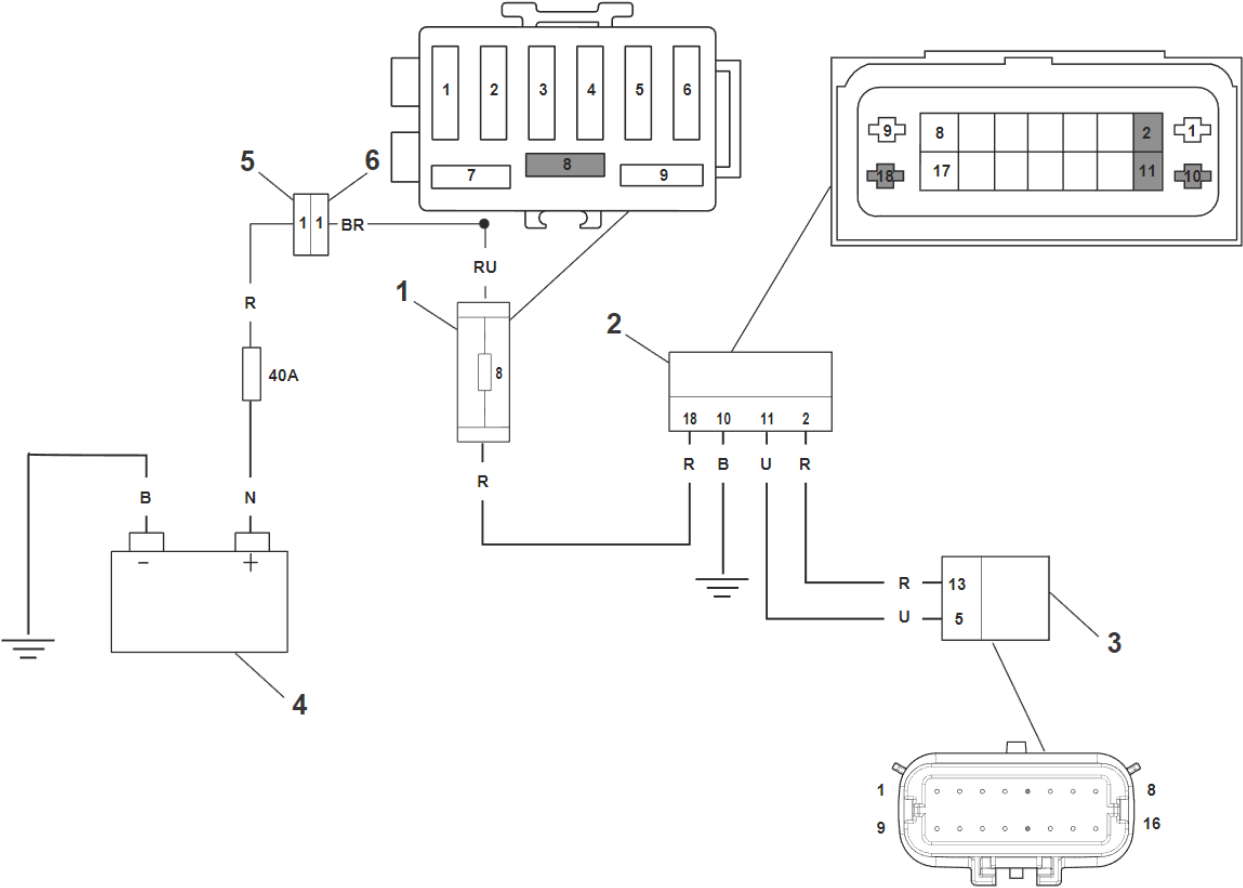
## ABS Communication (CAN)

| Fault | Possible cause                                  | Action  |
|-------|---|---|
| C1088 | CAN fault - lost communication with ABS modules | Disconnect Chassis ECM connectors and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- Keyless ECM pin 13<br>- Keyless ECM pin 5<br>- ABS ECM pin 2<br>- ABS ECM pin 11               | OK<br>Disconnect ABS ECM connector and proceed to test 4 |
|      | Faulty  | Locate and rectify wiring fault, proceed to test 6       |
| 2    | Check cable for short circuit:<br>- Keyless ECM pin 13 to ground<br>- Keyless ECM pin 5 to ground                                       | OK<br>Proceed to test 3                                  |
|      | Short circuit   | Locate and rectify wiring fault, proceed to test 6       |
| 3    | Check cable for short circuit:<br>- Keyless ECM pin 13 to Keyless ECM pin 5   | OK<br>Proceed to test 4                                  |
|      | Short circuit   | Locate and rectify wiring fault, proceed to test 6       |
| 4    | Check cable continuity:<br>- ABS ECM pin 18 to fuse box fuse 8<br>- ABS ECM pin 10 to ground<br>- ABS ECM pin 4 to Ignition Relay pin 5 | OK<br>Proceed to test 5                                  |
|      | Open circuit  | Locate and rectify wiring fault, proceed to test 6       |
| 5    | Check cable continuity:<br>- Keyless ECM pin 5 to ABS ECM pin 11<br>- Keyless ECM pin 13 to ABS ECM pin 2                               | OK<br>Proceed to test 6                                  |
|      | Open circuit  | Locate and rectify wiring fault, proceed to test 6       |
| 6    | Check ABS fuse integrity:<br>- Fuse box, fuse 8   | OK<br>Proceed to test 7                                  |
|      | Faulty  | Replace blown fuse, proceed to test 7                    |
| 7    | Reconnect harness, clear fault code and run engine to verify fault cleared  | OK<br>Action complete – quit test                        |
|      | Fault still present   | Contact Triumph service                                  |

Circuit diagram



- 1. Fuse Box
- 2. ABS Control Module
- 3. Keyless ECM
- 4. Battery
- 5. Battery Subharness (subharness side)
- 6. Battery Subharness (main harness side)

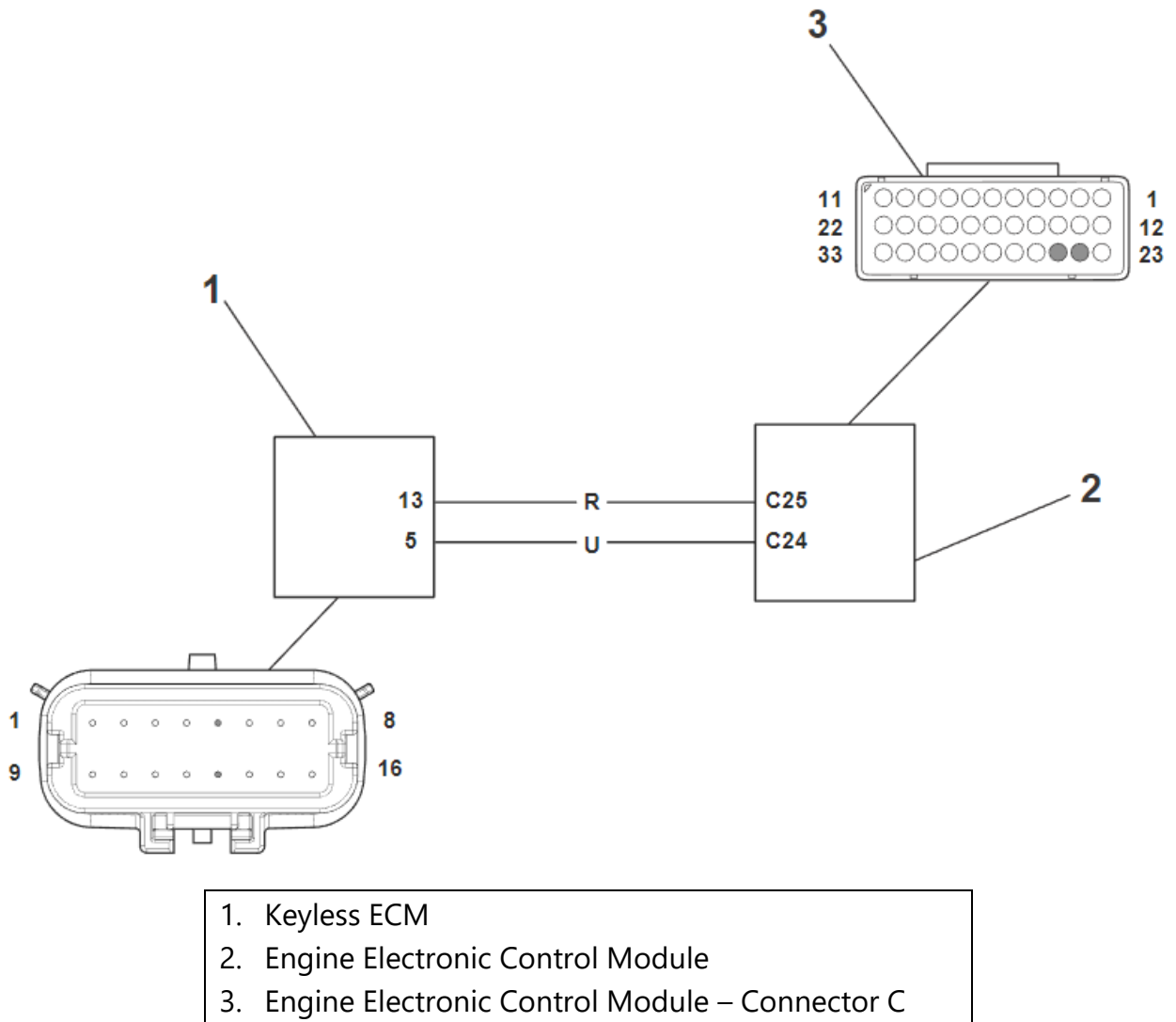
## Engine ECM Communication (CAN)

| Fault | Possible cause                                 | Action   |
|-------|--|--|
| C1091 | CAN fault - lost communication with Engine ECM | Disconnect Keyless ECM and Engine ECM connectors and proceed to pinpoint test 1: |
| C1106 | No Engine ECM immobiliser communication        |  |

## Pinpoint Tests

| Test | Result   | Action   |
|------|--|--|
| 1    | Check cable and terminal integrity.<br>- Engine ECM pin C24<br>- Engine ECM pin C25<br>- Keyless ECM pin 13<br>- Keyless ECM pin 5 | OK<br>Proceed to test 2                            |
|      | Faulty   | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:<br>- Engine ECM pin C24 to ground<br>- Engine ECM pin C25 to ground                                 | OK<br>Proceed to test 3                            |
|      | Short circuit  | Locate and rectify wiring fault, proceed to test 5 |
| 3    | Check cable for short circuit:<br>- Engine ECM pin C24 to Engine ECM pin C25   | OK<br>Proceed to test 4                            |
|      | Short circuit  | Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable continuity:<br>- Engine ECM pin C25 to Keyless ECM pin 13<br>- Engine ECM pin C24 to Keyless ECM pin 5                 | OK<br>Proceed to test 5                            |
|      | Open circuit   | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine.  | OK<br>Action complete – quit test                  |
|      | Fault still present  | Contact Triumph service                            |

## Circuit diagram



## Keyless ECM Internal Error

| Fault | Possible cause             | Action   |
|-------|----------------------------|--|
| C1095 | Keyless ECM internal error | Note and investigate any other stored DTCs<br>Erase DTC and monitor for further issues<br>If the fault fails to clear, contact Triumph service |

## Tyre Pressure Monitoring System (TPMS) Wheel Sensors

| Fault | Possible cause                                      | Action  |
|-------|---|---|
| C1097 | Front wheel sensor unit battery alert               | Replace the relevant wheel pressure sensor following the procedure described in the Triumph Diagnostic Tool User Guide<br>Record the new sensor's ID number into the Owner Handbook before fitting  |
| C1098 | Rear wheel sensor unit battery alert                |   |
| C1099 | Front wheel sensor unit fault alert                 | If the problem persists:<br>Replace the relevant wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide<br>Record the new sensor's ID number into the owner handbook before fitting  |
| C1100 | Rear wheel sensor unit fault alert                  |   |
| C1101 | Front wheel sensor unit loss of communication error | If the problem persists:<br>Using the Triumph diagnostic tool, check that the correct ID number for the relevant wheel pressure sensor is registered to the Keyless ECM<br>Replace the relevant wheel pressure sensor following the procedure described in the Triumph Diagnostic Tool User Guide<br>Record the new sensor's ID number into the Owner Handbook before fitting |
| C1102 | Rear wheel sensor unit loss of communication error  |   |

## Immobiliser Antenna

| Fault | Possible cause                                       | Action   |
|-------|--|--|
| C1103 | Immobiliser antenna - loss of communication with key | Check that the key has been registered with the chassis ECM, if it is a new key or an additional key<br>Check that there are no additional keys with a transponder chip fitted close to the ignition key and proceed to pinpoint test 1: |
| C1104 | Invalid key: Key authentication Unsuccessful         |  |
| C1105 | Immobiliser antenna internal error                   |  |

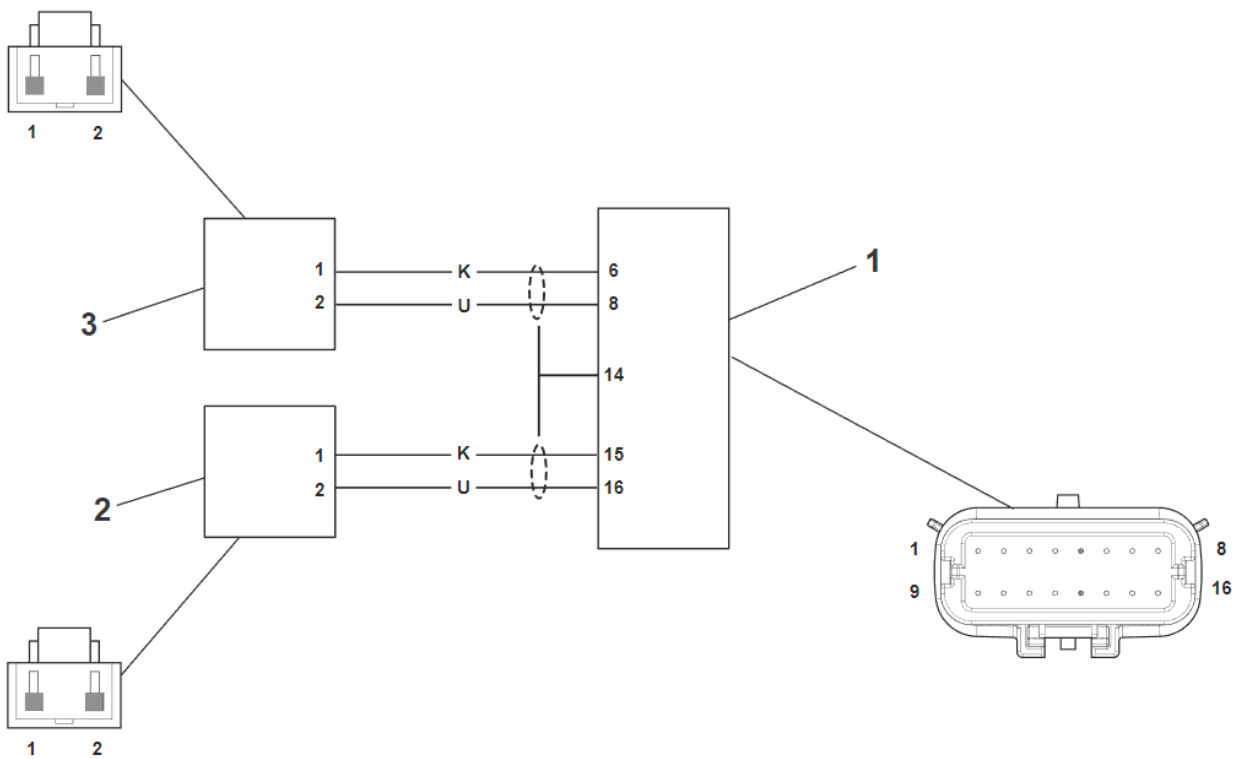
## Pinpoint Tests

| Test |   | Result            | Action  |
|------|---|-------------------|---|
| 1    | If available, try to start the motorcycle with the second registered key  | OK                | Transponder chip in the key not functioning correctly. Register a new key using Triumph Diagnostic Tool, proceed to test 7. |
|      |   | Faulty            | Proceed to test 2   |
| 2    | Check cable and terminal integrity:<br><ul style="list-style-type: none"> <li>- Keyless ECM pin 14</li> <li>- Keyless ECM pin 6</li> <li>- Keyless ECM pin 8</li> <li>- Keyless ECM pin 15</li> <li>- Keyless ECM pin 16</li> <li>- LF antenna 1 pin 1</li> <li>- LF antenna 1 pin 2</li> <li>- LF antenna 2 pin 1</li> <li>- LF antenna 2 pin 2</li> </ul> | OK                | Proceed to test 3   |
|      |   | Faulty            | Rectify fault, proceed to test 7  |
| 3    | Check cable for short circuit:<br><ul style="list-style-type: none"> <li>- Keyless ECM pin 6 to ground</li> <li>- Keyless ECM pin 8 to ground</li> <li>- Keyless ECM pin 15 to ground</li> <li>- Keyless ECM pin 16 to ground</li> </ul>  | OK                | Proceed to test 4   |
|      |   | Short circuit     | Locate and rectify wiring fault, proceed to test 7  |
| 4    | Check antenna coil resistance:<br><ul style="list-style-type: none"> <li>- LF antenna 1 pin 1 to pin 2</li> <li>- LF antenna 2 pin 1 to pin 2</li> </ul>  | 0.7 to 0.85 Ohms* | Proceed to test 5   |
|      |   | Faulty            | Replace the LF antenna, register new key and proceed to test 7  |
| 5    | Check cable continuity:<br><ul style="list-style-type: none"> <li>- Keyless ECM pin 8 to LF antenna 1 pin 2</li> <li>- Keyless ECM pin 6 to LF antenna 1 pin 1</li> <li>- Keyless ECM pin 16 to LF antenna 2 pin 2</li> <li>- Keyless ECM pin 15 to LF antenna 2 pin 1</li> </ul>   | OK                | Proceed to test 6   |
|      |   | Open circuit      | Locate and rectify wiring fault, proceed to test 7  |

| Test | Result   | Action   |
|------|--|--|
| 6    | Check cable for short circuit:<br>- Keyless ECM pin 6 to Keyless ECM pin 8<br>Keyless ECM pin 15 to Keyless ECM pin 16 | OK<br>Proceed to test 7                        |
| 7    | Reconnect harness, clear fault code and run engine to verify fault cleared   | OK<br>Action complete – quit test              |
|      |  | Fault still present<br>Contact Triumph service |

\*It may not be possible to accurately measure 0.70 to 0.85 Ohms using standard workshop equipment. When measuring the resistance, a reading of 0 to 3 Ohms should indicate a normally functioning LF antenna coil.

### Circuit diagram



- |   |
|---|
| <ul style="list-style-type: none"> <li>1. Keyless ECM</li> <li>2. LF Antenna rear</li> <li>3. LF Antenna front</li> </ul> |
|---|



Keyless ECM Restarted Due to Process Time Out During Normal Operation

| Fault | Possible cause  | Action   |
|-------|---|--|
| C1124 | Keyless ECM restarted due to process time out during normal operation | Note and investigate any other stored DTCs Contact Triumph service |
| C1125 |   |  |
| C1126 |   |  |

Keyless ECM Restarted due to Calibration Download

| Fault | Possible cause                                    | Action                                  |
|-------|---|---|
| C1127 | Keyless ECM restarted due to calibration download | Erase DTC<br>No further action required |

Unexpected Keyless ECM Restart

| Fault | Possible cause                 | Action   |
|-------|--------------------------------|--|
| C1128 | Unexpected keyless ECM restart | Note and investigate any other stored DTCs<br>Erase DTC and monitor for further issues<br>If the fault fails to clear or reoccurs, contact Triumph service |

Keyless ECM Power Supply Interrupted

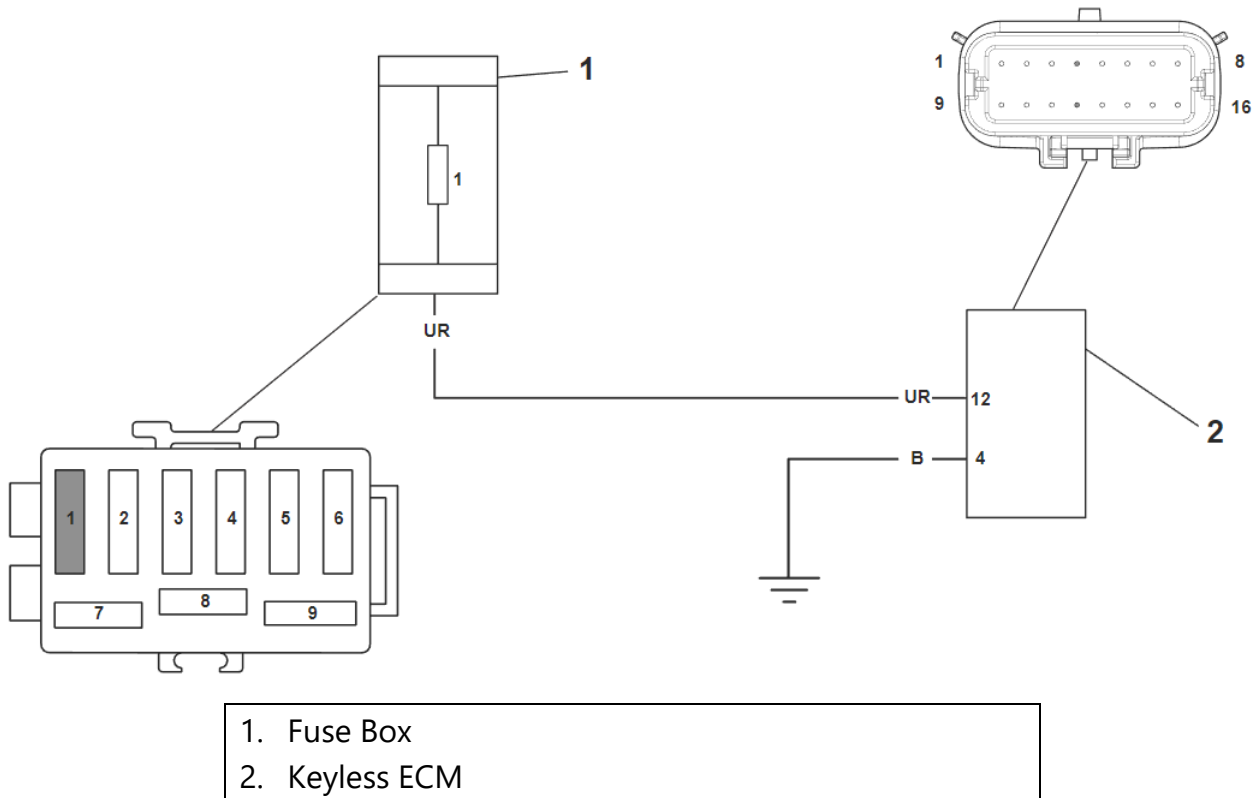
| Fault | Possible cause                       | Action   |
|-------|--------------------------------------|--|
| C1129 | Keyless ECM power supply interrupted | Make sure voltage across battery is acceptable. Note Voltage |

Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Has the battery been disconnected?  | Yes<br>Proceed to test 5                           |
|      |   | No<br>Disconnect Chassis ECM and proceed to test 2 |
| 2    | Check cable and terminal integrity:<br>- Battery terminals<br>- Keyless ECM pin 12<br>- Keyless ECM pin 4<br>- Alternator cable | OK<br>Proceed to test 3                            |
|      |   | Faulty<br>Rectify fault, proceed to test 5         |

| Test |  | Result                           | Action   |
|------|--|----------------------------------|--|
| 3    | Check fuse integrity<br>Fuse box, fuse 1   | OK                               | Proceed to test 4                                  |
|      |  | Faulty                           | Replace fuse(s), proceed to test 4                 |
| 4    | With Ignition 'ON', check Voltage at:<br>- Keyless ECM pin 12<br>- Keyless ECM pin 4 | Sane as across battery Voltage   | Proceed to test 5                                  |
|      |  | Less than across battery Voltage | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared.          | OK                               | Action complete – quit test                        |
|      |  | Fault still present              | Contact Triumph service                            |

### Circuit diagram



Keyless ECM Parameters Reset to Default

| Fault | Possible cause                          | Action  |
|-------|---|---|
| C1130 | Keyless ECM parameters reset to default | Download the latest keyless ECM calibration to ensure correct model specific configuration<br>Erase stored DTCs from all ECMs |

Electronic Steering Lock Internal Faults

| Fault  | Possible cause  | Action  |
|--------|---|---|
| C1136  | Electronic steering lock ID incompatible Electronic steering lock not paired to chassis ECM                                       | Pair the electronic steering lock to the chassis ECM (see <a href="#">Pairing the Electronic Steering Lock</a> )  |
| C1137  | Electronic steering lock internal Error   | Erase DTC<br>Turn the ignition off then On<br>Repeat if fault reoccurs<br>If the fault fails to clear after repeated attempts, replace the electronic steering lock   |
| C1138  | Electronic steering lock motor fault  |   |
| C1140  | Electronic steering lock Intermediate stop  |   |
| C1141  | Electronic steering lock operation time out   |   |
| Cc1144 | Electronic steering lock software fault   |   |
| C1142  | Electronic steering lock internal switch fault-both switches ON<br>Electronic steering lock has not fully engaged or disengaged   | Erase DTC<br>Turn the ignition off then On<br>Make sure steering is positioned at left hand full lock, such that it is not obstructing or restricting movement of the steering lock pin<br>Attempt to lock and unlock the electronic steering lock<br>If the fault fails to clear after repeated attempts, replace the electronic steering lock |
| C1143  | Electronic steering lock internal switch fault- both switches OFF<br>Electronic steering lock has not fully engaged or disengaged |   |
| C1145  | Incorrect chassis ECM calibration – electronic steering lock detected but not expected  | Download the correct chassis ECM calibration to ensure correct model specific configuration   |
| C1146  | Electronic steering lock - lock conditions not correct, ABS message missing<br>ABS fault<br>CAN communication fault               | Check ABS DTCs and rectify as necessary   |

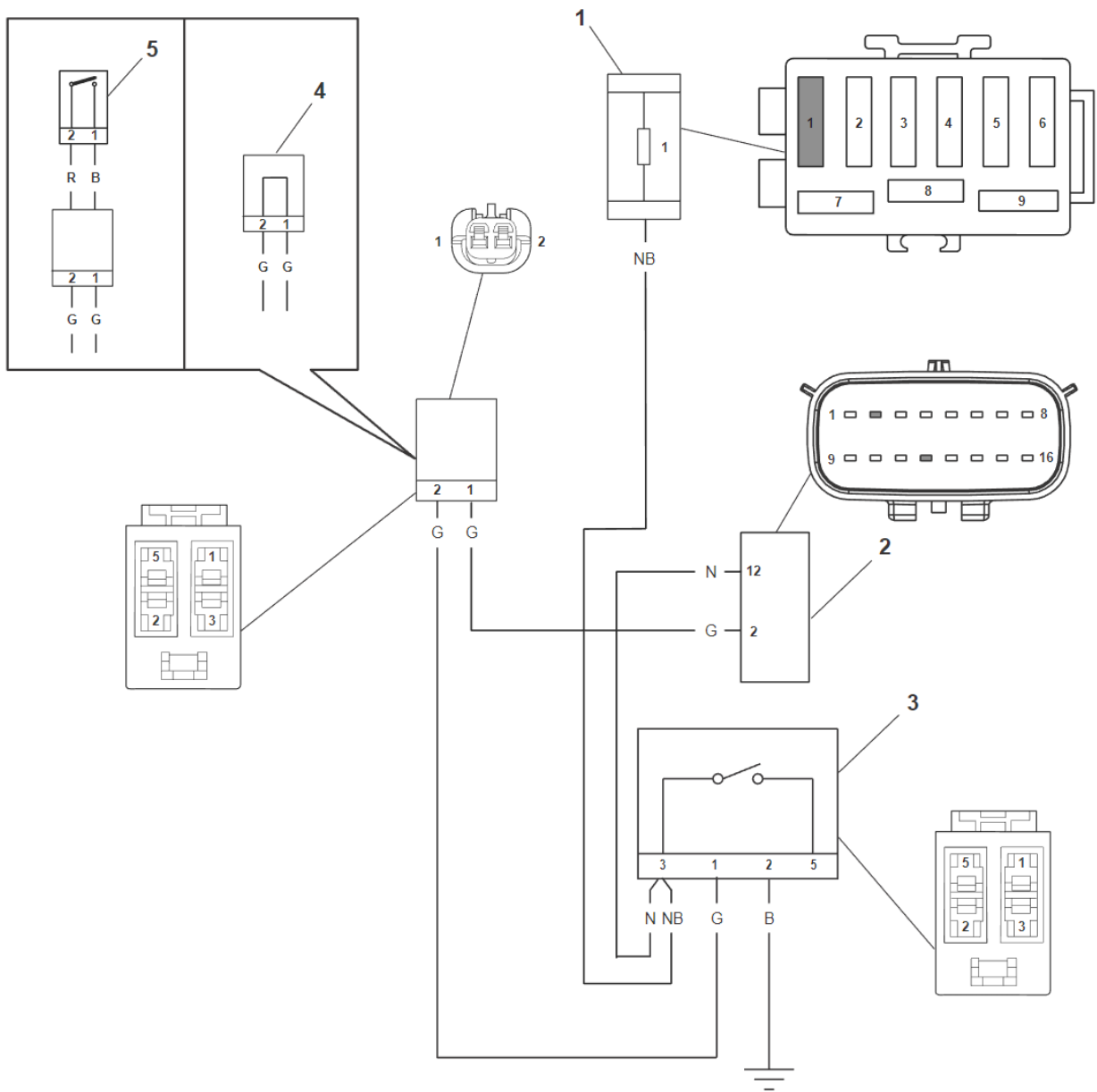
### Keyless ECM Ignition Fault - Output 1

| Fault | Possible cause                              | Action   |
|-------|---|--|
| C1147 | Keyless ECM ignition output 1 over current  | Disconnect Keyless ECM, handlebar switches subharness, instruments, headlight and reserved connector blanking plug.<br>Proceed to pinpoint test 2: |
| C1148 | Keyless ECM ignition output 1 under current | Proceed to pinpoint test 1:  |

### Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br><ul style="list-style-type: none"> <li>- Keyless ECM pin 12</li> <li>- Keyless ECM pin 2</li> <li>- Ignition master switch link connector pin 1</li> <li>- Ignition master switch link connector pin 2</li> <li>- Ignition relay pin 1</li> <li>- Ignition relay pin 2</li> </ul>  | OK<br>Disconnect keyless ECM and KL15 relay.<br>Proceed to pinpoint test 2 |
|      | Faulty  | Rectify fault, proceed to test 4   |
| 2    | Check cable for short circuit:<br><ul style="list-style-type: none"> <li>- Keyless ECM pin 2 to ground</li> </ul>   | OK<br>Proceed to test 3  |
|      | Short circuit   | Locate and rectify wiring fault, proceed to test 4                         |
| 3    | Check cable continuity:<br><ul style="list-style-type: none"> <li>- Fuse box fuse 1 to Keyless ECM pin 12</li> </ul> Note:<br>For all markets except US, the ignition master switch link connector must be fitted<br>For US markets only, the ignition master switch must be in the ON position<br>Check cable continuity:<br><ul style="list-style-type: none"> <li>- Keyless ECM pin 2 to KL15 relay pin 1</li> </ul> | OK<br>Proceed to test 4  |
|      | Open circuit  | Locate and rectify wiring fault, proceed to test 4                         |
| 4    | Check fuse integrity:<br><ul style="list-style-type: none"> <li>- Fuse box fuse 1</li> </ul>  | OK<br>Proceed to test 5  |
|      | Faulty  | Replace blown fuse, proceed to test 5                                      |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared  | OK<br>Action complete – quit test  |
|      | Fault still present   | Contact Triumph service  |

# Circuit diagram



1. Fuse Box
2. Keyless ECM
3. Ignition Relay
4. Ignition Master Switch Link Connector (all markets except US)
5. Ignition Master Switch (Us Markets Only)

### Key Missing During Riding

| Fault | Possible cause                                   | Action   |
|-------|--|--|
| C1149 | Key missing during riding Smart key flat battery | Make sure smart key is kept in range (1 meter/3 feet) of LF antenna during riding<br>Replace smart key battery |

### Electronic Steering Lock Communication

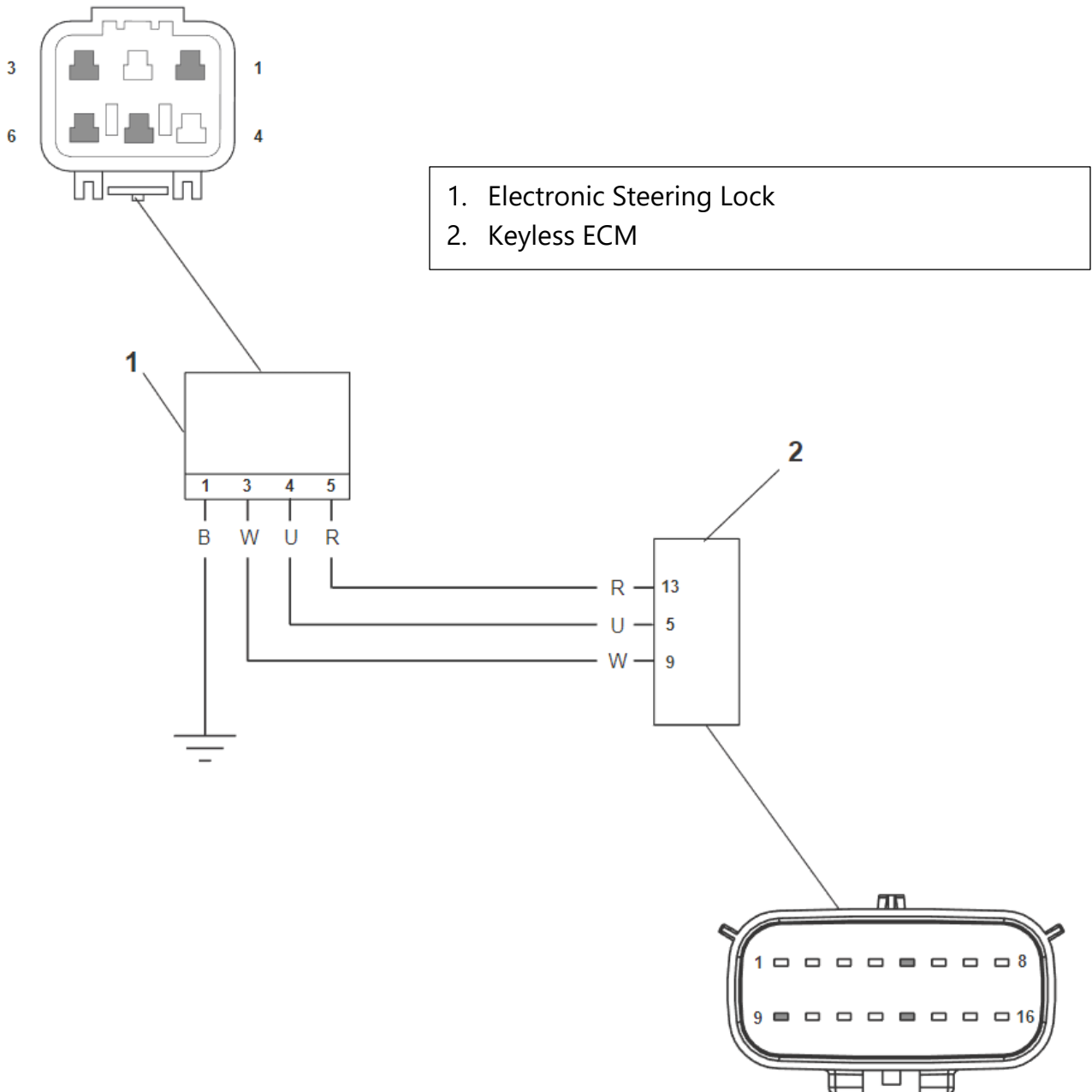
| Fault | Possible cause   | Action   |
|-------|--|--|
| C1150 | CAN fault - lost communication with electronic steering lock | Disconnect keyless ECM and proceed to pinpoint test 1: |

### Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- Keyless ECM pin 9<br>- Keyless ECM pin 13<br>- Keyless ECM pin 5   | OK<br>Proceed to test 2  |
|      | - Electronic steering lock pin 1<br>- Electronic steering lock pin 2<br>- Electronic steering lock pin 3<br>- Electronic steering lock pin 4<br>- Electronic steering lock pin 5                    | Faulty<br>Rectify fault, proceed to test 5                         |
| 2    | Check cable for short circuit:<br>- Keyless ECM pin 9 to ground<br>- Keyless ECM pin 13 to ground<br>- Keyless ECM pin 5 to ground  | OK<br>Proceed to test 3  |
|      |   | Short circuit<br>Rectify fault, proceed to test 5                  |
| 3    | Check cable continuity:<br>- Keyless ECM pin 9 to electronic steering lock pin 3<br>- Keyless ECM pin 13 to electronic steering lock pin 5<br>- Keyless ECM pin 5 to electronic steering lock pin 4 | OK<br>Proceed to test 4  |
|      | - Electronic steering lock pin 1 to ground  | Open circuit<br>Locate and rectify wiring fault, proceed to test 5 |

| Test | Result   | Action   |                             |
|------|--|--|-----------------------------|
| 4    | Check cable for short circuit:<br>- Keyless ECM pin 13 to pin 5            | OK   | Proceed to test 5           |
|      | Short circuit  | Locate and rectify wiring fault, proceed to test 5 |                             |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared | OK   | Action complete – quit test |
|      |  | Fault still present                                | Contact Triumph service     |

Circuit diagram



### Keyless Ignition Anti-Tamper Strategy Activated

| Fault | Possible cause  | Action  |
|-------|---|---|
| C1151 | <p>Keyless ignition anti-tamper strategy activated</p> <p>Repeated attempts to turn the Ignition ON without a paired key in range</p> | <p>Wait at least three minutes after the last attempt to turn the ignition ON</p> <p>Erase DTC</p> <p>Refresh the Read DTCs screen and make sure that C1151 is not re-triggered</p> <p>Make sure a paired key is in range of the LF antenna when turning the ignition ON</p> <p>If the ignition turns ON, no further action required</p> <p>If the ignition does not turn ON, check C1151 has not been re-triggered</p> |

### Right Hand Switch Housing Malfunction

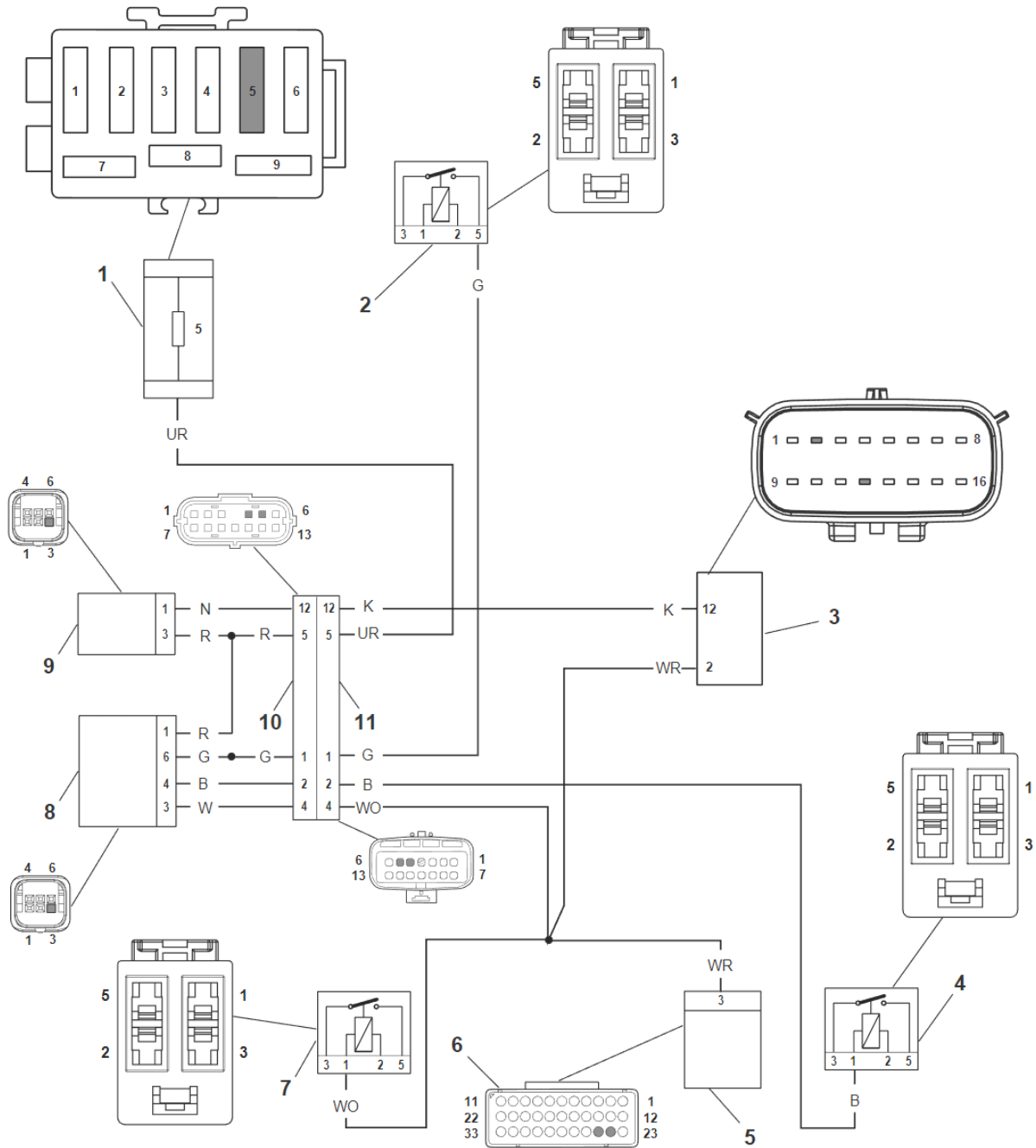
| Fault          | Possible cause   | Action  |
|----------------|--|---|
| C1156<br>C1157 | Right hand switch housing malfunction - Engine start/stop switch correlation fault | Disconnect right hand switch housing, engine ECM connector B and Keyless ECM and proceed to pinpoint test 1:  |
| C1158          | CAN fault-lost communication with engine ECM                                       | Refer to CAN fault - lost communication with engine ECM (see <a href="#">Engine ECM Communication (CAN)</a> ) |



## Pinpoint Tests

| Test |   | Result              | Action   |
|------|---|---------------------|--|
| 1    | Check cable and terminal integrity: <ul style="list-style-type: none"> <li>- Right hand switch housing black connector pin 1</li> <li>- Right hand switch housing black connector pin 3</li> <li>- Right hand switch housing black connector pin 4</li> <li>- Right hand switch housing black connector pin 6</li> <li>- Right hand switch housing grey connector pin 1</li> <li>- Right hand switch housing grey connector pin 3</li> <li>- Engine ECM pin C03</li> <li>- Keyless ECM pin 11</li> <li>- Keyless ECM pin 3</li> </ul> | OK                  | Proceed to test 2                                  |
|      |   | Faulty              | Rectify fault, proceed to test 4                   |
| 2    | Check cable for short circuit: <ul style="list-style-type: none"> <li>- Keyless ECM pin 11 to ground</li> <li>- Keyless ECM pin 3 to ground</li> <li>- Engine ECM pin C03 to ground</li> <li>- Keyless ECM pin 11 to pin 3</li> </ul>   | OK                  | Proceed to test 3                                  |
|      |   | Short circuit       | Rectify fault, proceed to test 4                   |
| 3    | Check cable continuity: <ul style="list-style-type: none"> <li>- Keyless ECM pin 11 to right hand switch housing black connector pin 3</li> <li>- Keyless ECM pin 3 to right hand switch housing grey connector pin 1</li> </ul>  | OK                  | Proceed to test 4                                  |
|      |   | Open circuit        | Locate and rectify wiring fault, proceed to test 4 |
| 4    | Reconnect harness, clear fault code and run engine to verify fault cleared  | OK                  | Action complete – quit test                        |
|      |   | Fault still present | Contact Triumph service                            |

# Circuit diagram



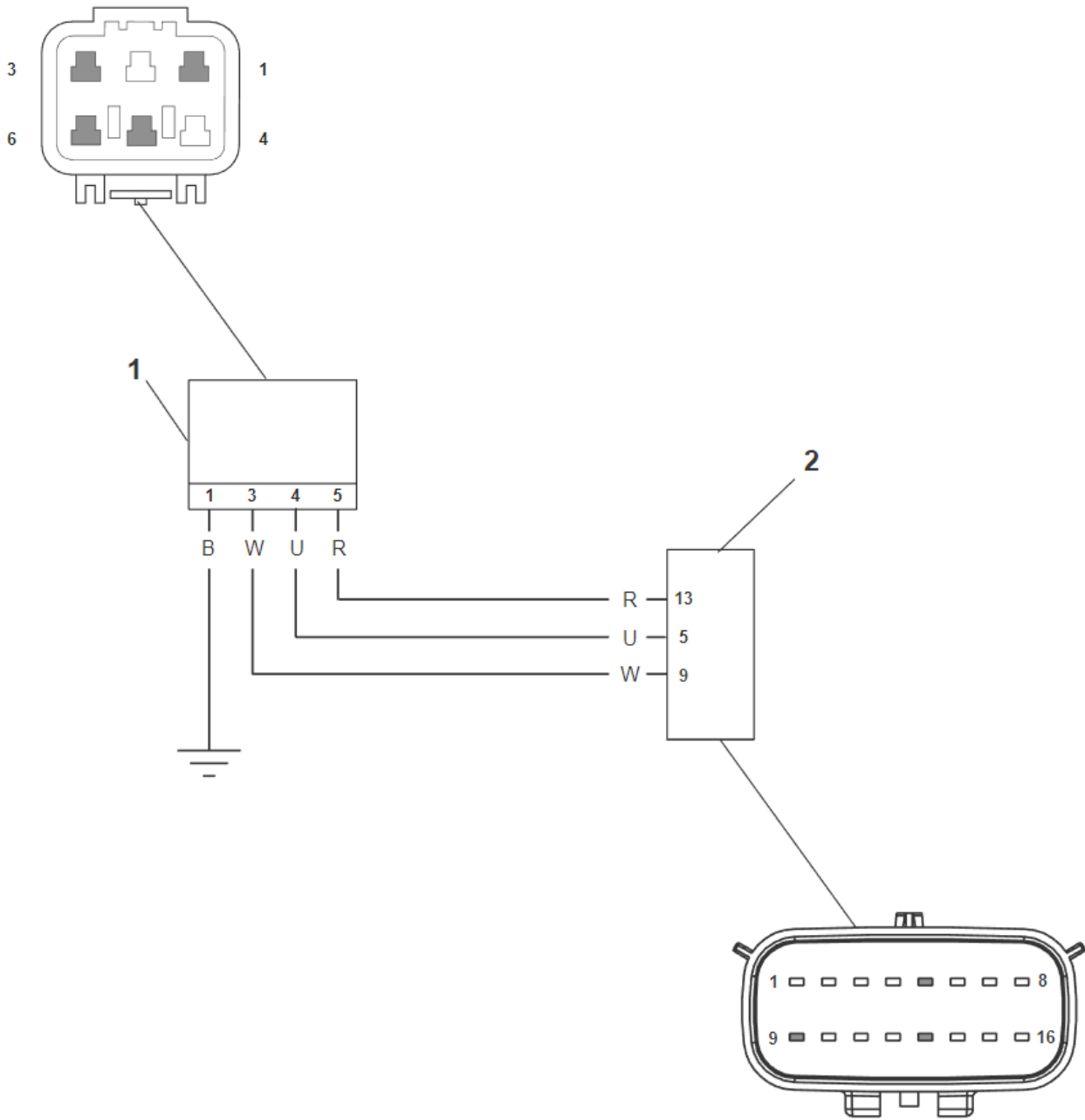
- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Fuse Box</li> <li>2. Ignition Relay</li> <li>3. Keyless ECM</li> <li>4. Fuel Pump Relay</li> <li>5. Engine Electronic Control Module</li> <li>6. Engine Electronic Control Module - Connector C</li> <li>7. Starter Motor Relay</li> </ul> | <ul style="list-style-type: none"> <li>8. Right Hand Switch Housing Black Connector</li> <li>9. Right Hand Switch Housing Grey Connector</li> <li>10. Switch Housing Subharness (main harness side)</li> <li>11. Switch Housing Subharness (subharness side)</li> </ul> |
|--|---|

| Fault | Possible cause   | Action   |
|-------|--|--|
| C1150 | CAN fault - lost communication with electronic steering lock | Disconnect keyless ECM and proceed to pinpoint test 1: |

## Pinpoint Tests

| Test | Result  | Action   |
|------|---|--|
| 1    | Check cable and terminal integrity:<br>- Keyless ECM pin 9<br>- Keyless ECM pin 13<br>- Keyless ECM pin 5<br>- Electronic steering lock pin 1<br>- Electronic steering lock pin 2<br>- Electronic steering lock pin 3<br>- Electronic steering lock pin 4<br>- Electronic steering lock pin 5 | OK<br>Proceed to test 2                            |
|      | Faulty  | Rectify fault, proceed to test 5                   |
| 2    | Check cable for short circuit:<br>- Keyless ECM pin 9 to ground<br>- Keyless ECM pin 13 to ground<br>- Keyless ECM pin 5 to ground  | OK<br>Proceed to test 3                            |
|      | Short circuit   | Rectify fault, proceed to test 5                   |
| 3    | Check cable continuity:<br>- Keyless ECM pin 9 to electronic steering lock pin 3<br>- Keyless ECM pin 13 to electronic steering lock pin 5<br>- Keyless ECM pin 5 to electronic steering lock pin 4<br>- Electronic steering lock pin 1 to ground   | OK<br>Proceed to test 4                            |
|      | Open circuit  | Locate and rectify wiring fault, proceed to test 5 |
| 4    | Check cable for short circuit:<br>- Keyless ECM pin 13 to pin 5   | OK<br>Proceed to test 5                            |
|      | Short circuit   | Locate and rectify wiring fault, proceed to test 5 |
| 5    | Reconnect harness, clear fault code and run engine to verify fault cleared  | OK<br>Action complete – quit test                  |
|      | Fault still present   | Contact Triumph service                            |

Circuit diagram



- 1. Electronic Steering Lock
- 2. Keyless ECM

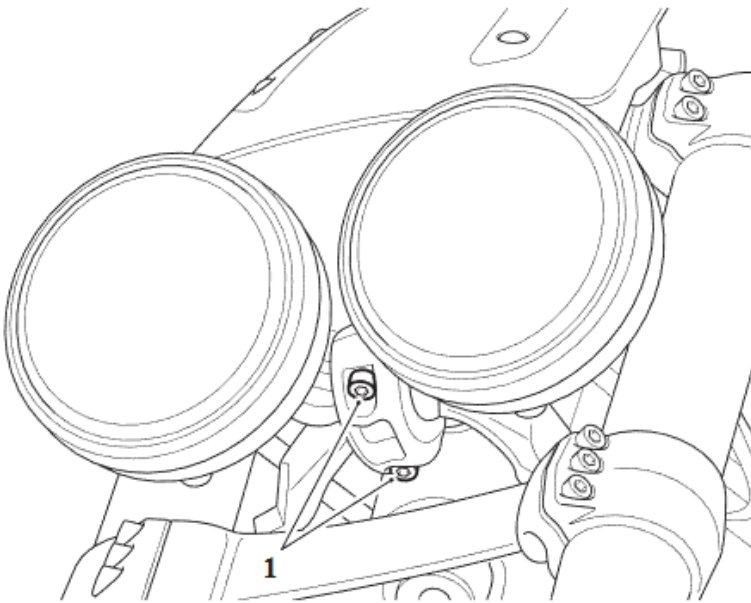
## Lighting Adjustment and Bulb Replacement

### Headlight Adjustment

#### **NOTICE**

The vertical beams of the left and right hand headlights can only be adjusted together. Independent adjustment is not possible.

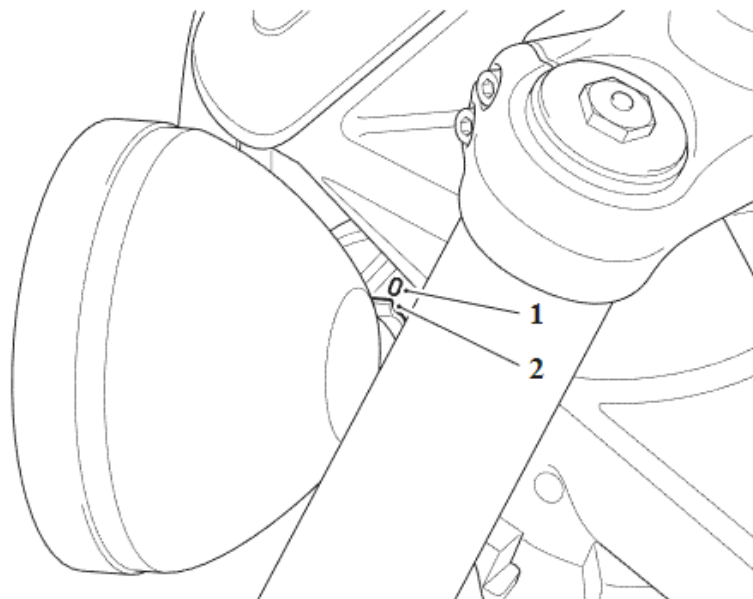
1. Switch the headlight dipped beam on.
2. Loosen the two fixings securing the headlight bracket to the front subframe sufficiently to allow restricted movement of the headlights.



1. Headlight bracket bolts

3. Move the headlight unit downwards or upwards to adjust the headlight beam accordingly.

4. To return the headlight alignment to the factory standard position, move the headlight unit until the front subframe alignment mark and the headlight bracket mark are aligned.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Front subframe alignment mark</li><li>2. Headlight bracket mark</li></ol> |
|--|

5. Tighten the headlight bracket bolts to, front one first, 15 Nm.
6. Recheck the headlight beam settings.
7. Switch the headlights off when the headlight beam settings are satisfactory.

#### Headlight/Position Light LED Unit – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The position light and headlight are situated within the headlight assembly and are a sealed, maintenance free LED unit. If the headlight or position light fails, the complete unit must be replaced.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)

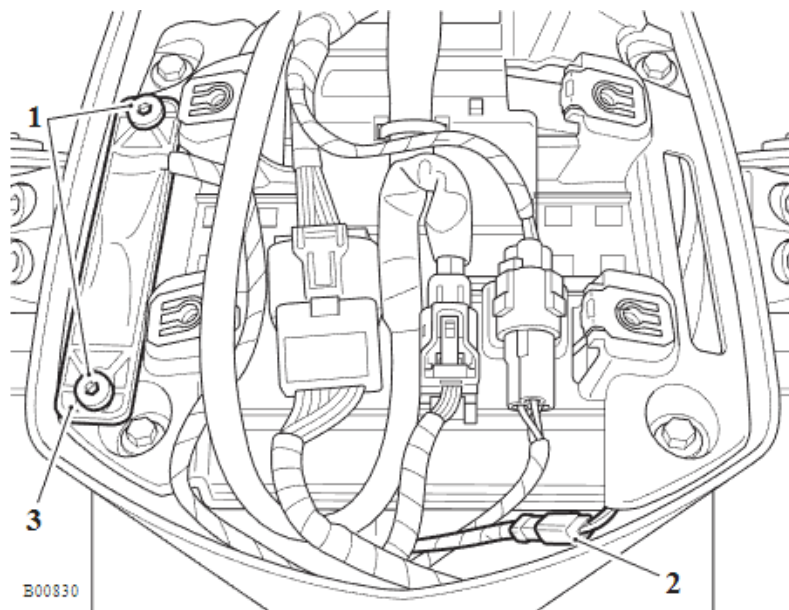
### NOTICE

Note the routing of the LF antenna harness for installation.

Note the orientation of the LF antenna for installation.

Note the routing of the harnesses under the flyscreen for installation.

1. Remove the fixings and detach the LF antenna from the flyscreen mounting.
2. Disconnect the LF antenna electrical connector from the main harness and remove the LF antenna.



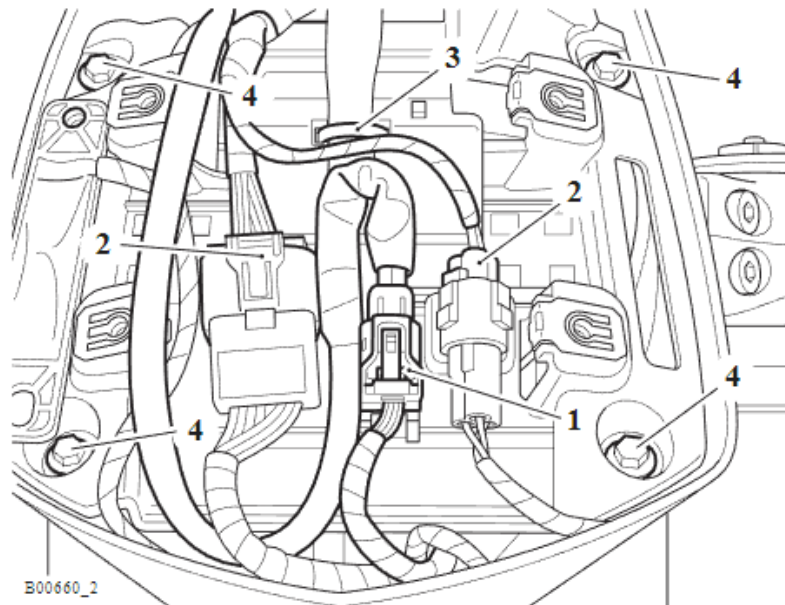
1. Fixings
2. Electrical connector
3. LF Antenna

3. Disconnect the two handlebar subharness connectors and the twist grip position sensor connector from the main harness.

**NOTICE**

Note the position of the two cable ties securing the harness for installation.

4. Cut the cable ties securing the harness to the flyscreen mounting.
5. Release the fixings and detach the flyscreen mounting from the front subframe.



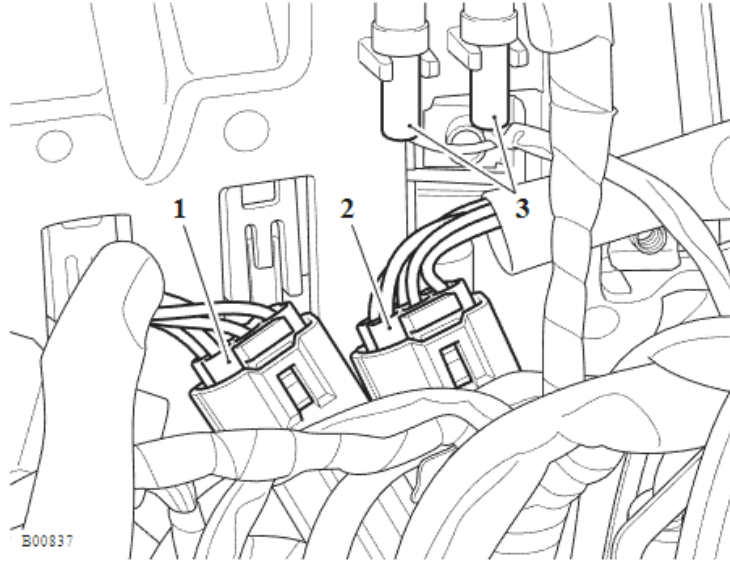
1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Cable tie (one of two shown)
4. Flyscreen mounting fixings

**NOTICE**

Note the routing of the headlight harnesses for installation.  
The main harness for the right hand headlight can be identified by the red tape on it.

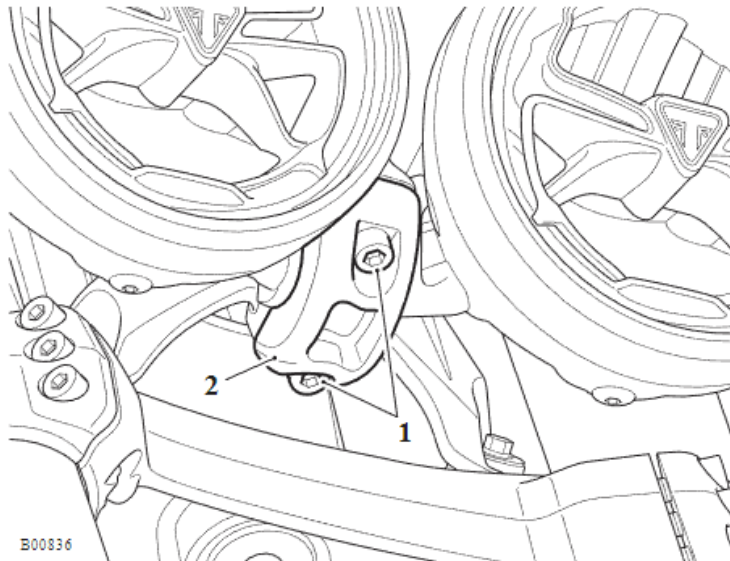


6. Turn the flyscreen mounting over and disconnect the headlight connectors from the main harness.



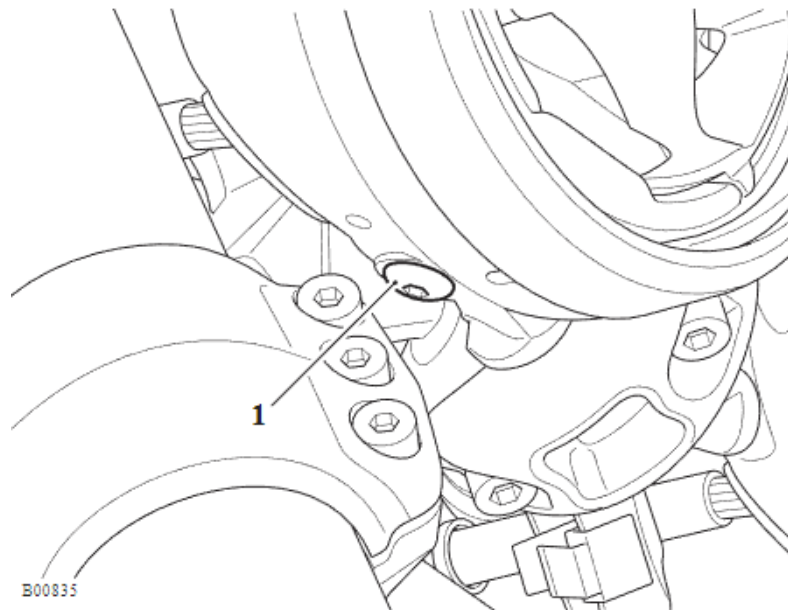
1. Left hand headlight connector
2. Right hand headlight connector
3. Right hand direction indicator connectors

7. Detach the headlight leads from the S-clips on the subframe.
8. Loosen the clamp and tilt the headlight assembly upwards for access to the headlight LED unit retaining fixing. Tighten the headlight bracket fixings to, front one first, 15 Nm.



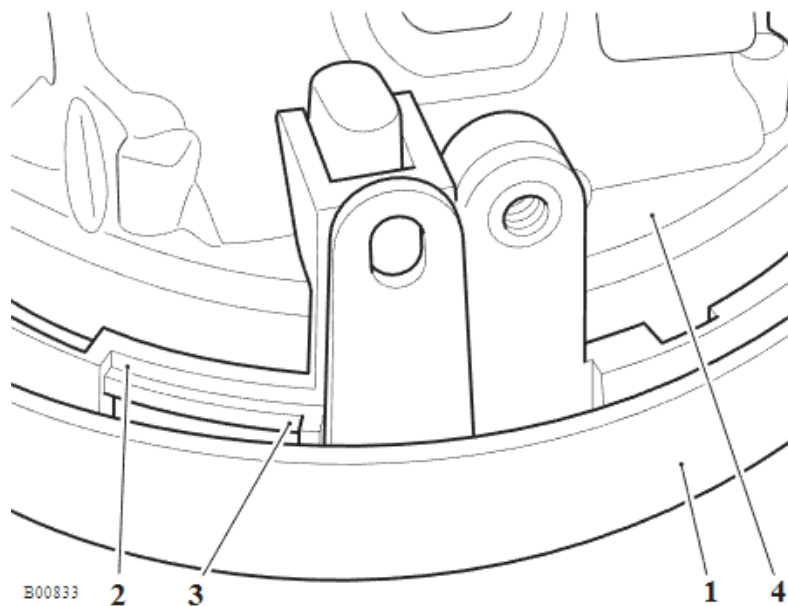
1. Fixings
2. Clamp

9. Remove the fixing and detach the headlight LED assembly from the headlight bowl, release the grommet from the rear of the headlight bowl and remove the headlight LED assembly.



1. Fixing

10. Looking at the back of the headlight LED assembly, turn the headlight bezel clockwise to the stop on the tension ring to release the retaining lugs.

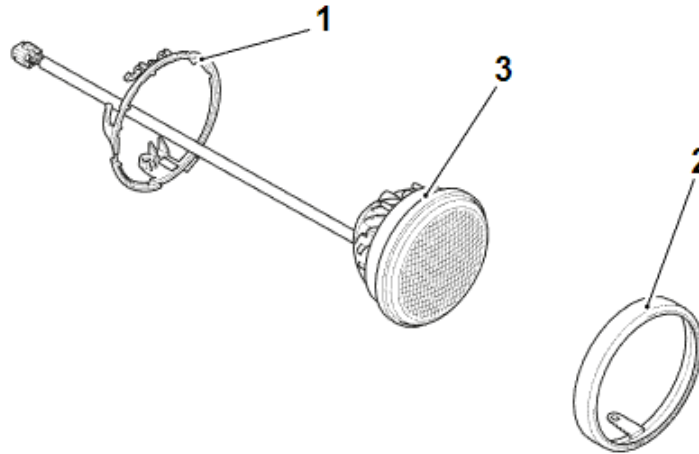


1. Headlight bezel  
2. Tension ring  
3. Stop  
4. Headlight LED

## NOTICE

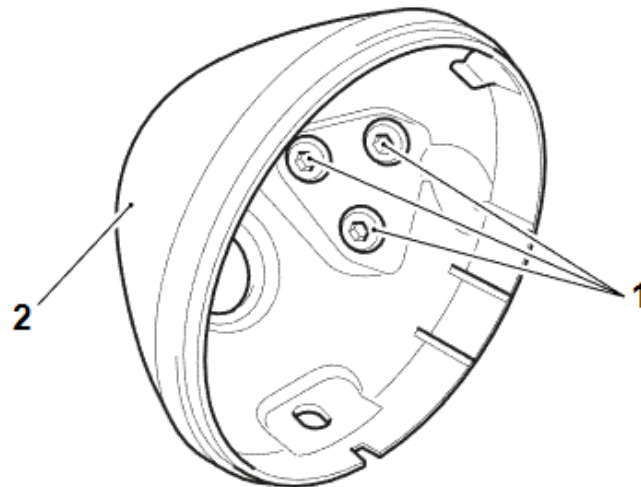
Note the orientation of the headlight bezel and the tension ring for installation.

11. Remove the tension ring then remove the headlight bezel.



1. Tension ring
2. Headlight bezel
3. Headlight LED

12. If required, release the fixings and remove the headlight bowl. Discard the fixings.

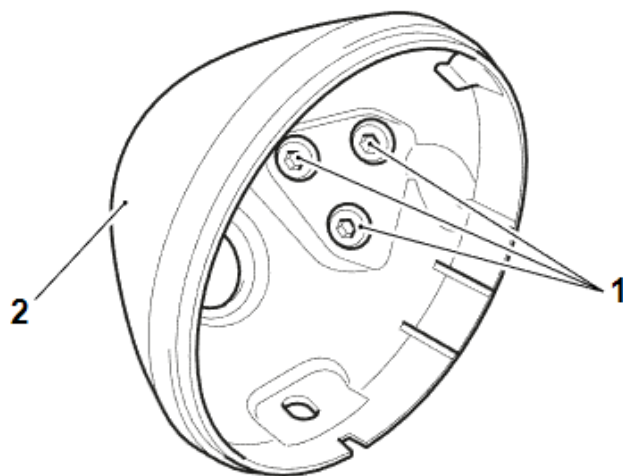


1. Fixings
2. Headlight bowl

**⚠ WARNING**

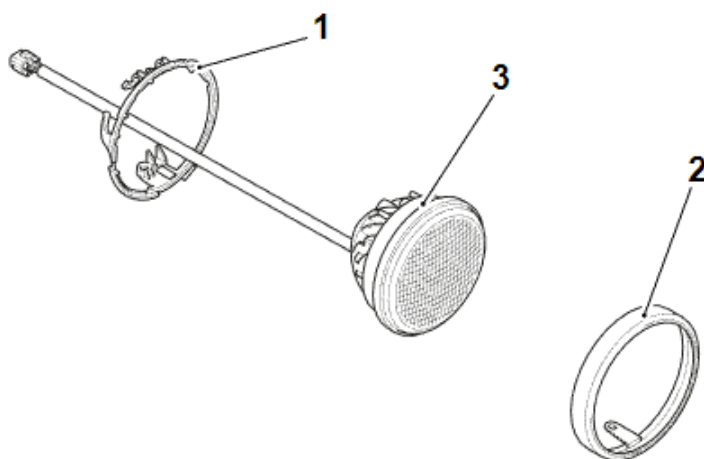
Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, Fit the headlight bowl and tighten the new fixings to 5 Nm.



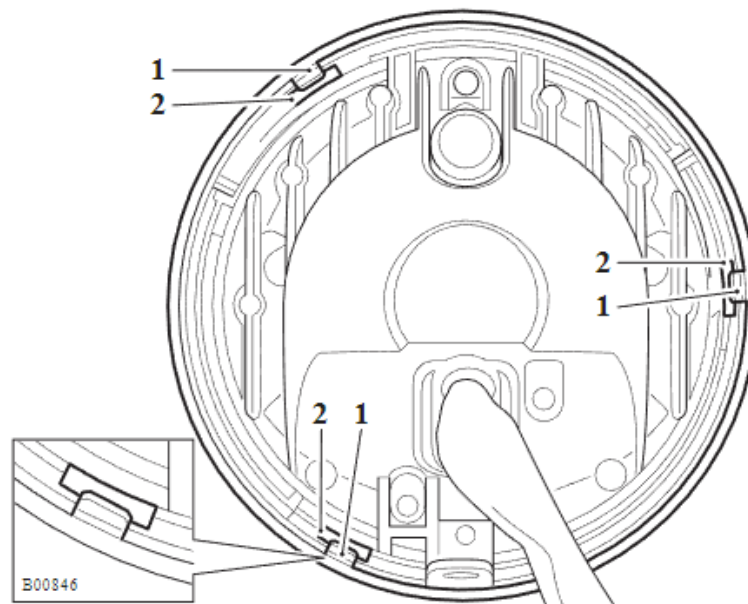
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Headlight bowl</li></ol> |
|--|

2. Fit the headlight bezel then the tension ring to the headlight LED as noted for removal.



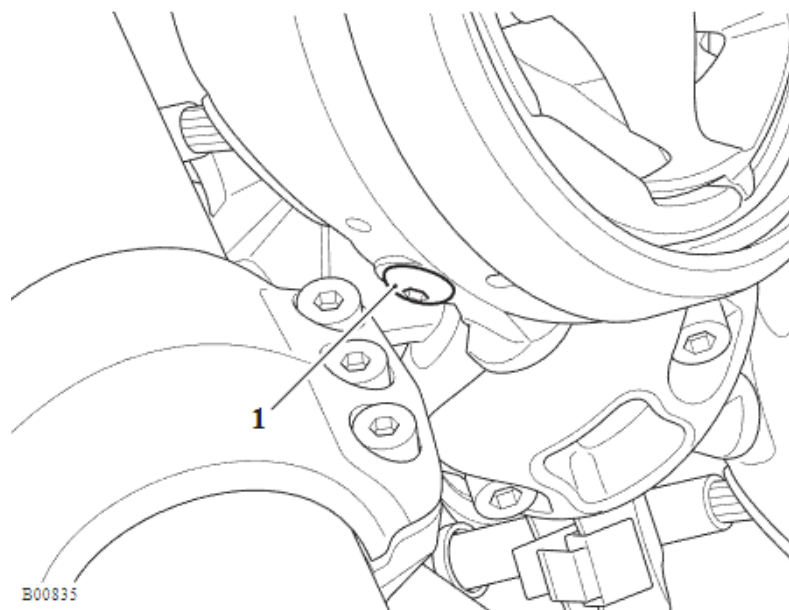
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Tension ring</li><li>2. Headlight bezel</li><li>3. Headlight LED</li></ol> |
|---|

3. Turn the headlight bezel clockwise to lock the tension ring and the headlight bezel together. Make sure the three retaining lugs on the bezel and tension ring are engaged.



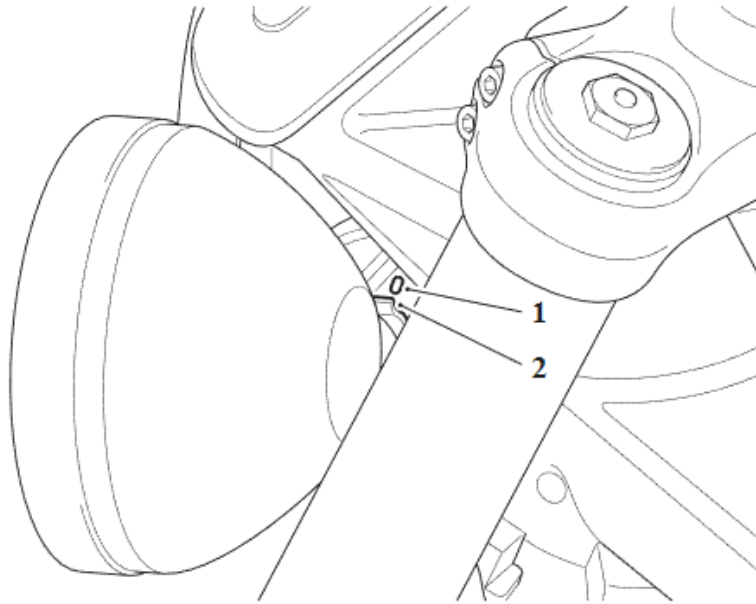
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Retaining lug (bezel)</li><li>2. Retaining lug (tension ring)</li></ol> |
|--|

4. Route the headlight harnesses as noted for removal and secure to the S-clips as noted for removal.
5. Fit the headlight LED assembly to the headlight bowl, fit the grommet to the rear of the headlight bowl and tighten the fixing to 4 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li></ol> |
|---|

6. Loosen the two fixings securing the headlight bracket to the front subframe sufficiently to allow restricted movement of the headlights.
7. To return the headlight alignment to the factory standard position, move the headlight unit until the front subframe alignment mark and the headlight bracket mark are aligned.



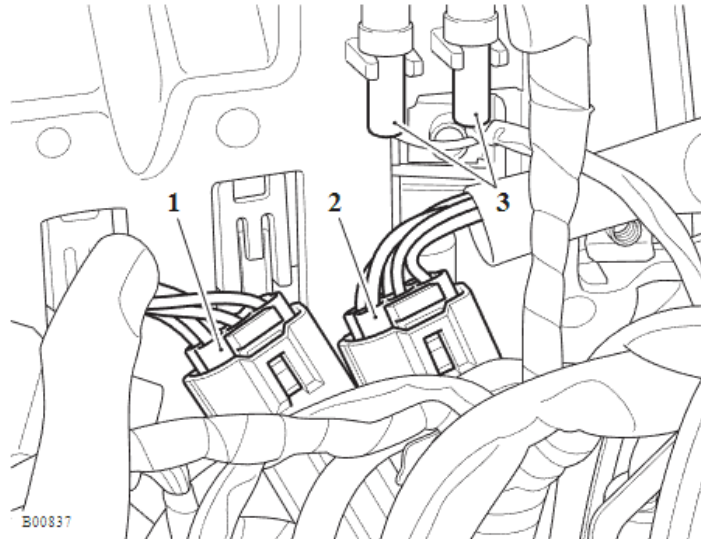
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Front subframe alignment mark</li><li>2. Headlight bracket mark</li></ol> |
|--|

8. Tighten the headlight bracket fixings to, front fixing first, 15 Nm.
9. Route the headlamp harnesses into the back of the front subframe as noted for removal.

**NOTICE**

The main harness for the right hand headlight can be identified by the red tape on it.

10. Connect the headlight harnesses to the main harness.

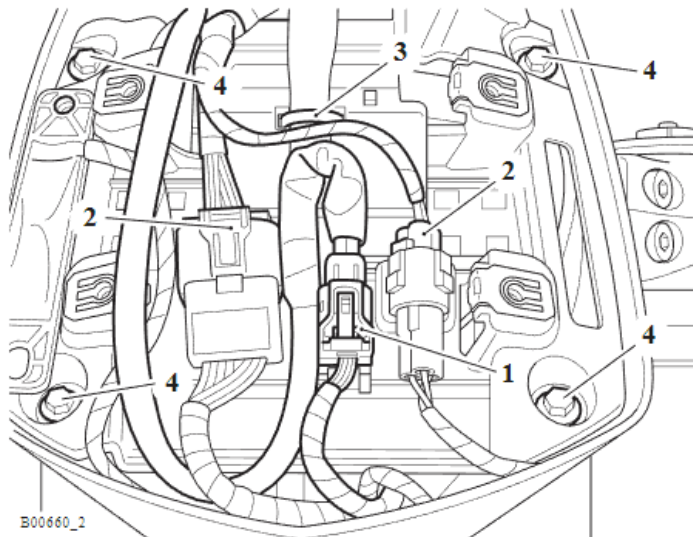


1. Left hand headlight connector
2. Right hand headlight connector
3. Right hand direction indicator connectors

11. Connect the two handlebar subharness connectors and the twist grip position sensor connector to the main harness.

12. Secure the harness to the underside of the flyscreen mounting with two cable ties, as noted for removal.

13. Fit the flyscreen mounting to the front subframe and tighten the fixings to 5 Nm.



1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Cable tie (one of two shown)
4. Flyscreen mounting fixings

14. Check the headlight operation and the beam setting, rectify as necessary.

Perform the following operations:

- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Rear Light Bulb Replacement – LED

The LED rear light units are sealed, maintenance free LED units. The rear light units must be replaced in the event of the failure of the rear lights.

Direction Indicators LED

The LED units inside the direction indicators are sealed for life units and must be replaced in the event of a failure.

LED Licence Plate Light

The LED units inside the licence plate light are sealed for life units and must be replaced in the event of a failure.



## Removal and Installation - Electrical Components

### Headlight Assembly – Removal

#### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)

#### **NOTICE**

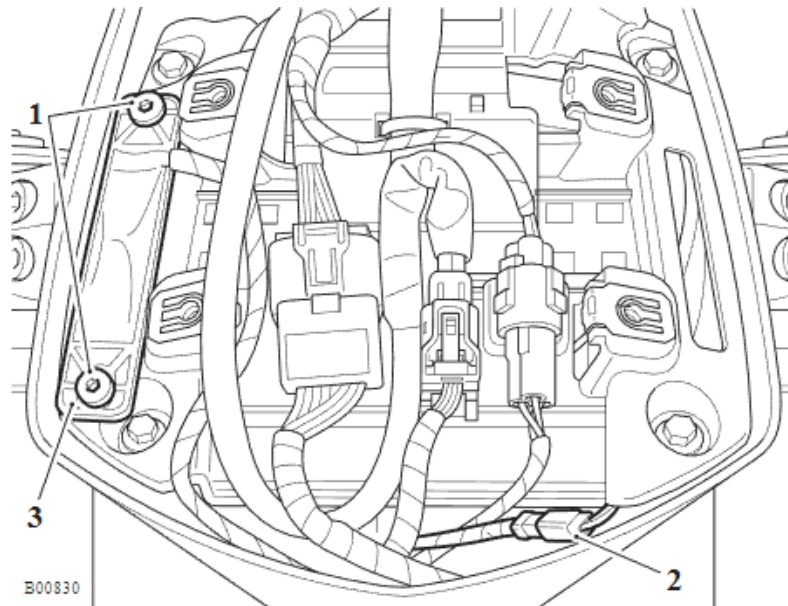
Note the routing of the LF antenna harness for installation.

Note the orientation of the LF antenna for installation.

Note the routing of the harnesses under the flyscreen for installation.

1. Remove the fixings and detach the LF antenna from the flyscreen mounting.

2. Disconnect the LF antenna electrical connector from the main harness and remove the LF antenna.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Electrical connector</li><li>3. LF Antenna</li></ol> |
|--|

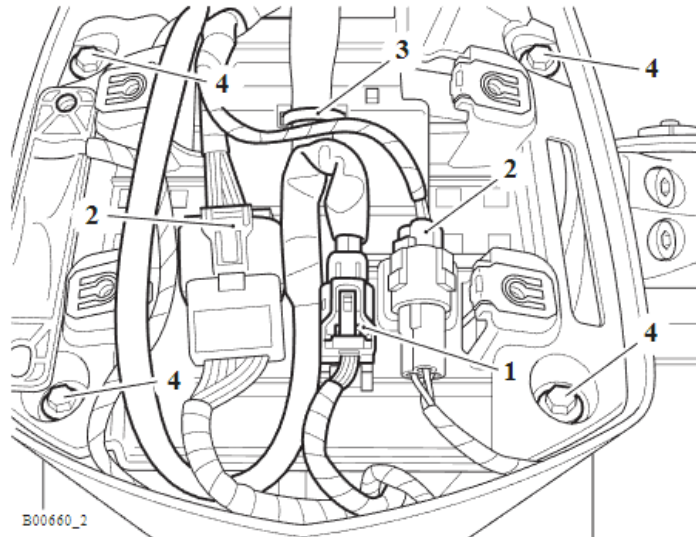
3. Disconnect the two handlebar subharness connectors and the twist grip position sensor connector from the main harness.

**NOTICE**

Note the position of the two cable ties securing the harness for installation.

4. Cut the cable ties securing the harness to the flyscreen mounting.

5. Release the fixings and detach the flyscreen mounting from the front subframe.



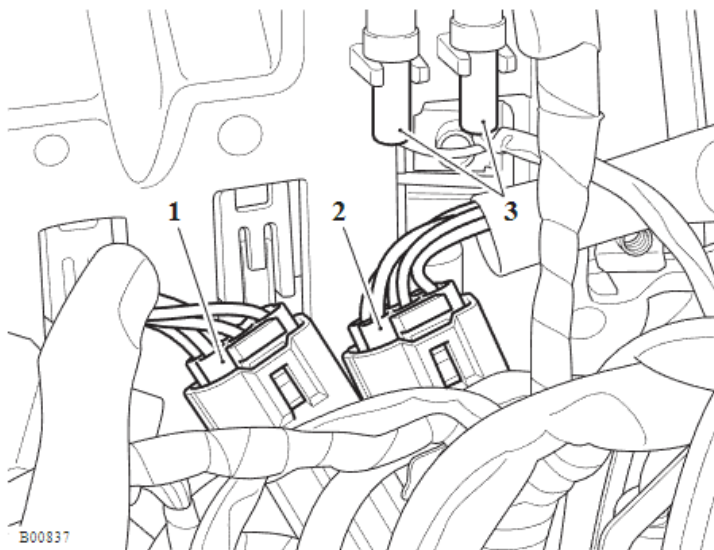
1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Cable tie (one of two shown)
4. Flyscreen mounting fixings

#### NOTICE

Note the routing of the headlight harnesses and their retaining S-clips on the front subframe for installation.

The main harness for the right hand headlight can be identified by the red tape on it.

6. Turn the flyscreen mounting over and disconnect the headlight connectors from the main harness.



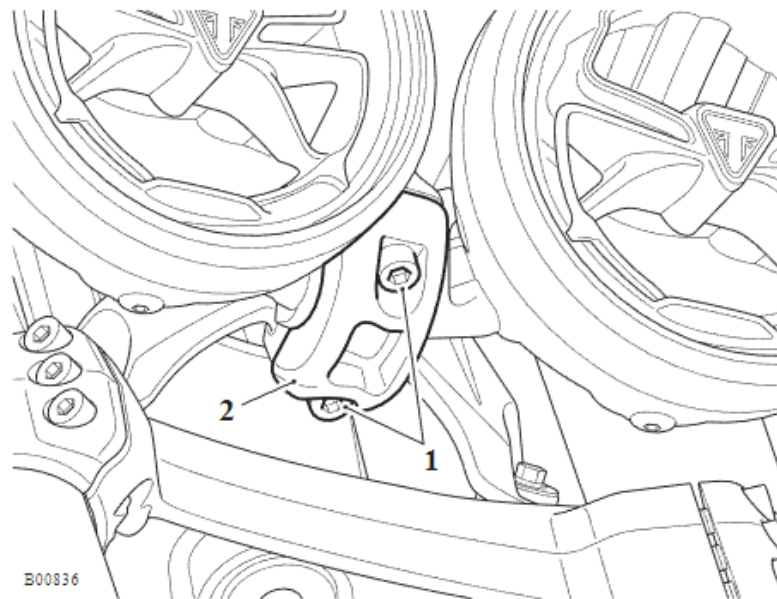
1. Left hand headlight connector
2. Right hand headlight connector
3. Right hand direction indicator connectors

7. Detach the headlight leads from the S-clips on the subframe.

**NOTICE**

Note the orientation of the headlight clamp for installation.

8. Support the headlight assembly, release the fixings, remove the clamp and headlight assembly.



- 1. Fixings
- 2. Clamp

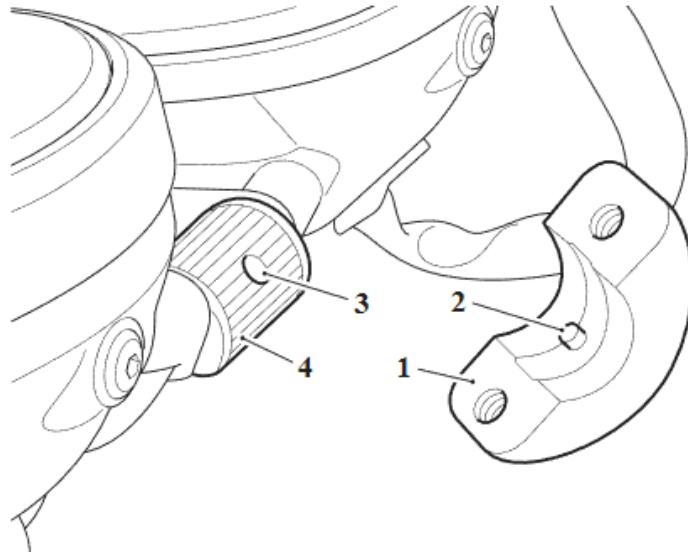
Headlight Assembly – Installation

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

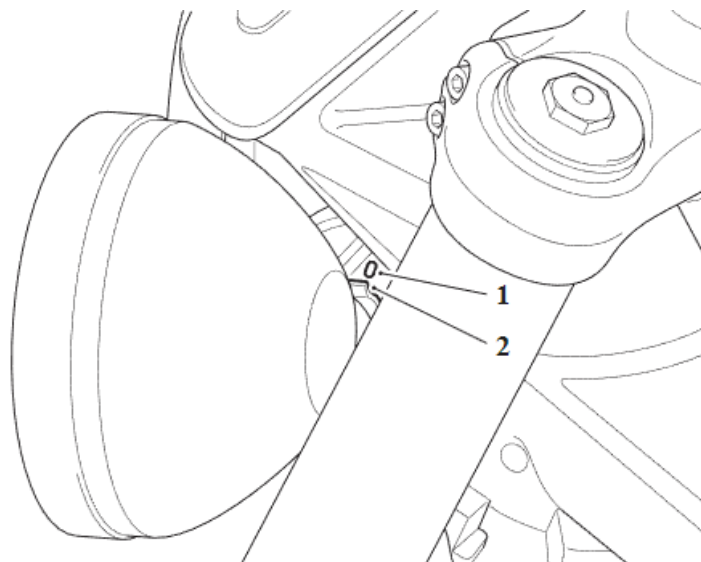
Perform the following operations:

1. Fit the headlight clamp to the headlight assembly as noted for removal. Make sure the locating lug on the clamp fit into the hole in the headlamp bracket.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Clamp</li><li>2. Locating lug</li><li>3. Hole</li><li>4. Headlamp bracket</li></ol> |
|--|

2. Position the headlamp to the front subframe. Fit the clamp but do not fully tighten the fixings at this stage.
3. To return the headlight alignment to the factory standard position, move the headlight unit until the front subframe alignment mark and the headlight bracket mark are aligned.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Front subframe alignment mark</li></ol> |
|--|

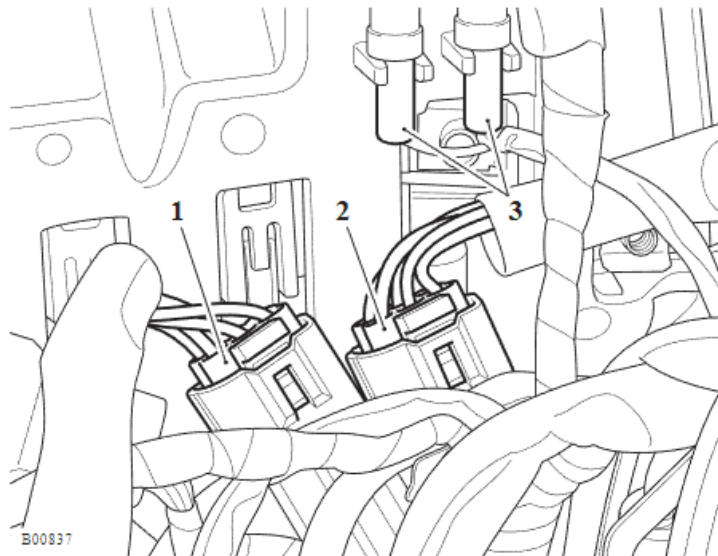
2. Headlight bracket mark

4. Tighten the headlight bracket fixings to, front one first, 15 Nm.
5. Route the headlamp harnesses to their S-clips and into the back of the front subframe as noted for removal.

**NOTICE**

The main harness for the right hand headlight can be identified by the red tape on it.

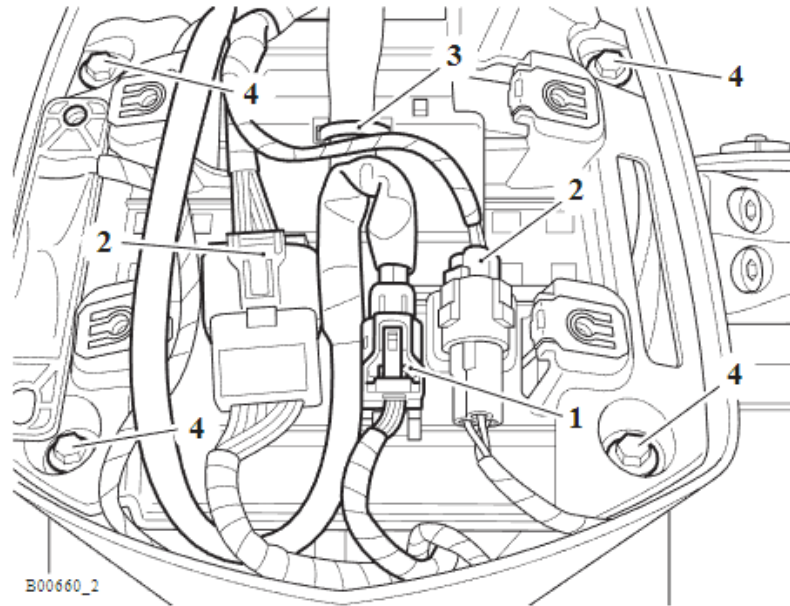
6. Connect the headlight harnesses to the main harness.



1. Left hand headlight connector
2. Right hand headlight connector
3. Right hand direction indicator connectors

7. Connect the two handlebar subharness connectors and the twist grip position sensor connector to the main harness.
8. Secure the harness to the underside of the flyscreen mounting with two cable ties, as noted for removal.

9. Fit the flyscreen mounting to the front subframe and tighten the fixings to 5 Nm.



1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Cable tie (one of two shown)
4. Flyscreen mounting fixings

10. Check the headlight operation and the beam settings, rectify as necessary.

## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

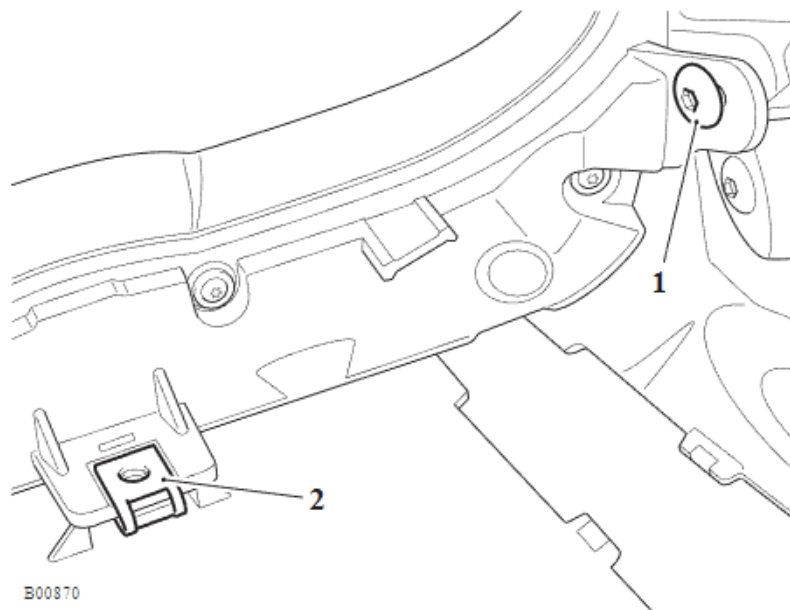
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Mudguard - Removal](#)

## NOTICE

To prevent damage to the rear mudguard painting finish, place the mudguard on a clean, flat surface which is covered with a soft cloth.

1. Remove the fixings securing the rear light to the left and right hand mudguard carriers.
2. Remove the captive nut for the rear light centre fixing and remove the rear light.



1. Fixing (right hand side shown)
2. Captive nut



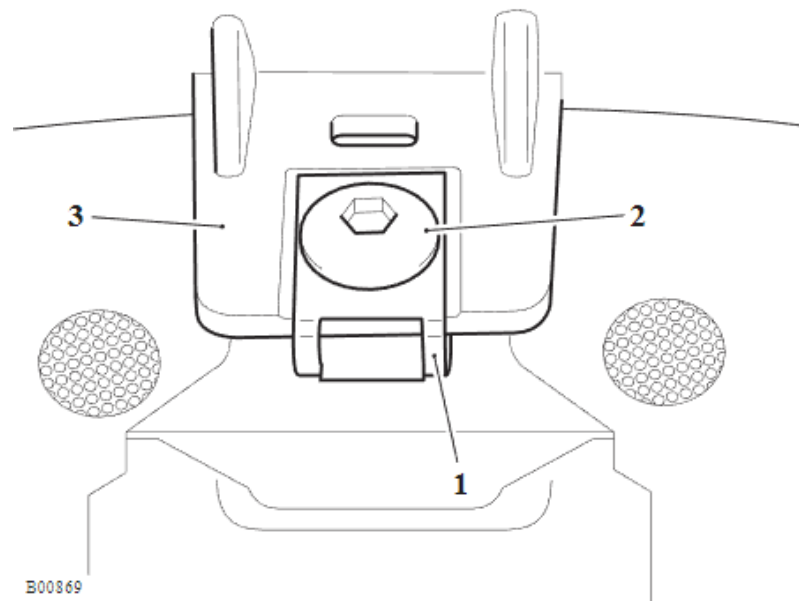
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

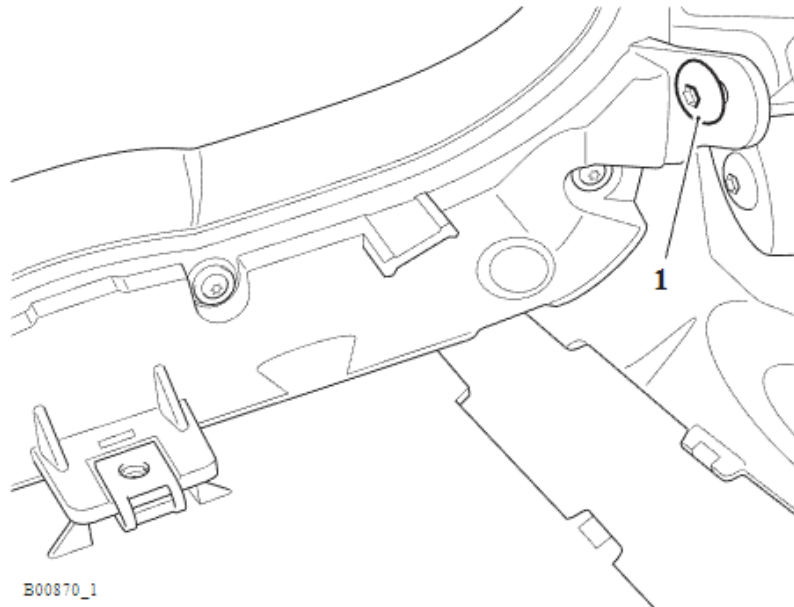
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the rear light onto the rear mudguard and fit the captive nut.
2. Temporarily fit the rear light centre fixing. Do not fully tighten the fixing.



1. Captive nut
2. Fixing
3. Rear light

- Secure the rear light to the left and right hand mudguard carriers. Tighten the fixings to 3 Nm.



1. Fixing

Perform the following operations:

- [Rear Mudguard - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)
- Check the operation of the rear light and rectify if necessary.

Front Direction Indicators – Removal

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The LED units inside the direction indicators are sealed for life units and must be replaced in the event of a failure.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)

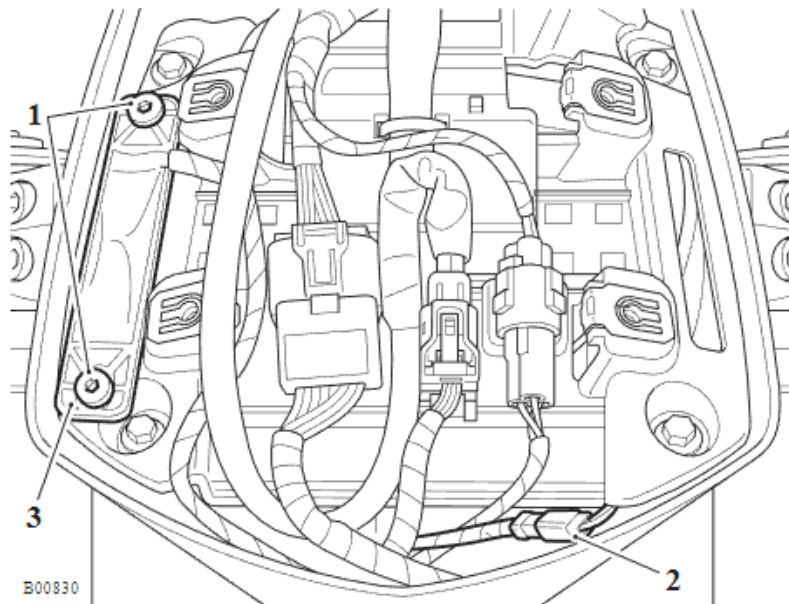
### NOTICE

Note the routing of the LF antenna harness for installation.

Note the orientation of the LF antenna for installation.

Note the routing of the harnesses under the flyscreen for installation.

1. Remove the fixings and detach the LF antenna from the flyscreen mounting.
2. Disconnect the LF antenna electrical connector from the main harness and remove the LF antenna.



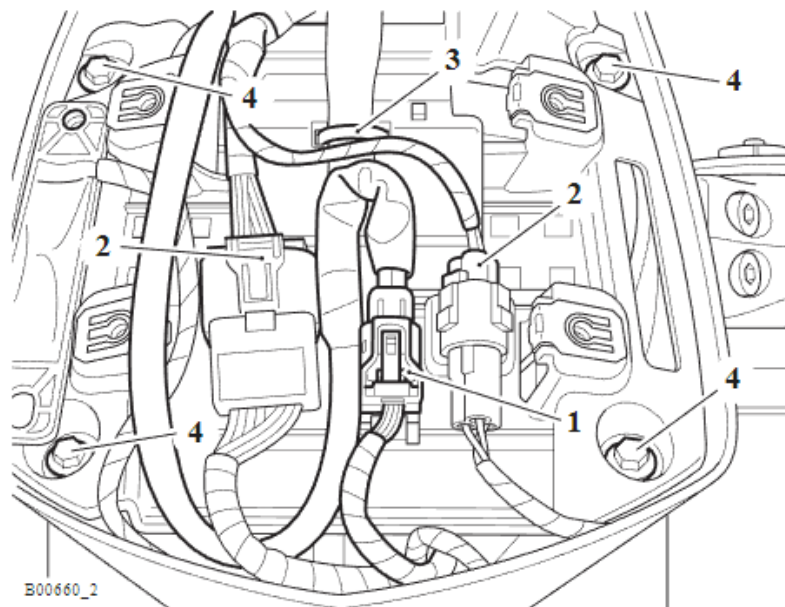
1. Fixings
2. Electrical connector
3. LF Antenna

3. Disconnect the two handlebar subharness connectors and the twist grip position sensor connector from the main harness.

**NOTICE**

Note the position of the two cable ties securing the harness for installation.

4. Cut the cable ties securing the harness to the flyscreen mounting.
5. Release the fixings and detach the flyscreen mounting from the front subframe.



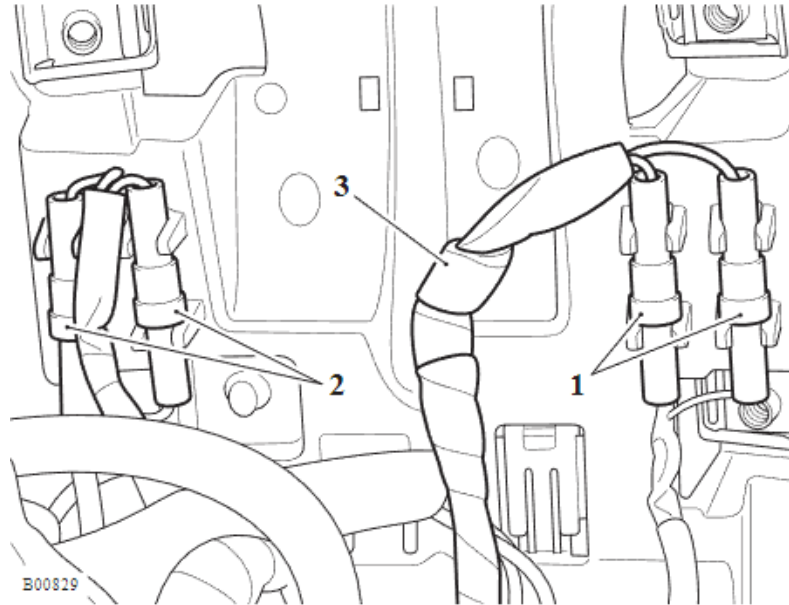
1. Twist grip position sensor connector
2. Handlebar sub harness connectors
3. Cable tie (one of two shown)
4. Flyscreen mounting fixings

**NOTICE**

Note the routing of the front direction indicator harnesses for installation.

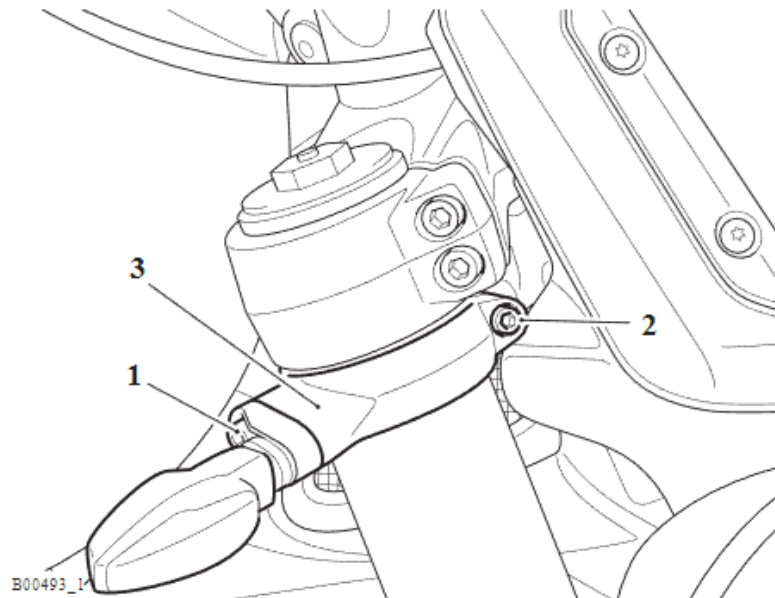
The harness for the right hand direction indicator can be identified by the red tape on it.

6. Turn the flyscreen mounting over and disconnect the front direction indicator connectors from the main harness.



1. Right hand direction indicator connectors
2. Left hand direction indicator harnesses
3. Red tape (right hand side only)

7. Loosen the fixing securing the direction indicator to its bracket
8. Remove the direction indicator bracket pinch fixing. Discard the fixing



1. Fixing (direction indicator)
2. Fixing (clamp)
3. Direction indicator clamp

9. Remove the front fork (see [Front Forks - Removal](#)).
10. As the fork is released, slide the direction indicator clamp off the fork and remove.

#### NOTICE

Note the routing of the direction indicator harness around the bracket for installation.

11. Remove the fixing detach the harness from the bracket and remove the front direction indicator.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)

#### Front Direction Indicators – Installation

#### WARNING

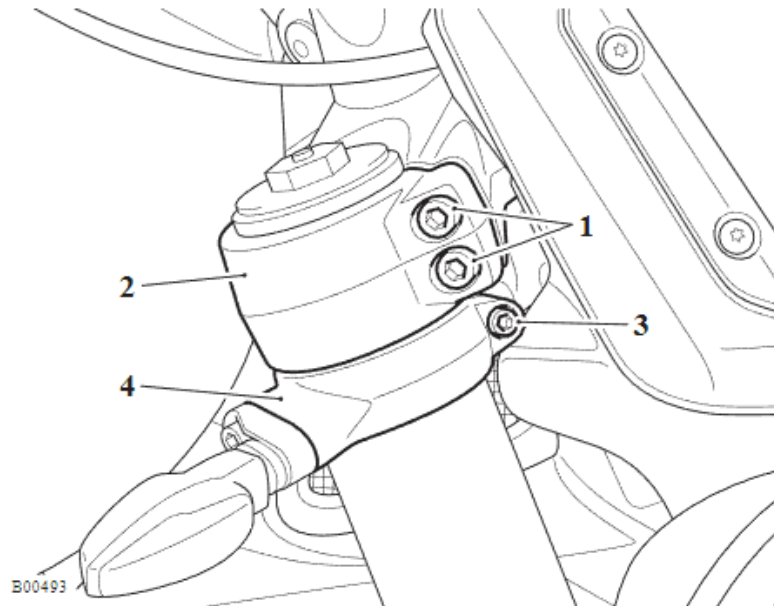
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Route the direction indicator harness to the bracket as noted for removal.
2. Fit the front direction indicator to its bracket with a new fixing.
3. Position the direction indicator clamp end between the upper and lower yokes and fit the front fork (see [Front Forks - Installation](#)).
4. Position the direction indicator as noted for removal and tighten its clamp fixing to 3 Nm.

5. Tighten the direction indicator to clamp new fixing to 3 Nm.



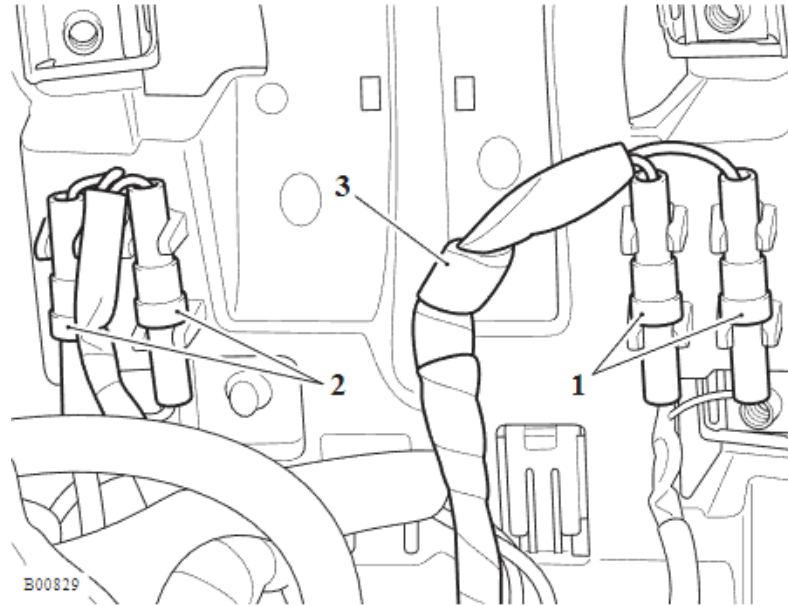
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Upper yoke</li><li>3. Fixing</li><li>4. Direction indicator</li></ol> |
|---|

6. Route the Direction indicator harness into the back of the front subframe as noted for removal.

**NOTICE**

The main harness for the right hand direction indicator can be identified by the red tape on it.

7. Connect the direction indicator harnesses to the main harness.

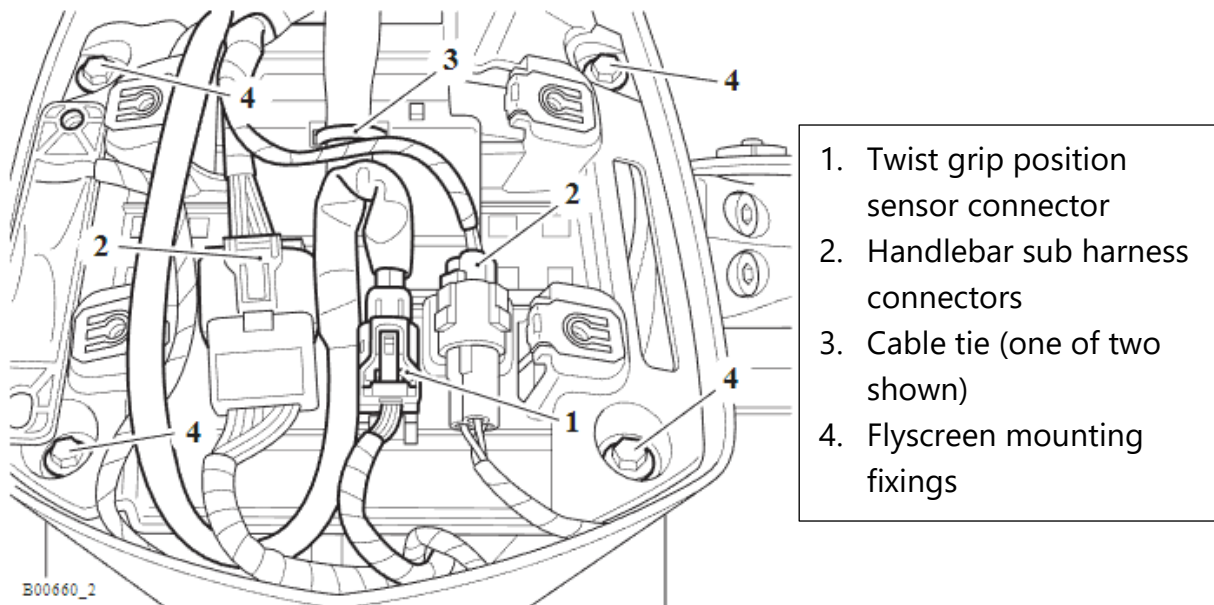


- 1. Right hand direction indicator connectors
- 2. Left hand direction indicator harnesses
- 3. Red tape (right hand side only)

8. Connect the two handlebar subharness connectors and the twist grip position sensor connector to the main harness.

9. Secure the harness to the underside of the flyscreen mounting with two cable ties, as noted for removal.

10. Fit the flyscreen mounting to the front subframe and tighten the fixings to 5 Nm.



- 1. Twist grip position sensor connector
- 2. Handlebar sub harness connectors
- 3. Cable tie (one of two shown)
- 4. Flyscreen mounting fixings



11. Check the direction indicator operation, rectify as necessary.

Perform the following operations:

- [Flyscreen - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Rear Direction Indicators – Removal

 **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

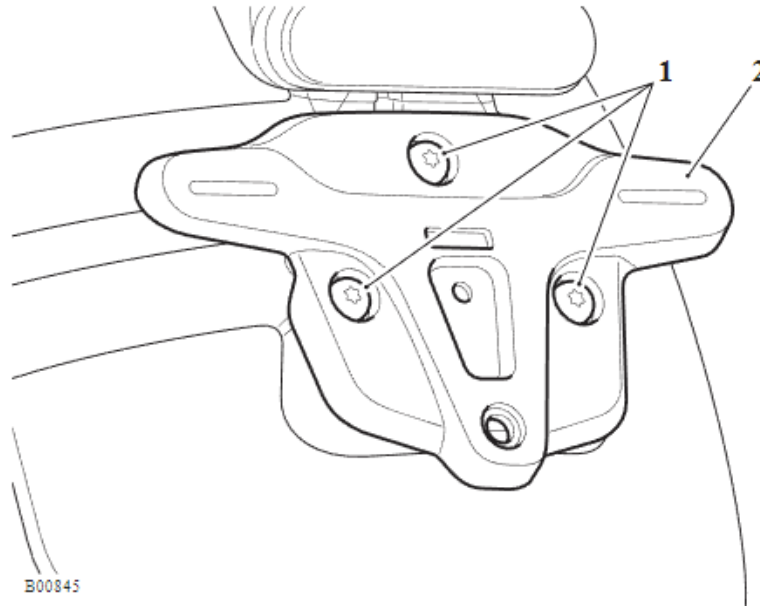
The LED units inside the direction indicators are sealed for life units and must be replaced in the event of a failure.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Wheel - Removal](#)

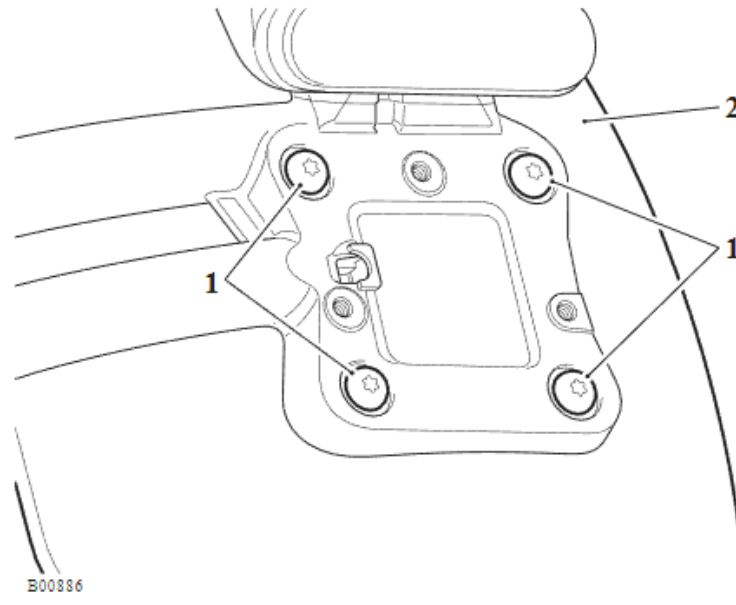
1. Remove the licence plate.

2. Release the fixings and remove the licence plate bracket. Discard the fixings.



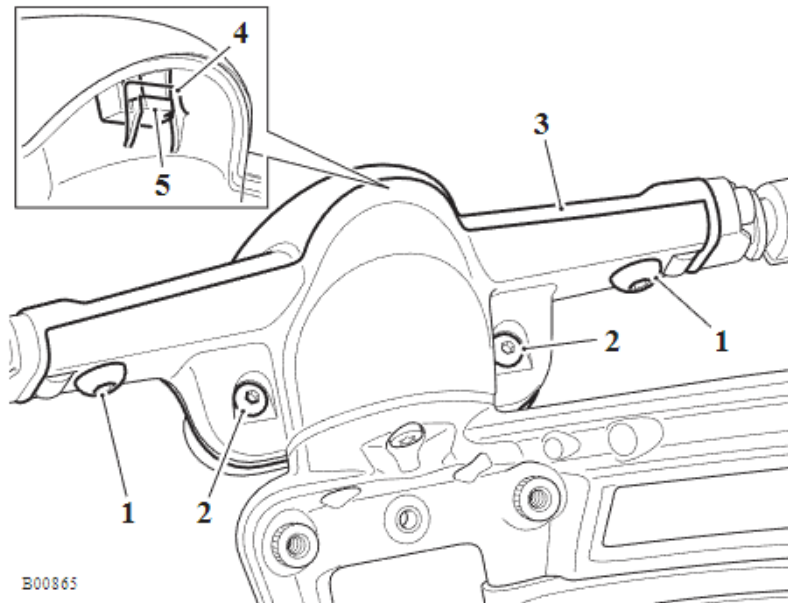
- 1. Fixings
- 2. Licence plate bracket

3. Release the fixings and remove the rear spray guard. Discard the fixings.



- 1. Fixings
- 2. Spray guard

4. Release the fixings and remove and slide the upper cover rearwards for removal.  
Discard the fixings.

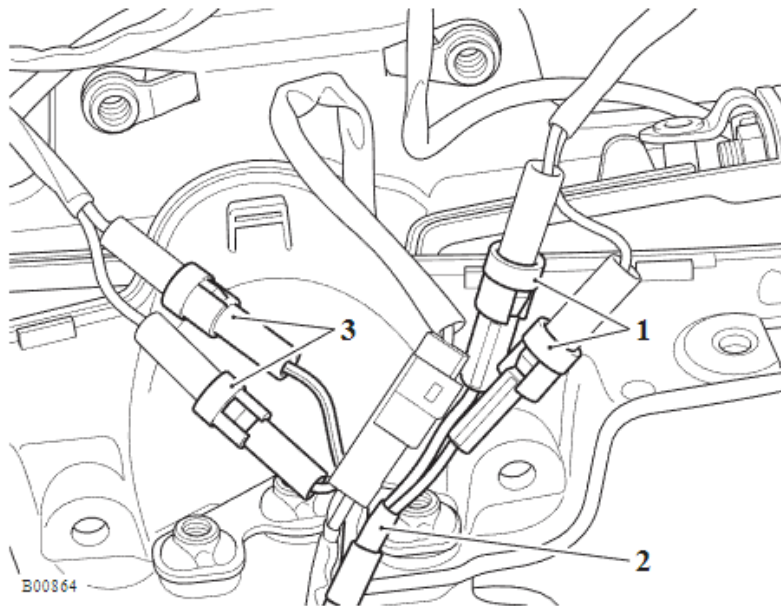


- 1. Fixings (M5 x 14 mm)
- 2. Fixings (M5 x 12 mm)
- 3. Upper cover
- 4. Slot on lower cover
- 5. Lug on upper cover

**NOTICE**

Note the routing of the rear direction indicator harnesses for installation.  
The harness for the right hand direction indicator can be identified by the red tape on it.

5. Disconnect the direction indicator electrical connectors.

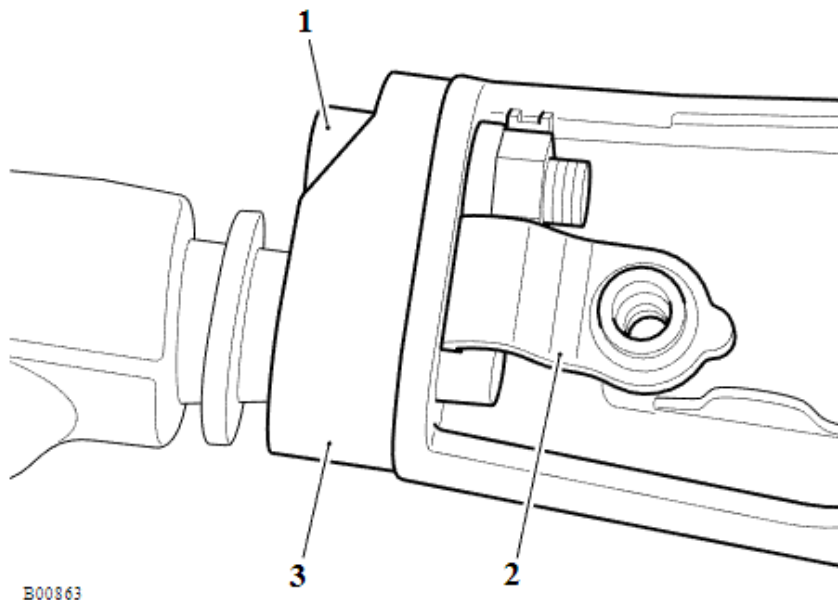


- 1. Right hand direction indicator connectors
- 2. Red tape
- 3. Left hand direction indicator connectors

**NOTICE**

Note the orientation of the indicator bracket for installation.

6. Release the fixing and remove the direction indicator. Discard the fixing.



B00863

- 1. Fixing
- 2. Indicator bracket
- 3. Direction indicator

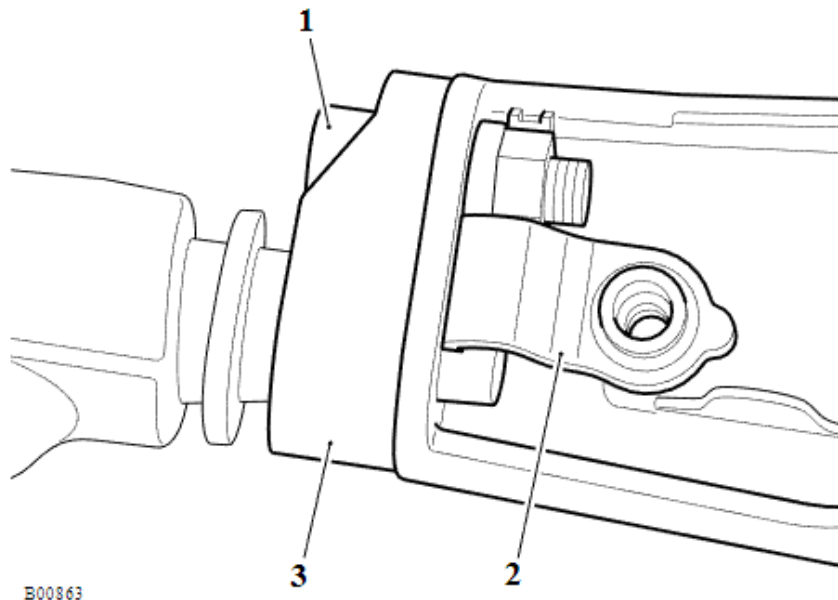
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Route the indicator harness as noted for removal.
2. Fit the direction indicator and the indicator bracket as noted for removal. Tighten the new fixing to 3 Nm.

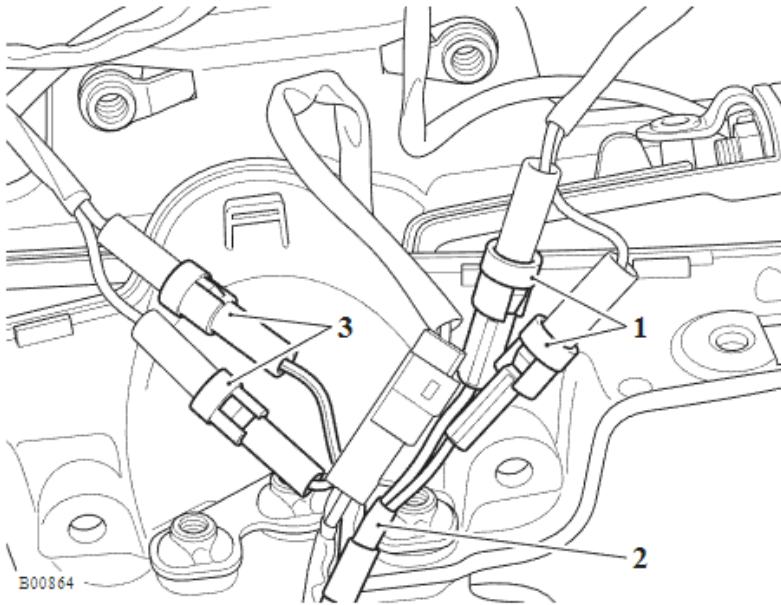


1. Fixing
2. Indicator bracket
3. Direction indicator

**NOTICE**

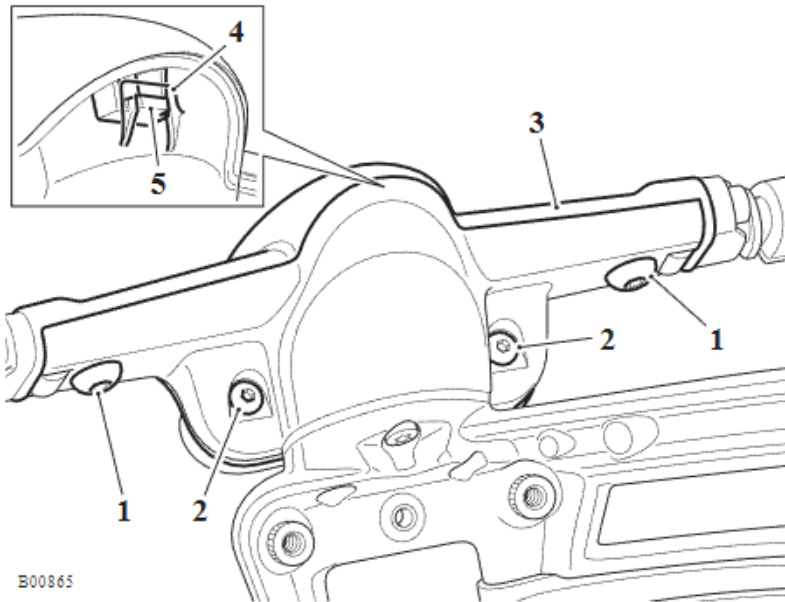
The harness for the right hand direction indicator can be identified by the red tape on it.

3. Connect the rear direction indicator electrical connectors and route the harnesses as noted for removal.



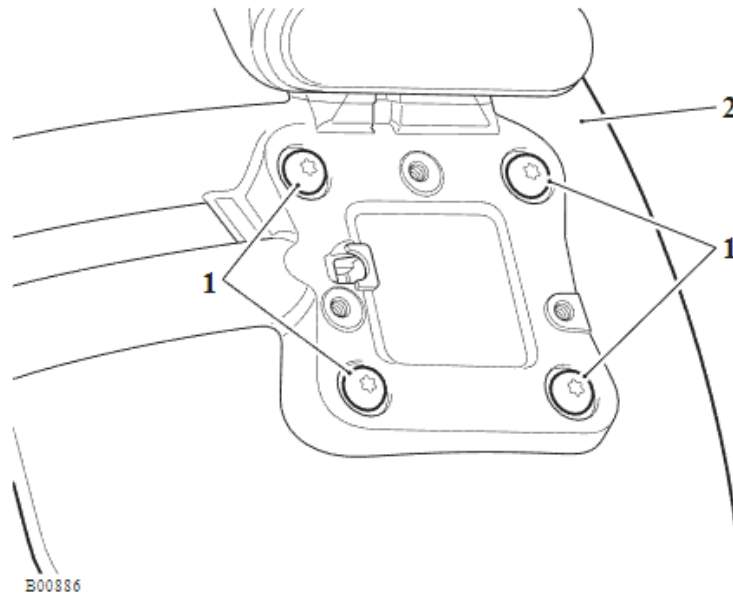
- |  |
|--|
| <ol style="list-style-type: none"><li>1. Right hand direction indicator connectors</li><li>2. Red tape</li><li>3. Left hand direction indicator connectors</li></ol> |
|--|

4. Fit the upper cover to the indicator mounting. Make sure the locating lug on the upper cover locates into its slot on the lower mounting.
5. Fit new M5 x 14mm fixings and tighten to 3 Nm.
6. Fit new M5 x 12mm fixings and tighten to 1 Nm.



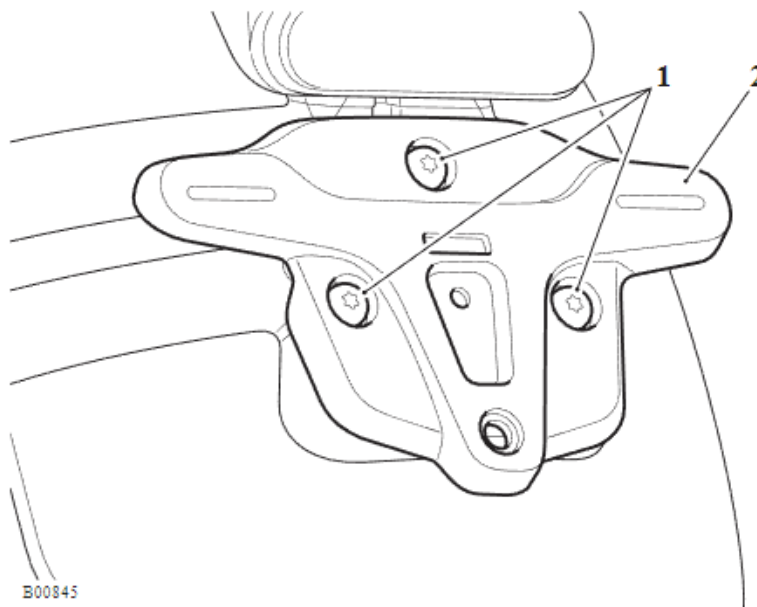
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings (M5 x 14 mm)</li><li>2. Fixings (M5 x 12 mm)</li><li>3. Upper cover</li><li>4. Slot on lower cover</li><li>5. Lug on upper cover</li></ol> |
|---|

7. Fit the rear spray guard and tighten its new fixings to 3 Nm.



- 1. Fixings
- 2. Spray guard

8. Fit the licence plate bracket and tighten its new fixings to 3 Nm.



- 1. Fixings
- 2. Licence plate bracket

9. Fit the licence plate.
10. Check the direction indicator operation, rectify as necessary.

Perform the following operations:

- [Rear Wheel - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Licence Plate Light – Removal

The LED units inside the direction indicators are sealed for life units and must be replaced in the event of a failure.

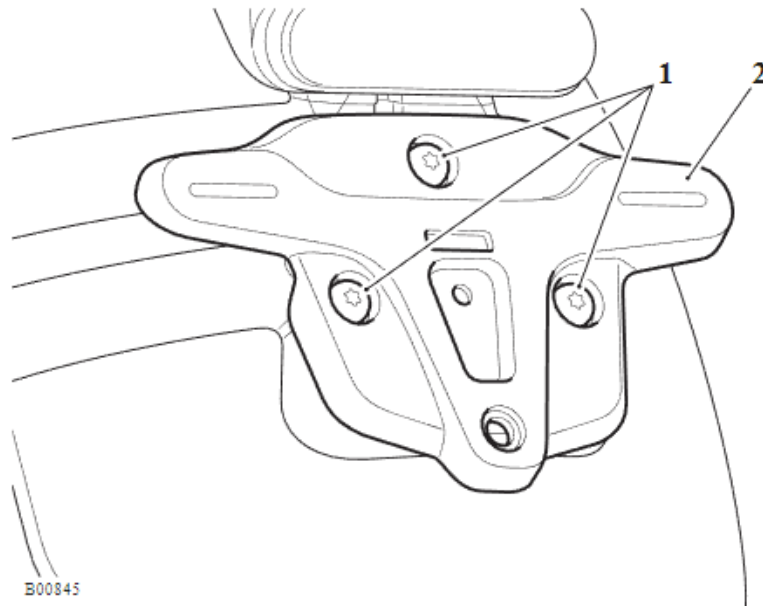
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Wheel - Removal](#)

1. Remove the licence plate.

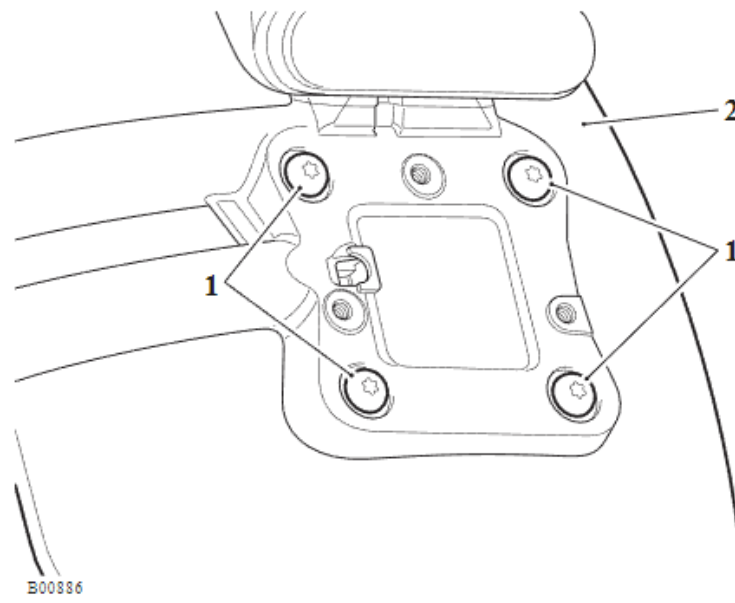


2. Release the fixings and remove the licence plate bracket. Discard the fixings.



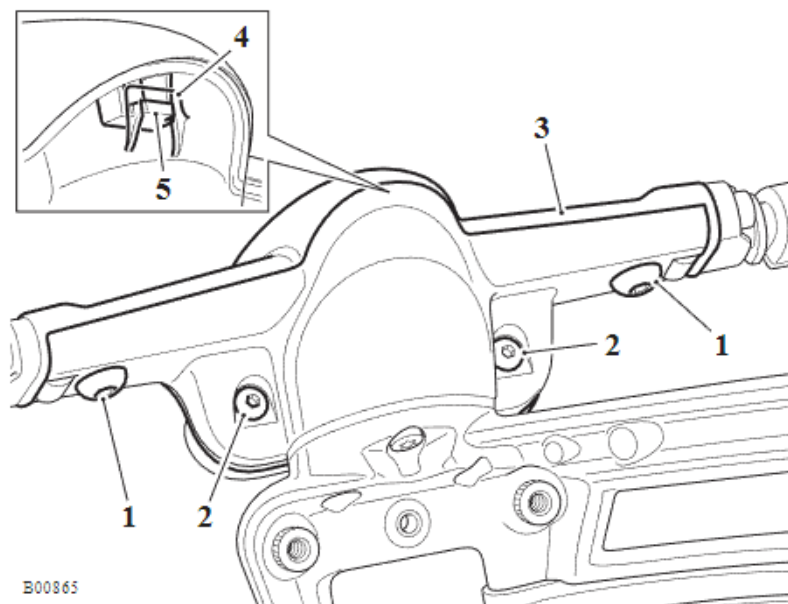
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Licence plate bracket</li></ol> |
|---|

3. Release the fixings and remove the rear spray guard. Discard the fixings.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Spray guard</li></ol> |
|---|

4. Release the fixings and remove and slide the upper cover rearwards for removal.  
Discard the fixings.

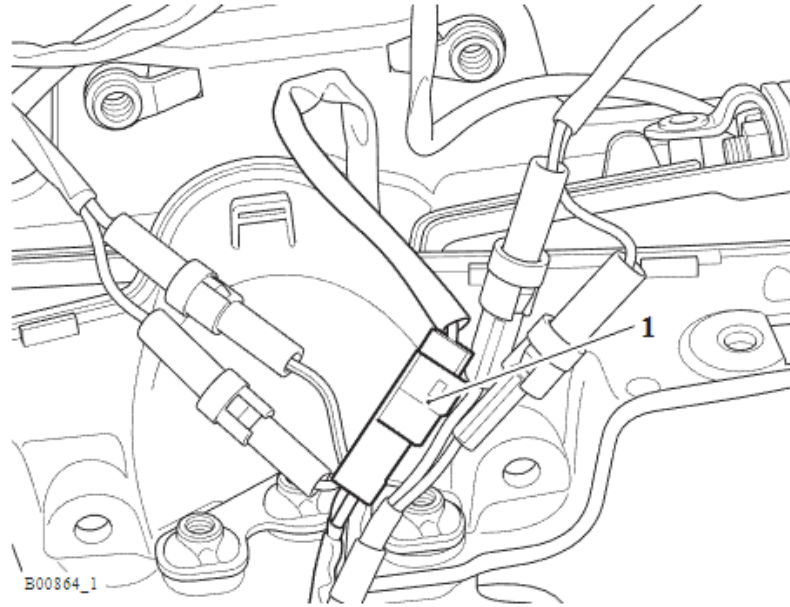


1. Fixings (M5 x 14 mm)
2. Fixings (M5 x 12 mm)
3. Upper cover
4. Slot on lower cover
5. Lug on upper cover

**NOTICE**

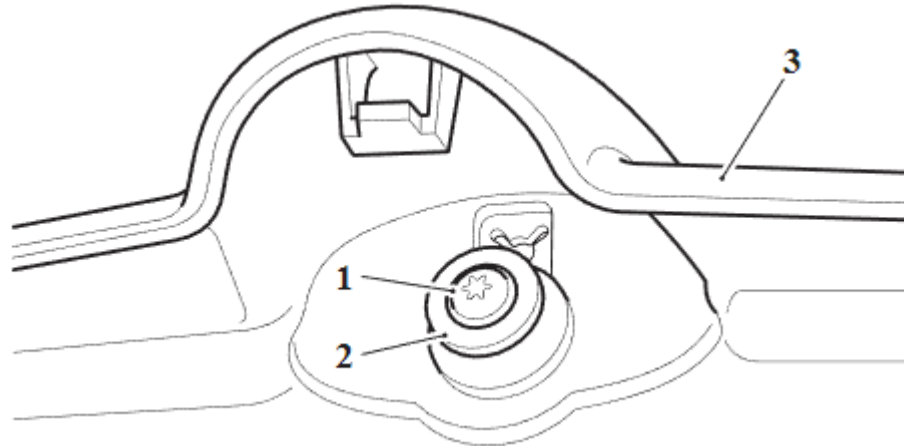
Note the routing of the rear direction indicator harnesses for installation.  
The harness for the right hand direction indicator can be identified by the red tape on it.

5. Disconnect the direction indicator electrical connectors.



1. Licence plate light connector

6. Release the fixing and remove the flanged sleeve and the licence plate light.

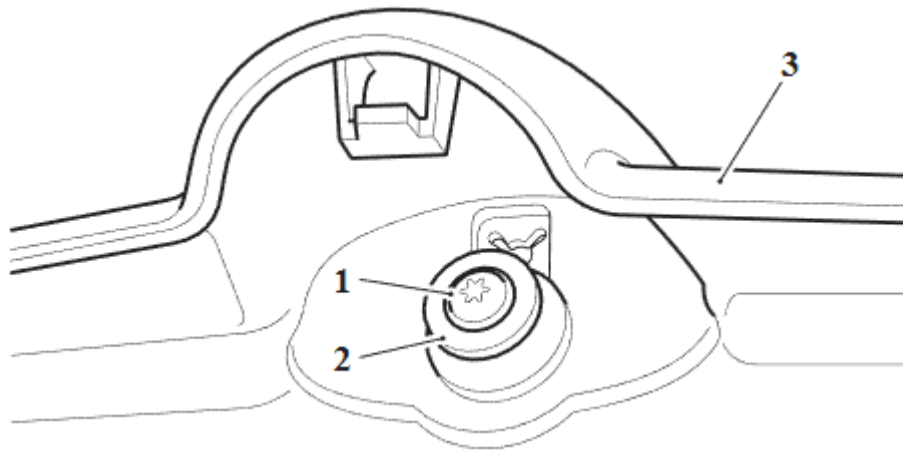


1. Fixing  
2. Flanged sleeve  
3. Upper cover

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Route the licence plate light harness as noted for removal.
2. Fit the licence plate light, flanged sleeve and tighten the fixing to 1.5 Nm.

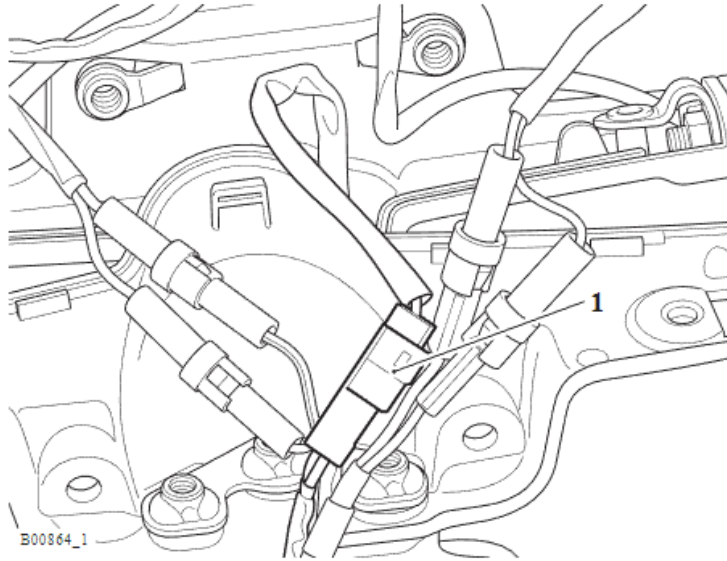


1. Fixing
2. Flanged sleeve
3. Upper cover

**NOTICE**

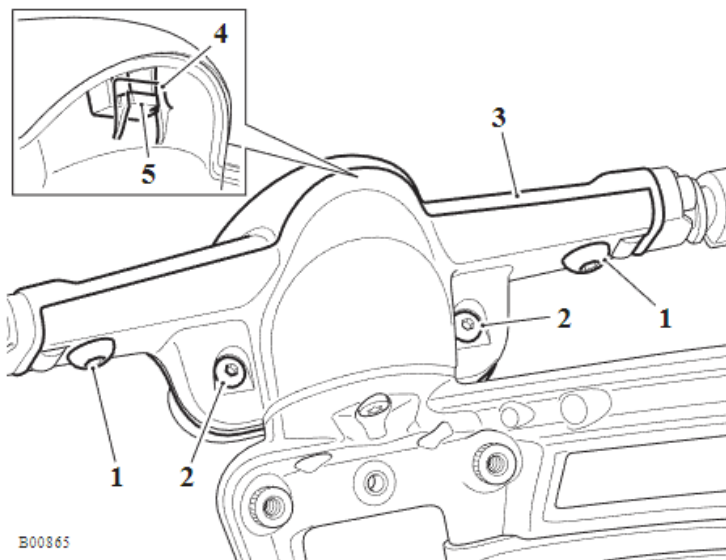
The harness for the right hand direction indicator can be identified by the red tape on it.

3. Connect the licence plate light electrical connector and route the harness as noted for removal.



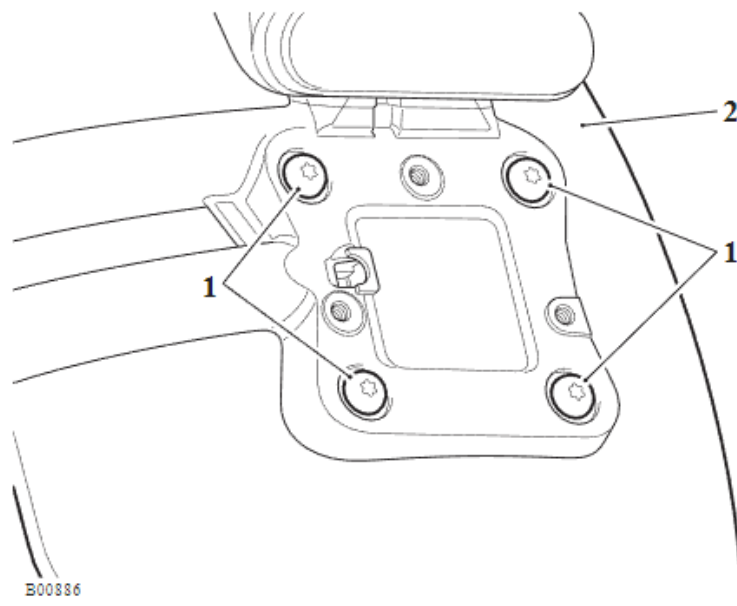
1. Licence plate light connector

4. Fit the upper cover to the indicator mounting. Make sure the locating lug on the upper cover locates into its slot on the lower mounting.
5. Fit new M5 x 14mm fixings and tighten to 3 Nm.
6. Fit new M5 x 12mm fixings and tighten to 1 Nm.



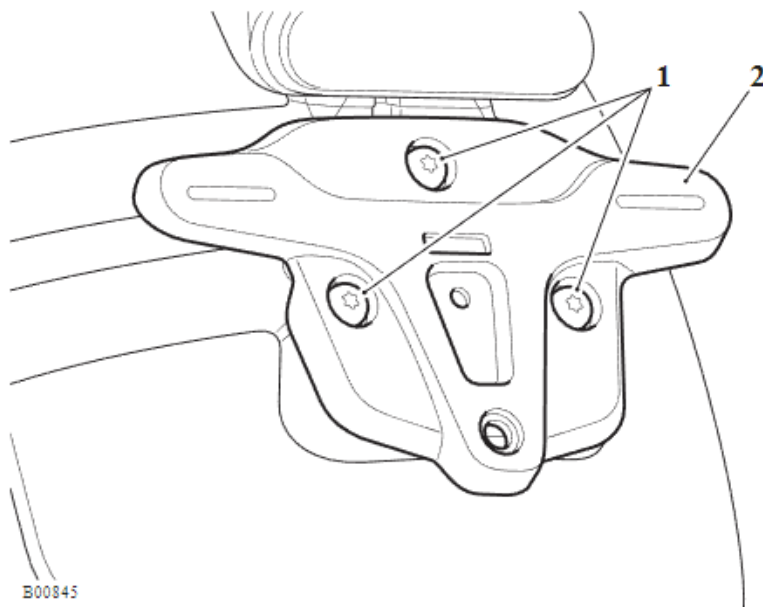
1. Fixings (M5 x 14 mm)  
2. Fixings (M5 x 12 mm)  
3. Upper cover  
4. Slot on lower cover  
5. Lug on upper cover

7. Fit the rear spray guard and tighten its new fixings to 3 Nm.



- 1. Fixings
- 2. Spray guard

8. Fit the licence plate bracket and tighten its new fixings to 3 Nm.



- 1. Fixings
- 2. Licence plate bracket

9. Fit the licence plate.
10. Check the direction indicator operation, rectify as necessary.

Perform the following operations:

- [Rear Wheel - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Instruments – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

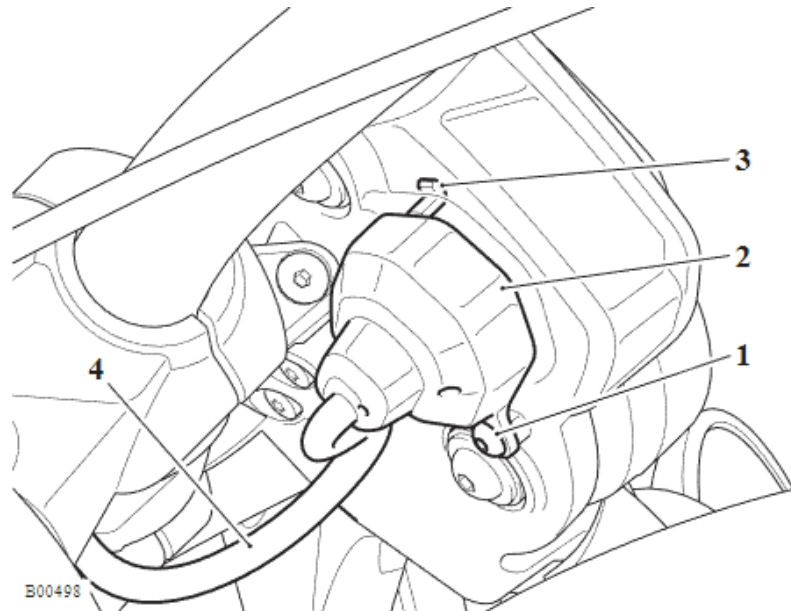
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

### **NOTICE**

The instruments electrical connector cover is secured to the instruments with a fixing and a retaining lug.

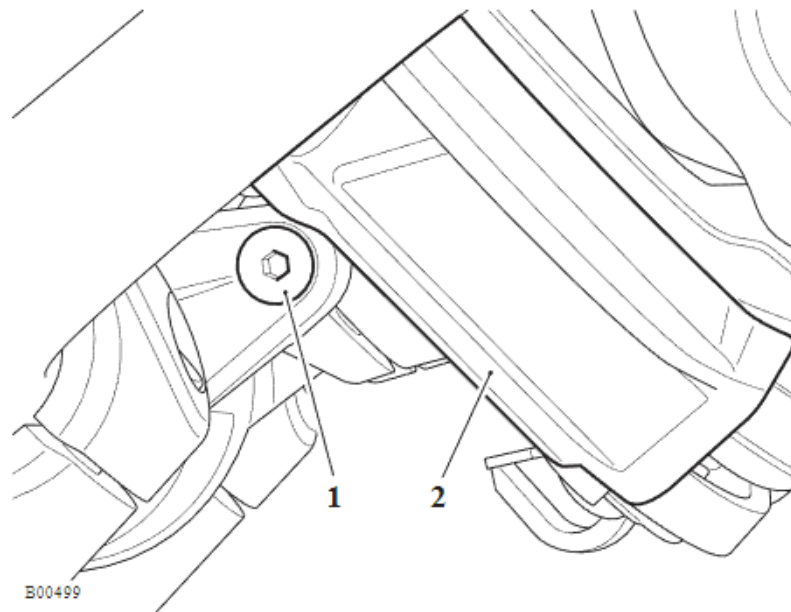
1. Detach the instruments harness from its retaining clip.

2. Release the fixing and manoeuvre the cover to release the retaining lug and remove the cover.



1. Fixing
2. Cover
3. Retaining lug
4. Instruments harness

3. Disconnect the electrical connector from the instruments.
4. Release the fixings and remove the instruments.



1. Fixing (left hand side shown)
2. Instruments

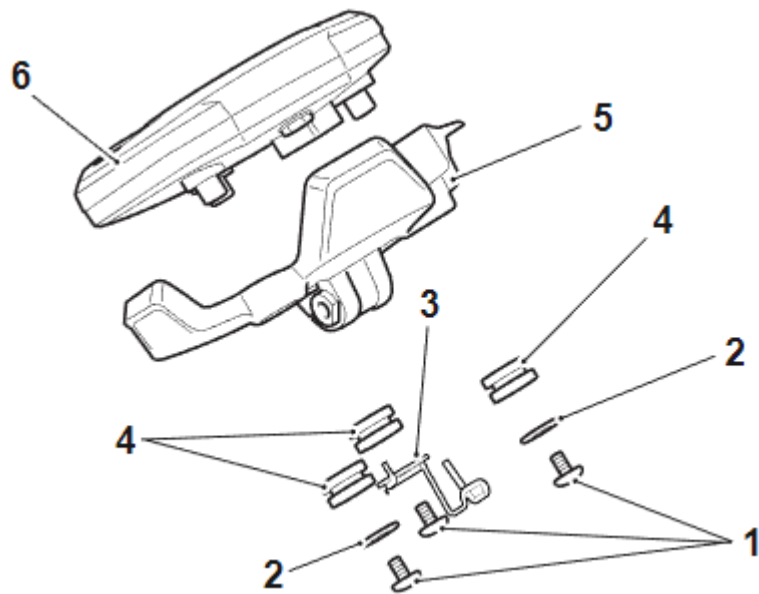


## NOTICE

Note the position and orientation of the wire guide for installation.

Note the position of the rubber grommets in the instruments mounting plate for installation.

5. Release the fixings and detach the instrument locating lugs from the grommets on its mounting plate. Collect the washers.



1. Fixings
2. Washers
3. Wire guide
4. Grommets
5. Mounting plate
6. Instruments

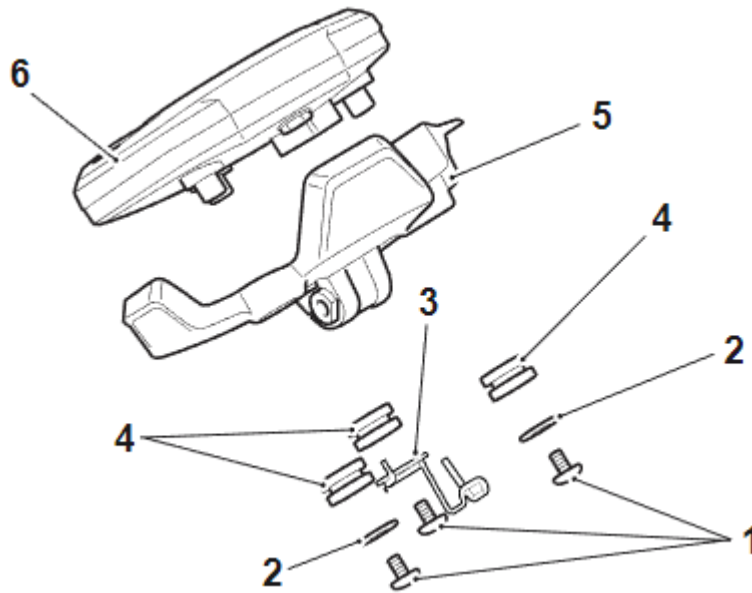
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**NOTICE**

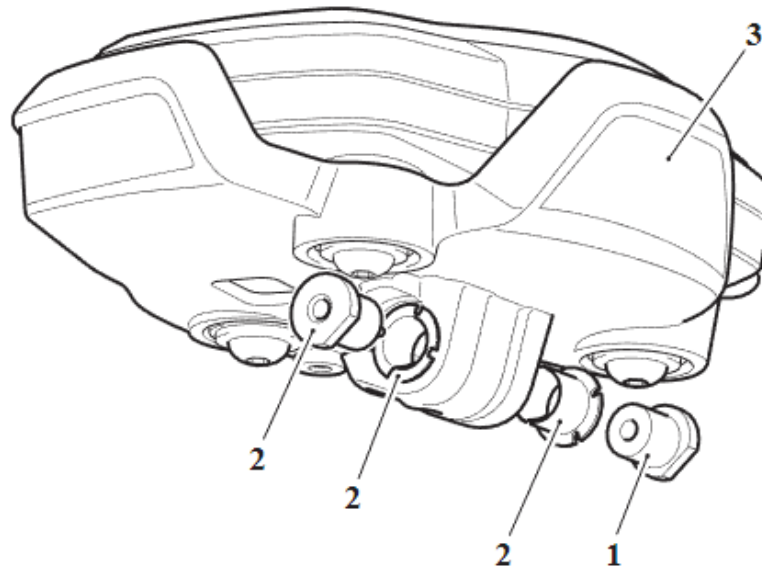
Make sure the three rubber grommets are fitted to the mounting plate as noted during removal.

1. Fit the instruments its mounting plate, make sure the locating lugs are correctly inserted into the grommets and fit the wire guide as noted for removal.
2. Secure with the fixings and washers and tighten to 3 Nm.



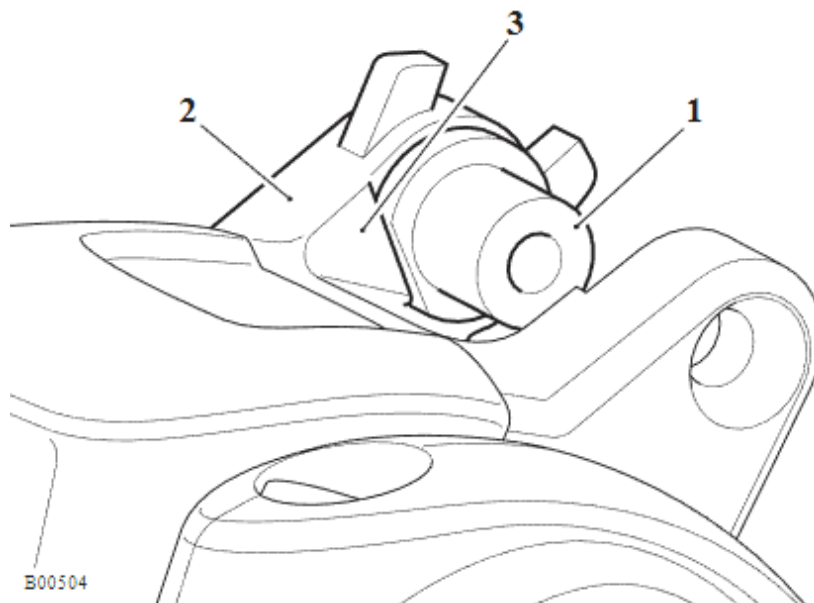
1. Fixings
2. Washers
3. Wire guide
4. Grommets
5. Mounting plate
6. Instruments

3. Make sure the bearings and the flanged pins are fitted to the Instruments mounting plate.



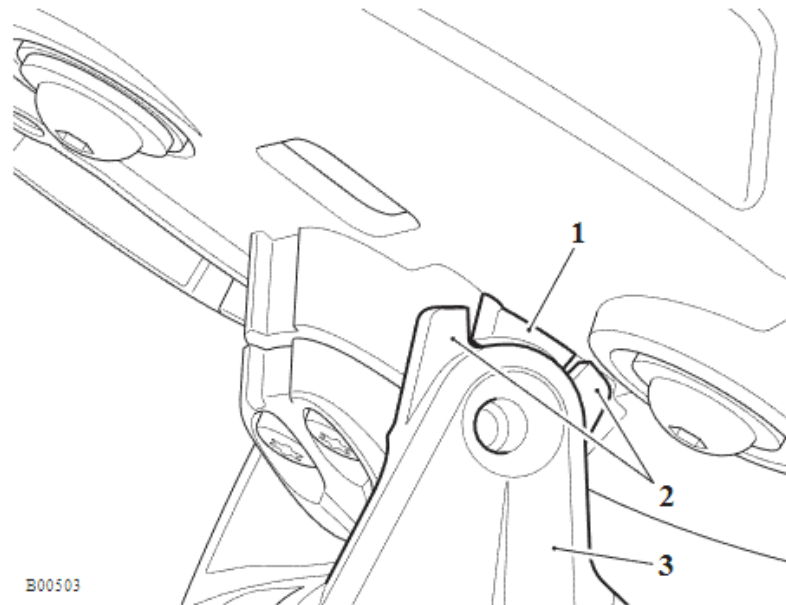
- |                |
|----------------|
| 1. Flanged pin |
| 2. Bearing     |
| 3. Mounting    |

4. When fitting the instruments assembly to the instruments riser, make sure the flat edge on the flanged pins align with the flat edge on the riser (instruments removed for clarity).



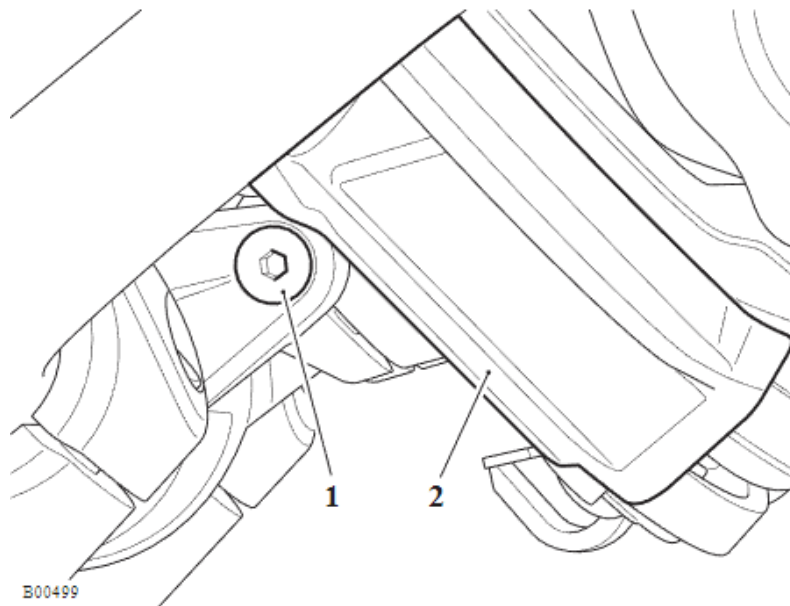
- |                      |
|----------------------|
| 1. Flanged pin       |
| 2. Instruments riser |
| 3. Flat edge         |

5. With the instruments assembly positioned onto the instruments riser, make sure the lug on the right hand side of the mounting is positioned between the two adjuster stops on the riser.



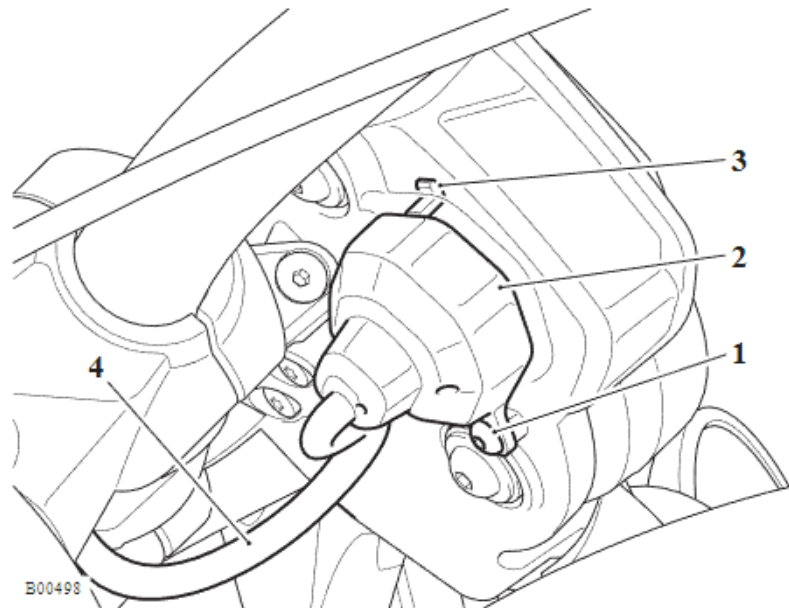
- |   |
|---|
| <ol style="list-style-type: none"><li>1. Lug</li><li>2. Adjuster stops</li><li>3. Instruments riser</li></ol> |
|---|

6. Fit the fixings and tighten to 5.5 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing (left hand side shown)</li><li>2. Instruments</li></ol> |
|---|

7. Connect the electrical connector to the instruments.
8. Fit the cover to as noted for removal and tighten the fixing to 3 Nm.
9. Attach the instruments harness to its retaining clip.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Cover</li><li>3. Retaining lug</li><li>4. Instruments harness</li></ol> |
|--|

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

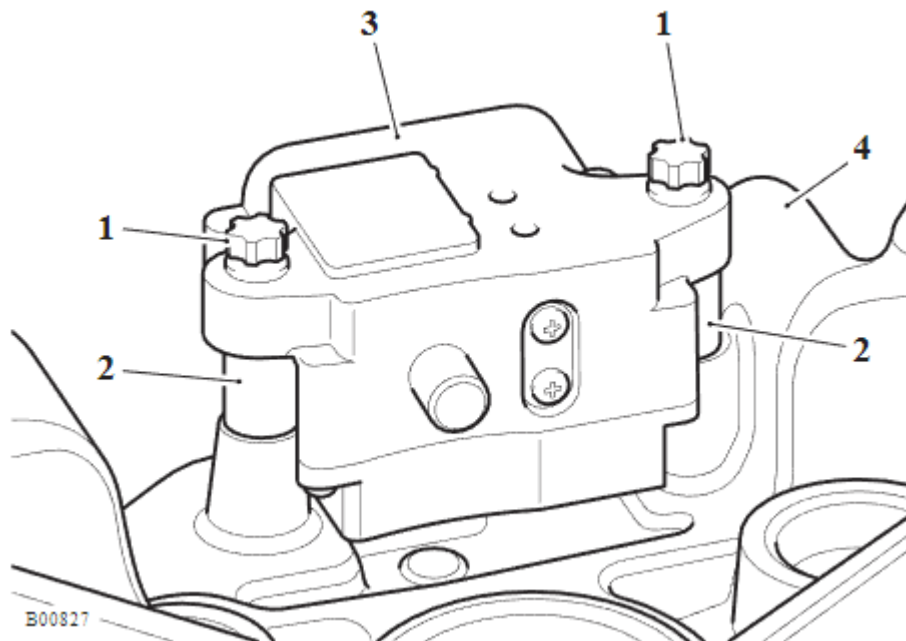
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Upper Yoke - Removal](#)

1. Remove the shear bolts and remove the electronic steering lock. Collect the spacers.



1. Shear bolts
2. Spacers
3. Electronic steering lock
4. Upper yoke

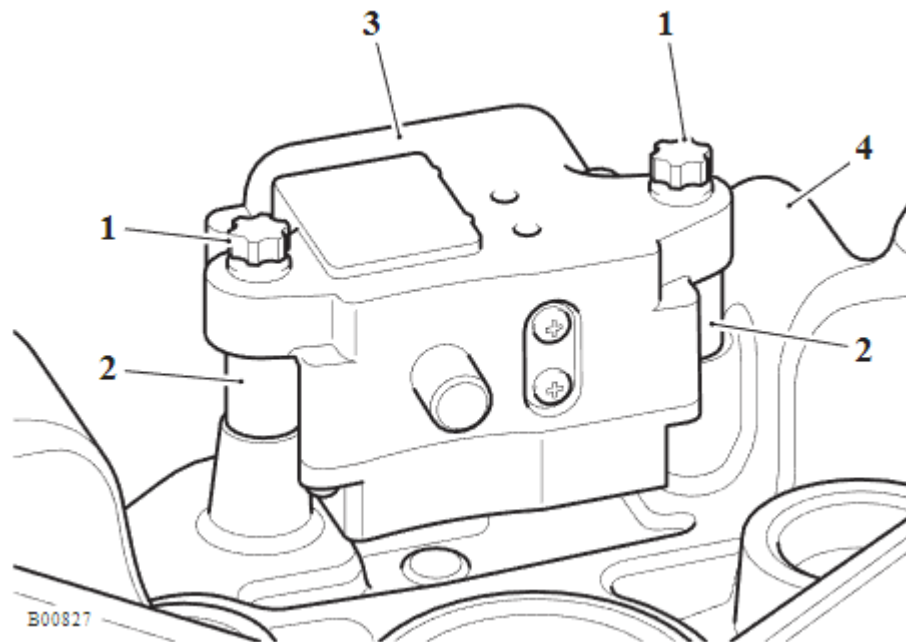
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Align the electronic steering lock and spacers to the upper yoke. Install new shear bolts and tighten until the heads shear off.



1. Shear bolts
2. Spacers
3. Electronic steering lock
4. Upper yoke

Perform the following operations:

- [Upper Yoke - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

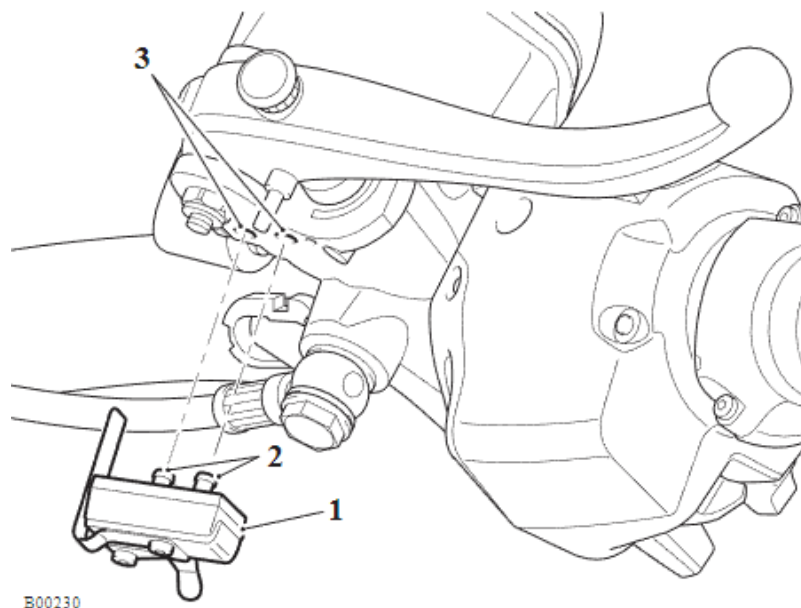
- [Seat - Removal](#)
- [Battery - Removal](#)

## NOTICE

The clutch switch is secured to its housing by two fixings. The clutch switch housing is a press fit to the clutch master cylinder.

Note the orientation of the clutch switch for installation.

1. Carefully detach the clutch switch assembly from the master cylinder.



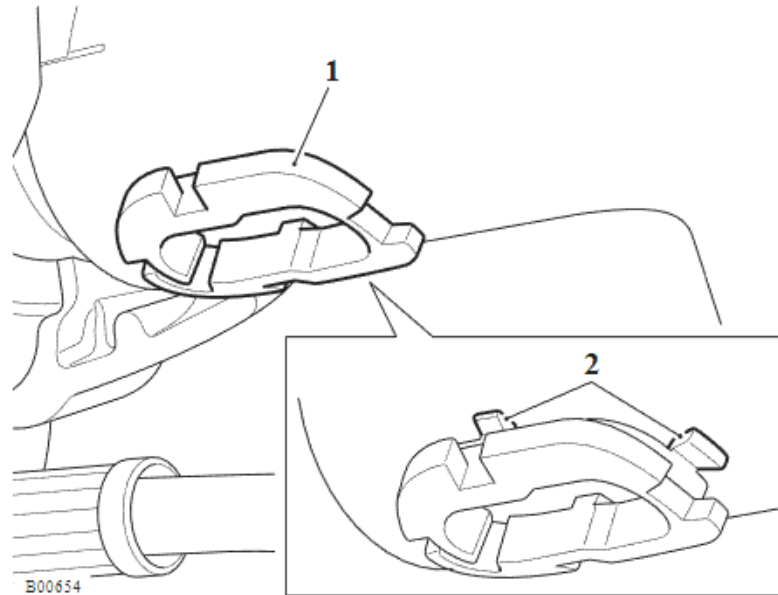
1. Clutch switch
2. Securing lugs
3. Location holes



## NOTICE

Three locating lugs hold the plastic grommet in position.

2. Press in the sides of the left hand plastic grommet to release two of the locating lugs and remove the grommet.



1. Plastic grommet (harness removed for clarity)
2. Locating lugs (two of three shown)

3. Carefully slide the clutch switch harness out of the handlebar to access the electrical connector.
4. Disconnect the electrical connector and remove the clutch switch.

### Clutch Switch – Installation

## **⚠ WARNING**

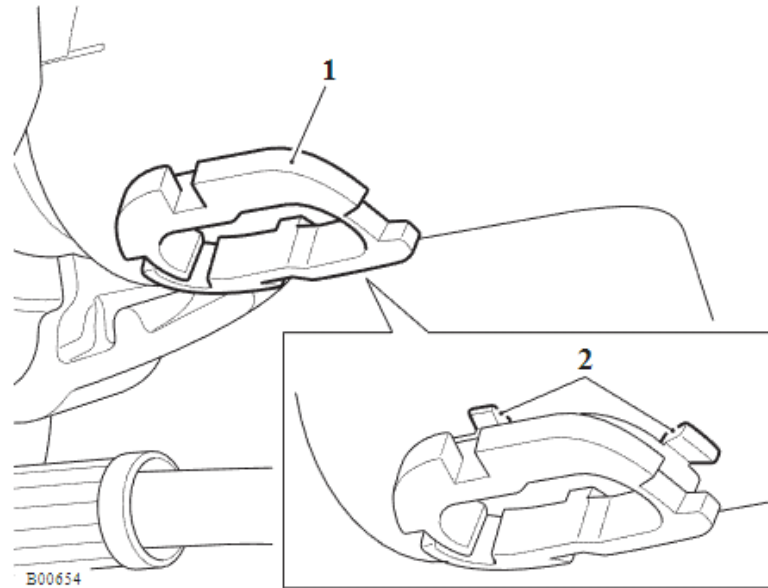
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

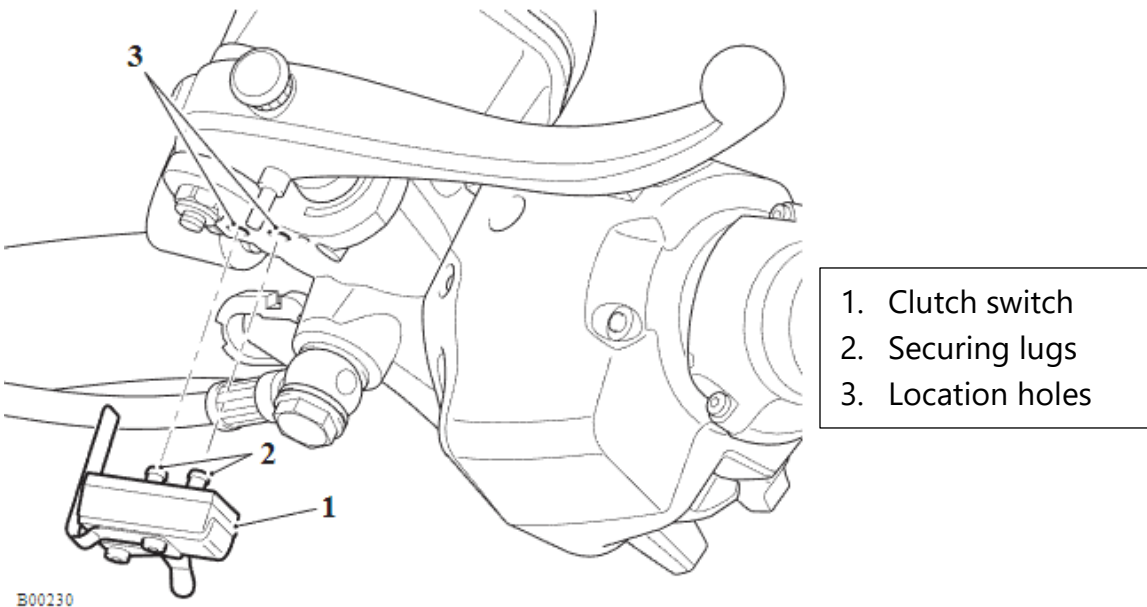
Perform the following operations:

1. Connect the clutch switch to the switch housing subharness.
2. Carefully slide the clutch switch harness in to the handlebar.
3. Fit the plastic grommet to the left hand side of the handlebar.



1. Plastic grommet (harness removed for clarity)
2. Locating lugs (two of three shown)

4. Attach the clutch switch assembly to the master cylinder as noted for removal.



1. Clutch switch
2. Securing lugs
3. Location holes

- [Battery - Installation](#)
- [Seat - Installation](#)

## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

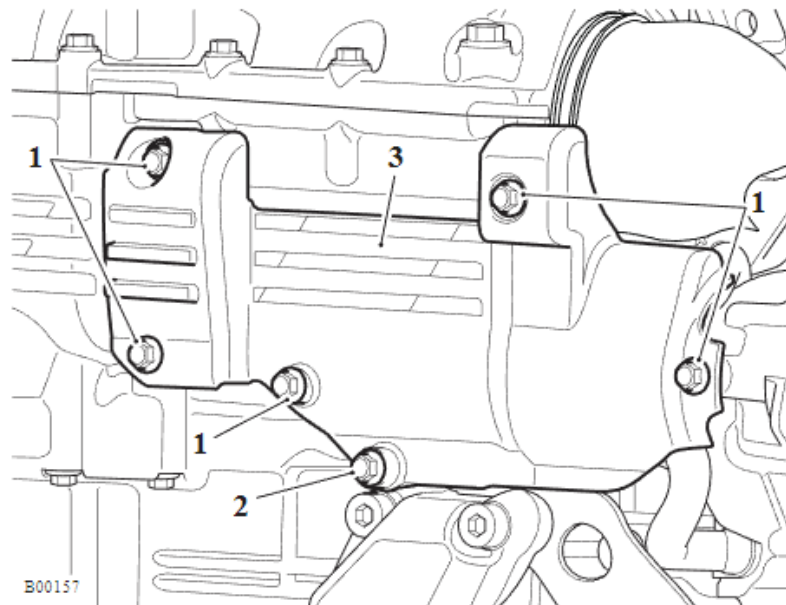
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Battery Box - Removal](#)

## NOTICE

The front upper fixing also secures the drive shaft cover.

Note the positions of the M6 x 20mm and M6 x 42mm fixings for installation.

1. Release the fixings and remove the starter motor cover.

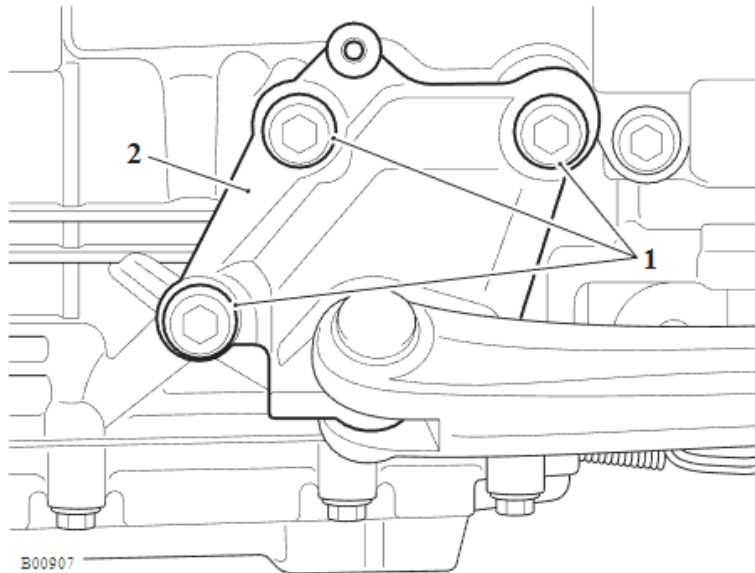


1. Fixings M6 x 20mm
2. Fixing M6 x 42mm
3. Starter motor cover

## NOTICE

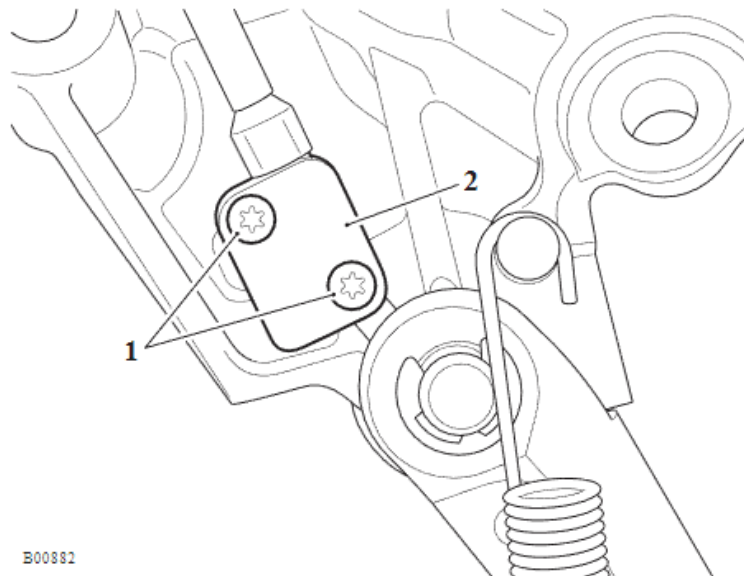
Note the routing of the side stand harness for installation.

2. Disconnect the side stand switch from the main harness. Route the side stand harness down to the switch.
3. Release the fixings and detach the side stand assembly from the crankcase.



1. Fixings
2. Side stand assembly

4. Release the fixings and remove the side stand switch. Discard the fixings.



1. Fixings
2. Side stand switch

## Side Stand Switch – Installation

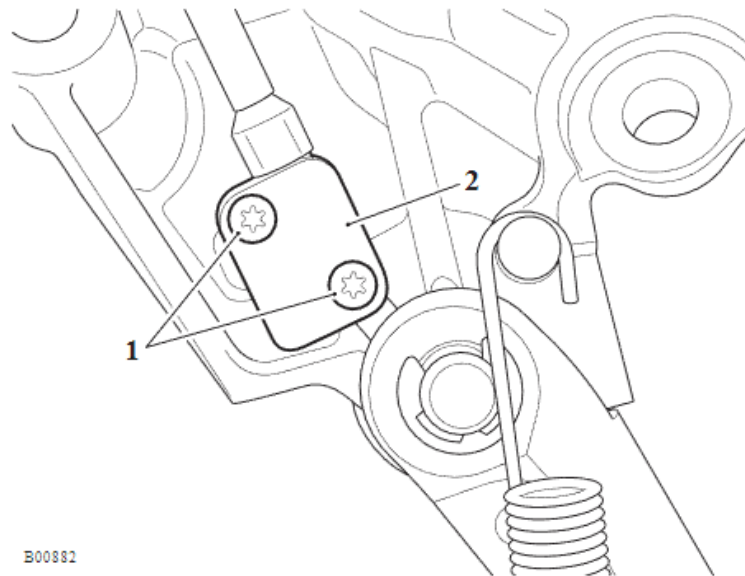
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

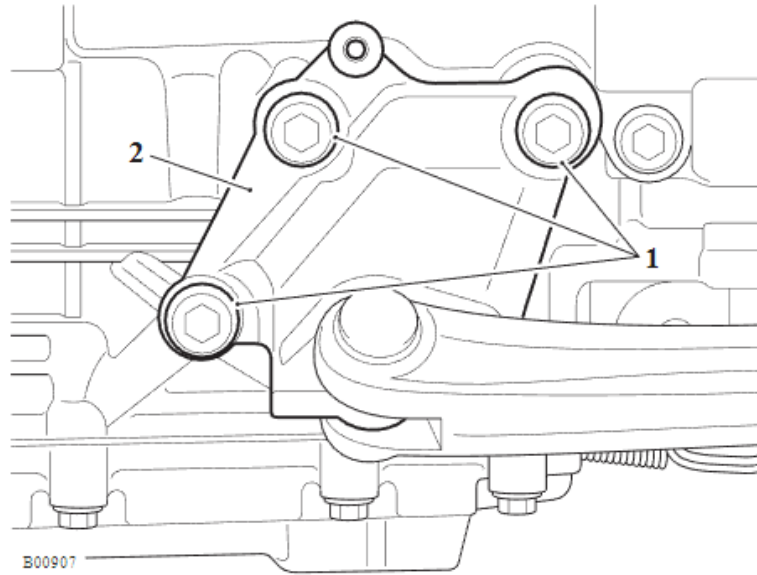
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the side stand switch to the side stand bracket and tighten the new fixings to 3 Nm.



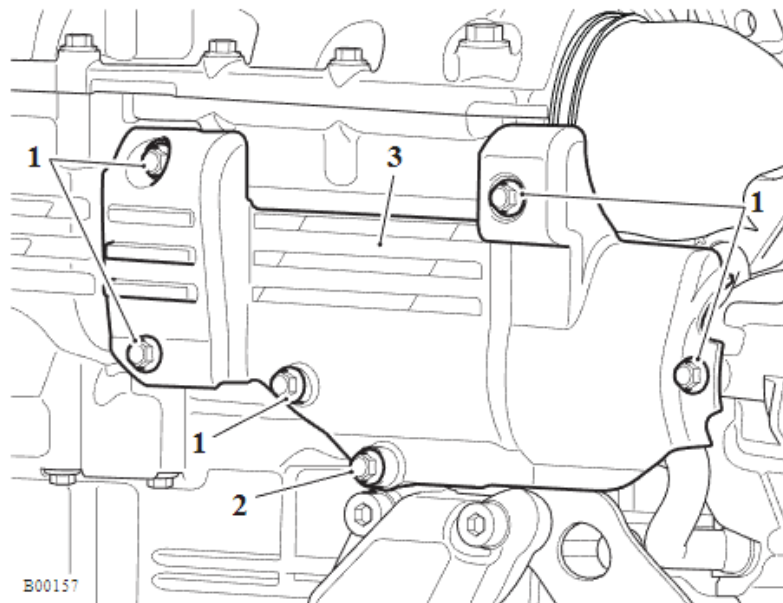
1. Fixings
2. Side stand switch

2. Fit the side stand assembly to the crankcase and tighten the fixings to 41 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Side stand assembly</li></ol> |
|---|

3. Route the side stand harness as noted for removal and connect to the main harness.
4. Fit the starter motor cover tighten the M6 x 20 mm fixings to 9 Nm.
5. Tighten the M6 x 42 mm fixings to 7 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings M6 x 20mm</li><li>2. Fixing M6 x 42mm</li><li>3. Starter motor cover</li></ol> |
|---|

Perform the following operations:

- [Left Hand Control Plate - Installation](#)
- [Battery Box - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Starter Motor – Removal

### **WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

### **CAUTION**

Damage to painted surfaces could result from inadequate care during removal or installation of the starter motor. Always protect the crankcase from damage during removal or installation.

Perform the following operations:

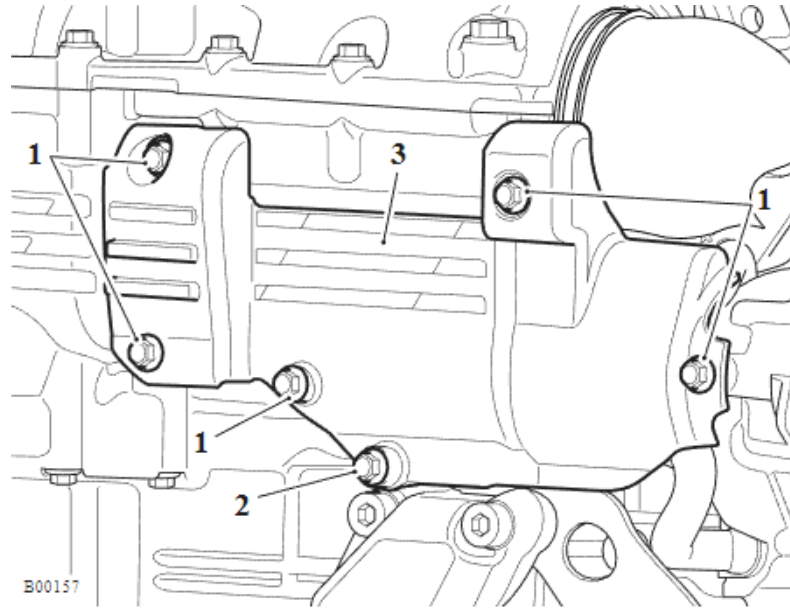
- [Seat - Removal](#)
- [Battery - Removal](#)

### **NOTICE**

The front upper fixing also secures the drive shaft cover.

Note the positions of the M6 x 20mm and M6 x 42mm fixings for installation.

1. Release the fixings and remove the starter motor cover.



1. Fixings M6 x 20mm
2. Fixing M6 x 42mm
3. Starter motor cover

#### **NOTICE**

Note the routing of the alternator harness, starter motor cable and the Triumph shift assist harness for installation.

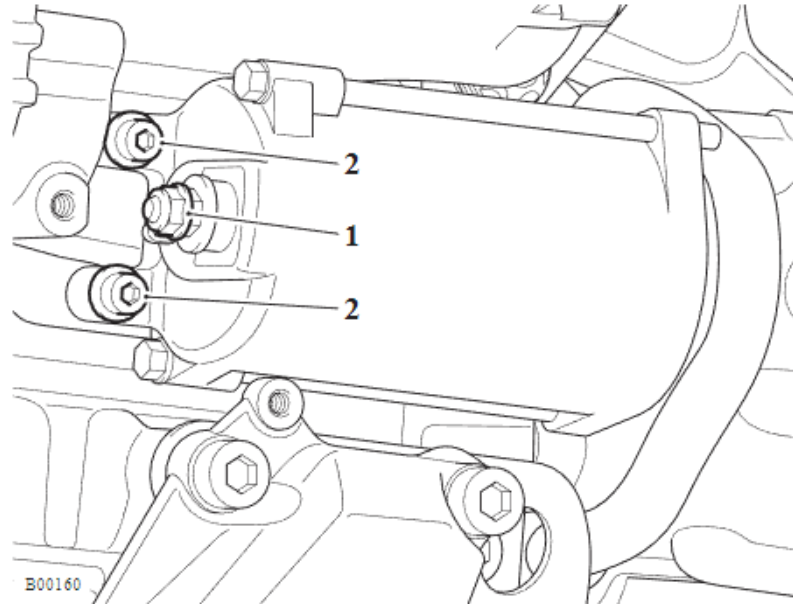
2. Ease the rubber boot from the starter cable, release the nut and disconnect the cable.
3. Protect the crankcase painted surfaces from damage, using a suitable self-adhesive tape such as masking tape.

#### **NOTICE**

The lower fixing for the starter motor also secures the ground cable and the Triumph shift assist harness bracket. Note the position of these components for installation.



4. Release the two fixings and carefully remove the starter motor.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Nut</li><li>2. Fixings</li></ol> |
|---|

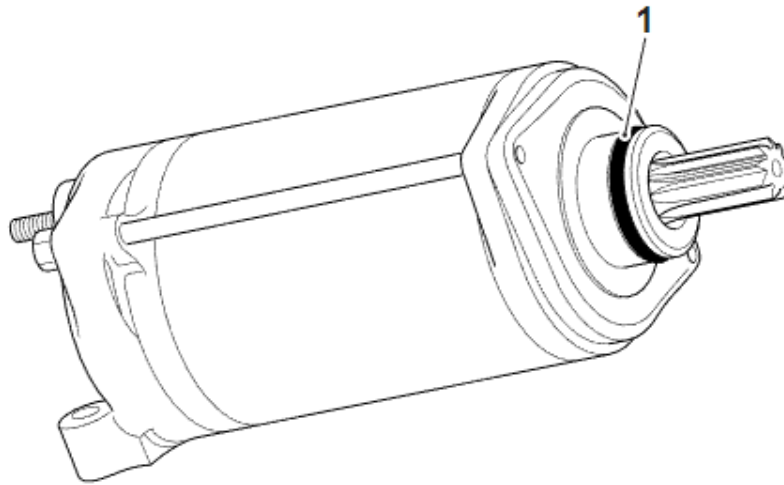
#### Starter Motor – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new O-ring to the starter motor.

2. Lubricate the starter motor O-ring with a small amount of petroleum jelly.

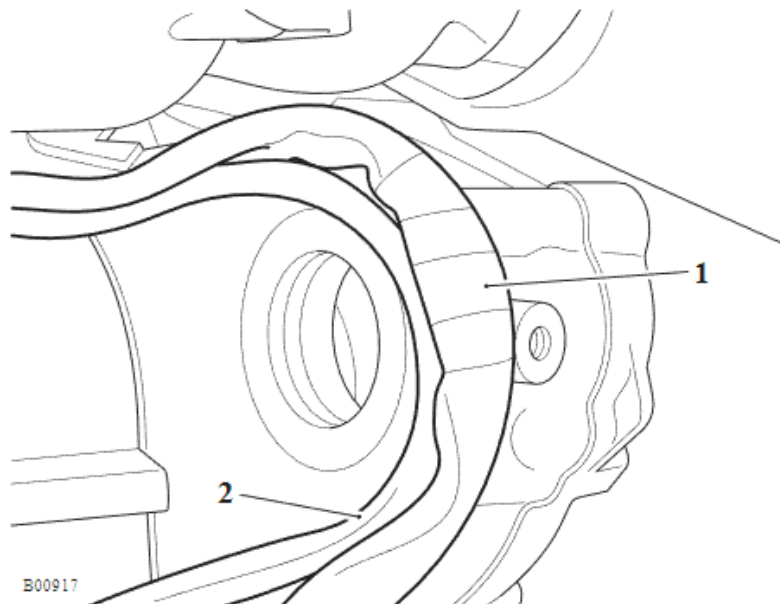


1. O-ring

**NOTICE**

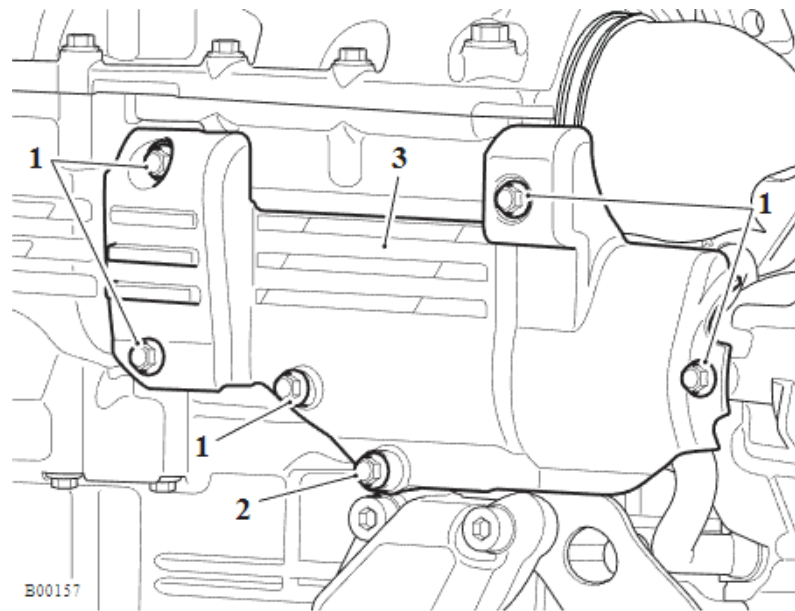
Make sure that when fitting starter motor not to pinch or trap the starter motor lead between the crankcase and starter motor upper mounting bolt.

3. Make sure the alternator harness and the starter motor cable are routed as noted for removal.



1. Alternator harness
2. Starter motor cable

- Carefully fit the starter motor to the crankcase.
- Fit the ground cable and Triumph shift assist harness bracket as noted for removal and tighten its fixings to 9 Nm.
- Fit the starter cable to its connection pole and tighten the nut to 5 Nm.
- Refit the rubber boot.
- Fit the starter motor cover tighten the M6 x 20 mm fixings to 9 Nm.
- Tighten the M6 x 42 mm fixings to 7 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings M6 x 20mm</li><li>2. Fixing M6 x 42mm</li><li>3. Starter motor cover</li></ol> |
|---|

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

**⚠ CAUTION**

When turning the crankshaft at the front of the engine (clutch cover end) always turn anticlockwise.

When turning the crankshaft at the rear of the engine (alternator cover end) always turn clockwise.

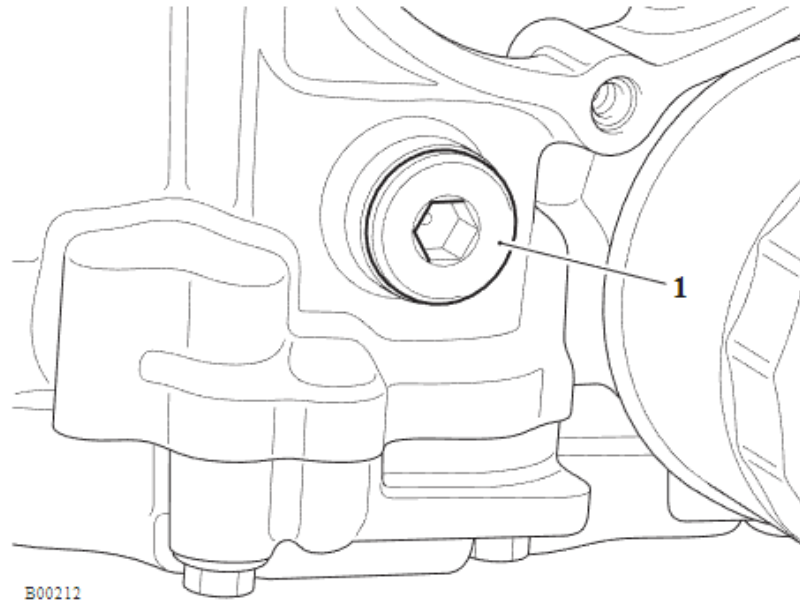
Turning the crankshaft in the wrong direction may cause the camshaft drive chain to slip on the camshaft sprockets resulting in incorrect camshaft timing.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Alternator Cover - Removal](#)

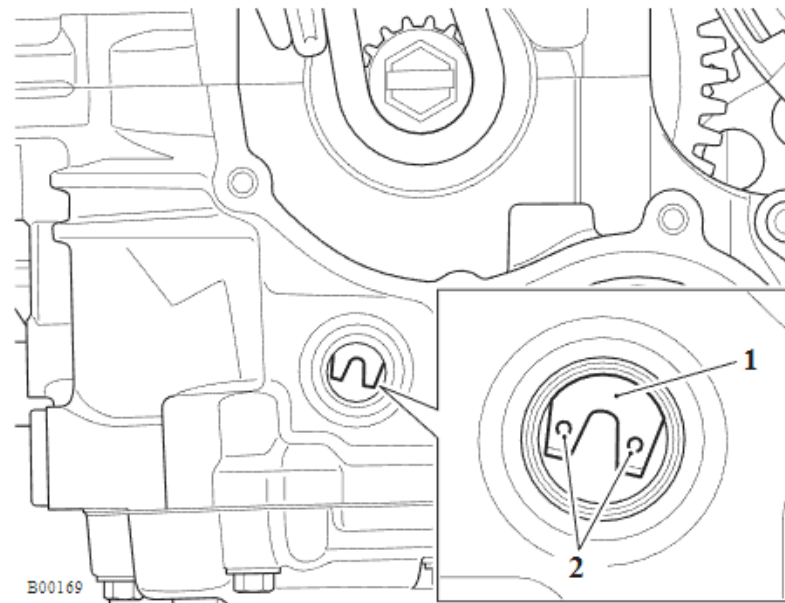
1. Remove the spark plugs to reduce compression resistance when turning the engine (see Spark Plugs - Check/Renew).

2. Remove the crankshaft locking pin plug from the crankcase.



1. Locking pin plug

3. Turn the crankshaft anticlockwise until the two gear teeth with an alignment mark on each is visible in the hole for the crankshaft locking pin.

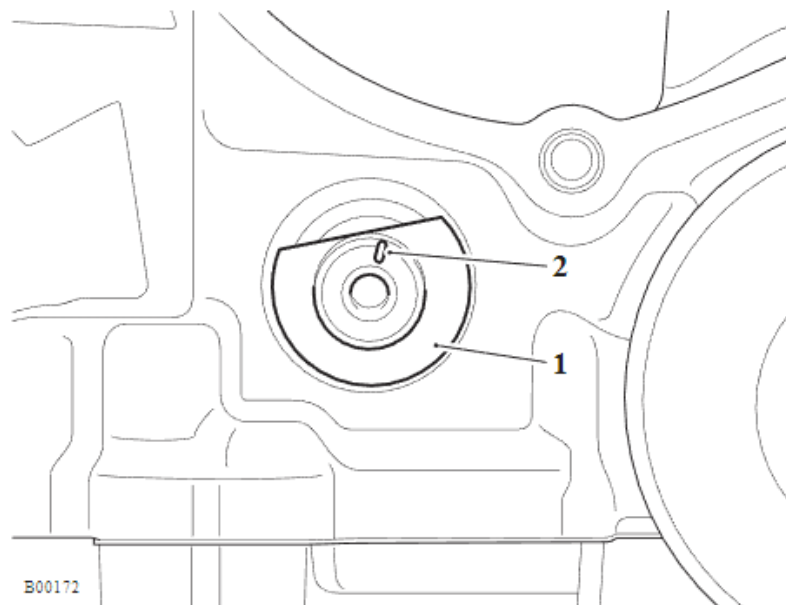


1. Crankshaft primary gear  
2. Alignment marks

### NOTICE

The alignment mark on the flange of T3880501 - Crankshaft Locking Pin is in line with the gear tooth at the other end of the service tool. Use this alignment mark as a guide when inserting the service tool.

4. Insert service tool T3880501 through the hole in the crankcase. Make sure the gear tooth on the service tool fits between the two teeth with the alignment marks.



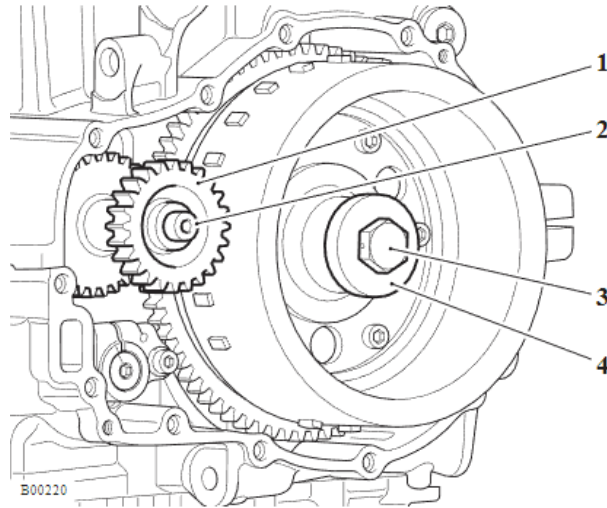
1. T3880501 - Crankshaft Locking Pin
2. Alignment mark

### NOTICE

Note the orientation of the starter drive idler gear for installation.

5. Remove the starter drive idler gear and its shaft.

6. Remove the alternator rotor fixing and washer.

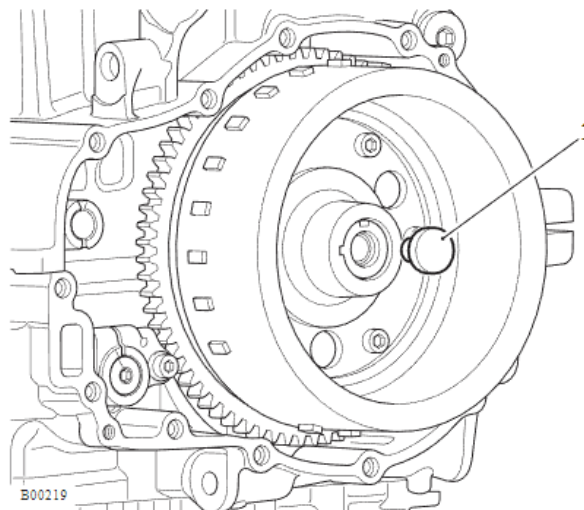


1. Idler gear
2. Shaft
3. Fixing
4. Washer

**⚠ WARNING**

The rotor magnets are very strong. When fitting the service tools to the rotor the magnets may 'grab' the service tool, causing injury to the hands or fingers. When installing the service tools, wear suitable gloves to protect hands and fingers.

7. Locate the spigot from the larger of the two thrust pads supplied with service tool T3880365 to the crankshaft.



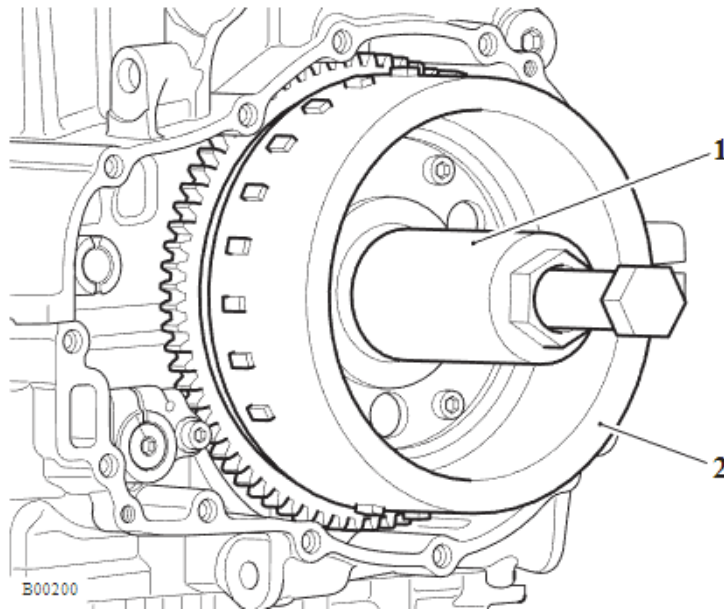
1. Thrust pad

8. Assemble service tool T3880365 to the threaded centre section of the rotor.

**NOTICE**

Make sure that the thrust pad does not fall out during assembly of the tool.

9. Hold the outer of the tool to prevent rotation then tighten the draw-bolt in the centre of the tool to release the taper seating of the rotor from the crankshaft.



- 1. T3880365 - Alternator Housing Puller
- 2. Alternator rotor

10. Withdraw the rotor and tool as an assembly and then separate the tool from the rotor. Collect the Woodruff Key and the tool thrust pad from the crankshaft.



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Refit the Woodruff key to the crankshaft.
2. Assemble the rotor to the key way on the crankshaft, ensuring the Woodruff key remains in position. Fit the washer and fixing.
3. Tighten the rotor retaining fixing in the following two stages:

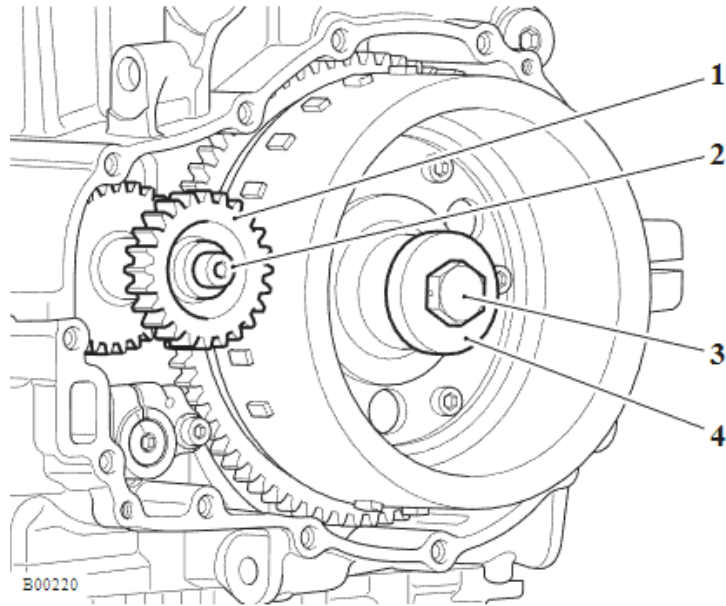
Stage 1

4. Tighten the fixing to 85 Nm.

Stage 2

5. Tighten the fixing to 160 Nm.

6. Fit the starter drive idler gear and its shaft.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Idler gear</li><li>2. Shaft</li><li>3. Fixing</li><li>4. Washer</li></ol> |
|--|

Perform the following operations:

- [Alternator Cover - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)
- [Crankshaft Position Adaption \(European Markets Only\)](#)

Alternator Stator – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Alternator Cover - Removal](#)

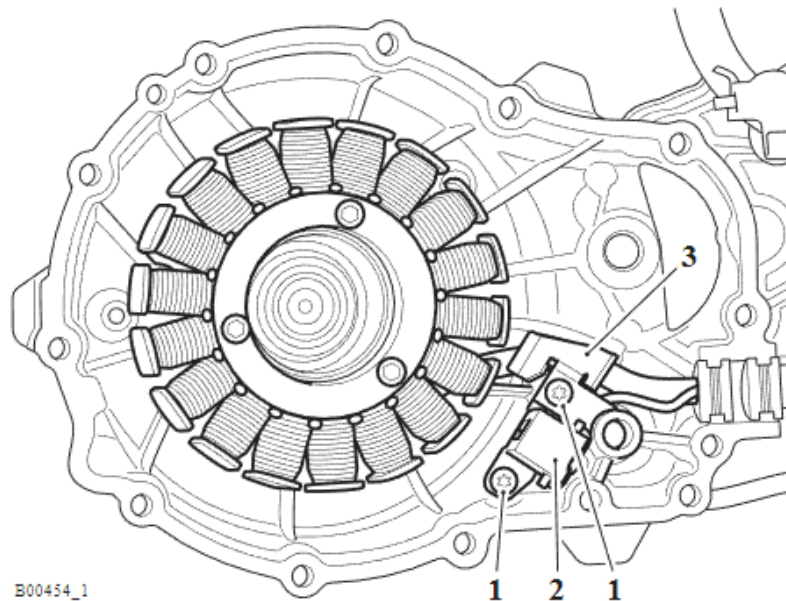
#### NOTICE

If the alternator stator needs to be replaced, the crankshaft position sensor will also be replaced as they are one assembly.

Note the position of the cable guide for installation

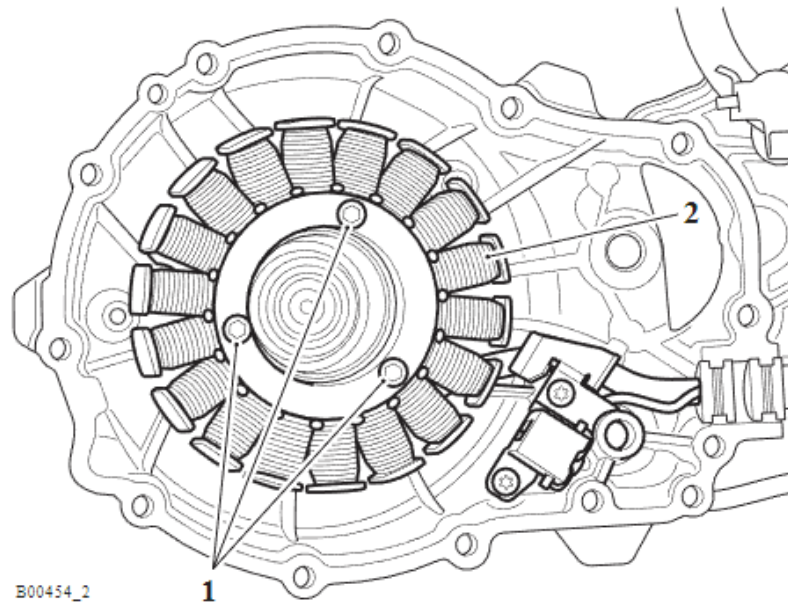
Note the routing of the stator harness for installation.

1. Remove and discard the fixings securing the crankshaft position sensor and the cable guide to the alternator cover.



1. Fixings
2. Crankshaft position sensor
3. Cable guide

2. Remove and discard the fixings securing the stator to the alternator cover and remove the stator.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Stator</li></ol> |
|--|

#### Alternator Stator – Installation

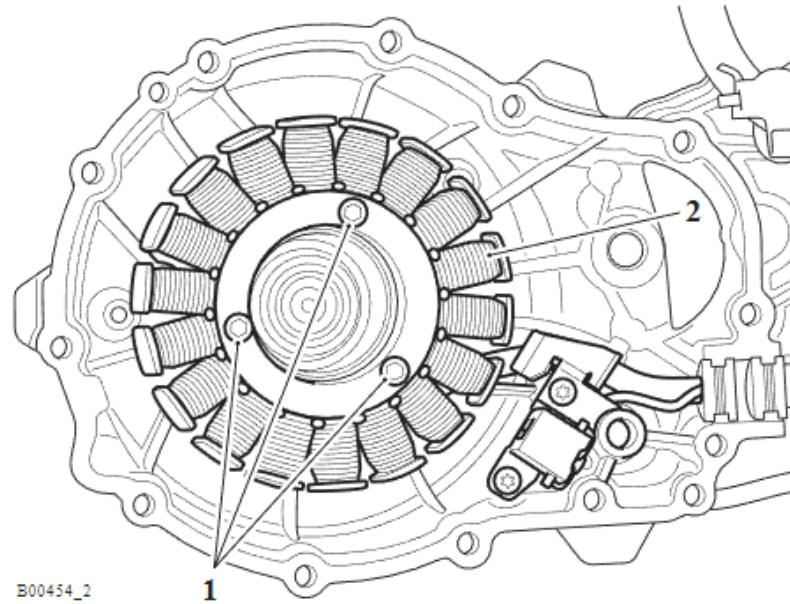
### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

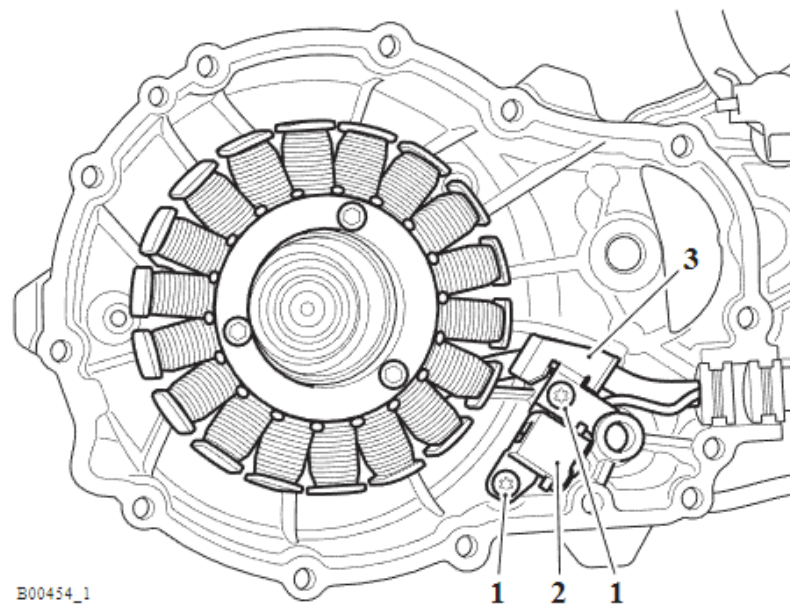
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the stator to the alternator cover and tighten its new fixings to 12 Nm



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Stator</li></ol> |
|--|

2. Route the harness as noted for removal.
3. Fit the cable guide and crankshaft position sensor as noted for removal. Tighten the new fixings to 6 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Crankshaft position sensor</li><li>3. Cable guide</li></ol> |
|---|

Perform the following operations:

- [Alternator Cover - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)
- [Crankshaft Position Adaption \(European Markets Only\)](#)

Alternator Regulator/Rectifier – Removal

**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Coolant Expansion Tank - Removal](#)

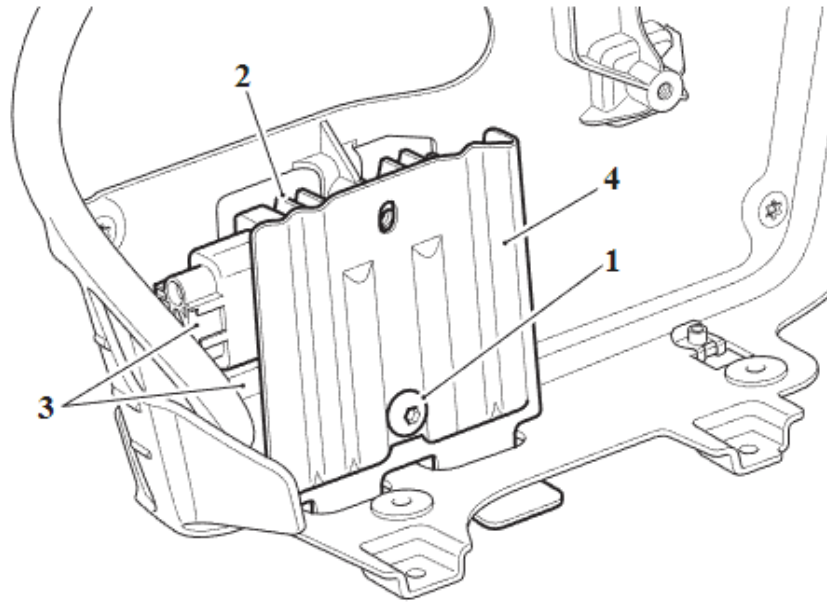
**NOTICE**

Note the position and orientation of the heat shield for installation.

Note the positions of the electrical connectors for installation.

1. Remove the fixing, disconnect the two electrical connectors and remove the regulator/rectifier.

2. If required, remove the heat shield.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Regulator/rectifier</li><li>3. Connectors</li><li>4. Heat shield</li></ol> |
|---|

#### Alternator Regulator/Rectifier – Installation

### **⚠ WARNING**

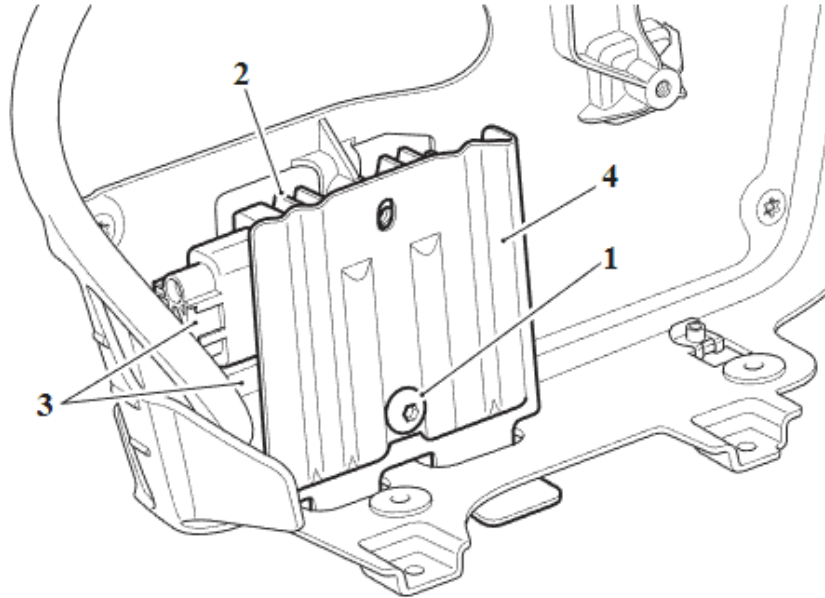
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, fit the heat shield as noted for removal.
2. Reconnect the two electrical connectors to the regulator/rectifier as noted for removal.

3. Fit the regulator/rectifier to the heat shield, fit the new lower fixing and tighten to 4 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixing</li><li>2. Regulator/rectifier</li><li>3. Connectors</li><li>4. Heat shield</li></ol> |
|---|

Perform the following operations:

- [Coolant Expansion Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)



**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

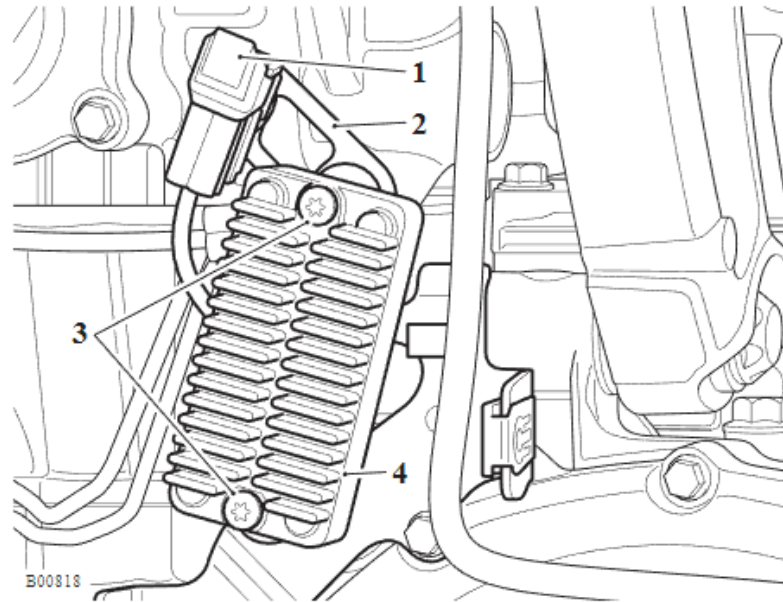
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Coolant Expansion Tank - Removal](#)
- [Radiator - Removal](#)

1. Disconnect the cooling fan from the main harness and detach its electrical connector from the bracket.

**NOTICE**

Note the positions and orientations of the grommets, flanged sleeves and washers for installation.

2. Release the fixings and remove the cooling fan connector. Discard the lock nuts.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Connector</li><li>2. Bracket</li><li>3. Fixings</li><li>4. Cooling fan controller</li></ol> |
|--|

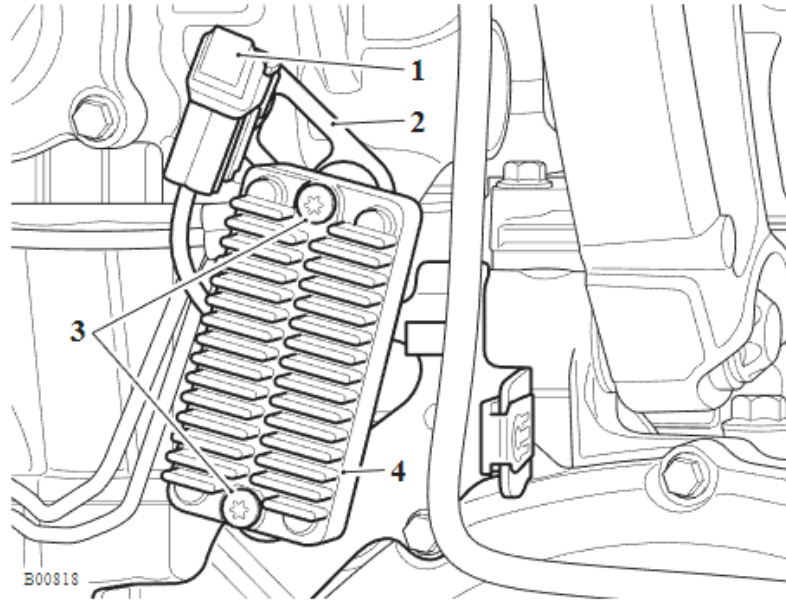
#### Cooling Fan Controller – Installation

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.  
A correctly supported motorcycle will help prevent it from falling.  
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the cooling fan controller to its bracket. Fit the grommets, flanged sleeves, washers and fixings as noted for removal. Tighten the fixings to 3 Nm.

2. Connect the cooling fan to the main harness and attach the cooling fan electrical connector to the bracket.



1. Connector
2. Bracket
3. Fixings
4. Cooling fan controller

Perform the following operations:

- [Radiator - Installation](#)
- [Coolant Expansion Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

For the removal of the heated twist grip see [Heated Twist Grip - Removal](#).

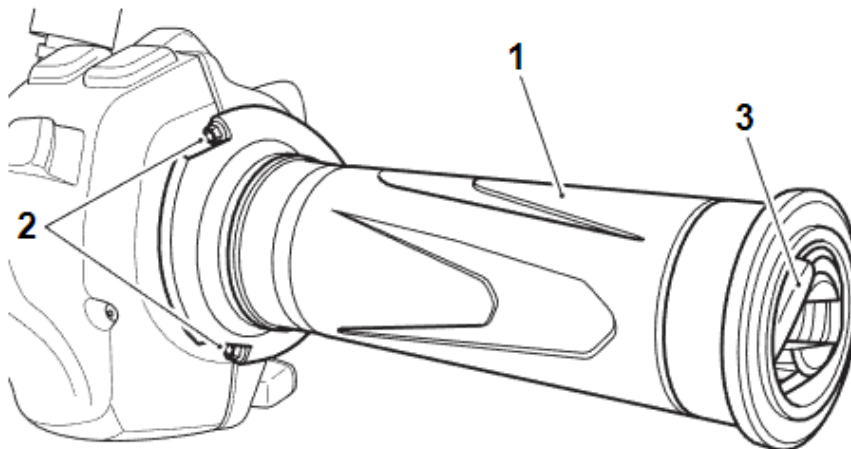
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Mirrors - Removal](#)

## NOTICE

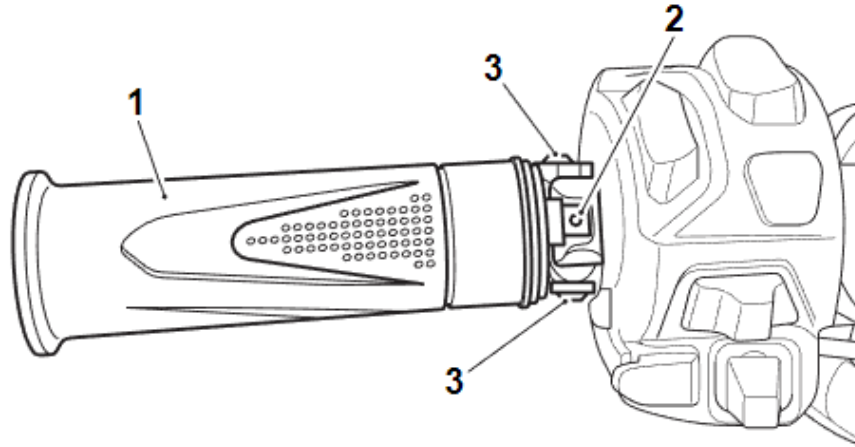
Note the orientation of the heated grip wires prior to removal of the heated grip.

1. Release the two fixings and remove the heated grip switch housing cover from the left hand grip. Collect the two fixings.



1. Left hand handlebar grip
2. Fixings
3. Heated grip wire

2. Release the two fixings securing the left hand heated grip to the handlebar and collect the two washers.



1. Heated grip
2. Heated grip switch
3. Fixings

3. Carefully slide the heated grip off the handlebar to access the electrical connector.
4. Disconnect the electrical connector and remove the heated grip.

#### Heated Grip - Installation (if fitted)

### **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

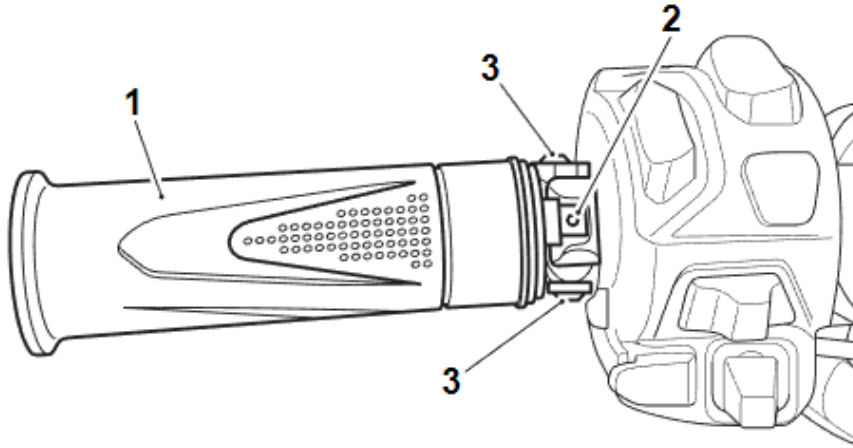
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

For the installation of the heated twist grip see [Heated Grip - Installation \(if fitted\)](#).

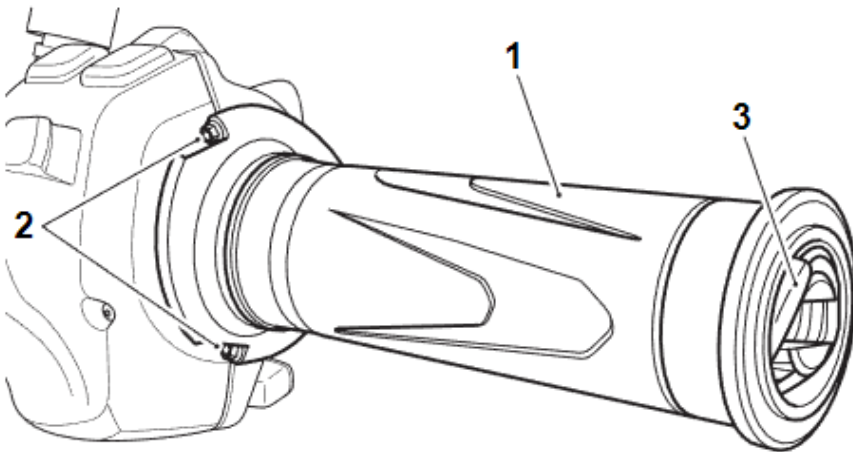
1. Connect the heated grip harness connector to the main harness.
2. Carefully fit the left hand heated grip to the handlebar.

3. Fit the two fixings and washers. Tighten the fixings to 3 Nm.



- 1. Heated grip
- 2. Heated grip switch
- 3. Fixings

4. Refit the heated grips switch housing covers. Tighten the fixings to 0.5 Nm.



- 1. Left hand handlebar grip
- 2. Fixings
- 3. Heated grip wire

## ⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

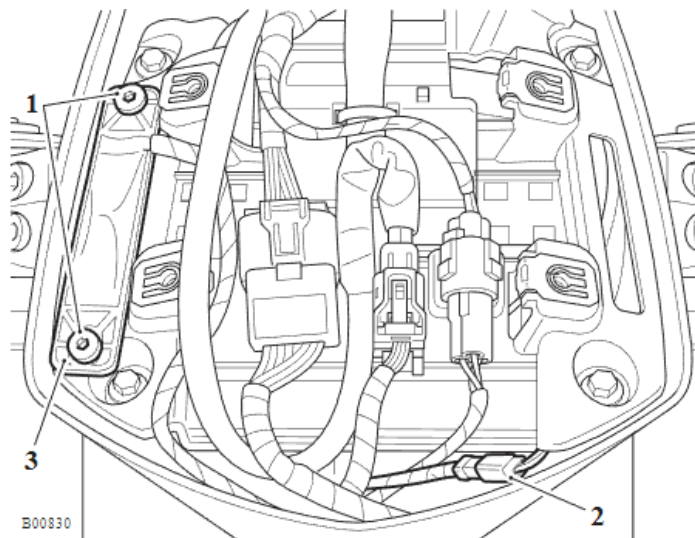
## NOTICE

Note the routing of the LF antenna harness for installation.

Note the orientation of the LF antenna for installation.

Front Low Frequency (LF) Antenna

1. Remove the flyscreen (see [Flyscreen - Removal](#)).
2. Remove the fixings and detach the LF antenna from the flyscreen mounting.
3. Disconnect the LF antenna electrical connector from the main harness and remove the LF antenna.



1. Fixings
2. Electrical connector
3. LF Antenna

## Rear Low Frequency (LF) Antenna

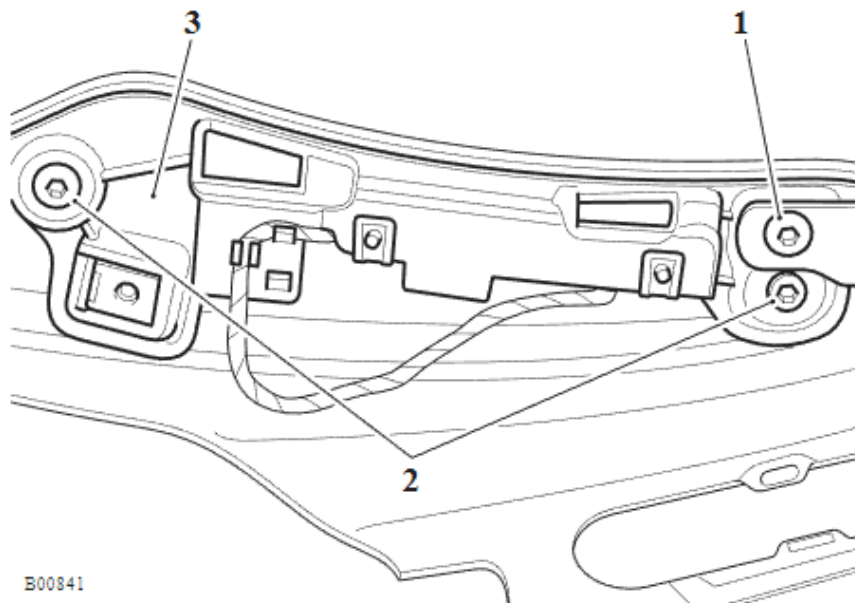
1. Remove the passenger seat backrest (see [Passenger Seat Backrest - Removal](#)).
2. Remove the rear mudguard (see [Rear Mudguard - Removal](#)).

### NOTICE

To prevent damage to the rear mudguard painting finish, place the mudguard on a clean, flat surface which is covered with a soft cloth.

Note the orientation of the left hand mudguard carrier for installation.

3. Remove the fixing securing the rear light to the left hand mudguard carrier.
4. Release the fixings and remove the left hand mudguard carrier.



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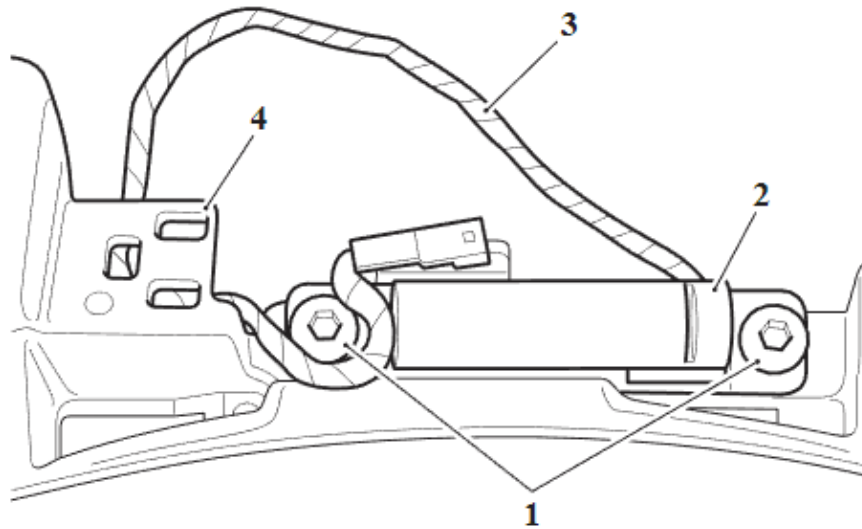
1. Rear light fixing
2. Fixings
3. Left hand mudguard carrier

### NOTICE

Note the routing of the LF antenna harness for installation.



5. Release the fixings and remove the LF antenna.



1. Fixings
2. LF antenna
3. Harness
4. Mudguard carrier

#### Low Frequency (LF) Antenna – Installation

### **⚠ WARNING**

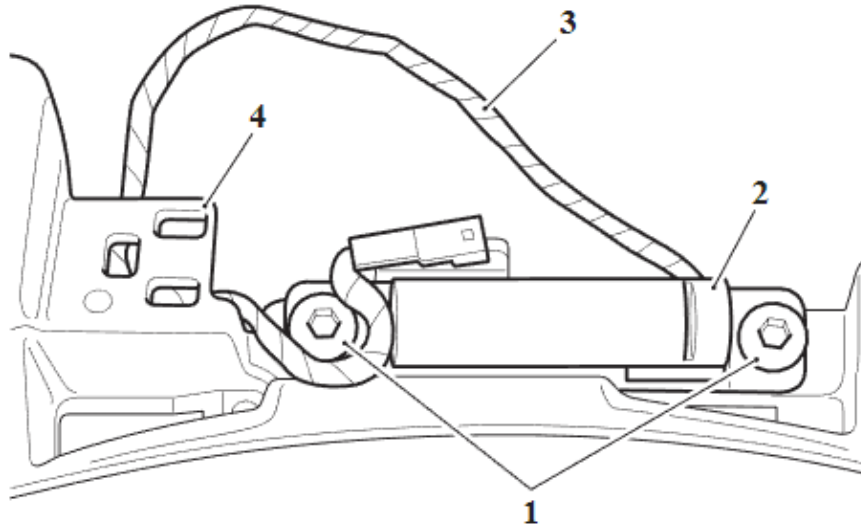
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

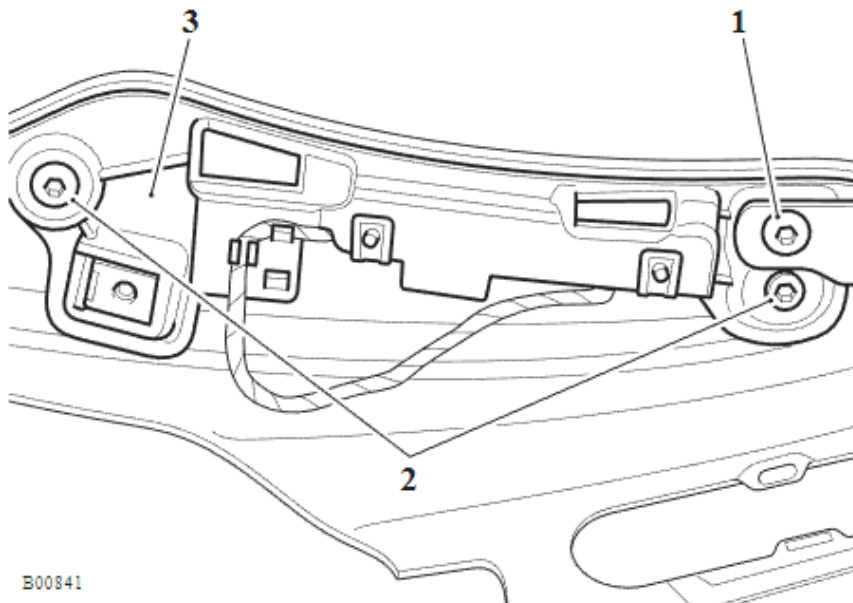
#### Rear Low Frequency (LF) Antenna

1. Fit the LF antenna as noted for removal and tighten the fixings to 3 Nm.



- |   |
|---|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. LF antenna</li><li>3. Harness</li><li>4. Mudguard carrier</li></ol> |
|---|

2. Route the LF antenna harness as noted for removal.
3. Fit the left hand mudguard carrier to the mudguard as noted for removal. Tighten the fixings to 3 Nm.
4. Secure the rear light to the left hand mudguard carrier. Tighten the fixing to 3 Nm.

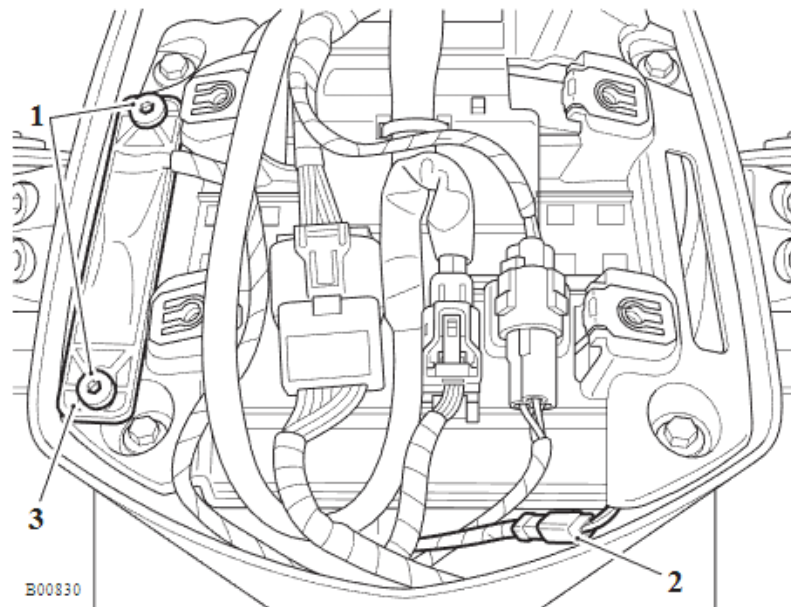


- |   |
|---|
| <ol style="list-style-type: none"><li>1. Rear light fixing</li><li>2. Fixings</li><li>3. Left hand mudguard carrier</li></ol> |
|---|

4. Fit the rear mudguard (see [Rear Mudguard - Installation](#)).
5. Fit the passenger seat backrest (see [Passenger Seat Backrest - Installation](#)).

#### Front Low Frequency (LF) Antenna

1. Route the LF antenna electrical connector as noted for removal and connect to the main harness.
2. Fit the LF antenna as noted for removal and tighten the fixings to 3 Nm.
3. Fit the flyscreen (see [Flyscreen - Installation](#)).



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Fixings</li><li>2. Electrical connector</li><li>3. LF Antenna</li></ol> |
|--|

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

## **⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

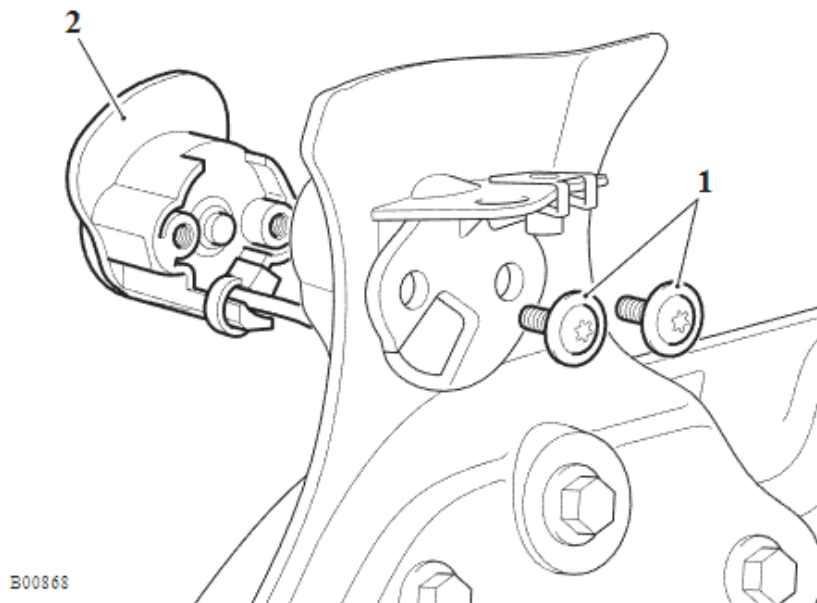
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Plenum - Removal \(US Markets Only\)](#)

1. Release the fixings and remove the ignition master switch.



1. Fixings
2. Ignition master switch

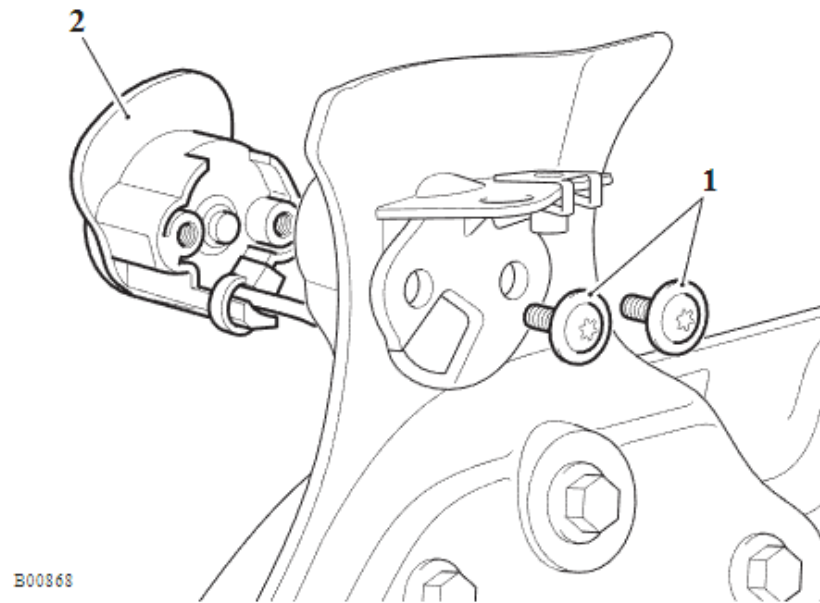
**⚠ WARNING**

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the ignition master switch to its bracket and tighten the fixings to 1.5 Nm.



1. Fixings
2. Ignition master switch

Perform the following operations:

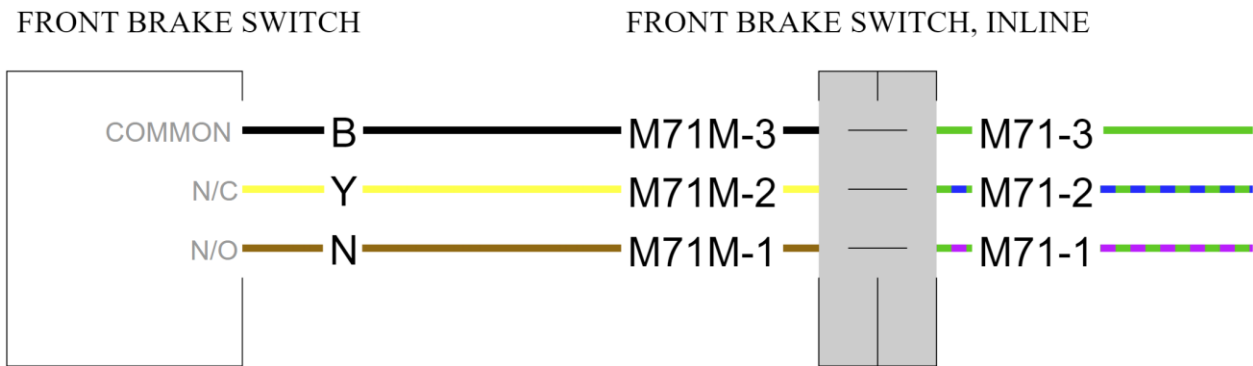
- [Plenum - Installation \(US Markets Only\)](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

The following is a description of the symbols and information found in the circuit diagrams for this model.

**NOTICE**

Wire colours and connector pin references shown in the illustrations below are examples and may differ from those contained in circuit diagrams for this model.

Components with a Fly lead and an In-line Connector



The illustration shows an example of a component with a fly lead and an in-line connector.

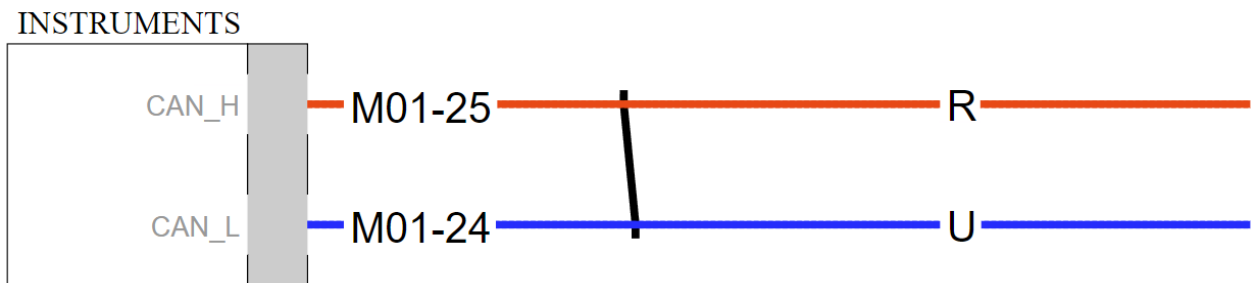
The component is represented by a white box, with fly lead wires leading to an in-line connector (shaded grey). Information provided with the component includes:

- The component name - located above the component.
- A function reference for each terminal - located inside the component, adjacent to the connecting wire (provided in English only).
- Wire colour references - located on each wire.
- An in-line connector name - located above the in-line connector.
- A component and pin number reference - located on each wire entering the in-line connector.

In the above example, the component and pin number references can be interpreted as follows:

|         |   |
|---------|---|
| M71     | Component reference for the front brake switch        |
| M       | Identifies the mating connector (component side only) |
| -       | Separator   |
| 1, 2, 3 | Connector pin number reference                        |

### Components with an Integral Connector



The illustration shows an example of a component with an integral connector.

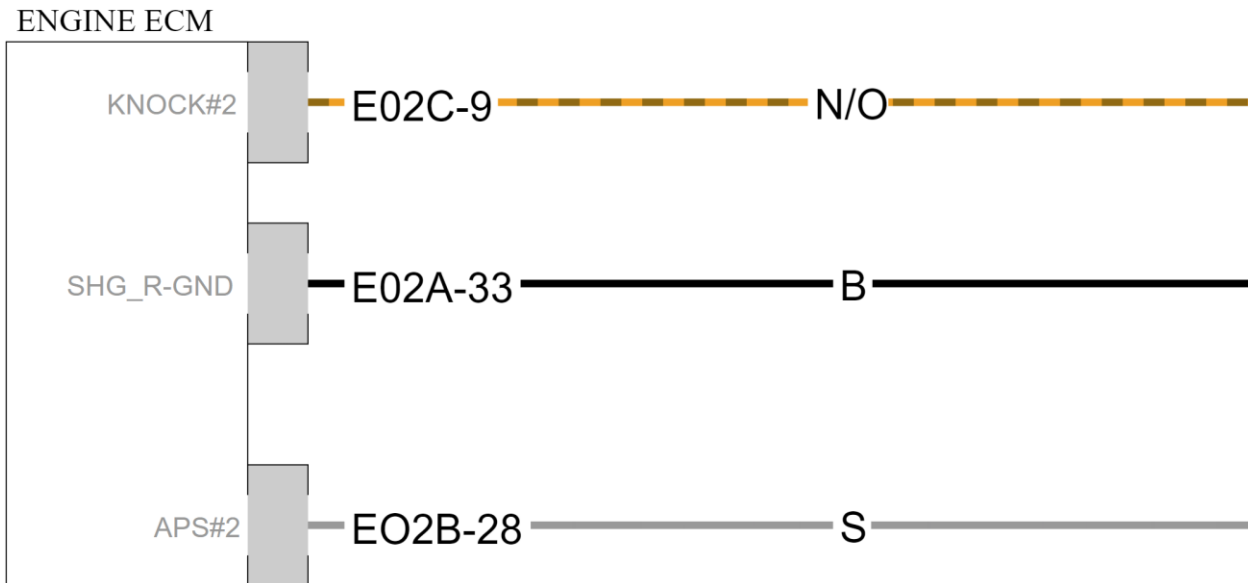
The component is identified by a white box, with a grey shaded area representing the integral connector. Information provided with the component includes:

- The component name - located above the component.
- A function reference for each terminal - located inside the component, adjacent to the connecting wire (provided in English only).
- Wire colour references - located on each wire.
- A component and pin number reference - located on each wire entering the integral connector.

In the above example, the component and pin number references can be interpreted as follows:

|        |   |
|--------|---|
| M01    | Component reference for the instruments |
| -      | Separator                               |
| 24, 25 | Connector pin number reference          |

## Components with Multiple Integral Connectors



The illustration shows an example of a component with multiple integral connectors.

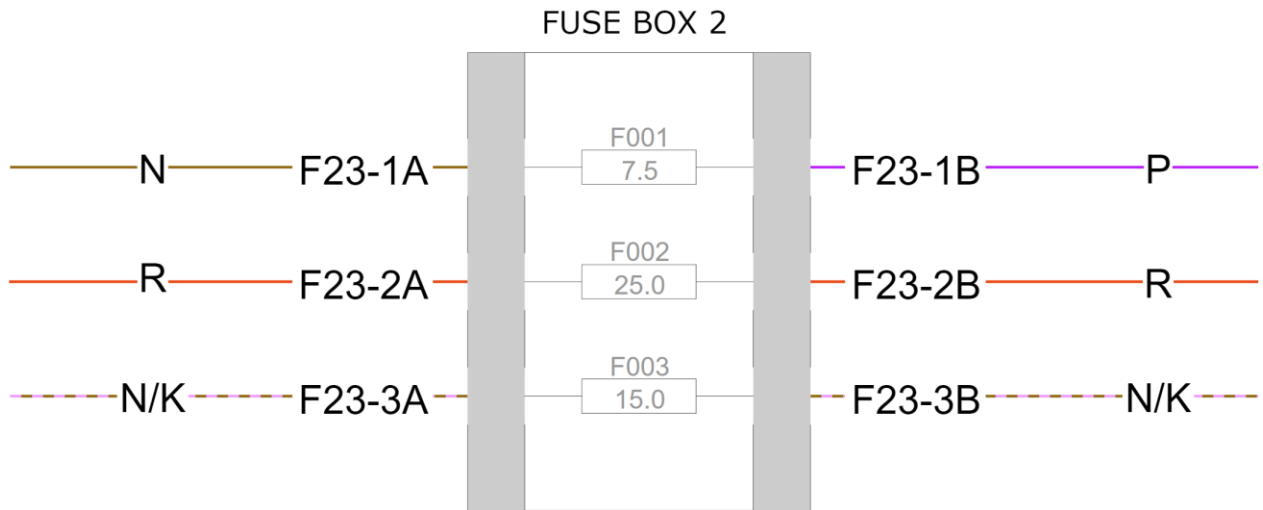
The multiple integral connectors can be identified by separated grey shaded areas (as shown), or by a grey shaded area that is divided into multiple sections by black line(s).

The above example shows an engine ECM with three integral connectors, connectors A, B and C. The component, connector and pin number references can be interpreted as follows:

|           |  |
|-----------|--|
| E02       | Component reference for the engine ECM |
| A, B, C   | Connector reference                    |
| -         | Separator                              |
| 9, 28, 33 | Connector pin number reference         |



## Fuse Boxes



The illustration shows an example of a fuse box.

A fuse is a device which protects a circuit in the event of a fault. The fuse will 'blow' should a short circuit occur, protecting that circuit from further damage.

Information provided with the fuse box includes:

- The fuse box name - located above the fuse box.
- A fuse number/location reference for each fuse - located above the fuse.
- A fuse rating (in Amps) for each fuse - located inside the fuse.
- A fuse box, terminal number and terminal block reference - located on each wire entering the fuse box.

In the above example, the fuse box, terminal number and terminal block references can be interpreted as follows:

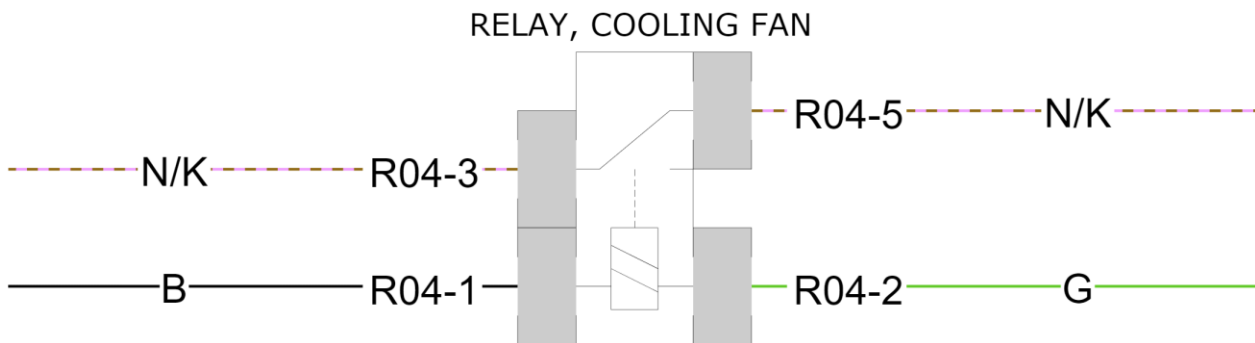
|         |   |
|---------|---|
| F       | Reference code for a fuse box   |
| 2       | Denotes the type of fuse box:<br>1 = Fuse box 1 (Main fuse)<br>2 = Fuse box 2 (Individual circuit protection) |
| 3       | Indicates the number of fuses contained in the fuse box   |
| -       | Separator   |
| 1, 2, 3 | Connector terminal number reference   |
| A or B  | Terminal block reference A (power in) or B (power out)  |

## Relays

A relay is effectively an electromagnetic switch. To close the relay contacts and complete the circuit, an electromagnet in the relay is energised which causes the relay contacts to close, making the circuit complete.

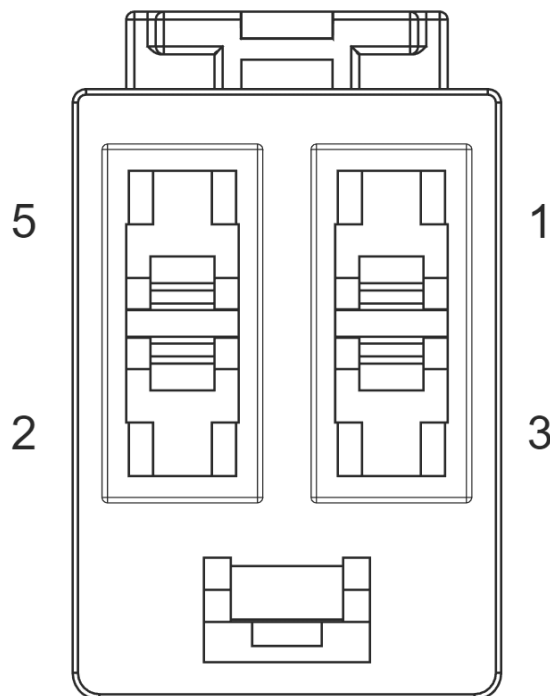
Relays are used when the electrical current is too great for a mechanical switch, usually when the switching must be done quickly to prevent arcing across the switch contacts. If a mechanical switch were used, the mechanical switch contacts would quickly burn away.

### Relays Connected with a Single Socket Connector



The illustration above shows an example of a relay connected to the wiring harness with a single socket relay connector.

A pin diagram of a typical single socket relay connector is shown below.



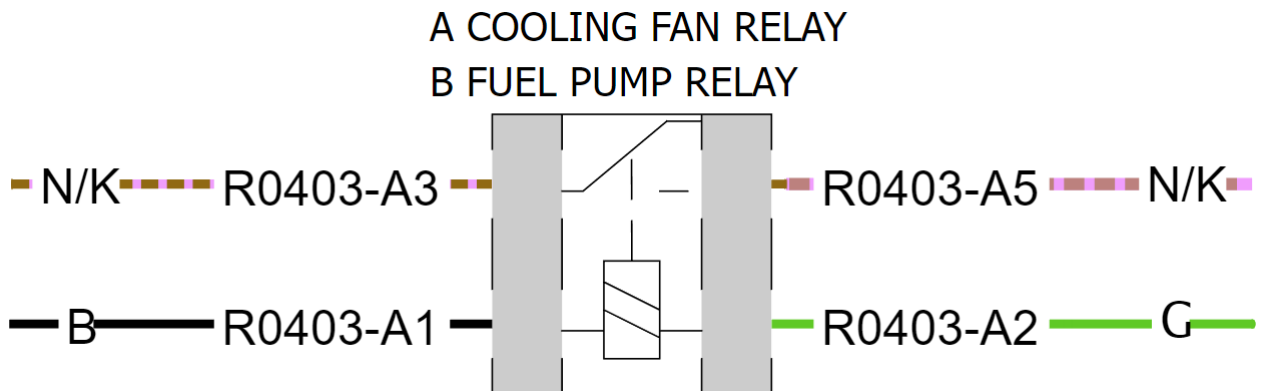
Information provided on the circuit diagram for relays with a single socket harness connector includes:

- The relay name - located above the relay.
- A relay and terminal number reference - located on each wire entering the relay connector terminals.

In the above example, the relay and terminal number reference can be interpreted as follows:

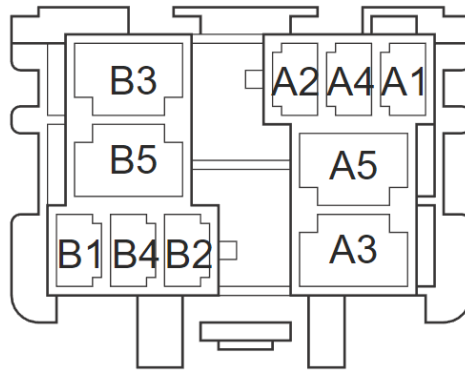
|            |   |
|------------|---|
| R          | Indicates the component is a relay                                      |
| 04         | Reference number for the relay (cooling fan relay in the example shown) |
| -          | Separator   |
| 1, 2, 3, 4 | Connector terminal number reference                                     |

Relays connected with a Dual Socket Connector



The illustration above shows an example of a relay connected to the wiring harness with a dual socket relay connector.

A dual socket relay connector provides sockets for two individual relays, socket A and socket B. A pin diagram of a typical dual socket relay connector is shown below.



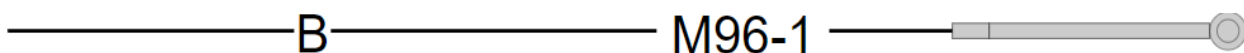
Information provided on the circuit diagram for relays with a dual socket harness connector includes:

- The names of the relays connected to sockets A and B - located above the relay.
- A dual relay and terminal number reference - located on each wire entering the relay connector terminals.

In the above example, the relay and terminal number reference can be interpreted as follows:

|            |   |
|------------|---|
| R          | Indicates the component is a relay  |
| 04         | Reference number for the relay connected to socket A (cooling fan relay in the example shown)   |
| 03         | Reference number for the relay connected to socket B (fuel pump relay in the example shown)   |
| -          | Separator   |
| A or B     | Socket reference (socket A or socket B)<br>In the example above, all references show socket A. <b>This indicates that the component shown is the cooling fan relay.</b> |
| 1, 2, 3, 4 | Connector terminal number reference for the socket/relay identified   |

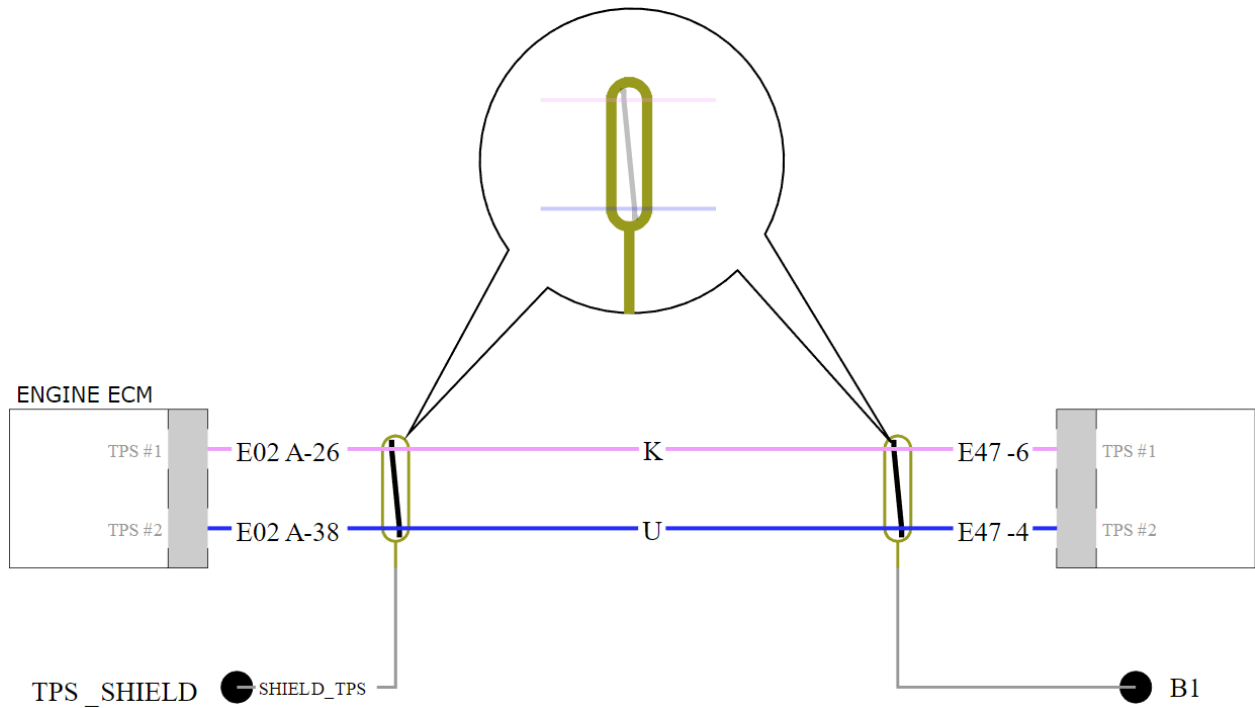
### Ring Terminals



The illustration shows the symbol used to identify a ring terminal (commonly used as ground points).

A ring terminal reference is provided on the wire entering the terminal.

## Shielded Wires



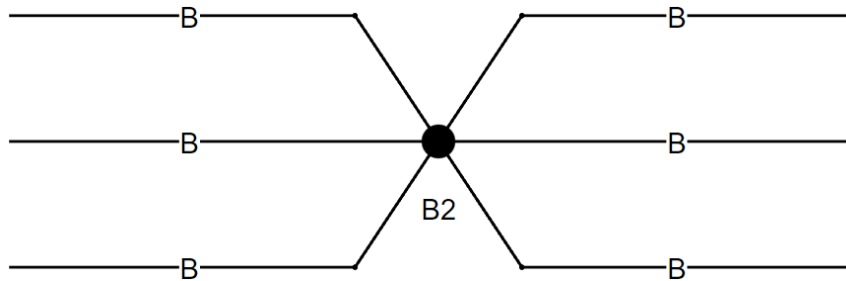
The illustration shows the symbol used to identify wires that are shielded against electromagnetic interference.

Examples of components that have shielded wires include:

- ABS wheel speed sensors
- Immobiliser antenna
- Throttle position sensor
- USB socket

The wire shielding is typically connected to ground.

## Splices

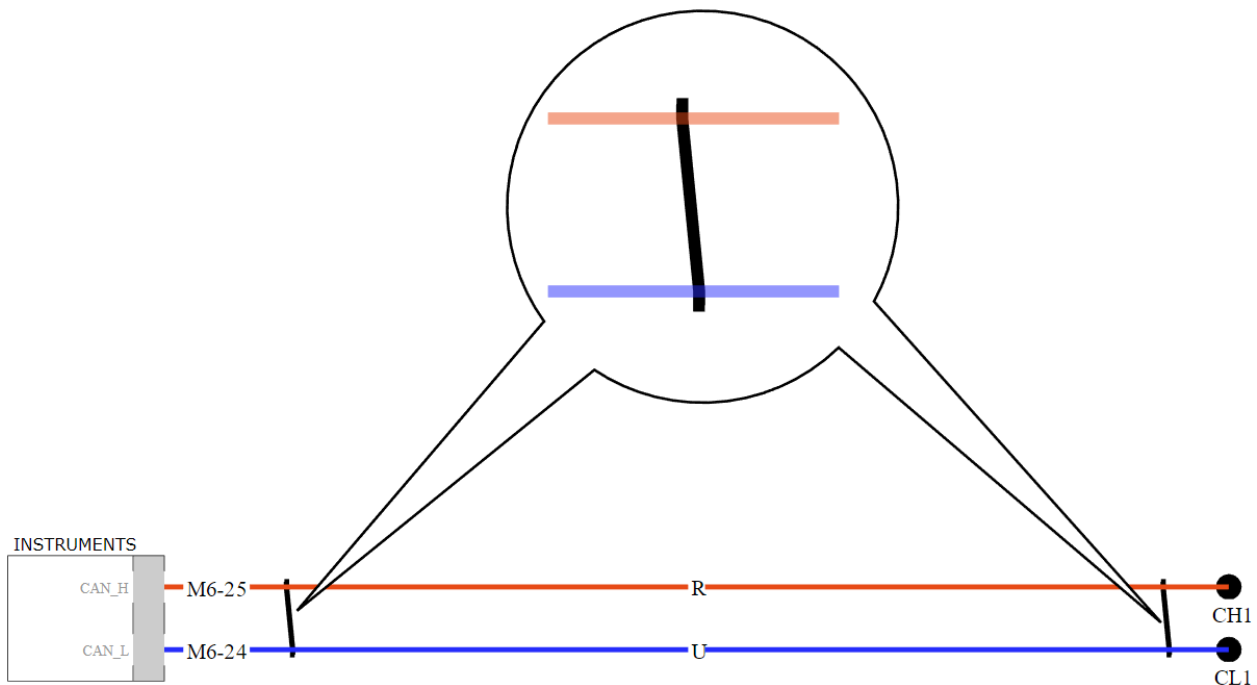


The illustration shows an example of a splice.

A splice is a hard cable joint where two or more cables are joined in the wiring harness. A splice is a potential source of both open and short circuits.

A splice reference code is provided at the nearest convenient location to the splice symbol.

## Twisted Wires



The illustration shows the symbol used to indicate a pair of wires that are twisted together, such as CAN circuit wires.

## Starter Motor Grounding

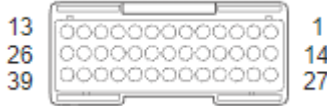
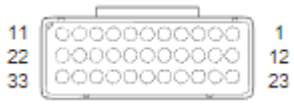

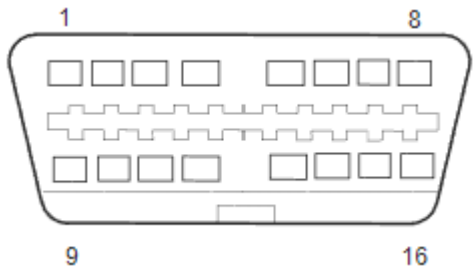
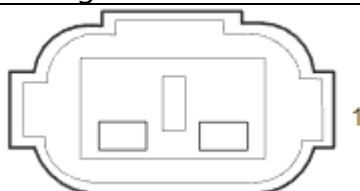
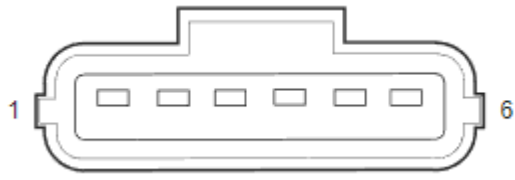
Starter motors fitted to Triumph motorcycles are connected to ground through the mating faces of the starter motor body and the crankcase.

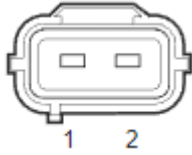
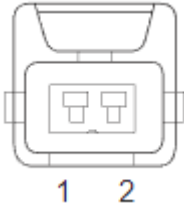



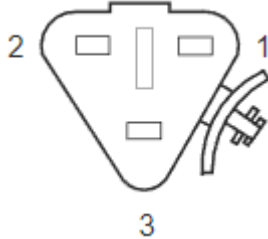


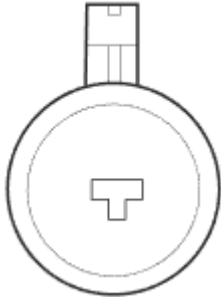
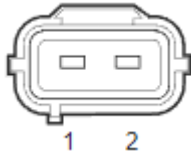
## Key To Wiring Colour Codes

| Code | Wiring Colour |
|------|---------------|
| B    | Black         |
| U    | Blue          |
| N    | Brown         |
| G    | Green         |
| S    | Slate/Grey    |
| O    | Orange        |
| K    | Pink          |
| R    | Red           |
| P    | Purple        |
| W    | White         |
| Y    | Yellow        |
| LG   | Light Green   |
| LU   | Light Blue    |

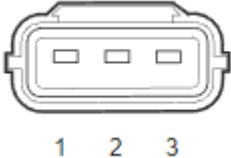




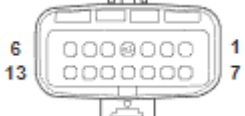
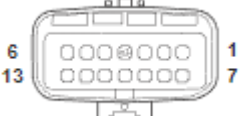

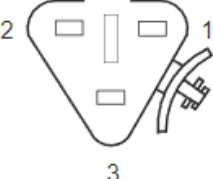





### Main Wiring Harness Electrical Connectors



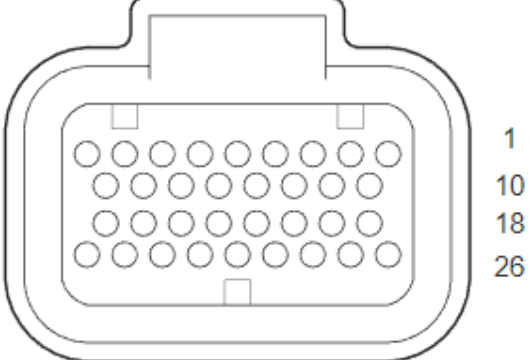
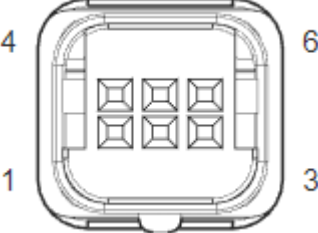
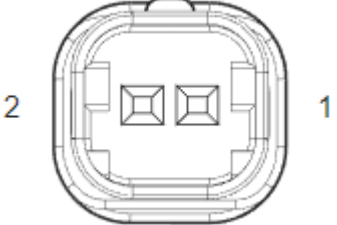
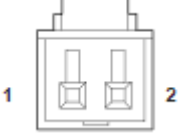
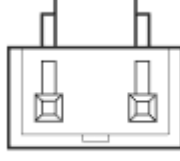

The table below shows the connector pin diagrams for each electrical connector on the main wiring harness for this model.

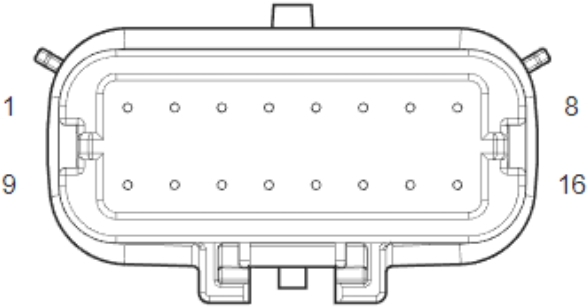
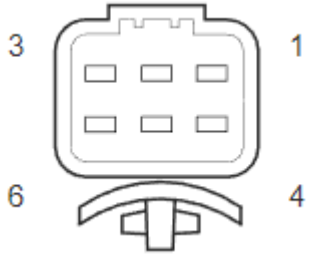
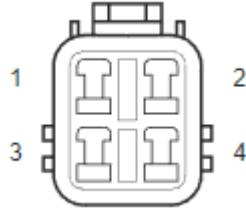

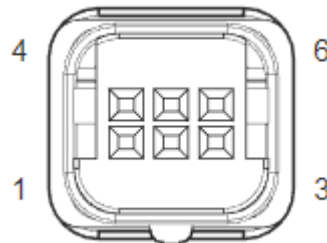


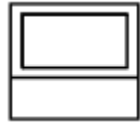


|   |   |
|---|---|
|  |  |
| E02A - Engine ECM connector A   | E02B - Engine ECM connector B   |
|  |   |
| E02C - Engine ECM connector C   | E04 - Diagnostic connector  |
|  |   |
| E05 - Crankshaft position sensor  | E08 - Throttle position sensor  |

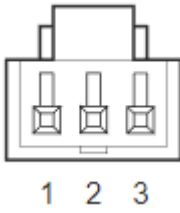
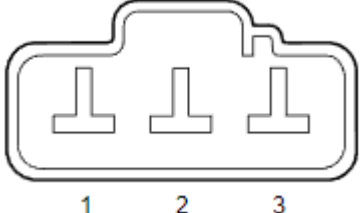

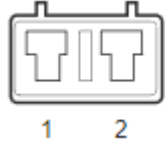
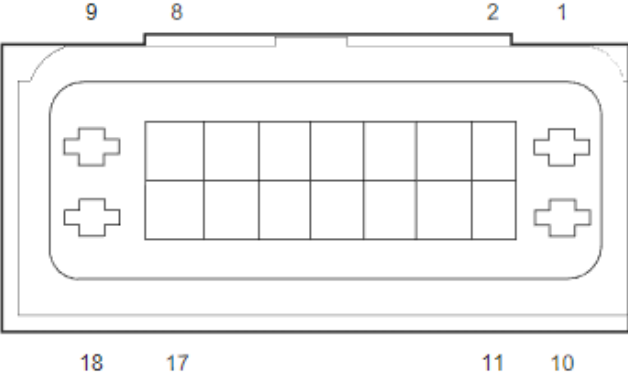
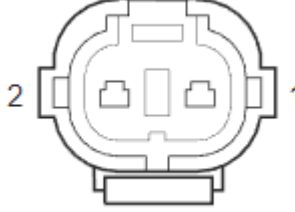

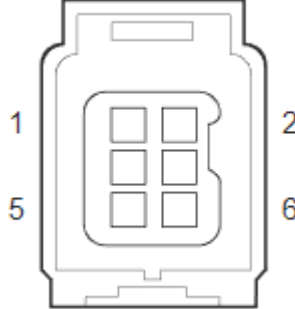

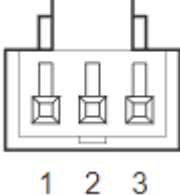
|   |   |
|---|---|
|    |    |
| <p>E09 - Purge valve</p>  | <p>E10 - Coolant temperature sensor</p>   |
|    |    |
| <p>E11 - Fuel injector 1-1<br/> E49 - Fuel injector 1-2<br/> E12 - Fuel injector 2-1<br/> E50 - Fuel injector 2-2<br/> E13 - Fuel injector 3-1<br/> E51 - Fuel injector 3-2</p> | <p>E15-Gear position sensor</p>   |
|    |    |
| <p>E16 - Oxygen sensor, bank 1 sensor 1</p>   | <p>E17 - Side stand switch</p>  |
|    |    |
| <p>E20 - Intake air temperature sensor</p>  | <p>E21A - Ignition coil 1 connector A<br/> E21B - Ignition coil 1 connector B<br/> E22A - Ignition coil 2 connector A<br/> E22B - Ignition coil 2 connector B<br/> E23A - Ignition coil 3 connector A<br/> E23B - Ignition coil 3 connector B</p> |
|    |    |
| <p>E25 - Oil pressure sensor</p>  | <p>E37 - Secondary air injection</p>  |


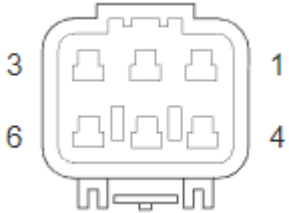

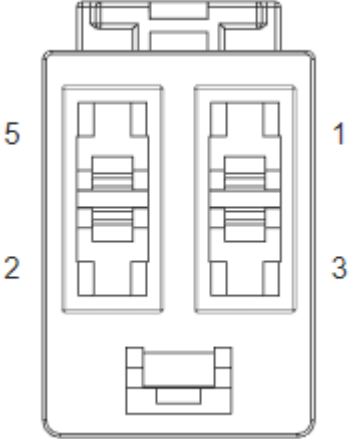


|  |   |
|--|---|
|     |    |
| <p>E38 - Manifold absolute pressure sensor<br/>E39 - Ambient air pressure sensor</p> | <p>E52 - Throttle actuator motor</p>  |
|     |    |
| <p>H02 - Battery subharness (harness side)</p>                                       | <p>HO2M - Battery subharness (subharness side)</p>                                    |
|     |    |
| <p>H05 - Engine subharness (main harness)</p>  | <p>H05M - Engine subharness (subharness)</p>  |
|     |    |
| <p>H06A - Handlebar switch housing subharness (main harness)</p>                     | <p>H06AM - Handlebar switch housing subharness (subharness)</p>                       |
|   |  |
| <p>H06B - Handlebar switch housing subharness (main harness)</p>                     | <p>H06BM - Handlebar switch housing subharness (subharness)</p>                       |
|   |  |
| <p>H07 - Master ignition switch link subharness</p>                                  | <p>H11- Fuel tank subharness (main harness)</p>                                       |
|   |  |
| <p>H12 - Licence plate subharness (main harness)</p>                                 | <p>H12M - Licence plate subharness (subharness)</p>                                   |

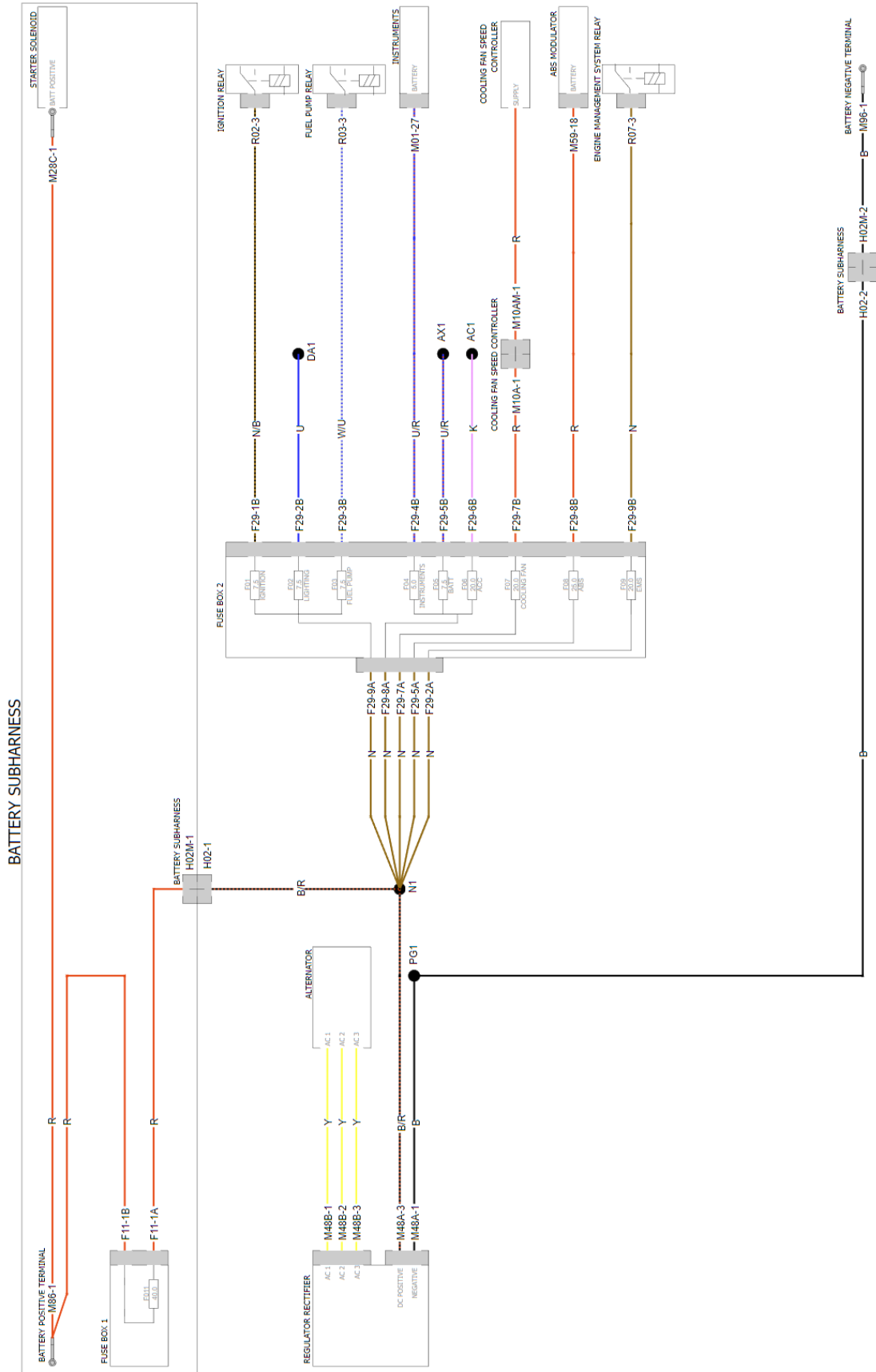
|   |   |
|---|---|
|    |    |
| <p>H14 - Triumph shift assist</p>   | <p>H14M - Triumph shift assist</p>  |
|    |   |
| <p>M01 – Instruments</p>  | <p>M02A - Left handlebar switch housing connector (6 pin)</p>   |
|   |    |
| <p>M02B - Left handlebar switch housing connector (2 pin)</p>                       | <p>M02C - Clutch switch</p>   |
|  |    |
| <p>M03A - Second LF antenna<br/>M03B-LF antenna</p>                                 | <p>M04A - Front left direction indicator connector A<br/>M04B - Front left direction indicator connector B<br/>M19A - Front right direction indicator connector A<br/>M19B - Front right direction indicator connector B<br/>M35B - Rear left direction indicator<br/>M35B - Rear left direction indicator<br/>M38A - Rear right direction indicator<br/>M35B - Rear left direction indicator</p> |

|   |   |
|---|---|
|    |    |
| <p>M05 - Keyless ignition ECM</p>   | <p>M07A - Headlight A<br/>M07B - Headlight B</p>                                      |
|    |    |
| <p>M10A - Cooling fan speed controller</p>  | <p>M11A - Horn connector A<br/>M11B - Horn connector B</p>                            |
|   |   |
| <p>M14A - Right handlebar switch housing connector (black)<br/>M14B - Right handlebar switch housing connector (grey)</p> | <p>M21 - Accessory socket, live<br/>M25 - Front accessory socket, switched</p>        |
|                                        |  |
| <p>M28 - Starter solenoid</p>   | <p>M28A - Starter solenoid connector A<br/>M28B - Starter solenoid connector B</p>    |
|                                        |  |
| <p>M28C - Starter solenoid connector<br/>M28D - Starter solenoid connector</p>  | <p>M36 - Alarm</p>  |

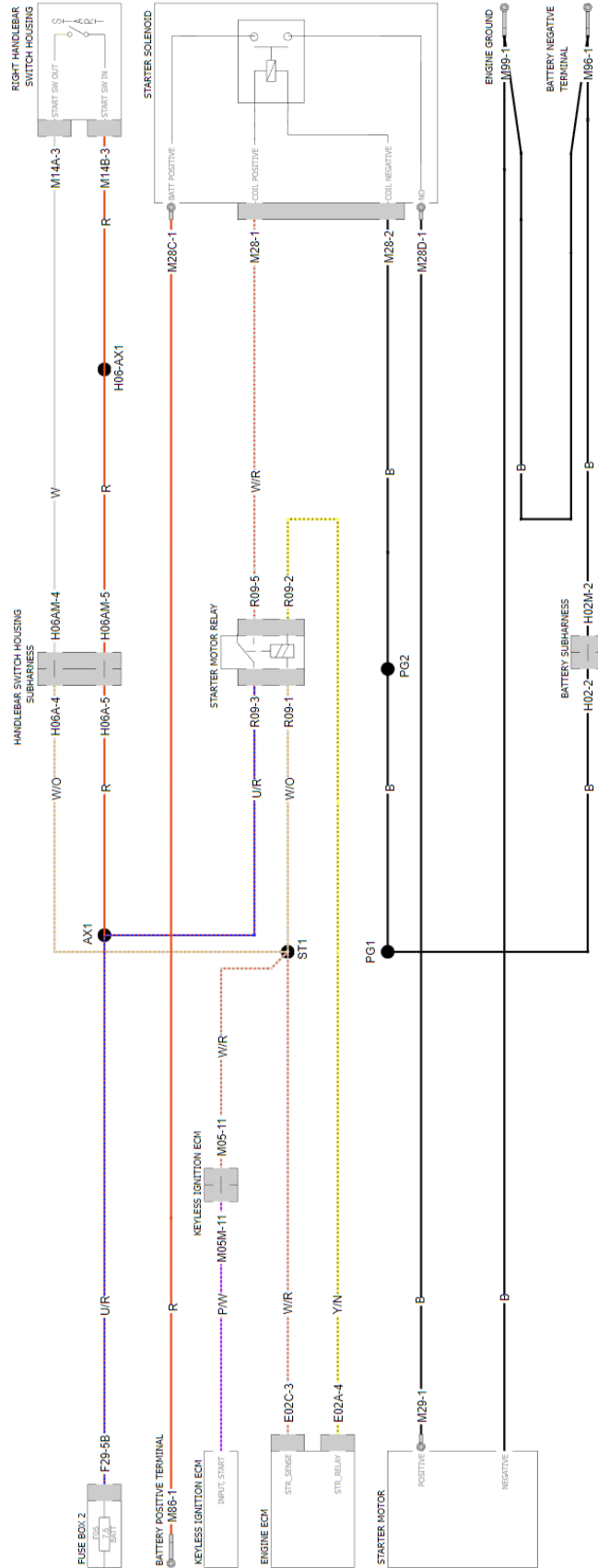
|   |   |
|---|---|
|    |     |
| <p>M37 - Rear light</p>   | <p>M48A - Regulator rectifier connector A</p>   |
|    |    |
| <p>M52 - Ambient air temperature sensor</p>   | <p>M57 - Front ABS wheel speed sensor<br/>M58 - Rear ABS wheel speed sensor</p>       |
|   |    |
| <p>M59 - ABS modulator</p>  | <p>M70 - USB socket</p>   |
|  |   |
| <p>M72 - Bluetooth module</p>   | <p>M73 - Twist grip position sensor</p>   |
|  |  |
| <p>M83 - Right heated grip</p>  | <p>M84 - Left heated grip</p>   |

|   |  |
|---|--|
|  |   |
| <p>M29 - Starter motor<br/>M86 - Battery positive terminal</p>                    | <p>M95 - Electronic steering lock</p>  |
|  |   |
| <p>M96 - Battery negative terminal<br/>M99 - Engine ground</p>                    | <p>R02 - Ignition relay<br/>R03 - Fuel pump relay<br/>R05 - Horn relay<br/>R07 - Engine management system relay<br/>R09 - Starter motor relay<br/>R11 - Dip beam relay<br/>R12 - Main beam relay<br/>R13 - Accessories relay</p> |

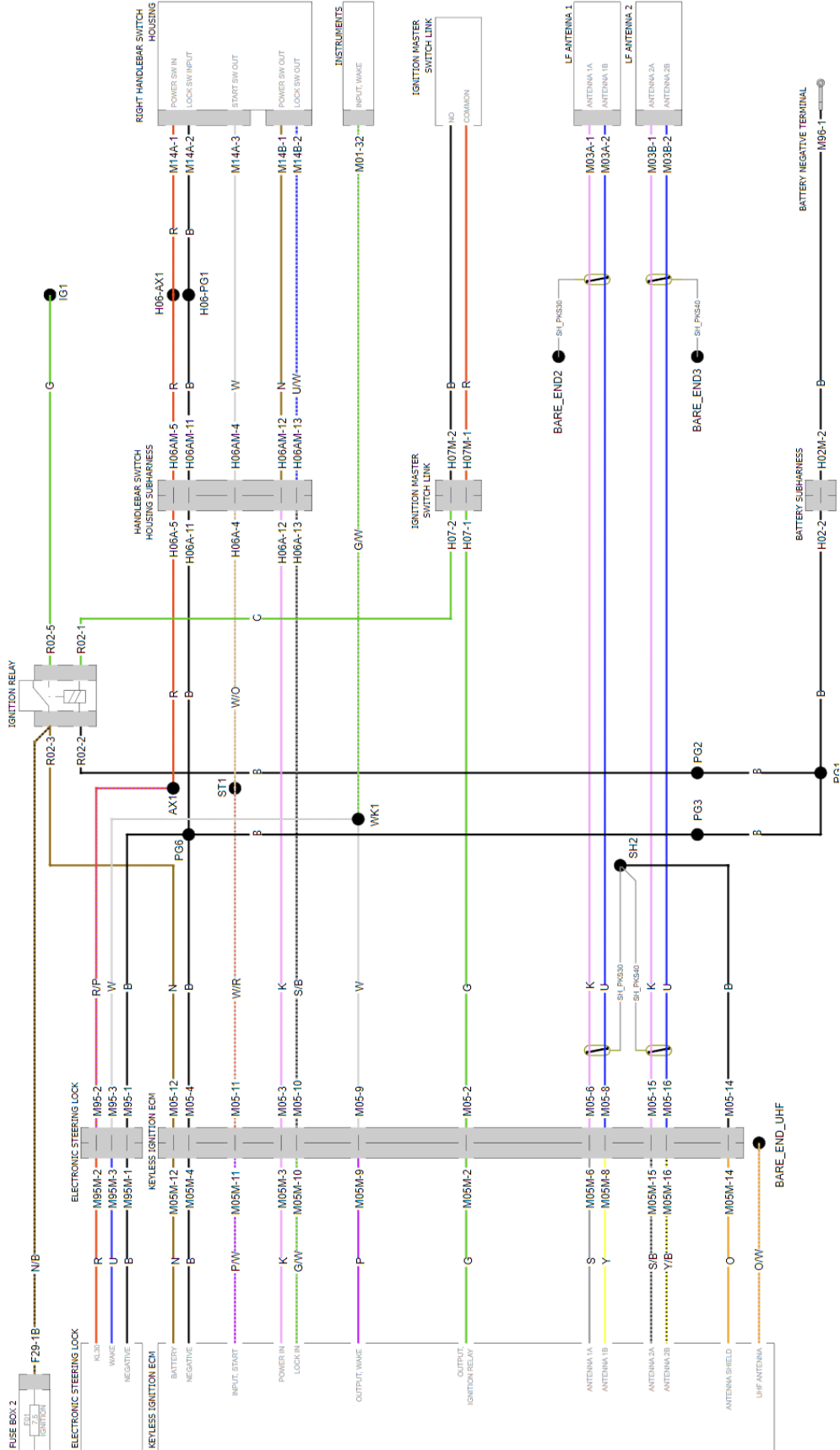
# Power Distribution



# Starter Motor Circuit

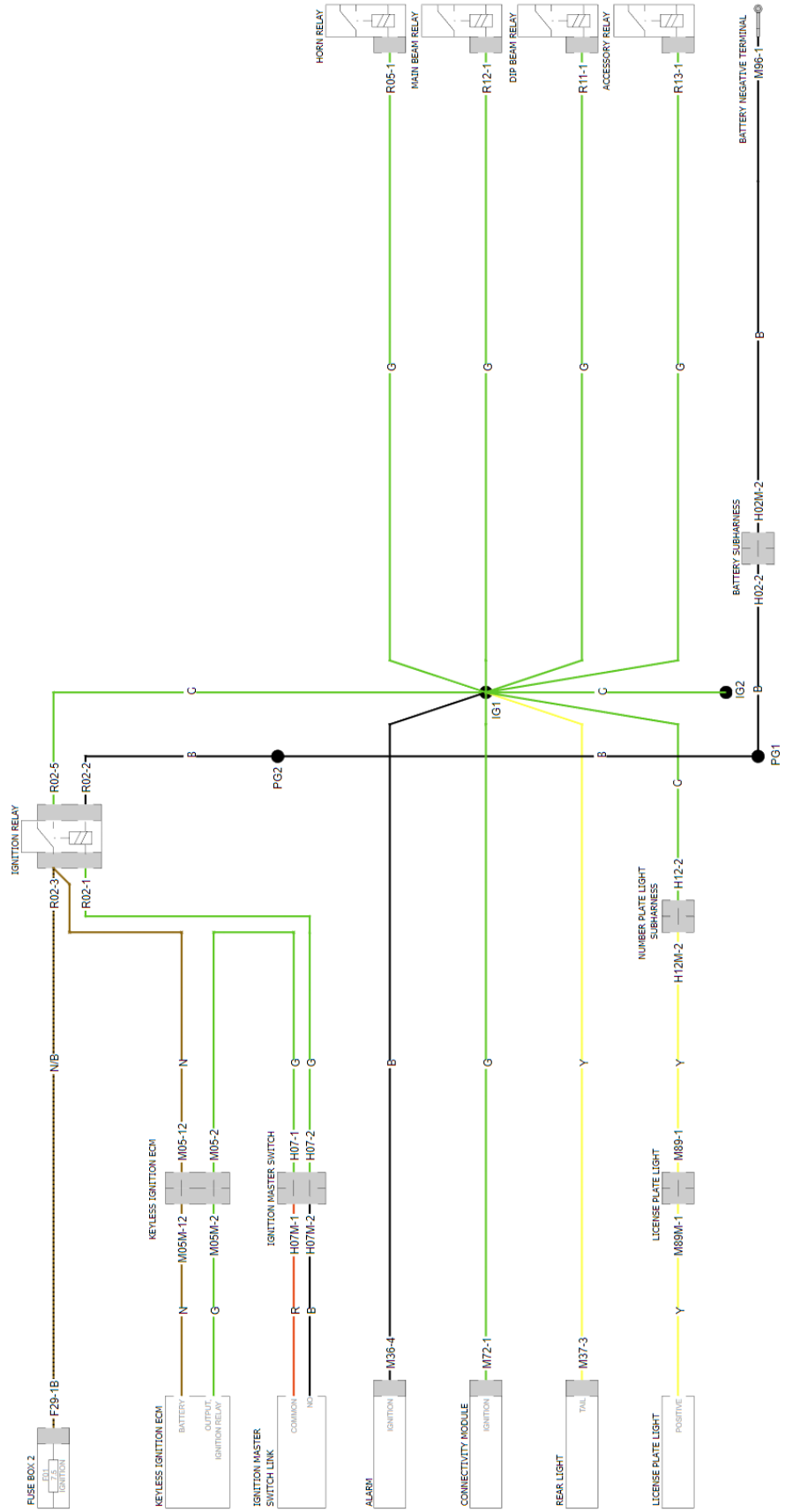


# Keyless Control Circuit

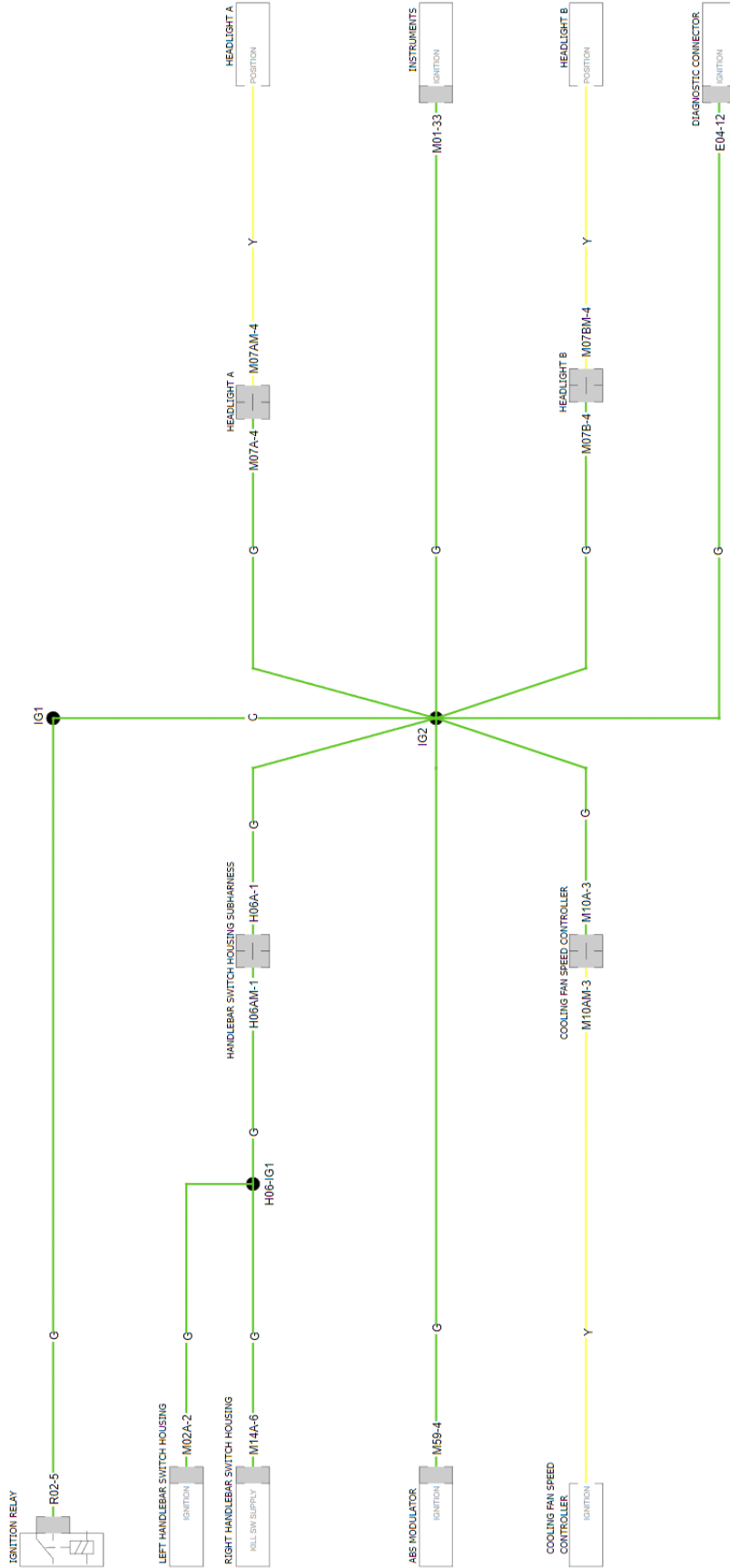




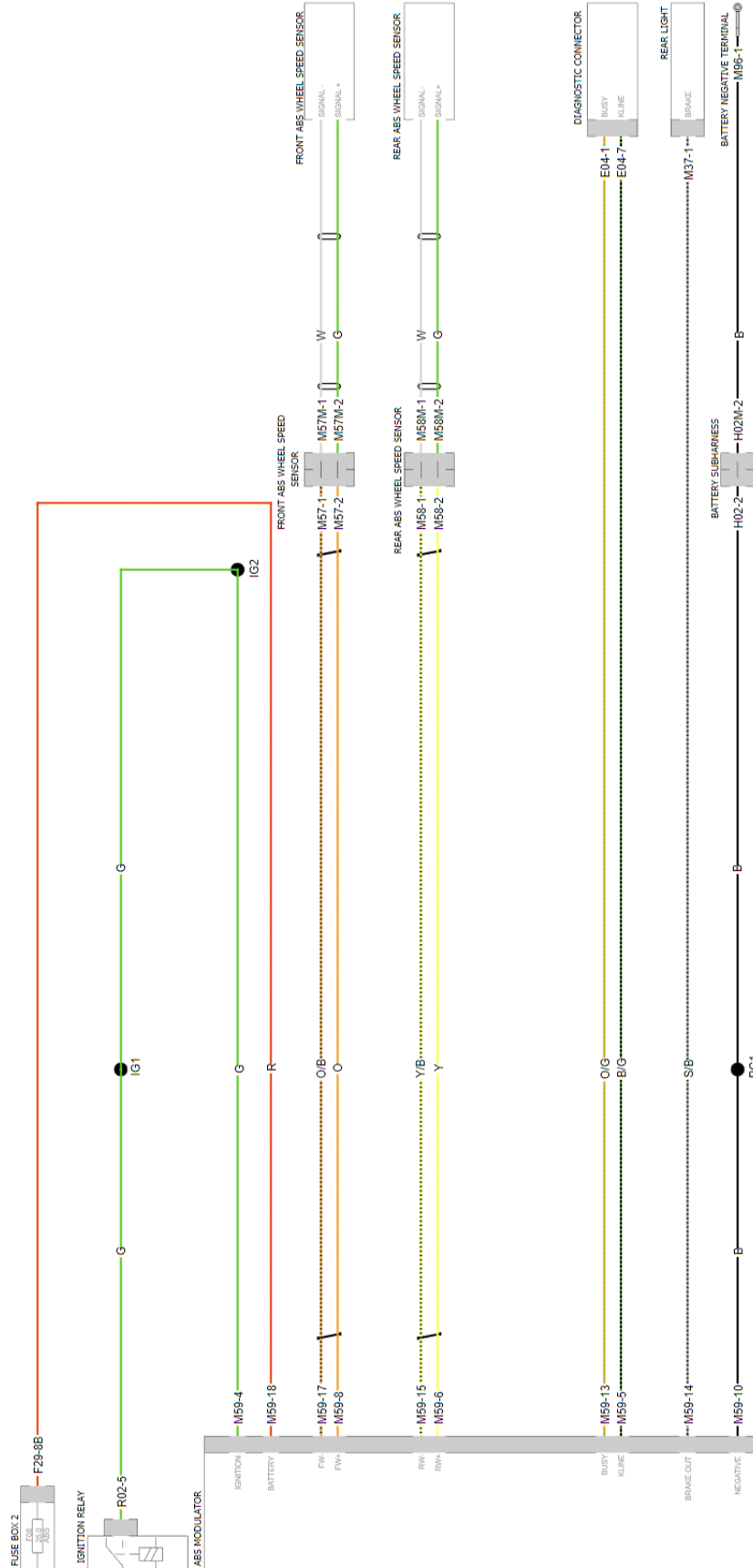
# Ignition Circuit 1 of 2



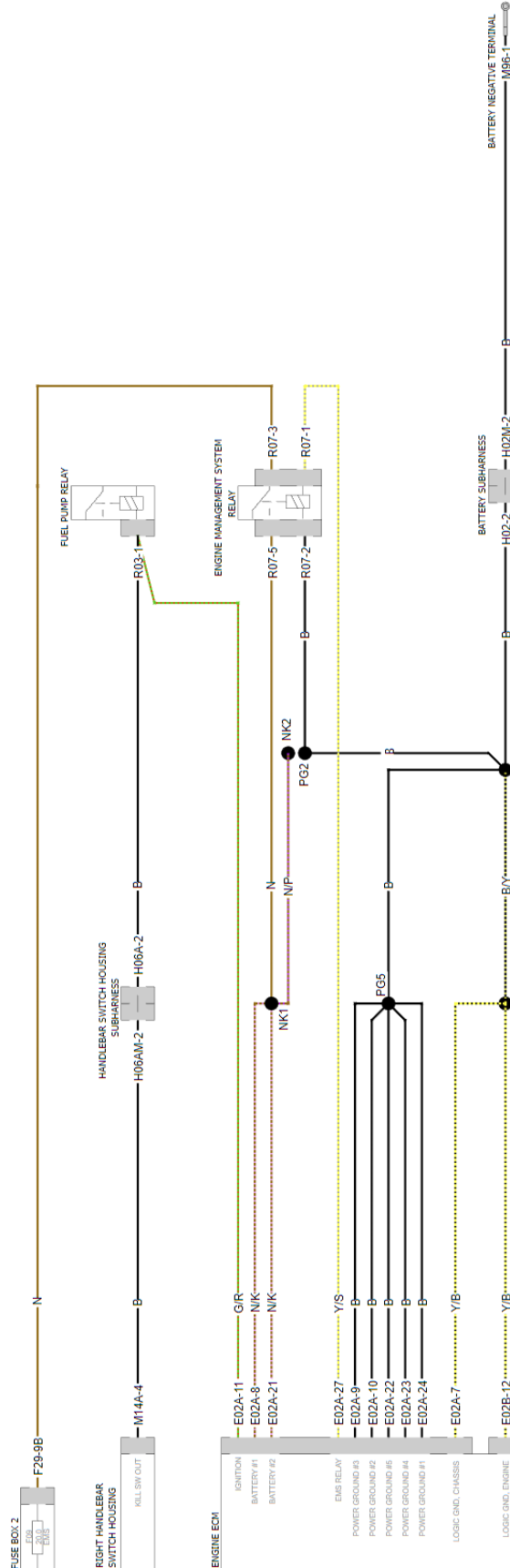
# Ignition Circuit 2 of 2



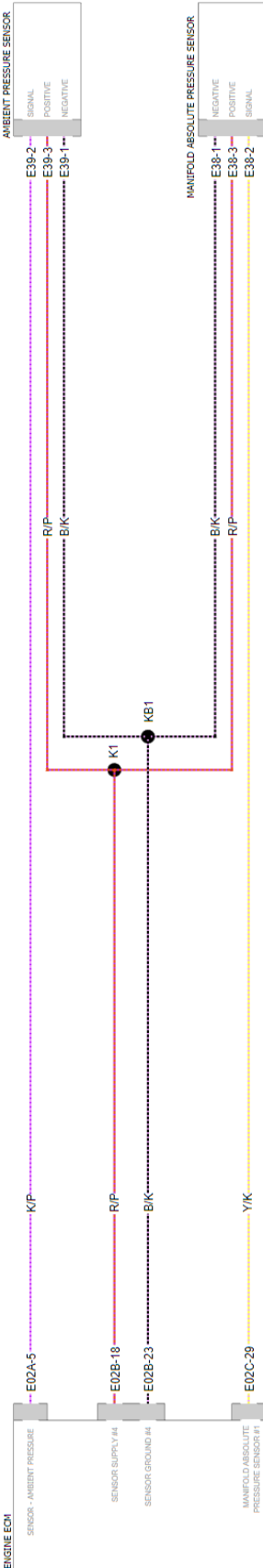
# ABS Circuit



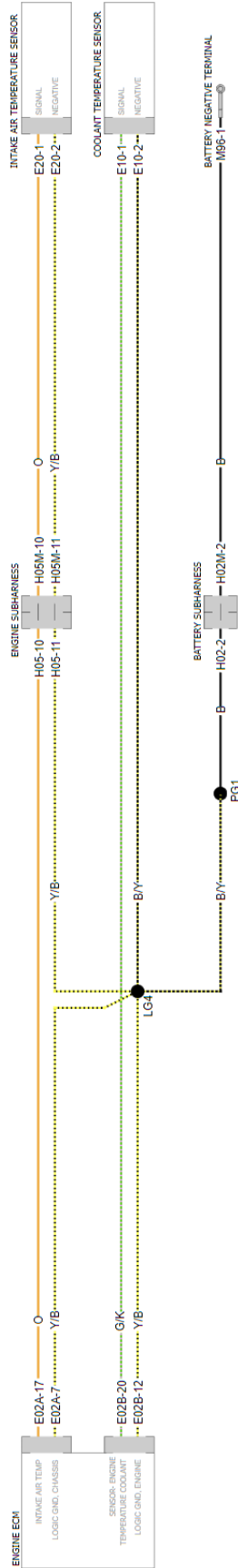
# Engine Management - ECM Power and Ground



# Engine Management - Pressure Sensors

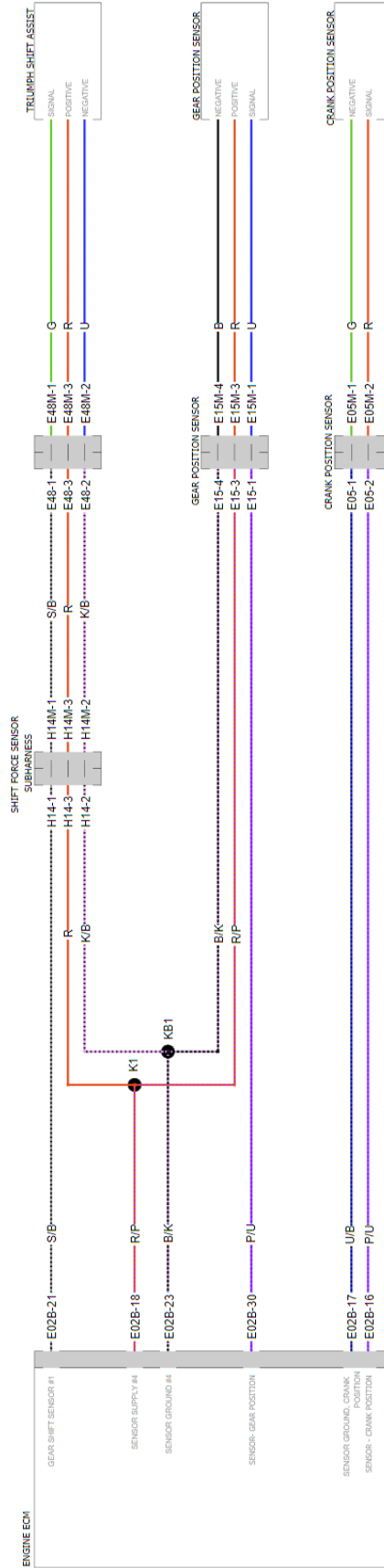


# Engine Management - Temperature Pressure Sensors



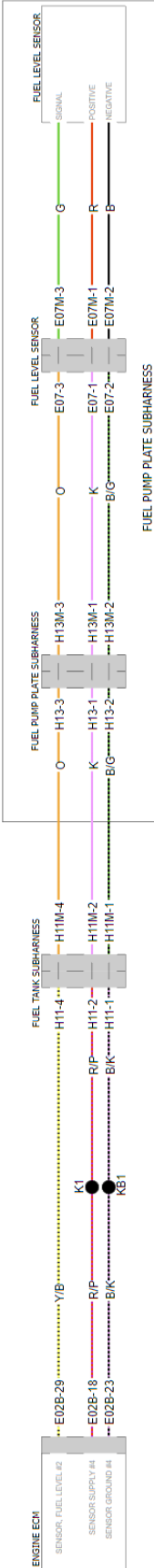


# Engine Management - Position Sensors

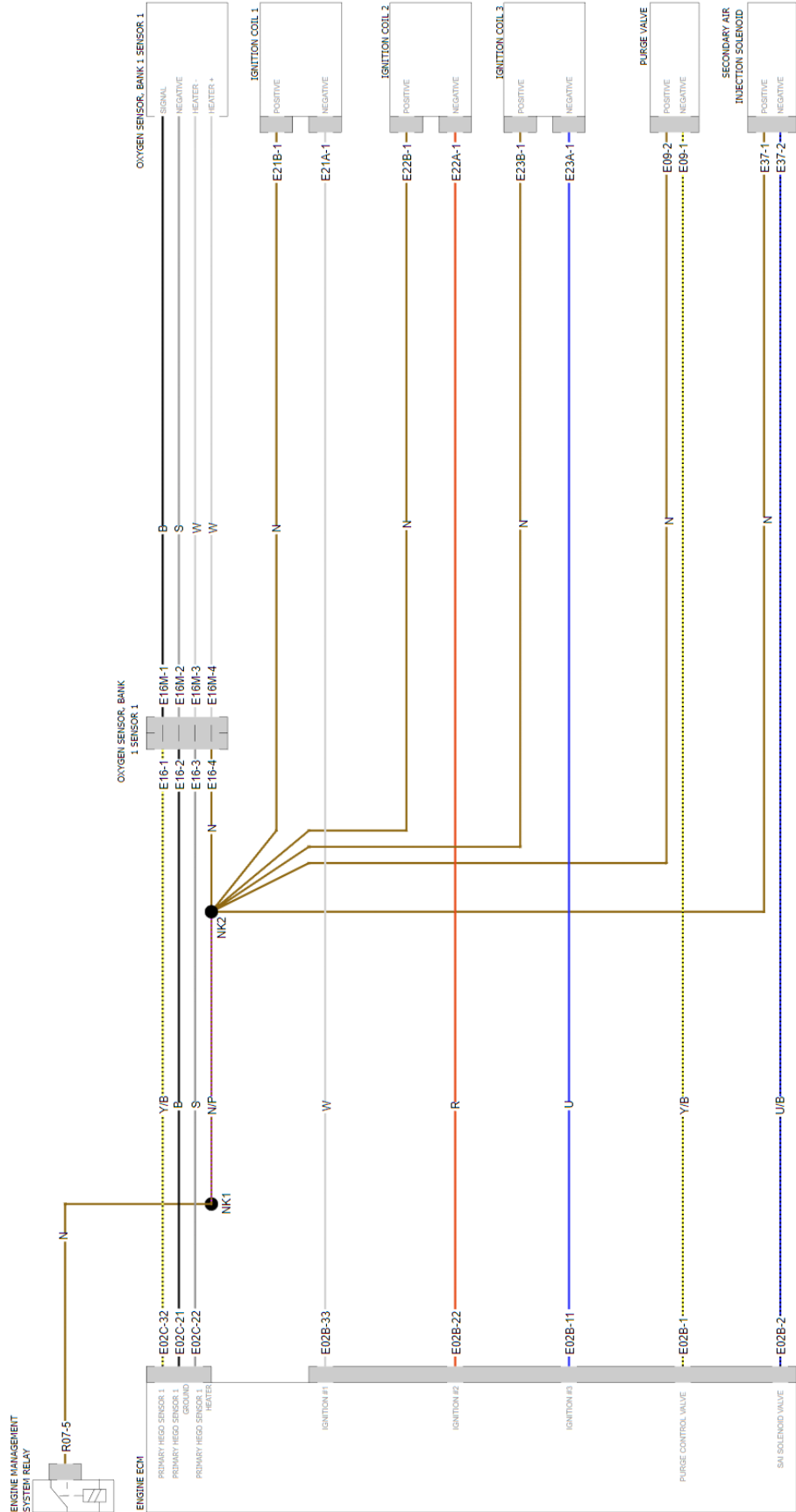




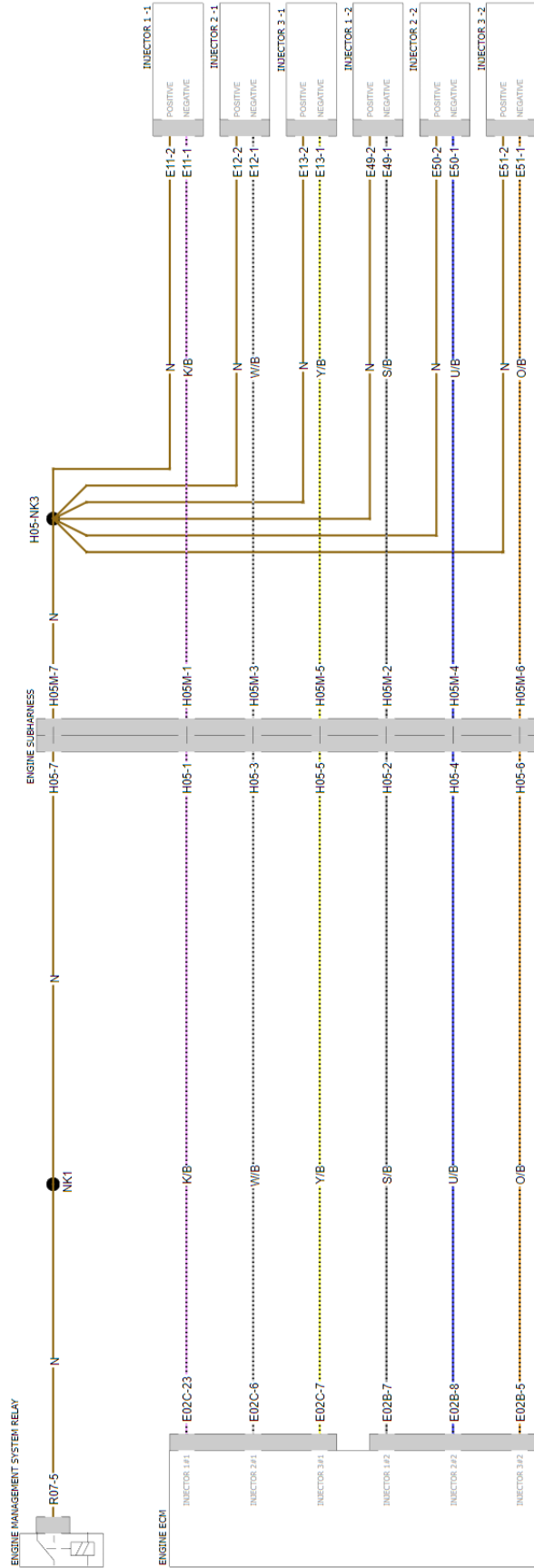
# Engine Management - Fuel Level Sensor



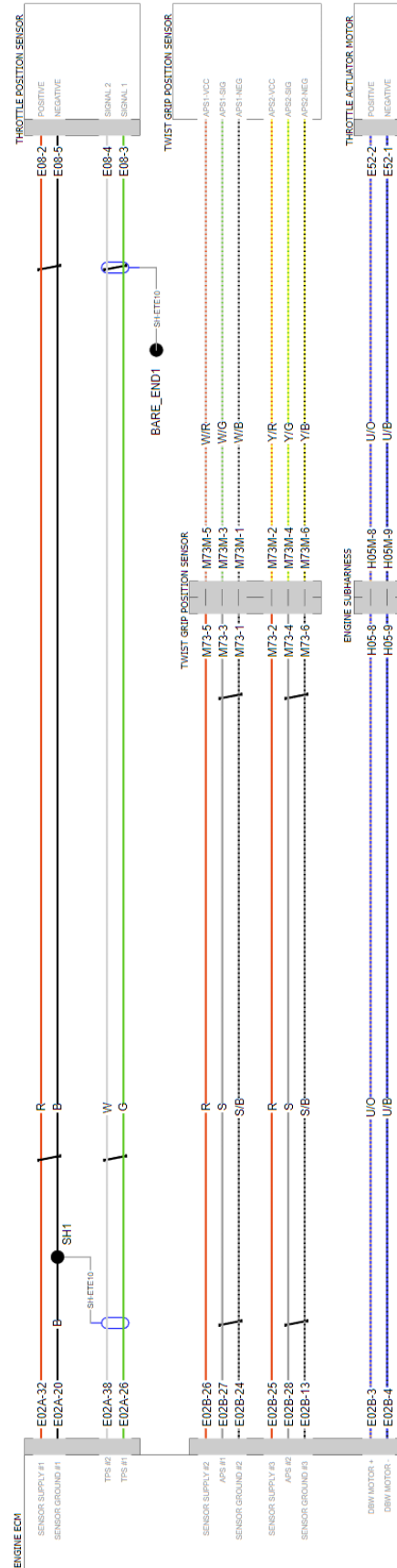
# Engine Management - EFI Components 1 of 2



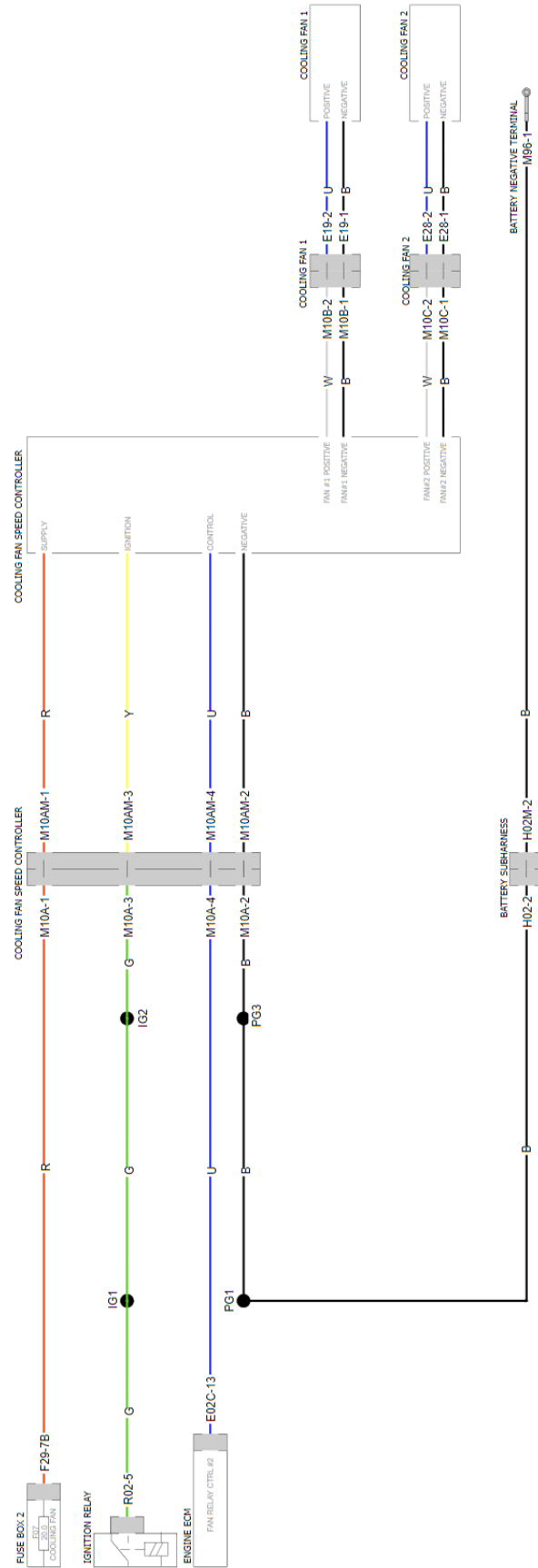
# Engine Management - EFI Components 2 of 2



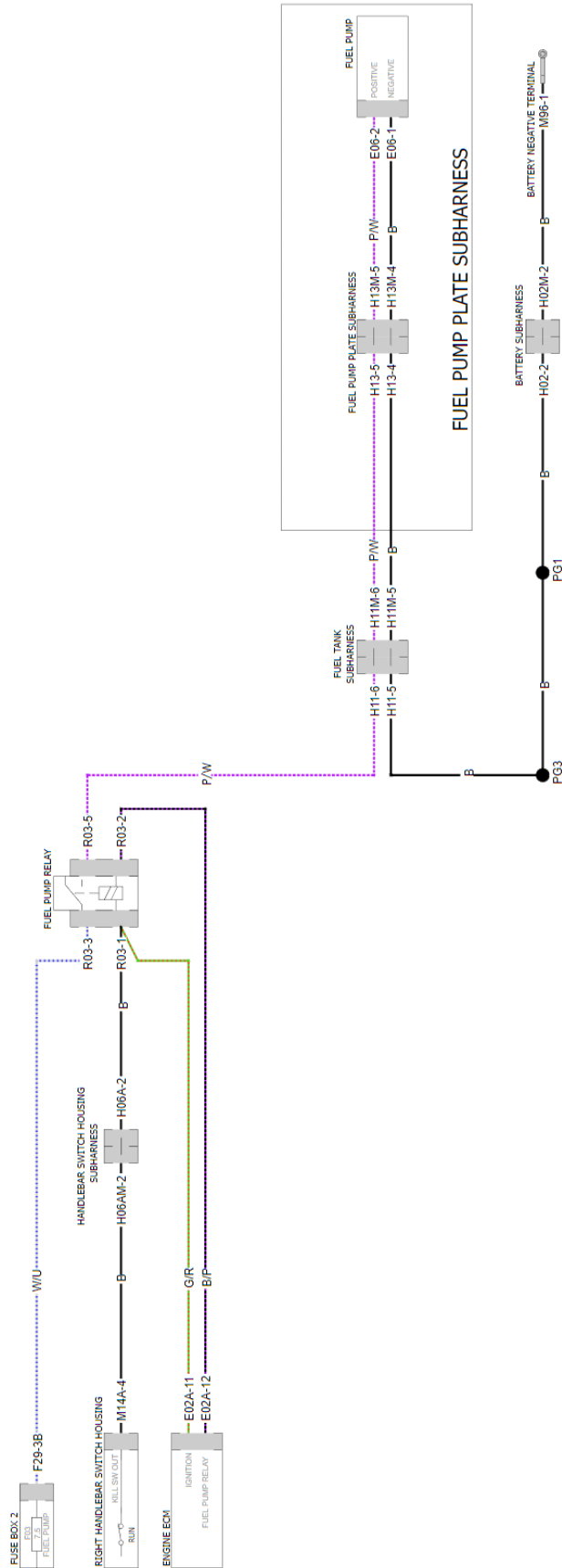
# Engine Management - Throttle Control



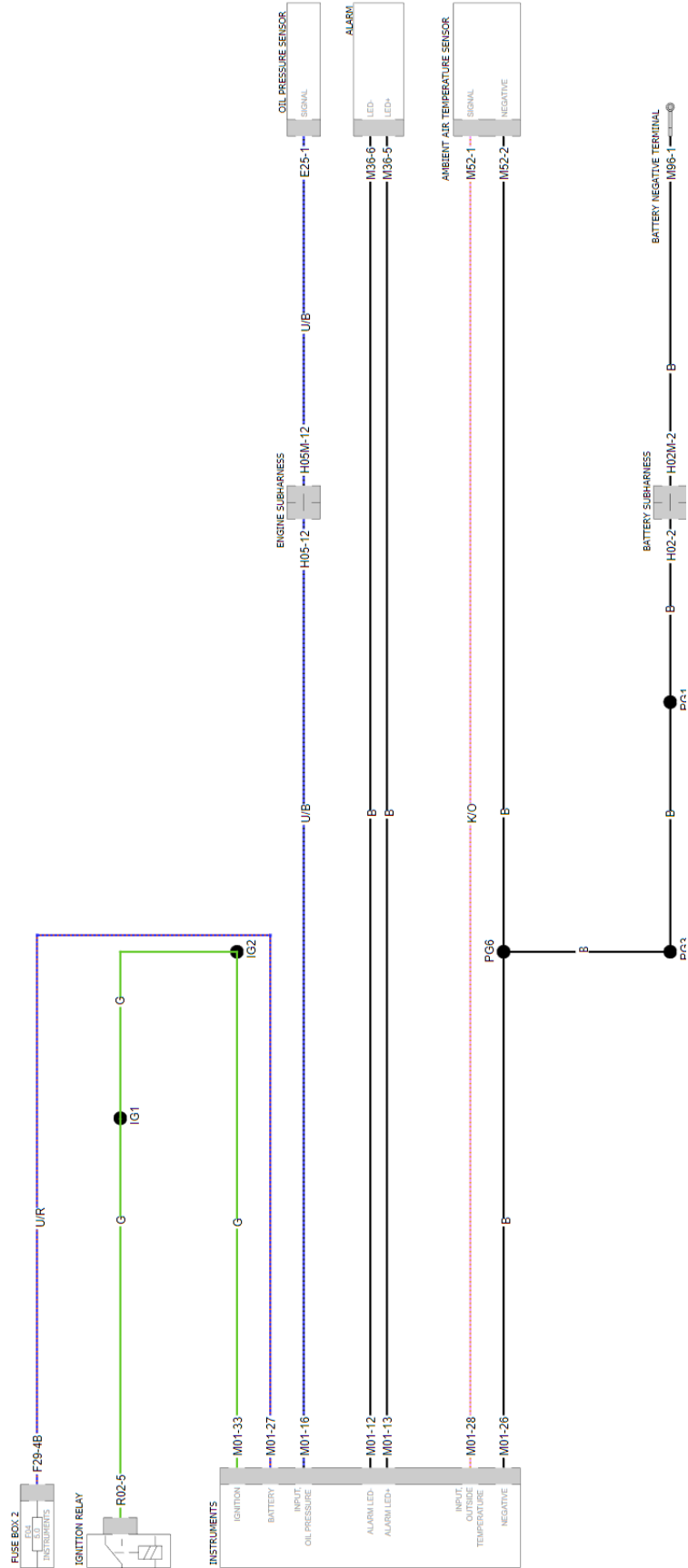
# Engine Management - Cooling Fan



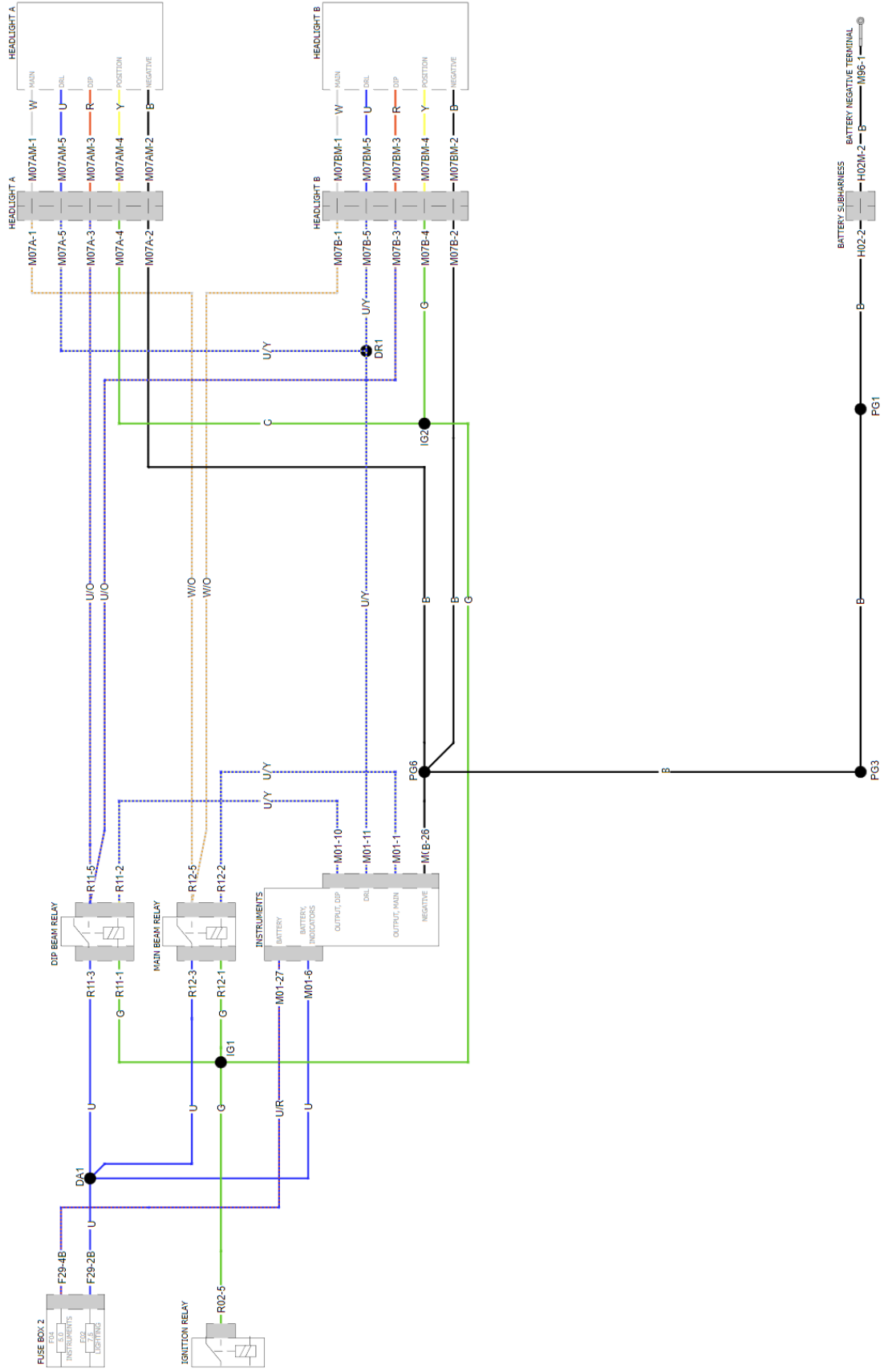
# Engine Management - Fuel Pump



# Instruments Circuit

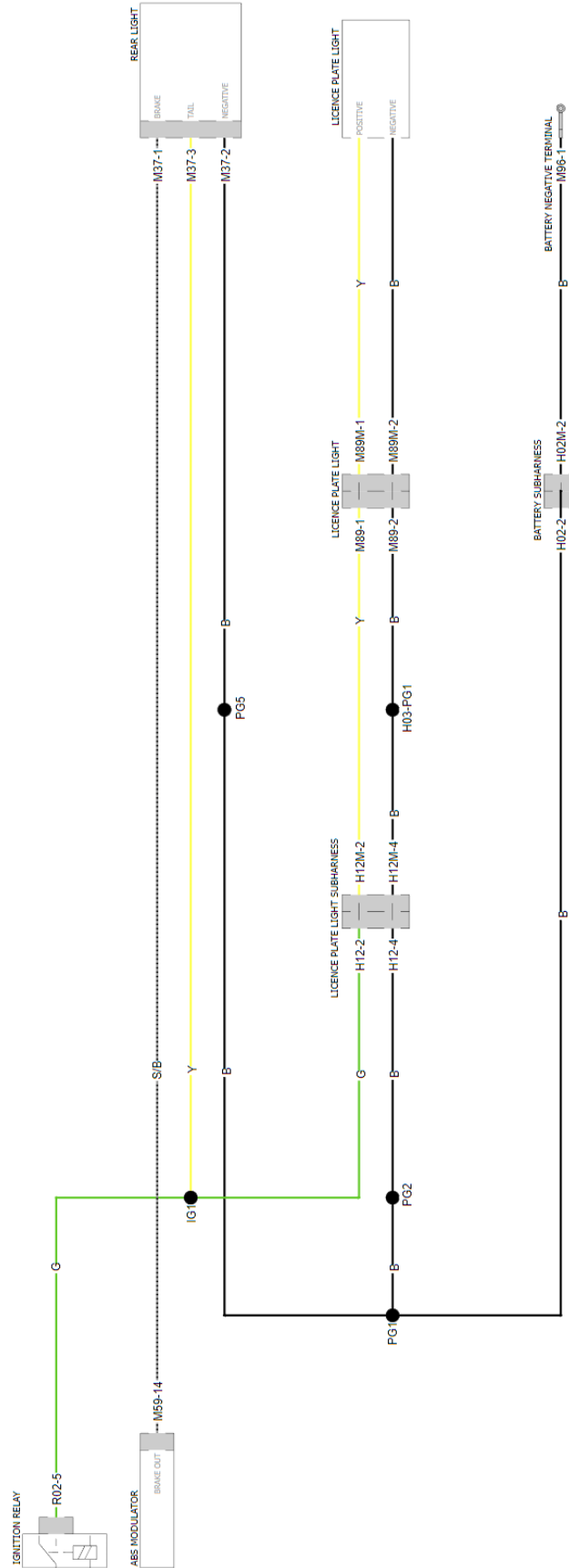


# Lighting Circuit – Front

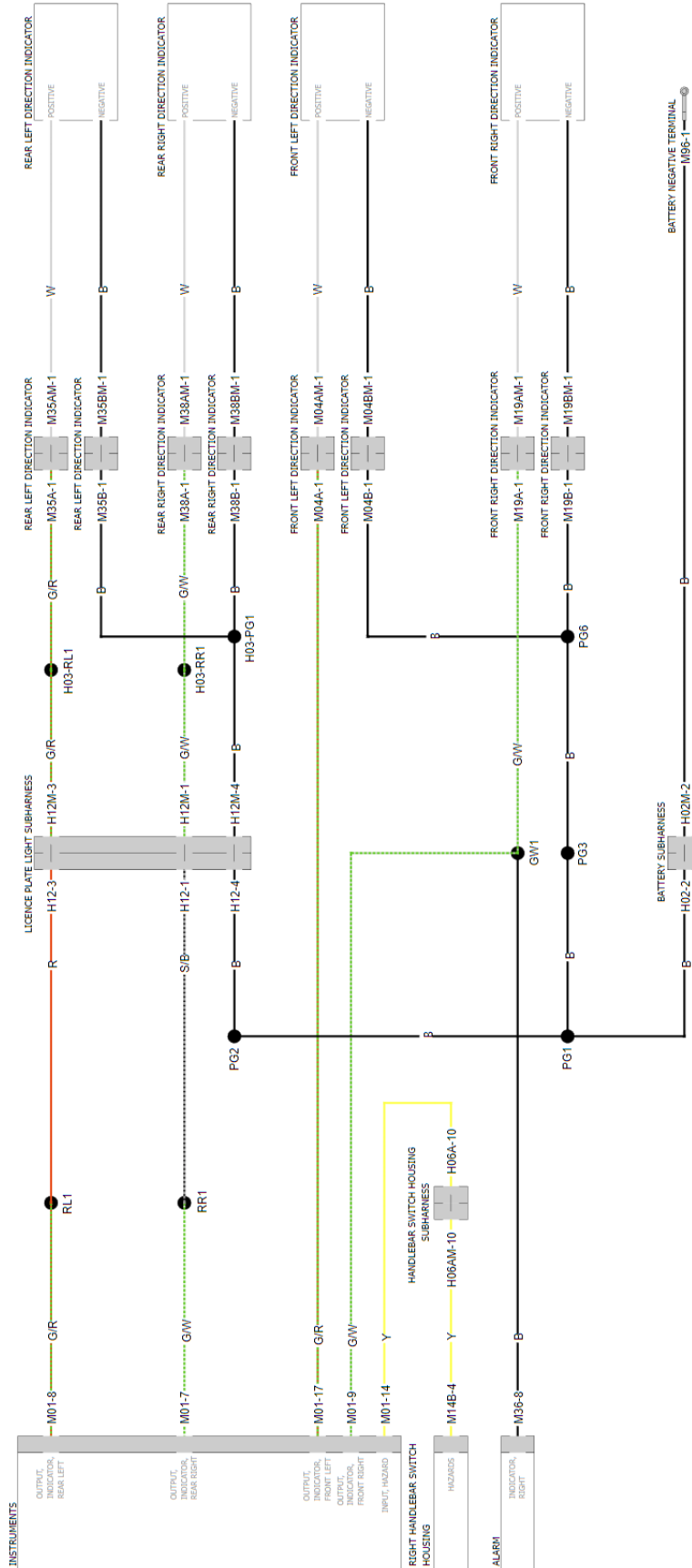




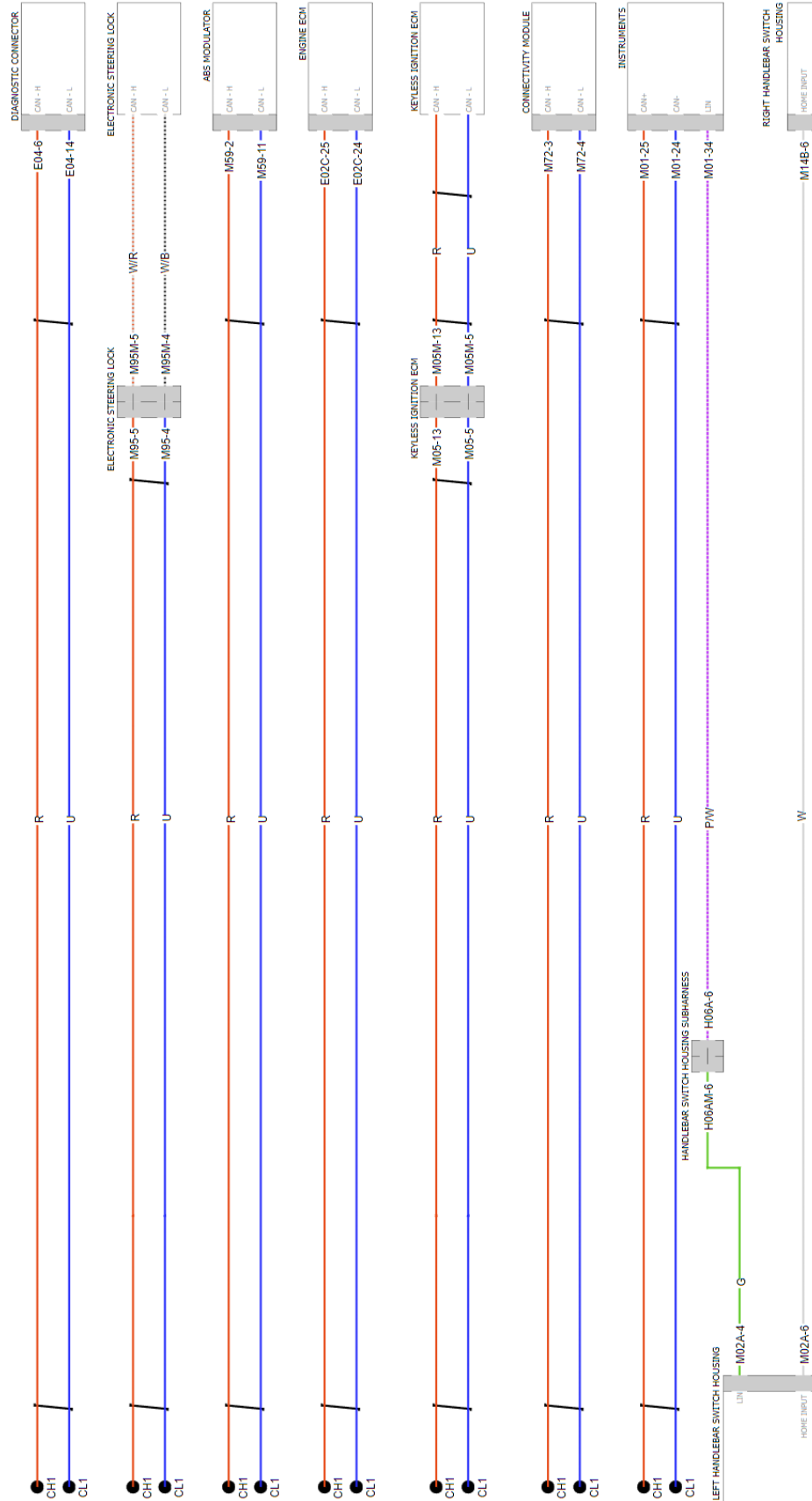
# Lighting Circuit – Rear



# Lighting Circuit – Indicators

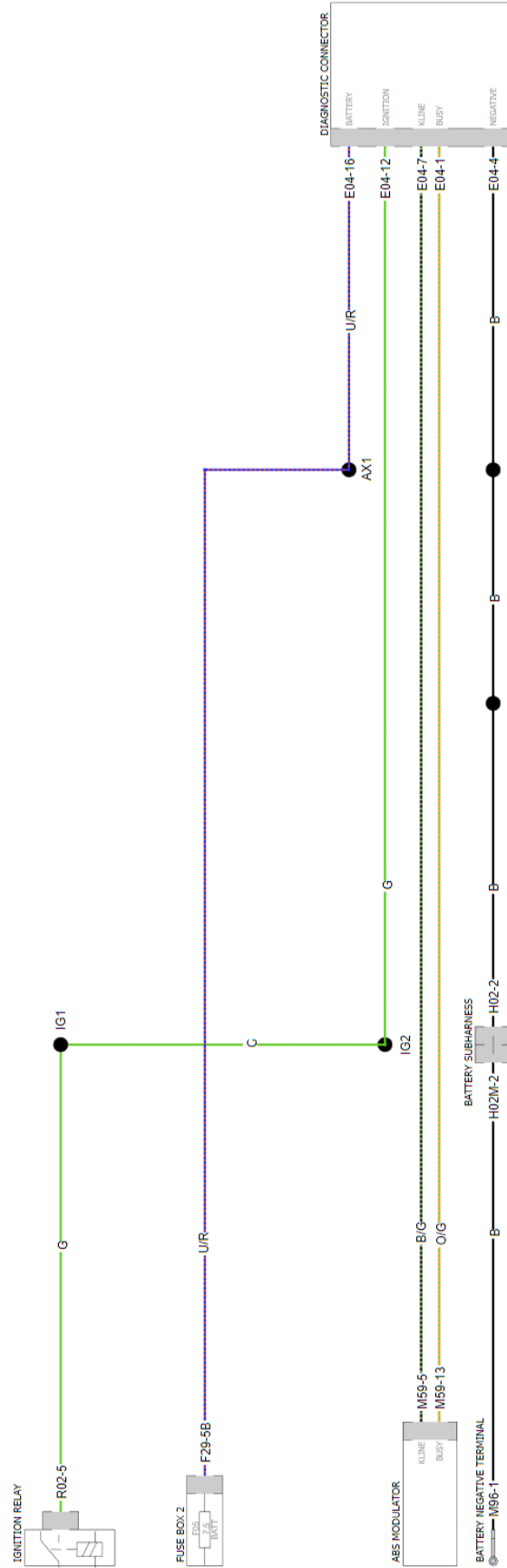


# Communications Networks Circuit



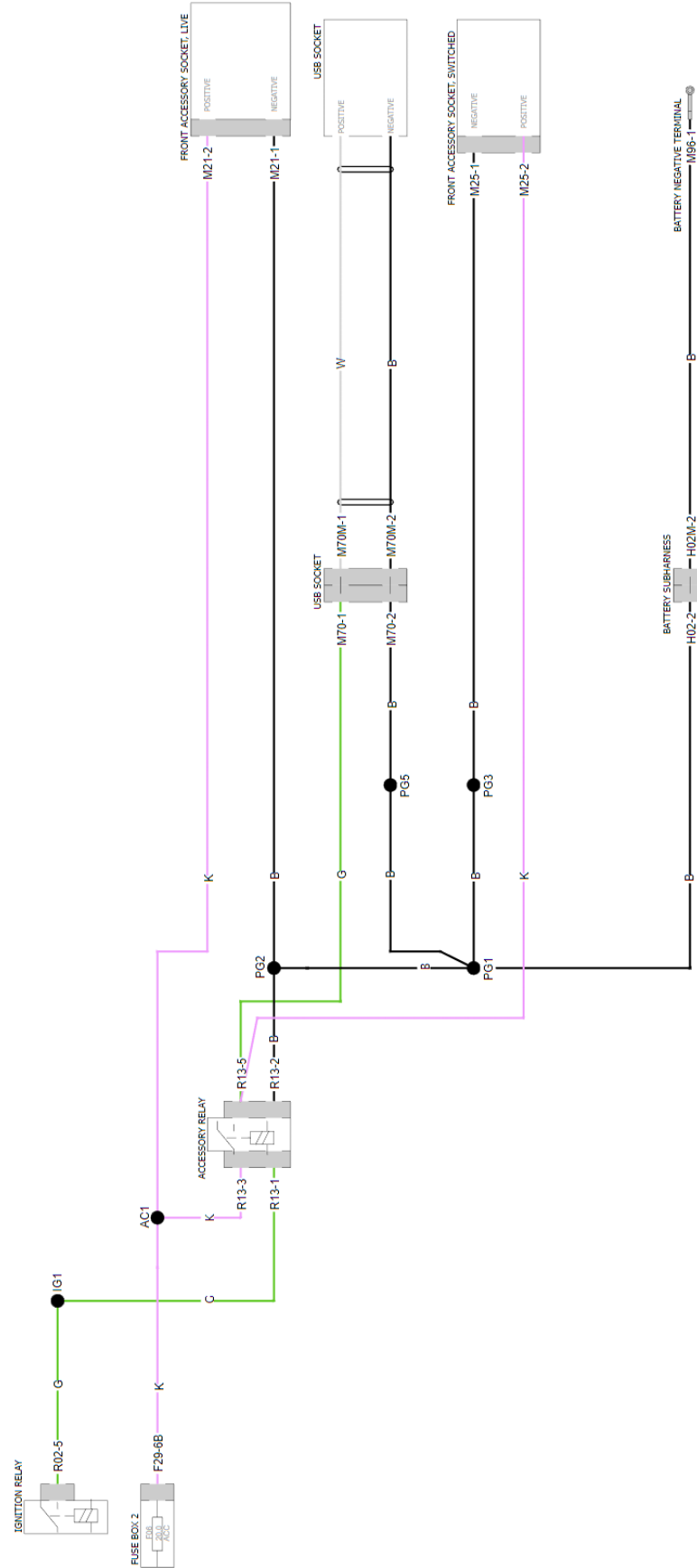


# Diagnostic Socket Circuit

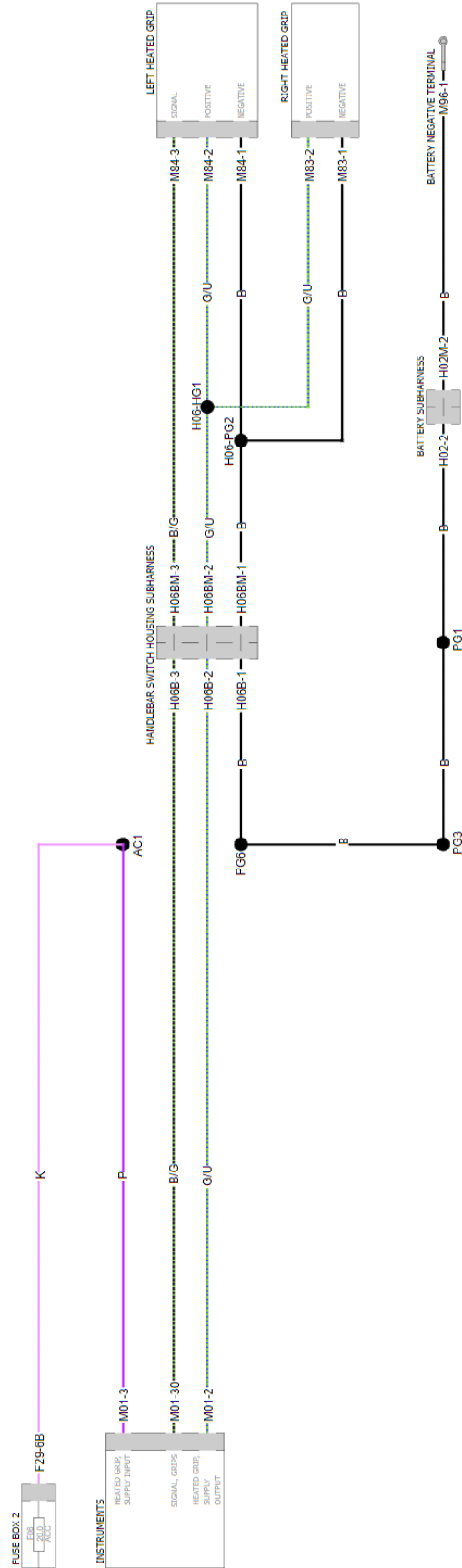




# Accessories Circuit

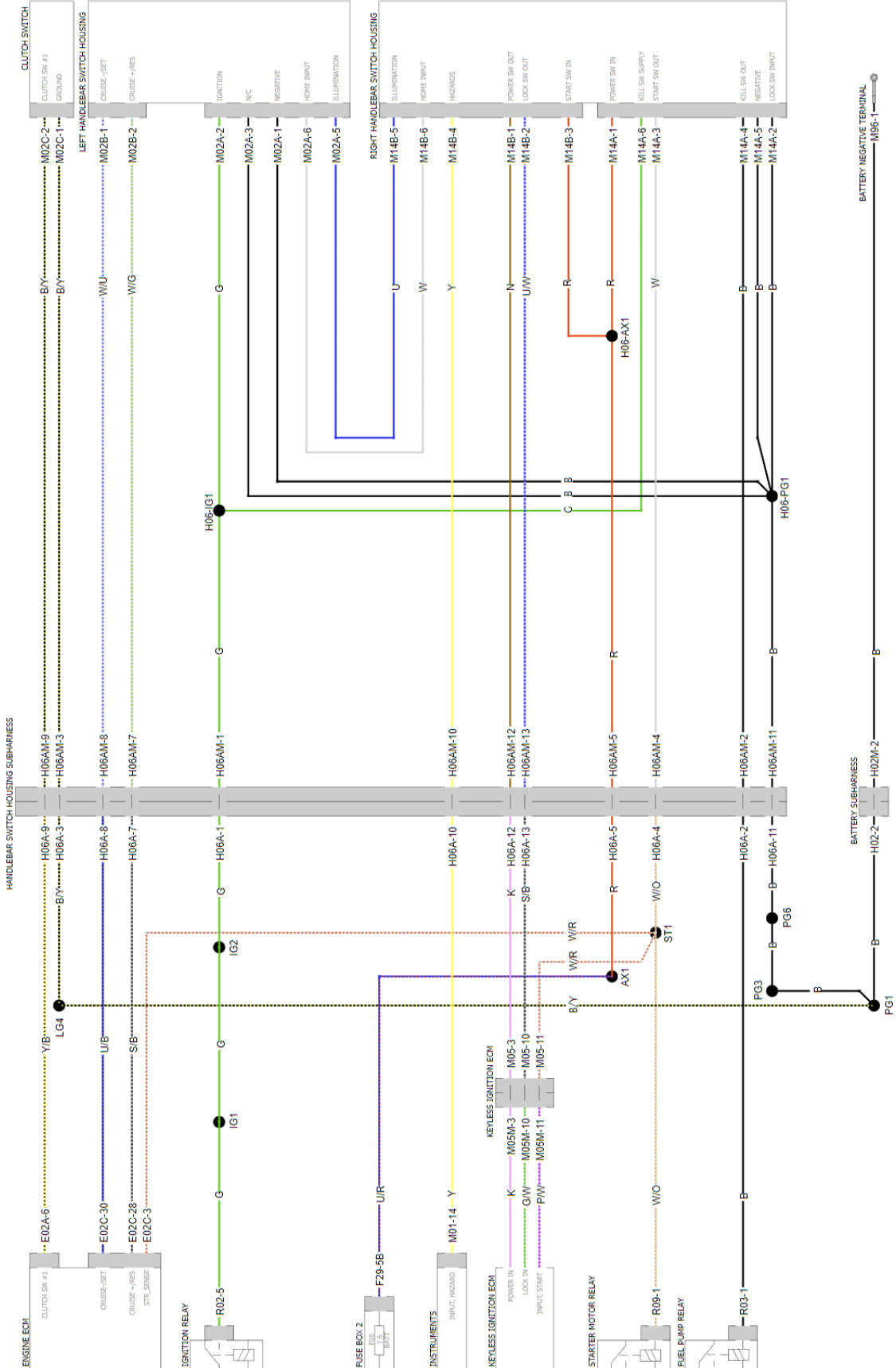


# Heated Accessories Circuit

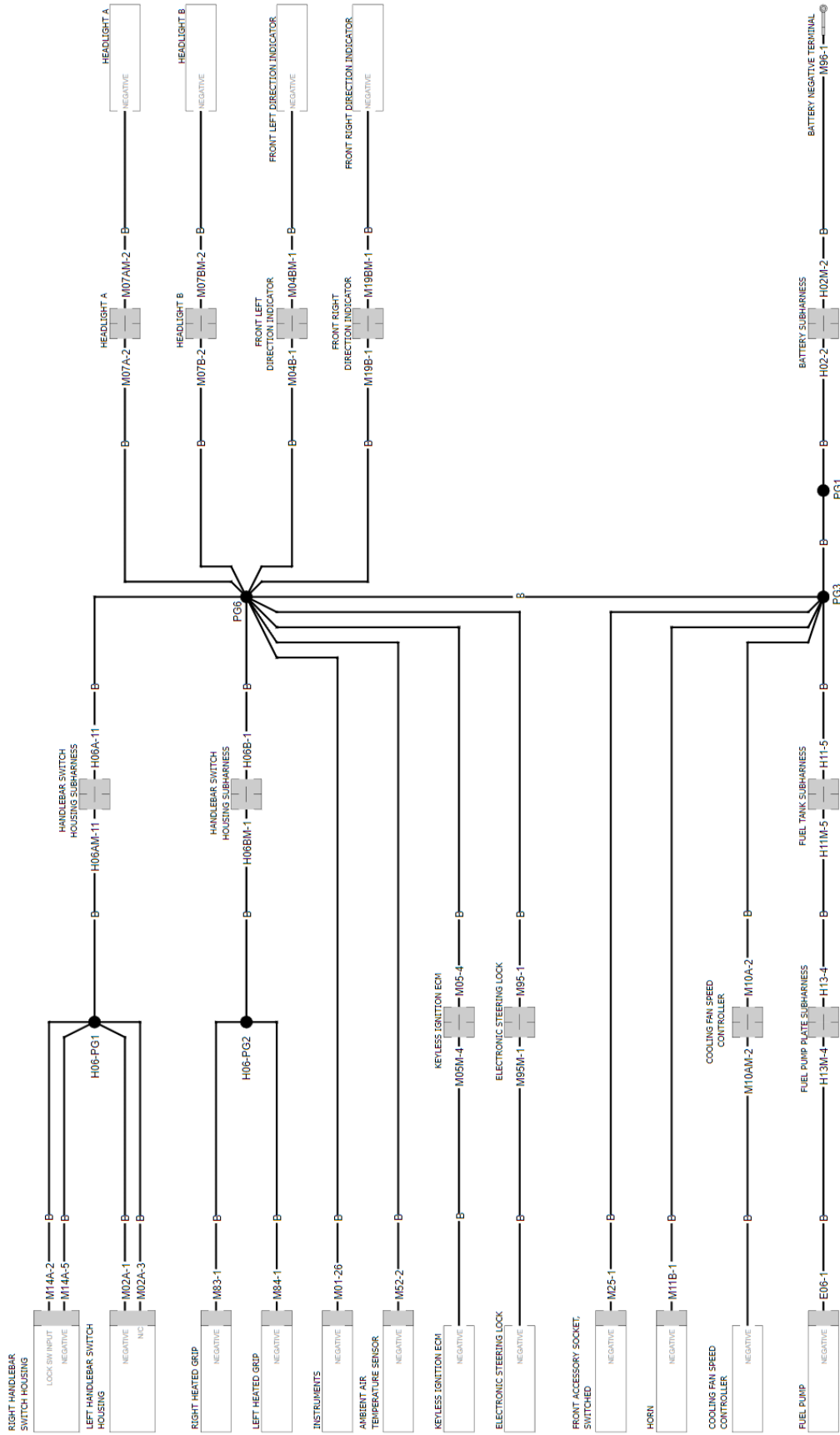




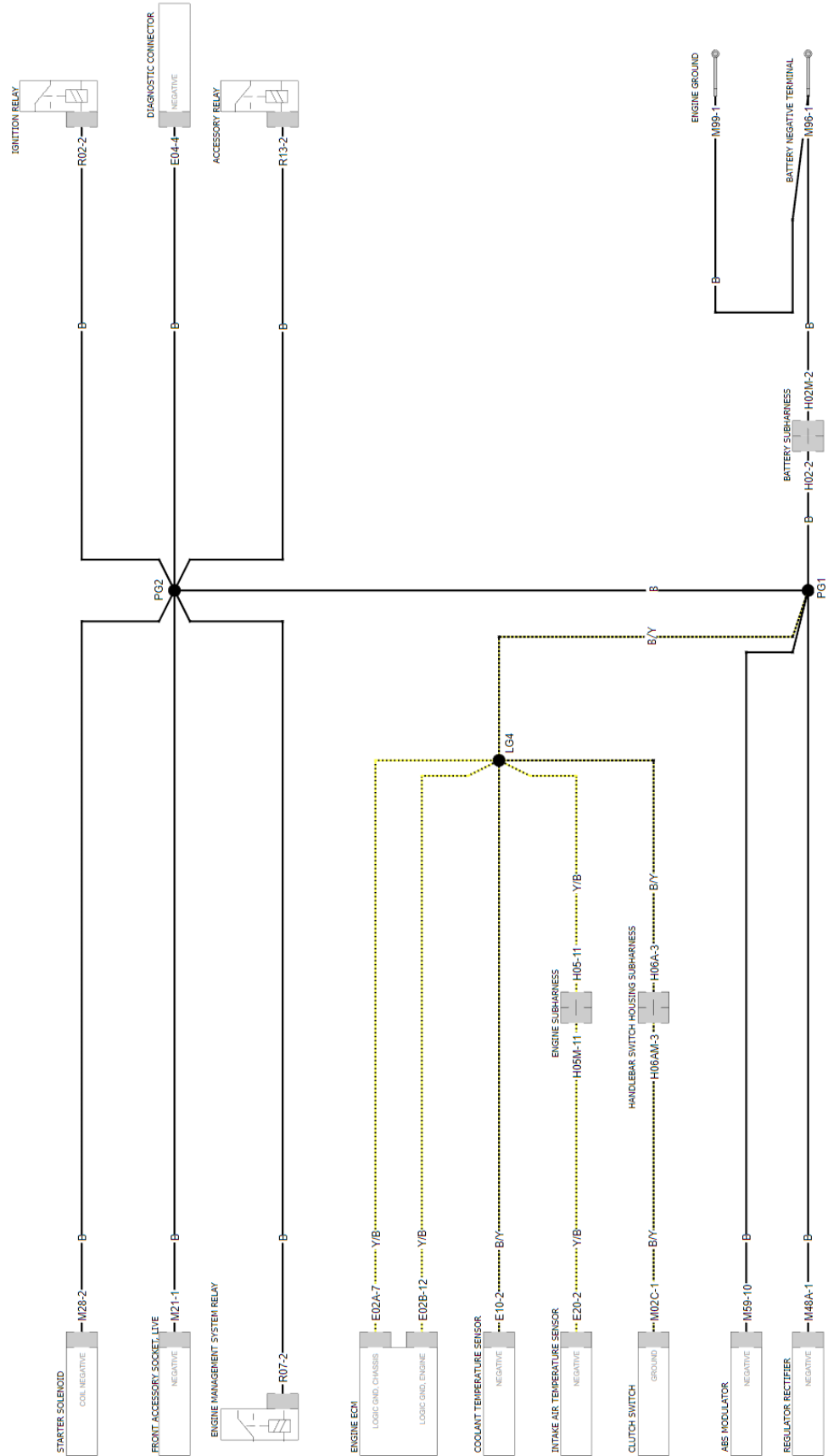
# Rider Information Circuit



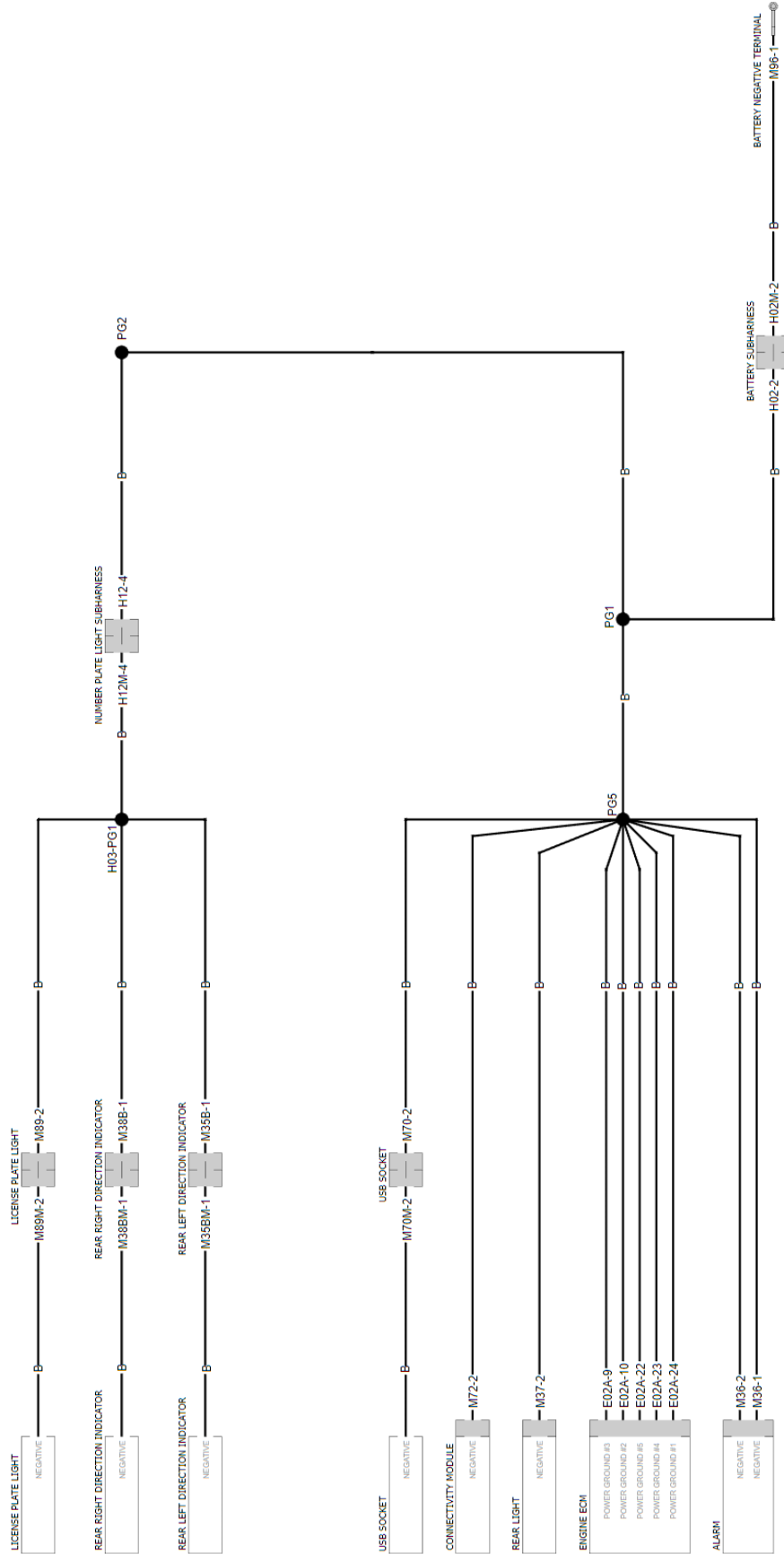
# Ground Circuit – Front



# Ground Circuit – Middle



# Ground Circuit - Rear



## Electronic Systems Configuration and Setup

### General Information

#### Calibration Downloading General Information

#### CAUTION

The calibration download procedures detailed in the flow charts provided in the following chapters must be followed precisely. Failure to precisely follow the procedures may result in permanent damage to the component receiving the calibration download.

#### CAUTION

When downloading a calibration, always ensure the calibration selected is correct for your model and region. Failure to select the correct calibration may result in permanent damage to the component receiving the calibration download.

#### CAUTION

When downloading an engine ECM calibration, always ensure the correct calibration is selected for your fuel type. Engine damage may result if a calibration for an incorrect fuel type is installed.

#### NOTICE

Before starting a download, make sure the battery voltage is at least 12.8 Volts. An approved motorcycle battery charger should be connected to maintain battery charge during download.

The headlight fuse may be removed prior to starting a download to prevent the headlight draining the battery. Refer to the label on the fuse box cover for the fuse location.

Ensure the ignition and engine Start/Stop switches are set to the positions detailed at the beginning of each download process flowchart.

Once the calibration download has been started, do not switch the ignition or engine Start/Stop switches to a different position unless instructed to do so by the Triumph Diagnostic Tool/download process flow chart.

Do not disconnect the diagnostic interface during the calibration download.

During a calibration download, multiple files are downloaded and the progress bar displayed will repeatedly rise from 0% to 100% as each file is downloaded. Always wait for the Verifying Download screen to appear to confirm that the full calibration has downloaded successfully and click the Finish button to end the process. Do not click the Cancel button while the download is still in progress.

### Instrument Calibration Downloads

Following an instrument calibration download, the following items (if fitted) may return to their factory default settings. Before starting an instrument calibration download, record the settings of each item where applicable so that the settings can be restored after the download has finished.

- Time/date
- Distance/time to next service
- TPMS instrument display (enabled/disabled)
- All riding mode settings
- Self cancelling indicators (enabled/disabled).

### Downloading Sequence - Calibration Downloads to Multiple ECMs

When planning to download a calibration, check each of the motorcycle's ECMs for out of date calibrations and make sure all ECMs are updated as necessary. Where calibration updates are available for more than one ECM, the ECMs should be updated in the following order.

1. Keyless ECM
2. Chassis ECM
3. Suspension ECM
4. Headlight ECM
5. Blind spot radar ECM
6. Instruments
7. Engine ECM

## Instruments

### Odometer Reset

This model is equipped with an odometer that allows the recorded odometer value to be reset to zero during the PDI check.

In the event of replacement this functionality will also allow a new set of instruments to be programmed with the motorcycle's existing odometer value.

#### **NOTICE**

Motorcycles with the odometer reset functionality enabled will display the Set/Reset Odometer option in the chassis diagnostics menu.

If the odometer has recorded more than 120 miles (200 km) or previously been reset the option will not be available and the buttons will be greyed out.

Triumph Motorcycles LTD. would like to emphasise the importance of following the correct process whilst using the Triumph Diagnostic Tool to SET/RESET the odometer.

#### **⚠ CAUTION**

This operation can only be performed once and cannot be undone.









Check the new value is correct before proceeding.

When setting or resetting the odometer value ensure:

- The **CORRECT** odometer value is displayed in the Set Odometer box before pressing the Set or Reset button.
- **DO NOT** press the Set or Reset buttons before entering the correct odometer value. Once pressed the option to set or reset the odometer will no longer be available.
- **REMEMBER**, pressing the set or reset buttons will lock the odometer and no further programming will be allowed.



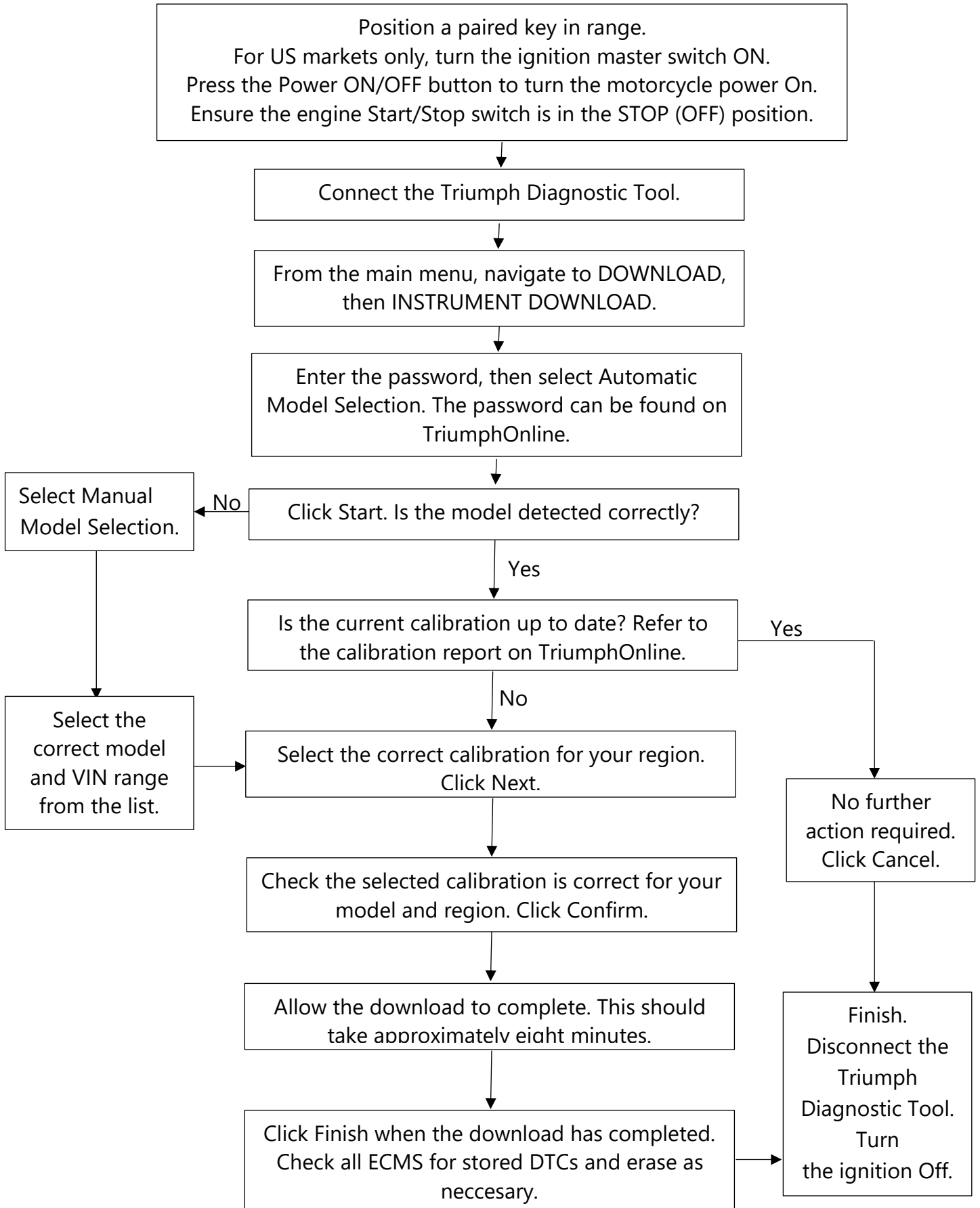
## Set/Reset Odometer

|  |  |   |
|--|--|---|
|  Current Odometer Reading   | 42 Miles   |  <b>Caution</b><br><br>This operation can only be performed once and cannot be undone. Check the new value is correct before proceeding. |
|  Set Odometer   | <input type="text" value="000000"/> Miles  |   |
|  Set - enter an existing odometer value to a new odometer. Value must be greater than current odometer value. | <br>Set   |   |
|  Reset - zero the odometer. Current odometer value must be below 120 miles (200 km).                          | <br>Reset |    |

To Set/Reset the Odometer always refer to Set/Reset Odometer in the Chassis Diagnostics chapter of the Triumph Diagnostic User Guide.



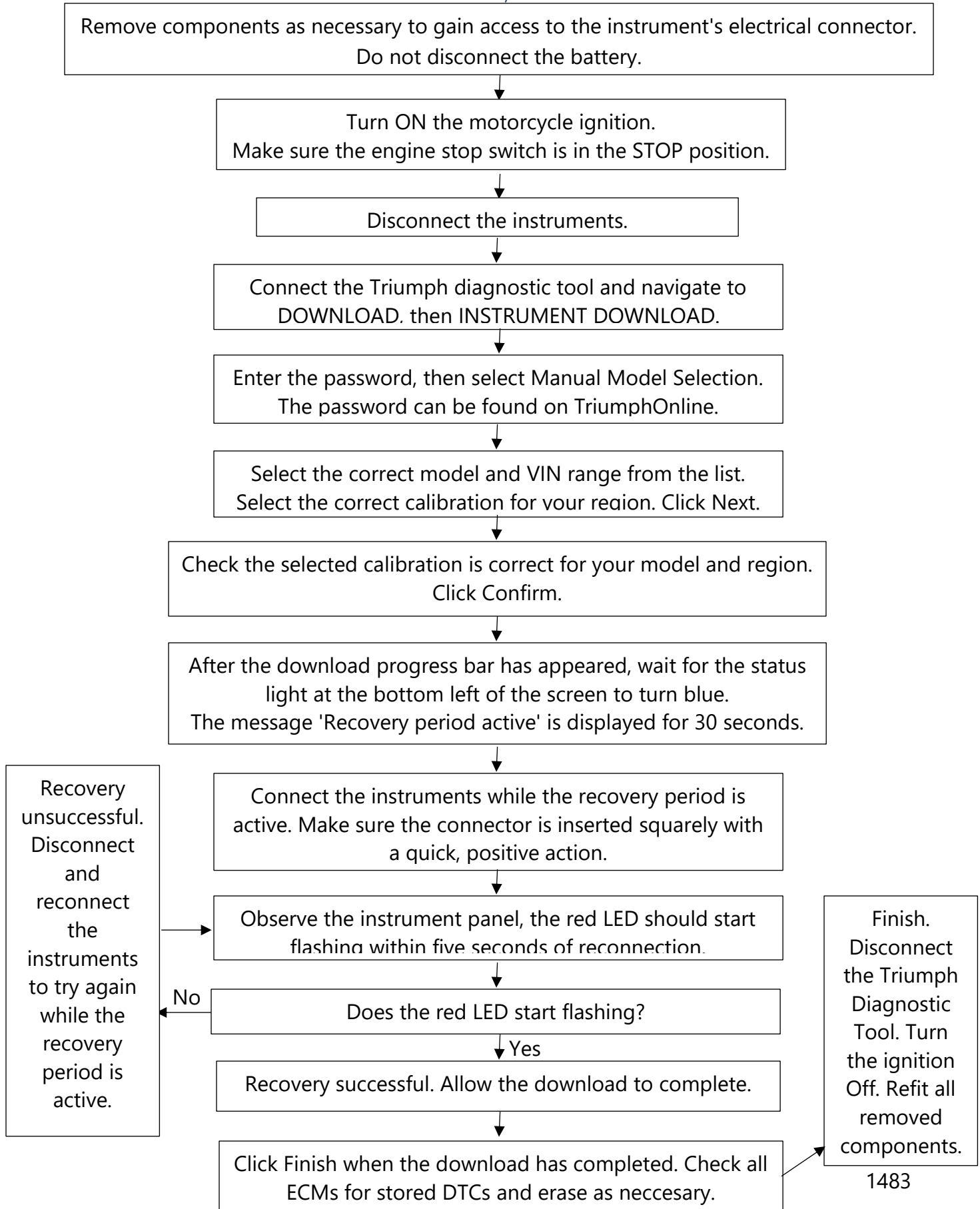
Instrument Calibration Download Flow Chart



### ***NOTICE***

If the download fails to complete, turn the ignition Off and allow the motorcycle to power down (approximately one minute) before restarting the download. If the download continues to fail, see [\*\*Instrument Calibration - Failed Download Recovery Flow Chart\*\*](#).

## Instrument Calibration - Failed Download Recovery Flow Chart

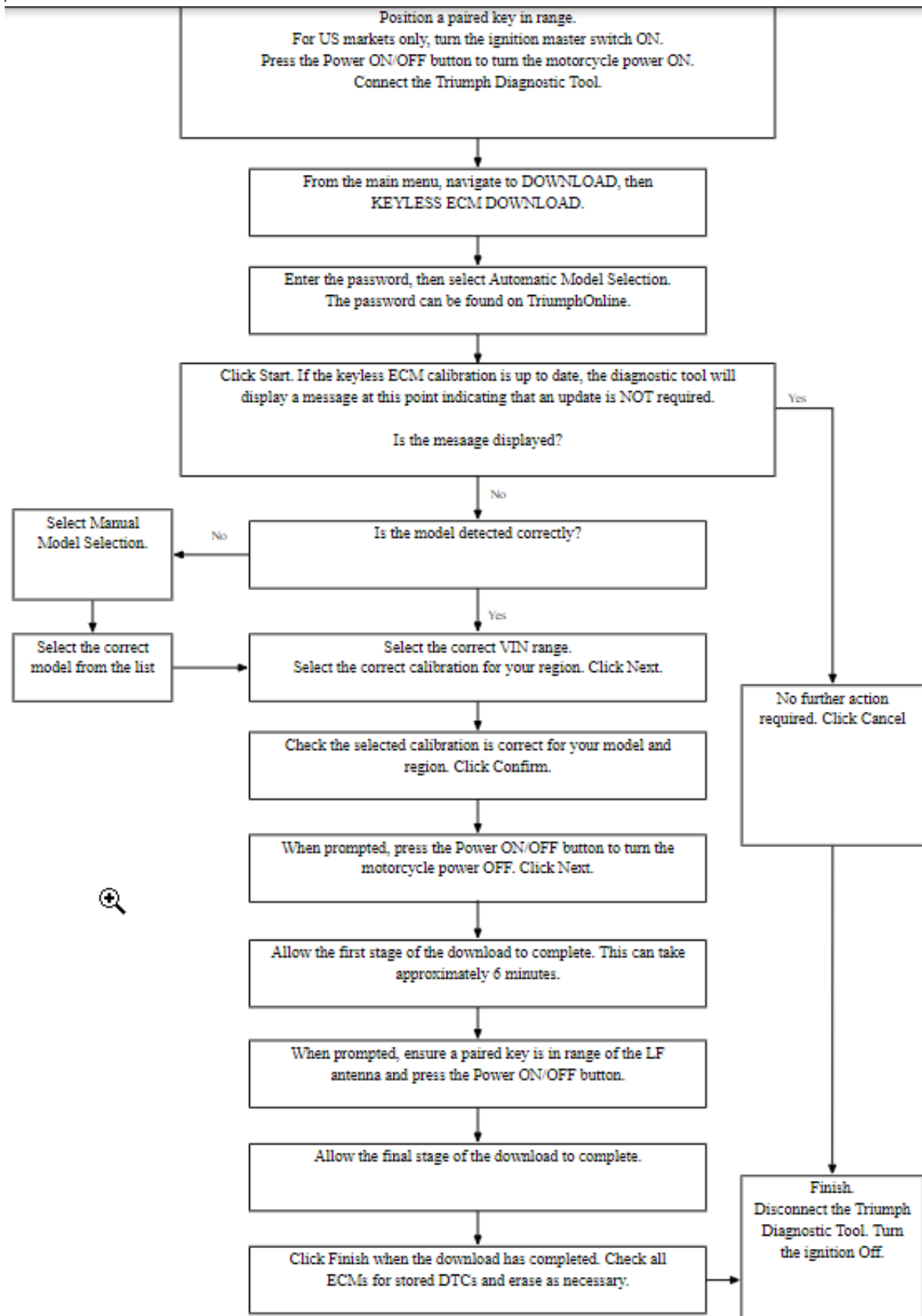


***NOTICE***

If the instruments fail to recover after repeated attempts, contact Triumph Service.

# Keyless ECM

## Keyless ECM Calibration Download Flow Chart



**NOTICE**

If a keyless ECM calibration download fails for any reason, it is possible that any existing software and immobiliser system pairings may have been erased from the keyless ECM's memory. Where this is the case, the keyless ECM can be recovered as described below.

If after completing this procedure, the download continues to fail, contact Triumph Service.

Stage 1 - Check Instrument and Headlight Behaviour at Ignition ON:

1. Make sure a paired key is in range.
2. Press the power ON/OFF button.
3. Do the Instruments and headlights turn ON?

Yes - The immobiliser system pairings have been retained. The keyless ECM download can be restarted and completed using the normal download method.

No - The immobiliser system pairings have been erased. Proceed to Stage 2.

Note: If the headlights illuminate but the instruments do not turn on, this indicates that the immobiliser system pairings have been retained but the instruments are not functioning correctly. Recover the instruments by downloading the correct instrument calibration for your model and region.



Stage 2 - Partial Keyless ECM download:

1. Connect the diagnostic tool.
2. Select the correct Keyless ECM calibration for download using Manual Model Selection.
3. Do not click Confirm to start the download at this point.
4. Press the motorcycle's Power On/Off button (Note: the motorcycle will not appear to power ON).
5. Within 10 seconds, click Confirm to start the download.
6. Follow the on screen instructions at the start of the download.
7. Click Cancel when the download reaches 100% and you are prompted turn the ignition ON.

Stage 3 – Re-register All keys:

1. Navigate to Chassis Diagnostics.
2. Press the motorcycle's Power button (Note: the motorcycle will not appear to power ON).
3. Within 10 seconds, click Immobiliser Diagnostics.
4. In the Configure tab, click Re-register all keys.
5. Pair the Smart key first, followed by the two passive keys.

Stage 4 - Pair the Electronic Steering Lock (if fitted).

Stage 5 - Full Keyless ECM download:

1. Make sure a paired key is in range and turn the ignition ON. The instruments and headlight should now turn ON.
2. Complete a full keyless ECM download using the normal download method.
3. Follow all on-screen instructions during the download.
4. Click Finish when the download has completed.

Stage 6 - Pair the Engine ECM with the Immobiliser:

1. Switch the engine start/stop switch to the RUN position.
2. Navigate to Immobiliser Diagnostics and pair the engine ECM and immobiliser.

Stage 7 - Final Steps:

1. Turn the ignition off for at least 60 seconds.
2. Check the ignition can be turned ON and engine started using each key.
3. Check all ECMs for stored DTCs and erase as necessary.

**NOTICE**

Before starting the set up procedure, the electronic steering lock must be disconnected from the main harness.

Disconnect the Electronic Steering Lock Connector

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Flyscreen - Removal](#)

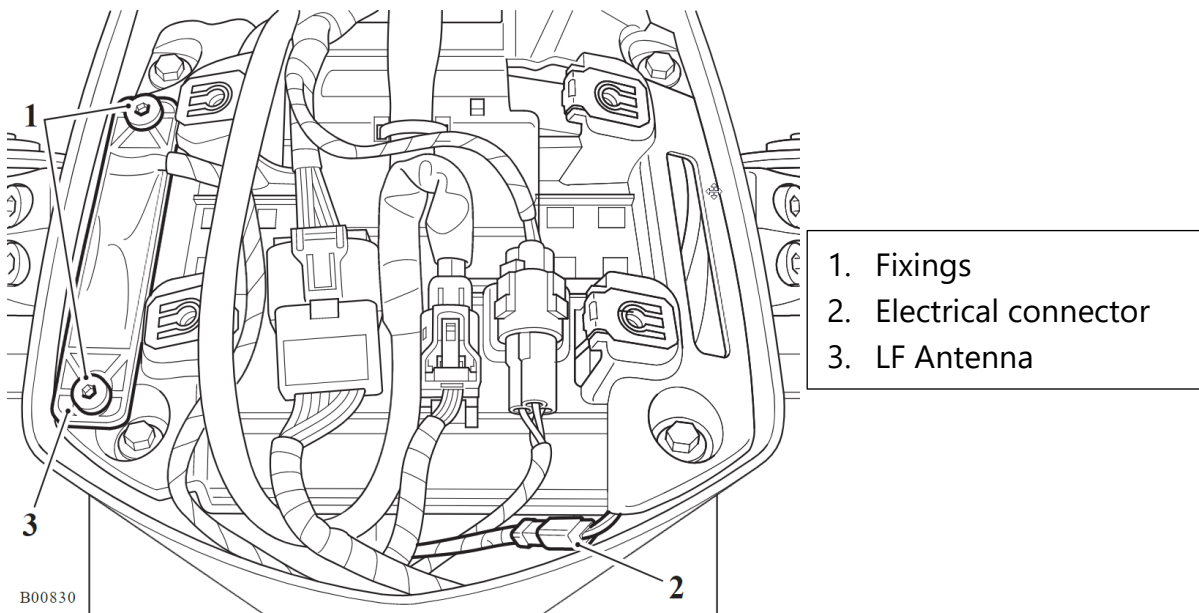
**NOTICE**

Note the routing of the LF antenna harness for installation.

Note the orientation of the LF antenna for installation.

Note the routing of the harnesses under the flyscreen for installation.

1. Remove the fixings and detach the LF antenna from the flyscreen mounting.
2. Disconnect the LF antenna electrical connector from the main harness and remove the LF antenna.





3. Disconnect the two handlebar subharness connectors and the twist grip position sensor connector from the main harness.

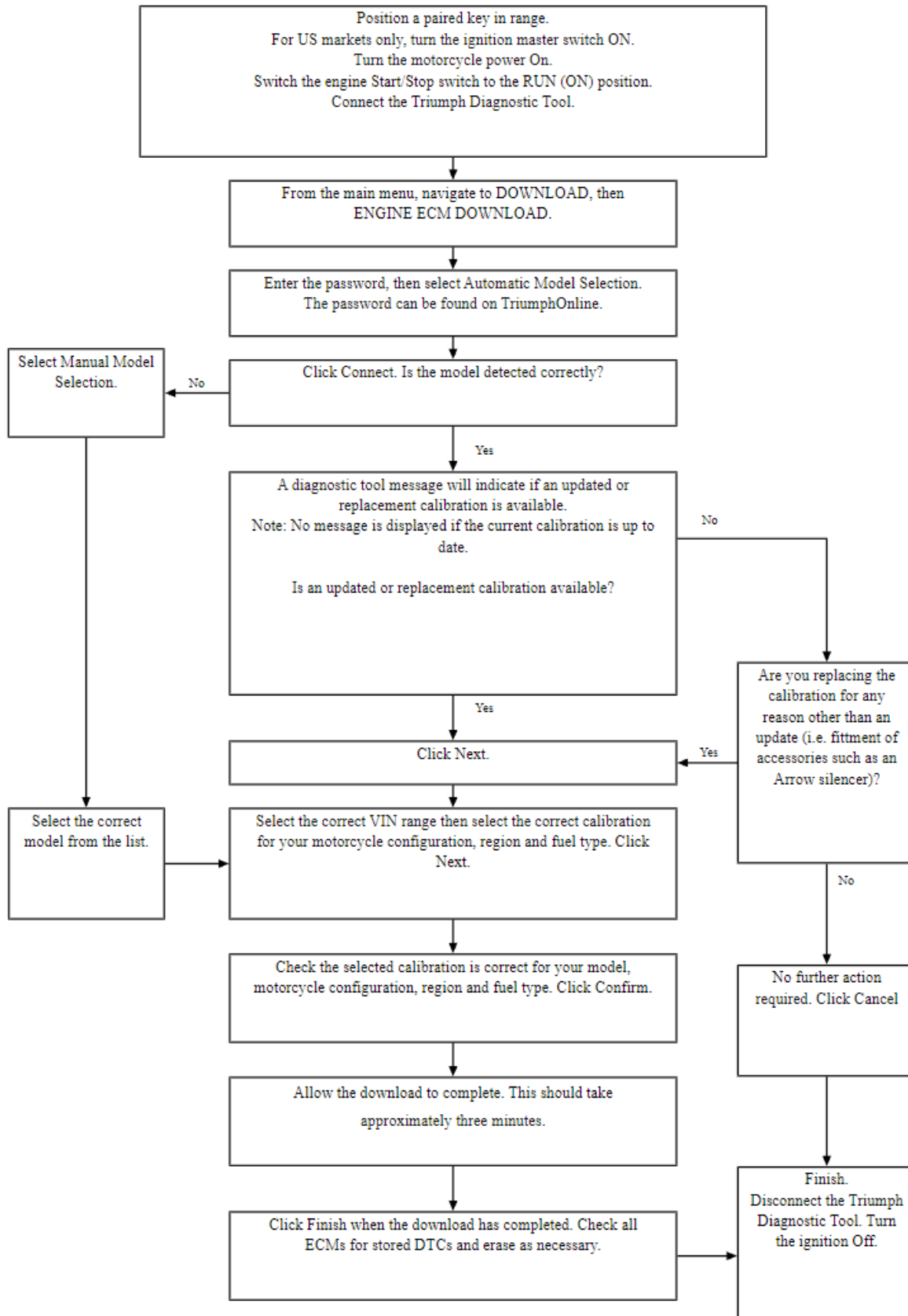
***NOTICE***

Note the position of the two cable ties securing the harness for installation.

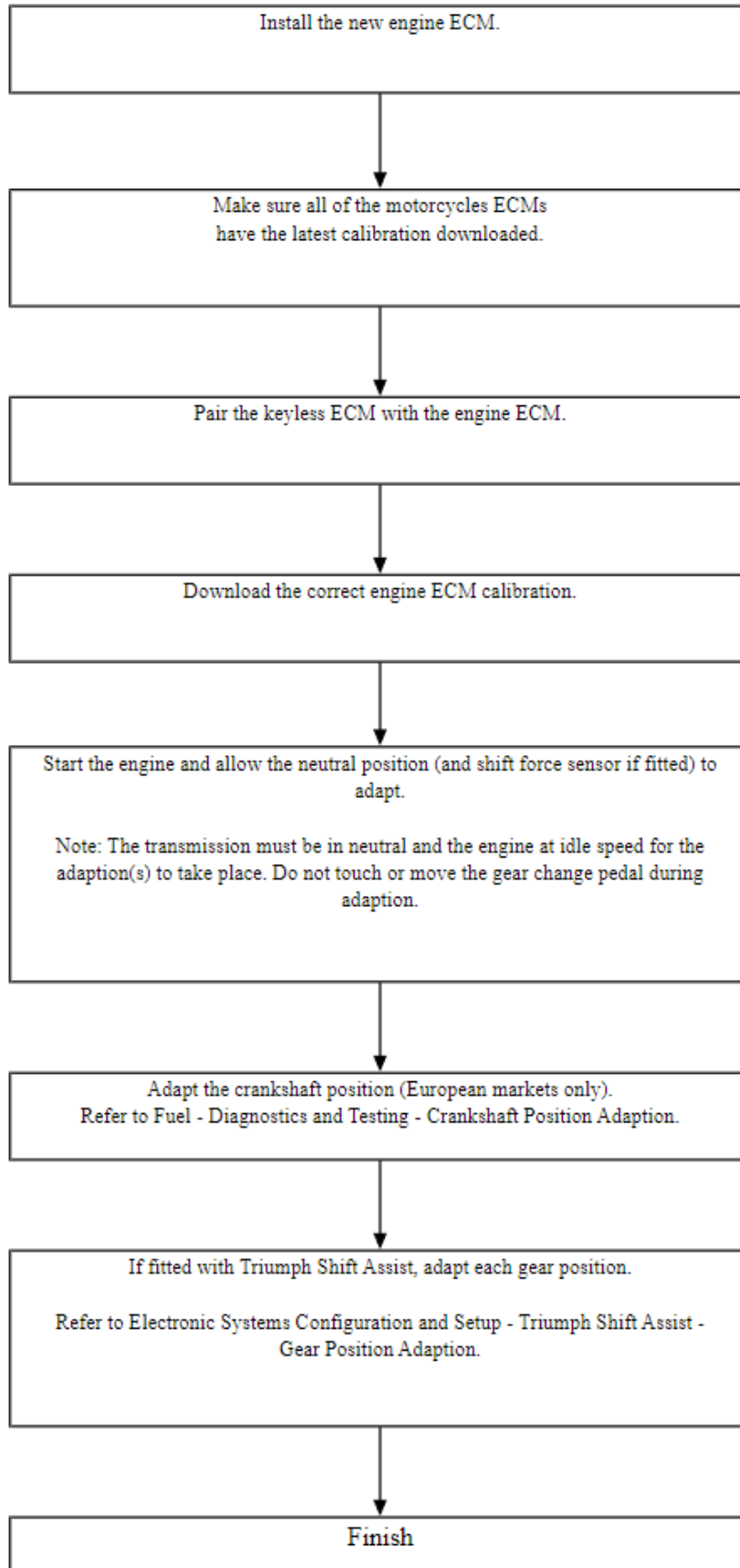
4. Cut the cable ties securing the harness to the flyscreen mounting.
5. Release the fixings and detach the flyscreen mounting from the from subframe.

# Engine ECM

## Engine ECM Calibration Download Flow Chart



## Replacement Engine ECM Setup



## Immobiliser System

### Keyless Ignition Keys

The keyless ignition system allows the motorcycle to be started without the use of a mechanical key. There are three keys supplied with the motorcycle. One smart key and two passive keys.

To turn the motorcycle on, ensure a key is positioned in range of the LF antenna as described below and press either the Power button or Engine Start button on the Engine Start/Stop switch.

#### **⚠ CAUTION**

All keys supplied are locked to the keyless ECM. They cannot be used with any other motorcycle or keyless ECM.

If all keys are lost, misplaced or damaged, then the keyless ECM will need to be replaced.

To avoid unnecessary cost and time, make sure that all spare keys are kept in a secure location.

#### **NOTICE**

An additional smart key can be purchased from your Triumph dealer. However, only three keys can be programmed to the motorcycle. This can be a combination of smart keys and standard keys.

### Smart Key Operation



Smart Key

The smart key has two modes, active mode and passive mode.

A short press on the smart key button shows the current status of the key. The smart key LED will flash:

- Green when the key is in active mode.
- Red when the key is in passive mode.

To switch modes, press and hold the smart key button until the LED changes colour from green to red or vice versa.

In active mode, the smart key must be within (one metre/three feet) of the LF antenna to allow the motorcycle to be powered on and started. If the smart key is out of range of the LF antenna then it will be unresponsive and the keyless ignition cannot be activated.

In passive mode (or if the smart key battery is flat) the smart key must be held against the LF antenna to allow the motorcycle to be powered on and started (see [Immobiliser Components Location](#)).

#### Passive Key Operation

Passive keys must be held against the LF antenna to allow the motorcycle to be powered on and started.

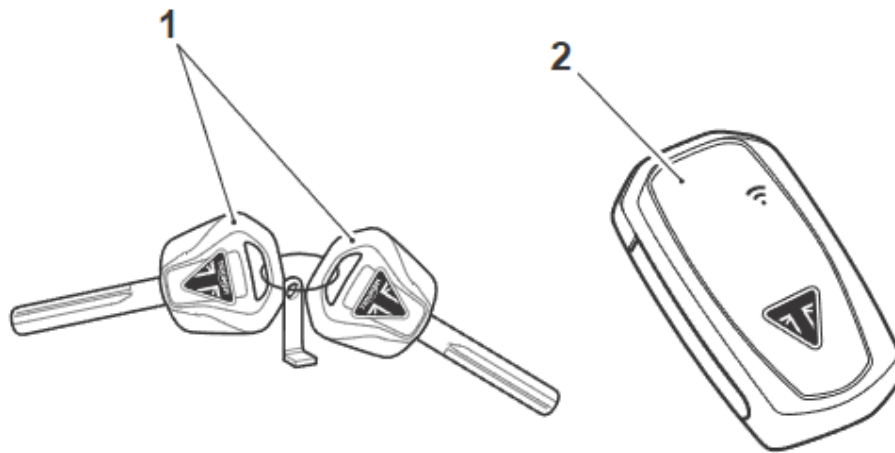
#### Smart Key Battery Replacement

1. Ensure the smart key is turned to its passive mode (red LED).
2. Remove the fixing and remove the battery cover.
3. Noting its orientation, remove the battery.

Installation is the reversal of removal, noting the following.

- A CR2032 battery is required.
- Tighten the fixing to 0.3 Nm.

The motorcycle is delivered from the factory with three keys; two passive keys and one smart key.



- |  |
|--|
| <ol style="list-style-type: none"><li>1. Passive keys</li><li>2. Smart Key</li></ol> |
|--|

**⚠ CAUTION**

All of the motorcycle's available keys should be obtained before performing any key pairing operations.

Starting a key pairing operation without having obtained all of the motorcycle's keys will render any spare keys inactive. In some circumstances, absent spare keys may also be rendered permanently unusable.

- Lost or unwanted keys can be erased, and additional/replacement keys added using the Triumph diagnostic tool.
- A maximum of three keys can be paired to the keyless ECM at any one time. This can be any combination of smart keys and passive keys. It is not possible to pair further keys when the maximum of three paired keys is reached.
- When pairing a combination of smart keys and passive keys, it is recommended that any smart keys are paired first, followed by the passive keys.

- A paired key can have three different states, active, inactive and erased.
- Once a key is paired it is regarded as active. At this point the key is permanently locked to its paired keyless ECM and cannot be paired to any other keyless ECM.
- A paired key is required to allow the motorcycle to power ON in order to perform key pairing operations. All available paired keys should be obtained before starting these operations.
- Paired keys can be erased using the Re-Register All Keys function on the Triumph diagnostic tool. When this function is used, the key being used to power the motorcycle will remain paired and active. Any other paired keys will be registered as inactive.
- When using the Re-Register All Keys function, a ten minute (600 second) security time delay is applied to the first key pairing. Further key pairings are subject to a five minute (300 second) time delay.
- Inactive keys can be either paired and reactivated, or replaced by new keys and overwritten.
- Any inactive keys that are overwritten are then stored as erased in the keyless ECM memory. A maximum of three erased keys can be stored.
- Erasing more keys after the maximum of three erased keys has been reached, will result in the erased keys being overwritten. Erased keys that are overwritten are then rendered permanently unusable.
- Stored erased keys can be paired and reactivated providing that the maximum number of three paired keys has not been reached. When a key is reactivated, it is moved from its 'erased' memory slot to a vacant 'active' memory slot.

## Pairing New or Replacement Keys

1. Obtain all available motorcycle keys from the owner.
2. Remove the rider's seat.
3. Power the motorcycle ON using a paired key.

### NOTICE

Refer to the following guidelines for advice on which key to use to power the motorcycle ON:

[Guidelines - Replacing a Lost Smart Key](#)

[Guidelines - Adding a Second Smart Key](#)

4. Connect the Triumph diagnostic tool.
5. Navigate to CHASSIS DIAGNOSTICS - IMMOBILISER DIAGNOSTICS - Configure.

### NOTICE

Before clicking Re-Register All Keys, ensure that you have all keys being paired to hand.

A ten minute (600 second) security time delay is then initiated for the first key pairing. Do not leave the motorcycle unattended during this time.

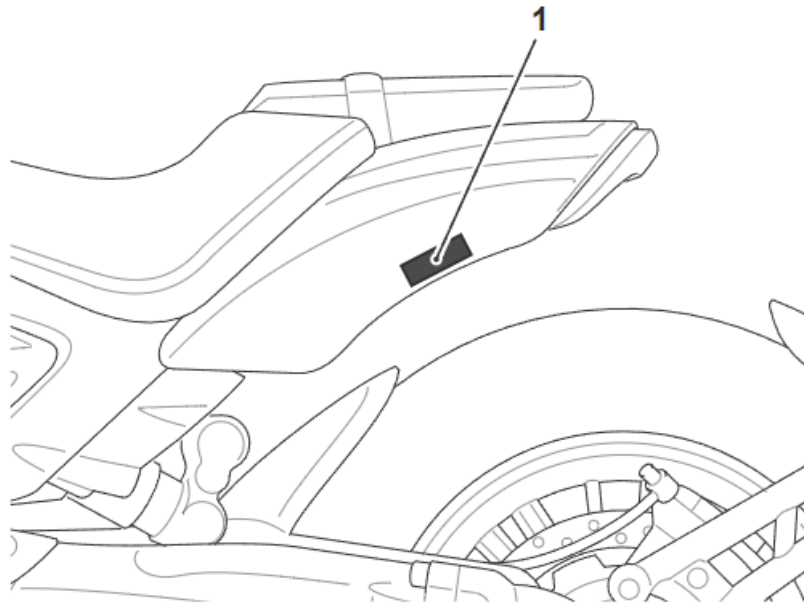
During the ten minute (600 second) time delay, the pairing of the key used to power the motorcycle ON is retained. It is therefore not necessary to re-pair this key. All other paired keys are registered as inactive.

After the ten minute (600 second) time delay has elapsed, a pairing command is transmitted by the Low Frequency (LF) antenna. The Triumph diagnostic tool will prompt you to position the key being paired against the LF antenna.

The LF antenna is located beneath the underseat storage compartment. For pairing purposes, the antenna can be accessed from inside the storage compartment. A symbol is provided inside the storage compartment to identify the antenna location. Only allow one key to be brought into close proximity of the LF antenna during each key pairing.

Further keys can be paired by clicking Add. A five minute (300 second) time delay is applied to each subsequent key pairing.



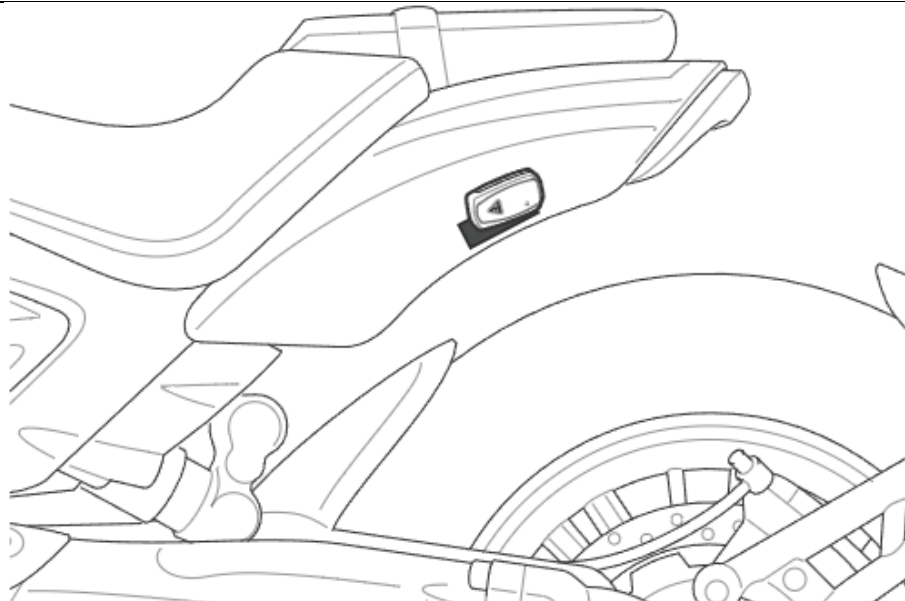


1. LF antenna location

6. Click Re-Register All Keys.
7. A ten minute (600 second) security time delay will begin.
8. When the time delay has elapsed, place the key against the LF antenna as prompted by the Triumph diagnostic tool.

**NOTICE**

Smart keys should be positioned so that the side with the logo/button is facing away from the LF antenna.



Key Placed Against LF Antenna

9. Hold the key against the LF antenna location until the Triumph diagnostic tool reports the key has been successfully paired.

#### **NOTICE**

If pairing does not occur immediately, slowly adjust the position of the key to the LF antenna (keeping it in close proximity) until the pairing is achieved.

10. Click Add to pair another key in the same way or click Finish to end the process.

#### Guidelines - Replacing a Lost Smart Key

This instruction provides a brief outline of the process for pairing a replacement smart key, in the event that the original smart key has been lost. The instruction assumes the motorcycle is in its delivered condition, with one smart key and two passive keys paired.

1. Obtain all available motorcycle keys from the owner.
2. Power the motorcycle ON using one of the passive keys.
3. Connect the Triumph diagnostic tool.
4. Select Re-Register All keys.

#### **NOTICE**

The pairing of the passive key used to power the motorcycle ON is retained.  
The other two keys are registered as inactive.

5. Pair the replacement smart key.
6. Press the smart key button to lock the new smart key to the keyless ECM.
7. Pair the passive key that was NOT used to power the motorcycle ON.

#### **NOTICE**

The motorcycle now has two passive keys and the replacement smart key paired. The original smart key is stored as an erased key in the keyless ECM memory. If the original smart key is later found, it can be paired and reactivated by following the 'Adding a Second Smart Key' procedure (see [Guidelines - Adding a Second Smart Key](#)).

## Guidelines - Adding a Second Smart Key

This instruction provides a brief outline of the process for pairing a second smart key. The instruction assumes the motorcycle is in its delivered condition, with one smart key and two passive keys paired.

1. Obtain all available motorcycle keys from the owner.
2. Power the motorcycle ON using the original smart key.
3. Connect the Triumph diagnostic tool.
4. Select Re-Register All Keys.

### **NOTICE**

The pairing of the smart key used to power the motorcycle ON is retained.  
The two passive keys are registered as inactive.

5. Pair the additional smart key.
6. Press the smart key button to lock the new smart key to the keyless ECM.
7. Pair a passive key.

### **NOTICE**

The motorcycle now has two smart keys and one passive key paired.  
The second passive key is stored as an erased key in the keyless ECM memory.  
The erased passive key can be later paired and reactivated, in the event that one of the paired keys is lost.

8. Attach a suitable label or key fob to the erased passive key to aid future identification.

**⚠ CAUTION**

Always store spare keys and the key number tag in a safe place away from the motorcycle.

At least one paired key is required to start any key pairing operations. If all keys have been lost, it will not possible to pair any replacement keys.

In this situation the keyless ECM and all keys must be replaced.

If the tag bearing the key number is also lost, the lock set (fuel tank cap, seat lock etc.) must also be replaced.

Pairing the Electronic Steering Lock

**NOTICE**

There must be at least one key registered before the electronic steering lock can be paired to the keyless ECM.

1. Remove the rider's seat.
2. Power the motorcycle ON using a paired key.
3. Connect the Triumph diagnostic tool.
4. Navigate to CHASSIS DIAGNOSTICS - IMMOBILISER DIAGNOSTICS - Configure.

**NOTICE**

Upon clicking Pair, a five minute (300 second) security time delay will be initiated. Do not leave the motorcycle unattended during this time.

5. Click Pair Electronic Steering Lock. The five minute (300 second) security time delay will begin.
6. The pairing will completed after the time delay has elapsed. The Triumph diagnostic tool will report if the pairing has been successful.

**NOTICE**

There must be at least one key registered before the engine ECM can be paired to the keyless ECM.

1. Remove the rider's seat.
2. Power the motorcycle ON using a paired key.
3. Switch the engine Start/Stop switch to the ON (RUN) position.
4. Connect the Triumph diagnostic tool.
5. Navigate to CHASSIS DIAGNOSTICS - IMMOBILISER DIAGNOSTICS - Configure - Pair ECM and Immobiliser.

**NOTICE**

The tyre pressure sensor ID numbers may be registered at this point for models fitted with TPMS.

Upon clicking Pair, a five minute (300 second) security time delay will be initiated. Do not leave the motorcycle unattended during this time.

6. **Models fitted with TPMS only** - Enter the front and rear tyre pressure sensor ID numbers in the spaces provided.
7. Click Pair. The five minute (300 second) security time delay will begin.
8. The pairing will completed after the time delay has elapsed. The Triumph diagnostic tool will report if the pairing has been successful.

## Key Pairing

The following table lists possible causes of a key pairing failure along with remedial actions.

| Key Pairing Failure - Possible Causes                                | Remedial Actions  |
|--|---|
| Maximum number of 3 keys reached                                     | Erase paired keys<br>Pair the required keys   |
| Key not positioned correctly to LF antenna after security time delay | Restart key pairing function. Ensure the key is correctly positioned to the LF antenna                            |
| Smart key flat battery   | Replace battery   |
| Key is locked to another keyless ECM                                 | Replace key   |
| Key has been erased then overwritten by another erased key.          | Replace key   |
| Key transponder not functioning due to damage, water ingress, etc.   | Replace key   |
| LF antenna not functioning   | Check LF antenna for damage<br>Check LF antenna is securely connected<br>Check stored DTC's. rectify as necessary |
| Keyless ECM not configured   | Download the correct keyless ECM calibration for your motorcycle  |

## Further Immobiliser System Diagnostics Using the Instrument Panel Alarm/Immobiliser LED

The table below lists immobiliser system faults that can be diagnosed In the event that the motorcycle cannot be powered ON. The faults can be diagnosed by observing the behavior of red alarm/immobiliser LED. Depending on the fault present, the LED will display a sequence of long and short flashes as follows.

| Fault  | LED Operation                  | Possible Causes   | Remedial Action   |
|--|--------------------------------|---|---|
| Key authentication fault   | 1 long flash                   | Key out of range<br>Key inactive or erased<br>No keys paired  | <ol style="list-style-type: none"> <li>1. Bring an active paired key in range of the LF antenna</li> <li>2. Obtain all available paired keys then pair any inactive or erased keys as necessary</li> <li>3. Pair new keys</li> </ol>  |
| Electronic steering lock disengagement fault                                 | 2 long flashes                 | Steering position preventing steering lock pin from retracting<br>Electronic steering lock pin seized | <ol style="list-style-type: none"> <li>1. Position steering to ensure there is no load on the steering lock pin and attempt to unlock the electronic steering lock</li> <li>2. If the steering lock pin fails to disengage, replace the electronic steering lock</li> </ol> |
| Electronic steering lock engagement fault (when locking the motorcycle only) | 1 long flash + 1 short flash   | Steering position preventing steering lock pin from engaging<br>Electronic steering lock pin seized   | <ol style="list-style-type: none"> <li>1. Position steering at left hand full lock and attempt to lock the electronic steering lock</li> <li>2. If the steering lock pin fails to engage, replace the electronic steering lock</li> </ol>                                   |
| Electronic steering lock ID mismatch   | 1 long flash + 2 short flashes | Electronic steering lock not paired to keyless ECM  | <ol style="list-style-type: none"> <li>1. Pair electronic steering lock to keyless ECM</li> </ol>   |
| Electronic steering lock – no response                                       | 1 long flash + 3 short flashes | Electronic steering lock disconnected or not communicating  | <ol style="list-style-type: none"> <li>1. Reconnect the electronic steering lock</li> <li>2. If ESL remains unresponsive, replace the ESL.</li> </ol>   |

Spares Kits Matrix - Keyless Ignition System

| Spares Kits Matrix - Keyless Ignition System                                  |  |                |   |                            |                       |  |                                |
|---|--|----------------|---|----------------------------|-----------------------|--|--------------------------------|
| Spares Item   | Scenario:                                      |                |   |                            |                       |  |                                |
|   | Lost keys (still have other keys) or smart key | Lost smart key | Non-functional smart key (still have blade) | Non-functional keyless ECM | Lost all keys and tag | Damaged /faulty lock set (still have keys) | Lost all keys (still have tag) |
| Standard lock set   |  |                |   |                            |                       | •  |                                |
| Spare keys (cut)  | •  |                |   |                            |                       |  |                                |
| Spare keys (uncut)  | •  |                |   |                            |                       |  |                                |
| Spare smart key, roll pin and blade (cut) [Japan]                             |  | •              |   |                            |                       |  |                                |
| Spare smart key, roll pin and blade (cut) [Rest of world]                     |  | •              |   |                            |                       |  |                                |
| Spare smart key, roll pin and blade (uncut) [Japan]                           |  | •              | •<br>Without blade                          |                            |                       |  |                                |
| Spare smart key, roll pin and blade (uncut) [Rest of world]                   |  | •              | •<br>Without blade                          |                            |                       |  |                                |
| Keyless ECM kit (ECM, smart key without blade, 2 keys) [cut, Japan]           |  |                |   | •                          | •                     |  | •                              |
| Keyless ECM kit (ECM, smart key without blade, 2 keys) [cut, rest of world]   |  |                |   | •                          | •                     |  | •                              |
| Keyless ECM kit (ECM, smart key without blade, 2 keys) [uncut, Japan]         |  |                |   | •                          | •                     |  | •                              |
| Keyless ECM kit (ECM, smart key without blade, 2 keys) [uncut, rest of world] |  |                |   | •                          | •                     |  | •                              |



## Gear Position Adaption and Triumph Shift Assist (if fitted)

### Gear Position Sensor

This model is fitted with a hall effect gear position sensor that provides a constant voltage output ranging from 0.5 to 4.5 Volts. The output voltage is used to determine which gear is currently engaged.

### Voltage Characteristics

The gear position is determined by the following voltage ranges:

| Gear | Minimum Voltage | Maximum Voltage |
|------|-----------------|-----------------|
| 1    | 0.5 V           | 0.7 V           |
| N    | 0.9 V           | 1.1 V           |
| 2    | 1.3 V           | 1.5 V           |
| 3    | 2.0 V           | 2.2 V           |
| 4    | 2.8 V           | 3.0 V           |
| 5    | 3.5 V           | 3.7 V           |
| 6    | 4.3 V           | 4.5 V           |

The sensor voltage can be read using the Triumph diagnostic tool.

### Further Diagnostics

Refer to [Gear Position Sensor](#) for details of pinpoint tests relating to diagnostic trouble codes P0914 and P0917.

### Neutral Position Adaption

The motorcycle is delivered from the factory with the neutral position fully adapted.

The neutral position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see [Gear Position Sensor](#)).
- The sensor has been removed or disconnected for any reason.

Refer to [Neutral Position Adaption](#).

## Neutral Position Adaption

The neutral position adaption is required to allow for manufacturing tolerances of the gearbox and gear position sensor. The motorcycle is delivered from the factory with the neutral position fully adapted.

The neutral position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see [Gear Position Sensor](#)).
- The gear position sensor has been removed or disconnected for any reason.

### Adaption Reset

The Gear Position/Neutral Position Adaption Reset function provided in the Triumph diagnostic tool will erase all previous Gear Position/Neutral Position Adaptions.

To reset the Neutral Position adaptions:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST then select Gear Position/Neutral Position Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.
7. The neutral position will now be reported as Not Adapted.

### Re-Adaption

#### **WARNING**

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

To re-adapt the neutral position:

1. Ensure the transmission is in neutral.
2. Start the engine.

**NOTICE**

For successful and accurate adaption, The engine must be at normal idle speed and the gear change pedal must be in its normal rested position.

During adaption, do not raise the engine speed and do not touch or move the gear change pedal.

3. The neutral position will adapt shortly after engine start provided the above conditions are met.
4. The adaption status can be confirmed by selecting GEAR POSITION ADAPTION STATUS on the Triumph diagnostic tool.
5. Turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.

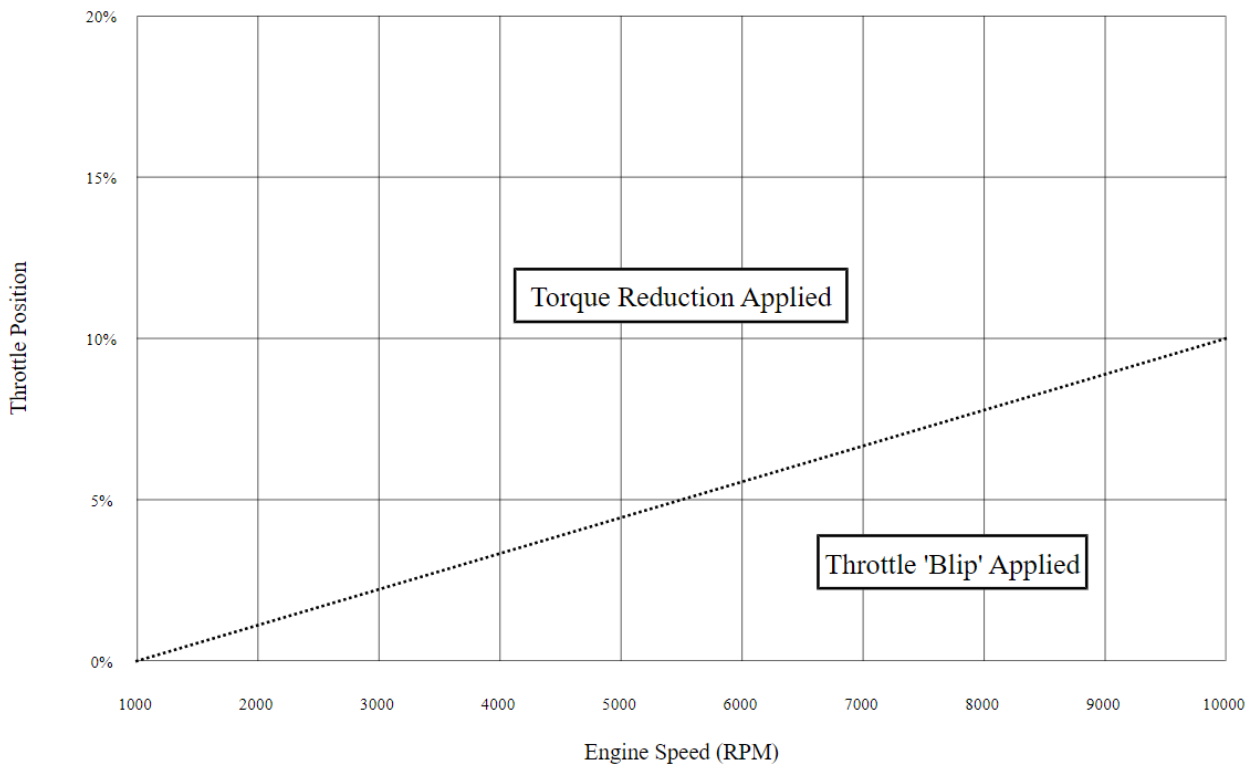
## Triumph Shift Assist System (if fitted)

### System Description

The Triumph Shift Assist (TSA) system enables the rider to change gears without the use of the clutch. The system uses signals from the **Shift Force Sensor (if fitted)** (located on the gear change linkage) and the **Gear Position Sensor** to detect when a shift force is applied to the gear change pedal. Engine torque is then adjusted to facilitate a smooth, clutch free gear change.

### System Operation

- The Triumph shift assist system allows clutch free shifts for the majority of gear changes. However, it is recommended that the clutch is used for gear changes at slow riding speeds, or when riding in slow traffic.
- The clutch must be used when selecting any gear from neutral, and also when selecting neutral from any other gear.
- To ensure a smooth gear change, use a positive pedal force to select the next gear then release the pedal. Do not hold the pedal in its upper or lower positions.
- Clutch free Up shifts are disabled by the system at engine speeds lower than 1,500 revolutions per minute (rpm) to prevent stalling.
- At maximum engine speeds, clutch free up shifts are allowed by the system, but clutch free down shifts are disabled to prevent engine over speed.
- The Triumph shift assist system is disabled if the motorcycle is traveling at its limited top speed. The system is automatically re-enabled when the motorcycle slows down from its limited top speed.
- Engine torque is reduced when changing gear at high engine loads.
- A throttle 'blip' is applied when changing gear at low engine loads.
- Engine torque is returned to normal control when the gear change is complete.



### Malfunction Action

- If a Triumph shift assist malfunction occurs, the system will be inhibited and the Transmission Warning symbol will be illuminated on the instrument panel.
- All Triumph shift assist related malfunctions must be rectified before the system can be re-enabled.
- If the malfunction is related to the gear position sensor, the neutral position and gear position adaption must be reset and re-adapted before the system can be enabled.
- If the malfunction is related to the shift force sensor, the shift force sensor adaption must be reset and re-adapted before the system can be enabled.
- The Transmission Warning symbol will continue to be displayed until each adaption is completed successfully.

## Shift Force Sensor (if fitted)

The shift force sensor is used to detect when a force is applied to the gear change pedal.

### Voltage Characteristics

#### **NOTICE**

The voltage characteristics for the shift force sensor will vary depending on the type of foot controls fitted to the motorcycle.

Rocket 3 GT models are fitted with foot controls that are mounted towards the front of the engine as standard (forward mounted foot controls). In this configuration, the shift force sensor is in tension during up shifts.

Rocket 3 R and Rocket 3 TFC models are fitted with foot controls that are mounted towards the rear of the engine as standard (rear mounted foot controls). In this configuration the shift force sensor is in compression on up shifts.

Accessory kits are available to allow owners to equip their motorcycle with either forward or rearward mounted foot controls. A function is available in the Triumph diagnostic tool to allow the shift force sensor voltage characteristics to be adjusted to match the type of foot controls installed. The Triumph Shift Assist system will not function if the shift force sensor voltage characteristics are not correctly adjusted to the type of foot controls installed. Refer to the fitting instructions provided with accessory foot control kits for further details.

The sensor output voltage changes as follows during normal operation:

| Sensor State   | Voltage |
|----------------|---------|
| At rest        | 2.6 V   |
| In compression | 1.6 V   |
| In tension     | 3.6 V   |

The sensor voltage can be read using the Triumph diagnostic tool.

### Further diagnostics

Refer to [Shift Force Sensor Circuit \(Triumph Shift Assist\)](#) for details of pinpoint tests relating to diagnostic trouble codes P1702 and P1703.

## Adaption

### **NOTICE**

If Triumph Shift Assist is fitted as standard, the motorcycle is delivered from the factory with the shift force sensor fully adapted.

If the Triumph Shift Assist has been fitted as an accessory, the Triumph Shift Assist system must be enabled, and the shift force sensor must be adapted as part of the accessory kit installation process.

In service, the shift force sensor adaption must be reset and the sensor re-adapted under the following conditions:

- If a shift force sensor malfunction occurs (DTC P1702 and P1703, see [Shift Force Sensor Circuit \(Triumph Shift Assist\)](#)).
- The sensor has been removed or disconnected for any reason.

Refer to [Shift Force Sensor Adaption \(if fitted\)](#).

## Shift Force Sensor Adaption (if fitted)

The shift force sensor adaption is required to allow for manufacturing tolerances of the shift force sensor.

If Triumph Shift Assist is fitted as standard, the motorcycle is delivered from the factory with the shift force sensor fully adapted.

If the Triumph Shift Assist has been fitted as an accessory, the shift force sensor must be adapted as part of the accessory kit installation process.

The shift force sensor adaption must be reset and re-adapted under the following conditions:

- If a shift force sensor malfunction occurs (DTC P1702 and P1703, see [Shift Force Sensor Circuit \(Triumph Shift Assist\)](#)).
- If the shift force sensor has been removed or disconnected for any reason.

## Adaption Reset

The Shift Force Sensor Adaption Reset function provided in the Triumph diagnostic tool will erase all previous shift force sensor adaptations.

To reset the shift force sensor adaption:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST then select Shift Force Sensor Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.
7. The Shift Force Sensor Adaption Status will now be reported as Not Adapted.



## Re-Adaption

### **WARNING**

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

### **NOTICE**

If necessary, the neutral position can be re-adapted simultaneously with the shift force sensor re-adaption (see [Neutral Position Adaption](#)).

To re-adapt the shift force sensor:

1. Ensure the transmission is in neutral.
2. Start the engine.

### **NOTICE**

For successful and accurate adaption, The engine must be at normal idle speed and the gear change pedal must be in its normal rested position.

During adaption, do not raise the engine speed and do not touch or move the gear change pedal.

3. The shift force sensor will adapt shortly after engine start provided the above conditions are met.
4. The adaption status can be confirmed by selecting TRIUMPH SHIFT ASSIST ADAPTION STATUS on the Triumph diagnostic tool.
5. Turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.

## Gear Position Adaption

Gear position adaption is required to allow for manufacturing tolerances of the gearbox and gear position sensor.

If Triumph Shift Assist is fitted as standard, the motorcycle is delivered from the factory with each gear position fully adapted.

If the Triumph Shift Assist has been fitted as an accessory, each gear position must be fully adapted as part of the accessory kit installation process.

Gear position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see).
- The gear position sensor has been removed or disconnected for any reason.

### Adaption Reset

The Gear Position/Neutral Position Adaption Reset function provided in the Triumph diagnostic tool will erase all previous Gear Position/Neutral Position Adaptions.

To reset the Gear Position/Neutral Position adaptions:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Gear Position/Neutral Position Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.
7. The neutral position and each gear position will now be reported as Not Adapted.

## Re-Adaption

### **WARNING**

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

### **WARNING**

Do not start the motorcycle and engage gears while it is parked on its centre stand. Do not attempt to adapt the gear positions with the motorcycle parked on its centre stand.

Should the motorcycle fall off its centre stand while the rear wheel is in motion, the motorcycle would accelerate rapidly. This could result in serious injury or death as well as causing damage to the motorcycle and other property.

To re-adapt the gear positions:

1. Ensure the transmission is in neutral.
2. Start the engine and allow the neutral position to adapt (see [Neutral Position Adaption](#)).

### **WARNING**

When riding the motorcycle the rider must always wear a safety helmet, eye protection, gloves, boots, trousers (close fitting around the knee and ankle) and a brightly coloured jacket. Brightly coloured clothing will considerably increase a rider's visibility to other operators of road vehicles. Although full protection is not possible, wearing correct protective clothing can reduce the risk of injury when riding.

## NOTICE

A suitable safe place should be found to carry out the road test.

The Transmission Warning symbol is illuminated on the instrument display.

### 3. Road test the motorcycle as follows:

- Ride the motorcycle smoothly at low engine speeds, changing up through each gear in turn.
- Fully close the throttle and use the clutch at each gear change.
- As soon as each gear engages, allow the gear change pedal to return to its normal resting position. Do not rest your foot on the pedal as any movement of the pedal can cause incorrect adaption.
- When each gear change is complete, release the clutch and ride normally using gentle acceleration. Avoid rapid acceleration or deceleration as this will prevent adaption.
- The gear position will adapt a few seconds after each gear change is completed.
- When all gear positions have successfully adapted, the Transmission Warning symbol will turn off.
- After completing the road test, turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.
- The gear position adaption status can be confirmed using the Triumph diagnostic tool.