Operation and Maintenance Manual

SY35U Excavator

service@sanyamerica.com

SANY Part Number SSY005082353

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SANY

SY35U Excavator

Operation and Maintenance Manual

WARNING!

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operating or maintaining it. Failure to do this could result in death or serious injury.

This manual and its contents prepared by SANY Technical Publications, while deemed to be accurate, is based upon technical information provided and for equipment designed, manufactured and tested by:

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It is the responsibility of the owner, user, properly trained operator and lessor to be knowledgeable of, and comply with, all industry standards, government regulations, workplace rules and other directives that may govern and/or apply to this equipment as well as its environment/conditions of use.

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WARNING!

CALIFORNIA PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

WARNING!

CALIFORNIA PROPOSITION 65 WARNING

The battery posts, terminals, and related accessories contain chemical lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Wash hands after handling.

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ABOUT THIS MANUAL

This manual provides operation and maintenance information for the SY35U cab and canopy excavators.

WARNING!

Unsafe operation and maintenance of this machine could result in death or serious injury. This machine must be operated and maintained by trained and experienced personnel. Do not operate or work on this machine without first reading and understanding this Operation and Maintenance Manual supplied with the machine.

It is important to read and understand this manual before beginning any operation or service. All personnel involved with this machine should read this manual periodically to remain knowledgeable on its operation and service.

Items addressed in this manual are designed to help the operator or service personnel:

- Understand the controls and operation of the machine.
- Point out possible hazardous situations when operation or maintaining the machine.
- Increase machine efficiency during operation.
- Prolong the service life of the machine.
- Reduce maintenance costs.

Continuing improvements in the design of this machine can lead to changes which may not be covered in this manual. Contact a SANY dealer for the latest available information on the machine or to answer any questions regarding information in this manual.

DOCUMENTATION PACKAGE

This documentation applies only to this machine and should not be used with any other machine. The documentation for this machine includes the following items:

Operation and Maintenance Manual

A copy of this manual must be stored in the machine or be accessible to the operator at all times. If the machine is sold, a copy of this manual must be provided to the new owner.

A copy of the operation and maintenance manual should be made available to maintenance personnel when servicing the machine.

Parts Manual

The parts manual consists of parts lists and matching drawings used for ordering parts as needed. The parts manual must be made available to all service personnel.

Maintenance Log

The maintenance log lists regularly scheduled maintenance that should be performed by the operator or service personnel. All maintenance performed on the machine must be recorded in the maintenance log.

ORGANIZATION OF THIS MANUAL

Introduction

Contains an overview of this manual, serial number information, and SANY contact information.

Safety

Hazard alerts used throughout the manual are explained. General and product-specific safety information is provided for this manual.

Machine Controls

An overview of controls and the operating systems is provided in this section.

Machine Operation

Detailed prestart checks, operating procedures, end-of-day checks, general operating instructions, and storage information.

Maintenance

Provides routine maintenance procedures and fluid specifications.

Specifications

General dimensions and weight of the machine, and systems/components performance information.

Optional Equipment

Provides general hydraulic installation and removal information for optional equipment.

MACHINE APPLICATIONS

This cab or canopy excavator is a multipurpose construction machine used primarily for digging or loading earth and stones. It can also be used for grading, slope-trimming, lifting, breaking, demolishing, and trenching. It can perform the functions of a bulldozer, loader, and a crane.

This excavator can also operate a variety of optional equipment.

SANY assumes no responsibility for any consequence caused by use outside this specified range.

Machine Directions

In this manual, the front, back, left, and right directions indicate the moving direction when viewed from the operator seat (see Fig. 1-1).

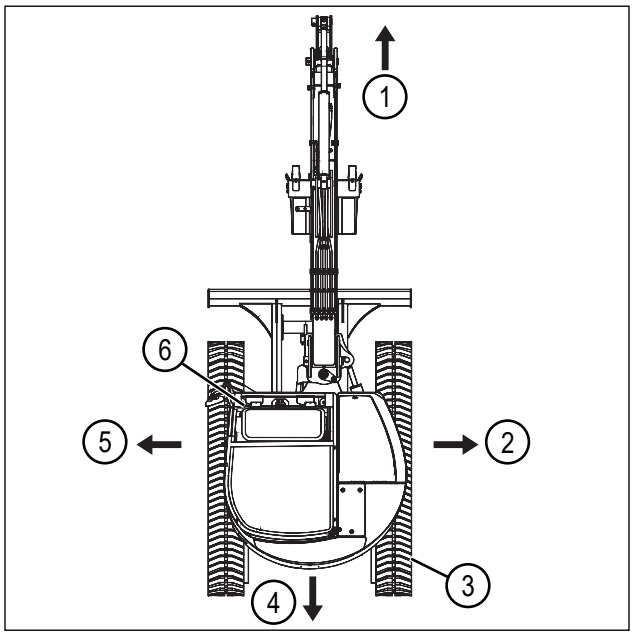

Fig. 1-1 0003784

1) Front
2) Right
3) Sprocket
4) Back
5) Left
6) Operator seat

SERIAL NUMBER LOCATION

Product identification plates are located in various places on the excavator. These list model and serial numbers that will be needed by a SANY dealer when ordering replacement parts or providing assistance for your machine.

Product Identification Plate

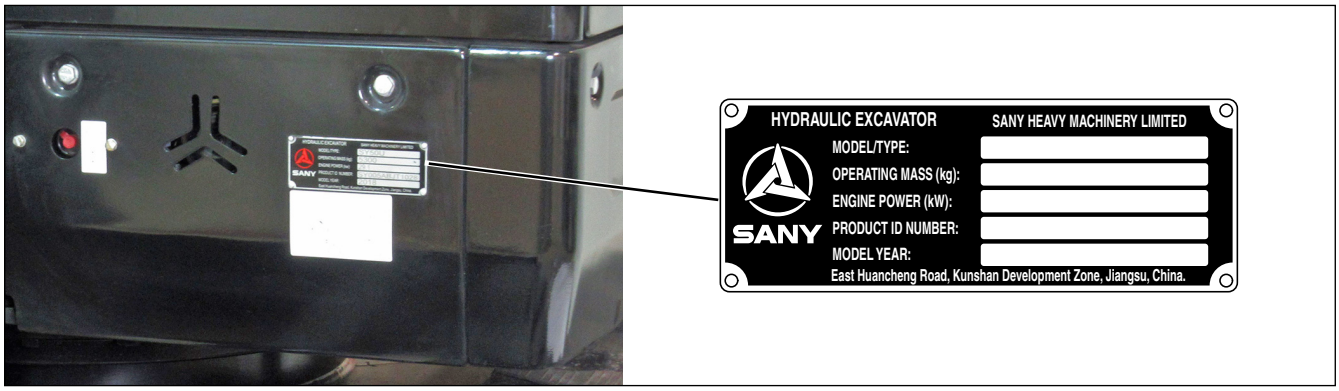

Fig. 1-2 0003139

The machine identification plate is on the lower front of the cab or canopy.

Frame Serial Number

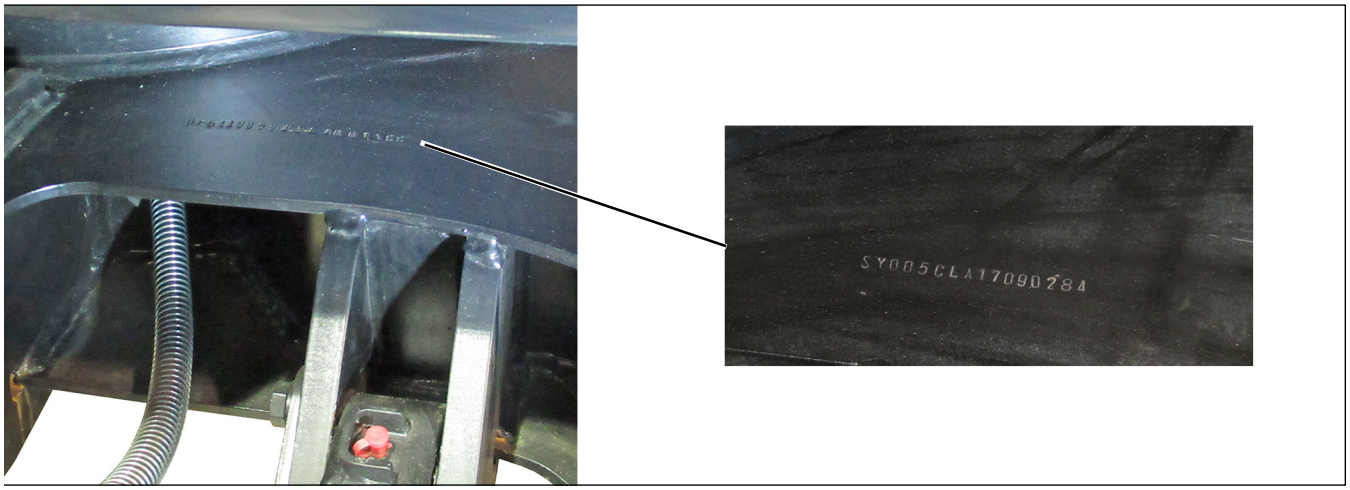

Fig. 1-3 0003170

The frame serial number is stamped on the front of the travel carriage frame.

Swing Motor Identification Plate

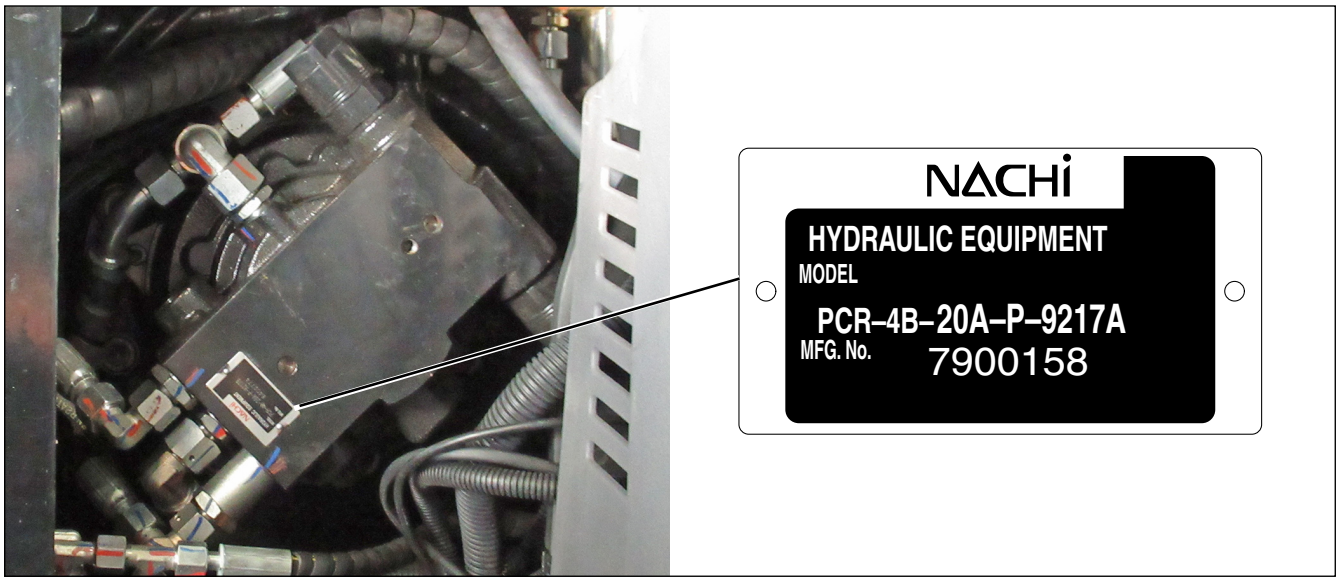

Fig. 1-4 0003140

The swing motor identification plate is on top of the swing motor.

Engine Identification Plate

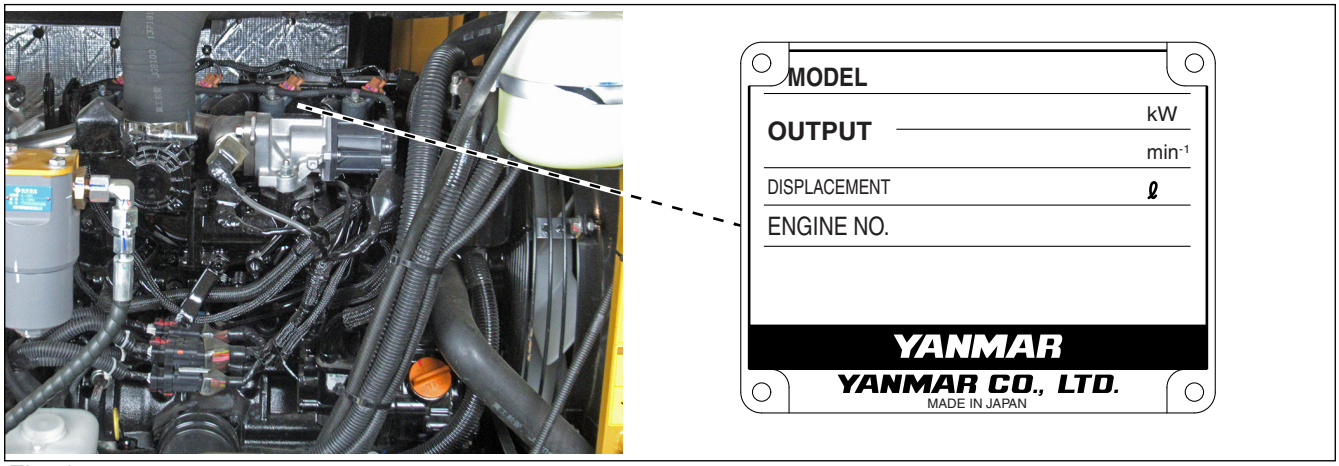

Fig. 1-5 0003138

The engine identification plate is on the top of the engine.

Hydraulic Pump Identification Plate

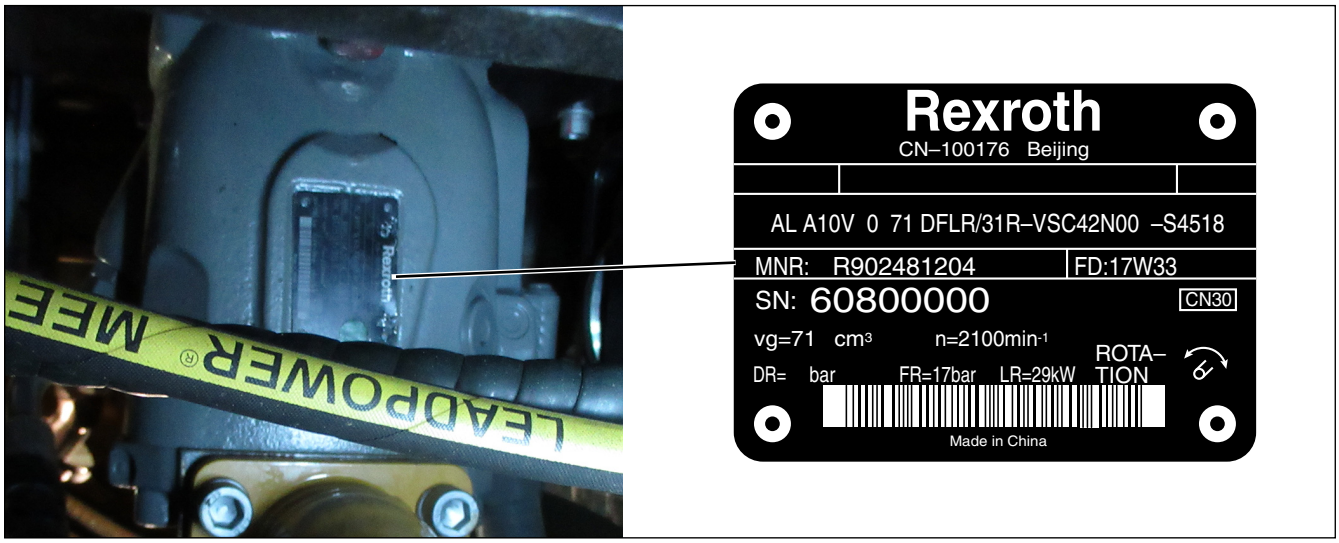

Fig. 1-6 0003169

The hydraulic pump identification plate is on the bottom of the hydraulic pump.

Travel Motor Identification Plate

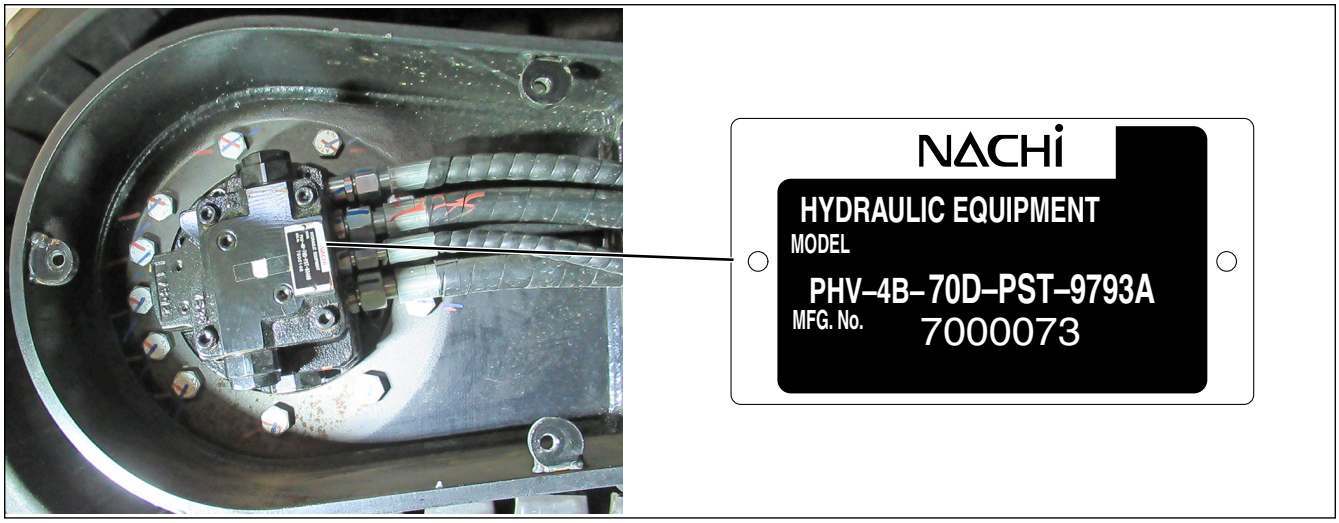

Fig. 1-7 0003188

An identification plate is on each travel motor. Remove the cover plates to access the travel motors.

SANY CONTACT INFORMATION

SANY
318 Cooper Circle
Peachtree City, GA 30269
www.sanyamerica.com
Phone: 470-552-SANY (7269)
Find a dealer go to: www.sanyamerica.com/find-a-dealer

RECORD OF SERIAL NUMBER AND DEALER INFORMATION

Use this table to record the product information related to this machine.	
Machine Serial No.	
Engine Serial No.	
Right Travel Motor Serial No.	
Left Travel Motor Serial No.	
Swing Motor Serial No.	
Hydraulic Pump Serial No.	
Dealer Name: Address:	
Phone Numbers:	

CORRECTION REQUEST FORM

If you find a problem with this manual, make a copy of this page, complete the form below, and send it to SANY.

Correction Request Form
Date of This Notification
Your Name
Company Name
Department
Street Address
City, State, and ZIP/Postal Code
Phone
E-mail
Machine Model and Serial No.
Description of Problem (wrong information, unclear or erroneous procedure, etc.)
Corrective Action Taken (if any)

GLOSSARY OF ACRONYMS

ANSI – American National Standards Institute

BHL – Backhoe Loader

DEF – Diesel Exhaust Fluid

DPF – Diesel Particulate Filter

ECM – Engine Control Module

GPS – Global Positioning System

HEST – High Exhaust System Temperatures

ISO – International Organization for Standardization

LCD – Liquid Crystal Display

OEM – Original Equipment Manufacturer

OSHA – Occupational Safety and Health Administration

PPE – Personal Protective Equipment

PQR – Procedure Qualification Record

ROPS – Rollover Protective Structure

SAE – Society of Automotive Engineers

SCA – Supplemental Coolant Additive

SDS – Safety Data Sheet

WPS – Weld Procedure Specification

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GENERAL SAFETY

This section provides detailed information on basic safety precautions and preventive measures that should be followed during the operation and maintenance of this machine.

Hazard Alerts in This Manual

Hazard alerts in this manual are used to alert operators, job supervisors, maintenance staff, and job site workers to hazardous operating practices and maintenance procedures. Hazard alerts are used throughout this manual. Each hazard alert contains a hazard alert symbol and a signal word to identify the hazard's degree of consequence if the message is ignored.

The following American National Standards Institute (ANSI) and International Organization for Standardization (ISO) signal words are used to warn of potentially hazardous situations that may lead to damage, personal injury, or even death. In this manual and on the machine decals, signal words or illustrations are used to express the potential level of hazard.

DANGER!

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION!

CAUTION indicates a hazardous situation which, if not avoided, could result in injury.

NOTICE!

***NOTICE* is used to address practices not related to personal injury.**

This symbol is used within a graphic to alert the user not to do something.

Machine Decals

All safety and warning decals must be in place, undamaged, and visible. Become familiar with the location and content of all decals on the machine. Walk around the machine and review each of them. Decals provide important instructions and warnings and must be read and understood prior to any operational or maintenance function.

Contact a SANY dealer for replacement decals if needed.

NOTE: When replacing decals, make sure they are placed in the proper locations. Contact a SANY dealer if you have any questions about their meaning and placement.

OPERATOR SAFETY INFORMATION

It is impossible to compile a list of safety precautions that covers every situation. However, there are basic principles that must be followed when operating this machine:

- Only qualified personnel who have been specifically trained on this machine are permitted to operate and/or work on this machine.
- The seat belt must be worn by the operator at all times.
- Operator aids such as warning lights, horns, or buzzers, along with displays on the monitors, are designed to alert the operator to potential problems. Sole reliance on these operator aids in place of good operating practices can lead to an accident. Inspect the operator aids of this machine daily and make sure each operator aid is in normal working condition. Any faults found shall be reported to a SANY dealer. Stop all work immediately if any operator aid is not working properly.
- All accident prevention guidelines, operating instructions, etc., are based on the intended usage of the machine.
- Read and understand this manual and any accompanying manuals before operating this machine.
- This manual must be readily available to the operator at all times and must remain on the machine while it is in use.
- Make sure all personnel in the working area around the machine are thoroughly familiar with the safe operating practices stated in this manual.
- Review the local, state, and federal regulations and standards regarding this machine and its operation. Work practice requirements may vary among government regulations, industry standards, and employer policies. A thorough knowledge of all such relevant work rules is required before operating this machine or performing maintenance on it.
- Check the maintenance log before the start of each workday shift. Make sure routine maintenance has been performed as stated in this manual. Do not operate a damaged or improperly maintained machine.
- Only the operator should be on the machine while it is in operation.
- Be sure all underground utilities have been marked before excavating.

Mount and Dismount the Machine

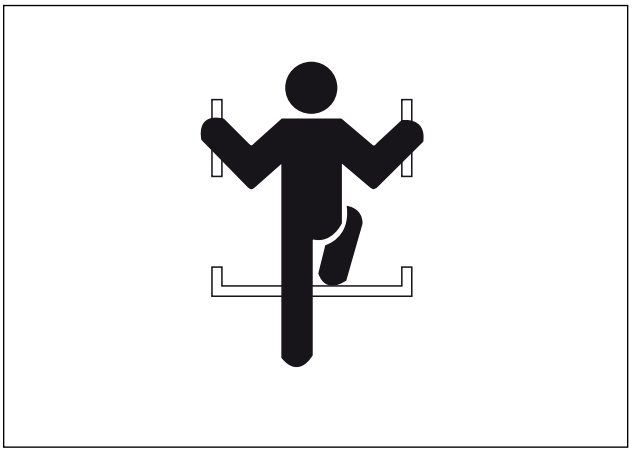

Fig. 2-1 0003054

Mounting or dismounting the machine presents hazards. Observe the following:

- Always make sure the hydraulic lockout control lever is in the locked (closed) position before entering or exiting the machine.
- Always make sure the machine is at a complete stop, work equipment is lowered to the ground, and the engine is shut down, before entering or exiting the machine. Never jump on or off the machine.
- Never exit or enter the machine by any means other than the provided grab handles and steps.
- Always face the machine as you mount and dismount.
- Always maintain three-point contact (both feet and one hand, or one foot and both hands) with the grab handles, steps, and deck for proper support.
- Wear safety shoes with slip-resistant soles.
- Do not walk on any surface of the machine if its slip-resistant material is missing or excessively worn. Do not step on surfaces of the machine that are not approved for walking or working. Keep all walking and working surfaces of the machine clean, dry, and slip-resistant.
- Always keep grab handles, steps, and walkway areas clean and clear of mud, oil, grease, or similar debris. If these areas are damaged, have them repaired or replaced immediately.

MACHINE SAFETY

Authorized Use of This Machine

This cab or canopy excavator is a multipurpose construction machine used primarily for digging or loading earth and stones. It can also be used for grading, slope-trimming, lifting, breaking, demolishing, and trenching. It can perform the functions of bulldozer, loader, and crane.

This excavator can also operated a variety of optional equipment.

SANY assumes no responsibility for any consequence caused by use outside this specified range.

Unauthorized Use of This Machine

Unauthorized uses include, but are not limited to, the following:

- Transporting riders on the machine or in the cab.
- Towing or pushing other equipment.

Unauthorized Machine Modifications

Do not perform any unauthorized machine modifications.

Do not add additional weight (attachments, etc.) to the machine. Do not exceed the gross weight.

Escape Tool

NOTE: Inspect the escape tool periodically. Replace the escape tool if it appears damaged or unable to break the cab window for emergency exit.

For cab models only, as a precaution, always keep an escape tool in the cab.

Fire Safety

Fuel, oil, and some engine coolants are flammable. Observe the following:

- Keep open flames, airborne sparks, and burning embers away from the machine.
- Shut down the engine and do not smoke when refueling or servicing the machine.
- Add oil, fuel, or engine coolant in a well-ventilated area.
- Clean up any spilled fluids immediately.
- Check the machine daily for debris buildup.

Electrical Fires

Short circuits, damaged wiring, or overcharging batteries can cause fires. Observe the following:

- Check the wiring on the machine for damage when doing a prestart check. Contact a SANY dealer for repairs or replacement of any damaged wiring.
- Make sure the battery is operating in its recommended range.
- Never install aftermarket electrical equipment without approval from a SANY dealer.

Fire Extinguisher

For cab models only, always keep a fire extinguisher in the cab. Read the instructions on the fire extinguisher carefully, and know how to use it in an emergency.

Inspect the fire extinguisher daily. If damaged, replace the extinguisher immediately.

Make sure the fire extinguisher is within the listed inspection period. Replace the fire extinguisher immediately if it has reached its expiration date.

The fire extinguisher must be at least a 2.5 lb. Class ABC rated fire extinguisher (National Fire Protection Association [NFPA] 10 Standard for Portable Fire Extinguishers).

In Case of Fire

If a fire occurs on the machine:

1. Immediately press the emergency stop to shut down the machine. Never continue operating the machine.
2. Get clear of the machine and immediately call for help. Always have a list of emergency phone numbers available.
3. Exit the area and remain clear of the machine until the fire response team gives permission to come near the machine.
4. If using a fire extinguisher, always aim the extinguisher nozzle at the base of the fire.

Crushing Hazard

For cab models, keep your body inside the windows and door during operation or travel.

For canopy models, keep your body inside the canopy during operation or travel.

Keep all guards in place on the machine.

For cab models, never remove the side window of the machine. If this window becomes damaged or broken, replace it immediately.

Block off the area where the machine is being operated and keep all unnecessary personnel out of the work area.

Diesel Engine Exhaust

WARNING!

CALIFORNIA PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

WARNING!

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, use an exhaust pipe extension to vent the exhaust to the outdoors. If an exhaust pipe extension is not available, open doors and use fans to supply fresh air into the area.

MAINTENANCE SAFETY

SANY cannot foresee every circumstance that might involve a hazard in operation or maintenance. Therefore, the hazard alerts in this manual and on the machine may not include all possible safety precautions.

Make sure all procedures and actions can be safely performed without damaging the machine or causing injury. When unsure about the safety of a procedure, contact a SANY dealer.

Before carrying out any repair, read all the safety messages on the machine associated with the procedure.

Wear and use the proper personal protective equipment (PPE), including (but not limited to) safety shoes, a hard hat, gloves, and goggles.

When carrying out any operation with two or more workers, always agree on the operating procedure before starting.

Always perform the lockout/tagout procedure before servicing the machine.

Always inform fellow workers before starting any step of the operation.

Keep all tools in good condition, know how to use them, and use the correct ones. Thoroughly check all tools before starting any procedure.

Park the machine on a hard, level surface, lower the work equipment, move the hydraulic lockout control lever to the locked (closed) position, and block the tracks to prevent the machine from moving before performing any maintenance or repairs.

Before disconnecting or removing components of the hydraulic system, relieve the system pressure to prevent hydraulic fluid from spraying out. See “Relieve Hydraulic System Pressure” on page 5-56.

The engine coolant and oil in the machine may be hot even after the engine is stopped. Wait for the engine coolant and oil systems to cool before working on them.

When checking the machine with the engine running (i.e., measuring oil pressure, revolving speed, or temperature), take extreme care to avoid rotating or moving parts.

Turn the battery disconnect switch to OFF unless it is needed for the procedure.

NOTE: The electrical circuit remains active to a few components even when the battery disconnect switch is in the OFF position.

When removing hoses or lines, close all openings using caps and plugs. If any fuel or fluids leak, clean them up immediately.

When installing high-pressure hoses, make sure they are not twisted. Damaged hoses are dangerous and should be replaced. Be extremely careful when installing hoses for high-pressure circuits. Make sure fittings are correctly installed and tightened.

When assembling or installing parts, always tighten them to the specified torques. When installing protective parts (such as guards) or parts that vibrate or rotate at high speed, make sure they are installed correctly.

Lockout/Tagout Procedure

Always perform the lockout/tagout procedure before servicing the machine.

Cleaning the Machine

Always use hot water and mild, nonflammable, grease-cutting soaps or cleaning agents to clean the machine. Never use flammable or caustic cleaning agents.

Never use high-pressure steam cleaners to clean the machine.

Always lubricate the machine thoroughly after cleaning to remove any water or soap residue.

Keep the mirrors and lights clean. Keep the cab and windows clean, if equipped.

Fluid Systems

Adding Fluids to the Machine

When adding fluids to the machine, be aware that fluid systems may be under pressure and hot.

Refueling

When adding fuel, shut down the machine before removing the fuel tank cap.

Fuel spills present a hazard if not cleaned up immediately.

Refuel only in a well-ventilated area. Never smoke or allow open flames nearby while refueling the machine.

Do not top-off the fuel tank.

High-Pressure Fluid Lines

WARNING!

- **Never perform repairs to items while any system is under pressure.**
- **Never use your hands to check or feel for leaks. Always wear personal protective equipment (PPE), and use a piece of wood or cardboard to check for leaks.**
- **If high-pressure fluids penetrate skin or get into eyes, seek medical attention immediately.**

Failure to follow these warnings can result in death or serious injury.

Check for cracks in the lines or hoses and for swelling in the hoses.

NOTE: If there is any leakage from a line or hose, the surrounding area may be wet.

Replace lines and hoses immediately if leaks, swelling, or cracking are found or if failure occurs.

Accumulator

This machine is equipped with an accumulator charged with high-pressure nitrogen gas. Do not disassemble the accumulator.

Never expose the accumulator to temperatures above 140ºF (60ºC) or to open flames.

Never weld on the accumulator.

Never strike the accumulator.

If the accumulator needs service, contact a SANY dealer.

Electrical System

Always clean the electrical system using only SANY-approved electrical cleaners.

Never use caustic soaps, high-pressure water, or steam cleaners to clean the electrical system. These could damage the system or cause intermittent system failures.

Battery Safety

When working with batteries, always work in a well-ventilated area. Batteries present a hazard, especially when they have been in use for a long period of time. The following are some basic precautions for working around batteries:

- Always wear personal protective equipment (PPE).
- Battery gases are extremely explosive. Smoking, sparks, or open flames could cause an explosion. When opening a battery compartment, always allow ample time for battery gases to escape.
- If the battery is corroded, clean it with a mixture of warm water and baking soda.
- If battery acid gets on skin or in eyes, flush the area immediately with fresh water and seek medical attention.

Check the battery's condition only with proper test equipment.

Disconnect the Battery

When disconnecting the battery, always disconnect the negative (-) cable first, then disconnect the positive (+) cable.

NOTE: Disconnecting the jumper cable between the batteries may not completely interrupt the electrical system.

JOB SAFETY

It is the owner's/operator's responsibility to replace any safety decals that are damaged or missing from the machine.

Never leave the machine running while it is unattended. Always park the machine in a safe, level area, lower any work equipment to the ground, move the hydraulic lockout control lever to the locked (closed) position, and shut down the engine before exiting. Secure the machine to prevent tampering by unauthorized personnel.

Before starting any work operations, travel, or maintenance procedures, make sure all personnel are a safe distance from all points of the machine. Never allow anyone to stand near the machine while it is in operation or under maintenance or repair.

It is the responsibility of the operator's employer to conduct periodic safety training and familiarize all personnel with emergency procedures.

If pedestrians are in the area, sound the horn and proceed slowly.

When working with another person on a job site, make sure that all personnel involved understand all industry-standard hand signals that are to be used.

The operator shall respond to operating signals from the proper signal only, but shall obey a stop signal at any time from anyone.

The operator must always be able to see the work location. If this is not possible, then a signalman must be used. If visibility becomes blocked for any reason, stop operation immediately.

If the machine is equipped with operator aids, Occupational Safety and Health Administration (OSHA) requires this equipment to be used when operating the machine.

Personal Protective Equipment (PPE)

Before using personal protective equipment (PPE), make sure it is in good working condition.

Hearing Protection

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protection to protect against loud noises.

Travel and Operation Precautions

Confirm the relative positions of the undercarriage and operator before operating the machine.

Traveling with the machine may present hazards. When traveling with the machine, always travel in a safe, controlled manner and remain alert at all times. Be sure the areas around the machine are clearly visible.

When traveling over rough ground, travel at a low speed and steer carefully. Whenever possible, avoid traveling over obstacles or raised areas. Traveling over obstacles or raised areas could result in loss of control or damage to the machine. When traveling over raised areas, always travel at a low speed.

During travel, always maintain a safe distance from people and surrounding objects. Always check to make sure areas such as bridges and roadways will support the weight of the machine before attempting to cross.

Before traveling in public areas, always gain approval from local authorities and follow their instructions.

Raise work equipment 8 in.–12 in. (20 cm–30 cm) above the ground when traveling.

When traveling or operating in shallow water, be aware of its depth and current.

Inclined Areas

Traveling on an incline can be dangerous. To prevent tipping, loss of control, or a rollover, it is important to follow these rules:

- Always check the firmness of an incline before attempting to travel on it.
- Always travel straight up or straight down an incline.
- Avoid turning on an incline.
- Avoid sudden stops.

Snow or Frozen Surfaces

Be careful when traveling or operating the machine on frozen or snow-covered surfaces. The ability to maneuver the machine is seriously affected. The machine may not respond as expected when turning. Other precautions are:

- Avoid any rapid movement, acceleration, or quick stopping. Always be aware of the increased stopping distance required on these surfaces.
- Avoid deep snow or frozen bodies of water.
- Even a slight incline may cause the machine to slip. Be extra careful when working on an incline covered with snow or ice.
- When traveling or moving the machine on a snow-covered incline, allow the machine to come to a stop slowly.

Avoid Backover Accidents

Keep the mirrors and lights clean. Keep the cab and windows clean, if equipped.

Before moving the machine, make sure all bystanders are clear of the intended path.

Before moving the machine, warn others with the horn.

Use a signalman if the view is obstructed when backing up. Keep the signalman in view at all times.

Dust and Chemical Hazards

Hazardous dust or chemicals present a serious danger when they are released or mishandled. All workers involved should use approved personal protective equipment (PPE) and follow all environmental safety regulations.

Consult the Safety Data Sheet (SDS) for guidelines on personal protective equipment (PPE), proper handling and cleanup, and correct reporting agencies if needed.

Environmental Precautions

Oils and coolants poured onto the ground, into bodies of water, into storm drains, or tossed into trash cans (even in a sealed container) can contaminate and pollute soil, groundwater, streams, and rivers.

Recycling used oil, coolants, and filters helps conserve natural resources and is good for the environment.

Obey all regulations when disposing of harmful items such as oil, fuel, filters, batteries, hydraulic oil, and used parts.

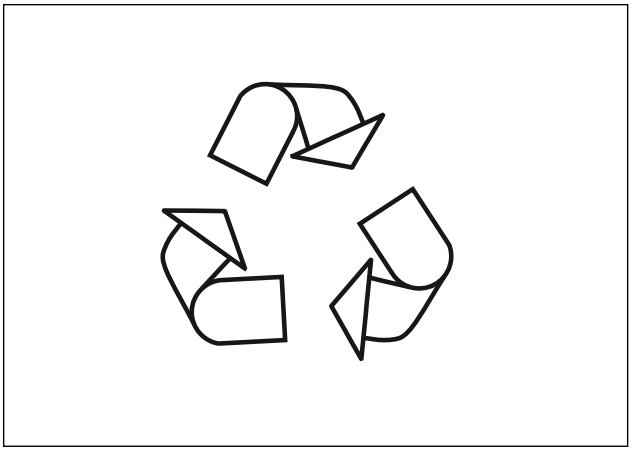

Fig. 2-2 0003055

Precautions in High-Voltage Areas

WARNING!

Overhead power lines carry high-voltage electricity that can discharge to the ground through the machine, even without direct contact with the machine's structure. Avoid direct contact with high-voltage power lines while operating. High-voltage contact could result in equipment damage, death, or serious injury.

Stay clear of overhead power lines; they are an electrical hazard. Treat all overhead power lines as being energized and not insulated.

Be sure all underground utilities have been marked before excavating.

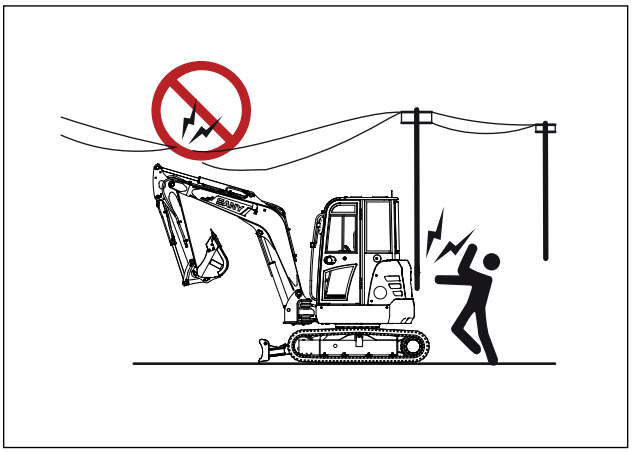

Fig. 2-3 0003056

SANY

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MACHINE OVERVIEW

NOTE: The illustration below shows a cab machine. Canopy machines are similar for non-cab related items.

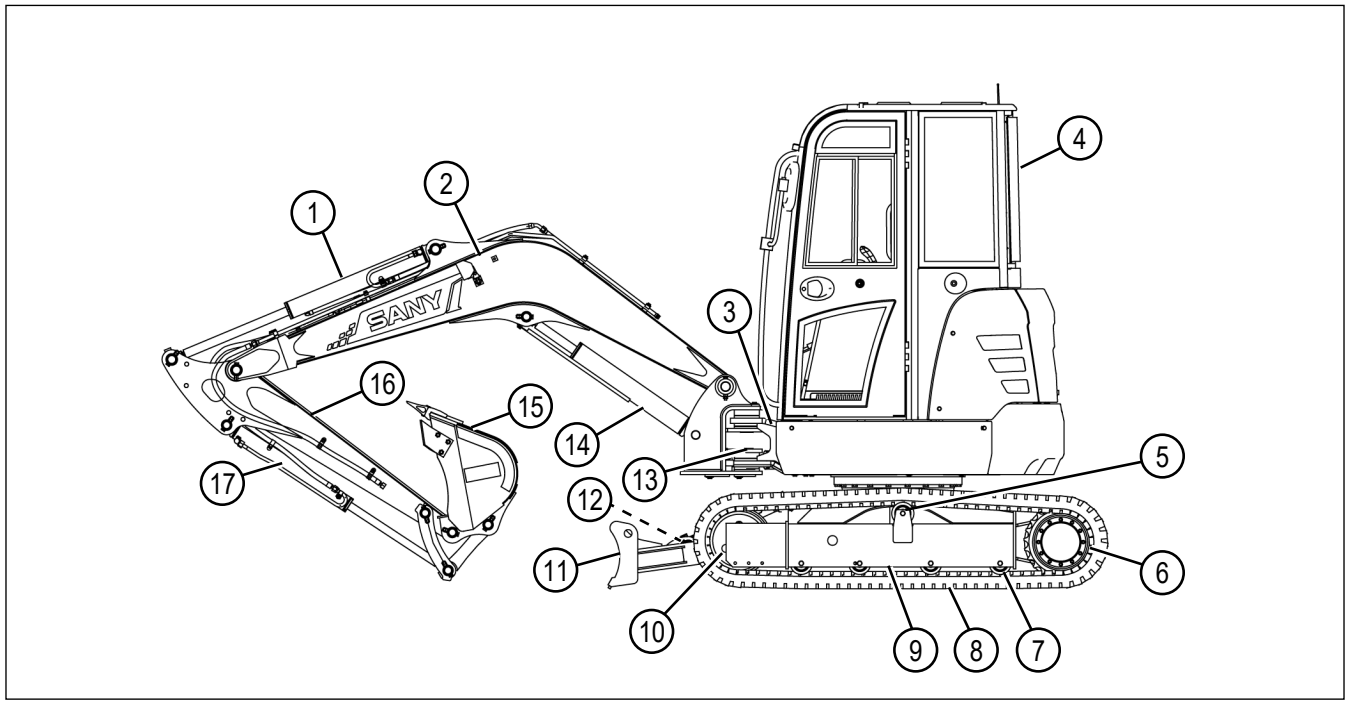

Fig. 3-1 0001462

1) Arm cylinder
2) Boom
3) Boom swing cylinder
4) Cab or canopy
5) Carrier roller
6) Drive sprocket
7) Track rollers
8) Track
9) Track frame
10) Idler
11) Dozer blade
12) Dozer blade cylinder
13) Boom pivot
14) Boom cylinder
15) Bucket
16) Arm
17) Bucket cylinder

CONTROLS

Switches – Cab Machine

NOTE: See “Switches – Canopy Machine” on page 3-5 if your machine has a canopy.

Fig. 3-2 0003776

1) Left joystick buttons (page 3-6)
2) Horn button (page 3-7)
3) Right joystick switch (page 3-6)
4) Throttle control dial (page 3-7)
5) Key switch (page 3-8)
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9) Work light switch (page 3-10)
10) Emergency stop switch (page 3-9)

Switches – Canopy Machine

NOTE: See “Switches – Cab Machine” on page 3-4 if your machine has a cab.

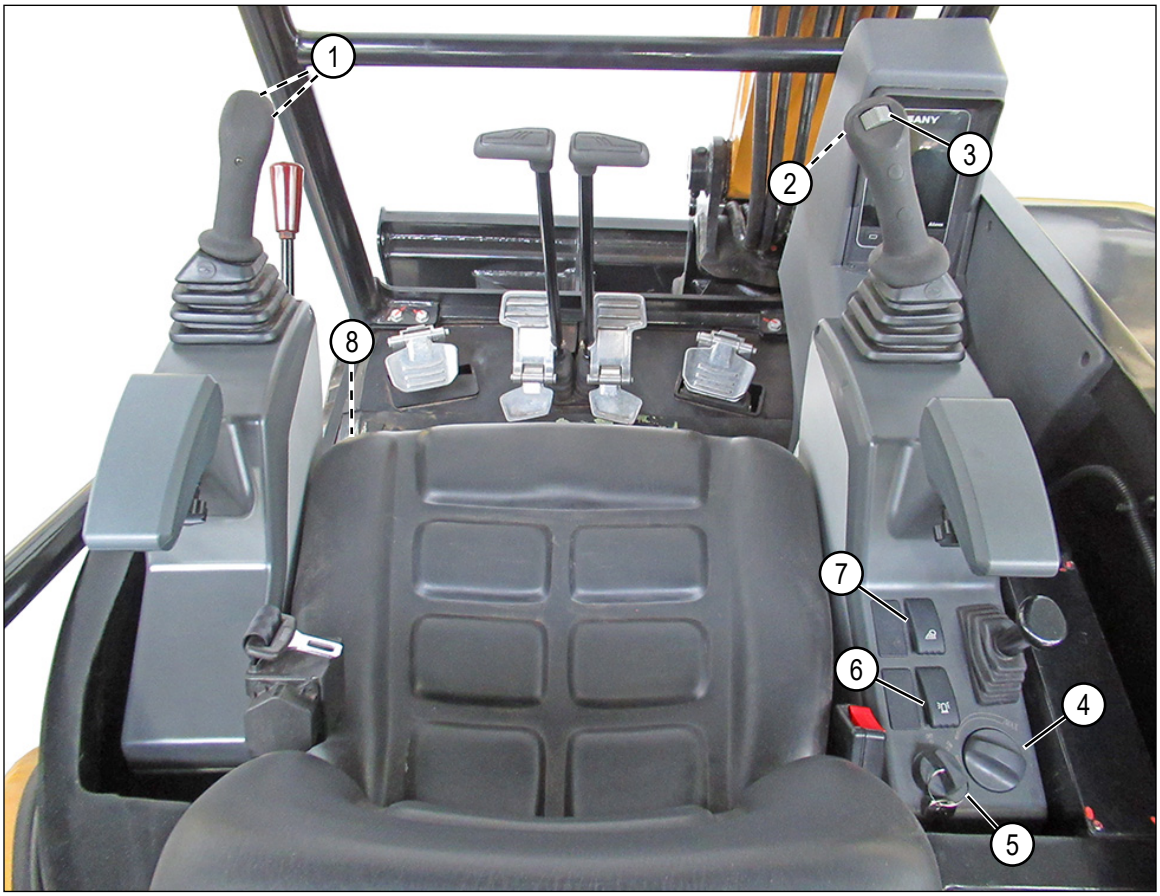

Fig. 3-3 0003777

1) Left joystick buttons (page 3-6)
2) Horn button (page 3-7)
3) Right joystick switch (page 3-6)
4) Throttle control dial (page 3-7)
5) Key switch (page 3-8)
6) Travel alarm switch (page 3-8)
7) Work light switch (page 3-11)
8) Emergency stop switch (page 3-9)

Joystick Buttons and Switches

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

Left Joystick Buttons

The two buttons (1) on the back of the left joystick are not used.

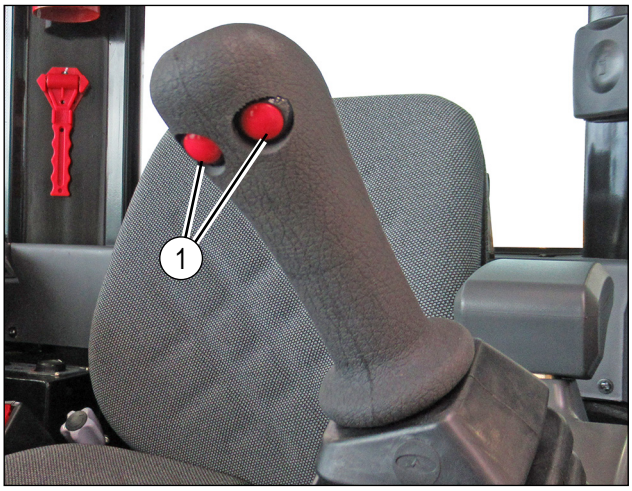

Fig. 3-4 0003766

Right Joystick Switch

Move the right joystick switch (2) to the left (1) for high flow and high pressure in the left side auxiliary hydraulic lines.

Move the right joystick switch to the right (3) for high flow and high pressure in the right side auxiliary hydraulic lines.

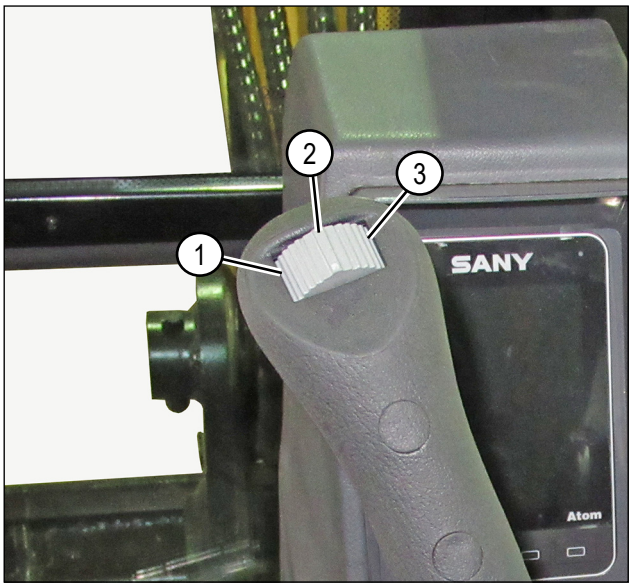

Fig. 3-5 0003277

Horn Button

NOTE: The illustration shows a cab machine. Canopy machines are similar.

The horn button (1) is on the back of the right joystick. Press the horn button to sound the horn.

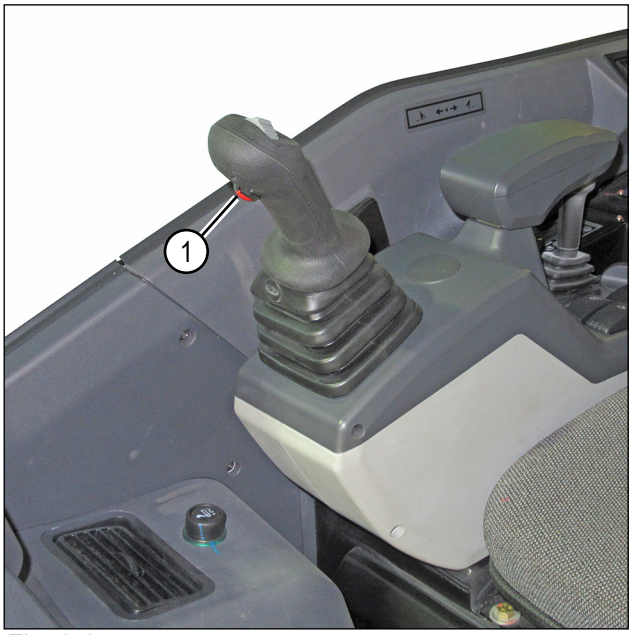

Fig. 3-6 0002827

Throttle Control Dial

NOTE: The illustration shows a cab machine. Canopy machines are similar.

Use the throttle control dial (1) to adjust engine speed. Turn the dial clockwise to increase engine speed, and counterclockwise to decrease engine speed:

- MIN (low idle): Turn the throttle control dial fully counterclockwise.
- MAX (high idle): Turn the throttle control dial fully clockwise.

Fig. 3-7 0002782

Key Switch

NOTE: The illustration shows a cab machine. Canopy machines are similar.

Use the key switch (1) to start or stop the engine. There are three positions on the key switch:

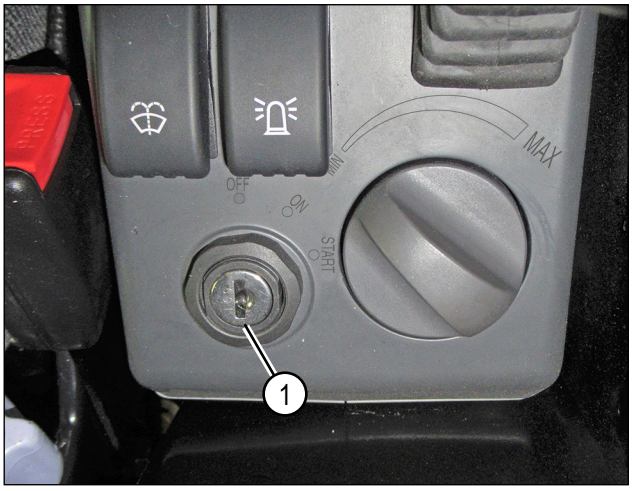

Fig. 3-8 0002782

- **OFF:** When the key switch is turned to OFF, the engine is shut down, power to the electrical system is shut off, and the key can be removed or inserted.
- **ON:** When the key switch is turned to ON, the electrical system is energized.
- **START:** When the key switch is turned to START:
  - The engine coolant temperature will determine if the engine preheat cycle will begin. The engine preheat cycle will initiate when the engine coolant temperature is below the preset value. (See “Home Screen” on page 3-34.)
  - When the preheat cycle is complete (preheat icon not illuminated), the starter motor can be engage to start the engine. Release the key after the engine has started. The key switch will return to ON. The engine will continue to run and supply power to the electrical systems.

Travel Alarm Switch

NOTE: The illustration shows a cab machine. Canopy machines are similar.

Use the travel alarm switch (1) to turn both the beacon light (on top of cab or canopy) and audible travel alarm on and off. Activate the travel alarm whenever the machine is moving.

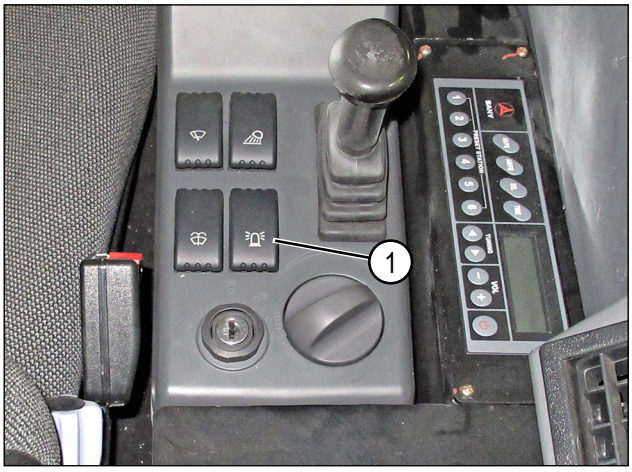

Fig. 3-9 0002978

Windshield Washer Switch – Cab Machine

Press the windshield washer switch (1) to spray washer fluid on the windshield to clean it.

Fig. 3-10 0002978

Windshield Wiper Switch – Cab Machine

NOTICE!

Before cleaning a dry windshield, press the windshield washer switch to spray washer fluid on the windshield. Failure to follow this notice can cause damage to the machine.

When it is raining or if the front windshield is dirty, press the windshield wiper switch (1) to activate the windshield wiper.

Fig. 3-11 0002978

The windshield wiper switch has two operating positions.
In the center position, the windshield wiper operates at low speed; in the rear position, the windshield wiper operates at high speed.

Work Light Switch – Cab Machine

Use the work light switch (1) to turn the work lights on and off.

Fig. 3-12 0002978

There are two work lights on a cab machine:

- One work light (2) on the boom.

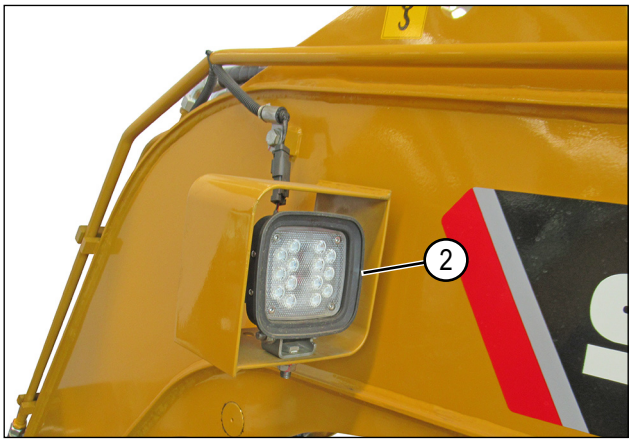

Fig. 3-13 0003860

- One work light (3) on the cab roof.

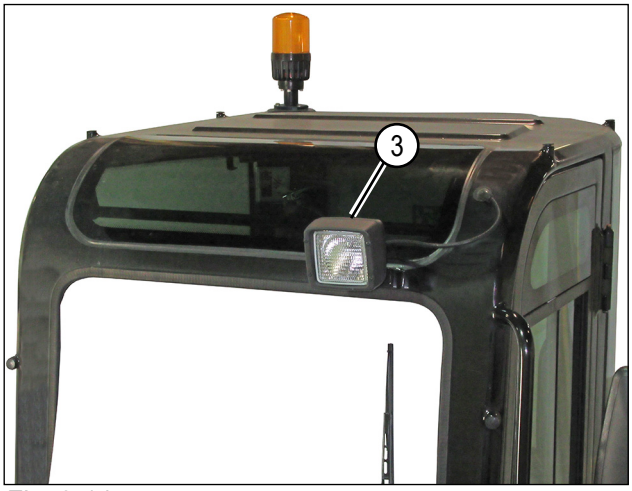

Fig. 3-14 0002980

Work Light Switch – Canopy Machine

Use the work light switch (1) to turn the work lights on and off.

Fig. 3-15 0003768

There are three work lights on a canopy machine:

- One work light (2) is mounted on the boom.

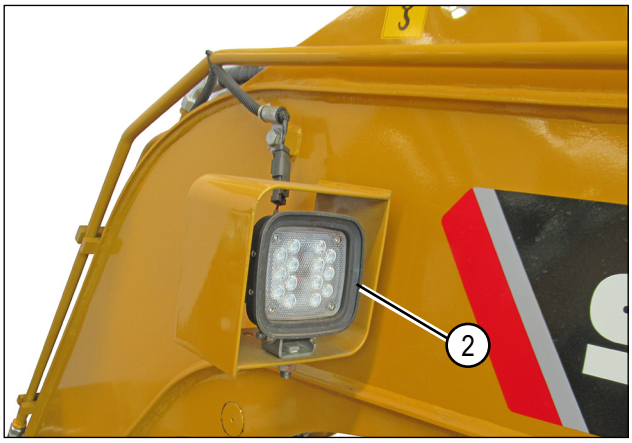

Fig. 3-16 0003860

- Two work lights (3 and 4) are mounted on the top of the canopy.

Fig. 3-17 0003149

Emergency Stop Switch

NOTE: The illustration shows a cab machine. Canopy machines are similar.

If an emergency stop and quick shutdown is required or the engine cannot be stopped normally, push in the emergency stop switch (1).

Turn the switch as indicated to reset the switch.

NOTE: The emergency stop switch should not be used if the machine is operating normally.

Fig. 3-18 0004629

Cigarette Lighter (12V) – Cab Machine

Press the cigarette lighter (1) in to activate the lighter. The lighter will pop out when ready to be used.

With the lighter removed, the power outlet (12V) can be used to charge or operate 12V electronic devices.

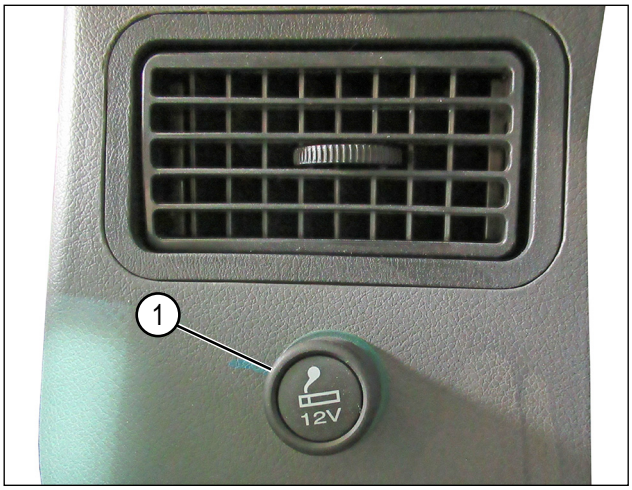

Fig. 3-19 0002977

Power Outlet (12V) – Canopy Machine

Lift the access cover (1) up to use the power outlet (12V) (1) to charge or operate 12V electronic devices.

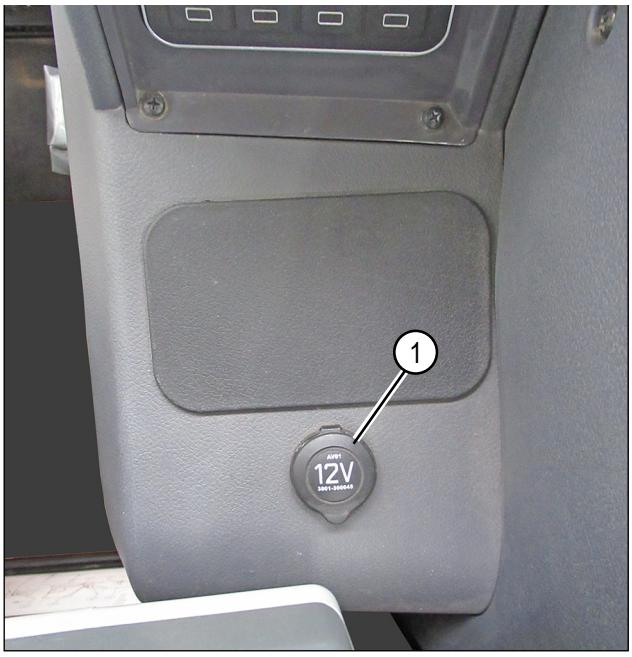

Fig. 3-20 0003769

Dome Light Switch – Cab Machine

Use the dome light switch (1) to turn the dome light (2) on and off.

NOTE: The switch is shown in the OFF (up) position. The cab light can be turned on only when the key switch is in the ON or START position.

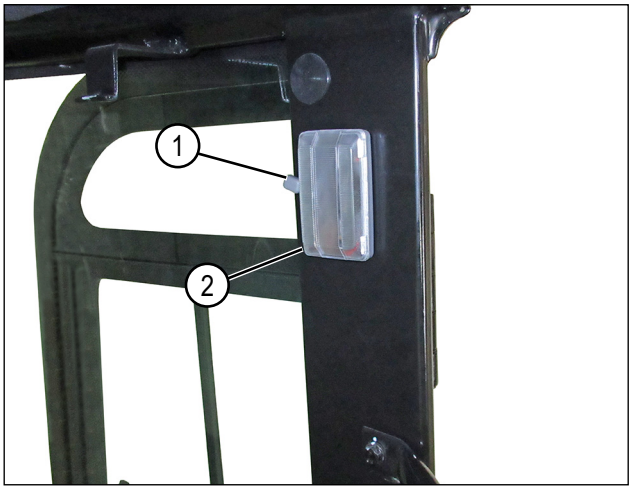

Fig. 3-21 0002981

OPERATOR CONTROLS

NOTE: The illustration shows a cab machine. Canopy machines are similar.

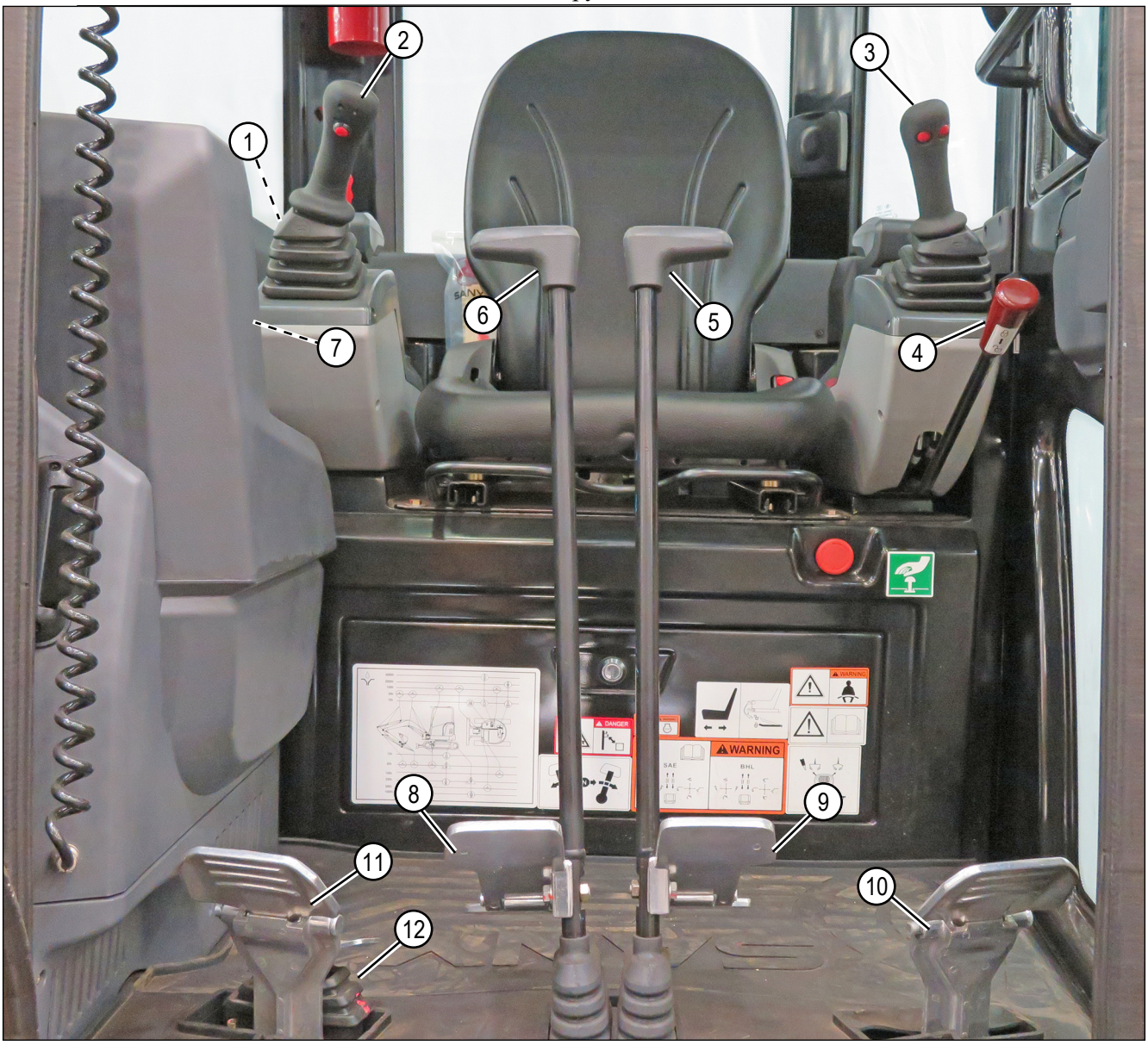

Fig. 3-22 0004645

1) Dozer blade control lever (page 3-15)
2) Right joystick (page 3-16)
3) Left joystick (page 3-16)
4) Hydraulic lockout control lever (page 3-19)
5) Left travel control lever (page 3-21)
6) Right travel control lever (page 3-21)
7) Monitor (page 3-33)
8) Right travel control pedal (page 3-21)
9) Left travel control pedal (page 3-21)
10) Left footrest
11) Right footrest
12) Boom swing control pedal (page 3-22)

Dozer Blade Control Lever

NOTE: The illustration shows a cab machine. Canopy machines are similar.

The dozer blade control lever (1) is on the right side of the operator seat.

- Move the lever forward (2) to lower the dozer blade.
- Move the lever backward (3) to raise the dozer blade.

NOTE: The dozer blade control lever returns to the neutral position when released.

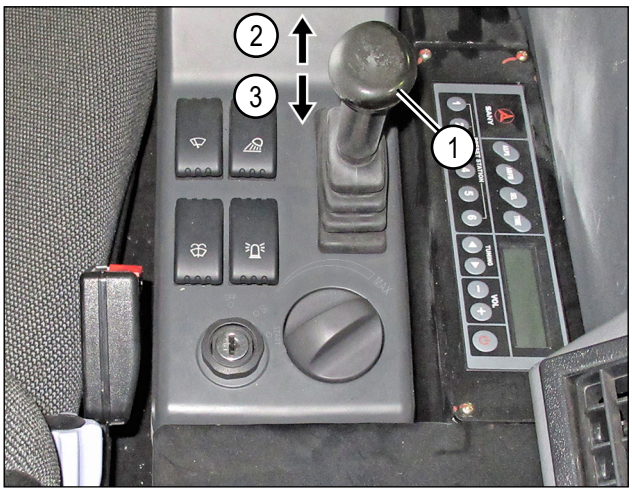

Fig. 3-23 0003063

Joystick Controls

WARNING!

Prevent unexpected movement of the machine. Know the positions and functions of both joysticks before operation.

Failure to follow this warning could result in death or serious injury.

NOTE: There are two operating modes available for the joystick controls. The Society of Automotive Engineers (SAE) mode and the Backhoe Loader (BHL) mode. The swing and bucket functions are the same for SAE and BHL modes.

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

Joystick SAE Mode

Left Joystick – SAE Mode

The SAE mode uses the left joystick to control the arm and upper structure:

- Swing the upper structure to the left (1)
- Arm out (2)
- Swing the upper structure to the right (3)
- Arm in (4)
- Neutral (N)

NOTE: The joystick controls return to the neutral position automatically when released. The functions of the machine will stop.

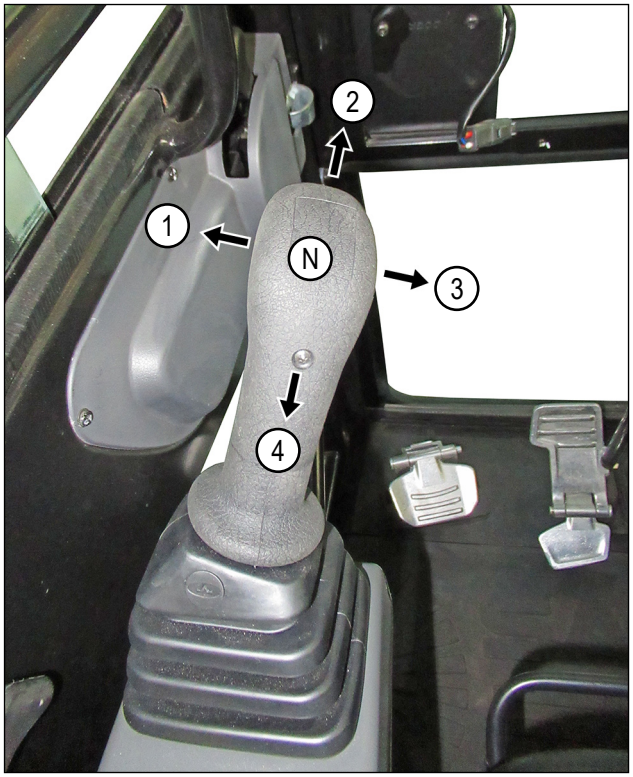

Fig. 3-24 0003837

Right Joystick – SAE Mode

The SAE mode uses the right joystick to control the boom and bucket:

- Bucket dig (1)
- Boom down (2)
- Bucket dump (3)
- Boom up (4)
- Neutral (N)

NOTE: The joystick controls return to the neutral position automatically when released. The functions of the machine will stop.

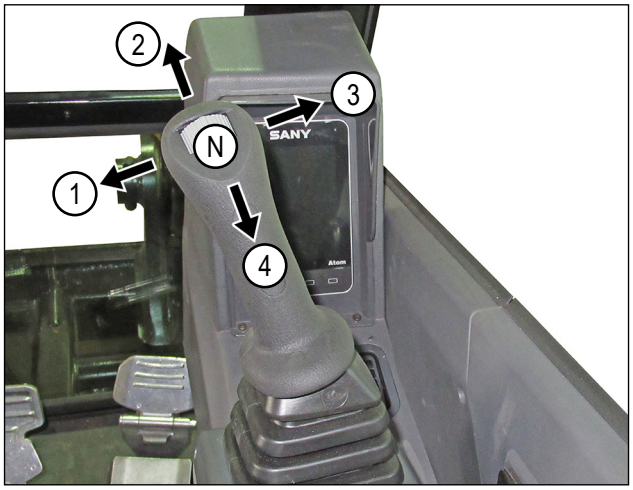

Fig. 3-25 0003062

Joystick BHL Mode

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

Left Joystick — BHL Mode

The BHL mode uses the left joystick to control the boom and upper structure:

- Swing the upper structure to the left (1)
- Boom down (2)
- Swing the upper structure to the right (3)
- Boom up (4)
- Neutral (N)

NOTE: The joystick controls return to the neutral position automatically when released. The functions of the machine will stop.

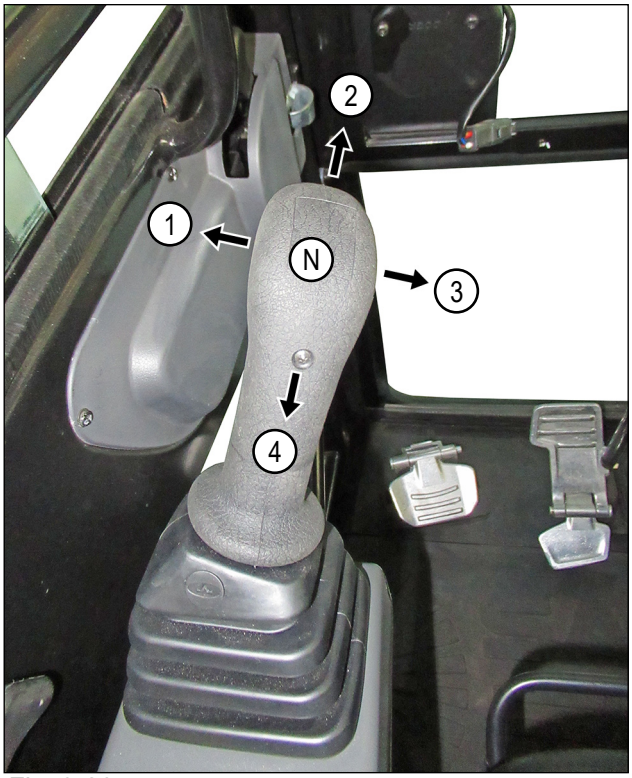

Fig. 3-26 0003837

Right Joystick — BHL Mode

The BHL mode uses the right joystick to control the arm and bucket:

- Bucket dig (1)
- Arm out (2)
- Bucket dump (3)
- Arm in (4)
- Neutral (N)

NOTE: The joystick controls return to the neutral position automatically when released. The functions of the machine will stop.

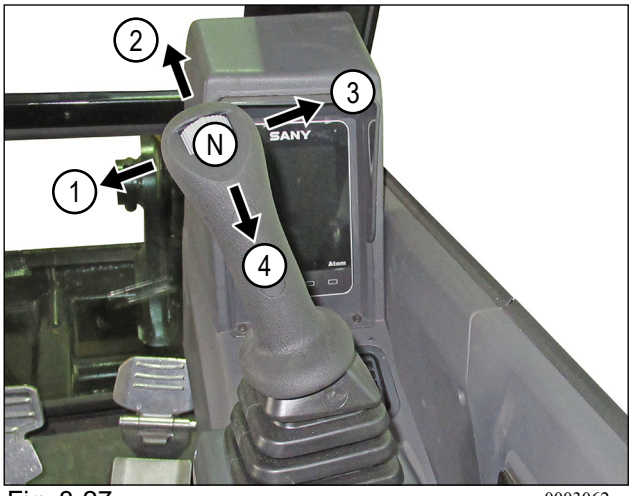

Fig. 3-27 0003062

Pattern Change (SAE/BHL) Valve

NOTICE!

Shut the engine down before adjusting the pattern change (SAE/BHL) valve. Failure to follow this notice could damage the machine or cause it to operate improperly.

The pattern change (SAE/BHL) valve changes control of the boom and arm from one joystick to the other.

To change the operation mode, perform the following steps:

1. Turn the engine off.
2. Insert the key in the latch and open the fuse access door, beneath the operator seat. See “Fuse Access Door” on page 5-27.
3. Unscrew the wing nut (1) until it is free of the threaded hole.
4. Rotate the bar (3) to the desired mode position.
5. Tighten the wing nut into the threaded hole (2) and tighten securely.
6. Close the fuse access door and lock the door.

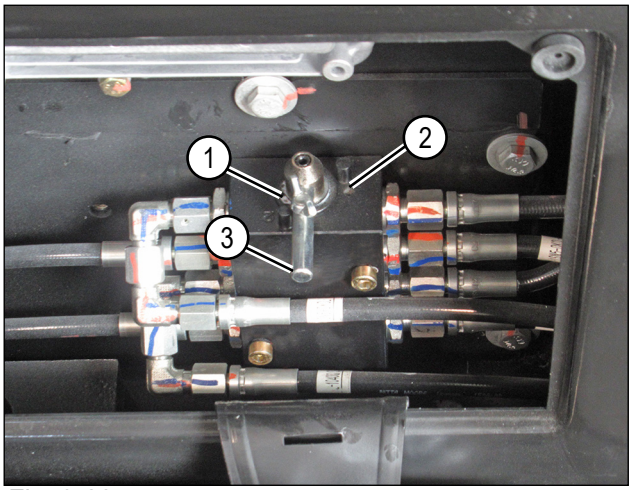

Fig. 3-28 0003066

Return Flow Selector Valve

The return flow selector valve (1) has a one-way position (3) or a two-way position (2) for operating optional equipment. It is located on top of the hydraulic tank.

A variety of optional one-way and two-way flow equipment is available for use on this machine. A hydraulic breaker is an example of one-way flow equipment. A tilt bucket is an example of two-way flow equipment.

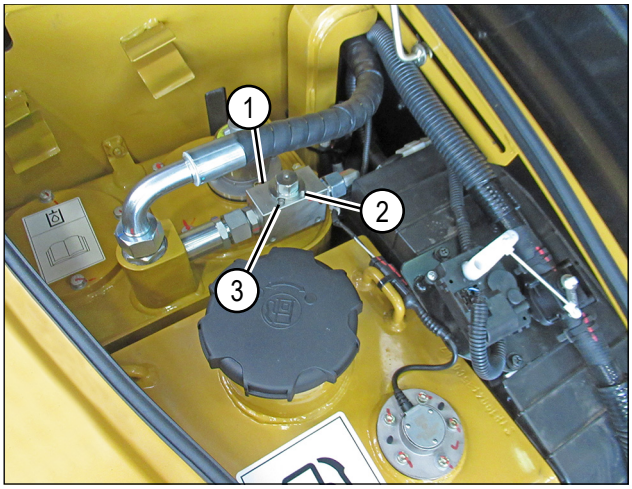

Fig. 3-29 0003772

Hydraulic Lockout Control Lever

WARNING!

Always place the hydraulic lockout control lever in the locked (closed) position before leaving the seat. Failure to follow this warning and unintended movement of the joysticks or travel control levers/pedals could result in death or serious injury.

NOTICE!

If any part of the machine moves when the hydraulic lockout control lever is in the locked (closed) position, shut down the engine immediately and contact a SANY dealer to solve this problem.

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

The hydraulic lockout control lever (1) disables or enables the hydraulic function for work equipment, swing and travel control, and optional equipment.

Move the hydraulic lockout control lever to the locked (closed) position (2) to disable all hydraulic controls.

Fig. 3-30 0002781

NOTE: Keep all the control levers in a neutral position when moving the hydraulic lockout control lever to the unlocked (open) position.

Move the hydraulic lockout control lever to the unlocked (open) position (3) to enable the hydraulic controls.

Fig. 3-31 0002982

Directional Arrow

The directional arrow (1) on each of the track frames indicates forward movement of the machine. Check these arrows before using the travel control levers/pedals. The drive sprocket is at the rear of the track frame.

If the track frame is facing backward, the travel direction will be opposite the maneuvering direction of the travel control lever/pedal. The machine will move forward when you pull the control levers backward, and backward when you push them forward. Left and right control directions are also reversed when the track frame faces backward.

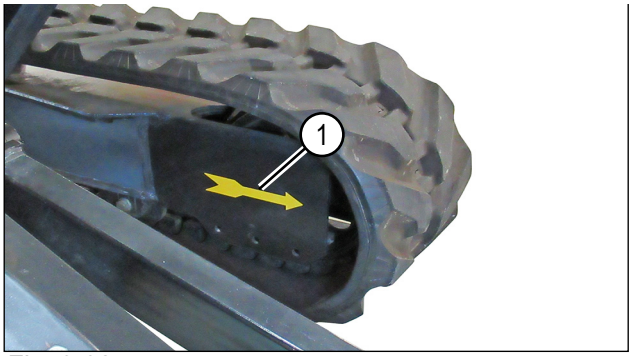

Fig. 3-32 0003794

Travel Control Levers/Pedals

WARNING!

- **Take extra care when using the travel control pedals to steer the machine.**
- **Never place your feet on the travel control pedals unless you are driving or steering the machine, which could cause unexpected movement.**

Failure to follow these warnings could result in death or serious injury.

NOTE: The track frame faces the front if the drive sprocket is in the rear.

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

Use the travel control levers (3) or pedals (4) to change the machine's direction or travel:

- Forward travel: Push the control levers or pedals forward (1).
- Backward travel: Pull the control levers or press pedals backward (2).
- Neutral position (N): The machine stops.

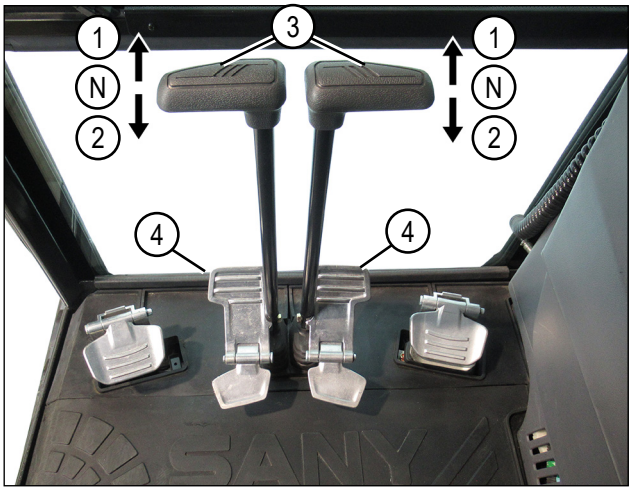

Fig. 3-33 0003064

Boom Swing Control Pedal

WARNING!

Do not place your foot on the boom swing control pedal except when using it for boom swing operation.

Failure to follow this warning could result in death or serious injury.

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

Lift the right footrest (1) up to access the boom swing control pedal (2). Press the right side of the pedal to swing the boom right, and press the left side of the pedal to swing the boom left.

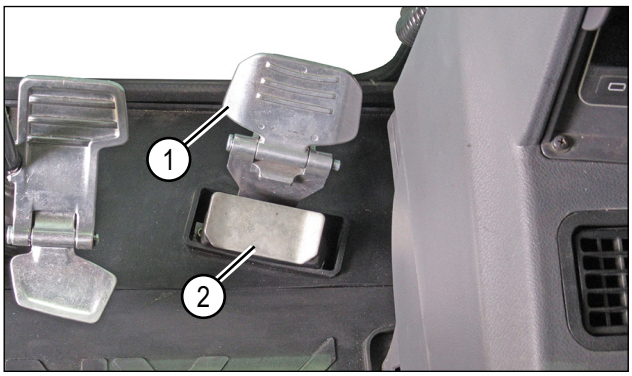

Fig. 3-34 0003018

Close the boom swing control pedal footrest (1) when boom swing operation is not used.

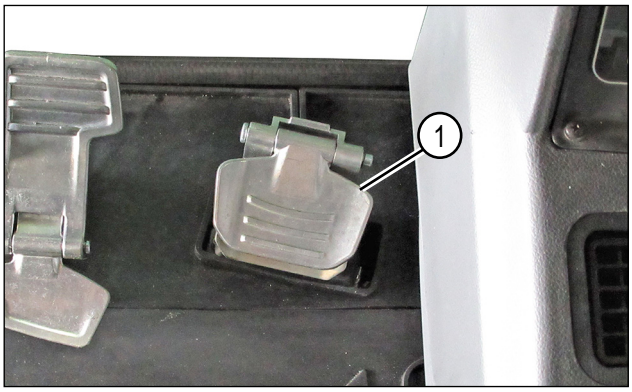

Fig. 3-35 0003019

WINDSHIELD

The windshield (1) can be opened and stored on the inside of the cab roof.

Fig. 3-36 0004625

Opening the Windshield

CAUTION!

- **Avoid sudden movement of the machine or work equipment.**
- **Always place the hydraulic lockout control lever in the locked (closed) position before opening the windshield.**

Failure to follow these cautions could result in injury.

1. Before opening the front windshield, park the machine on level ground, lower the work equipment to the ground, and stop the engine.
2. Place the hydraulic lockout control lever (1) in the locked (closed) position.

Fig. 3-37 0002781

CAUTION!

When open, the windshield must be secured to the roof of the cab. If it is not secured, the windshield may slide down unexpectedly and result in injury or machine damage.

3. Inside the cab, grasp left and right grips (3) and press down the latches (2) with your thumbs. Pull grips back slightly and lift the windshield to disengage the latches, then move the windshield up to the roof of the cab until it locks.

   NOTE: The right side is shown. The left side is similar.

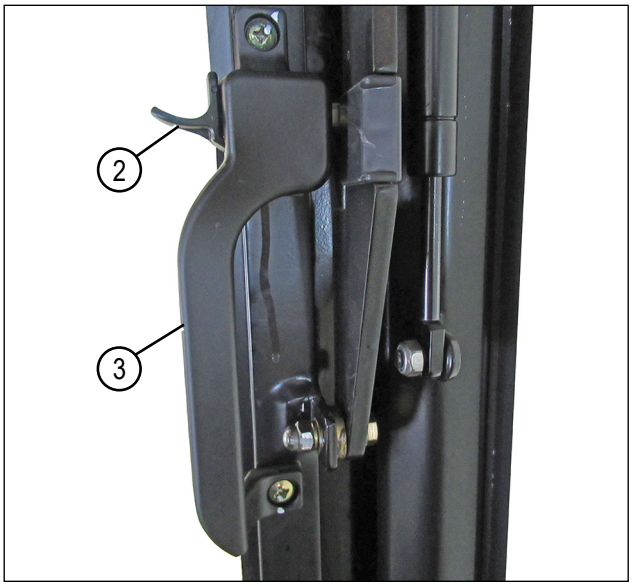

Fig. 3-38 0002986

Closing the Windshield

CAUTION!

Close the windshield slowly to avoid pinching hands or fingers. Failure to follow this caution could result in injury.

1. Before closing the windshield, park the machine on level ground, lower the work equipment to the ground, and stop the engine.

2. Move the hydraulic lockout control lever (1) to the locked (closed) position.

Fig. 3-39 0002781

3. Grasp left and right grips (3) and press down the latches (2) with your thumbs. Move the windshield forward and down, and release the latches.

   NOTE: The right side is shown; the left side is similar.

4. When the front windshield reaches the lowered position, firmly push the left and right grips forward at the top of the front windshield to engage the latches.

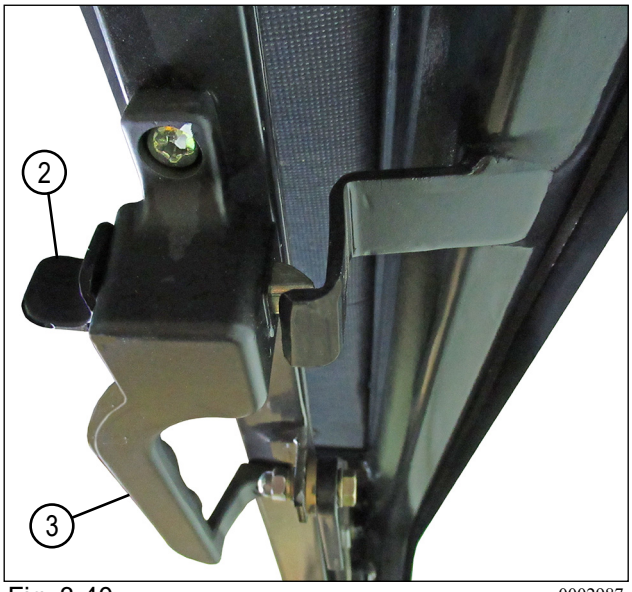

Fig. 3-40 0002987

Lower Front Windshield

1. Raise the windshield to remove the lower front windshield (1). See "Opening the Windshield" on page 3-23.

   NOTE: Sand or dust accumulated along the bottom of the lower front windshield and the seal may make it difficult to remove or install. Make sure the bottom of the lower front windshield and the seal are clean before removing or installing it.

2. Rotate the latches (2) to clear the lower front windshield.

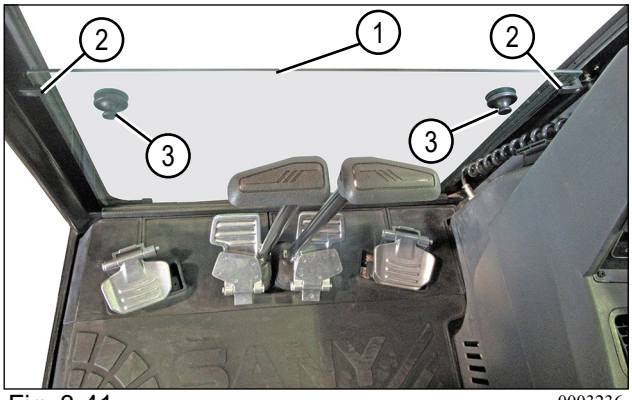

Fig. 3-41 0003236

3. Firmly grasp the lower front windshield knobs (3) and lift upward for removal.

4. Installation is done in the reverse order of removal. Make sure the bottom of the lower front windshield is seated in the seal.

HEATING AND AIR CONDITIONING SYSTEM

Control Panel

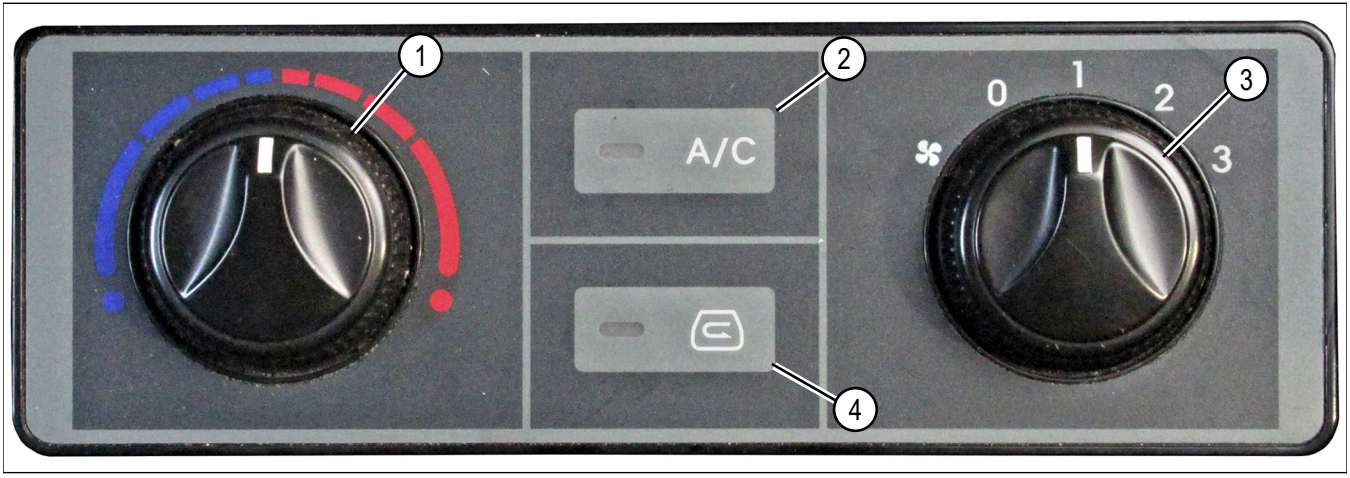

Fig. 3-42 0002995

Item	Control	Operation	Function
1	Temperature adjustment dial	Rotate to the right.	Increases the temperature inside the cab.
		Rotate to the left.	Decreases the temperature inside the cab.
2	Air conditioning power switch	Press and release.	Turns the air conditioning system on or off.
3	Blower speed adjustment dial	Rotate to the right (0 to 3).	Increases the blower speed – air volume output increases.
		Rotate to the left (3 to 0).	Decreases the blower speed – air volume output decreases.
4	Fresh-air/recirculation switch	Press and release.	Indicator light illuminated – recirculation mode.
			Indicator light off – fresh-air mode.

Heating and Air Conditioning System Operation

NOTICE!

- **If water gets on the control panel, a failure may result.**
- **Always keep this component free from water.**

Failure to follow these notices could result in damage to the machine or cause the machine to operate improperly.

1. Start the engine. See “Starting the Engine” on page 4-16.

   NOTE: In cooling mode, when the temperature inside the cab reaches the preset temperature the compressor power button will be turned on/off automatically to maintain the temperature inside the cab. The indicator light stays on.

2. Select the heating or cooling mode.

   - Cooling mode: Press the air conditioner power button to turn on the air conditioning system. The indicator light will illuminate. Turn the temperature adjustment dial to the left to the desired position.
   - Heating mode: Press the air conditioning power button to turn the air conditioning system off. The indicator light will go out. Turn the temperature adjustment dial to the right to the desired position.

3. Turn the blower speed adjustment dial to the right, to positions 1, 2, or 3. The blower fan will begin to deliver air to the cab.

4. To switch off the heating and air conditioning system, turn the blower speed adjustment dial to 0.

Air Outlets

There are multiple air outlets in the cab for operator comfort and windshield defrosting:

- Windshield defrosting vent (1).

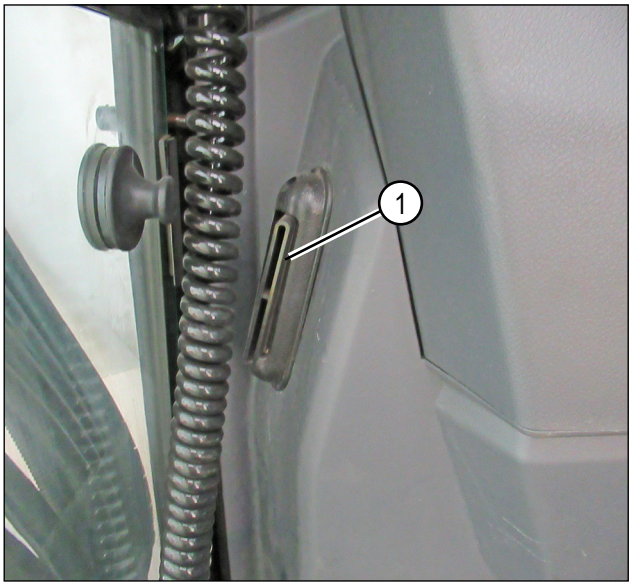

Fig. 3-43 0003856

- Cab front vent (2).
- Cab rear vent (3).

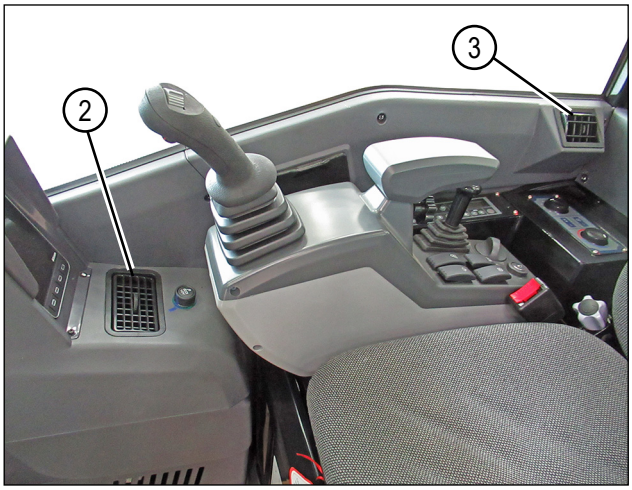

Fig. 3-44 0003793

Cab Ventilation

When the air conditioner is used for extended periods, the fresh-air/recirculation switch should be switched to fresh-air mode every hour to ventilate the cab.

RADIO

Radio Control Panel

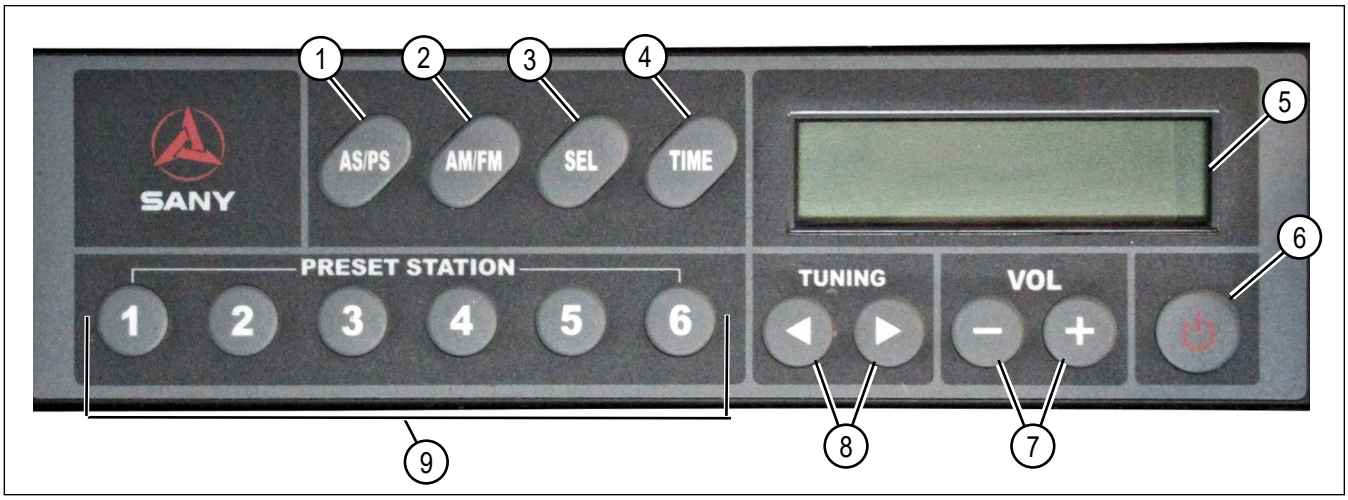

Fig. 3-45 0002996

1) AS/PS selector button
2) AM/FM selector button
3) Sound mode adjustment button (SEL)
4) Time display button
5) Liquid crystal display (LCD)
6) Power button
7) Volume (VOL) + and - control buttons
8) Tuning ◄ and ► control buttons
9) Preset station buttons (1 through 6)

Radio Operation

NOTE: The key switch must be on for the radio to operate. The radio displays time when the key is off.

Auto Scan/Preset Station (AS/PS) Button

Press and release the AS/PS button (1) to begin the auto scan feature, where each preset station will play for 5 seconds with the currently playing station frequency blinking on the display. Press the AS/PS button once more to remain on the current station.

Press and hold the AS/PS button for 2 seconds to activate the auto programming feature. In auto programming, the six radio stations with the strongest signals are stored in the six preset buttons (1–6).

AM/FM Selector Button

Press the AM/FM selector button (2) to switch between AM1, AM2, FM1, FM2, and FM3 bands. Each band can have six preset stations selected.

LCD

Displays the band (either AM or FM), currently tuned radio station frequency, preset station number, and current time on the LCD screen (5).

Sound Mode Adjustment Button (SEL)

Use the SEL sound mode adjustment button (3) to adjust the sound tones and speaker balance. Each time the SEL button is pressed, the display will cycle to adjustment options as follows:

- Press and hold the SEL button to access the bass adjustment.
- Press and release the SEL button again to access the treble adjustment.
- Press and release the SEL button again to adjust the cab speaker balance.

With the preferred sound mode option selected, use the VOL plus (+) or minus (–) buttons (7) to adjust the level.

NOTE: If the sound mode adjustment button is not pressed after 5 seconds, the display defaults back to the current radio station frequency.

Time Display / Time Set Button

Press and release the TIME button (4) to display the set time for 5 seconds.

While the time is being displayed, press and hold the TIME button to enter the time set screen. The hour numbers will flash. Press the tuning arrows (8) to set the desired hour.

To set the minutes, press and release the TIME button again and the minute numbers will flash. Press the tuning arrows to set the desired minutes.

Press and release the TIME button to leave the time set screen and return to time display for 5 seconds. After 5 seconds, the time display will return to the radio display.

Power Button

Press and release the power button (6) to turn the radio on. The radio frequency is displayed on the LCD. Press and release the power button to mute the radio. Press and hold the power button to turn the radio off.

Volume Control Buttons

Press the VOL + or – button (7) to increase or decrease the volume.

Tuning Buttons

Press the left ◄ or right ► TUNING arrow buttons (8) to search for the next available radio station frequency within range.

Preset Station Buttons

Press and hold any of the six preset station buttons (9) to assign the current radio station to that button. When stations have been assigned to the buttons, press and release a preset station button to select its station.

BATTERY DISCONNECT SWITCH

NOTICE!

- **Never turn the battery disconnect switch to the OFF position while the engine is running. This can damage the electrical system or cause the machine to operate improperly.**
- **After machine shutdown, wait at least 1 minute for the engine control module (ECM) to complete its shutdown before disconnecting the battery.**

Failure to follow this notice can cause damage to the machine or cause the machine to operate improperly.

The battery disconnect switch (1) is behind the right rear access door. Turn the switch to the OFF position to isolate the battery from the electrical system when securing the machine for the day, or as needed for maintenance.

Fig. 3-46 0003771

ESCAPE TOOL – CAB

If the cab door or windshield cannot be opened during an emergency, the escape tool (1) can be used to break a cab window. The escape tool is inside the cab behind the seat.

To use the escape tool, grasp the handle and remove it from the holder. Firmly strike a cab window to break it.

Fig. 3-47 0004626

FIRE EXTINGUISHER – CAB

NOTICE!

- **Always keep a fire extinguisher in the machine. Read the instructions on the fire extinguisher carefully and know how to use it in an emergency.**
- **Inspect the fire extinguisher daily. If it is damaged, replace it immediately.**
- **Make sure the fire extinguisher is within the listed inspection period. Replace the fire extinguisher immediately if it has reached its expiration date.**

The fire extinguisher (1) is located on the rear pillar behind the seat of the cab.

Fig. 3-48 0004626

The fire extinguisher must be at least a 2.5 lb. Class ABC rated fire extinguisher (National Fire Protection Association [NFPA] 10 Standard for Portable Fire Extinguishers).

MONITOR

The monitor (1) displays machine operating information and provides access to change system parameters.

Fig. 3-49 0003777

Daily Maintenance Information Screen

When the key switch is turned to ON, the monitor displays the Daily Maintenance Information screen.

The checklist steps 1–7 should be completed before starting the machine. See “Prestart Checks and Adjustments” on page 4-5.

1. Start the engine and idle until operating temperature is reached. See “Starting the Engine” on page 4-16.

2. Press the button below the check-mark icon (1) to confirm all checks and procedures have been completed. The display will change to the home screen.

   NOTE: If maintenance is required, the Maintenance Information screen will display instead of the Daily Maintenance screen. See “Maintenance Information Screen” on page 3-34.

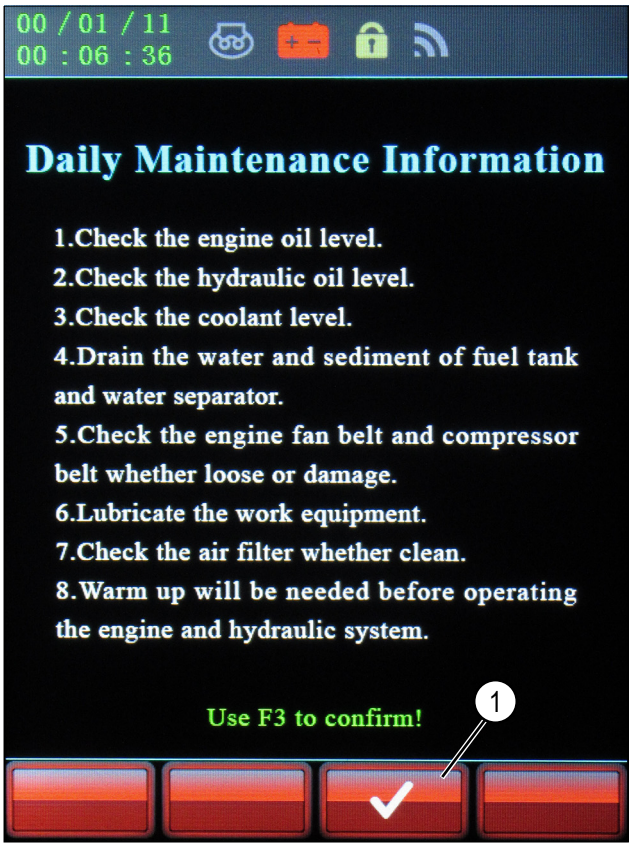

Fig. 3-50 0003808

Maintenance Information Screen

The Maintenance Information screen will display instead of the Daily Maintenance Information screen at each maintenance interval.

1. Press and hold the button below the operating mode icon, on the home screen, to display information from 50–4000 service interval hours. See “Home Screen” on page 3-34.

2. Press the button below the pause icon (1) to pause or continue the display of maintenance information screens.

3. Press the button below the check-mark icon (2) to confirm the completion of the maintenance work displayed on the screen. When prompted to reset the maintenance icon on the home screen, enter the password “53188” to clear the maintenance prompt.

   NOTE: To return to the previous screen, press the button below the return icon (3).

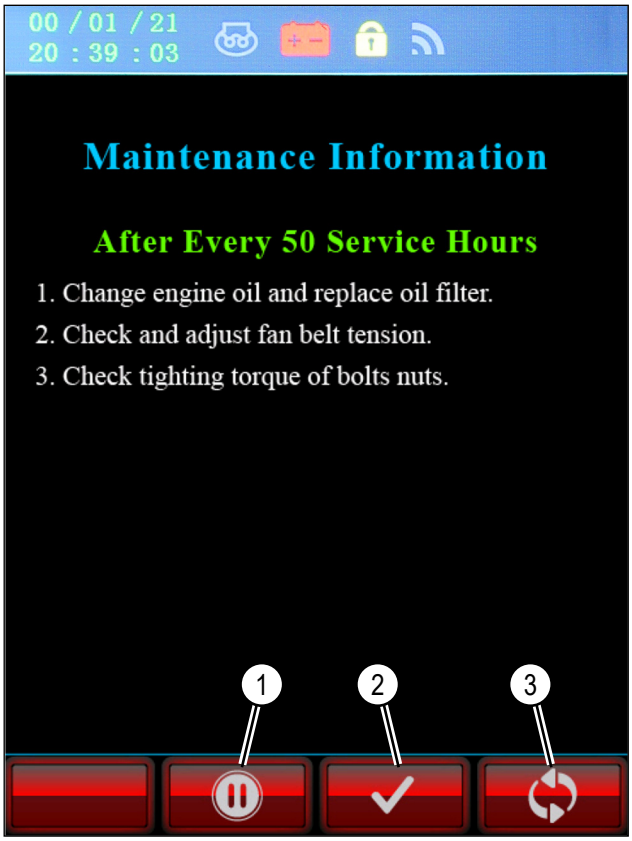

Fig. 3-51 0003819

Home Screen

The home screen displays machine operating information and provides access to change system parameters.

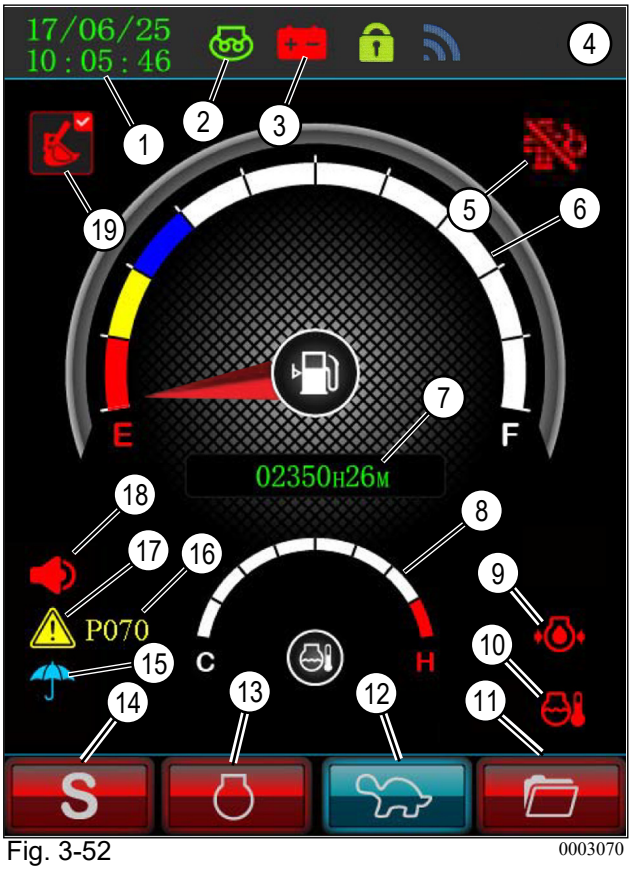

Fig. 3-52 0003070

Item	Home Screen Display	Function	Description
1	Date and time	Displays the current date and time.	Date (YY/MM/DD) and Time (HH/MM/SS)
2	Preheat icon	Indicates the engine is in preheating mode.	
3	Battery discharge icon	When illuminated, indicates the battery is discharging.	
4	Throttle position	Displays the current throttle position.	0 to 100%
5	Diesel particulate filter (DPF) regeneration inhibit icon	Indicates regeneration has been stopped.	
6	Fuel level gauge	Displays the fuel level.	
7	Operating hours	Displays the total number of machine operating hours.	
8	Engine coolant temperature gauge	Displays the engine coolant temperature.	
9	Engine oil pressure alarm	When the oil pressure is low, the icon appears as a warning.	
10	Coolant temperature alarm	When the coolant temperature is high, the icon appears as a warning.	
11	Function list (folder) icon	Press the button below the icon to access the function list screen.	See “Function List Screen” on page 3-36.
12	High/Low travel speed icon	Press the button below the icon to select high/low travel speed.	
13	Auto idle icon	Press the button below the icon to enable or disable the auto idle function.	
14	Work mode icon: S = Standard Work Mode B = Breaker Work Mode	Displays the current work mode. Press the button below the icon to change to the next work mode.	
15	Maintenance prompt icon	This blue icon appears if any scheduled maintenance is due.	See “Diesel Particulate Filter (DPF) Screens” on page 3-47.
16	Failure code	Failure code appears when an abnormality is detected.	See “Failure Information Screen” on page 3-41.
17	Failure information icon	Indicates that an abnormality has occurred.	See “Failure Information Screen” on page 3-41.
18	Severe failure alarm icon	Indicates a severe failure has occurred.	
19	Operating mode icon	Indicates the selected work tool or equivalent 1-way or 2-way operating modes for optional work equipment.	See “Operating Mode Screen” on page 3-43.

Function List Screen

Access the Function List screen by pressing the button under the folder icon on the home screen. See “Home Screen” on page 3-34.

The Function List screen displays the following:

- Main Menu – Machine operational information and controls.

  NOTE: The Main Menu screen is accessed with a password. See “System Information Screen” on page 3-37.

- Operating Mode – Designation of work equipment and corresponding hydraulic flow control.
- Quick Coupler Control – Not equipped.
- Time calibration – Correct the year, month, day, time and time zone.
- System unlocked – Factory and service only.
- Reserved function – Not used at this time. Reserved for future function.

  NOTE: Access to some screens requires a password.

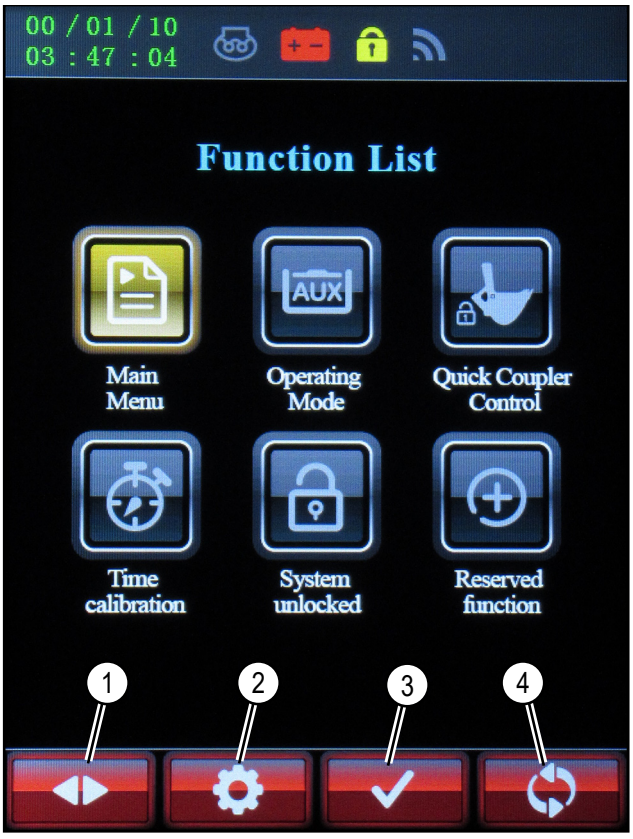

Fig. 3-53 0003823

1. Press the button below the left/right arrow icon (1) to scroll to and illuminate the selected icon.
2. Press the button below the gear icon (2) to display the system setup screen which is password-protected for use by SANY only.
3. Press the button below the check-mark icon (3) to confirm the selected icon.

   NOTE: To return to the home screen, press the button below the return icon (4).

System Information Screen

Access to the Main Menu screen requires entering the password 31868 on the System Information screen.

1. Press the button below the up/down arrow icon (1) to scroll to the desired number.

2. Press the button below the left/right arrow icon (2) to move to the next number position.

3. Press the button below the check-mark icon (3) to confirm the selected icon.

   NOTE: To return to the previous screen, press the button below the return icon (4).

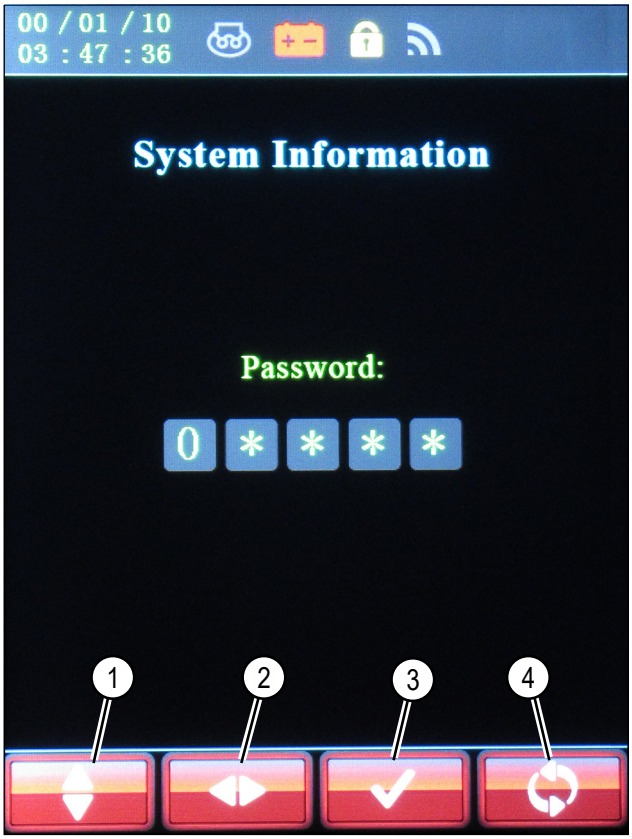

Fig. 3-54 0003812

Main Menu Screen

The Main Menu screen displays the main signals to and from the system controller, including real-time running information, machine configuration, detailed failure information, available languages, and maintenance information.

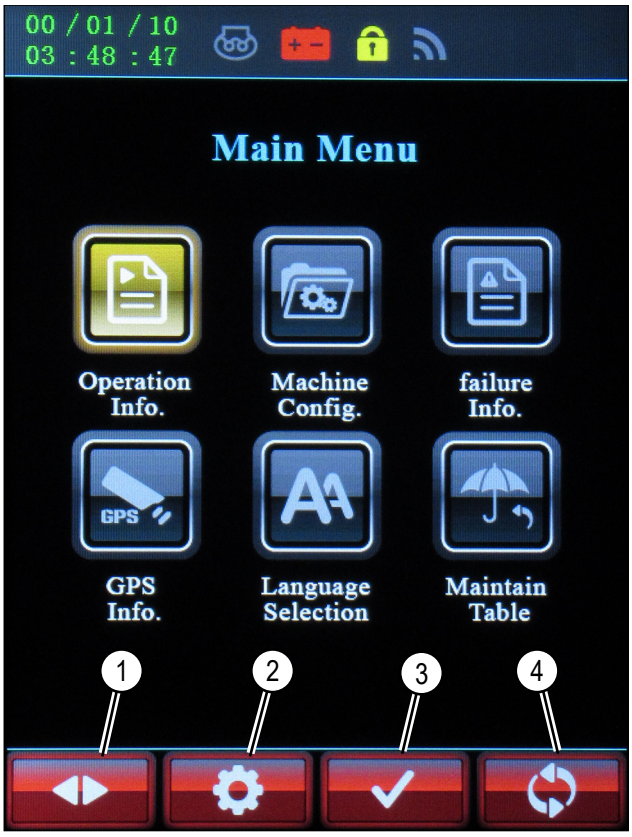

Fig. 3-55 0003810

- Operation Information – Displays real-time engine operating values, fuel level, and load-sense pressure with the engine running.
- Machine Configuration – Displays basic information of the excavator.
- Failure Information – Displays detailed failure codes recorded by the machine.
- Global Positioning System (GPS) Information – Not used at this time in North America.
- Language Selection – Select the language that displays information on all screens.
- Maintain Table – Displays when the machine is due for maintenance. If maintenance is not due, the Maintain Table screen will not open. The Maintain Table screen is also used to reset the service timer.

NOTE: Access to some screens requires a password.

1. Press the button below the left/right arrow icon (1) to scroll and illuminate the selected icon.
2. Press the button below the gear icon (2) to display the System Setup screen, which is password-protected for use by SANY only.

   NOTE: The gear icon selection is password-protected for most of the Main Menu selections.
3. Press the button below the check-mark icon (3) to access the selected icon screen if an active function of the machine.

   NOTE: To return to the previous screen, press the button below the return icon (4).

Operation Information Screen

The Operation Information screen displays real-time engine operating values, fuel level, and load-sense pressure with the engine running.

Press the button below the up/down arrow icon (1) to scroll to the next pages.

NOTE: To return to the Main Menu screen, press the button below the return icon (2).

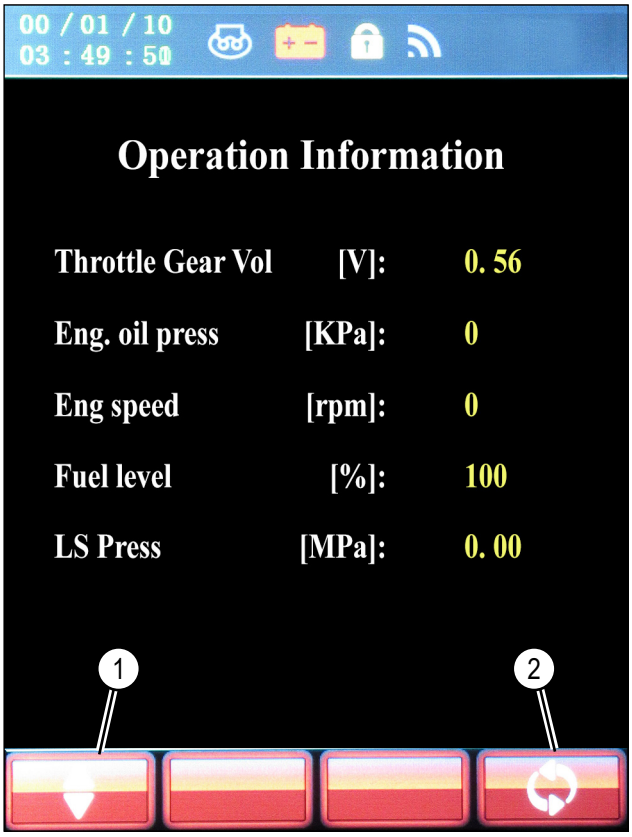

Fig. 3-56 0003084

Switch Signals Screen

The Switch Signals screen enables the operator to monitor the input and output of switch functions.

Press the button below the up/down arrow icon (1) to scroll to the next pages.

NOTE: To return to the Main Menu screen, press the button below the return icon (2).

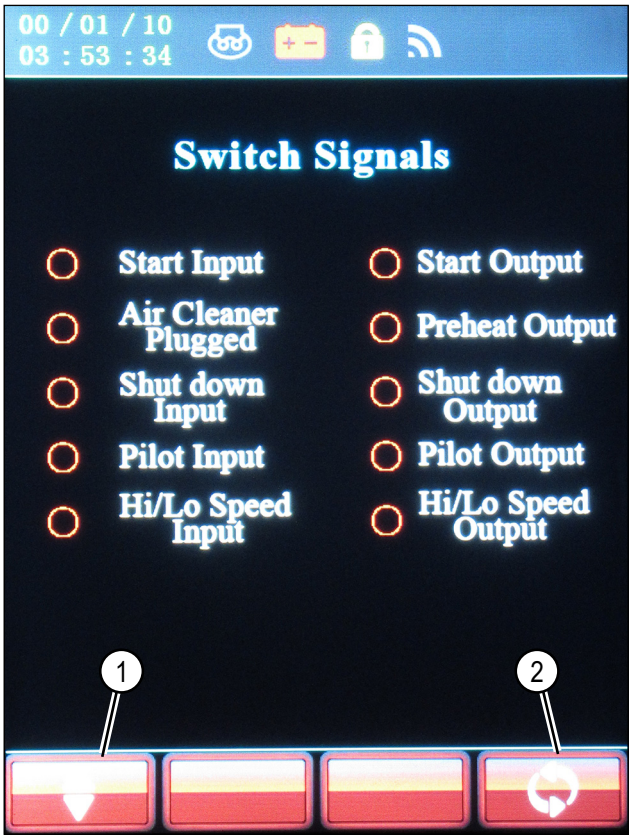

Fig. 3-57 0003813

Joystick Screen

The Joystick screen (1) displays real-time joystick valve information:

Press the button below the up/down arrow icon (1) to scroll to the next pages.

NOTE: To return to the Main Menu screen, press the button below the return icon (2).

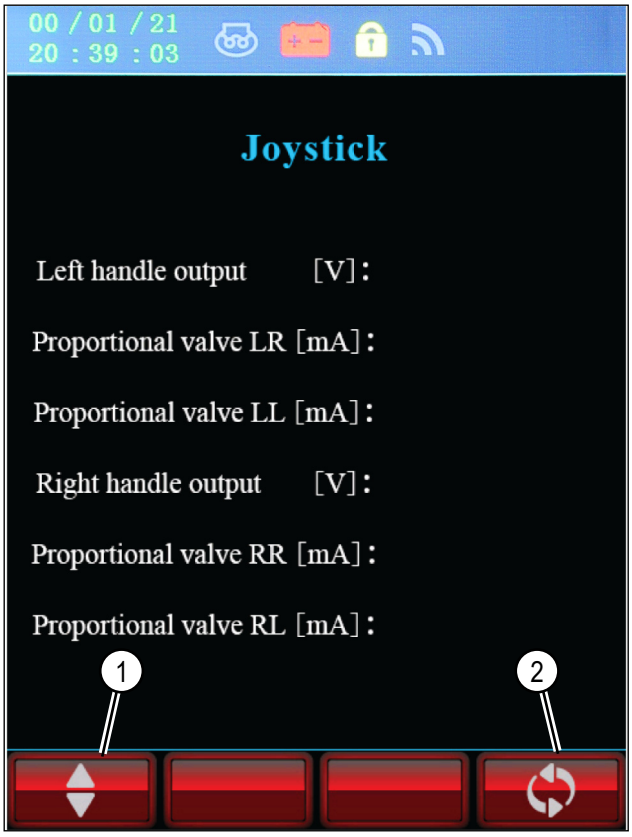

Fig. 3-58 0003814

Machine Configuration Screen

Access the Machine Configuration screen from the Main Menu screen.

The Machine Configuration screen displays machine information such as model number, serial number, and control system information.

NOTE: To return to the previous screen, press the button below the return icon (1).

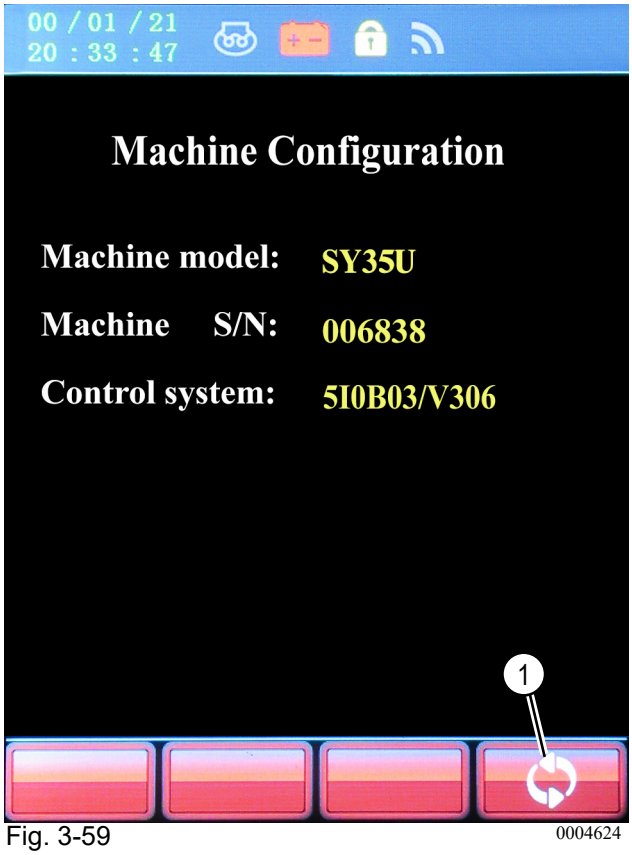

Fig. 3-59 0004624

Failure Information Screen

When a failure occurs, the failure information icon on the home screen will turn blue and the failure code will be displayed on the home screen.

The Failure Information screen displays failure codes recorded by the machine.

SPN and FMI codes are engine diagnostic failure codes. Contact a SANY dealer for troubleshooting information.

NOTE: To return to the previous screen, press the button below the return icon (1).

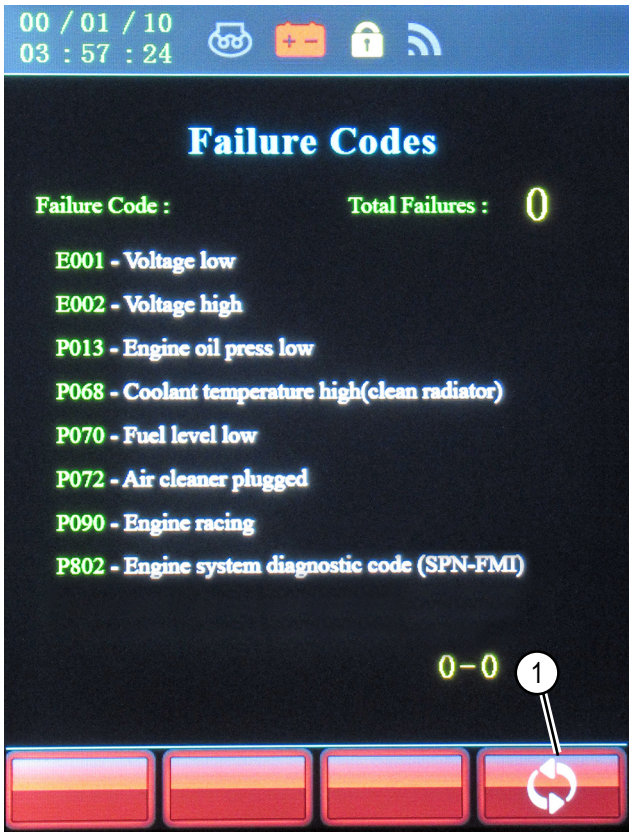

Fig. 3-60 0004627

Global Positioning System (GPS) Information Screen

The GPS Information screen display is not used at this time in North America.

NOTE: To return to the previous screen, press the button below the return icon (1).

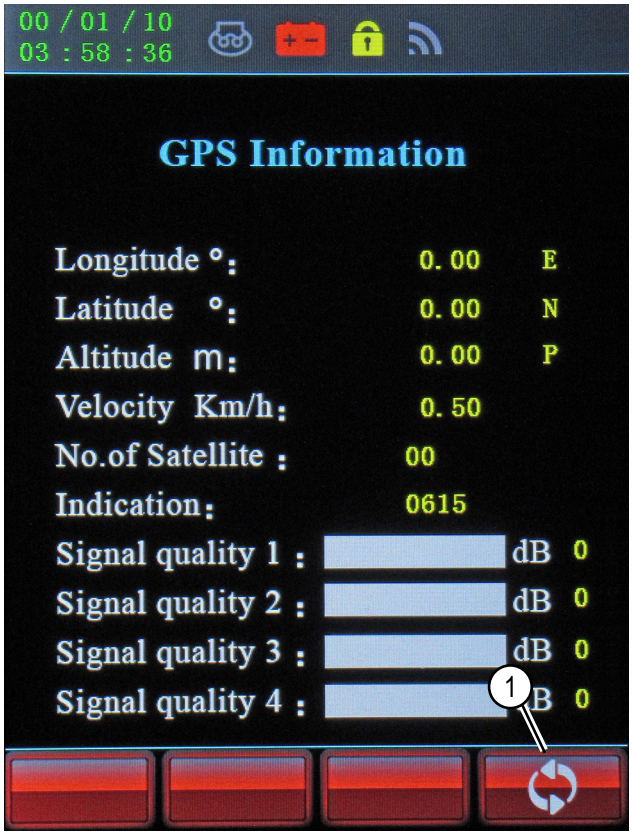

Fig. 3-61 0003821

Language Selection Screen

Access the Language Selection screen from the Main Menu screen.

The Language Selection screen allows the selection of the language that will display information on all display screens.

To change the language setting:

1. Press the button below the up/down arrow icon (1) to select the desired language.

2. Press the button below the check-mark icon (2) to confirm the selected language.

   NOTE: To return to the previous screen, press the button below the return icon (3).

Fig. 3-62 0003820

Maintain Table Screen

Displays when the machine is due for maintenance. If maintenance is not due, the Maintain Table screen will not open.

NOTE: The Maintain Table screen is also used to reset the service timer.

Operating Mode Screen

Use the Operating Mode screen to select a work tool or the equivalent one-way or two-way flow.

The Operating Mode screen displays the bucket (1) as the default work tool. The auxiliary ports are used for hydraulic work tools. Select the hydraulic work tool icon prior to operating it.

- Bucket (default) (1)
- Breaker (2)
- Clamshell bucket (3)
- Tilt bucket (4)
- Auger (5)
- Rotary grapple (6)
- Grapple (7)
- Brush cutter (8)

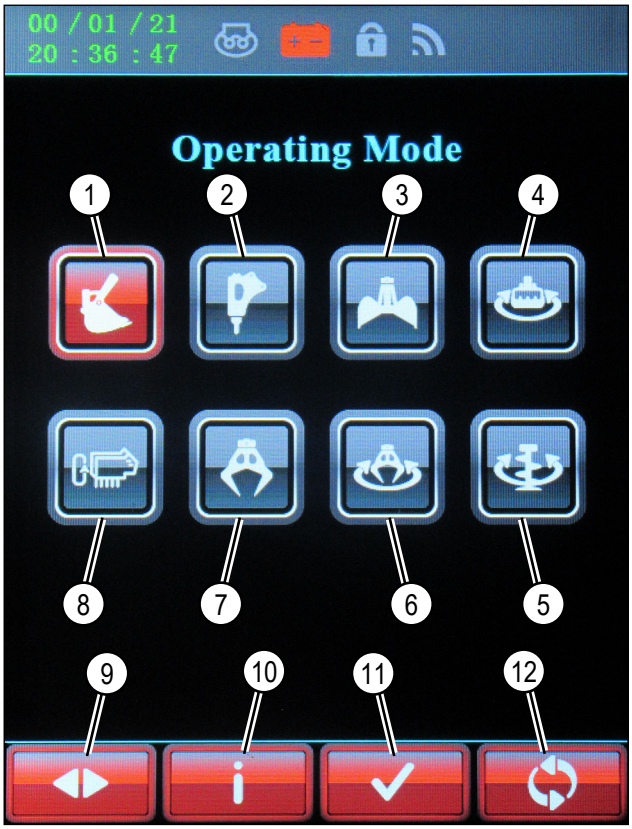

Fig. 3-63 0003816

NOTE: Check the work tool operator manual or contact a SANY dealer for hydraulic flow rate information.

1. Press the button below the left/right arrow icon (9) to scroll to and illuminate the selected work tool icon.
2. Press the button below the information icon (10) to access the Flow Rate Information screen. Flow rate for a work tool can be adjusted on this page. See “Flow Rate Setting Screen” on page 3-45.
3. Press the button below the check-mark icon (11) to confirm the selected work tool.

   NOTE: To return to the previous screen, press the button below the return icon (12).

Flow Rate Information Screen

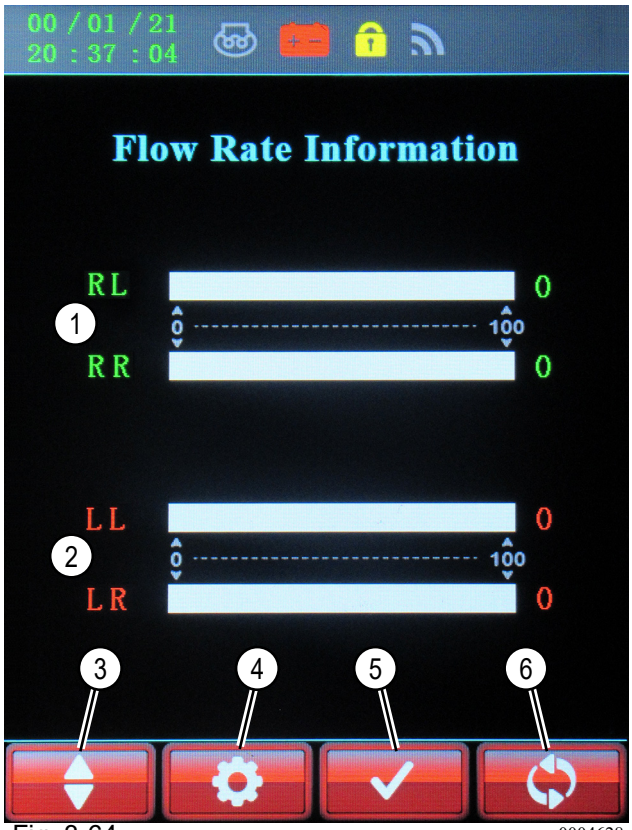

Fig. 3-64 0004628

NOTICE!

Check the work tool operator manual for hydraulic flow rate information. Follow all optional equipment information and safety precautions.

The Flow Rate Information screen displays the flow rate of the hydraulic work tool selected in the Operating Mode screen.

- RL [right joystick, left button] and RR [right joystick, right button] (1) settings are for the right joystick high-pressure, high-flow circuit.
- LL [left joystick, left button] and LR [left joystick, right button] (2) settings are for the left joystick low-pressure, low-flow circuit.

1. Press the button below the up/down arrow icon (3) to select the hydraulic flow rate to adjust.
2. Press the button below the gear icon (4) to access the Flow Rate Setting screen.
3. Press the button below the check-mark icon (5) to display a service screen that is password-protected.

   NOTE: To return to the previous screen, press the button below the return icon (6).

Flow Rate Setting Screen

The Flow Rate Setting screen displays the flow rate information of the operating mode of the hydraulic work tool selected in the Flow Rate Information screen.

- Check the work tool operator manual for hydraulic flow rate information.
- When the bar graph (1) has been set to the highest level, the flow rate is at its maximum (100%).
- When the bar graph has been set to its lowest level (no bar is visible), the flow is blocked and no hydraulic oil will flow.

Flow rate of the selected function in the Flow Rate Information screen can be adjusted in the bar graphic in the Flow Rate Setting screen.

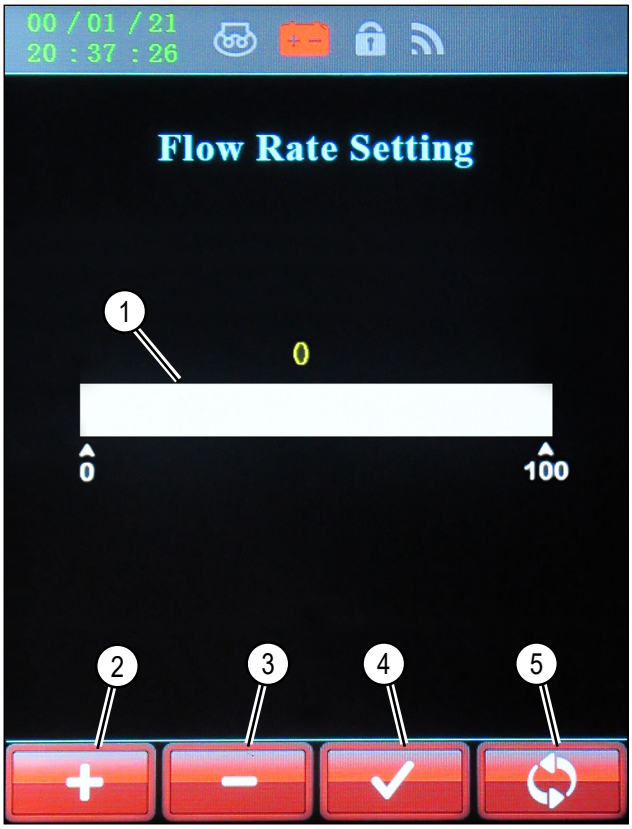

Fig. 3-65 0003817

1. Press the button below the plus icon (2) to increase the length of the bar graph, which will increase the flow rate.
2. Press the button below the minus icon (3) to decrease the length of the bar graph, which will lower the flow rate.
3. Press the button below the check-mark icon (4) to confirm the flow rate adjustment.

   NOTE: To return to the previous screen, press the button below the return icon (5).

Date and Time Setup Screen

The Date and Time Setup screen is accessed by selecting the Time Calibration icon on the Function List screen and allows changes to be made to the date, time, and time zone.

1. Press the button below the up/down icon (1) to increase the value of the selected position.

2. Press the button below the left/right icon (2) to select the position for adjustment.

3. Press the button below the check-mark icon (3) to confirm the time adjustment.

   NOTE: To return to the previous screen, press the button below the return icon (4).

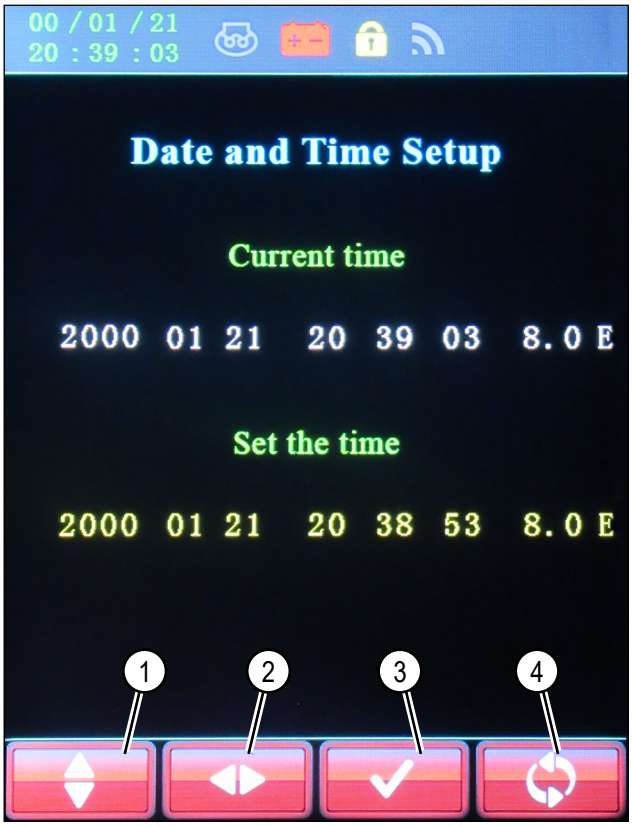

Fig. 3-66 0003818

System Unlocked Screen

For factory and service use only.

Reserved Function

Not used at this time. Reserved for future function.

Diesel Particulate Filter (DPF) Screens

Stationary Regeneration

The DPF Tips screen on the monitor will prompt the operator to perform stationary regeneration of the exhaust system when needed. Read and understand the operation procedures and precautions before starting stationary regeneration. To return to the previous screen, press the button below the return icon (2).

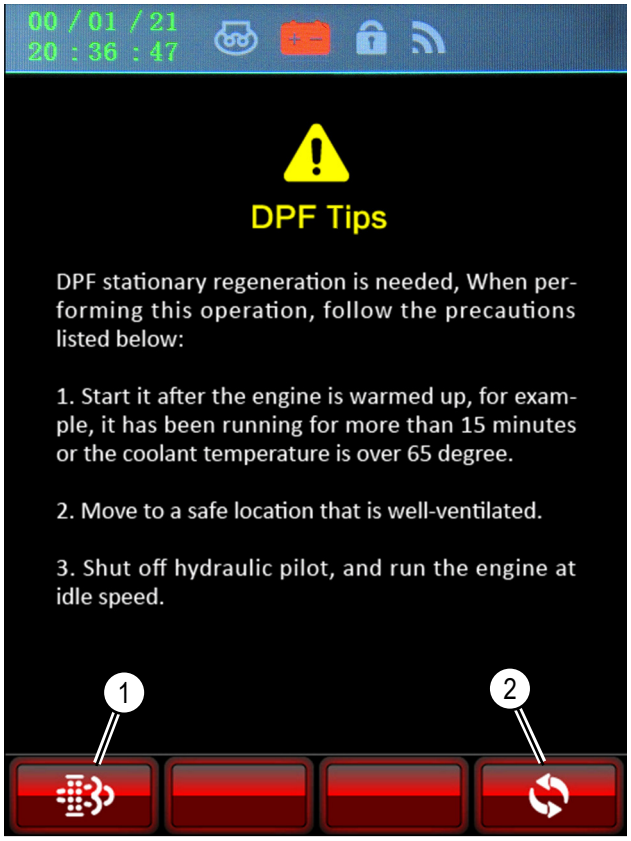

Fig. 3-67 0003121

WARNING!

- **The exhaust temperature during DPF regeneration can reach approximately 1100°F (600°C). Make sure there are no flammable materials around the exhaust system or machine. Do not touch any part of the exhaust system.**
- **Exhaust gas contains carbon monoxide. Carbon monoxide is an invisible and odorless gas, and is toxic. Operate the engine only in a well-ventilated area.**

Failure to follow these warnings could result in death or serious injury.

When particulate deposits (soot) build up in the exhaust system, the diesel particulate filter (DPF) will need regeneration to remove the soot. Performing the stationary regeneration process will make sure the machine does not operate in a derated mode where the engine rpm and power are reduced due to the exhaust becoming clogged with soot.

NOTICE!

When performing DPF stationary regeneration, start the engine and allow it to warm to operating temperature 104°F (40°C). Do not start the regeneration process before the engine is at operating temperature. Failure to follow this notice could damage the machine or cause it to operate improperly.

1. Park in a safe location where the exhaust pipe will not face any combustible surface, prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Start the engine. See “Starting the Engine” on page 4-16.
3. Move the hydraulic lockout control lever to the locked (closed) position and run the engine at low idle.

NOTE: Be sure the DPF regeneration icon (1) is illuminated. The illuminated icon indicates “Regeneration permitted.”

4. Press the button below the DPF regeneration icon (10) for the DPF Regeneration screen.

5. If the preceding conditions are met, press the button below the DPF regeneration icon (10) to begin the stationary regeneration process. The engine speed will gradually increase to high idle.

When started, the DPF regeneration cycle can be inhibited and restarted without interrupting the cycle by repeating step 6. If the button below the DPF Regen Inhibit icon (11) is pressed, regeneration will not be allowed and a warning light will display on the home screen.

NOTE: The stationary regeneration process will take approximately 25 to 30 minutes.

6. With regeneration enabled and no other warnings illuminated, press the button below the DPF Regen Ack (acknowledge) icon (10) to begin the stationary regeneration process. The engine speed will gradually increase to approximately 2000 rpm during the regeneration process.

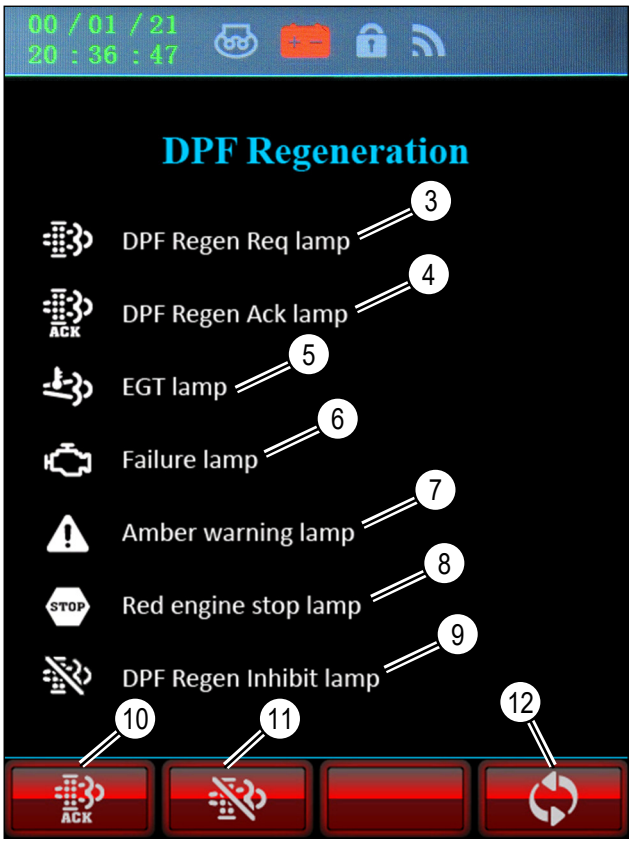

Fig. 3-68 0003123

NOTE: After the stationary regeneration process begins, the failure lamp (6) and the amber warning lamp (7) turn off and simultaneously the DPF Regen Req lamp message (3) and the DPF Regen Ack lamp (4) message will flash. The DPF Regen Req lamp message will go out and the DPF Regen Ack lamp message and exhaust gas temperature lamp message (5) will illuminate steadily.

NOTICE!

If the red engine stop lamp (8) illuminates, shut down the engine immediately. Contact a SANY dealer for further information. Failure to follow this notice could damage the machine or cause it to operate improperly.

NOTE: A DPF regeneration in-progress message will display on the DPF Regeneration screen with a caution message of high exhaust temperatures.

7. When the regeneration cycle is complete, the engine returns to low idle and a manual DPF regeneration completed message is displayed. The DPF Regen Ack icon extinguishes automatically. Press the button below the return icon (12) to return to the previous screen.

NOTE: If it is necessary to abort the stationary regeneration, press the button below the DPF regeneration inhibit icon (11). The DPF Regen Inhibit lamp (9) will illuminate and the regeneration cycle will be stopped. Shut down the engine. See “Engine Shutdown” on page 4-23.

SANY

Machine Operation

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WORK AREA

The work area is where the actual job is performed. Within the work area are hazard areas. Hazard areas immediately surround the machine where personnel may be at risk due to the machine's operation and movement.

All personnel within the work area must wear appropriate personal protective equipment (PPE).

The machine operator is responsible for the safety of all personnel within the hazard area.

GENERAL JOB SAFETY

See "Job Safety" on page 2-11 for additional information.

Operator Responsibilities

The machine operator must perform the following:

- Reject the job site if there are doubts regarding safety.
- Become familiar with the work area and surroundings before beginning work.
- Read and completely understand the instructions in this manual prior to operation.
- Know and obey all operating procedures, applicable laws, and regulations.
- Know and follow the requirements for safe operation.
- Know and use the required safety precautions and protective devices.
- Know and use the correct hand signals between the machine operator and a signalman.
- Stop machine operations immediately if any defects endangering safety are found.
- Maintain complete control of the machine at all times.
- Before leaving the cab, make sure that all control devices are set to the neutral or low-idle position, and that the engine is shut down.
- Give warning signals when necessary.

PRESTART CHECKS AND ADJUSTMENTS

Complete the following checks and adjustments before starting the engine each day:

- Check the maintenance log to verify that all required maintenance checks have been performed before operating the machine.
- Check fluid levels. See “Fluid Level Checks” on page 4-6.
- Check the machine for loose hardware, fluid leaks, and any signs of damage. If repairs are needed, contact a SANY dealer.
- Inspect the engine compartment for combustible debris that may come in contact with hot engine components. Clear all debris from the engine and engine compartment.
- Check the undercarriage (tracks, sprockets, rollers, and guards) for damage, wear, loose fasteners, and oil leaks. If repairs are needed, contact a SANY dealer.
- Check the bucket or optional equipment for damage. Lubricate work equipment as necessary. See “Lubrication” on page 5-75.
- Check the air filter. See “Check and Replace the Engine Air Filters” on page 5-36.
- Clean and check the mirror for damage. Adjust the mirror so the area behind the machine is visible from the operator seat. See “Mirror Adjustment” on page 4-15.
- Check the seat belt and buckle for damage or wear. See “Seat and Seat Belt” on page 4-13.
- Check the monitor in the cab. See “Monitor” on page 3-33.

FLUID LEVEL CHECKS

Complete the following procedures in this section before starting the engine.

Check the Engine Coolant Level

WARNING!

- **Engine coolant is toxic. Avoid inhaling or ingesting engine coolant. If eyes or skin are contaminated by coolant, wash the affected area with plenty of water and seek medical treatment immediately.**
- **Engine coolant is under pressure when the engine is hot. Avoid contact with hot engine coolant. Allow the engine to cool before removing the radiator cap.**

Failure to follow these warnings could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the engine hood and make sure the engine coolant level in the overflow tank (1) is between the FULL and LOW marks.

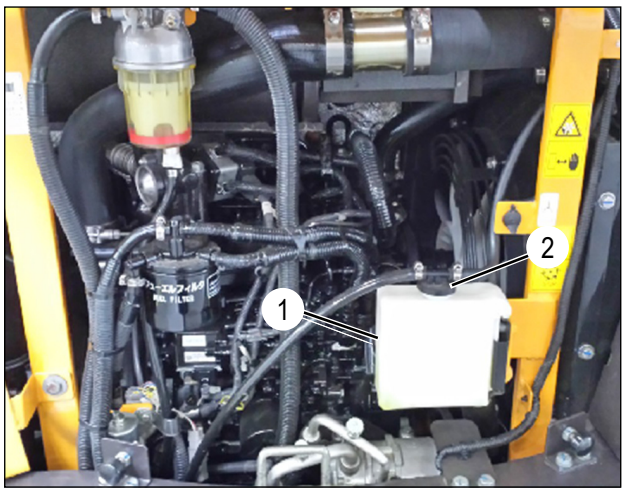


Fig. 4-1 0003773

Add Engine Coolant

1. If the engine coolant level is low, remove filler cap (2).
2. Add engine coolant through the fill opening of the overflow tank until the engine coolant is at the FULL mark.
3. Install the filler cap after refilling.

NOTICE!

If the overflow tank is empty, there may be an engine coolant leak. Inspect for engine coolant leaks. If a leak is not found, check the engine coolant level in the radiator. Contact a SANY dealer for additional information.

Engine Oil Level Check

WARNING!

Hot oil and engine components may cause burns or other serious injury. Allow the engine to cool before performing engine maintenance. Failure to follow this warning could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the engine hood.
3. Remove the dipstick (1) and wipe with a clean cloth.
4. Fully insert the dipstick into the dipstick opening, then remove it and note the oil position on the dipstick.

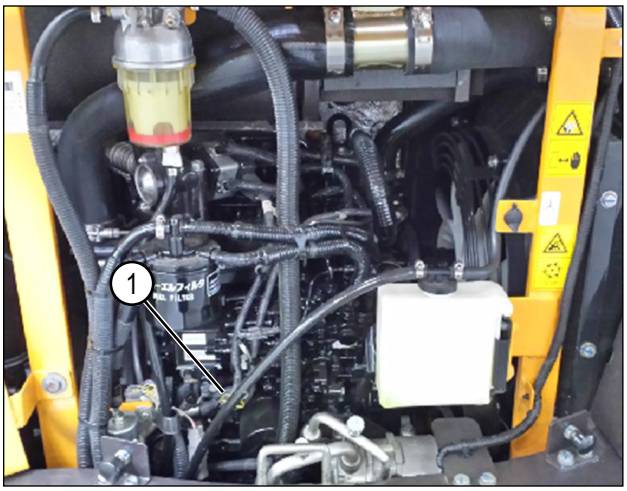


Fig. 4-2 0003773

NOTICE!

Do not add oil past the upper mark on the dipstick, as this may result in engine damage.

5. Add clean engine oil through the filler port (3) until the oil level is at the upper mark of the dipstick (2). Always use SANY-approved engine oil. See “Recommended Lubricants, Fuels, and Engine Coolant” on page 5-10.

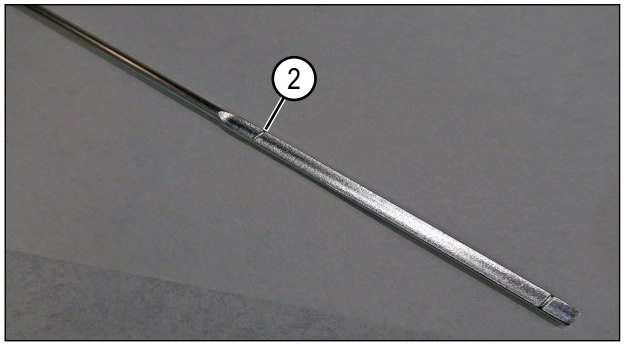


Fig. 4-3 0002770

6. Install the dipstick.

   NOTE: If the oil level is above the upper mark on the dipstick, drain the excess oil. See “Change the Engine Oil and Filter” on page 5-33.

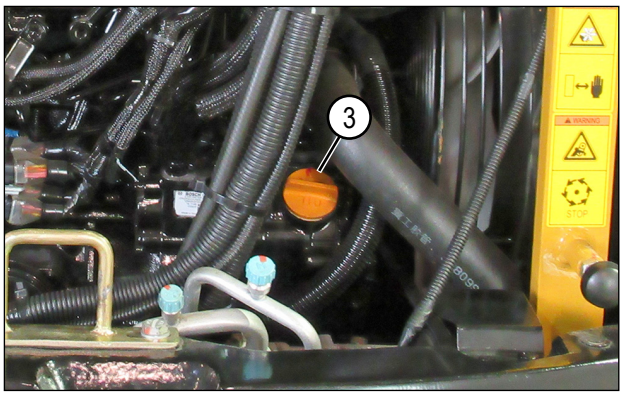


Fig. 4-4 0002771

Fuel Level Check

1. Turn the key switch to ON to activate the monitor.
2. Check the fuel level (1) on the monitor.
3. Turn the key switch to OFF.

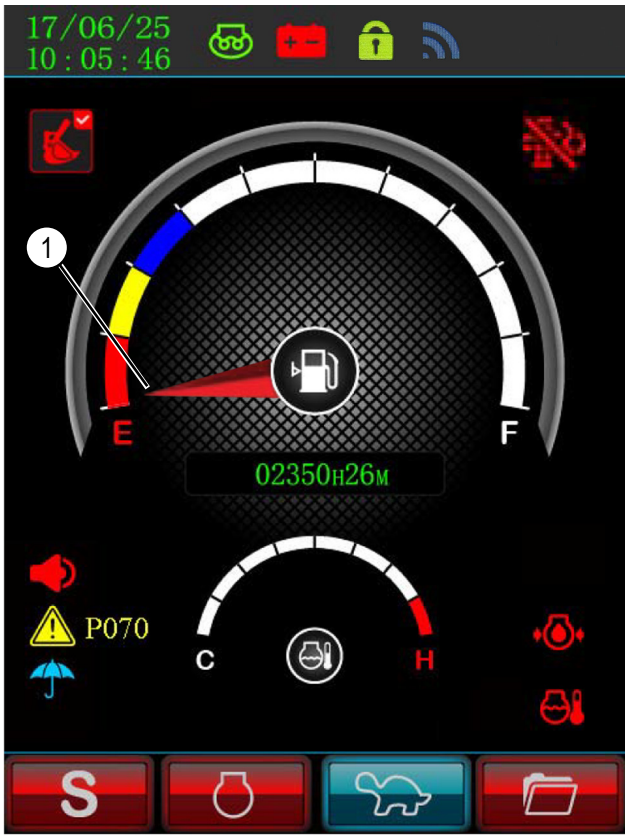


Fig. 4-5 0003770

Add Fuel

WARNING!

- **Fuel or fuel vapors that come into contact with hot surfaces or electrical components can cause a fire.**
- **Never service the fuel system near an open flame or while smoking.**
- **Clean up spilled fuel immediately.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

Contaminated fuel can cause engine damage or improper machine operation. Always fill the fuel tank with clean diesel fuel.

1. Remove the fuel filler cap. See “Fuel Tank Filler Cap” on page 4-9.
2. Fill the machine with clean diesel fuel as necessary.

NOTE: Never overfill the fuel tank. Stop fueling if the fuel spills over the fuel fill strainer. Make sure the fuel nozzle does not damage the fuel fill strainer.

3. Install the fuel filler cap after refueling.

Fuel Tank Filler Cap

NOTICE!

To prevent damage to the fuel filler cap:

- **Make sure the O-ring on the fuel filler cap is clean. If the O-ring is contaminated by dirt or debris, the O-ring could be damaged and not seal improperly.**
- **Inspect the O-ring for wear or damage, replace as necessary.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

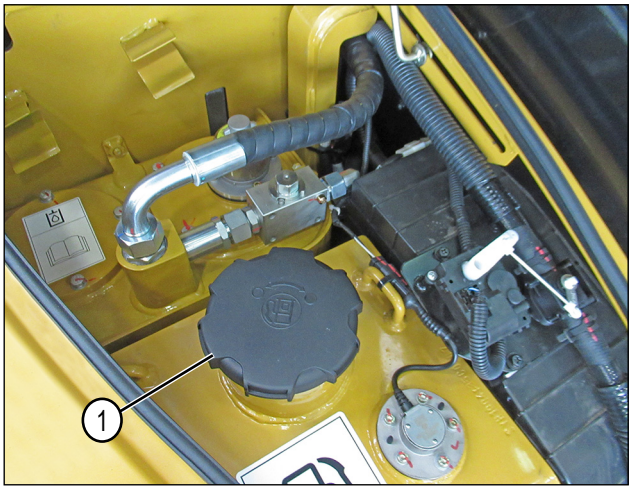


Fig. 4-6 0003772

1. To remove the filler cap (1), turn it counterclockwise.
2. To install the filler cap, place the cap on the filler neck and turn it clockwise.

Check and Drain the Primary Fuel Filter/Water Separator

WARNING!

- **Fuel or fuel vapors that come into contact with hot surfaces or electrical components can cause a fire.**
- **Never service the fuel system near an open flame or while smoking.**
- **Clean up spilled fuel immediately.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

Dispose of contaminated fuel or water in accordance with all applicable environmental regulations. Failure to do so could damage the environment.

A primary fuel filter/water separator separates water and sediment from diesel fuel. Complete the following steps to drain water and sediment from the primary fuel filter/water separator:

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the engine hood and right rear access door.
3. Route the drain hose (2) into a suitable container.
4. Open the drain valve (1) and drain the water and sediment.
5. When only clean fuel flows through the drain valve, close and tighten the valve.
6. Start the engine and check for leaks.

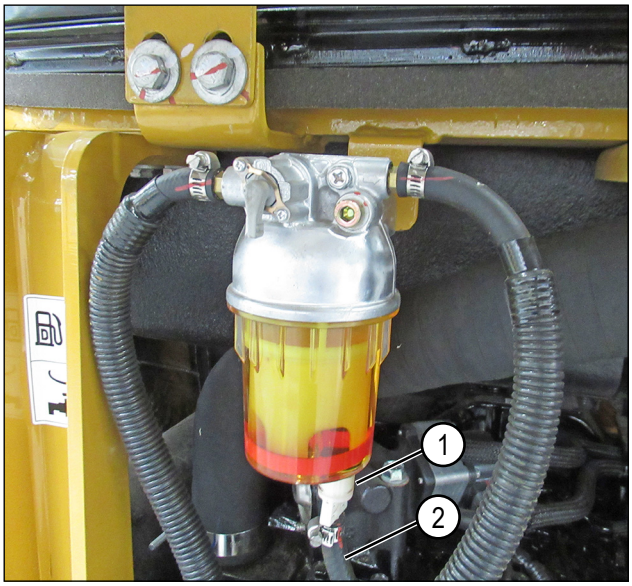


Fig. 4-7 0003774

Check the Hydraulic Oil Level

1. Position the work equipment (1) as shown on the hydraulic tank decal.

2. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

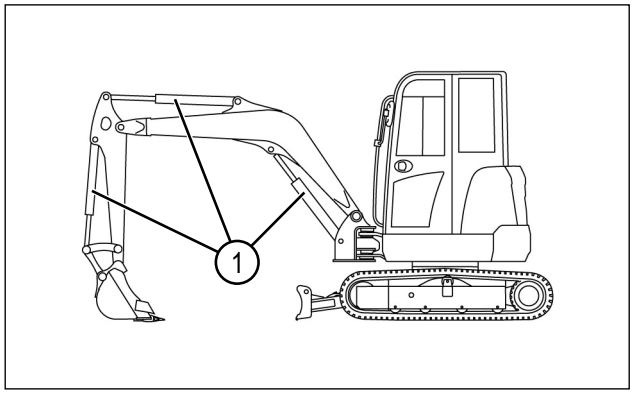


Fig. 4-8 0002925

3. Check the hydraulic oil level in the hydraulic tank through the sight gauge (2). The hydraulic oil level should be between the H (3) and L marks (4).

4. If the level is below the L mark, add hydraulic oil. See “Add Hydraulic Oil” on page 5-57.

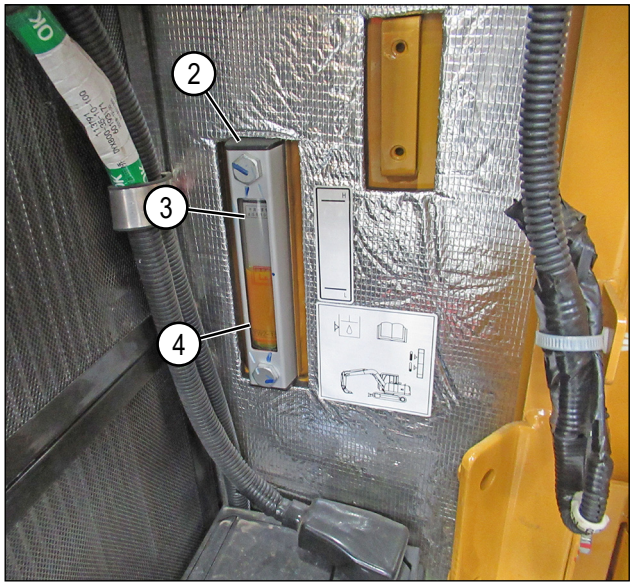


Fig. 4-9 0003775

Windshield Washer Fluid Check and Fill

Prepare the machine for service. See “Maintenance Safety” on page 2-8.

Check the windshield washer fluid level in the windshield washer reservoir (1). Fill with clean windshield washer fluid as necessary.

NOTE: Keep dust and dirt out of the windshield washer tank when adding windshield washer fluid.

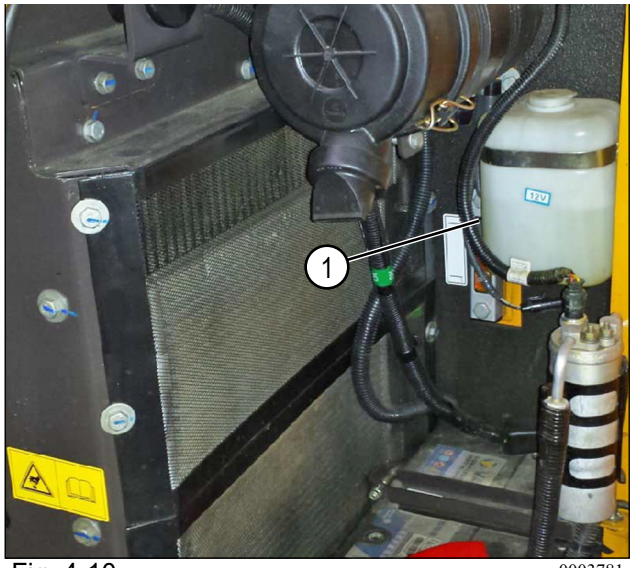


Fig. 4-10 0003781

ELECTRICAL COMPONENTS CHECK

NOTICE!

- **If fuses fail frequently, the wiring harness must be inspected for broken or damaged wire insulation or a component placing a high electrical load on the system. Contact a SANY dealer for additional information.**
- **The top of the battery must be kept clean to prevent plugging of the battery vents. Regularly wash the top of the battery to prevent battery vents from plugging.**

Failure to follow these notices may cause damage to the machine or cause the machine to operate improperly.

Check the fuse panel for blown fuses, fuses of incorrect capacity, open or short circuits, and loose connections. Replace blown fuses and fuses of incorrect capacity, and tighten loose connections as necessary. See “Fuses” on page 5-28.

Make sure the battery cables and wires are clean and in good condition when inspecting the battery, starting motor, and alternator.

Clear the area around the battery of combustible materials. For more information about faults in the electrical system, contact a SANY dealer.

Horn Function Check

1. Turn the key switch to ON.
2. The horn sounds when the horn button (1) on the right joystick is pressed. If the horn does not sound, check the horn fuse. See “Fuses” on page 5-28.

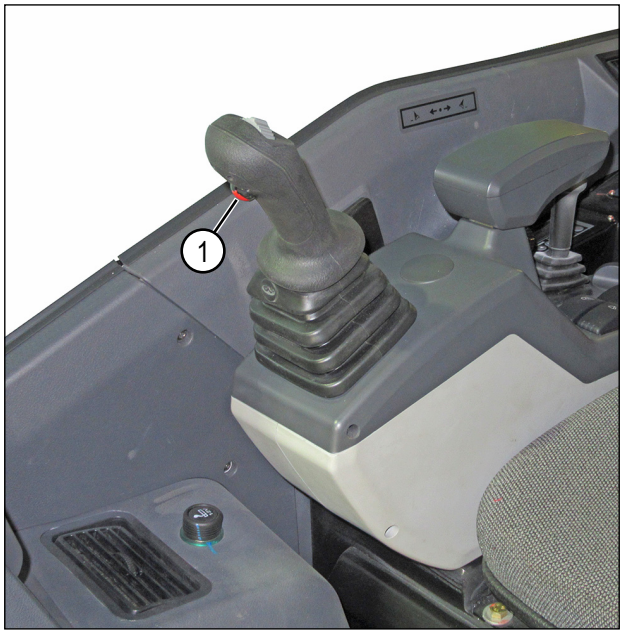


Fig. 4-11 0002827

SEAT AND SEAT BELT

This machine has an operator seat with seat position, backrest, and weight suspension adjustments.

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

Seat Position Adjustment

When seated, lift the seat position adjustment lever (1) on the front lower edge of the seat. Slide the seat forward or backward to the desired position and release the lever to lock the seat in place.

Seat Backrest Adjustment

The backrest adjustment dial (2) is on the right side of the seat. Turn clockwise or counterclockwise to adjust the backrest forward or backward.

Seat Weight Suspension Adjustment

Use the seat weight adjustment lever (3) to select from one of three weight levels that are indicated on the seat weight adjustment lever (light, medium, or heavy). The seat will lock in the next position each time the lever is pressed down and released.

Fig. 4-12 0002779

Seat Belt

WARNING!

- Inspect the seat belt. Replace the seat belt immediately if the webbing is frayed or cut, if the buckle is damaged or malfunctions, or if the mounting hardware is loose. Replace according to seat belt manufacturer's instructions.
- Always keep the seat belt fastened during machine operation. Never twist the seat belt when fastening it.
- Keep belt slack to no more than 1 in. (25 mm). Belt slack beyond this amount could significantly reduce your protection in an accident.

Failure to follow these warnings could result in death or serious injury.

NOTE: A recoil assembly (4) is attached to the seat belt. It removes slack from the seat belt and locks to restrain the operator. It also retracts the seat belt when not in use.

Buckle the Seat Belt

Grasp the latch plate (1), pull the seat belt out of the recoil assembly (2), and insert the latch plate into the buckle (3) until it locks into place. Pull on the latch-plate end of the seat belt to make sure the seat belt is securely fastened.

Fig. 4-13 0002779

WARNING!

Keep belt slack to no more than 1 in. (25 mm). Belt slack beyond this amount could significantly reduce your protection in an accident. Failure to follow this warning could result in death or serious injury.

Unbuckle the Seat Belt

Press the red button on the buckle (3) to release the latch plate.

WARNING!

Contact a SANY dealer if the seat belt fails to fasten or unfasten. Failure to follow this warning could result in death or serious injury.

MIRROR ADJUSTMENT

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

1. Loosen the fasteners (1) that secure the mirror (2) to the arm and rail.

2. Adjust the mirror for the best visibility to the rear of the machine and tighten the fasteners.

Fig. 4-14 0002780

ANTENNA

The antenna receives radio signals. For best reception, keep the antenna in a vertical position. When transporting or parking the machine in a building, loosen the wing nut (1) and lower the antenna (2) to prevent damage.

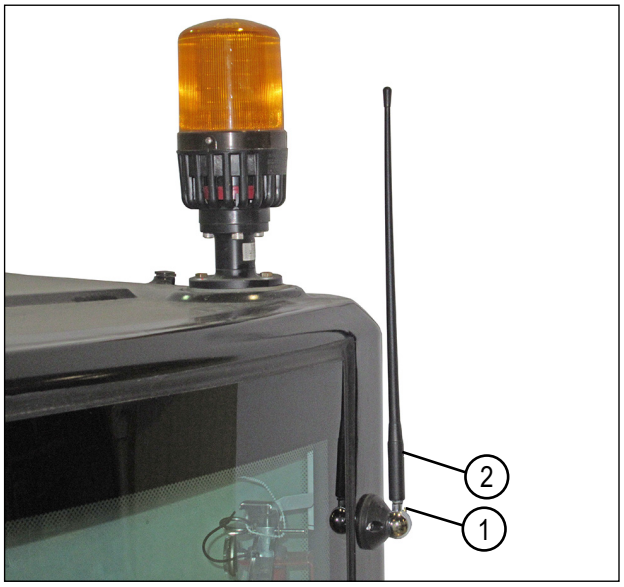


Fig. 4-15 0002994

STARTING THE ENGINE

WARNING!

- **Before starting the engine or leaving the operator seat, make sure the hydraulic lockout control lever is in the locked (closed) position. If the hydraulic system is not locked, unintentional machine operation may occur.**
- **Confirm that the surrounding area is clear of personnel and obstructions, and sound the horn before starting the engine.**
- **Always start the engine from the operator seat. Never start the engine by shorting the starter solenoid or starter relay.**
- **Never use ether starting fluid to start the engine. Ether is highly flammable and can cause a fire or an explosion.**
- **Exhaust gas contains carbon monoxide. Carbon monoxide is an invisible and odorless gas, and is toxic. Provide adequate ventilation when starting the engine in a confined space.**

Failure to follow these warnings could result in death or serious injury.

NOTE: The illustrations in this section show a cab machine. Canopy machines are similar.

1. Turn the battery disconnect switch to ON. See “Battery Disconnect Switch” on page 3-31.
2. When in the operator seat, buckle the seat belt. See “Seat Belt” on page 4-13.
3. Check that the emergency stop switch is in the RUN position. See“Emergency Stop Switch” on page 3-12.
4. Pull the hydraulic lockout control lever (1) back and make sure it is in the locked (closed) position. If it is in the unlocked position, the engine will not start.
5. Make sure the control levers and pedals are in the neutral position, move freely, and return to the neutral position when released.

Fig. 4-16 0002781

NOTICE!

Before starting the engine, make sure that the throttle control dial is at MIN (low idle). Starting the engine with the throttle control dial at MAX (high idle) will accelerate the engine and could cause damage.

NOTE: The illustration shows a cab machine. Canopy machines are similar.

6. Turn the throttle control dial (2) to MIN (low idle).
7. Insert the key into the key switch (3).
8. Turn the key switch to ON (do not start the engine) and check the following items on the monitor display:
   - Engine coolant temperature
   - Fuel level
   - Fault codes

   NOTE: If all readings are normal and no fault codes are present, the monitor display returns to the home screen within 2 seconds after the key switch is turned to ON.

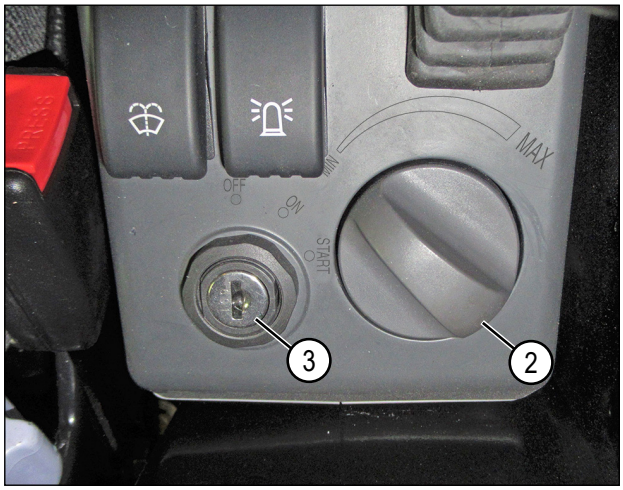


Fig. 4-17 0002782

9. Sound the horn to warn personnel that the machine is being started. See “Horn Function Check” on page 4-12.

NOTICE!

- **Never crank the engine for more than 15 seconds.**
- **If the engine fails to start after 15 seconds, stop and allow the starter motor to cool for at least 2 minutes before attempting another start.**
- **If the engine fails to start after five attempts, contact a SANY dealer.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

10. Turn the key switch to START, and the starter motor will crank the engine. Release the key after the engine has started, and the key switch will return to ON.

Idling the Engine

Idling the engine for long periods wastes fuel and causes carbon formation, oil dilution, formation of lacquer or gummy deposits on the valves, pistons, and rings, and rapid accumulation of sludge in the engine.

Allow the engine to idle until it reaches normal operating temperatures before beginning operation.

Cold Weather Engine Starting

WARNING!

- **Before starting the engine or leaving the operator seat, make sure the hydraulic lockout control lever is in the locked (closed) position. If the hydraulic system is not locked, unintentional machine operation may occur.**
- **Confirm that the surrounding area is clear of personnel and obstructions, and sound the horn before starting the engine.**
- **Always start the engine from the operator seat. Never start the engine by shorting the starter solenoid or starter relay.**
- **Never use ether starting fluid to start the engine. Ether is highly flammable and can cause a fire or an explosion.**
- **Exhaust gas contains carbon monoxide. Carbon monoxide is an invisible and odorless gas, and is toxic. Provide adequate ventilation when starting the engine in a confined space.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Never crank the engine for more than 15 seconds.**
- **If the engine fails to start after 15 seconds, stop and allow the starter motor to cool for at least 2 minutes before attempting another start.**
- **If the engine fails to start after five attempts, contact a SANY dealer.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

Start the engine with the following procedures in cold temperatures:

1. Check the fluid levels before starting the engine. Drain the water and sediment from the fuel/water separator. See “Check and Drain the Primary Fuel Filter/Water Separator” on page 4-10.

2. Turn the key switch to the ON position. If the engine coolant is less than 37°F (3°C), an engine preheat cycle will start and the engine preheat symbol will illuminate. When the preheat symbol turns off, the engine can be started.

3. Turn the key switch to the START position, and the starter motor will crank the engine. Release the key after the engine has started, and the key switch will return to the ON position.

4. After the engine starts, check the monitor for faults or errors.

   NOTE: If the engine fails to start after preheating, wait at least 2 minutes before repeating the process.

5. Allow the engine to idle until the engine coolant temperature reaches the normal operating range before using the machine. Operate all functions with no load for 5 to 10 minutes.

NOTICE!

When the temperature is below 32°F (0°C) and mud is built up on the tracks, swing the upper structure 90° and raise the machine so that one track is off the ground. Rotate the track forward and backward to remove the mud from the sprocket, track rollers, and idlers. Repeat for the other side.

Warm-up Operation

WARNING!

- **In case of emergency, irregular engine operation, or other faults, turn the key switch to OFF or press the emergency stop switch to stop the engine.**
- **Do not operate the machine immediately after starting the engine. Insufficient warm-up of the machine and hydraulic oil may cause slow control response or abrupt movement during operation, resulting in serious accidents. Warm-up is especially necessary in cold areas.**

Failure to follow these warnings could result in death or serious injury.

Perform the following steps during machine warm-up:

1. Deactivate the auto idle mode after starting the engine, and adjust the throttle so the engine runs unloaded at 1400 rpm for 5 minutes.

2. Adjust the throttle so the engine runs at 1600 rpm, then slowly operate the bucket for 5 minutes.

3. Adjust the throttle so the engine runs at max rpm, then operate the boom, arm, and bucket five to ten times.

Repeat all movements several times. Check the monitor for normal operating readings.

Jump-Start the Engine

WARNING!

- **When working with any open electrical circuit, ensure that your hands are free of any metal objects (rings, watches, jewelry, etc.).**
- **The top of the battery must be kept clean to prevent plugging of the battery vents. Regularly wash the top of the battery to prevent the battery vents from plugging.**
- **Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.**
- **Wear personal protective equipment when working with batteries.**
- **Work in a well-ventilated area.**
- **If battery acid contacts your skin or eyes, flush the area immediately with fresh water and seek medical attention.**
- **Always jump-start the engine with equal voltages. The starting system voltage and the battery voltage in the boosting machine should be no more than 12V. Never use a welder or equipment with a higher voltage system to jump-start the machine. Using a higher voltage to jump-start the engine may damage the electrical system or cause an explosion or fire.**
- **The jumper cables and their clamps must be undamaged, have no corrosion, and be suitable for the amperage. All clamps must be securely attached to their jumper cable ends.**
- **Be careful when disconnecting jumper cables after both engines are running. Never allow the jumper cable clamps to touch each other.**

Failure to observe and follow these warnings could result in death or serious injury.

1. Make sure the key switches of both machines are in the OFF position.
2. Set all controls to their neutral positions.

3. Clamp one end of a jumper cable to the positive red terminal (+) of the drained battery.

4. Clamp the other end of the same jumper cable to the positive red terminal (+) of the charged battery.

5. Clamp one end of a second jumper cable to the ground black terminal (–) of the charged battery.

6. Clamp the other end of the second jumper cable to the negative terminal or an unpainted part of the structure of the machine with the drained battery.

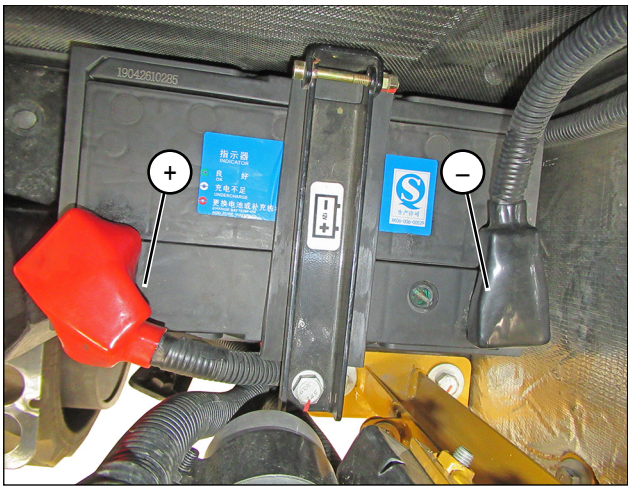


Fig. 4-18 0003861

NOTICE!

Make sure the jumper cables are securely clamped to the battery terminals. Failure to follow this notice could result in damage to the machine or cause it to operate improperly.

7. Start the engine of the machine with the charged battery and run it at medium speed.

8. Attempt to start the engine of the machine with the drained battery. Retry every 3 minutes if the engine will not start.

   NOTE: Contact a SANY dealer if the engine will not start after five attempts.

9. Disconnect the jumper cables from the machine with the drained battery in the reverse order of installation.

10. Disconnect the cables from the machine with the charged battery in the same way.

New Machine Break-In

NOTE: The machine has been thoroughly tested and adjusted before shipment. However, initial operation of the machine under severe conditions can adversely affect the performance of the machine or shorten the machine life. Sany recommends a break-in period of 100 service hours for a new machine. Properly breaking in a new machine is crucial for long service life by allowing time for internal engine parts to break in properly. Make sure the machine is in normal working condition before proceeding with break-in.

1. Start the engine and run at low idle until it reaches proper operating temperatures. Do not move the controls or the throttle.

2. Avoid operating the machine under heavy loads or at high speeds during the break-in period. Operate as much as possible in the 1/2 to 3/4 throttle range. Do not operate this machine with a full load during the break-in period.

3. Avoid sudden starts, movements, or stops.

4. Monitor the instruments frequently – especially the engine oil pressure and coolant temperature. Shut down the machine at the first indication of an abnormal reading.

5. Avoid operating the engine at low idle for extended periods of time.

6. Manage engine power to allow acceleration to governed speed when conditions require more power. Do not over-rev the engine.

7. Always allow the engine to cool before shutting it down.

8. After shutting down the engine, check the fluid levels.

ENGINE SHUTDOWN

NOTICE!

- **Stopping the engine before it cools can accelerate engine component wear. Never abruptly shut down the engine except in an emergency.**
- **Never stop the engine suddenly when it is overheated. Run the engine at low idle to allow it to cool down gradually before shutting it down.**

Failure to follow this notice could result in damage to the machine or cause it to operate improperly.

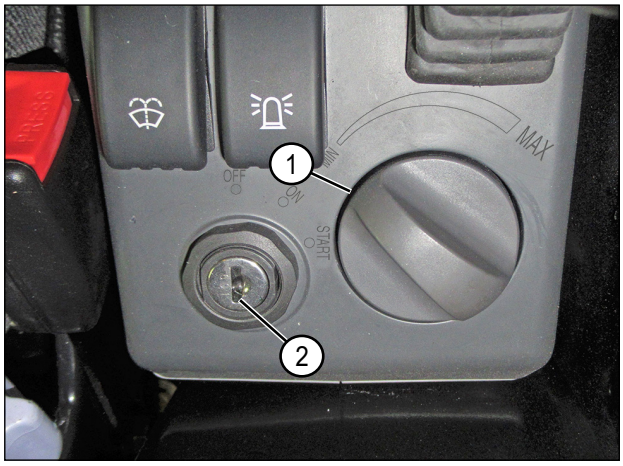


Fig. 4-19 0002782

NOTE: Illustrations in this section show a cab machine. Canopy machines are similar.

1. Park the machine on a firm, level surface.
2. Lower the bucket or optional equipment to the ground.
3. Adjust the throttle control dial (1) to MIN (low idle) position and allow the engine to idle for 5 minutes to cool down.
4. Turn the key switch (2) to the OFF position and remove the key. Pull the hydraulic lockout control lever (3) back to the locked (closed) position.

Fig. 4-20 0002781

Inspection After Engine Shutdown

1. After shutting down the engine, conduct a walk-around inspection. Check the work equipment, the exterior of the machine, and the undercarriage.
2. Check the engine coolant, engine oil, and hydraulic oil levels. See “Fluid Level Checks” on page 4-6.
3. Check for fluid leaks.
4. Fill the fuel tank with diesel fuel. See “Add Fuel” on page 4-8.
5. To prevent fires, clear the engine compartment of combustible debris.
6. Clean mud from the tracks and undercarriage.

MOVING THE MACHINE

Directional Arrow

The directional arrow (1) on each of the track frames indicates forward movement of the machine. Check these arrows before using the travel control levers/pedals. The track drive sprocket is at the rear of the track frame.

If the track frame is facing backward, the travel direction will be opposite the maneuvering direction of the travel control lever/pedal. The machine will move forward when you pull the control levers backward, and backward when you push them forward. Left and right control directions are also reversed when the track frame faces backward.

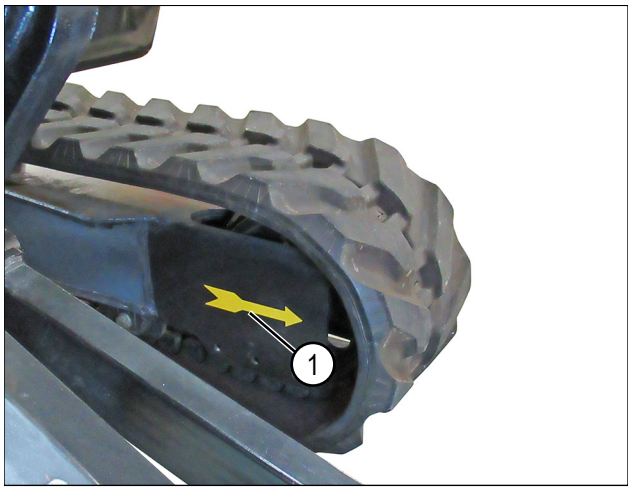


Fig. 4-21 0003794

Auto Idle Function

The auto idle function automatically activates when the engine is started and acts to reduce fuel consumption and noise levels.

With the engine running, the auto idle function works as follows:

- If the joysticks and travel controls remain in their neutral positions for 5 seconds or longer, the engine speed drops from the current speed to the factory-set auto idle speed (1300 rpm–1400 rpm).

  NOTE: If the engine idle speed is set to below the factory-set auto idle speed, the auto idle function will not change the engine speed.

- If either of the joysticks or travel controls are operated, the engine speed automatically returns to the previously set level. If the throttle control dial is adjusted, the engine speed automatically maintains the newly set level.

- If the engine is shut down and then restarted, the auto idle function is automatically re-activated.

Machine Moving Precautions

WARNING!

- **Check the surroundings and sound the horn before moving the machine.**
- **Personnel are not allowed to approach the machine without operator approval.**
- **If the travel motors are in the front of the machine, the travel control pedals will operate in reverse. Check the position of the travel direction arrows on the track frame before traveling.**
- **The rear of the machine is a blind area. Use the mirror and be extremely careful when backing up the machine. Use a signalman as needed.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Standard travel direction: The idlers are in the front of the track frame, and the travel motors are at the rear of the track frame. If the travel motors are at the front of the machine, the travel control levers/pedals will operate in reverse. Check the position of the travel motors before traveling.**
- **Stop the machine for 5 minutes after every 15 minutes of traveling. Prolonged traveling may strain the travel motors.**

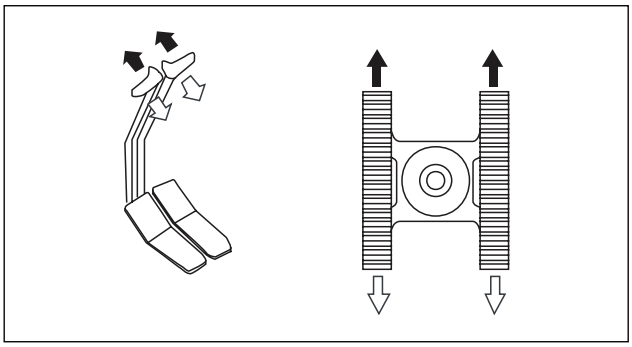
Travel Controls

Forward Travel

Push both travel control levers forward or press the top of both foot pedals equally to move the machine forward.

Reverse Travel

Pull both travel control levers backward or press the bottom of both foot pedals equally to move the machine in reverse.



0002835

Fig. 4-22

Right Turn

Push the left travel control lever (1) forward or press the top of the left pedal with the right travel control lever (2) in the neutral position to turn the machine to the right.

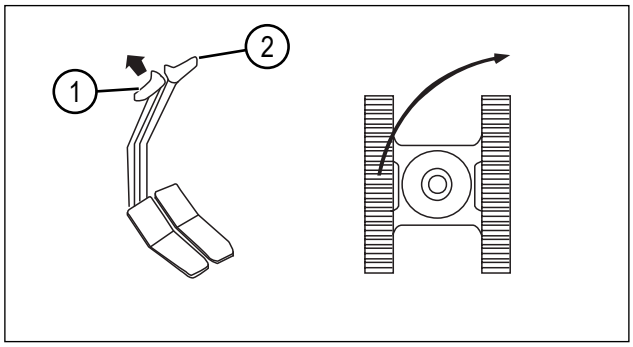


Fig. 4-23 0002836

Left Turn

Push the right travel control lever (1) forward or press the top of the right pedal with the left travel control lever (2) in the neutral position to turn the machine to the left.

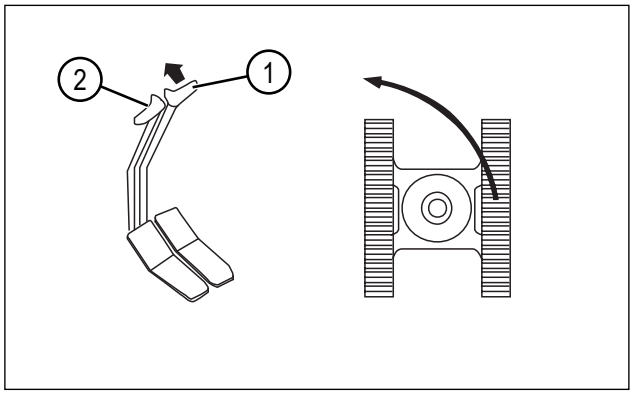


Fig. 4-24 0002837

Spot Turning

Simultaneously push one travel control lever forward and pull the other travel control lever backward, or press the top of one travel pedal and the bottom of the other, to rotate the machine without traveling.

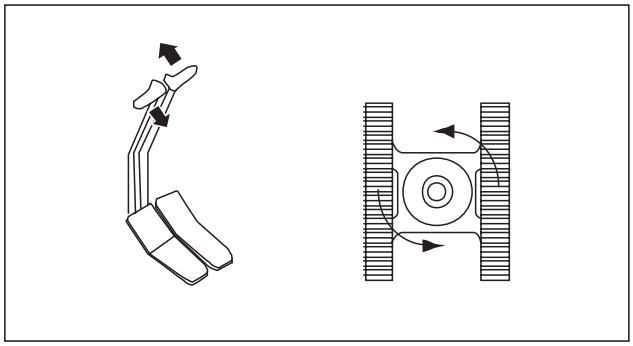


Fig. 4-25 0002838

Stopping the Machine

Slowly move the travel control levers/pedals to the neutral (N) position. The travel brake will stop the machine automatically.

NOTICE!

Do not stop the machine suddenly except in an emergency. Failure to follow this notice could result in machine damage.

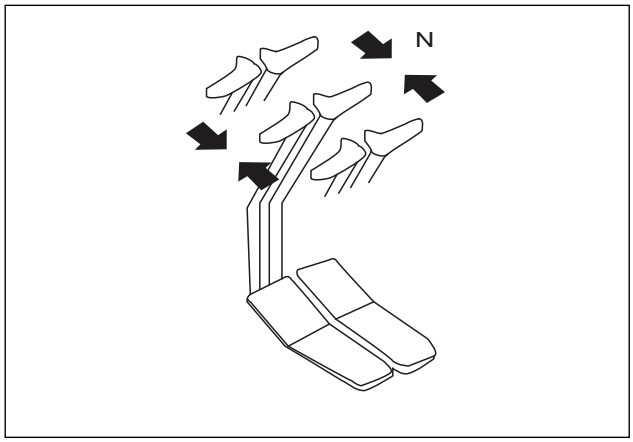


Fig. 4-26 0002839

WORK EQUIPMENT CONTROL AND OPERATION

NOTE:

- When released, the joysticks return to the neutral position and the work equipment holds its current position.
- There are two operating modes available for the joystick controls, the Society of Automotive Engineers (SAE) mode and the Backhoe Loader (BHL) mode. The swing and bucket functions are the same for the SAE and BHL modes.

Arm Control – SAE Mode

To extend the arm push, the left joystick.

To retract the arm pull, the left joystick.

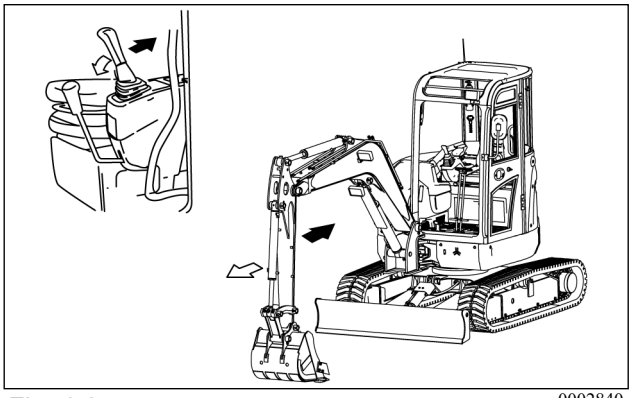


Fig. 4-27 0002840

Arm Control – BHL Mode

To extend the arm push, the right joystick.

To retract the arm pull, the right joystick.

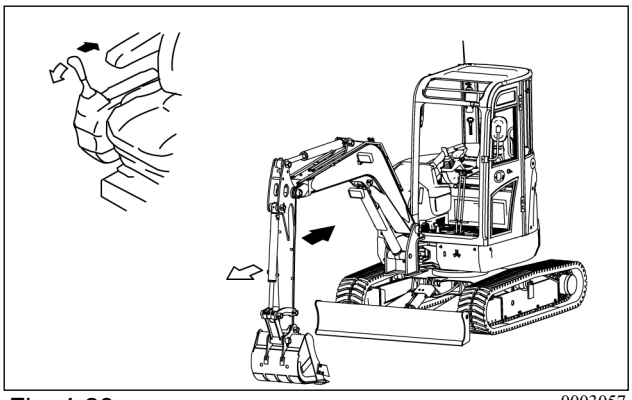


Fig. 4-28 0003057

Boom Control – SAE Mode

To raise the boom pull, the right joystick.

To lower the boom push, the right joystick.

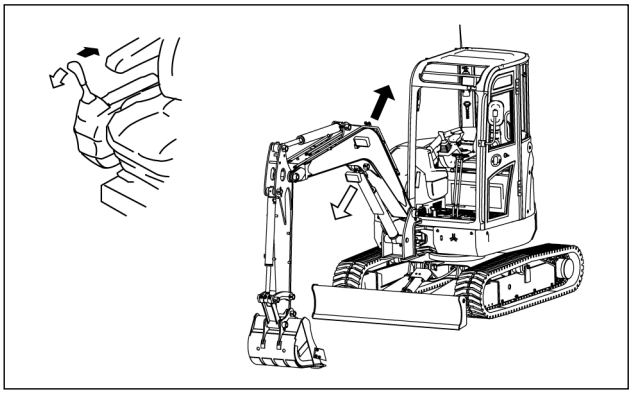


Fig. 4-29 0002842

Boom Control – BHL Mode

To raise the boom pull, the left joystick.

To lower the boom push, the left joystick.

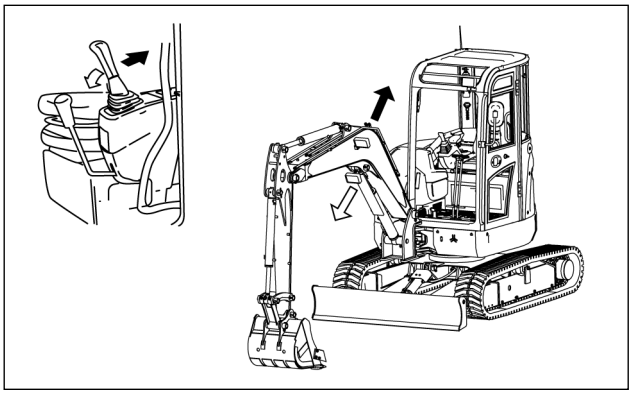


Fig. 4-30 0003058

Swing Control – SAE/BHL Mode

To swing the machine to the right, move the right joystick to the right.

To swing the machine to the left, move the right joystick to the left.

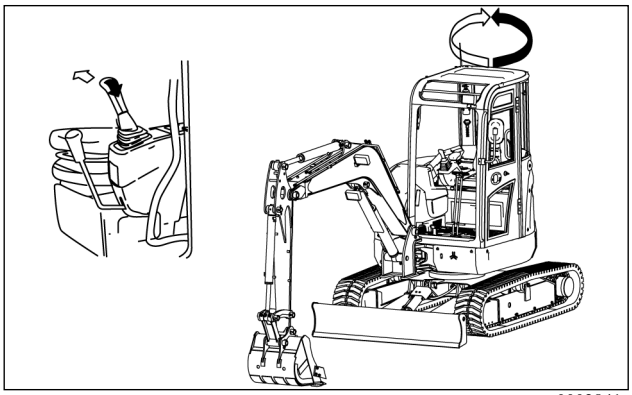


Fig. 4-31 0002841

Bucket Control – SAE/BHL Mode

To uncurl the bucket, move the right joystick to the right.

To curl the bucket, move the right joystick to the left.

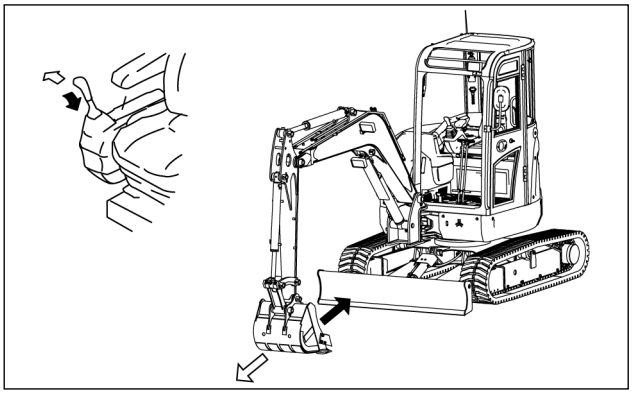


Fig. 4-32 0002843

Boom Swing Pedal

The boom swing control pedal is mounted on the cab floor to the right of the travel controls. The boom swing control pedal swings the boom to the right or left.

Press the right side of the pedal to swing the boom to the right.

Press the left side of the pedal to swing the boom to the left.

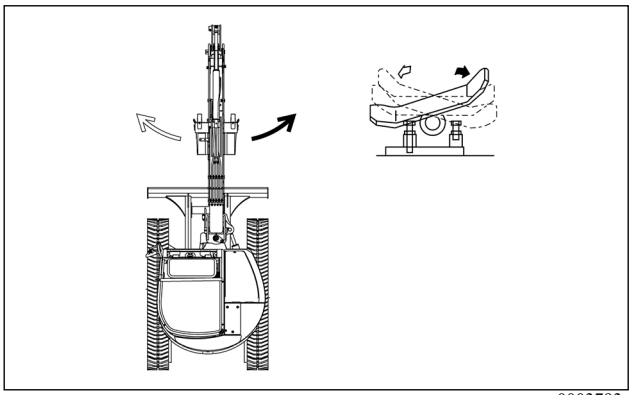


Fig. 4-33 0003793

Dozer Blade Control Lever

NOTE: Illustration shows a cab machine. Canopy machines are similar.

Push the dozer blade control lever (1) forward to lower the dozer blade.

Pull the dozer blade control lever backward to raise the dozer blade.

Fig. 4-34 0003063

RESTRICTED OPERATION

WARNING!

- **Use caution when operating work equipment while the machine is traveling.**
- **When the engine auto idle is on, moving any control lever will increase the engine speed.**
- **Do not operate the machine on any ground that lacks sufficient support.**
- **Do not attempt work operations with the hydraulic cylinder fully extended**
- **When the machine is traveling, keep the bucket 8 in. to 12 in. (20 cm to 30 cm) above the ground.**
- **Avoid any working conditions that may cause the machine to tip over.**

Failure to follow these warnings could result in death or serious injury.

Never Operate with Bucket Force

Never use the force of the bucket for excavating, digging, breaking, or pile-driving operations. Such operations may considerably reduce the service life of the machine.

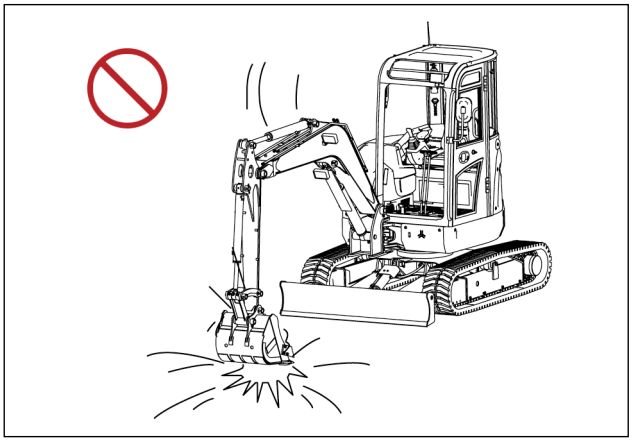


Fig. 4-35 0002866

To avoid cylinder damage, do not use the bucket to strike or compact the ground.

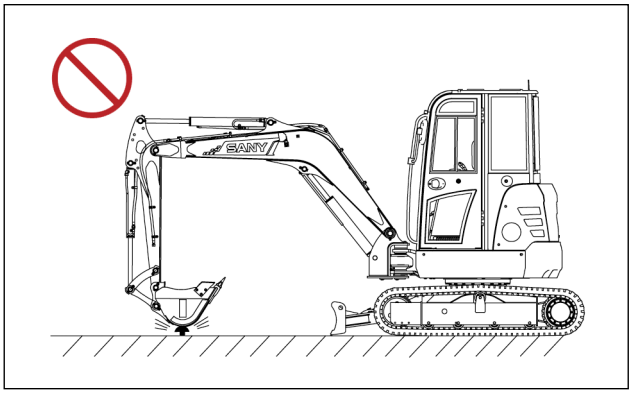


Fig. 4-36 0002868

Never Use Swing Force

Never use swing force to compact the ground or to break objects. Such operation is very dangerous and may reduce the service life of the machine.

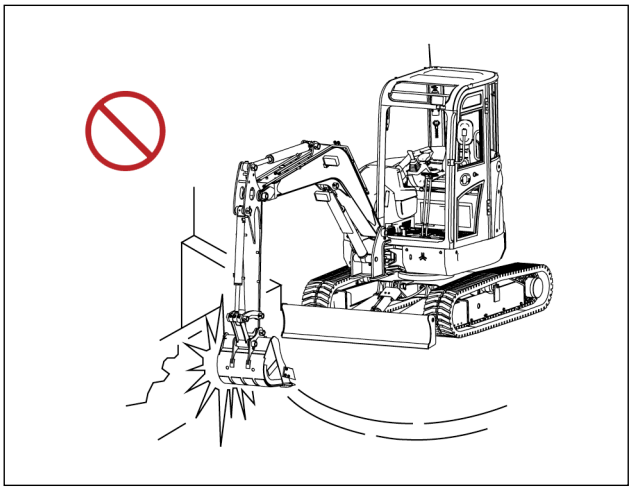


Fig. 4-37 0002846

Never Use Traveling Force

Never use the machine's traveling force to cut the bucket into the ground to excavate. Such an operation may damage the machine or the work equipment.

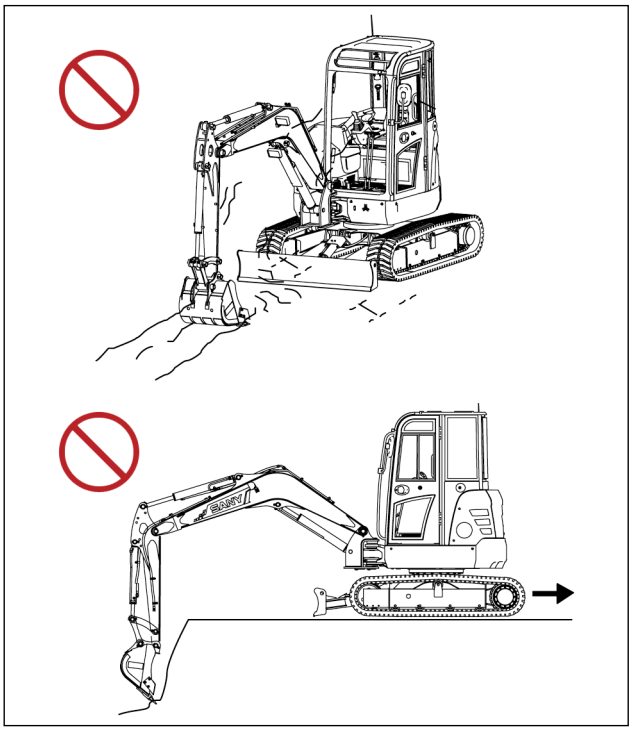


Fig. 4-38 0002864

Never Operate Using Machine Weight

Never raise the rear or front of the machine to use the machine's weight to excavate. Operating while using the machine's weight may damage the machine.

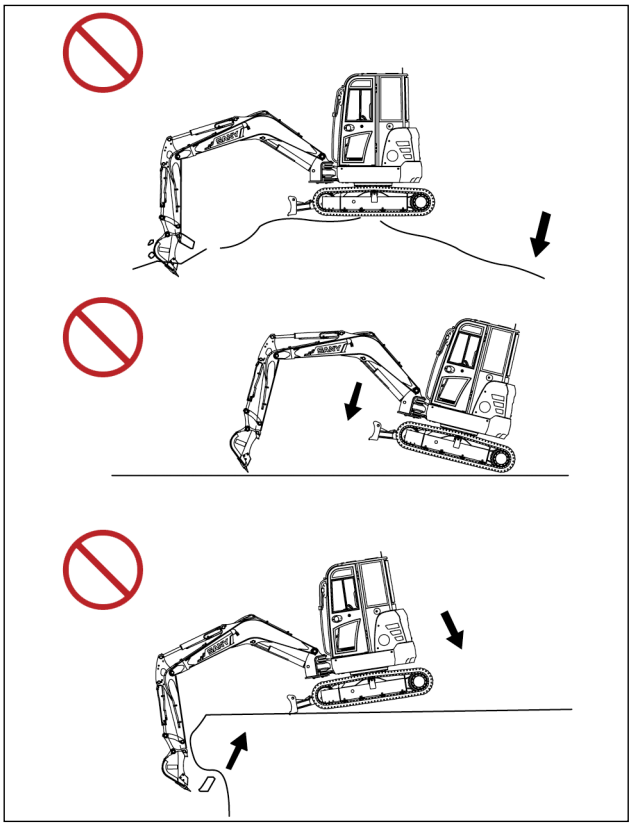


Fig. 4-39 0002870

Do Not Operate a Cylinder at the Stroke End

Avoid operating the machine with any cylinder fully retracted or extended.

NOTE: If a cylinder piston reaches its end of stroke, continued use of the work equipment could damage the cylinder.

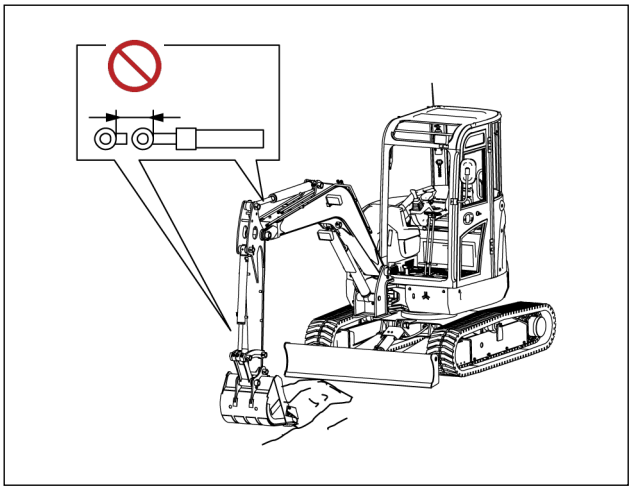


Fig. 4-40 0002848

Avoid Dozer Blade Impact

Do not strike rocks or other hard objects with the dozer blade. This can shorten the service life of the dozer blade or the hydraulic cylinder.

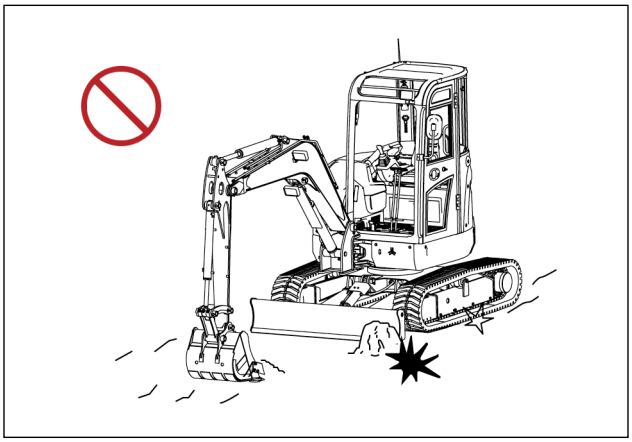


Fig. 4-41 0002874

Avoid Shifting Travel Directions Suddenly

- Never jerk the control levers. Jerking the control levers can cause travel motor strain and shorten the service life.
- Avoid moving the control levers quickly from forward travel to reverse travel.
- Avoid moving the control levers quickly from high speed to neutral.

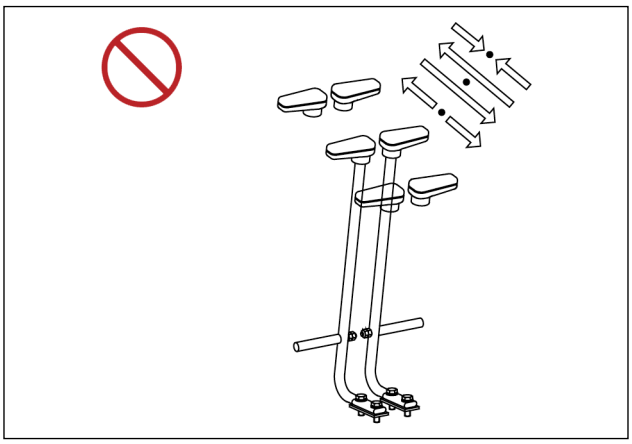


Fig. 4-42 0002872

Support the Dozer Blade

When the dozer blade is used as a stabilizer, never use one end of the blade to support the machine.

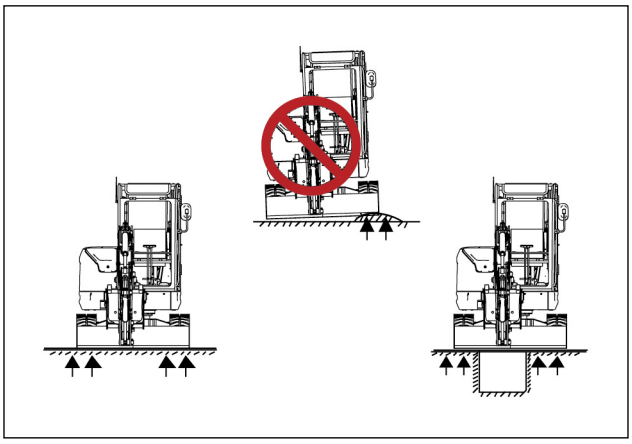


Fig. 4-43 0002876

Excavating Hard Ground

To prevent machine damage, use alternate work equipment to break up hard ground before excavation.

TRAVEL

General Travel Instructions

WARNING!

- **Check the surroundings and sound the horn before moving the machine.**
- **Personnel are not allowed to approach the machine without operator approval.**
- **If the travel motors are in the front of the machine, the travel control pedals will operate in reverse. Check the position of the travel direction arrows on the track frame before traveling.**
- **The rear of the machine is a blind area. Use the mirror and be extremely careful when backing up the machine. Use a signalman as needed.**

Failure to follow these warnings could result in death or serious injury.

- The machine's travel direction is controlled by the travel control levers/pedals and is dictated by the location of the travel direction arrows on the track frame relative to the cab.
- With the travel motors (1) positioned behind the cab, press the top of the travel control pedals or push the travel control levers to move the machine forward.
- Select a flat travel surface and travel in a straight line. If possible, turn the machine slowly and gradually.
- Never let the machine make contact with power lines or bridges (2).

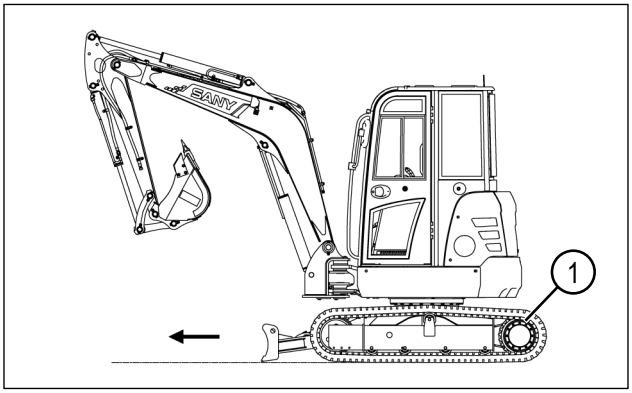


Fig. 4-44 0002878

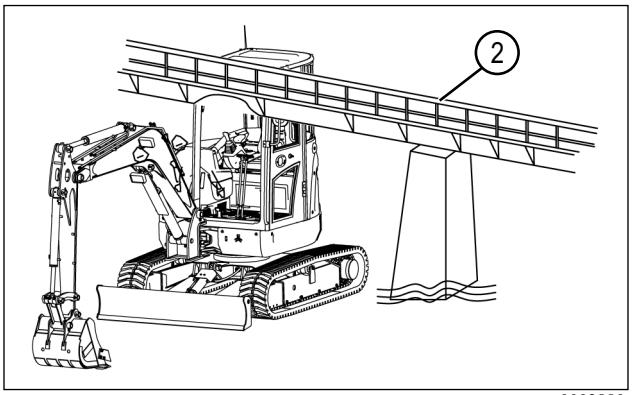


Fig. 4-45 0002880

- Do not drive or swing the machine on broken stones, rugged surfaces, steel bars, or scrap iron. This could cause personal injury or track damage.
- Do not perform operations where the rubber tracks may skid. This can cause early track wear.
- Slow the machine when traveling on uneven ground. A lower speed reduces the possibility of machine damage.

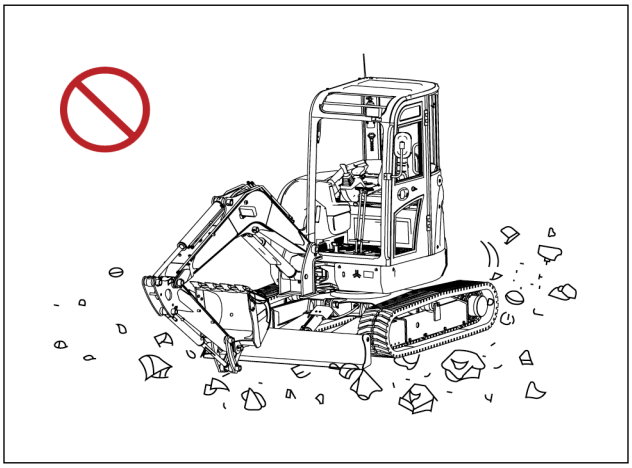


Fig. 4-46 0002882

- Do not operate the machine on a surface covered by small stones that could cause track skidding or damage.
- Avoid premature track wear or damage. Do not operate the machine on new asphalt or other hot surfaces.
- Do not allow fuels, oils, salt, or chemical solvents to make contact with the tracks. These substances will erode the track links and cause rusting and peeling. Wash these substances off the tracks immediately with clean water.

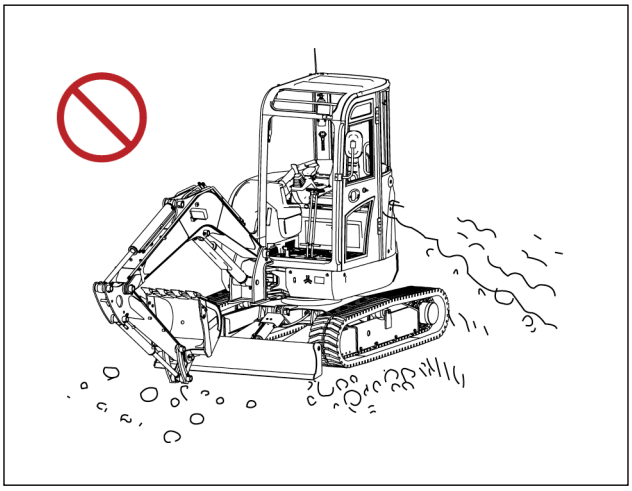


Fig. 4-47 0002884

Traveling at High Speed

When traveling at high speeds, position the idlers to the front of the cab (direction arrows on track frame facing forward).

Operating in Water

NOTICE!

- **Operate the machine slowly when traveling through water. Check the depth of the water with the bucket.**
- **Do not operate the machine in a marine environment. Salt in seawater can damage the track links.**
- **When driving the machine out of water on a grade steeper than 15°, the rear of the upper structure may be submerged in water. The radiator fan may sustain water damage that can result in damage to the machine or cause the equipment to operate improperly.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

- Do not drive the machine into water where the water depth is above the center of the final drive sprocket (1).
- Grease the parts that have been submerged until the old grease has been displaced from the bearing (especially the bucket pin).
- Make sure that the job site surface is hard enough for the machine.

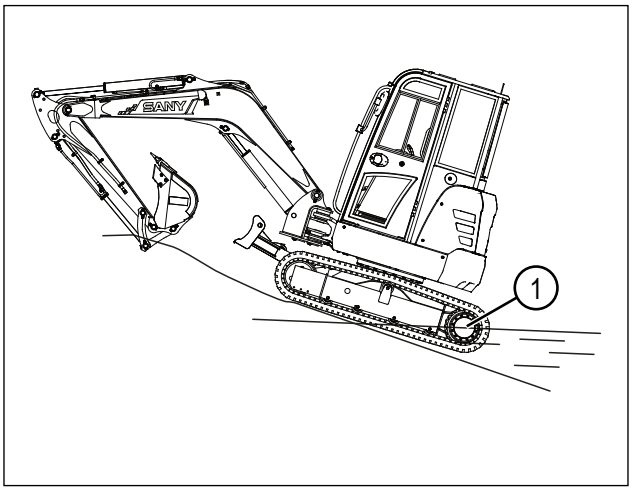


Fig. 4-48 0002886

- Continuously monitor the condition of the machine when operating in water. Move the machine to a different location if necessary.
- Make sure that the swing bearing, swing drive gear, and swivel do not become submerged in water.

  NOTE: If the swing bearing, swing drive gear, or swivel have been submerged in water, they must be cleaned. Lubricate the swing drive gear and swing bearing.

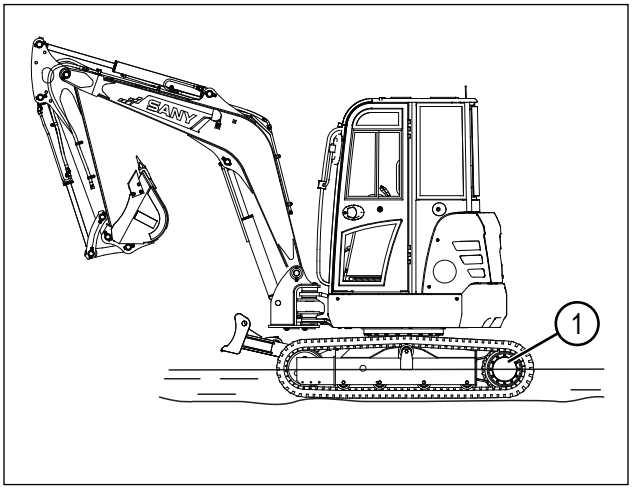


Fig. 4-49 0002888

Traveling on an Incline

Precautions When Traveling on an Incline

WARNING!

- **Operating the machine on an incline may cause the machine to become unstable.**
- **Use caution when operating the machine on inclines, and use a lower engine speed.**
- **Operate the machine slowly and monitor machine movement.**
- **Do not travel on an incline with the bucket loaded or with a lifted load.**
- **Do not swing a loaded bucket toward the downhill direction.**
- **Build a platform on an incline so the machine can be operated on a level surface.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

The engine may be damaged if the machine is operated on an incline of more than 25°.

Tipping over may result if the machine is on uneven ground or a slope. To avoid accidents, follow these instructions:

- Keep the engine running at a low speed.
- Choose low-speed travel mode.
- Operate slowly and observe the motion of the machine.
- Do not attempt to travel on a slope with the bucket loaded or with a load lifted.
- Never attempt to travel up or down a slope with a grade greater than 30°. Never attempt to cross a slope with a grade greater than 15°.
- Always keep the seat belt fastened.
- Keep the bucket pointed toward the traveling direction and 8 in. to 12 in. (20 cm to 30 cm) off the ground. Travel at low speed.
- Do not attempt to change direction on a slope, or the machine may slip and tip over. Only perform a direction change on an even and solid surface.
- If the engine stalls on a slope, see “Engine Stalls on an Incline” on page 4-39.
- Before traveling up a steep slope, allow the machine to warm up sufficiently so it can perform properly.

- Avoid crossing inclines as much as possible. Slipping or rolling over may occur.
- Do not swing (1) the upper structure on a slope. The machine may tip over. If such an operation is necessary, swing the upper structure and the boom with great care.
- Do not swing a loaded bucket to the downhill direction. Build a platform (2) on an incline so the machine can be operated on a level surface.

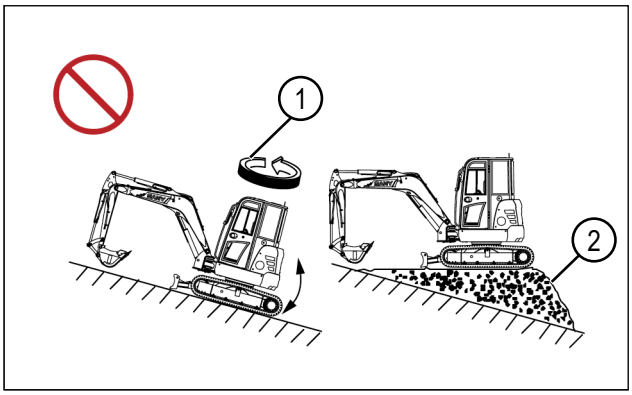


Fig. 4-50 0002890

- When traveling down a grade greater than 15°, the work equipment should be positioned in front of the cab with the travel motors (3) at the rear of the machine. Keep the boom-arm angle (4) between 90° and 110° and the bucket (5) 8 in.–12 in. (20 cm–30 cm) above the ground.

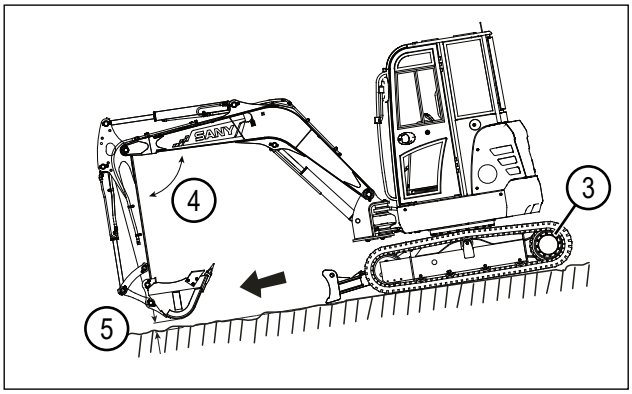


Fig. 4-51 0002901

- When traveling up a grade greater than 15°, the work equipment should be positioned with the travel motors (6) at the rear of the machine. Keep the boom-arm angle (7) between 90° and 110°, and the bucket (8) 8 in.–12 in. (20 cm–30 cm) above the ground.

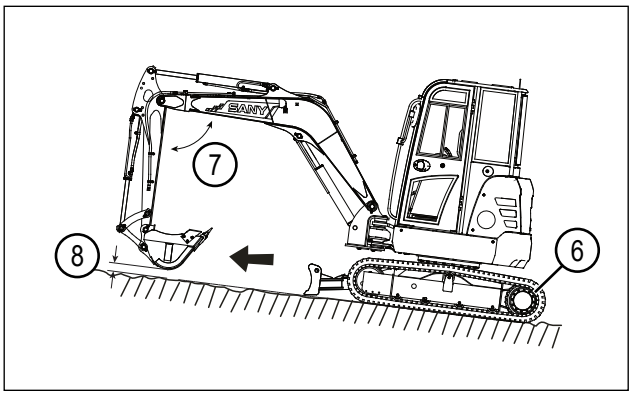


Fig. 4-52 0002903

NOTE: The tracks may slip when the machine is traveling uphill. Use the arm to help the machine travel uphill as necessary.

- To maintain machine balance on an incline, extend the boom and arm uphill and keep the bucket 8 in. to 12 in. (20 cm to 30 cm) off the ground (9). Travel at low speed.
- When traveling uphill, keep the travel motors (10) at the rear of the machine.
- When traveling downhill, keep the bucket in the traveling direction and 8 in. to 12 in. (20 cm to 30 cm) above the ground (11). Lower the bucket immediately if the machine slips or loses balance.

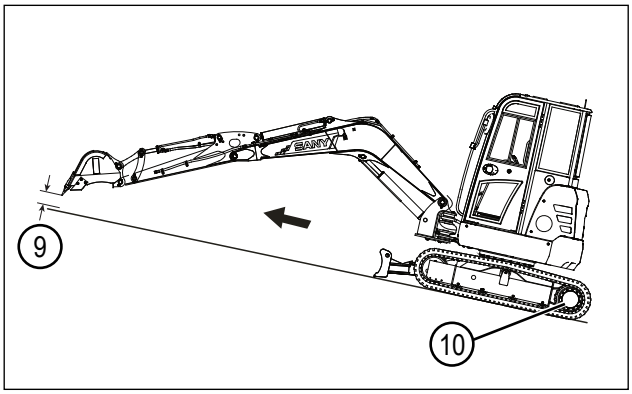


Fig. 4-53 0002905

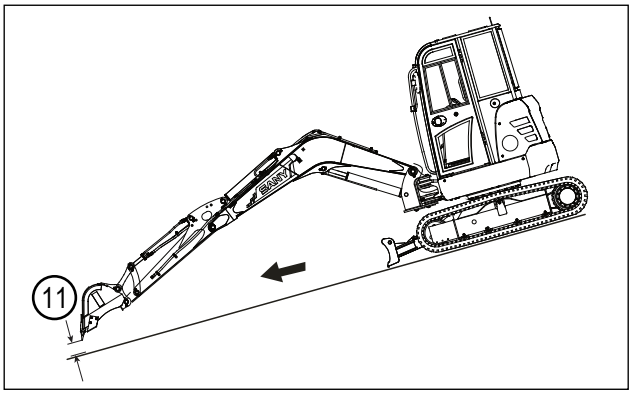


Fig. 4-54 0002907

Engine Stalls on an Incline

If the engine stalls when the machine is on an incline, lower the bucket to the ground immediately, move all control levers to the neutral position, and restart the engine.

If the engine stalls on an incline, do not use the left joystick to swing the machine. The upper structure will swing due to its weight.

Before traveling up a steep incline, allow the machine to warm up.

Operation on Soft Ground

NOTICE!

- **Rugged terrain could cause damage to track components.**
- **Wide track shoes are intended for operation on soft surfaces.**
- **Inspect the tracks on a regular basis.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

Choose the proper tracks when operating the machine on soft ground. Soft ground may cave in and cause the machine to roll over. Place steel plates on soft ground to support the machine.

Mud buildup on the tracks can be removed using the following steps:

1. Swing the upper structure to position the boom over one track.
2. Curl the bucket so the back of the bucket touches the ground.
3. Lower the boom to lift the stuck track off the ground. Keep the boom-arm angle between 90° and 110° (1) with the back of the bucket on the ground.
4. Remove mud buildup by rotating the lifted track backward and forward.
5. Raise the boom to lower the track to the ground.

Removing a Stuck Machine

Be careful when operating on soft terrain to avoid becoming stuck. If your machine becomes stuck in soft terrain, perform the following procedure to free the machine:

One Track Stuck

WARNING!

- **Rotating tracks are dangerous. Stay away from rotating tracks.**
- **Use caution when placing cribbing under the track. The machine is supported only by the boom and could drop without warning.**

Failure to follow these warnings could result in death or serious injury.

1. Position the boom and arm at an angle (1) between 90° and 110°.
2. Pivot the upper structure to position the boom over the track that is stuck.
3. Curl the bucket so the back of the bucket touches the ground.
4. Lower the boom to raise the track.
5. Remove mud buildup by operating the lifted track forward and backward.

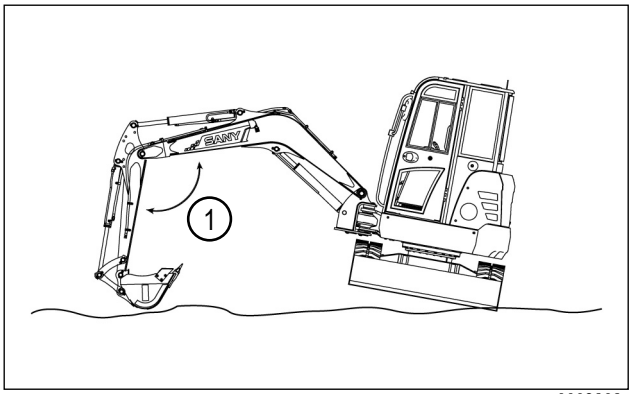


Fig. 4-55 0002909

6. Place cribbing under the stuck track while lifted to provide a firm surface if necessary.
7. Raise the boom to lower the track onto the cribbing.
8. Drive the machine to solid ground at low speed.

Two Tracks Stuck

WARNING!

- **Rotating tracks are dangerous. Stay away from rotating tracks.**
- **Use caution when placing cribbing under the track. The machine is supported only by the boom and could drop without warning.**

Failure to follow these warnings could result in death or serious injury.

1. Position the boom-arm angle between 90° and 110°.
2. Pivot the upper structure to position the boom over the front the machine.
3. Curl the bucket so the bottom of the bucket touches the ground.
4. Lower the boom to raise the front of the tracks.
5. Place cribbing under the tracks to provide a firm surface if necessary.
6. Raise the boom to lower the tracks onto the cribbing.
7. Cut the bucket into the ground in front of the machine. Retract the arm (as with normal excavating) while driving the machine forward out of the mud.

If the machine does not move, tow the machine. See “Towing the Machine” on page 4-42.

If the machine is not operational, it may need to be moved using a lifting device. See “Lifting the Machine” on page 4-58.

Towing the Machine

WARNING!

- **Make sure the equipment used for towing the machine has the correct capacity rating.**
- **Never use a broken chain, worn wire rope, or a bent hook to tow the machine.**
- **Never jerk the wire rope.**

Failure to follow these warnings could result in death or serious injury.

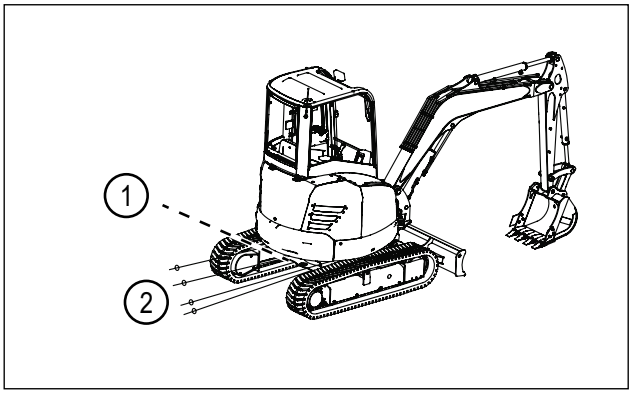


Fig. 4-56 0002911

If the machine is trapped in mud and is unable to get out under its own power, use wire rope(s) (2) attached to the frame towing point (1) to assist in its removal.

Towing Point for a Light Load

NOTICE!

- **Make sure the equipment used for towing has the correct capacity rating.**
- **A shackle must be used.**
- **Keep the wire ropes/slings horizontal and parallel to the tracks.**
- **Drive the machine at low speed.**
- **Never use a broken chain, worn wire rope, or a bent hook to tow the machine.**
- **Never jerk the wire rope.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

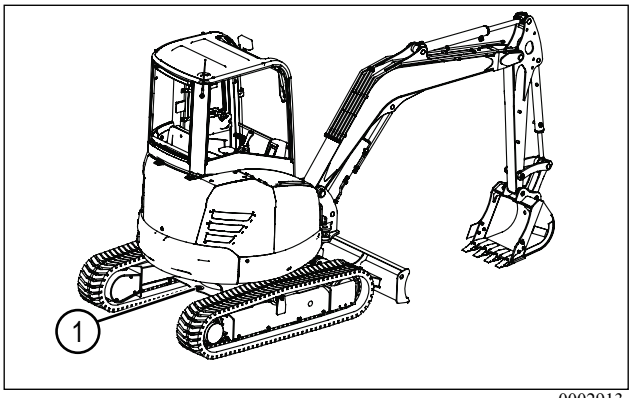


Fig. 4-57 0002913

The machine is equipped with a light-load towing point (1) on the frame that can be used to tow a light load.

RECOMMENDED OPERATIONS

WARNING!

- **Contact the site supervisor before any digging to make sure that all underground hazards have been located.**
- **To avoid injury, never allow any personnel within the work zone of the machine.**
- **Be aware of all crush points on the machine and make sure all personnel keep clear of these areas to prevent injury.**
- **To prevent injuries, avoid moving any travel control lever or pedal to abruptly change the direction of the machine.**
- **Avoid stopping the machine suddenly by releasing the travel control lever or pedal while traveling at high speed.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Avoid sudden stops when lowering the boom. Hydraulic shock can damage the hydraulic system.**
- **Avoid extending the arm cylinder while in full travel. This can damage the hydraulic cylinder.**
- **Do not allow the bucket to come in contact with the tracks when excavating at an angle.**
- **Do not allow the boom or arm hydraulic cylinder's hoses to come into contact with the ground.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

Operate the machine using the following applications. The scope of application can also be expanded by using various optional attachments.

Trenching Work

When performing trenching work, install a bucket that matches the width of the trench, and keep the tracks parallel with the trench.

When excavating a trench, always start from the sides, then remove the earth in the middle.

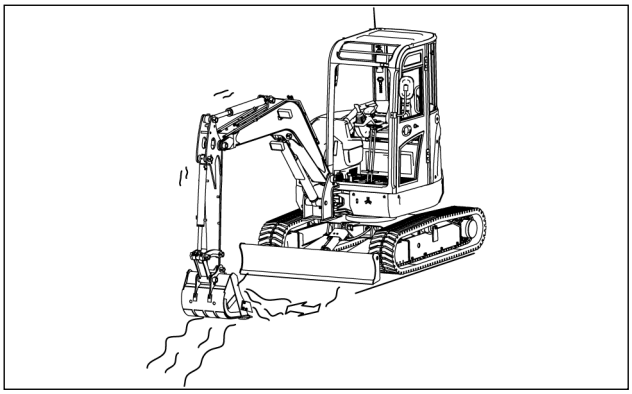


Fig. 4-58 0002915

Boom Swing Feature

The boom swing feature allows this excavator to perform trench work close to a wall.

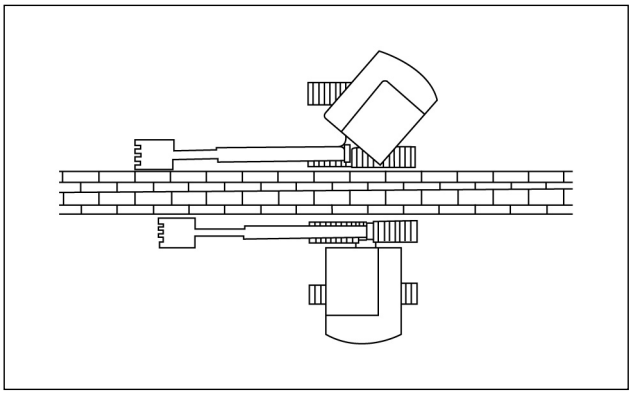


Fig. 4-59 0002917‘

Vehicle Loading

To increase efficiency, load the dump truck from behind instead of from the side.

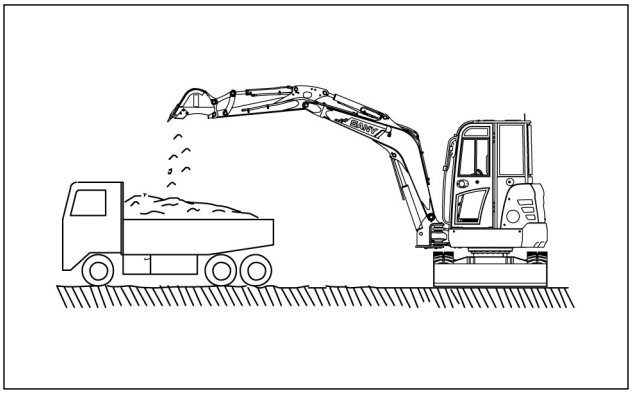


Fig. 4-60 0002919

Leveling Operation

1. Choose the light-load mode when performing a leveling operation. Roll the bucket out and hold it slightly ahead of the arm.

2. Raise the boom slowly and retract the arm at the same time. Once the arm passes the vertical position, lower the boom slowly and keep the bucket moving parallel to the ground.

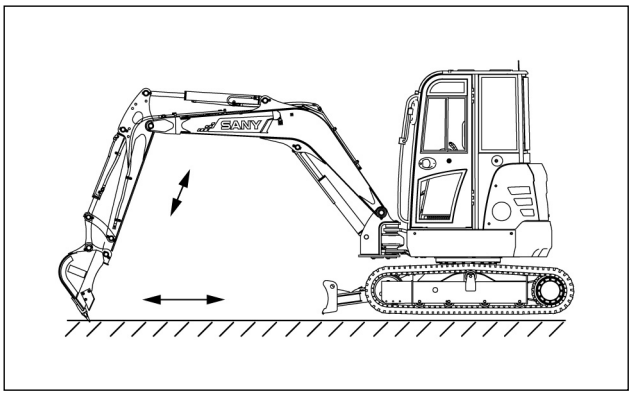


Fig. 4-61 0002921

OPERATING PRECAUTIONS

WARNING!

- **Always wear appropriate personal protective equipment (PPE) and clothing during operation.**
- **Clear all personnel and obstacles around the machine and the work area. Inspect the machine and its surroundings during operation. Be careful not to allow the upper structure to hit any objects when operating the machine in narrow or confined spaces.**
- **When loading a dump truck, do not swing the bucket over the truck cab or any people on the job site.**
- **Operate the machine on a hard and level surface. When working in a ditch or on a road shoulder, keep the tracks perpendicular to the work face and the travel motors at the rear of the machine. Placing the machine in this position helps facilitate escape if a collapse occurs.**
- **When working under a cliff or high embankment, make sure the work area is secure.**

Failure to follow these warnings could result in death or serious injury.

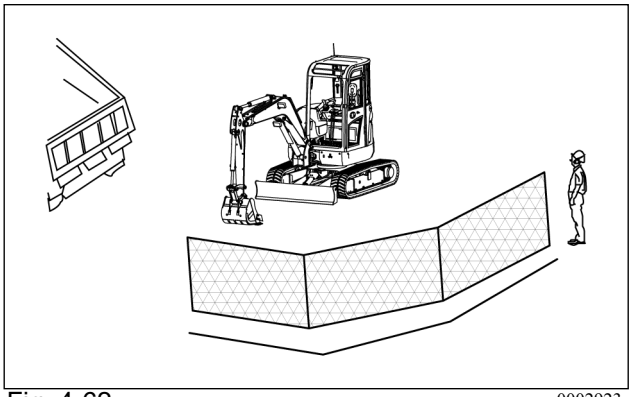


Fig. 4-62 0002923

NOTICE!

- **Do not allow the arm to interfere with the tracks during operation.**
- **Do not use the swinging force of the machine to move rocks or break walls.**
- **Adjust the length and depth of the cut so the bucket is full after each cycle.**
- **To improve efficiency, a full bucket is more important than loading speed.**
- **Do not use the side of the bucket to level materials or strike objects.**

Failure to follow these notices could result in damage to the machine or cause it to operate improperly.

PARK THE MACHINE

1. Move the machine to a solid, level surface.
2. Lower the bucket and dozer blade to the ground.
3. Move the throttle control lever to MIN (low idle). Run the engine at idle for 5 minutes to cool it.
4. Move the hydraulic lockout control lever to the locked (closed) position.
5. Turn the key switch to OFF and remove the key.
6. Close the windows and cab door.
7. Turn the battery disconnect switch to OFF.
8. Close and lock all doors.

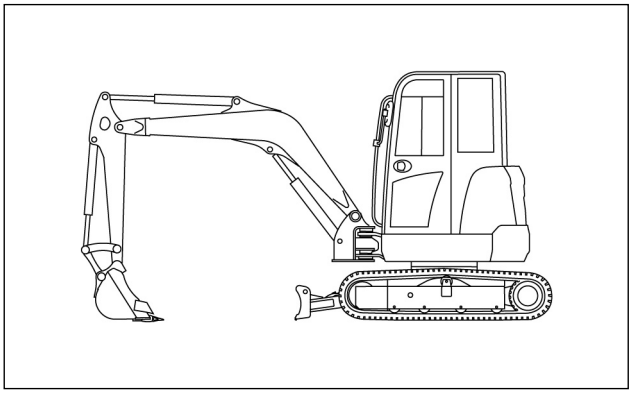


Fig. 4-63 0002925

Parking the Machine on a Grade

WARNING!

Avoid parking the machine on a grade when possible. The machine may become unstable and roll over. Failure to follow this warning could result in death or serious injury

If it is necessary to park the machine on a grade:

1. Face the machine uphill.
2. Firmly set the bucket teeth and dozer blade into the ground.
3. Move the hydraulic lockout control lever to the locked (closed) position.
4. Turn the key switch to OFF and remove the key.
5. Turn the battery disconnect switch to OFF.
6. Close and lock all doors.
7. Securely chock the tracks.

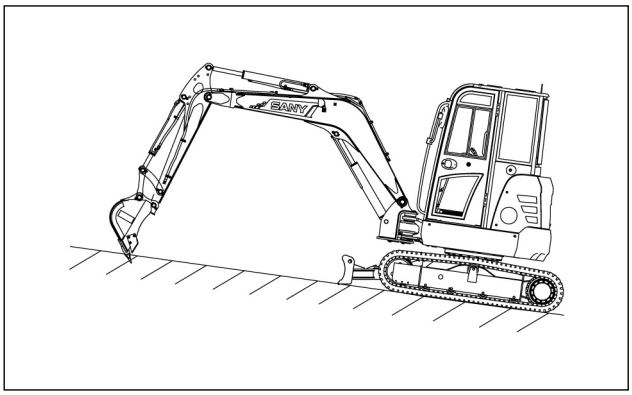


Fig. 4-64 0002927

COLD WEATHER OPERATION

When operating the machine in low temperatures, the engine may be difficult to start, the fuel lines may freeze, and oil may become more viscous (thicker). Select fuels and lubricants according to the air temperature.

Engine Coolant in Cold Weather

See “Recommended Lubricants, Fuels, and Engine Coolant” on page 5-10.

Battery in Cold Weather

WARNING!

Before proceeding with any battery maintenance procedure, observe the following precautions:

- **The top of the battery must be kept clean to prevent plugging of the battery vents. Regularly wash the top of the battery to prevent the battery vents from plugging.**
- **Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames. Work in a well-ventilated area.**
- **Wear personal protective equipment (PPE) when working with batteries.**
- **Battery acid can cause burns or injury. If battery acid makes contact with your skin or eyes, flush the area immediately with fresh water and seek medical attention.**

Failure to follow this warning could result in death or serious injury.

In cold climates, battery efficiency will decline. Electrolyte can freeze if the battery charge is low. Keep the battery charged near 100% and keep the battery in a warm area if possible.

Track Cleaning in Cold Weather

WARNING!

Rotating tracks are dangerous. Stay away from rotating tracks. Failure to follow this warning could result in death or serious injury.

When the temperature is below 32°F (0°C) and mud is built up on the tracks, swing the upper structure 90° and raise the machine so that one track is off the ground. Rotate the track forward and backward to remove the mud from the sprocket, track rollers, and idlers. Repeat for the other side.

After Daily Operation

WARNING!

Rotating tracks are dangerous. Stay away from rotating tracks. Failure to follow this warning could result in death or serious injury.

NOTICE!

Fill the fuel tank to its maximum level after operation to prevent moisture in the fuel tank from condensing. Failure to follow this notice could damage the machine or cause it to operate improperly.

Mud and water accumulation on the undercarriage can affect normal operation of the machine. After operating the machine in mud or water, make sure to perform the following actions after daily operation:

- Remove mud and water from the machine. Mud, dirt, and water can damage the seals. See “Operation on Soft Ground” on page 4-40.
- Park the machine on a firm, dry surface. If possible, park the machine on boards, which can prevent the tracks from sinking into soft ground.
- Open the drain valve of the fuel/water separator to remove any water in the fuel system. See “Check and Drain the Primary Fuel Filter/Water Separator” on page 4-10.
- Fill the fuel tank.

Machine Storage in Cold Weather

1. Clean the machine.
2. Check the engine coolant and engine oil levels, and check for leaks. The machine is normally filled to withstand a minimum low temperature of -40°F (-40°C). Change the fuel, hydraulic oil, and gear oil with new fluids that meet the air temperature requirements as necessary.
3. Check the machine for leaks. Check all cylinder rods for scratches and corrosion. Apply grease to exposed cylinder rods.
4. Remove and charge the battery. When the battery is fully charged, store it indoors.
5. Clean the battery terminals as necessary. Apply a coat of dielectric grease to the terminals. Check the specific gravity of the electrolyte and add distilled water if necessary.

After Cold Season

Replace the fuel and engine oil with fuel and oil of the specified viscosity. See “Approved SANY Lubricants” on page 5-6.

If appropriate engine coolant was not used and ethanol coolant was used as an alternative in the engine cooling system, drain, flush, and refill with the appropriate engine coolant.

Long-Term Storage

Before Long-Term Storage

NOTICE!

Extend the bucket and arm and lower the boom to help prevent the cylinder rods from rusting. Failure to follow this notice could damage the machine or cause it to operate improperly.

Perform the following procedures before storing the machine:

1. Clean and wash all components and park the machine indoors. If indoor storage is not possible, park the machine on a firm, level surface. Cover the machine if possible.
2. Extend the bucket, arm, and boom.
3. Support the dozer blade on a block.
4. Fill the fuel tank, apply lubricant, and change the engine oil before storage.
5. Apply a thin coat of grease to any exposed surfaces of the hydraulic cylinder rods.

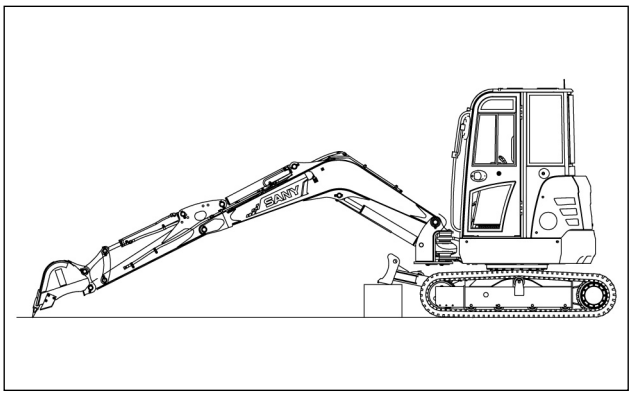


Fig. 4-65 0002929

6. Disconnect the negative battery cable or remove the battery and store it.
7. If the ambient temperature is expected to drop below 32°F (0°C), check the engine coolant mixture ratios and add concentrated engine coolant to the cooling system if necessary.
8. Place the hydraulic lockout control lever in the locked (closed) position.
9. Close and lock all doors.

During Storage

WARNING!

When operating the machine indoors, open the windows and doors to provide proper ventilation and avoid gas poisoning. Failure to follow this warning could result in death or serious injury.

During the storage period, operate the machine on a monthly basis to prevent rust and seizing of moving parts and to lubricate the seals. Charge the battery at this time.

Air Conditioner Storage

When the air conditioner will not be used for an extended period of time, it should be operated for 3 to 5 minutes each month to lubricate the compressor components and air conditioning system seals.

Removing from Storage

NOTICE!

If the machine was not operated monthly, contact a SANY dealer. Failure to follow this notice could damage the machine or cause it to operate improperly.

Follow the procedures below before using a machine that has been stored for a prolonged period of time:

- Clean the grease from the hydraulic cylinder rods.
- Add oil or apply lubricant to all parts or components.
- Check fluid levels.
- Drain the water and sediment from the fuel water separator. See “Check and Drain the Primary Fuel Filter/ Water Separator” on page 4-10.

Starting the Engine After Long-Term Storage

NOTE: The illustration shows a cab machine. Canopy machines are similar.

1. Insert the key and turn the key switch (1) to ON.
2. Turn the throttle control dial (2) to the MAX (high idle) position for 3 seconds.
3. Turn the throttle control dial (2) to the MIN (low idle) position and start the engine. See “Starting the Engine” on page 4-16.

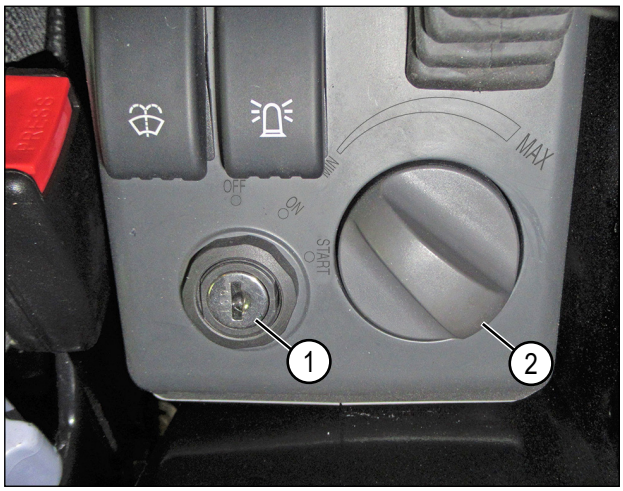


Fig. 4-66 0002782

TRANSPORTATION INFORMATION

Transportation Method

Applicable laws and regulations must be observed when transporting the machine:

- When transporting the machine with a trailer, confirm the length, width, height, and weight capacity of the trailer before loading.
- Investigate the road conditions in advance (for example, dimension restrictions, weight restrictions, and traffic regulations).
- The machine may need to be disassembled to meet the local dimension and/or weight limits.

NOTE: The machine's shipping weight and dimensions may vary, depending on its tracks and work equipment.

Loading and Unloading

WARNING!

- **To prevent the machine from tipping over, select a firm and level location that is a safe distance from any road or structure.**
- **Make sure the trailer is properly chocked to prevent any movement.**
- **Use an access ramp with enough length, strength, and width to properly support the machine. The ramp grade should not exceed 15°.**
- **Drive slowly at the junction of the ramp and the trailer. The machine may shift suddenly due to a change in its center of gravity.**
- **Use a signalman to alert the operator to any potential hazards.**
- **Deactivate the auto idle mode before loading or unloading; otherwise, the machine may move suddenly.**
- **Adjust the throttle control lever to MIN (low idle). Operating the engine at high speed could result in sudden, unexpected movement.**
- **Swinging the upper structure may cause the machine to tip over and result in personal injury. Retract and lower the arm and swing the upper structure slowly to achieve the optimal balance.**
- **Grease, mud, or ice on the trailer, landing platform, and ramps can cause the machine to slide and tip over.**

Failure to follow these warnings could result in death or serious injury.

Use level, solid ground and keep the machine a safe distance away from roads during loading and unloading operations.

- Make sure the loading ramps have adequate width, length, thickness, and strength. The ramp grade should not exceed 15° (1).
- Never change direction on the access ramp. If repositioning the machine is necessary, back up, re-orient the machine, and drive up or down the ramps.

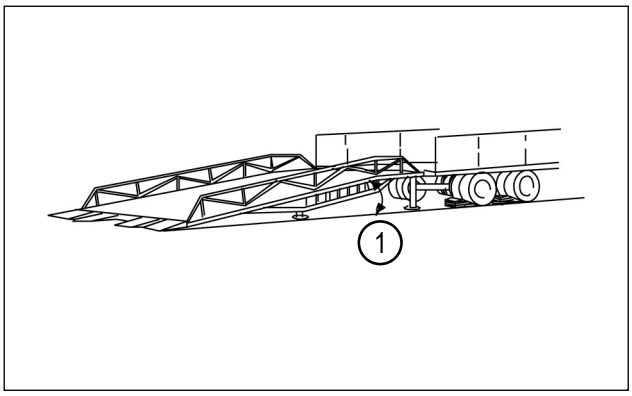


Fig. 4-67 0002935

- Use care when driving over the joints (2) between the trailer and the ramps.
- Never operate any control levers other than the travel levers when the machine is on a ramp.
- Clean the landing platform, ramps, and trailer floor before loading or unloading.

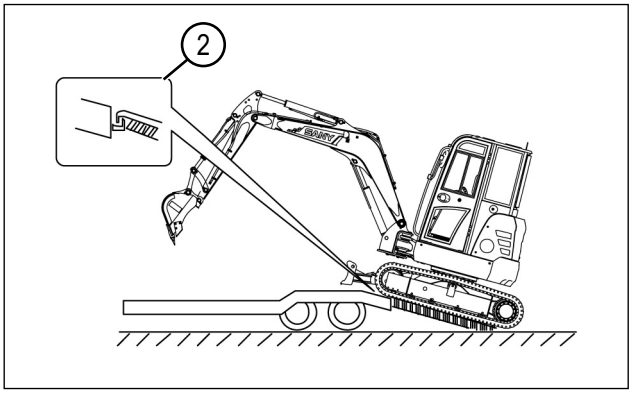


Fig. 4-68 0002933

Loading the Machine

- Use a landing platform or ramps when loading or unloading the machine.

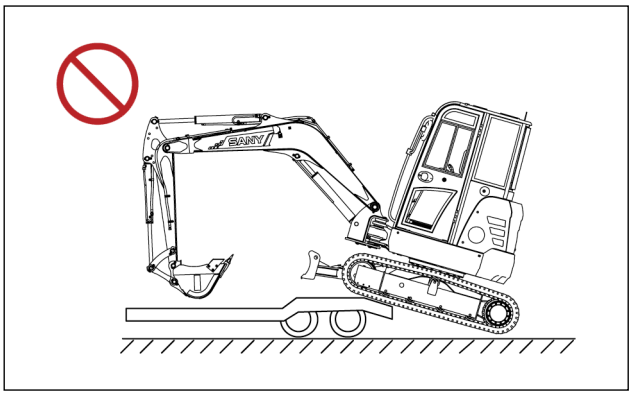


Fig. 4-69 0002931

- When loading the excavator with work equipment installed, place the work equipment in the front and travel forward.

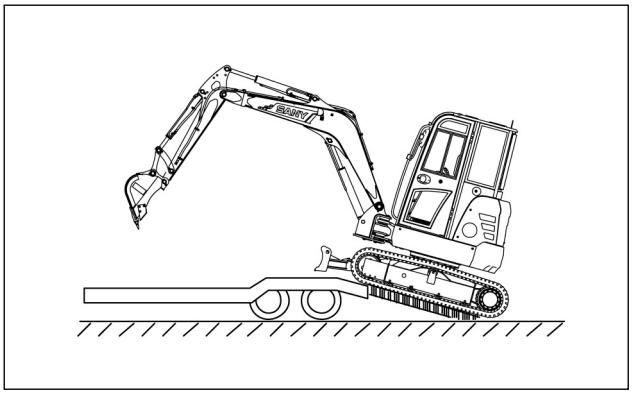


Fig. 4-70 0002937

- When loading the excavator without equipment installed, travel in reverse up the ramps. The ramp grade should not exceed 15°(1).

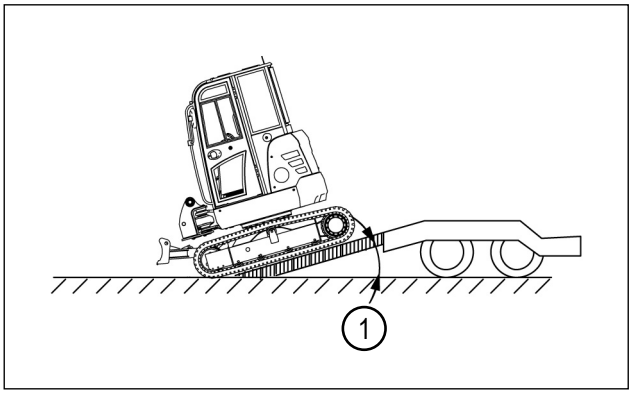


Fig. 4-71 0002939

Use the following procedures during loading:

1. Align the centerline of the machine with that of the trailer.
2. Slowly drive the machine up the ramps.
3. When the machine tilts toward the trailer side, lower the bucket close to the trailer floor. Drive slowly until the tracks are completely on the trailer.
4. Slightly raise the bucket. Retract the arm and keep it in a lower position. Slowly swing the upper structure 180°. Lower the dozer blade.
5. Fully curl the bucket and arm. Slowly lower the boom.

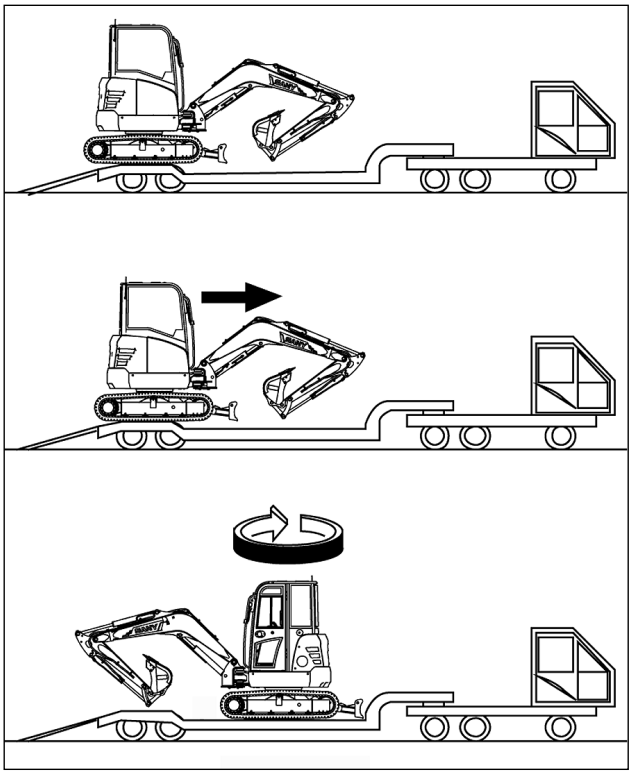


Fig. 4-72 0002941

NOTE: To prevent damage to the bucket cylinder, place a wood block (2) between the bucket cylinder and the trailer floor. Slowly lower the bucket cylinder onto the wood block.

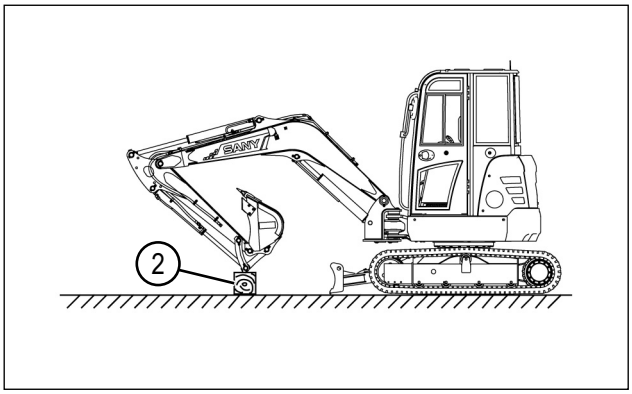


Fig. 4-73 0002943

6. Stop the engine and turn the key switch to ON.
7. Operate the joysticks until the pressure inside the hydraulic cylinders is fully released.
8. Place the hydraulic lockout control lever in the locked (closed) position.
9. Turn the key to OFF and remove it from the key switch.
10. Close the cab window and door.

NOTICE!

- **Never turn the battery disconnect switch to OFF while the engine is running. This can damage the electrical system or cause the machine to operate improperly.**
- **After machine shutdown, wait at least 1 minute for the Engine Control Module (ECM) to complete its shutdown before turning the battery disconnect switch to OFF.**

Failure to follow this notice could cause damage to the machine or cause it to operate improperly.

11. Turn the battery disconnect switch to OFF.
12. Lock all doors and the engine hood.
13. Cover the exhaust opening to prevent contamination.

Securing the Machine

NOTICE!

To prevent damage to the machine during transportation:

- **Lower the radio antenna and position the mirror inward towards the cab.**
- **Secure any removed parts to the trailer.**
- **Put a wood block between the bucket cylinder and the trailer floor to help prevent damage to the bucket cylinder.**
- **Secure chains and wire ropes to the machine frame.**
- **Prevent chains and wire ropes from crossing or pressing against the hydraulic lines or hoses, which could result in damage and leaks.**

Failure to follow this notice could cause damage to the machine or cause it to operate improperly.

When the machine has been loaded, follow these procedures to tie down the machine:

1. Prevent machine movement during transportation by placing chocks (1) at both ends of the tracks. Secure the machine with chains or wire ropes.
2. Make sure to secure the machine firmly in place to prevent it from sliding.

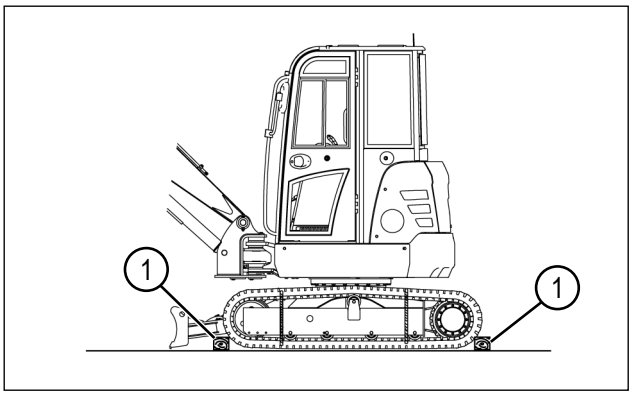


Fig. 4-74 0002945

Unloading the Machine

NOTICE!

To avoid damage to the machine during unloading:

- **Use extreme care when the machine drives over the joint area between the trailer and the ramps.**
- **Avoid damage caused by unexpected movement of the work equipment.**
- **Maintain the boom-arm angle between 90° and 110°.**
- **Unloading the machine with the arm retracted may damage the machine.**

Failure to follow this notice could cause damage to the machine or cause it to operate improperly.

1. Always load/unload the machine on firm, level ground and keep a safe distance away from roads.
2. Brake the trailer properly and chock (1) the trailer wheels. Place the ramps between the trailer and the machine. Make sure the two ramps are on the same level and have an angle less than 15° (2). Adjust the distance between the ramps to match the distance between the tracks.
3. Remove the chains or the wire ropes that secure the machine.
4. Start the engine.
5. Push the hydraulic lockout control lever to the unlocked (open) position.
6. Raise the work equipment and retract the arm toward the boom. Drive the machine slowly.
7. Stop the machine when it travels over the rear wheels of the trailer and toward the ramps.

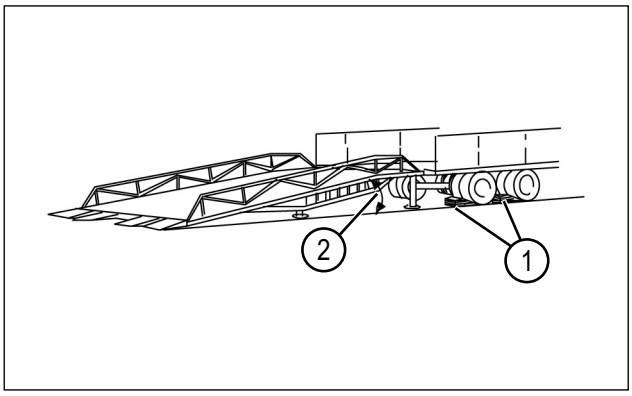


Fig. 4-75 0002935

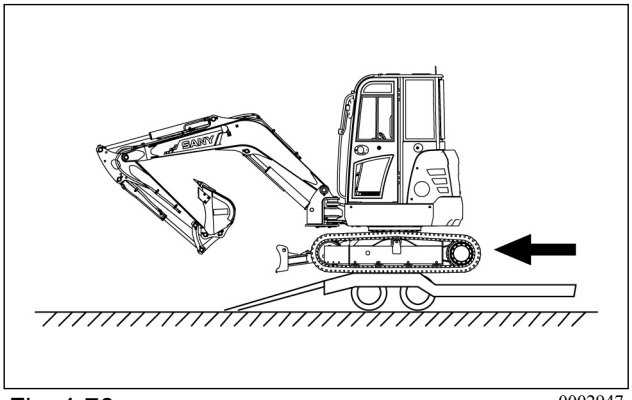


Fig. 4-76 0002947

8. Adjust the boom-arm angle (3) to between 90° and 110° and lower the bucket so that the flat surface is in contact with the ground. Drive the machine slowly onto the ramps.

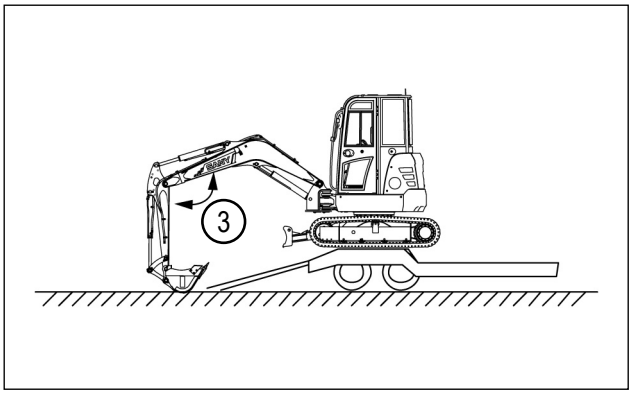


Fig. 4-77 0002949

9. Operate the boom and the arm slowly when the machine is on the ramps. Allow the machine to descend slowly until it comes in contact with the ground.

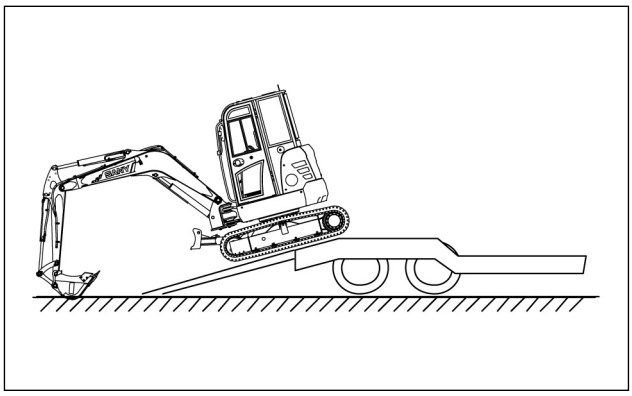


Fig. 4-78 0002951

NOTICE!

- **Use extreme care when the machine drives over the joint area between the trailer and the ramps.**
- **Avoid damage caused by unexpected movement of the work equipment.**
- **Maintain the boom-arm between an angle of 90° and 110°.**
- **Avoid unloading the machine with the arm retracted.**

Failure to follow this notice could cause damage to the machine or cause it to operate improperly.

Lifting the Machine

WARNING!

- **Make sure all lifting devices are in safe operating condition and with sufficient capacity rating to safely support the intended load.**
- **Never lift the machine with a person inside the cab.**
- **Allow no one to stand close to or under a lifted machine.**
- **Always lift with the longitudinal centerlines of the upper structure and undercarriage parallel to each other.**
- **Keep the hydraulic lockout control lever in the locked (closed) position to prevent unexpected movement of the machine.**

Failure to follow these warnings could result in death or serious injury.

NOTE: This lifting procedure applies to standard machines. Check the operating weight of the machine. See “Technical Specifications” on page 6-4.

1. Park the machine on firm, level ground, raise the dozer blade, and swing the upper structure to the rear of the machine.
2. Fully extend the arm cylinder and the bucket cylinder. Raise the boom.
3. Place the hydraulic lockout control lever in the locked (closed) position
4. Turn the key switch to OFF and remove the key.
5. Turn the battery disconnect switch to OFF and lock all the doors.
6. Cover the exhaust opening to prevent contamination.
7. Use wire ropes and a spreader bar that have adequate length to keep the machine free from damage
8. Lift the machine 10 in.–12 in. (25 cm–30 cm) and check its balance. If it is not balanced, lower the machine to the ground and adjust the boom or dozer blade positions.

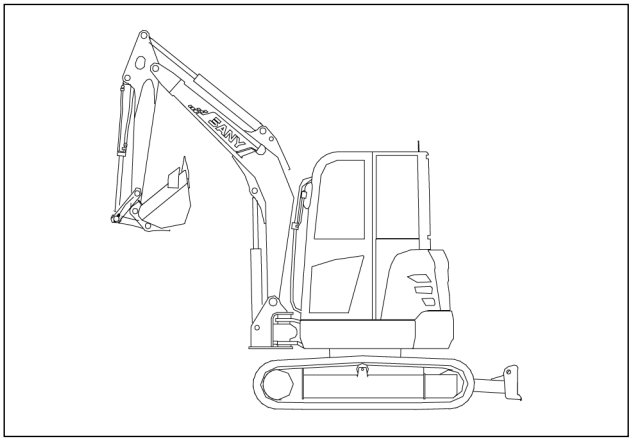


Fig. 4-79 0002953

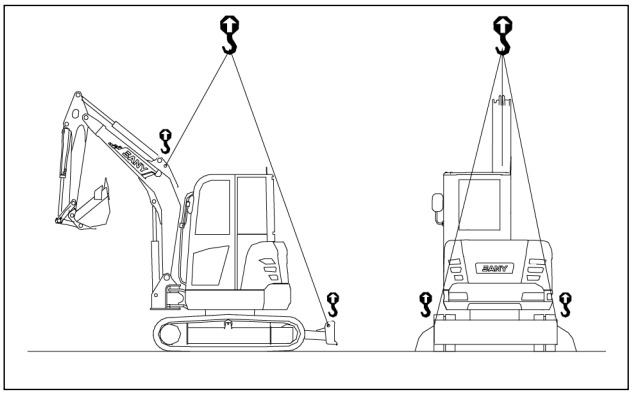


Fig. 4-80 0002955

SANY

Maintenance

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MAINTENANCE INFORMATION

Do not perform any maintenance and/or repairs unless the procedures are covered in this manual. Always follow all safety precautions. Read and understand the Safety section of this manual before proceeding with any inspection or maintenance procedures. See “Maintenance Safety” on page 2-8.

Checks Before Maintenance or Repairs

Review the Maintenance Log and follow these points:

- Avoid working on the machine while the engine is running unless required to do so in the procedure. If the engine must remain running during a procedure, always have a person in the cab who can correctly operate the machine and who is in clear contact with you at all times.
- Contact a SANY dealer if you are unable to perform the procedures listed in this manual or if additional procedures are required.
- Always use the proper tools when performing any maintenance procedures.

Checks After Maintenance or Repairs

Before starting the machine after maintenance or repairs, verify the following:

- If necessary, have a coworker inspect your work for correct and proper completion.
- Complete the Maintenance Log.
- Check for leaks in the system that had maintenance or repairs.
- Verify there are no abnormal sounds coming from the engine or hydraulic system.
- Check for any loose or abnormal movement in the system you have maintained.
- Check for any overheating in the system you have maintained.

After performing maintenance or repairs to the machine, always take time to inventory your tools, parts used, and fasteners to be sure none of these items were left on or inside the machine. Return the machine to its proper location.

Hour Meter Reading

Record the hour meter reading daily. Confirm hour meter readings with the required maintenance intervals listed in this manual. When a maintenance service is due, an umbrella symbol will appear on the display.

Genuine SANY Parts

Use genuine SANY replacement parts when repairing or replacing machine components. Failure to do so may result in premature system or part failure.

Approved SANY Lubricants

Always use SANY-approved lubricants and coolants. Never mix different lubricant brands or viscosities. The use of unapproved lubricants and coolants, or mixing different lubricant brands or viscosities, may result in shortened service life or system failure.

Oil and Filter Inspection

NOTICE!

Failure to inspect oils and filters for contamination may result in damage to the machine or cause improper operation.

After changing the engine or hydraulic oil or filters, inspect them for contamination. If contamination is found, send a sample of the oil for testing to help determine the cause. Consult with a SANY dealer before operating the machine.

Collect Oil Sample

Collect and send an oil sample for testing in accordance with the maintenance schedule. Obtain and follow the instructions within an oil analysis sample kit from a SANY dealer.

Fuel Tank Strainer

The fuel tank strainer should always be installed when fueling the machine. The fuel tank strainer prevents larger dirt and other contaminates from entering the fuel system. The fuel tank strainer does not filter out very small or non-solid impurities.

Preventing Contamination

Clean dirt, dust, and debris from the hydraulic tank filler cap or cover before opening. Make sure objects do not fall into the tank and contaminate fluids during servicing. If any object falls into any tank, remove it immediately. Failure to do so could result in component malfunction, damage to the machine, or improper machine operation.

Installation of Hydraulic Hoses

When disassembling parts sealed by O-rings or gaskets, clean the surfaces before installing the new parts. Always install new O-rings and gaskets.

Never kink or twist a hydraulic hose during removal or installation. Hydraulic hoses that have been kinked or twisted can be damaged internally, which can considerably shorten the service life of the hose.

Securing Access Covers and Compartment Doors

When servicing the machine with any access cover or compartment door open, use the lock latch or bar to secure the cover or compartment door in the open position. Covers and doors that are not locked open can shut unexpectedly and cause injury.

Cleaning the Machine

Never clean the machine with caustic chemicals or steam cleaners. Instead, use mild soaps and a pressure washer to clean the machine. Always protect electrical parts when cleaning the machine. Never flood or pressure-wash the inside of the cab. Use only nonflammable cleaning solvents. Never use flammable liquids to clean parts or systems.

Weld, Drill, Cut, or Grind on the Machine

NOTICE!

Contact a SANY dealer before beginning any welding repairs. Any welding repairs on the machine must be performed by personnel who are qualified and certified to perform repairs that require welding. Owners are responsible for the structural integrity of any completed repair.

- **After turning off the key switch, wait 1 minute before disconnecting the battery. Remove the negative battery cable from the negative (-) post of the battery.**
- **The welding ground cable must be connected within 3.3 ft. (1 m) of the welding area. The welding cable must be connected directly to the part being welded. Do not ground through bearings, hydraulic cylinder pins, or work equipment pins.**

Failure to disconnect the battery frame ground could result in damage to the machine or personal property, or cause the machine to operate improperly.

Inspection and Maintenance in Adverse Environments

If the machine will be operating under adverse conditions:

- Check and clean all electrical components to prevent any accumulated corrosion.
- Check and clean any areas where extreme heat is present, such as the exhaust system, manifold, and turbocharger.

For heavy-load operation, add grease to the pins of the work equipment prior to each operation. Cycle the operation of all working parts several times before filling with additional grease.

Mud, Rain, or Snow Conditions

Before operating the machine, inspect each connector for looseness.

After operating the machine, clean the machine and inspect for missing or loose fasteners. Add oil and lubricating grease as needed.

Near Ocean (Salt Air) Environments

Before operating the machine, inspect for any signs of corrosion. Apply grease where rust is found.

After operating the machine, thoroughly wash away the salt residue, apply grease where rust is found, and perform maintenance carefully on the electrical components to prevent corrosion.

Dusty Environments

Clean the following components:

- Engine air filter: Clean the dust evacuator frequently. Immediately service the air filter and housing if an air filter restriction indicator is displayed. See “Check and Replace the Engine Air Filters” on page 5-36.
- Radiator: Clean the radiator core frequently to prevent blockage.
- Fuel equipment: Drain sediment frequently.
- Fresh-air and recirculation filters: Clean the filters frequently.

Cold Environments

In cold environments (32°F [0°C] or below), lubricate only with the oils and fuel shown in “Recommended Lubricants, Fuels, and Engine Coolant” on page 5-10. Prior to starting the engine, make sure the battery is fully charged and the battery case and the cables have not cracked.

Other Weather Environments

NOTE: If there is evidence of overheating of bearings or bushings, loose parts, or rust during regular inspection, increase the frequency of lubrication.

Based on experience and suggestions by lubricating oil suppliers, the lubricating intervals listed in the “Maintenance Schedule” on page 5-14 apply only to normal operating conditions. In harsh environments, including those with dusty and corrosive air, abnormal external temperature, extremely heavy overload, frequent operating times, longtime duty cycle, etc., lubricating intervals should be shortened. Always follow the “Maintenance Schedule” on page 5-14 until enough experience is obtained to establish a new schedule.

Check the Maintenance Log

The maintenance log lists regularly scheduled maintenance that should be performed by the operator or service personnel. All maintenance performed on the machine must be recorded in the maintenance log.

Daily Inspection and Maintenance

Do the following before operation with the engine off:

- Perform daily service as necessary.
- Inspect the machine for loose or missing components.
- Clean the cab.
- Check all controls for smooth operation and make sure they return to the neutral position.
- Make sure all safety decals are in place and are legible.
- Make sure safety equipment is in place and in operating condition.
- Check for fluid leaks.

Check the following during operation with the engine running:

- Monitor the control panel for normal machine operating parameters.
- Make sure that the machine operates normally.
- Check for fluid leaks.

Check the following after operation with the engine off and cool:

- Check service points for wear or damage.
- Clean the cab.
- Check for fluid leaks.
- Check for loose or missing fasteners and components.

RECOMMENDED LUBRICANTS, FUELS, AND ENGINE COOLANT

NOTICE!

Never mix lubricants of different types or viscosities (weights), and never overfill the system that is being serviced. Failure to follow this notice could damage the machine or cause it to operate improperly.

Component or System	Oil Type	Ambient Temperature								
		-22°F	-4°F	5°F	32°F	50°F	68°F	86°F	104°F	122°F
		-30°C	-20°C	-15°C	0°C	10°C	20°C	30°C	40°C	50°C
Engine (Yanmar 3TNV88F)	Engine oil				SAE 40W					
		SAE 5W-40								
		SAE 5W-30								
			SAE 10W-30							
				SAE 15W-40						
Swing machinery case Idler Final drive	Gear oil			SAE 30						
				SAE 15W-40						
Hydraulic system	Hydraulic oil			SAE 10W						
				SAE 10W-30						
				SAE 15W-40						
			ISO VG32							
					ISO VG46					
							ISO VG68			
Fuel tank	Diesel fuel				ASTM D 975 No.2					
				GB252 Super-20 diesel fuel						
			GB252 Super -35 diesel fuel							
Lubrication	Grease			NLGI No.2						
Cooling system	Engine coolant	See the engine manual or contact a SANY dealer for the recommended engine coolant.								

Fluid Capacities

The capacities shown in the table are approximate. For exact capacities, use the inspection points, inspection plugs, dipsticks, and sight glasses.

Model	Capacities				
	Fuel Tank	Hydraulic Tank	Engine Oil	Cooling System	Final Drive Lubricant
SY35U	10.6 gal. (40 L)	10.6 gal. (40 L)	1.8 gal. (6.7 L)	1.7 gal. (6.5 L)	0.18 gal. (0.7 L)

Hydraulic Oil Description

Hydraulic oil is an important part of the hydraulic system. Hydraulic oil lubricates hydraulic system components, carries heat away from components, and contains anti-corrosion additives and detergents.

Hydraulic system malfunctions are often caused by poor machine maintenance practices. Following the guidelines below will result in proper hydraulic system maintenance:

- Do not use any additives to the hydraulic oil.
- Replace hydraulic oil that has been subjected to overheating or damaged components.
- Change the hydraulic oil filter as recommended.
- Keep the hydraulic oil tank filled to the full level.
- Keep the oil cooler free of dust and debris.
- Cap and plug all openings after removing components for service or repair.

Lubrication and Grease

Always use clean extreme pressure (EP) grease when greasing the machine. Avoid using low-viscosity greases. SANY recommends EP 2 or equivalent designed lubricants for heavy-duty plain and rolling element bearings operating under severe conditions, including shock loading in wet environments.

Windshield Washer Fluid

Only use clean automotive windshield washer fluid. Do not mix concentrates into the washer fluid. In cold weather areas, use washer fluid with a low temperature rating.

Fuel

WARNING!

- **Fuel or fuel vapors that come into contact with hot surfaces or electrical components can cause a fire.**
- **Never service the fuel system near an open flame or while smoking.**
- **Clean up spilled fuel immediately.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

Never dilute fuels. Damage to the injection system can result, causing the machine to operate improperly.

Observe the following when adding fuel:

- Use #2 diesel fuel. Use a mixture of #2 diesel and #1 diesel fuels in cold weather climates.
- Use only ultra-low sulfur fuel, with a limit of S<15 mg/kg for all normal operations.
- SANY does not recommend the use of any diesel fuel with a cetane level less than 40.
- Do not use gasoline, kerosene, or any unapproved fuels in the fuel system.
- If fuel waxing or bacterial growth occurs in the fuel system, contact a SANY dealer.
- Make sure that there is no water or foreign material in the fuel. Take appropriate precautions to prevent fuel contamination during refueling.

Engine Coolant

WARNING!

- **Engine coolant is toxic. Avoid inhaling or ingesting engine coolant. If eyes or skin are contaminated by coolant, wash the affected area with plenty of water and seek medical treatment immediately.**
- **Engine coolant may be under pressure when the engine is hot. Avoid contact with hot engine coolant. Allow the engine to cool before removing the radiator cap.**

Failure to follow these warnings could result in death or serious injury.

Engine coolant is an important fluid protecting against overheating and freezing. Anti-freezing engine coolant is also necessary in regions where freezing protection is unnecessary:

- If using concentrated engine coolant, use distilled water to dilute per instructions on engine coolant container. Natural water, such as river water and well water (hard water), contains large amount of minerals (calcium, magnesium, etc.) which can form scale in the engine and radiator. Mineral scale is not easily removed and can cause overheating.
- Precautions in this manual must be followed when working with engine coolants.
- Some engine coolants are flammable. Keep them away from open fire.
- If the engine is overheating, wait for the engine to cool before refilling the engine coolant.

Other Approved Lubricants

NOTICE!

Commercially available service products may cause harm. Use only the service products recommended in this manual. Failure to follow this notice could damage the machine and could it to operate improperly.

Approved lubricants include:

- Any anaerobic sealant (thread-locking compound) having properties that offer high-temperature performance and oil tolerance to prevent the loosening of fasteners.
- Any lithium grease-based spray lubricant.
- Mineral spirits, Type II odorless and/or Class 1 (high flash point).

MAINTENANCE SCHEDULE

NOTICE!

Failure to perform the following procedures when and as directed could result in machine damage and improper machine operation.

1. Park the machine on a flat, firm surface.
2. Obtain the maintenance log for this machine and complete it at the close of all maintenance procedures.
3. Read and understand all of the procedures to be performed.
4. Prepare the machine for checks and inspections. See “Maintenance Safety” on page 2-8.
5. Allow the machine to cool before performing maintenance.

When Required

- Replace the primary air filter and secondary air filter according to the air filter restriction indicator. (See page 5-36.)
- Check the windshield washer fluid. (See page 4-11.)
- Check the track tension. (See page 5-67.)
- Replace the bucket teeth. (See page 5-82.)
- Replace the bucket. (See page 5-83.)
- Drain the water and sediment from the fuel tank. (See page 5-46.)

Daily or Every 10 Hours

- Lubricate the work equipment. (See page 5-75.)
- Drain the primary fuel filter/water separator. (See page 4-10.)
- Check for fluid leaks.
- Check the fuel lines. (See page 5-52.)
- Check the escape tool on cab machines. (See page 3-32.)
- Check the fire extinguisher. (See page 3-32.)
- Check the engine oil level. (See page 4-7.)
- Check the engine coolant level. (See page 4-6.)

- Check the hydraulic oil tank level. (See page 4-11.)
- Check the hydraulic oil pump mounting fasteners. (See page 5-65.)
- Check the hydraulic line connections. (See page 5-65.)
- Check the sheet metal. (See page 5-83.)
- Check the idlers. (See page 5-70.)
- Check the decals. (See page 2-3.)
- Check the air conditioner compressor belt on cab machines. (See page 5-44.)
- Check the fan belt. (See page 5-35.)
- Check the windshield locks on cab machines. (See page 5-23.)
- Check the mirrors. (See page 4-15.)
- Check the electrical system. (See page 4-12.)
- Check the fuel level. (See page 4-8.)
- Check component operating functions. (See page 5-84.)
- Check the air conditioner on cab machines. (See page 3-27.)
- Check the Operation and Maintenance Manual. (See page 5-86.)

After the First 50 Hours

- Initial change of the engine oil and filter. (See page 5-33.)

Weekly or Every 50 Hours

- Check the exhaust system. (See page 5-37.)
- Check the battery. (See page 5-52.)
- Check the air filter system. (See page 5-36.)
- Check the hydraulic hoses, lines, and connectors. (See page 5-65.)
- Check the final drive oil level. (See page 5-72.)
- Check the final drive motor mounting fasteners. (See page 5-71.)
- Check the carrier roller fasteners. (See page 5-70.)
- Check the track tension. (See page 5-67.)

- Adjust the track tension. (See page 5-68.)

Every 100 Hours

- Lubricate the machine. (See page 5-19.)
- Lubricate the swing bearing. (See page 5-80.)

After the First 100 Hours

- Initial replacement of the hydraulic oil return filter. (See page 5-60.)

Monthly or Every 250 Hours

Make sure all daily and 50-hour maintenance tasks have been completed before proceeding with the 250-hour maintenance tasks.

- Inspect and adjust air conditioner compressor belt tension. (See page 5-44.)
- Change the engine oil and filter. (See page 5-33.)
- Check the doors and hood. (See page 5-21.)
- Check the track tension. (See page 5-67.)
- Check the track assembly. (See page 5-67.)
- Check the fuses. (See page 5-28.)
- Initial change of the final drive oil (See page 5-73.)
- With a breaker operating above 50%, replace the hydraulic oil return filter. (See page 5-60.) Otherwise, see “Hydraulic Breaker Maintenance Interval” on page 5-18.
- Clean/replace ventilation filter screen on cab machines. (See page 5-43.)

Every 3 Months or 500 Hours

Make sure all daily, 50-hour, and 250-hour maintenance tasks have been completed before proceeding with the 500-hour maintenance tasks.

- Check the upper structure and undercarriage. (See page 5-87.)
- Check the final drive oil level. (See page 5-72.)
- Check the hydraulic lines and hoses. (See page 5-65.)
- Check the hydraulic pump. (See page 5-65.)
- Inspect the engine coolant pump. (See page 5-41.)

- Clean the radiator, oil cooler, and air conditioner condenser fins. (See page 5-42.)
- Lubricate the swing bearing. (See page 5-80.)
- Lubricate the swing pinion gear. (See page 5-81.)
- Replace the hydraulic tank breather filter. (See page 5-58.)
- Replace the primary fuel filter. (See page 5-49.)
- Replace the secondary fuel filter. (See page 5-48.)
- Replace the engine secondary air filter. (See page 5-36.)
- Collect engine oil sample. (See page 5-31.)
- Collect hydraulic oil sample. (See page 5-64.)
- Collect final drive oil samples (both sides). (See page 5-74.)

Every 6 Months or 1000 Hours

Make sure all daily, 50-hour, 250-hour, and 500-hour maintenance tasks have been completed before proceeding with the 1000-hour maintenance tasks.

- Check the exhaust system mounting hardware. (See page 5-37.)
- Check the fuel tank strainer. (See page 5-51.)
- Check the fuel lines. (See page 5-52.)
- Check the accumulator function. (See page 5-56.)
- Change the engine coolant. (See page 5-39.)
- Replace the hydraulic tank breather filter. (See page 5-58.)
- Replace the hydraulic oil pilot filter. (See page 5-59.)
- Replace the hydraulic oil tank return filter. (See page 5-60.)

Every 1500 Hours

- Inspect the crankcase breather system. (See page 5-38.)

Annually or Every 2000 Hours

Make sure all daily, 50-hour, 250-hour, 500-hour, and 1000-hour maintenance tasks have been completed before proceeding with the 2000-hour maintenance tasks.

- Pressure wash and clean the entire machine. Do a complete machine structural inspection.

- Check the engine valve clearance. (Contact a SANY dealer for information.)
- Inspect the alternator. (See page 5-36.)
- Inspect the starter. (See page 5-37.)
- Clean the hydraulic oil suction strainer. (See page 5-62.)
- Change the hydraulic oil. (See page 5-63.)
- Change the final drive oil. (See page 5-73.)

Annually or Every 4000 Hours

- Check the air conditioner compressor function and look for leaks. (See page 5-43.)

After Maintenance is Completed

Record the completion of all of the maintenance tasks in the Maintenance Log. If authorized, remove all lockout/tagout warnings and machine-securing elements and fully activate the machine. Return the machine to operation.

Hydraulic Breaker Maintenance Interval

Hydraulic oil breaks down faster on machines equipped with a hydraulic breaker than on machines equipped with a bucket. Follow the steps below to set the service intervals:

1. Initial hydraulic filter maintenance must be carried out after the first 100 hours.
2. Hydraulic oil return filter must be replaced every 250 hours with a breaker operating rate above 50%.
3. Change the hydraulic oil according to the change interval shown in the chart.

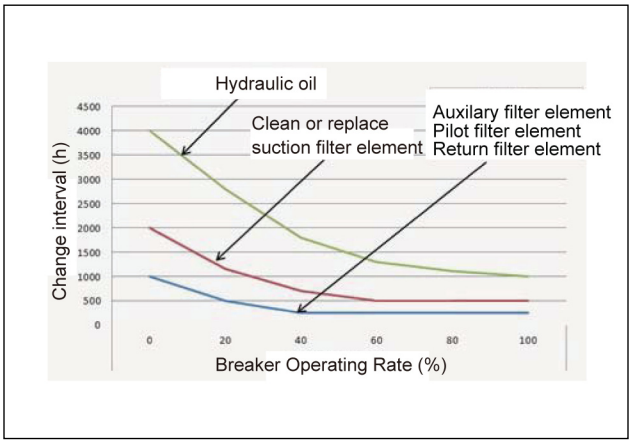


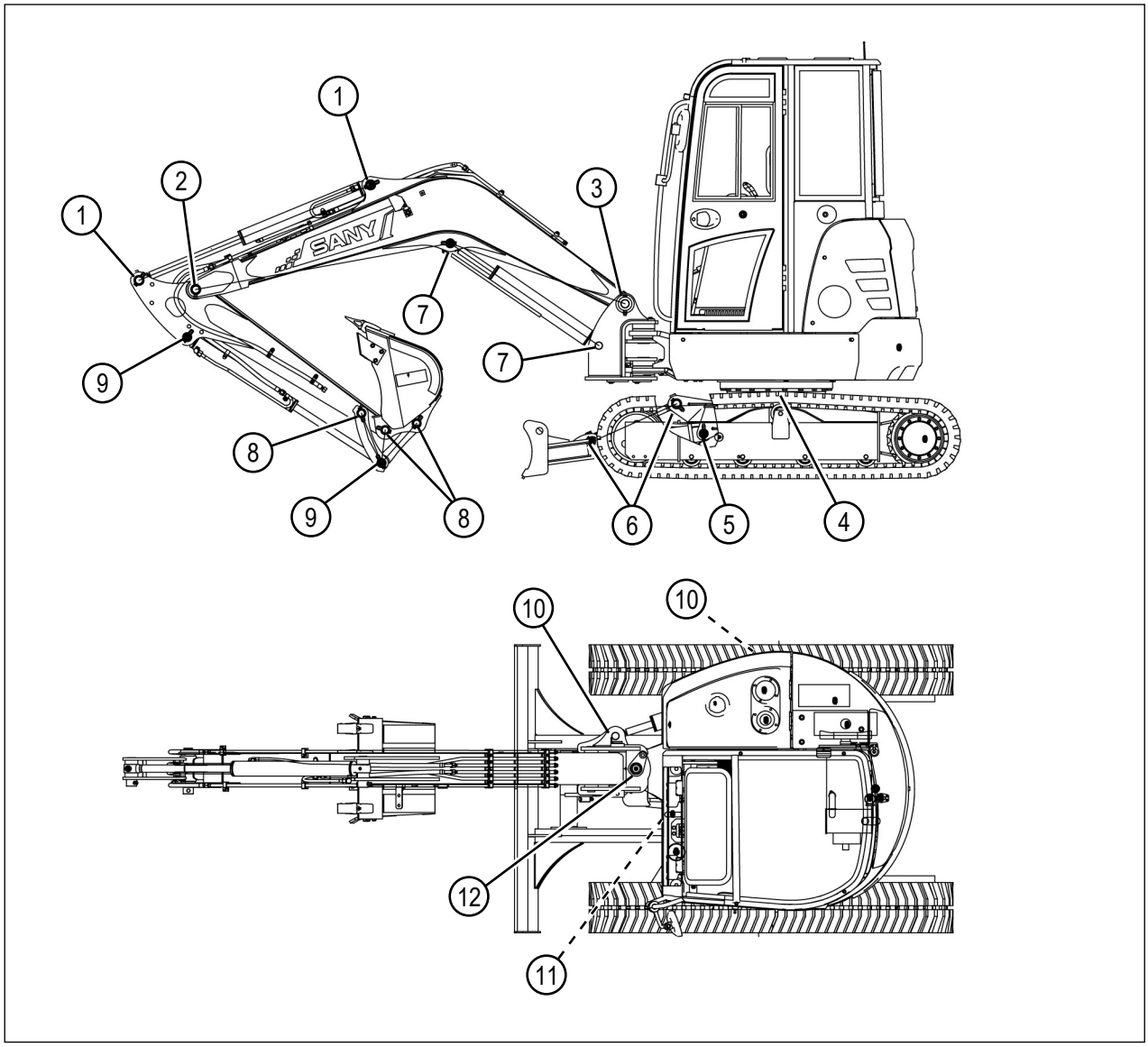
Fig. 5-1 0001636

Lubrication and Maintenance Charts

Lubricants minimize wear between moving parts. Insufficient lubrication will lead to excessive wear and damage to components. Engine oil is critical for engine operation. Never use lubricants that are not SANY-approved.

Clean grease fittings before applying grease. Use a grease gun to pump grease into the fitting until old grease begins to escape. Clean off any grease that has escaped.

Shown below are the lubrication points that must be maintained according to the lubrication chart. See “Lubrication Points” on page 5-75.



0001635

Fig. 5-2

Lubrication Chart							
Item	Maintenance Items	Qty.	Lubrication Interval				Lubricant
			Daily	100 hr.	250 hr.	500 hr.	
1	Arm cylinder pins	2		○			Grease
2	Boom-arm connecting pin	1		○			
3	Boom pin	2		○			
4	Swing bearing	2				○	
5	Dozer blade linkage pins	2		○			
6	Dozer blade cylinder pins	2		○			
7	Boom cylinder pins	2		○			
8	Bucket linkage pins	3	○				
9	Bucket cylinder pins	4	○				
10	Boom swing cylinder pins	2		○			
11	Swing gear	1				○	
12	Boom swing pin	2			○		

Replacement Item Intervals								
Replacement Items	When Required	10 hr.	50 hr.	100 hr.	250 hr.	500 hr.	1000 hr.	2000 hr.
Engine oil and filter		○	▲		△			
Engine coolant		○					△	
Fuel/water separator element		□				△		
Fuel filter						△		
Primary air filter	△							
Secondary air filter	△							
Hydraulic tank breather filter							△	
Hydraulic pilot filter							△	
Hydraulic suction strainer	△							□
Hydraulic return filter				▲			△	
Hydraulic oil								△
Final drive oil						△		△

The charts indicate service intervals for lubrication, maintenance, and replacement. The following symbols indicate the type of service:

- ○ Maintenance/lubrication.
- △ Replacement.
- ▲ Initial replacement on a new machine.
- □ Clean or drain as applicable.

ACCESSORY LIGHT OUTLET

An accessory light (12V) outlet (1) is located in the engine compartment and is used for operating an accessory light.

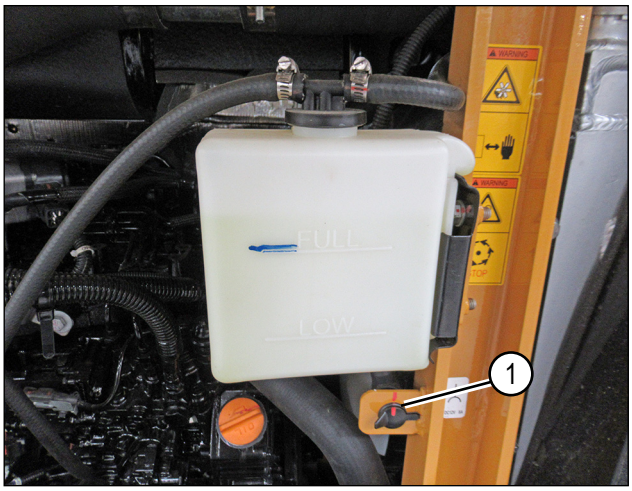


Fig. 5-3 0003786

DOORS, WINDSHIELD, AND HOOD

NOTE: Illustrations show a cab machine. Canopy machines are similar for non-cab-related items.

The following can be locked using the machine key to prevent unauthorized access:

- Fuel tank filler cap. See “Fuel Tank Filler Cap” on page 4-9.
- Cab door (1)
- Engine hood (2)

Fig. 5-4 0003785

- Right rear access door (3)

Fig. 5-5 0003770

- Right front access door (4)

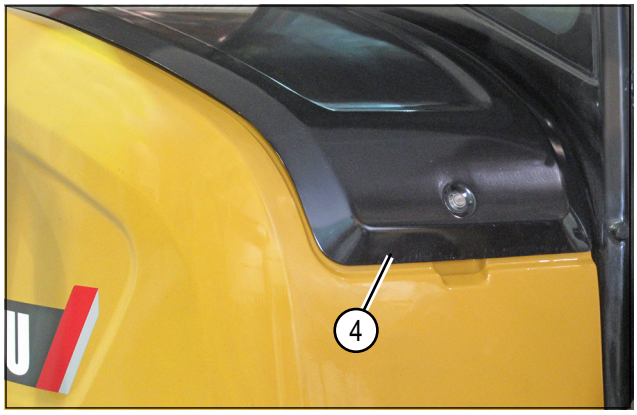


Fig. 5-6 0002991

- Fuse access door (5)

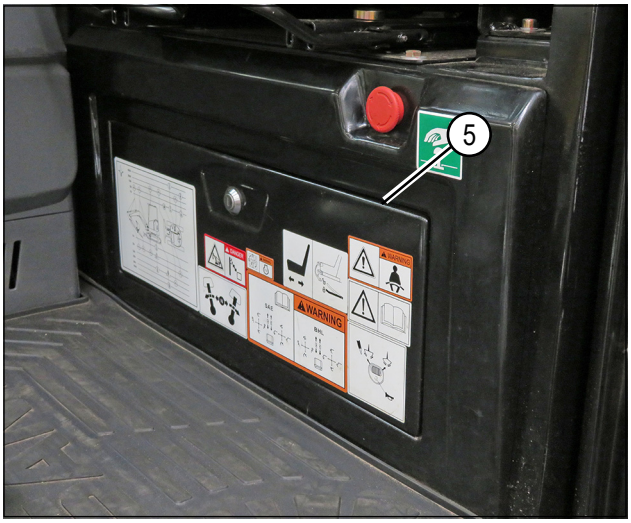


Fig. 5-7 0004629

Cab Door

The cab door can be locked (1) when closed.

Secure the cab door in position after opening it using the cab door latch:

1. Pull the door handle (2) to open and push the cab door open until the catch (3) engages the latch (4).

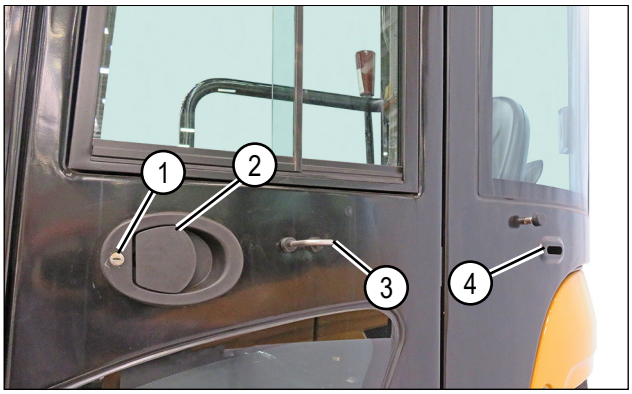


Fig. 5-8 0004631

2. To release the cab door from the catch, push down on the release lever (5) on the left side of the operator seat.

Fig. 5-9 0003000

Inspect and Lubricate the Cab Door

1. Check the body (1) of the cab door lock for loose or damaged components. Make sure the cab door closes tightly and latches securely. Contact a SANY dealer if repairs are required.

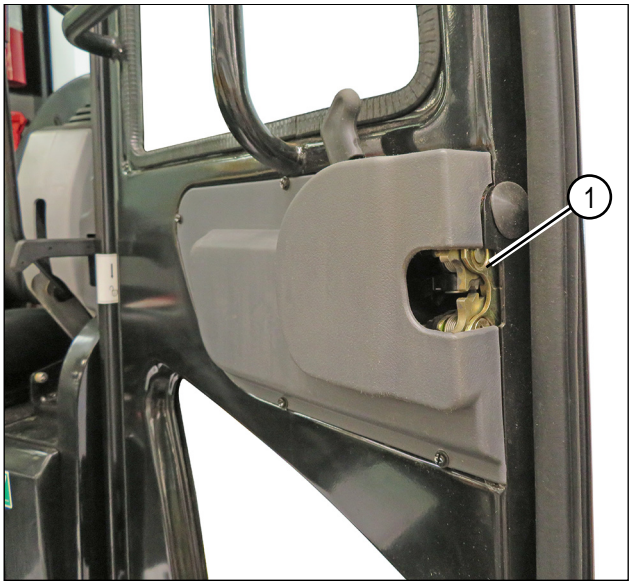


Fig. 5-10 0004630

2. Check that the lock catch (2) of the cab door lock is secure and has no excessive wear or damage.

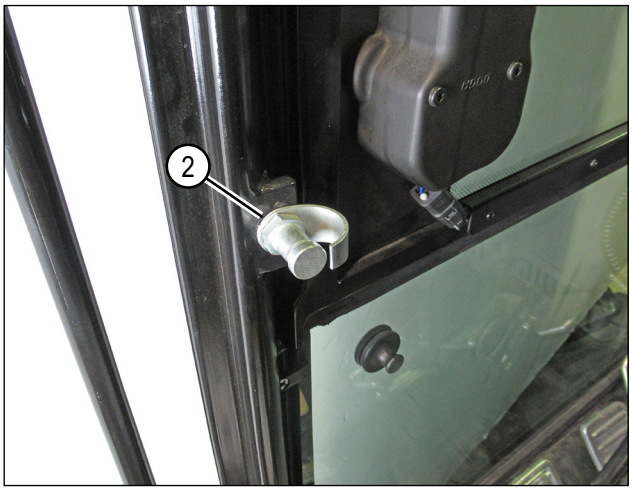


Fig. 5-11 0003193

3. Grease the two cab door hinges (3) until grease comes out of the hinges. Wipe off excess grease.

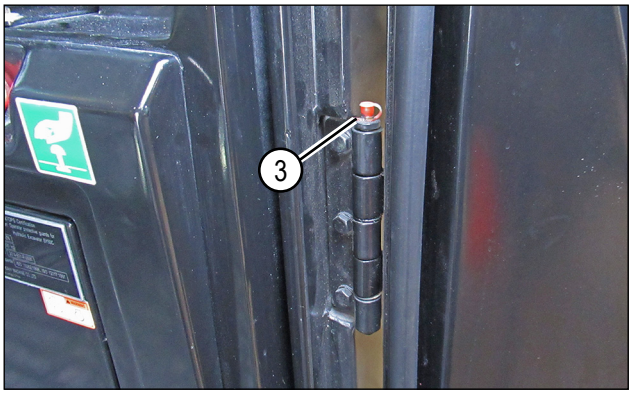


Fig. 5-12 0003195

Windshield

Inspect the Windshield Mechanisms

1. Check the windshield latches (4), linkages (5), and struts (6) inside the cab for loose or damaged components.

2. Make sure the windshield closes tightly and latches securely.

   NOTE: The left side is shown. The right side is similar.

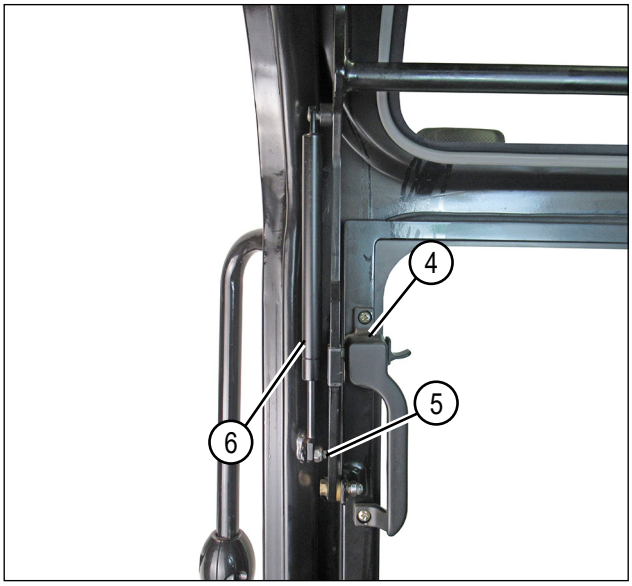


Fig. 5-13 0003194

Engine Hood

Opening the Engine Hood

1. Insert the key into the lock (1) and turn the key clockwise to unlock the hood (2).

2. Press the lock button to release the latch and open the engine hood.

Fig. 5-14 0002992

Closing the Engine Hood

1. Close the right rear access (2) door before closing the engine hood (1).

2. Close the engine hood and make sure it is firmly seated in the latch (3).

3. Insert the key into the lock and turn counterclockwise to lock the latch. Remove the key.

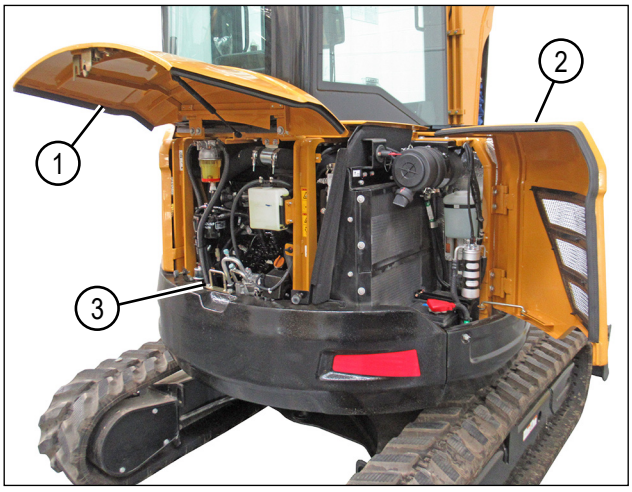


Fig. 5-15 0003770

Right Rear Access Door

Opening the Right Rear Access Door

1. The engine hood (1) must be opened, as shown, before the right rear access door (2) can be opened. See “Engine Hood” on page 5-25.

2. Pull the door open (2). There is no latch. The door is secured by the engine hood.

3. Secure the door in position by placing the support rod (4) into a slot on door bracket (3).

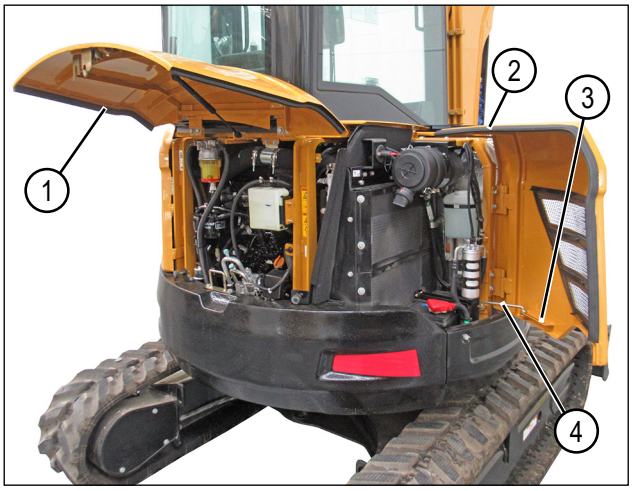


Fig. 5-16 0003770

Closing the Right Rear Access Door

Move the support rod (4) out of the door bracket (3) and close the door. There is no latch. The door is secured by the engine hood.

Right Front Access Door

Unlocking/Opening the Right Front Access Door

1. Insert the key into the right front access door lock (1).

   NOTE: Insert the key all the way into the lock. The key may break if turned before it is fully inserted.

2. Turn the key clockwise to unlock the right front access door.

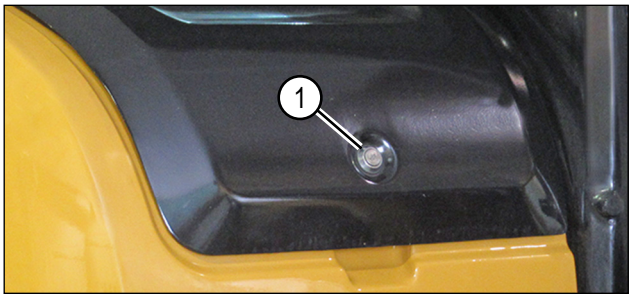


Fig. 5-17 0003001

Lift the right front access door until the support arm holds the door open in one of two positions.

Closing/Locking the Right Front Access Door

1. Lift the access door support arm (1) up slightly from the support position, close the access door, and insert the key.

2. Turn the key counterclockwise to lock. Remove the key.

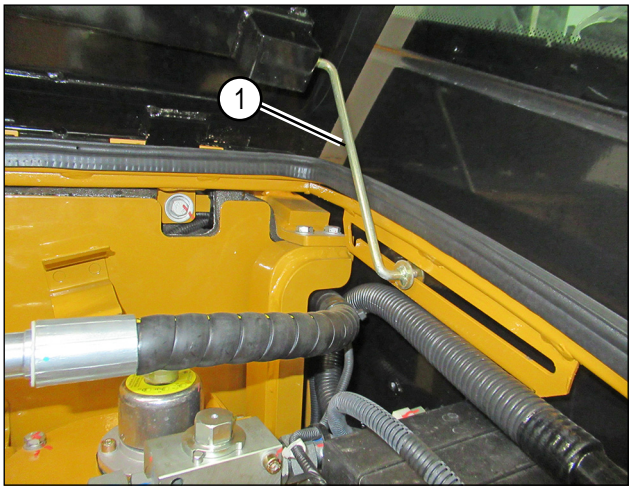


Fig. 5-18 0003859

Fuse Access Door

NOTE: The illustration shows a cab machine. Canopy machines are similar.

Unlocking/Opening the Fuse Access Door

1. Insert the key into the fuse access door lock (2).

   NOTE: Insert the key all the way into the lock. The key may break if turned before it is fully inserted.

2. Turn the key clockwise to unlock the fuse access door (1). Remove the key and lower the door.

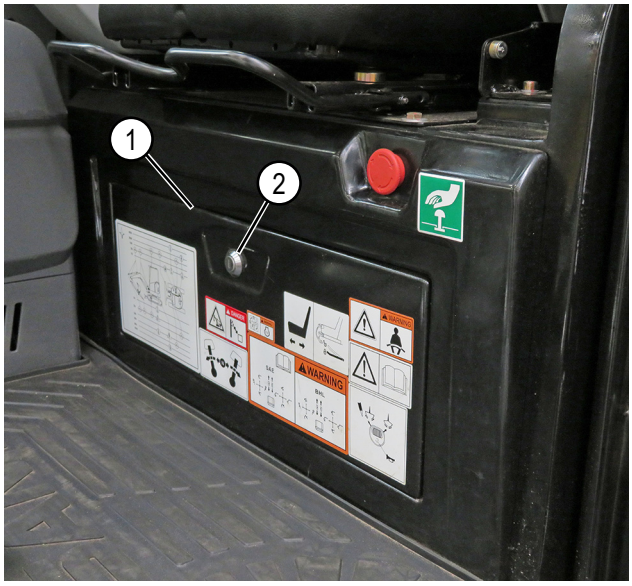


Fig. 5-19 0004629

Closing/Locking the Fuse Access Door

1. Raise the fuse access door to the closed position and insert the key.

2. Turn the key counterclockwise to lock. Remove the key.

FUSES

NOTICE!

- **A fuse should be replaced if it is blown, corroded, or becomes loose in the fuse block.**
- **Before replacing a fuse, make sure the key switch is in the OFF position and the batteries are disconnected.**
- **Always replace a fuse with one of the same capacity. Never replace a fuse with a higher capacity fuse, which could damage the machine or cause it to operate improperly.**

Access the Fuse Panel

If an electrical component fails, check the fuse first. The fuse and relay box is located under the operator's seat.

1. Always turn the battery disconnect switch to off before checking or replacing fuses. See "Battery Disconnect Switch" on page 3-21.

2. Unlock and open the access door (1) under the operator's seat to access the fuse panel (2). See "Fuse Access Door" on page 5-27.

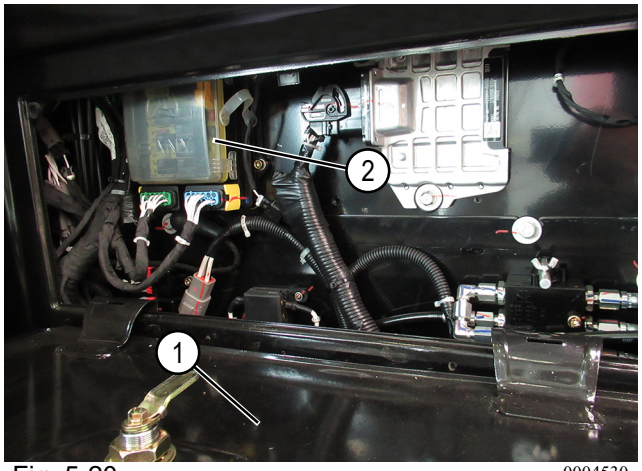


Fig. 5-20 0004530

3. Remove the transparent fuse cover (3) by gently pulling out on the bottom of one of the four latches (4) while lifting up the adjacent corner of the cover. Repeat for the other three tabs to release the cover.

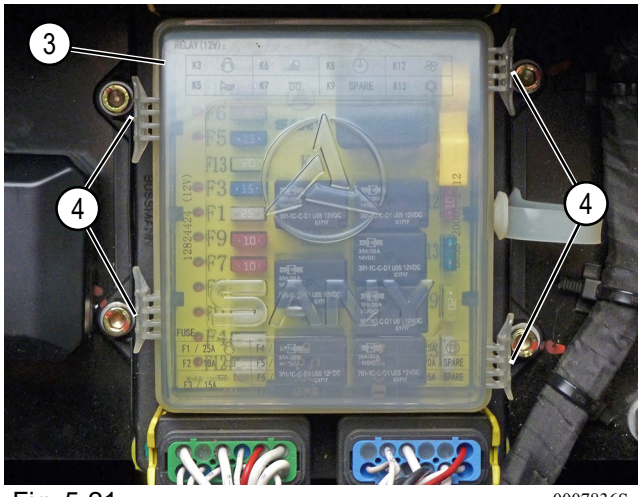


Fig. 5-21 0007836S

Replacing a Fuse

1. Use the fuse removal and installation tool (1) to pull a blown fuse and install a new fuse.

2. Spare fuses (2) can be used for replacing a blown fuse. Always replace a fuse with a fuse of the same amperage rating.

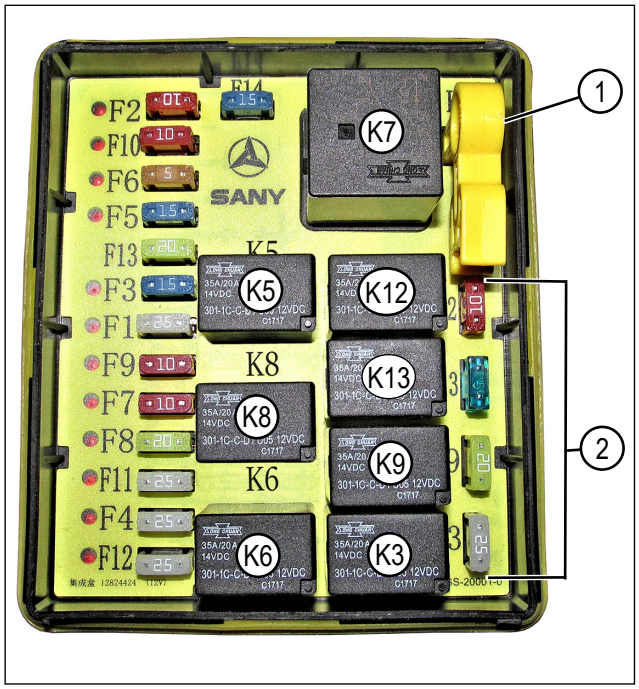


Fig. 5-22 0002998

Fuse Circuits

Fuse	Amperage	Circuit
F1	25A	Starting
F2	10A	Battery charging
F3	15A	Cab dome light, horn, and accessory light
F4	25A	Work light
F5	15A	Washer, beacon wiper, and radio
F6	5A	HVAC control panel
F7	10A	Global positioning system (GPS)
F8	20A	HVAC system fan
F9	10A	Power outlet (12V)
F10	10A	AC compressor
F11	25A	Monitor controller
F12	25A	Fuel pump
F13	20A	Reserved for future circuit
F14	15A	Reserved for future circuit

Relay Circuits

Contact a SANY dealer for troubleshooting electrical problems with the machine.

Relay	Amperage	Circuit
K3	12V/35A	Starting
K5	12V/35A	Horn
K6	12V/35A	Work lights
K7	12V/35A	Cold weather starting
K8	12V/35A	Monitor power down
K9	12V/35A	Spare
K12	12V/35A	HVAC system fan
K13	12V/35A	AC compressor

MAINTENANCE PROCEDURES

Engine

WARNING!

Maintenance and service must be performed with the engine off unless otherwise indicated.

- **Shut off the engine before opening or removing the engine cover.**
- **Remove the key and turn the battery disconnect switch to the OFF position.**

Failure to follow these warnings could result in death or serious injury.

CAUTION!

Do not perform engine maintenance when the engine is hot. Hot engine oil or engine components may cause severe burns. Allow the engine to cool before performing engine maintenance. Failure to follow this caution could result in injury.

Engine Inspection

Always turn off the engine and turn the battery disconnect switch to OFF (unless otherwise specified) before inspecting the engine or performing maintenance or service procedures.

Regular inspection of the engine and engine compartment helps identify potential problems and prevents defects that may lead to service interruption and costly repair.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Shut the engine off and open the engine hood. See “Opening the Engine Hood” on page 5-25.
3. Inspect the engine and engine compartment for:
    - Oil, fuel, and engine coolant leaks.
    - Loose fasteners and connections.
    - Worn or loose belts.
    - Damaged hoses and wiring harnesses.

Prestart Inspection

For more information, see “Daily Inspection and Maintenance” on page 5-9.

Prestart Check	Reference
Check the engine coolant level and add engine coolant as necessary.	“Check the Engine Coolant Level” on page 4-6.
Check the engine oil level and add engine oil as necessary.	See “Engine Oil Level Check” on page 4-7.
Check the fuel level and add fuel as necessary.	See “Fuel Level Check” on page 4-8.
Drain water from the fuel.	See “Check and Drain the Primary Fuel Filter/Water Separator” on page 4-10.
Check the hydraulic oil level and add hydraulic oil as necessary.	See “Check the Hydraulic Oil Level” on page 4-11.
Check the electrical wires and connectors for damage.	See “Electrical Components Check” on page 4-12.
Check the horn operation.	See “Horn Function Check” on page 4-12.

Collect Engine Oil Sample

NOTE: Engine oil samples are taken every 3 months or every 250 operating hours.

1. Obtain an oil analysis sample kit from a SANY dealer.
2. Operate the machine until the engine oil is up to normal operating temperature.
3. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

NOTICE!

It is critical that all material used to collect the sample is absolutely clean.

Failure to follow this notice could damage the machine, cause it to operate improperly, or contaminate the sample.

4. Clean the area around the engine oil dipstick and remove the dipstick.
5. Insert the oil sample tube into the dipstick tube and collect a sample of engine oil. Replace the dipstick.
6. Send the sample for testing according to the instructions packaged with the sample kit.

Check the Engine Oil Level

WARNING!

Hot oil and engine components may cause burns or other serious injury. Allow the engine to cool before performing engine maintenance. Failure to follow this warning could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the engine hood.
3. Remove the dipstick (1) and wipe off the engine oil with a clean cloth.
4. Fully insert the dipstick into the dipstick opening, then remove it and note the oil level on the dipstick.

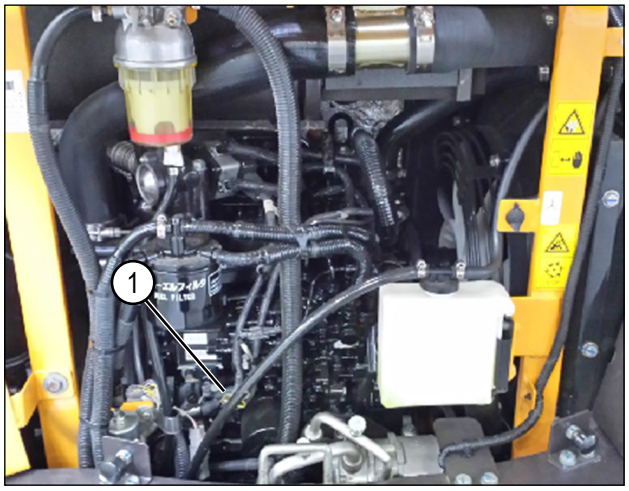


Fig. 5-23 0003773

NOTICE!

Do not add oil past the upper mark on the dipstick, as this may result in engine damage.

5. The engine oil level must be maintained between the upper mark (2) and lower mark (3) of the dipstick. Add clean engine oil until the oil level is at the upper mark of the dipstick.

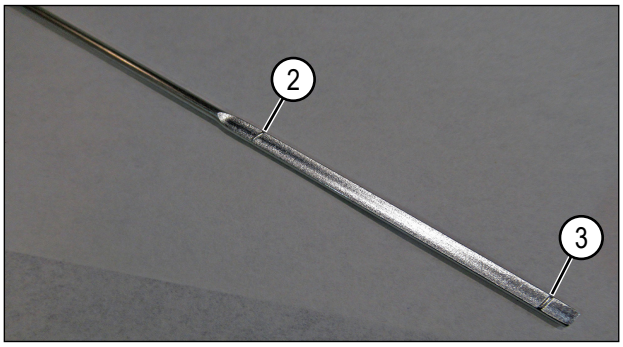


Fig. 5-24 0002770

6. Add engine oil through the filler port (4) as required. Always use SANY-recommended engine oil.

   NOTE: If the oil level is above the upper mark on the dipstick, drain the excess oil. See “Change the Engine Oil and Filter” on page 5-33.

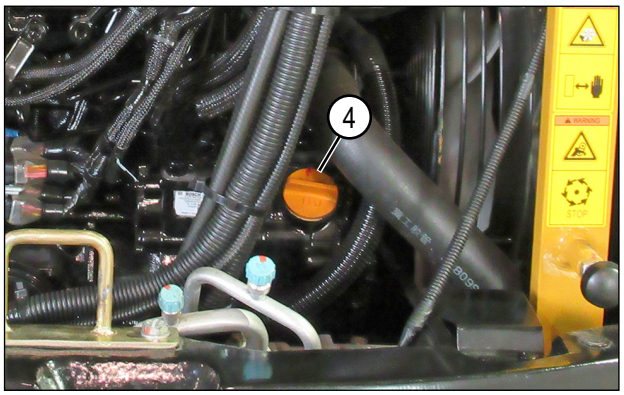


Fig. 5-25 0002771

Change the Engine Oil and Filter

NOTE: See “Fluid Capacities” on page 5-11 for the engine oil capacity.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

NOTICE!

Dispose of used oil and filters in according to all applicable environmental regulations. Failure to do so could damage the environment.

2. Remove the four fasteners (1) and oil drain cover (2).

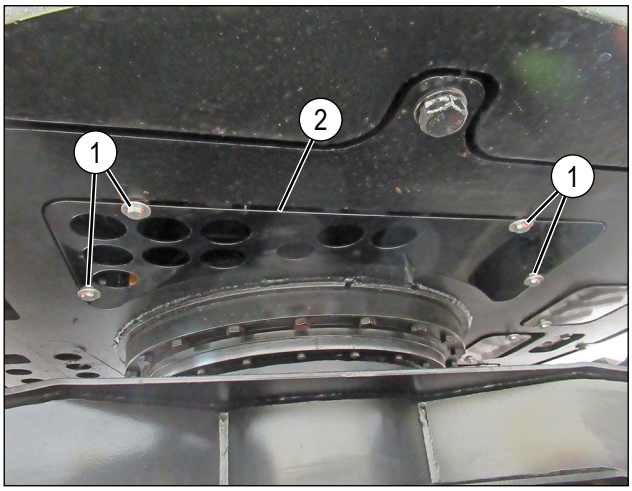


Fig. 5-26 0003858

3. Place a suitable container under the engine oil drain plug (4).
4. Remove the engine oil drain plug and allow the oil to completely drain.
5. Install and tighten the engine oil drain plug.
6. Install oil drain cover and fasteners.

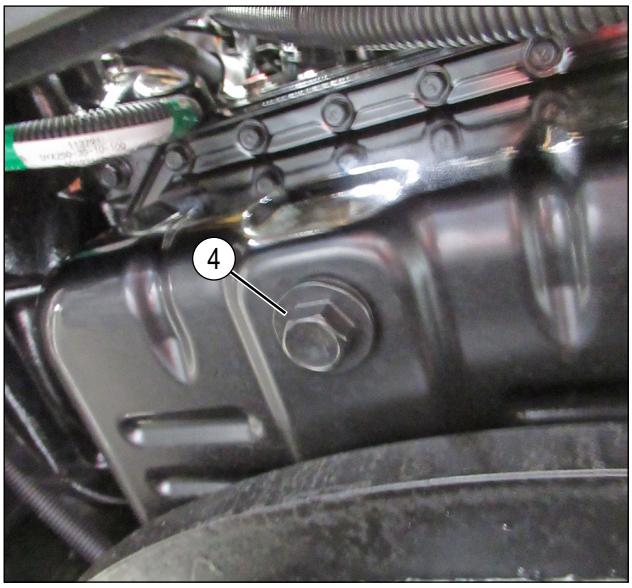


Fig. 5-27 0003838

7. Open the engine hood. See “Opening the Engine Hood” on page 5-25.

8. Remove the oil filter (6).

9. Clean the oil filter housing mating surface as necessary to remove O-ring residue. Inspect the threads.

10. Apply a thin layer of engine oil to the new oil filter O-ring gasket.

11. Install the new oil filter by hand until the oil filter O-ring touches the oil filter housing.

12. Tighten the oil filter 3/4 to 1 full turn by hand to securely install the oil filter.

    NOTE: Overtightening the filter may damage the O-ring, resulting in an oil leak.

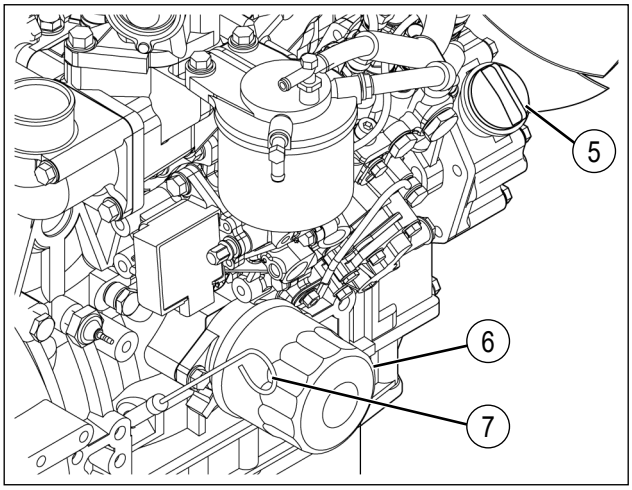


Fig. 5-28 0003864

13. Remove oil filler cap (5).

    NOTE: See “Fluid Capacities” on page 5-11 for the engine oil capacity, and “Recommended Lubricants, Fuels, and Engine Coolant” on page 5-10 for the proper engine oil.

14. Add engine oil until the oil level is at the upper mark on the dipstick (7). See “Engine Oil Level Check” on page 4-7.

15. Install the oil filler cap.

16. Start and run the engine at low idle for 5 minutes. See “Starting the Engine” on page 4-16.

17. Stop the engine and check the engine oil level. Add oil as necessary.

Check and Adjust the Fan Belt Tension

NOTICE!

- **A loose fan belt may cause improper battery charging, engine overheating, or accelerated fan belt wear.**
- **An overtightened fan belt may damage the belt, the bearings in the alternator, and the engine coolant pump.**

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Check the fan belt tension:
   - Use a tensioning gauge to check the tension of the fan belt. The fan belt should be tightened to 22 lbf. (98 N).
   - Check the fan belt tension by pressing down on the fan belt between the fan pulley (1) and the alternator pulley (2). The fan belt must deflect (3) 0.35 in.–0.47 in. (9 mm–12 mm).

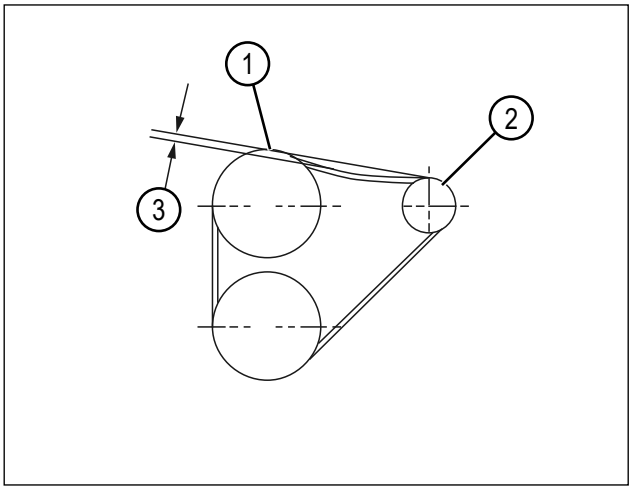


Fig. 5-29 0003092

3. Adjust the belt if it is outside of specification.
4. Loosen the adjusting plate fastener (4) and alternator bracket fastener (5).
5. Use a lever between the alternator and adjusting plate bracket to properly tension the belt.
6. Hold the alternator in this position and tighten the adjusting plate fastener.
7. Tighten the alternator bracket fastener.
8. Check the fan belt tension to confirm adjustment.

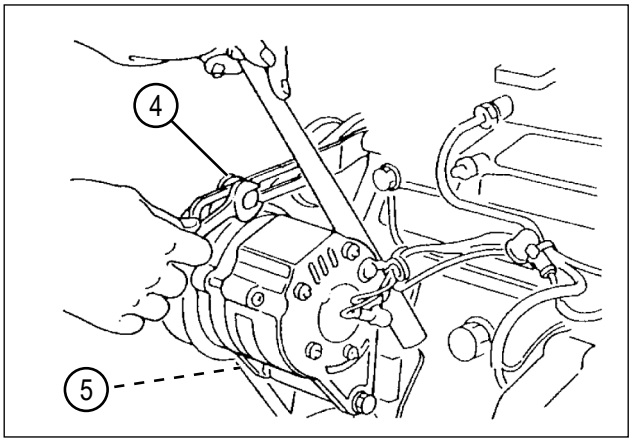


Fig. 5-30 0003865

Replace the Fan Belt

Visually inspect the condition of the belt. Fan belts that have been exposed to oil or engine coolant, or show signs of damage or wear, must be replaced.

Contact a SANY dealer if the fan belt needs to be replaced.

Check and Replace the Engine Air Filters

NOTICE!

Shut off the engine to prevent dirt from entering the engine and causing damage when checking or replacing the air filters.

Check the Engine Air Filters

The air cleaner assembly is equipped with an air filter restriction indicator (3). When the service indicator window is red, airflow through the filter is restricted and the primary air filter element must be replaced. Reset the air filter restriction indicator after servicing by pressing the end of the indicator body.

Replace the secondary air filter every 500 hours.

The dust valve (1) is at the bottom of the end cover (2). When the engine is off, the dust valve should be closed; if not, replace the dust valve.

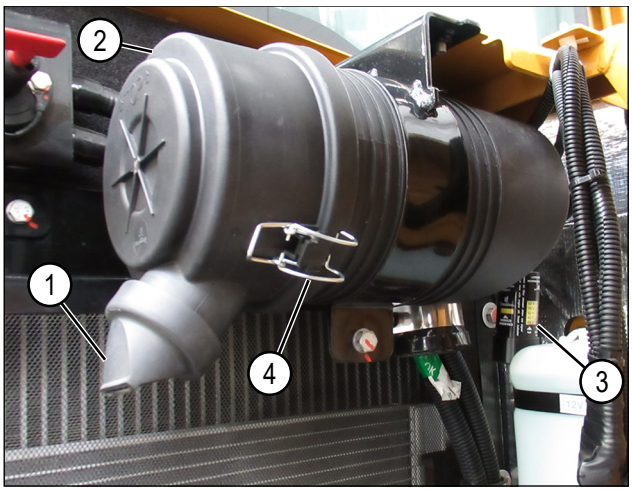


Fig. 5-31 0003839

Replace the Engine Air Filters

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Release the two latches (4) and remove the end cover.

   NOTE: Clean the interior of the housing before removing the primary filter element.
3. Remove the primary filter element (6) and then the secondary filter element (5).
4. Installation is in the reverse order of removal.

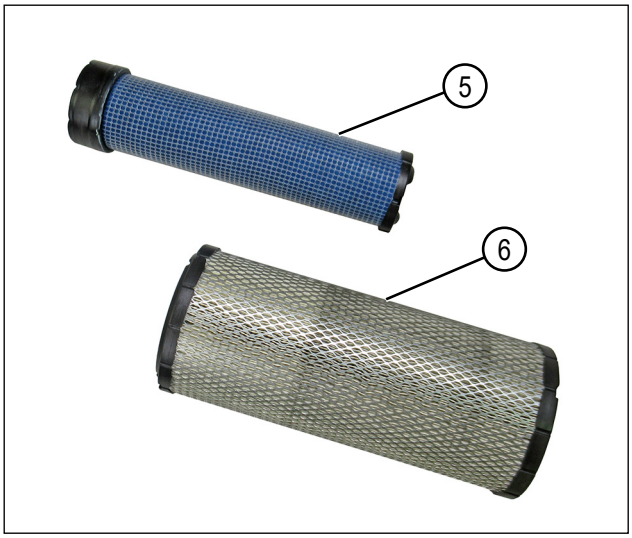


Fig. 5-32 0003093

Check the Alternator

Prepare the machine for service. See “Maintenance Safety” on page 2-8.

Check the alternator for abnormal noise and operation. If the alternator is malfunctioning, the brushes or bearings may have reached the end of their service life and may need to be replaced. Contact a SANY dealer for additional information.

Check the Starter

Prepare the machine for service. See “Maintenance Safety” on page 2-8.

Check the starter motor for abnormal noise and operation. If the starter is malfunctioning, contact a SANY dealer for additional information.

Check the Exhaust System

WARNING!

Never operate a machine with a damaged or defective exhaust system, exhaust leaks, or restrictions. Failure to follow this warning could result in death or serious injury.

1. Open the engine hood (1). See “Opening the Engine Hood” on page 5-25.

   NOTE: A cab is shown. Canopy machines are similar.

2. Remove four fasteners (2) and the left rear panel (3).

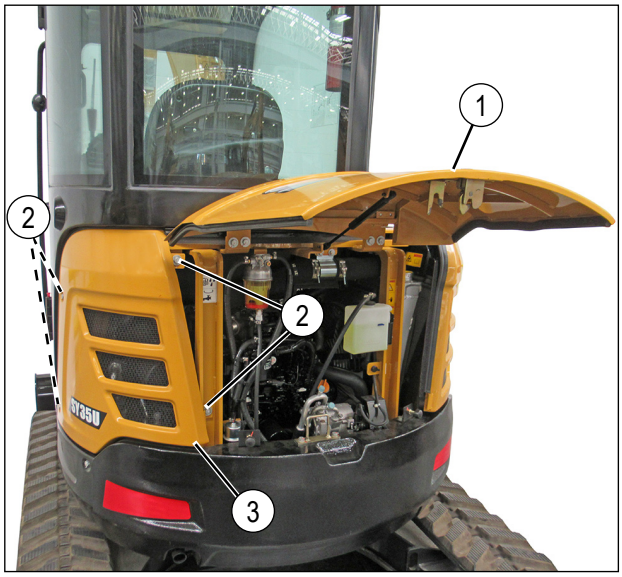


Fig. 5-33 0003854

3. Inspect the muffler (4) and its mount for leaks or signs of damage.

4. Make sure the exhaust pipe (5) is clear and not restricted.

5. Check the connection to the expansion pipe to be sure there are no signs of leakage.

   NOTE: If any abnormality is found, contact a SANY dealer for repairs.

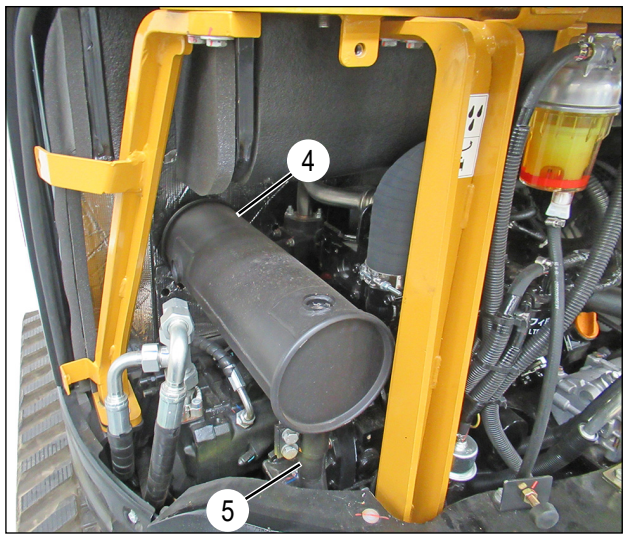


Fig. 5-34 0003853

Inspect Engine Crankcase Breather System

The crankcase breather system is required to be inspected every 1500 hours to maintain the emission requirements of the engine.

The crankcase breather system has a spring-backed diaphragm in the valve cover. When the crankcase pressure reaches a predetermined level, the diaphragm opens a passage that allows crankcase fumes to be routed to the intake manifold.

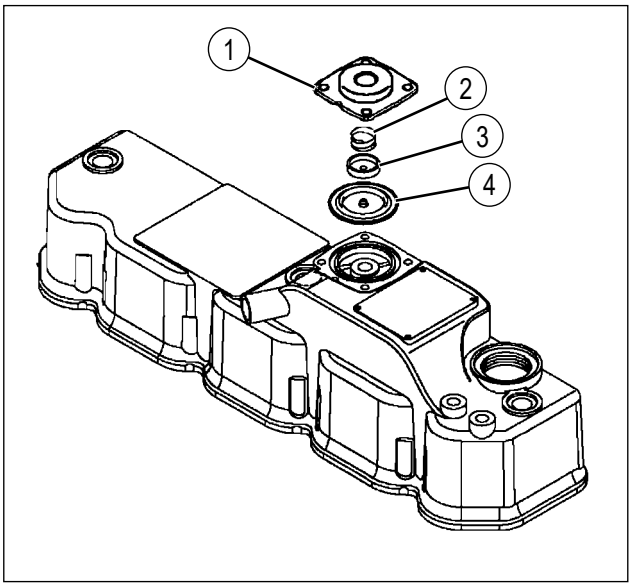


Fig. 5-35 0005030

To inspect the diaphragm and spring:

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Remove the fasteners and diaphragm cover (1).
3. Remove the spring (2), diaphragm plate (3), and diaphragm (4).
4. Inspect the diaphragm for damage and the spring for distortion. Replace components if necessary.
5. Install the diaphragm, diaphragm plate, spring and diaphragm cover. Tighten the fasteners.

Engine Cooling System

WARNING!

Never operate a machine with a damaged or defective exhaust system, exhaust leaks, or restrictions. Failure to follow this warning could result in death or serious injury.

Check the Engine Coolant Level

See “Check the Engine Coolant Level” on page 4-6.

Change the Engine Coolant

WARNING!

- **Engine coolant is toxic. Avoid inhaling or ingesting engine coolant. If eyes or skin are contaminated by coolant, wash the affected area with plenty of water and seek medical treatment immediately.**
- **Do not remove the radiator cap while the engine is hot. Engine coolant may be under pressure when the engine is hot. Avoid contact with hot engine coolant. Allow the engine to cool before removing the radiator cap.**

Failure to follow these warnings could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the engine hood. See “Opening the Engine Hood” on page 5-25.
3. Slowly loosen and remove the radiator cap (1).

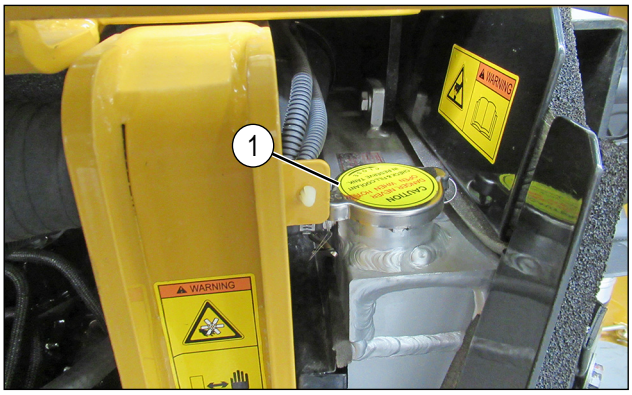


Fig. 5-36 0003841

4. From under the radiator, remove four fasteners (2) and cover (3).

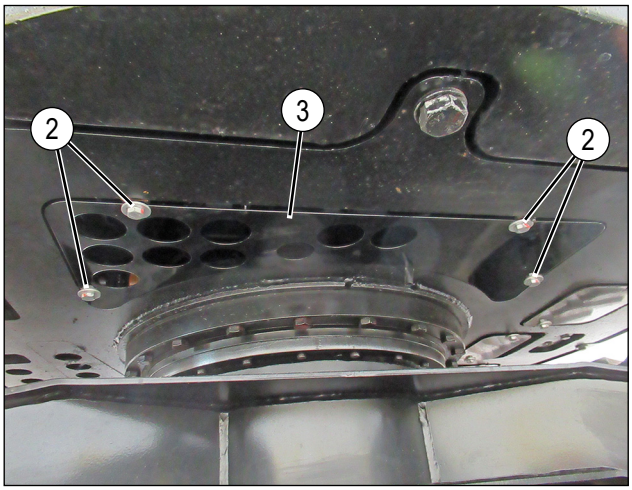


Fig. 5-37 0003858

NOTE: See “Other Approved Lubricants” on page 5-13 for cooling system capacity. Use a catch container of adequate size for this capacity.

5. Trace the drain hose (4) from the drain valve (5) to where it exits the bottom of the machine. Place an appropriate container under the drain hose. Open the drain valve and allow the engine coolant to drain.

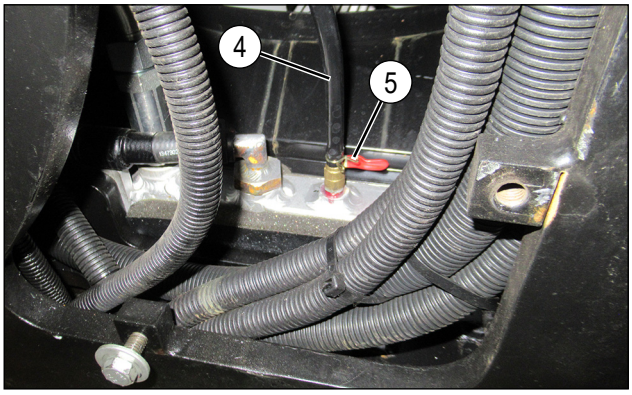


Fig. 5-38 0003842

6. Close the drain valve. Add clean water to fill the radiator. Start the engine and run it at low speed until the temperature reaches a normal operating temperature. Run the engine for an additional 10 minutes.

7. Stop the engine. Allow the engine to cool and drain the water into an appropriately sized container.

NOTICE!

Dispose of engine coolant in according to all applicable environmental regulations. Failure to do so could damage the environment.

8. Remove expansion tank cap (4), remove expansion tank (5), and pour the contents into a container.

9. Install the expansion tank and cap.

10. Close the drain valve.

    NOTE: See “Other Approved Lubricants” on page 5-13 for cooling system capacity.

11. Add new engine coolant until the level reaches the radiator filler opening. With the radiator cap removed, run the engine at low idle for 5 minutes, and then at high speed for 5 minutes, to bleed air from the cooling system.

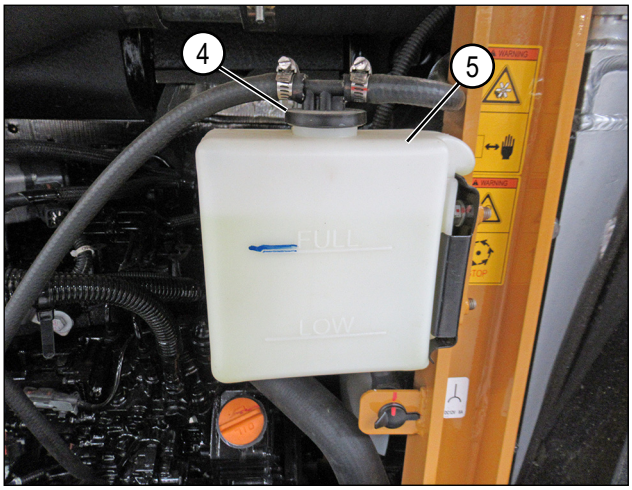


Fig. 5-39 0003786

12. Top off the radiator and fill the expansion tank until the engine coolant is between the FULL and LOW marks.

13. Install the radiator cap

Inspect the Engine Coolant Pump

Prepare the machine for service. See “Maintenance Safety” on page 2-8.

The engine coolant pump (1) is behind and connected to the engine fan (2) by a fan pulley (3).

1. Check if the engine fan pulley has any play by gently pulling and pushing the fan assembly from side to side.

2. If the fan pulley has play, the bearings inside the engine coolant pump are worn and the engine coolant pump must be replaced.

3. Look for signs of leaking coolant at hose connections and underneath the coolant pump.

    NOTE: Contact a SANY dealer for replacement of engine components.

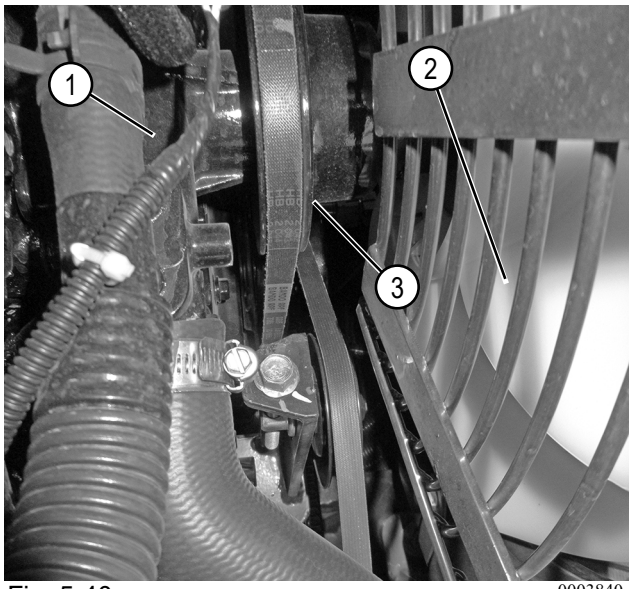


Fig. 5-40 0003840

Inspect and Clean the Cooling Package

WARNING!

- **Do not allow compressed air, pressurized water, or steam to come into contact with skin.**
- **Always wear goggles, gloves, and other personal protective equipment (PPE).**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Compressed air, high-pressure water, or steam can damage the cooling fins if the nozzle is too close to the fins. To prevent cooling fin damage, keep the nozzle at a safe distance while cleaning.**
- **Damaged cooling fins may lead to leaks and overheating. In dusty environments, inspect the cooling fins daily regardless of the maintenance schedule.**

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

   NOTE: Only cab machines have an air conditioner condenser as shown.

2. Open the engine hood. See “Opening the Engine Hood” on page 5-25.

3. Open the right rear access door. See “Opening the Right Rear Access Door” on page 5-26.

   NOTE: Maintain a minimum distance of 12 in. (30 cm) from the cooling fins during cleaning.

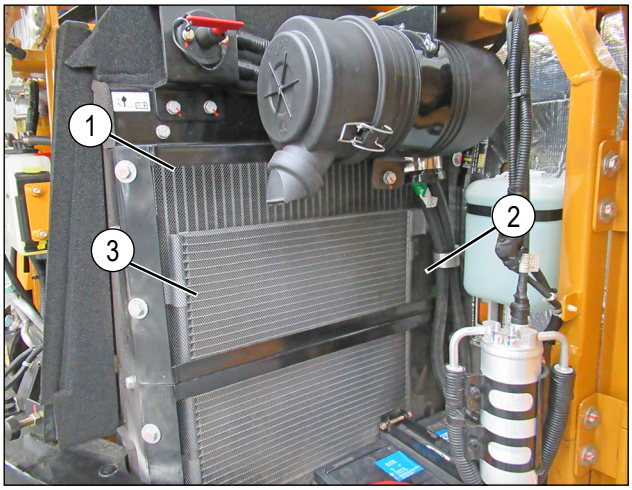


Fig. 5-41 0003845

4. Check the front and rear of the radiator (1), hydraulic oil cooler (2), and air conditioner condenser (3) for dirt or debris. Use compressed air or pressurized water in the opposite direction of the airflow through the cooling package.

5. Check the fins for deformation, corrosion, and cracks after cleaning. Repair the component immediately if damaged cooling fins are found.

6. Check the hose clamps. Tighten as necessary.

Heating and Air Conditioning System–Cab

Check Heating and Air Conditioning System Operation

See “Heating and Air Conditioning System” on page 3-26.

1. With the engine running, adjust the blower speed adjustment dial to check start-up, fan speed control, and airflow.
2. Turn the temperature adjustment dial to the right and check if heat is present.
3. Turn the temperature adjustment dial to the left and check if the air temperature decreases.
4. Check the fresh-air/recirculation switch function.
5. Check the air conditioning power switch function.

Clean or Replace the Ventilation Filter Screen–Cab

WARNING!

- **Do not allow compressed air, pressurized water, or steam to come into contact with skin.**
- **Always wear goggles, gloves, and other personal protective equipment (PPE).**

Failure to follow this warning could result in death or serious injury.

NOTICE!

- **Clean the ventilation filter screen every 250 hours to prevent machine damage.**
- **Use low-pressure compressed air less than 3 psi (20 kPa).**
- **If the machine is in a dusty environment, a shorter service interval will apply and the filter must be cleaned more often.**

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

2. Lift the right side of the front floor mat (2).

3. Remove the two fasteners (3) and the ventilation filter screen cover (1).

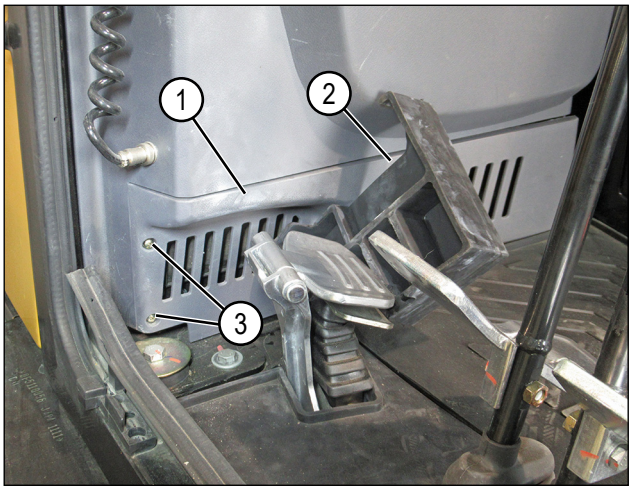


Fig. 5-42 0003095

4. Remove the fasteners (4) and the ventilation filter element (5).

5. Replace the ventilation filter element.

6. Installation is in the reverse order of removal.

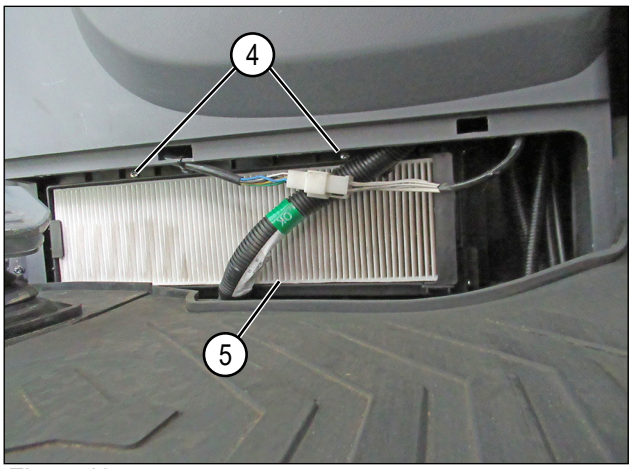


Fig. 5-43 0003844

Inspect and Adjust the Air Conditioner Compressor Belt Tension

Check the Air Conditioner Compressor Belt Tension

Prepare the machine for service. See “Maintenance Safety” on page 2-8.

Check the air conditioner compressor belt tension using one of the following two methods:

- Check the tension of the compressor belt using a tensioning gauge. A new belt should be tightened to 143 lbf. (637 N), and a used belt should be tightened to 99 lbf. (441 N).

- Press down on the belt halfway between the compressor pulley (1) and the drive pulley (2). The belt must deflect 0.20 in.–0.31 in. (5 mm–8 mm) (3).

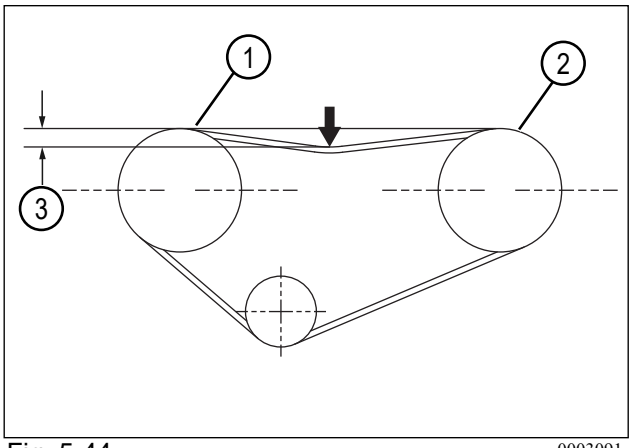


Fig. 5-44 0003091

Adjust the Air Conditioner Compressor Belt Tension

NOTICE!

- **Check the pulleys and V-belt for damage and wear. Make sure that the V-belt does not rub against the bottom groove of the pulleys.**
- **A newly installed V-belt must be readjusted after operating the machine for 1 hour.**

1. Prepare the machine for service. See "Maintenance Safety" on page 2-8.
2. Loosen the belt adjustment pulley locknut (2) and turn the tension adjuster (1) to achieve the correct belt tension.

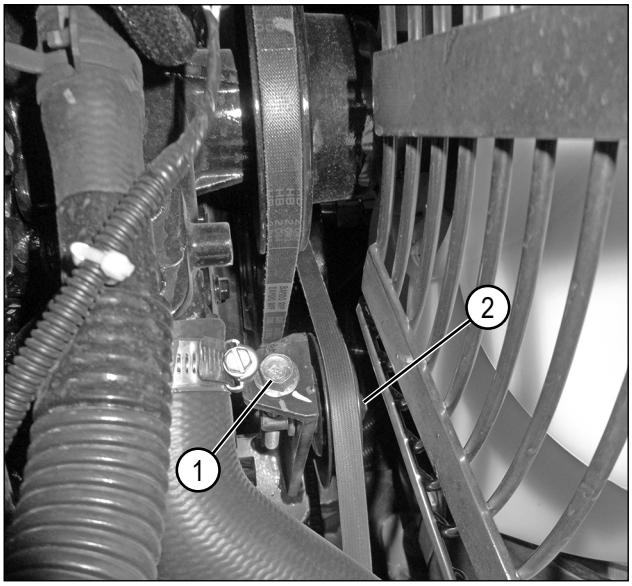


Fig. 5-45 0003840

NOTE: The tension adjuster can be accessed from below through a cutout in the machine frame.

3. Tighten the belt adjustment pulley locknut.

Air Conditioner Storage

When the air conditioner will not be used for an extended period of time, it should be operated for 3-5 minutes each month in order to lubricate the compressor components and air conditioning system seals.

Air Conditioner Components Inspection and Maintenance Schedule

Item	Description	Service Interval
Refrigerant (R134a)	Check for leaks in lines, fittings, and components.	Daily
Condenser	Check if condenser fins are plugged.	When required
Compressor	Check the compressor function and look for leaks.	Every 4000 service hours
Compressor V-belt	Check tension.	Every 250 service hours
	Check for damage, wear, and deterioration.	
Blower speed adjustment dial	Check fan motor and fan operation.	Daily
	Check speed adjustment function.	
Temperature adjustment dial	Check for normal operation.	Daily
Fasteners	Check for loose connections, fasteners, and locknuts.	Every 6 months

Fuel System

Bleed the Fuel System

NOTE: Air trapped in the fuel system may cause engine starting failure or abnormal running.

After servicing the fuel system or running out of fuel, the key switch should be turned to the ON position for 2-3 minutes before attempting to start the engine. The lift pump will bleed air from the system.

Drain the Fuel Tank of Water and Sediment

WARNING!

- **Fuel or fuel vapors that come into contact with hot surfaces or electrical components can cause a fire.**
- **Never service the fuel system near an open flame or while smoking.**
- **Clean up spilled fuel immediately.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

Dispose of contaminated fuel or water in accordance with all applicable environmental regulations. Failure to do so could damage the environment.

NOTE:

- Use diesel fuel to clean the inside of the fuel tank. Never use trichloroethane to clean the fuel tank.
- Perform this procedure only if an excessive amount of water or contaminants is found while draining the primary fuel filter/water separator.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

2. Locate the fuel drain valve (1) under the right side of the machine.

3. Place a suitable container under the valve to collect the drained fuel. If needed, you can attach a drain hose to the valve by removing the right side panel (2).

   NOTE: See “Other Approved Lubricants” on page 5-13 for fuel tank capacity.

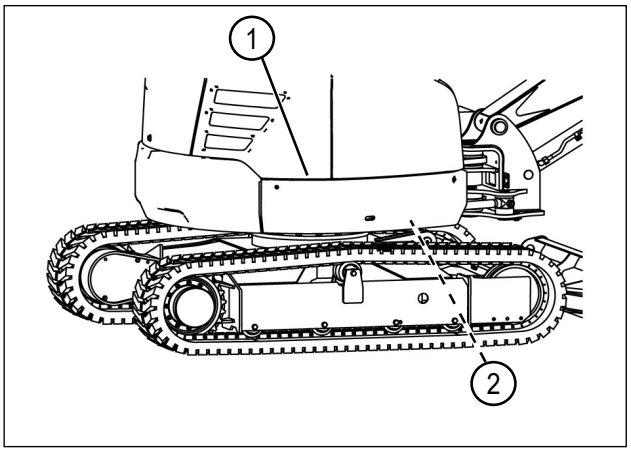


Fig. 5-46 0001682

4. Open the valve (3) to drain water and sediment accumulated on the bottom of the tank. Do not allow the fuel to splash out of the container.

5. Close the valve when only clean fuel drains from the fuel tank.

6. If the fuel tank is completely drained, the system must be bled after refilling. See “Bleed the Fuel System” on page 5-46.

7. Check fuel level. See “Fuel Level Check” on page 4-8.

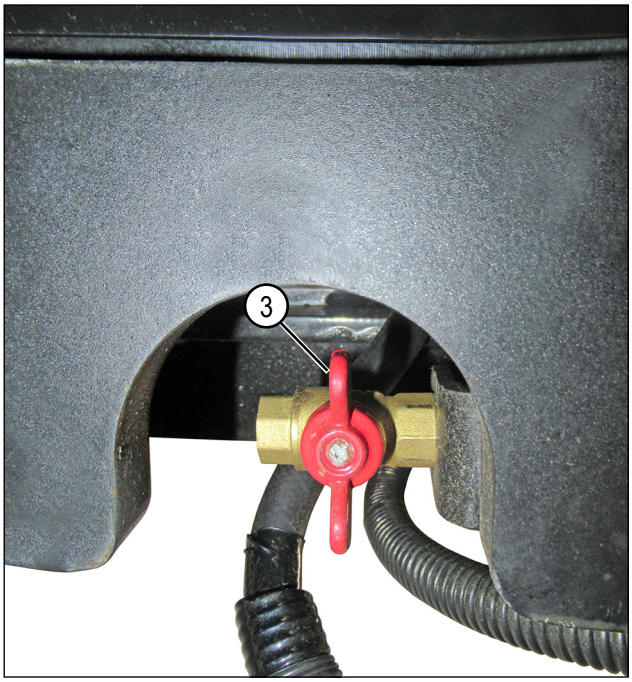


Fig. 5-47 0003850

Replace the Secondary Fuel Filter

WARNING!

- **Components and oil remain hot when the engine is stopped, which may cause severe burns. Wait until components and oil are cool before you proceed.**
- **Never service the fuel system near an open flame or while smoking.**
- **Fuel that comes into contact with hot surfaces or electrical components can cause a fire.**
- **Clean up any fuel spills immediately.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Cleanliness is important when working with an open fuel system. Contaminated fuel can result in engine damage.**
- **Dispose of fuel and filter in according to all applicable environmental regulations.**

Failure to follow this notice could damage the environment.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Place a container under the fuel filter (1) to collect spilled fuel.
3. Remove the fuel filter with a filter wrench.

   NOTE: Always use SANY-approved fuel filters.
4. Clean the mounting base of the fuel filter and fill the new fuel filter with clean fuel. Apply a thin film of oil to the O-ring and install the new fuel filter onto the filter housing.
5. When the fuel filter O-ring touches the filter housing, turn the fuel filter an additional 1/2 turn. Overtightening the filter may damage the O-ring, resulting in a fuel leak.

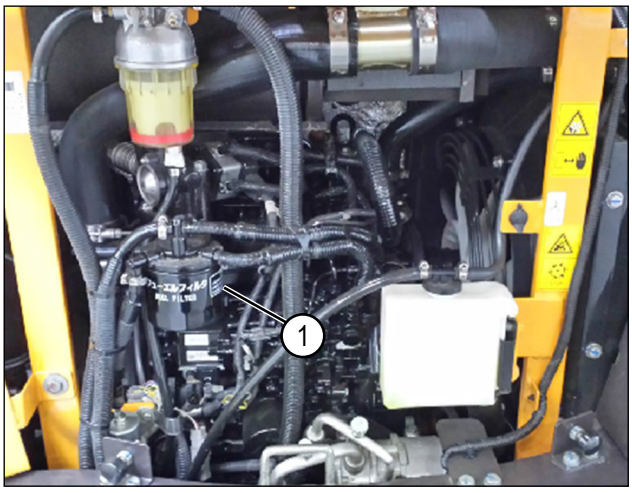


Fig. 5-48 0003773

6. Turn the key switch to the ON position for 2-3 minutes before attempting to start the engine. The lift pump will bleed air from the system.
7. Start the engine and check the fuel filter for leaks.

Replace the Primary Fuel Filter/Water Separator Element

WARNING!

- **Components and oil remain hot when the engine is stopped and may cause severe burns. Wait until components and oil are cool before you proceed.**
- **Never service the fuel system near an open flame or while smoking.**
- **Fuel that comes into contact with hot surfaces or electrical components can cause a fire. Clean up any fuel spills immediately.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Cleanliness is important when working with an open fuel system.**
- **Dispose of fuel and filters according to all applicable environmental regulations.**

Failure to follow this notice could damage the machine, cause it to operate improperly, or damage the environment.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the right rear access door. See “Opening the Right Rear Access Door” on page 5-26.
3. Turn the battery disconnect switch to OFF. See “Battery Disconnect Switch” on page 3-31.
4. Drain the primary fuel filter. See “Check and Drain the Primary Fuel Filter/Water Separator” on page 4-10.

5. Place the fuel shutoff valve (1) in the OFF position.
6. Route the drain hose (6) into a suitable container.
7. Open the drain valve (5) to allow all water and fuel to drain from the filter.
8. Remove the filter housing (4).
9. Remove the filter (3) from the filter body (2).
10. Replace the filter and make sure it is securely seated within the filter body.
11. Fill the filter housing with clean fuel.
12. Install the filter housing.
13. Place the fuel shutoff valve in the ON position.

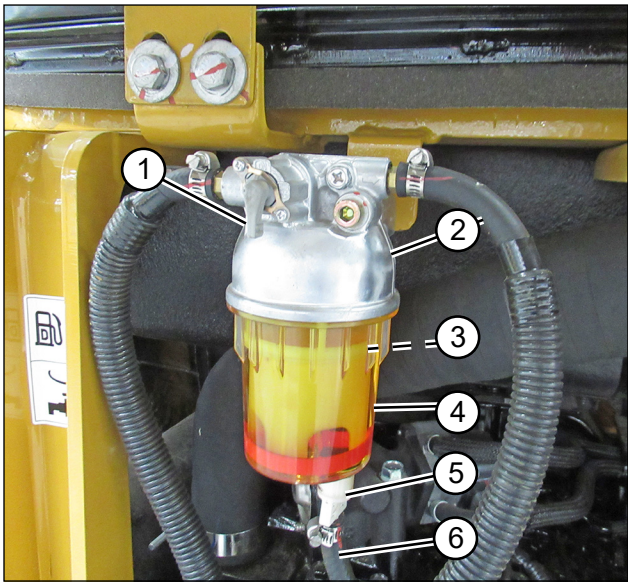


Fig. 5-49 0003774

14. Turn the key switch to the ON position for 2 to 3 minutes before attempting to start the engine. The lift pump will bleed air from the system.
15. Start the engine and allow it to run at idle speed. See “Starting the Engine” on page 4-16.
16. Check for leaks in the fuel system.
17. Shut down the engine.
18. Close the right rear access door.

Check the Fuel Tank Strainer

1. Open the right front access door. See “Unlocking/Opening the Right Front Access Door” on page 5-26.
2. Remove the fuel filler cap (1).

   NOTE: Fuel filler cap may be a locking type cap.

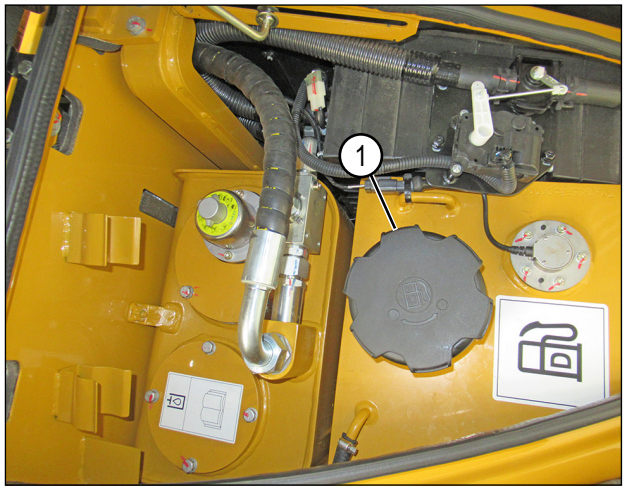


Fig. 5-50 0003806

3. Lift the fuel tank strainer (2) out of the fuel filler tube.
4. Clean and inspect the fuel tank strainer.

   NOTE: Replace a damaged or missing fuel tank strainer with a new one.

5. Install the new or cleaned fuel tank strainer and the fuel filler cap.

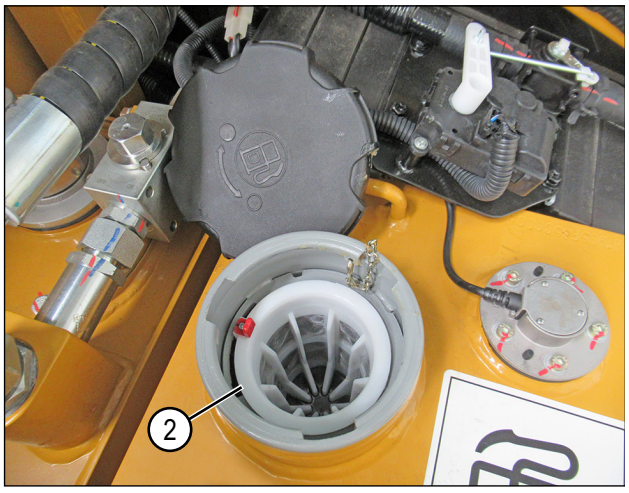


Fig. 5-51 0003851

Check the Fuel Lines

WARNING!

Perform a daily check of fuel lines for leaks prior to starting the machine. Failure to perform this procedure as directed could result in a fire during operation, which could result in death or severe injury.

Inspect all steel, plastic, and rubber fuel lines, including those on the engine.

- Replace any fuel lines that show signs of deterioration, wear, damage, or leaks.
- Contact a SANY dealer for repairs on the fuel system.

Battery

Check the Battery

WARNING!

Before proceeding with any battery maintenance procedure, observe the following:

- **The top of the battery must be kept clean to prevent plugging of the battery vents. Regularly wash the top of the battery to prevent the battery vents from plugging.**
- **Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames. Work in a well-ventilated area.**
- **Wear personal protective equipment (PPE) when working with batteries.**
- **Battery acid can cause burns or injury. If battery acid makes contact with your skin or eyes, flush the area immediately with fresh water and seek medical attention.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

After machine shutdown, wait at least 1 minute for the engine control module (ECM) to complete its shutdown before disconnecting the battery.

Failure to follow this notice can damage the machine or cause it to operate improperly.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

2. Open the engine hood (1). See “Opening the Engine Hood” on page 5-25.

3. Open the right rear access door (2). See “Opening the Right Rear Access Door” on page 5-26.

   NOTE: Allow several minutes for any accumulated battery gases to clear before servicing the battery.

4. Turn the battery disconnect switch (3) to the OFF position.

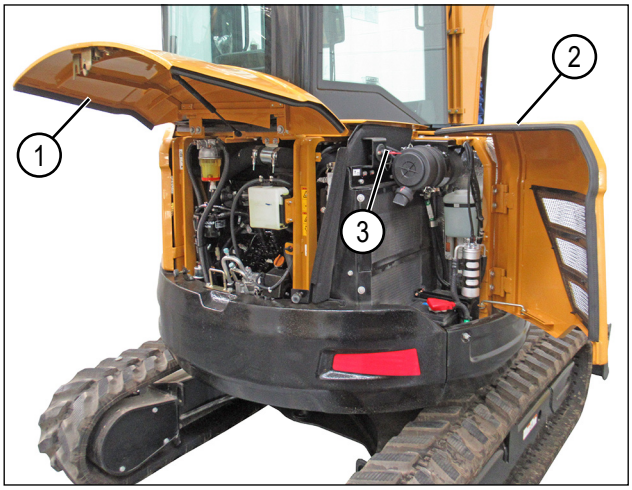


Fig. 5-52 0003770

5. Check the positive (1) and ground (2) terminals for corrosion or loose connections under the protective covers. Clean the area with a mixture of baking soda and warm water and tighten fasteners as needed.

6. Wipe down the battery and terminals with a clean cloth.

7. Remove any trash or debris from the battery compartment.

8. Use a corrosion-preventing coating on the battery terminals.

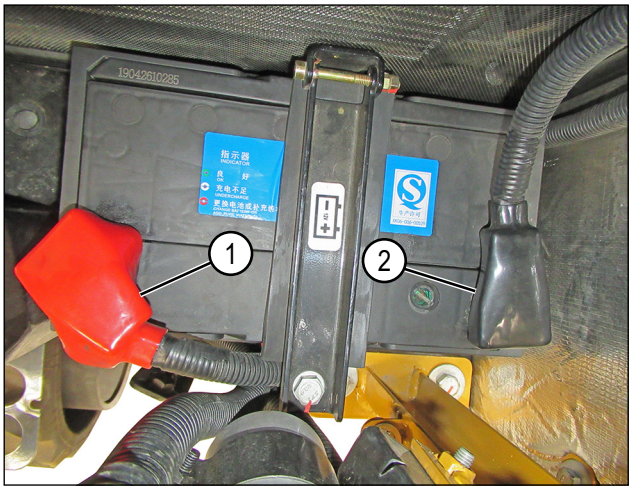


Fig. 5-53 0003861

Remove the Battery

WARNING!

Before proceeding with any battery maintenance procedure, observe the following:

- **The top of the battery must be kept clean to prevent plugging of the battery vents. Regularly wash the top of the battery to prevent the battery vents from plugging.**
- **Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames. Work in a well-ventilated area.**
- **Wear personal protective equipment (PPE) when working with batteries.**
- **Battery acid can cause burns or injury. If battery acid makes contact with your skin or eyes, flush the area immediately with fresh water and seek medical attention.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

After machine shutdown, wait at least 1 minute for the engine control module (ECM) to complete its shutdown before disconnecting the battery.

Failure to follow this notice can damage the machine or cause it to operate improperly.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Open the engine hood (1). See “Opening the Engine Hood” on page 5-25.
3. Open the right rear access door (2). See “Opening the Right Rear Access Door” on page 5-26.

   NOTE: Allow several minutes for any accumulated battery gases to clear before servicing the battery.
4. Turn the battery disconnect switch (3) to the OFF position.

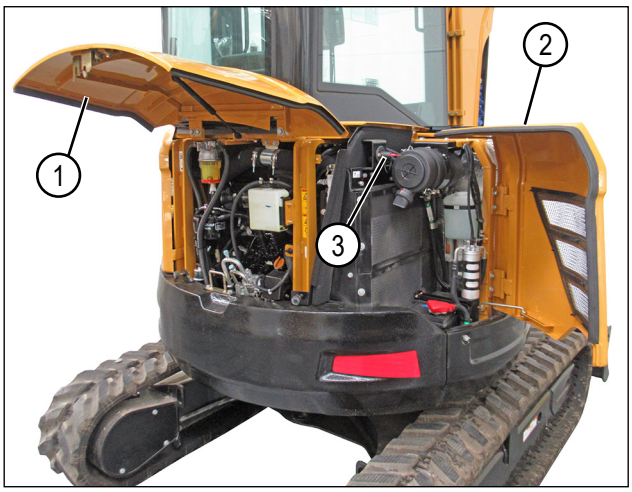


Fig. 5-54 0003770

5. Disconnect the ground terminal (2) first, then the positive terminal (1).

6. Remove the fastener (3) securing the battery hold-down (4). Remove the battery hold-down.

7. Check that all cables and parts are out of the way, then lift the battery out of the battery compartment.

8. Clean the battery and terminals. See “Check the Battery” on page 5-52.

9. Clean the battery tray.

10. Installation is in the reverse order of removal. Connect the positive terminal first, then the ground terminal.

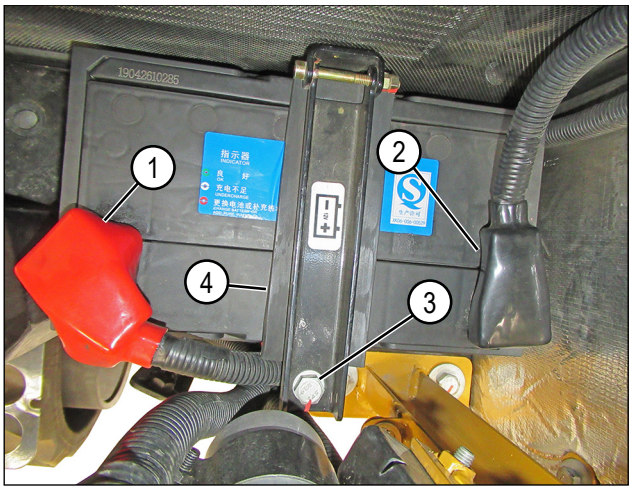


Fig. 5-55 0003861

Hydraulic System

Check the Accumulator Function

1. Lower the work equipment to 18 in.–24 in. (0.45 m–0.6 m) from the ground.
2. Shut down the engine.
3. Turn the key switch to the ON position.
4. Move the hydraulic lockout control lever to the unlocked (open) position.
5. Fully cycle each pedal, joystick, and travel control lever two or three times within 15 seconds in order to release any pressure remaining in the hydraulic lines.

   NOTE: If there is no movement, contact a SANY dealer.

Relieve Hydraulic System Pressure

NOTE: Hydraulic system pressure must be relieved before disconnecting or servicing hydraulic system components.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Turn the key switch to the ON position. Do not start the engine.
3. Set the hydraulic lockout control lever to the unlocked (open) position.
4. Fully cycle each pedal, joystick, and travel control two or three times to release pressure remaining in the hydraulic lines.
5. Turn the key switch to the OFF position.
6. Move the hydraulic lockout control lever to the locked (closed) position.

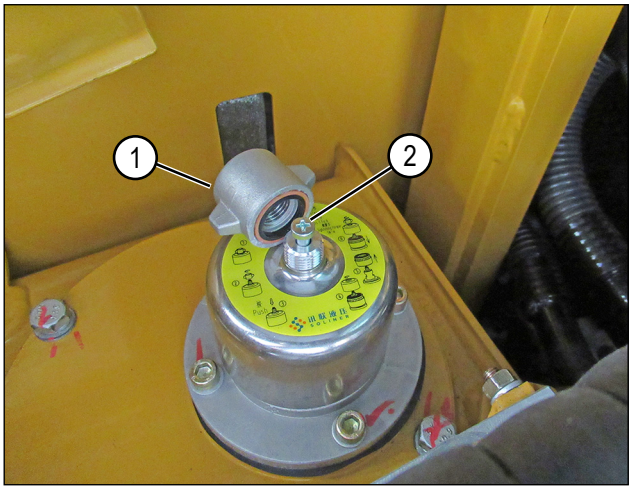


Fig. 5-56 0003846

7. Open the right front access door.
8. Remove the wing nut cover (1) and press the relief valve button (2) to release pressure in the hydraulic tank.
9. Install the wing nut cover.

Check Hydraulic Oil Level

See “Check the Hydraulic Oil Level” on page 4-11.

Add Hydraulic Oil

WARNING!

- **Allow the hydraulic system to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The hydraulic tank may be under pressure, and hydraulic oil may be present at the filler cap. Relieve any pressure to prevent injury.**

Failure to follow this warning could result in death or serious injury.

NOTICE!

Filling the hydraulic tank past the recommended maximum level may result in hydraulic system damage.

1. Position the work equipment as shown on the hydraulic tank decal.
   See “Check the Hydraulic Oil Level” on page 4-11.
2. Open the right front access door. See “Unlocking/Opening the Right Front Access Door” on page 5-26.
3. Relieve system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.
4. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
5. Clean around the hydraulic tank breather assembly (1).
6. Remove the four fasteners (2) and the hydraulic tank breather assembly.
7. Slowly add hydraulic oil through the breather assembly opening of the hydraulic tank. Monitor the oil level as it is added. See “Check the Hydraulic Oil Level” on page 4-11.
8. Reinstall the hydraulic tank breather assembly.

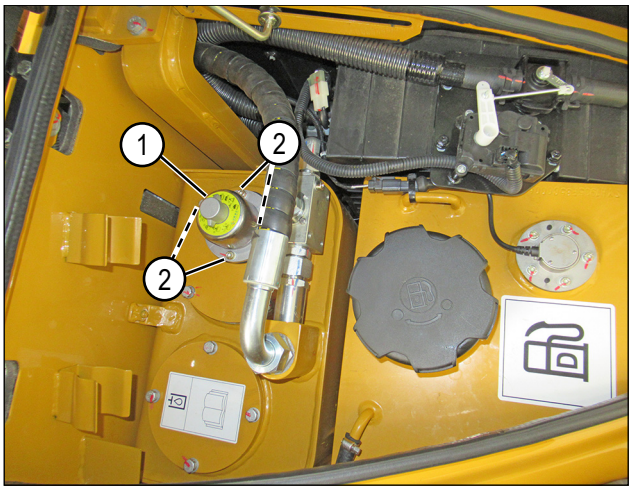


Fig. 5-57 0003848

Replace the Hydraulic Tank Breather Filter Element

WARNING!

- **Allow the hydraulic system to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The hydraulic tank may be under pressure, and hydraulic oil may be present at the filler cap. Relieve any pressure to prevent injury.**

Failure to follow these warnings could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

   NOTE: Do not add hydraulic oil to the tank if the monitor shows a hydraulic oil temperature higher than 160°F (71°C).

2. Open the right front access door. See “Unlocking/ Opening the Right Front Access Door” on page 5-26.
3. Clean around the hydraulic tank breather assembly (4).
4. Remove the wing nut cover (2) and press the relief valve button (3) to release pressure in the hydraulic tank.
5. Remove and clean the cover (1).
6. Inspect the filter element (5). Replace the filter element as needed.
7. Install the filter. Tighten the cover and wing nut cover securely.

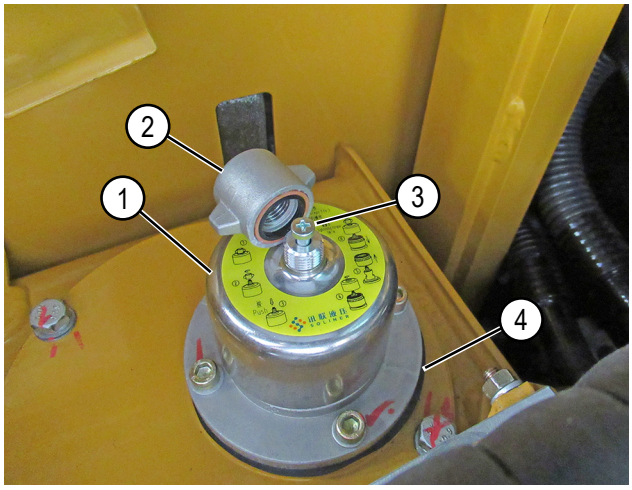


Fig. 5-58 0003846

NOTICE!

Dispose of hydraulic oil and filters according to all applicable environmental regulations. Failure to follow this notice could damage the environment.

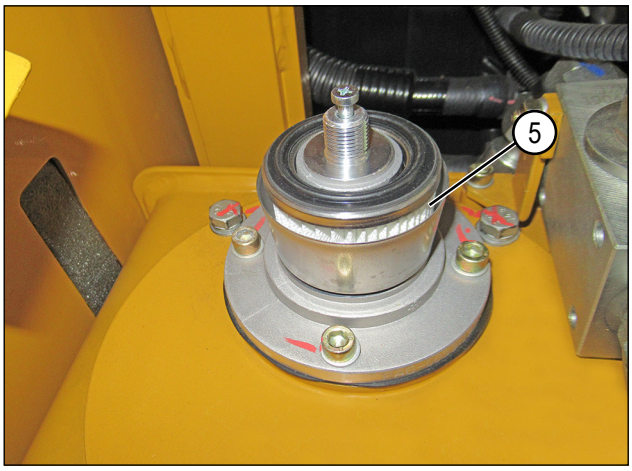


Fig. 5-59 0003847

Replace the Hydraulic Oil Pilot Filter

WARNING!

- **Allow the hydraulic system to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The hydraulic tank may be under pressure, and hydraulic oil may be present at the filler cap. Relieve any pressure to prevent injury.**

Failure to follow these warnings could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Relieve system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.
3. Remove two fasteners (1) and the front cover (2).

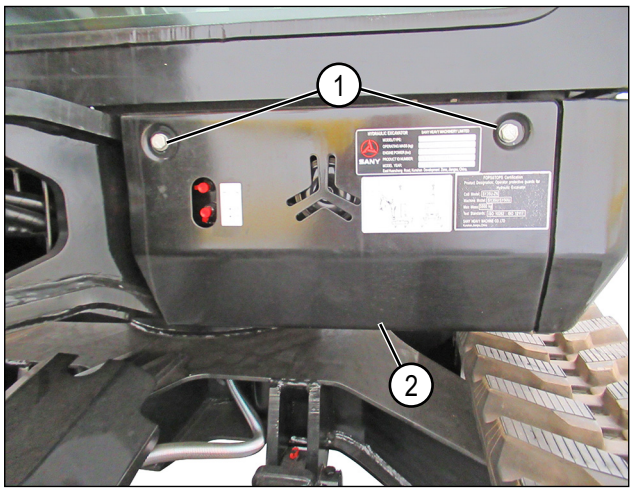


Fig. 5-60 0003849

4. Place a container under the pilot filter bowl (3) to catch any spilled oil.
5. Loosen and remove the pilot filter bowl.

NOTICE!

Dispose of hydraulic oil and filters according to all applicable environmental regulations. Failure to do so could damage to environment.

6. Remove the filter element from the housing. Clean the interior of the housing and bowl.

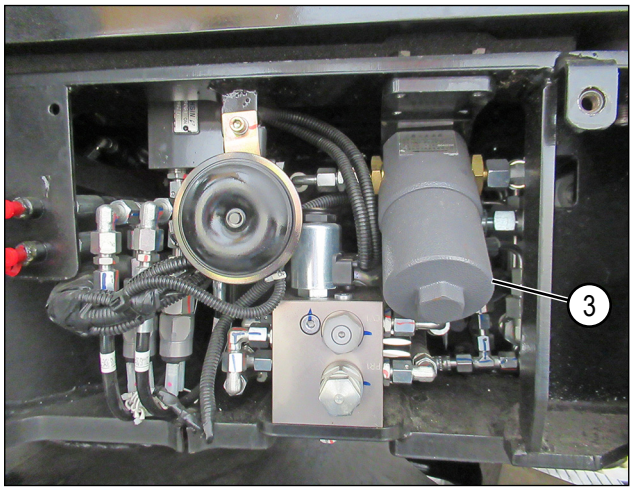


Fig. 5-61 0003787

7. Install a new filter element, gasket, and O-ring. Install the filter bowl and tighten securely.
8. To purge air from the system, start the engine and run it at low idle for 10 minutes. Check for leaks.

9. Check the hydraulic oil level and add hydraulic oil as needed.
   See “Check the Hydraulic Oil Level” on page 4-11.

Replace the Hydraulic Oil Return Filter

WARNING!

- **Allow the hydraulic system to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The hydraulic tank may be under pressure, and hydraulic oil may be present at the filler cap. Relieve any pressure to prevent injury.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **Examine the return filter for metal chips and debris.**
- **An excessive amount of bronze and steel chips indicates that the hydraulic pump or a hydraulic motor has been damaged.**
- **Rubber debris indicates seal and/or gasket damage.**
- **Inspect the return filter before filling the hydraulic tank and returning the machine to service.**

Failure to follow this notice could damage the machine or cause it to operate improperly.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Relieve system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.

3. Clean the top of the hydraulic tank and the return filter cover (1).

4. Loosen the four fasteners (2) securing the return filter cover. Push the cover down against spring pressure while removing the fasteners. Remove the cover.

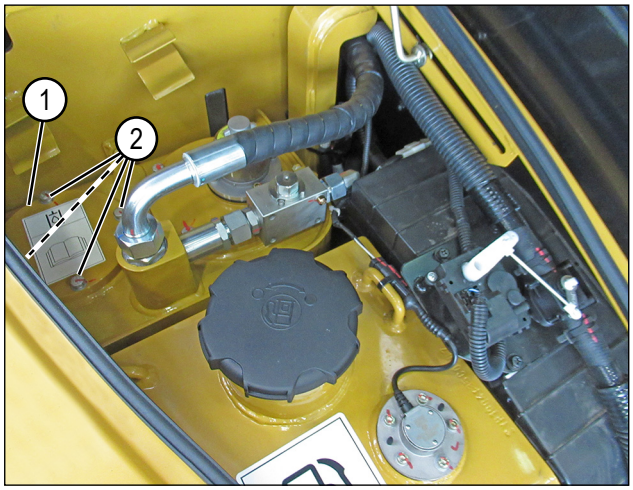


Fig. 5-62 0003772

NOTICE!

Dispose of hydraulic oil and filters according to all applicable environmental regulations. Failure to follow this notice could damage the environment.

5. Discard the used spring (3) and return filter (4). Install a new return filter and spring.

6. Install a new O-ring for the return filter cover. Tighten the fasteners securely.

7. To purge air from the system, start the engine and run it at low idle for 10 minutes.

8. Check the hydraulic oil level and add hydraulic oil as needed. See “Check the Hydraulic Oil Level” on page 4-11.

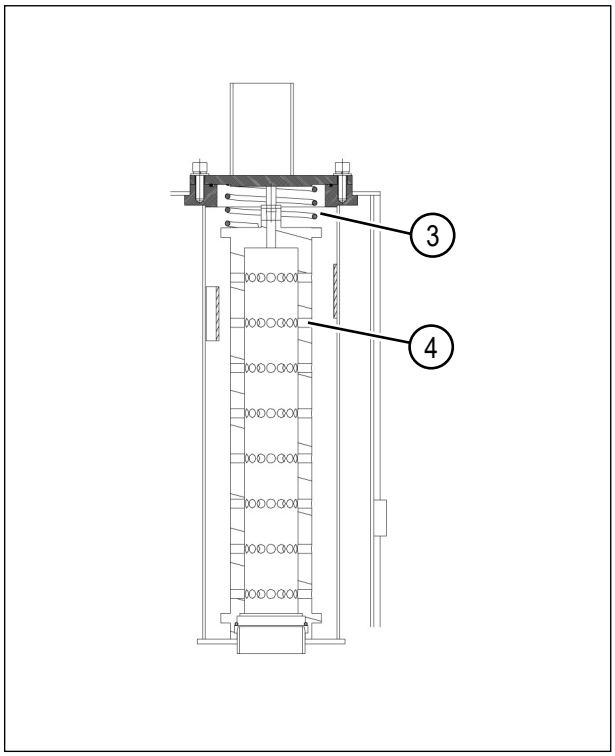


Fig. 5-63 0001693

Clean and Replace the Hydraulic Oil Suction Strainer

WARNING!

- **Allow the hydraulic system to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The hydraulic tank may be under pressure, and hydraulic oil may be present at the filler cap. Relieve any pressure to prevent injury.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

Dispose of hydraulic oil and filters according to all applicable environmental regulations. Failure to do so could damage the environment.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Relieve system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.
3. Clean the top of the hydraulic tank and the suction strainer cover (1).
4. Loosen the four fasteners (2) securing the suction strainer cover. Push the cover down against spring pressure while removing the fasteners. Remove the cover.
5. Remove the spring (3), rod (4), and suction strainer (5).
6. Clean the suction strainer of any contaminants. Inspect and replace if damaged.
7. Install the suction strainer to the boss (6) of the hydraulic tank.
8. Install a new O-ring for the suction strainer cover. Tighten the fasteners securely.

   NOTE: Use the extrusion on the bottom of the cap to hold the spring in place.
9. To purge air from the system, start the engine and run it at low idle for 10 minutes.
10. Check the hydraulic oil level. See “Check the Hydraulic Oil Level” on page 4-11.

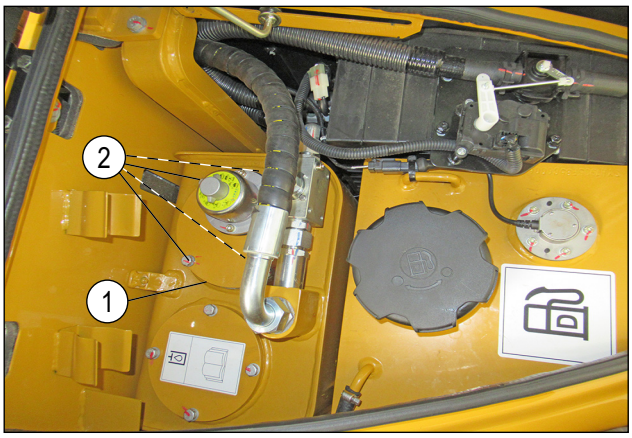


Fig. 5-64 0003848

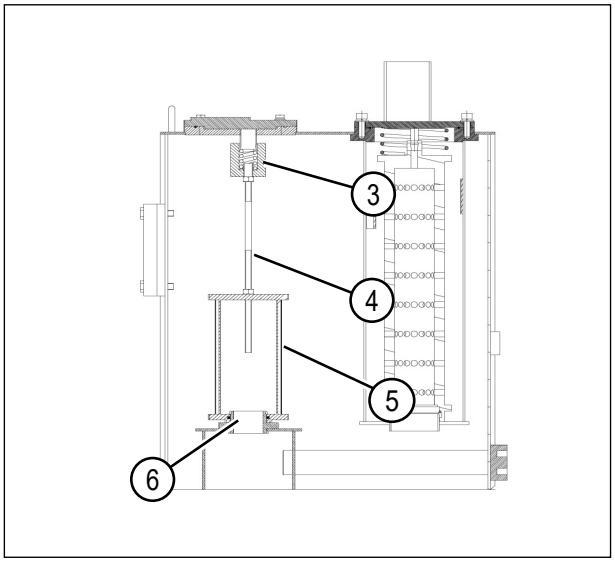


Fig. 5-65 0001698

Change the Hydraulic Oil

WARNING!

- **Allow the hydraulic system to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The hydraulic tank may be under pressure, and hydraulic oil may be present at the filler cap. Relieve any pressure to prevent injury.**

Failure to follow these warnings could result in death or serious injury.

NOTICE!

- **If the hydraulic oil is contaminated (discolored or containing debris), change the oil immediately. Find and correct the cause of the contamination before changing the hydraulic oil.**
- **Dispose of the hydraulic oil and filters according to all applicable environmental regulations.**

Failure to follow this notice could damage the machine, cause it to operate improperly, or damage the environment.

NOTE:

- Always use the same type and grade of hydraulic oil.
- Hydraulic oil deteriorates faster on machines equipped with a hydraulic breaker than on machines equipped with a bucket. See “Hydraulic Breaker Maintenance Interval” on page 5-18 for additional information.

1. Swing the upper structure 90º clockwise to position the hydraulic oil drain access panel (1) between the tracks.
2. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
3. Relieve system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.
4. Remove the two fasteners (2) securing the hydraulic oil drain access panel and remove the panel.

Fig. 5-66 0003857

5. Place a suitable container under the hydraulic tank plug (1).

   NOTE: See “Other Approved Lubricants” on page 5-13 for the hydraulic tank capacity. Make sure your catch container is of sufficient capacity.

6. Remove the hydraulic tank plug and allow the oil to drain.

7. Install and tighten the hydraulic tank plug.

8. Install the hydraulic oil drain access panel.

9. Fill the hydraulic tank to the specified level. See “Add Hydraulic Oil” on page 5-57 and See “Other Approved Lubricants” on page 5-13.

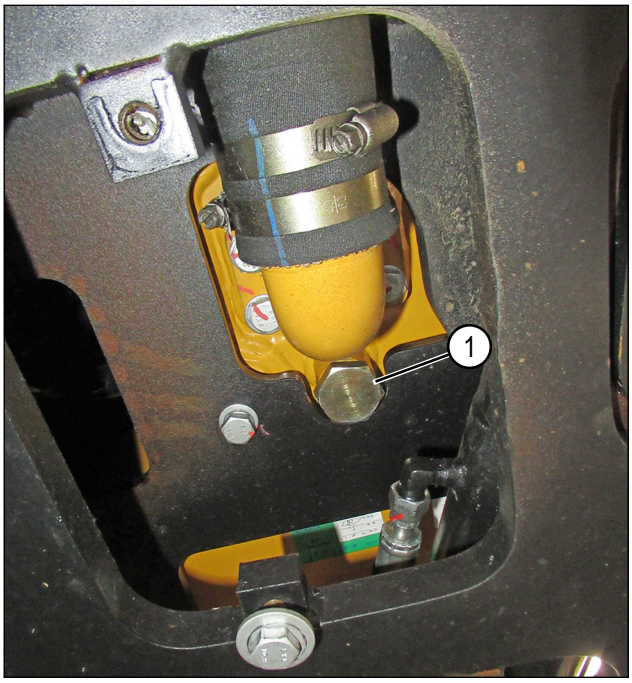


Fig. 5-67 0003843

Collect Hydraulic Oil Sample

NOTE: Hydraulic oil samples are taken every 3 months or every 250 operating hours.

1. Obtain an oil analysis sample kit from a SANY dealer.

2. Operate the machine until the hydraulic oil is up to normal operating temperature.

3. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

NOTICE!

It is critical that all material used to collect the sample is absolutely clean.

Failure to follow this notice could damage the machine, cause it to operate improperly, or contaminate the sample.

4. Remove the hydraulic tank breather assembly. See “Add Hydraulic Oil” on page 5-57.

5. Insert the oil sample tube into the hydraulic tank and collect a sample of hydraulic oil. Reinstall the hydraulic tank breather assembly.

6. Send the sample for testing according to the instructions packaged with the sample kit.

Check the Hydraulic Hoses, Lines, and Connectors

Check all hoses and lines for leaks. Replace damaged or leaking hoses or lines immediately. Any hydraulic pump lines or connectors connected to the engine compartment must be replaced if damaged.

Make sure there is sufficient clearance between all hydraulic lines and hoses and the high-temperature engine components. Make sure there is no friction between them, and that no hydraulic lines and hoses contact each other.

Check the Hydraulic Pump and Fasteners

NOTE: This section shows a cab. Canopy machines are similar.

1. Open the engine hood (1). See “Opening the Engine Hood” on page 5-25.

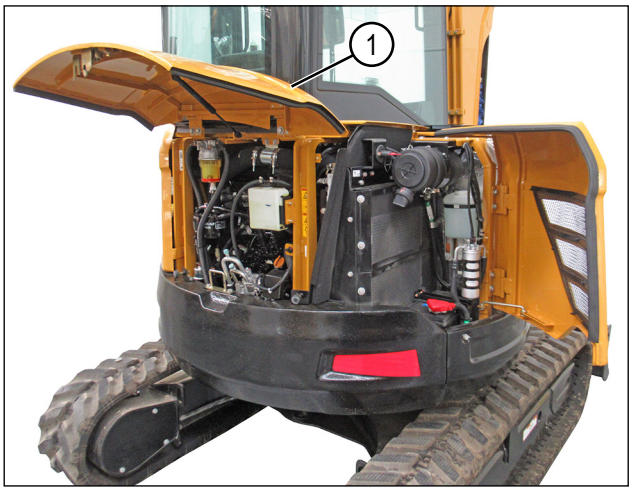


Fig. 5-68 0003770

2. Remove left rear panel (2) of the machine.

Fig. 5-69 0003785

3. Inspect hydraulic pump (3) for loose, broken, or missing pump mounting fasteners (4), and leaks or cracking at these mounting fastener locations.

   NOTE: Not all pump mounting fasteners are visible. Be sure to inspect all pump mounting fastener locations.

4. Tighten any loose fasteners.

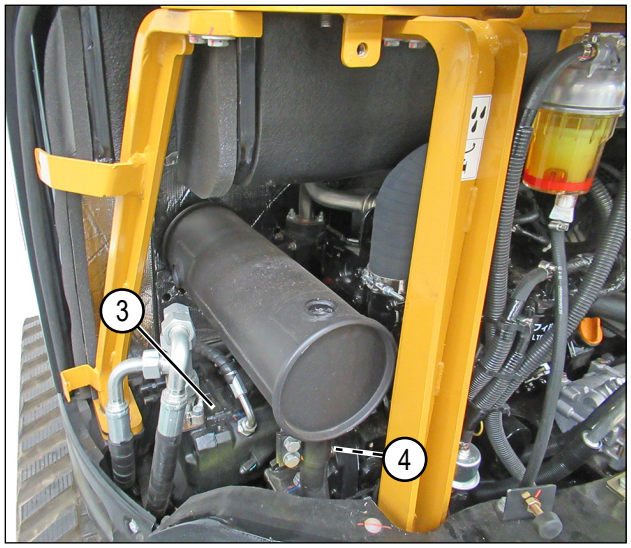


Fig. 5-70 0003853

Track Assembly

Check the Track Tension

NOTICE!

Remove gravel or mud buildup between the sprocket and the track before checking track tension.

1. Use the bucket as a support to raise the track on one side. Swing the upper structure sideways, lower the bucket to the ground, and raise one track off the ground. Keep the boom-arm angle between 90° and 110° (1) with the bottom of the bucket on the ground.
2. Rotate the track one full revolution.
3. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

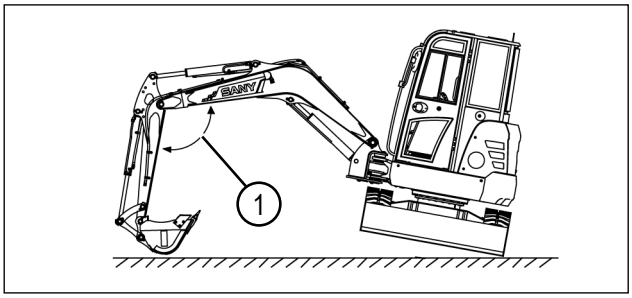


Fig. 5-71 0003825

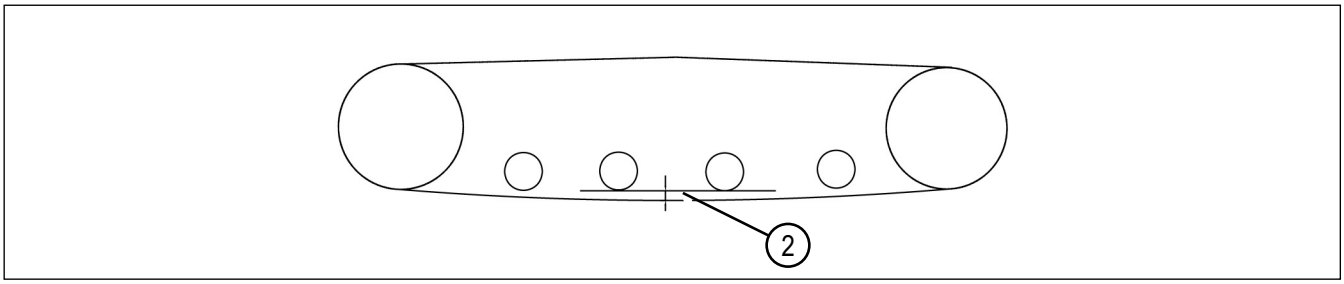


Fig. 5-72 0001642

4. Use a straightedge to measure the track sag (2) between the tread of the track roller and the rail surface of the track.
5. Normal track sag is 0.4 in.–0.8 in. (10 mm–20 mm) for rubber tracks and 0.6 in.–1.0 in. (15 mm–25 mm) for steel tracks. If the track sag is outside of this range, the track tension must be adjusted.

Adjust the Track Tension

WARNING!

- **The track tension grease fitting is under extreme pressure, and grease can exit the grease valve and cause serious injury.**
- **Wear safety goggles, gloves, and other personal protective equipment (PPE) to prevent serious injury.**
- **Do not stand directly in front of the track tension grease fitting valve when loosening the valve.**

Failure to follow these warnings could result in death or serious injury.

Increase the Track Tension

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Use the bucket as a support to raise the track on one side. Swing the upper structure sideways, lower the bucket to the ground, and raise one track off the ground. Keep the boom-arm angle between 90° and 110° (1) with the bottom of the bucket on the ground.

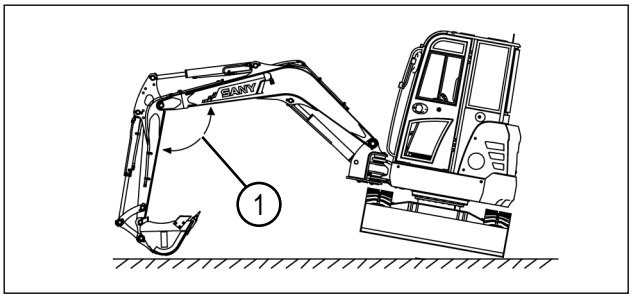


Fig. 5-73 0003825

3. Make sure that the grease valve (1) is closed tightly.
4. Using a grease gun, pump grease into the grease fitting (2) while observing idler movement.
5. Rotate the track one full revolution. Check the track tension to confirm adjustment.

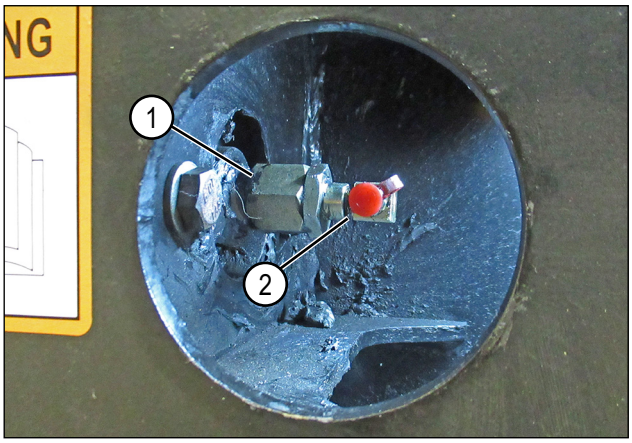


Fig. 5-74 0003133

Decrease the Track Tension

NOTICE!

Remove gravel or mud buildup between the sprocket and the track before reducing track tension.

1. Use the bucket as a support to raise the track on one side. Swing the upper structure sideways, lower the bucket to the ground, and raise one track off the ground. Keep the boom-arm angle between 90° and 110° (1) with the bottom of the bucket on the ground.

2. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

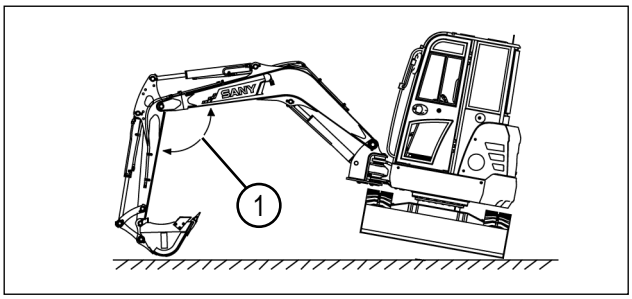


Fig. 5-75 0003825

3. Slowly open the grease valve (1) 1 to 1-1/2 turns while observing idler movement. Grease should come out from behind the grease valve.

   NOTE: If grease does not come out, slowly rotate the track in both directions. When grease begins to flow, stop and continue the adjustment.

4. When the track sag is within specification, tighten the grease valve to 44 lb-ft–59 lb-ft (60 N•m–80 N•m).

5. Rotate the track one full revolution. Check the track tension to confirm adjustment.

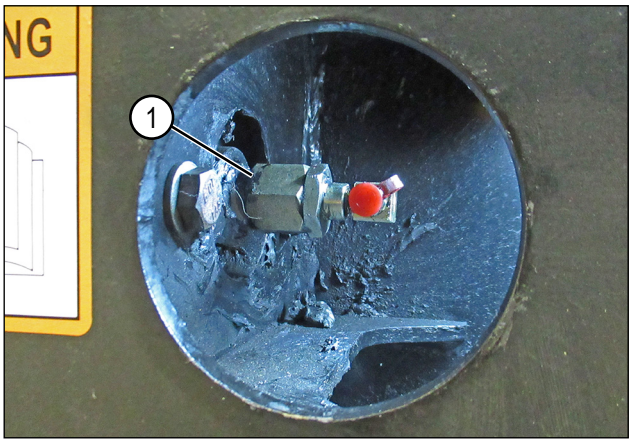


Fig. 5-76 0003133

Check the Carrier Roller Fasteners

1. Inspect the carrier roller fasteners (1) for rust, damage, or looseness.

   NOTE: The right side is shown. The left side is similar.

Replace any damaged or defective fasteners and tighten any loose fasteners.

NOTE: Use thread lock compound when tightening loose fasteners or installing new fasteners.

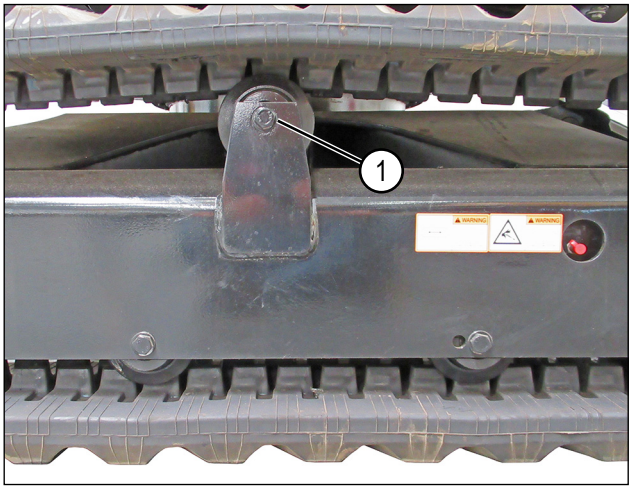


Fig. 5-77 0003852

Check the Idler

Check the idler (1) for cracks and distortion.

NOTE: The left side is shown. The right side is similar.

Contact a SANY dealer for replacement if damage is found.

Fig. 5-78 0003866

Check the Final Drive Motor Connections and Mounting Fasteners

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

2. Remove the three fasteners (1) and remove the final drive motor cover (2). The left side is shown; the right side is similar.

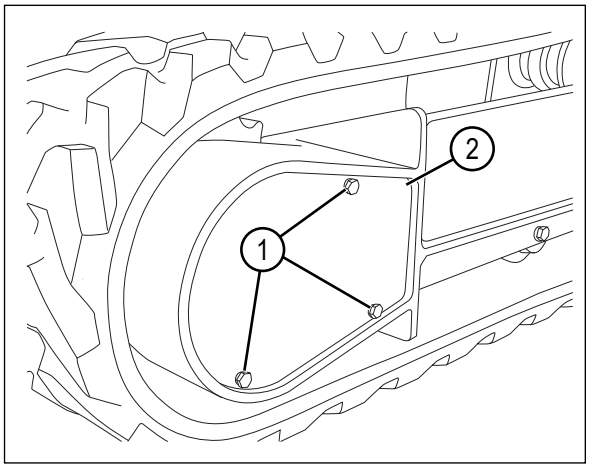


Fig. 5-79 0003801

3. Inspect the final drive to make sure all hoses (3) are connected tightly. The right side is shown; the left side is similar.

4. Inspect all of the final drive mounting fasteners (4) for rust, damage, or looseness.

5. Replace any damaged or missing fasteners and tighten any loose fasteners.

   NOTE: Use thread lock compound when reinstalling loose fasteners and installing new fasteners.

6. Check for leaks.

   NOTE: Contact a SANY dealer if any abnormalities are found.

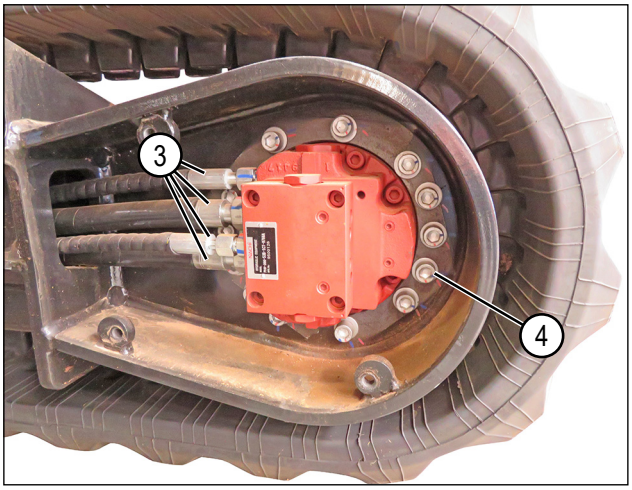


Fig. 5-80 0004632

Check and Add Final Drive Oil

CAUTION!

- **Allow the final drive to cool before servicing. Hot oil may cause burns or other serious injury.**
- **Wear safety goggles, gloves, and other personal protective equipment (PPE) to prevent serious injury.**
- **The final drive oil may be under pressure. Remove the plugs slowly to prevent injury.**

Failure to follow these cautions could result in injury.

NOTICE!

Dispose of used oil in accordance with all applicable environmental regulations. Failure to do so could result in damage to the environment.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Park the machine to position the drain plug (3) at the bottom of one of the final drives.
3. Wait 10 minutes for the final drive oil to cool.
4. Slowly loosen the oil level plug (2) to relieve any internal pressure.
5. The oil should be at or near the lower edge of the oil level plug opening.

   NOTE: Refer to “Recommended Lubricants, Fuels, and Engine Coolant” on page 5-10 for the recommended final drive oil.

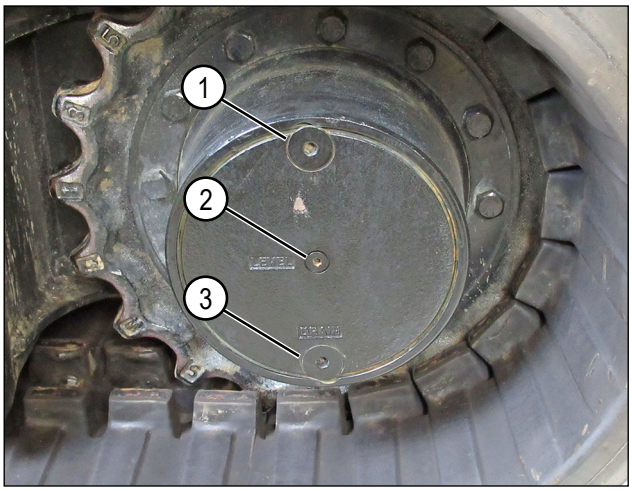


Fig. 5-81 0003128

6. If necessary, remove the fill plug (1) and add oil.
7. Install the oil level and fill plugs and tighten to 12.5 lb-ft (17 N•m).
8. Repeat this procedure on the other final drive.

Change the Final Drive Oil

CAUTION!

- **Allow the final drive to cool before servicing. Hot oil may cause burns or other serious injury.**
- **The final drive gear case may be under pressure. Remove the plugs slowly to prevent injury.**

Failure to follow these cautions could result in injury.

NOTICE!

Dispose of used oil according to all applicable environmental regulations. Failure to follow this notice could damage the environment.

NOTE: If the final drive oil is cold, it should be warmed prior to changing. Use the bucket as a support to lift the track on one side. Move the throttle control dial to MIN (low idle) and operate the raised track for 5 minutes. Lower the track.

1. Park the machine to position the drain plug (3) at the bottom of one of the final drives.
2. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
3. Wait 10 minutes for the gear oil to cool.
4. Place a suitable container under the final drive.
5. Slowly loosen and remove the oil level (2) and fill (1) plugs to relieve any internal pressure.

   NOTE: See “Other Approved Lubricants” on page 5-13 for the final drive capacity.

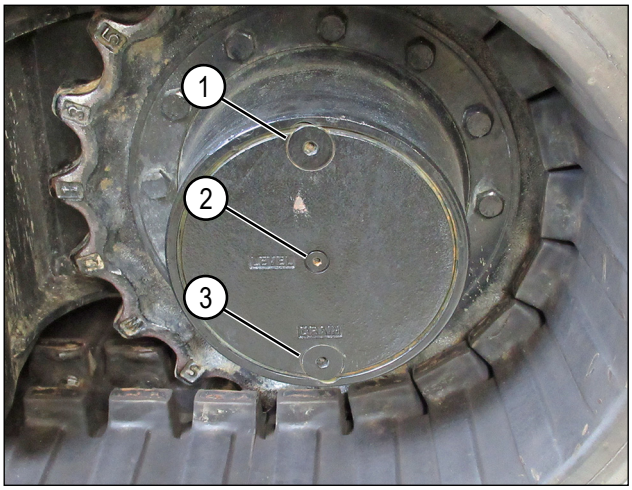


Fig. 5-82 0003128

6. Remove the drain plug and allow the oil to drain.
7. Install the drain plug and tighten to 12.5 lb-ft (17 N•m).

   NOTE: Refer to “Recommended Lubricants, Fuels, and Engine Coolant” on page 5-10 for the recommended final drive oil.

8. Add new gear oil through the fill plug opening. Fill until the gear oil is at the lower edge of the level plug opening.
9. Install the oil level and fill plugs. Tighten the plugs to 12.5 lb-ft (17 N•m).
10. Repeat this procedure on the other final drive.

Collect Final Drive Oil Sample

1. Obtain an oil analysis sample kit from a SANY dealer.
2. Operate the machine to normal operating temperature.
3. Prepare the machine for service. See “Maintenance Safety” on page 2-8.

NOTICE!

It is critical that all material used to collect the sample is absolutely clean. Failure to follow this notice could damage the machine, cause it to operate improperly, or contaminate the sample.

4. Remove the final drive check plug. See “Check and Add Final Drive Oil” on page 5-72.
5. Insert the oil sample tube into the final drive and collect a sample of final drive oil. Install the final drive check plug.
6. Send the sample for testing according to the instructions packaged with the sample kit.

Lubrication

Lubrication Points

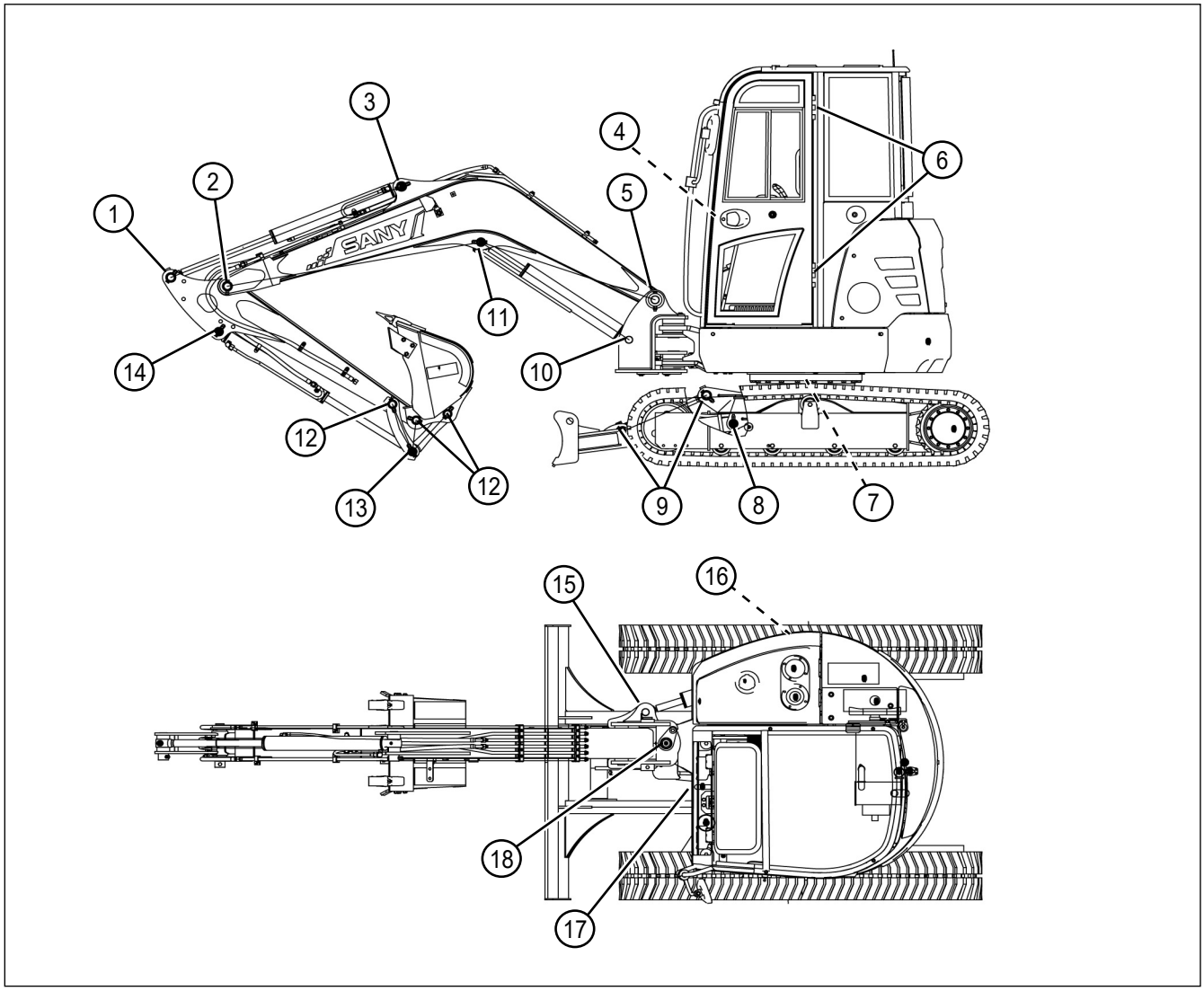


Fig. 5-83

0001635

1) Arm cylinder rod end pin (page 5-76)	10) Boom cylinder base end pin (page 5-78)
2) Boom-arm connecting pin (page 5-76)	11) Boom cylinder rod end pin (page 5-78)
3) Arm cylinder base end pin (page 5-77)	12) Bucket linkage pins (page 5-78)
4) Cab door lock (page 5-23)	13) Bucket cylinder rod end pin (page 5-79)
5) Boom pin (page 5-77)	14) Bucket cylinder base end pin (page 5-79)
6) Cab door hinges (page 5-23)	15) Boom swing cylinder rod end pin (page 5-79)
7) Swing bearing (page 5-80)	16) Boom swing cylinder base end pin (page 5-80)
8) Dozer blade linkage pins (page 5-77)	17) Swing pinion gear (page 5-81)
9) Dozer blade cylinder end pins (page 5-77)	18) Boom swing pin (page 5-80)

See “Lubrication and Maintenance Charts” on page 5-19.

A new machine must be greased every 8 hours within the initial 50 service hours.

If the lubricated location produces abnormal noise, additional lubrication is required besides regular maintenance.

More frequent lubrication is required when the machine is operated with heavy optional equipment (hydraulic breaker).

After operating in water, grease the machine to expel any water from the lubrication points.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Using a grease gun, pump grease into the grease fittings.
3. Clean off all excess grease.

Arm Cylinder Rod End Pin

1. Remove the grease fitting cap (1) from the arm cylinder rod end pin grease fitting (2).
2. Grease the arm cylinder rod end pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.
3. Install the grease fitting cap.

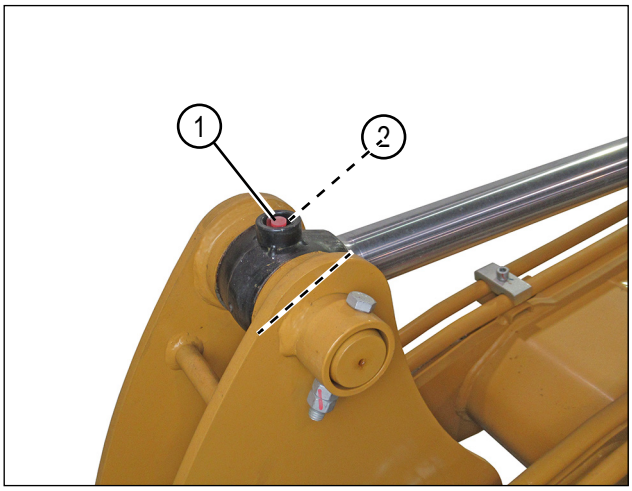


Fig. 5-84 0003171

Boom-Arm Connecting Pin

1. Remove the grease fitting cap (1) from the boom-arm connecting pin grease fitting (2).
2. Grease the boom-arm connecting pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.
3. Install the grease fitting cap.

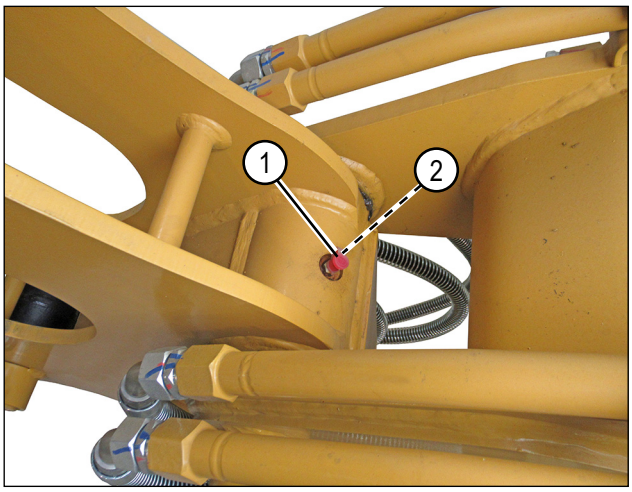


Fig. 5-85 0003172

Arm Cylinder Base End Pin

1. Remove the grease fitting cap (1) from the arm cylinder base end pin grease fitting (2).
2. Grease the arm cylinder base end pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.
3. Install the grease fitting cap.

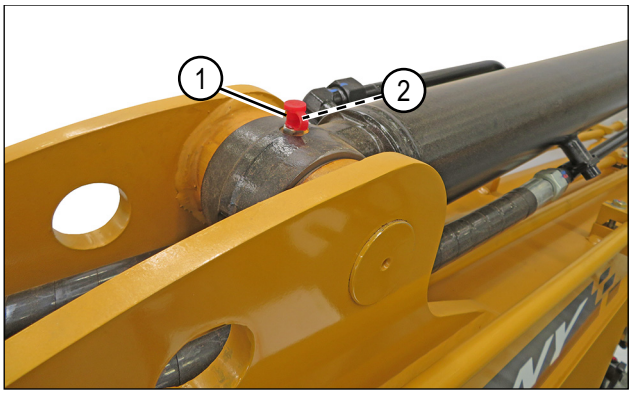


Fig. 5-86 0004633

Boom Pin

1. Remove the grease fitting cap (1) from the boom pin grease fitting (2).
2. Grease the boom pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.
3. Install the grease fitting cap.

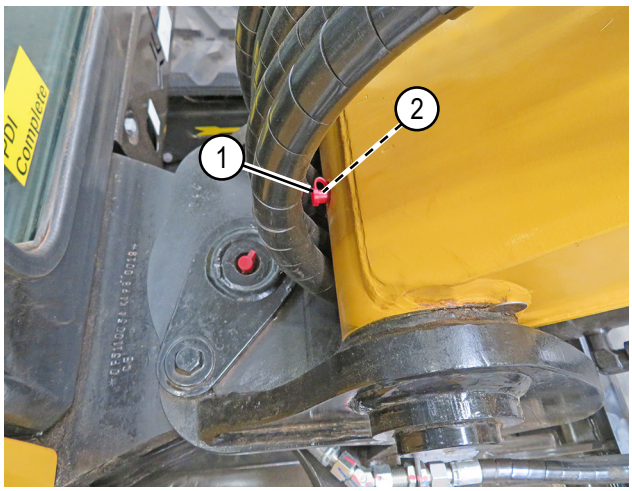


Fig. 5-87 0004634

Dozer Blade Linkage Pins and Dozer Blade Cylinder End Pins

NOTE: Only one dozer blade linkage pin grease fitting cap is shown.

1. Remove the grease fitting caps (1) from the dozer blade cylinder end pins (2) and the dozer blade linkage pins. (3)
2. Grease the dozer blade cylinder end pins and the dozer blade linkage pins grease fittings.

   NOTE: Wipe excess grease from around the grease fittings.
3. Install the grease fitting caps.

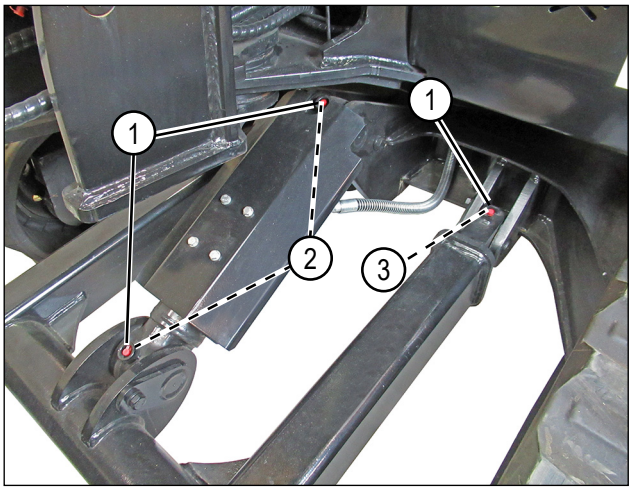


Fig. 5-88 0003176

Boom Cylinder Base End Pin

1. Remove the grease fitting cap (1) from the boom cylinder base end pin grease fitting (2).

2. Grease the boom cylinder base end pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.

3. Install the grease fitting cap.

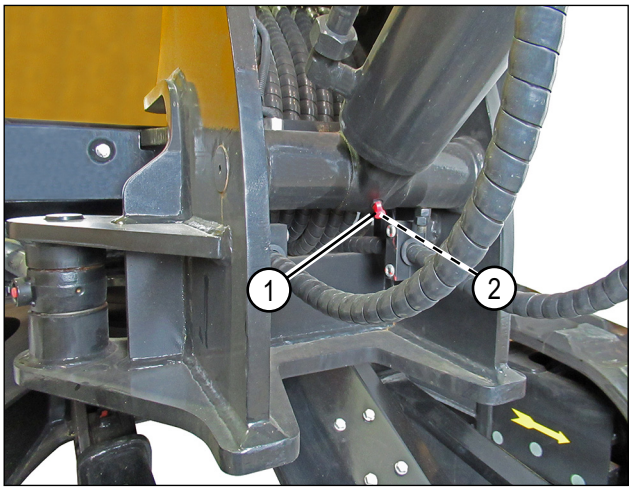


Fig. 5-89 0003177

Boom Cylinder Rod End Pin

1. Remove the grease fitting cap (1) from the boom cylinder rod end pin grease fitting (2).

2. Grease the boom cylinder rod end pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.

3. Install the grease fitting cap.

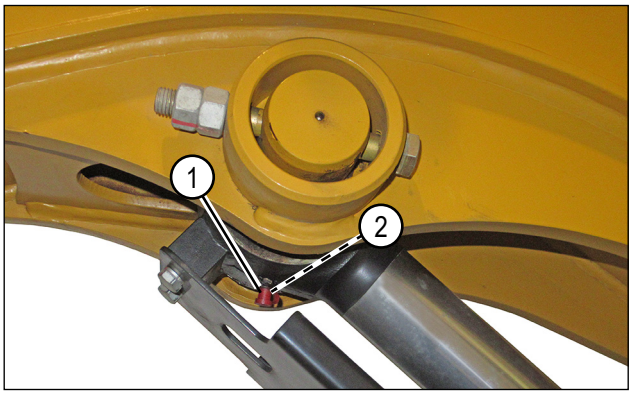


Fig. 5-90 0003178

Bucket Linkage Pins

1. Remove the grease fitting caps (2) from the bucket linkage pin grease fittings (1).

2. Grease the bucket linkage pin grease fittings.

   NOTE: Wipe excess grease from around the grease fittings.

Install the grease fitting caps.

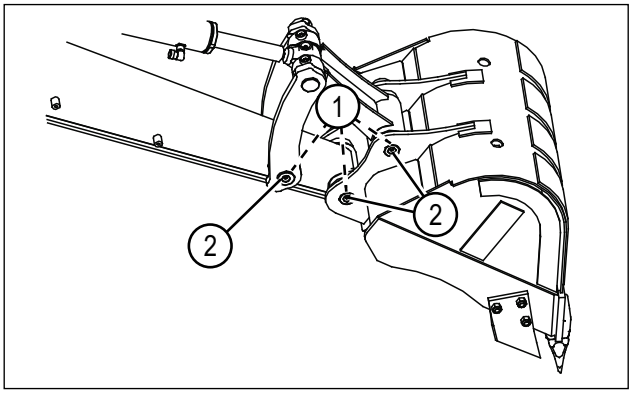


Fig. 5-91 0001677

Bucket Cylinder Rod End Pin

1. Remove the grease fitting caps (1) from the bucket cylinder rod end pin grease fittings (2).

2. Grease the bucket cylinder rod end pin grease fittings.

   NOTE: Wipe excess grease from around the grease fittings.

3. Install the grease fitting caps.

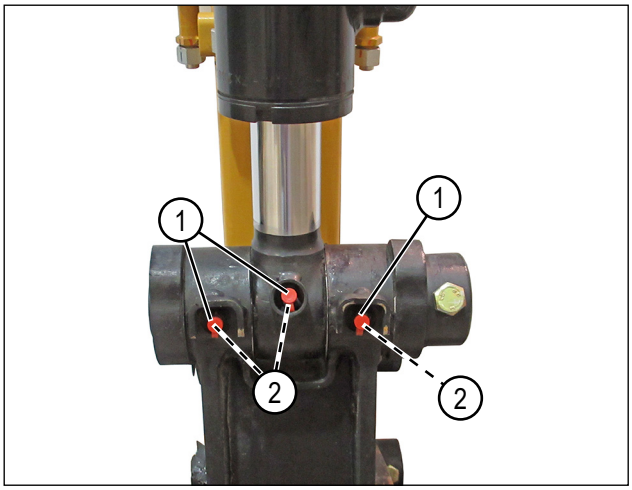


Fig. 5-92 0003179

Bucket Cylinder Base End Pin

1. Remove the grease fitting cap (1) from the bucket cylinder base end pin grease fitting (2).

2. Grease the bucket cylinder base end pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.

3. Install the grease fitting cap.

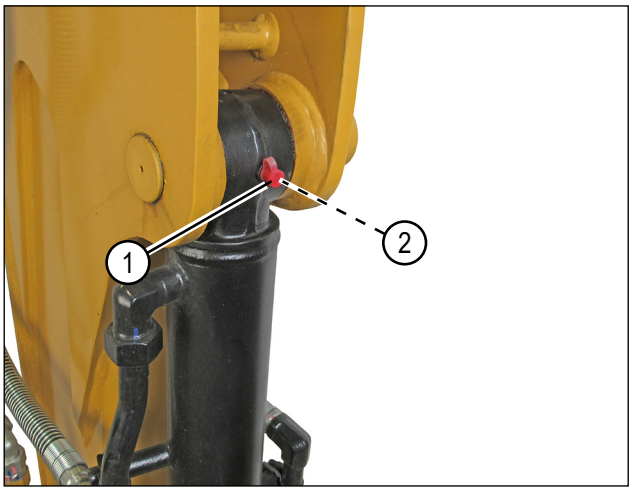


Fig. 5-93 0003180

Boom Swing Cylinder Rod End Pin

1. Remove the grease fitting cap (1) from the boom swing cylinder rod end pin grease fitting (2).

2. Grease the boom swing cylinder rod end pin grease fitting.

   NOTE: Wipe excess grease from around the grease fitting.

3. Install the grease fitting cap.

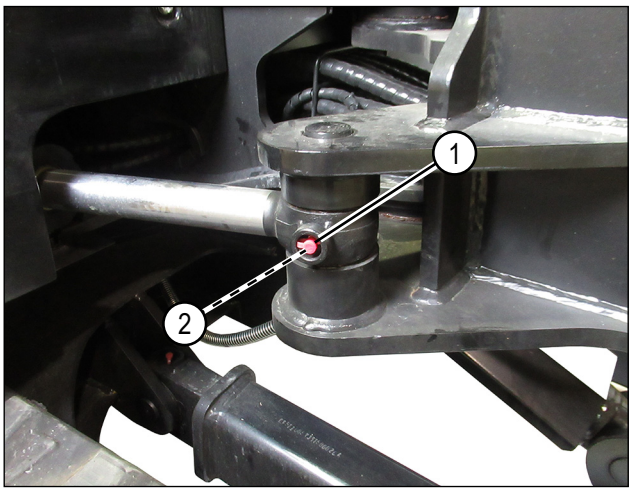


Fig. 5-94 0003181

Boom Swing Cylinder Base End Pin

Grease the boom swing cylinder base end pin grease fitting (1).

Wipe excess grease from around the grease fitting.

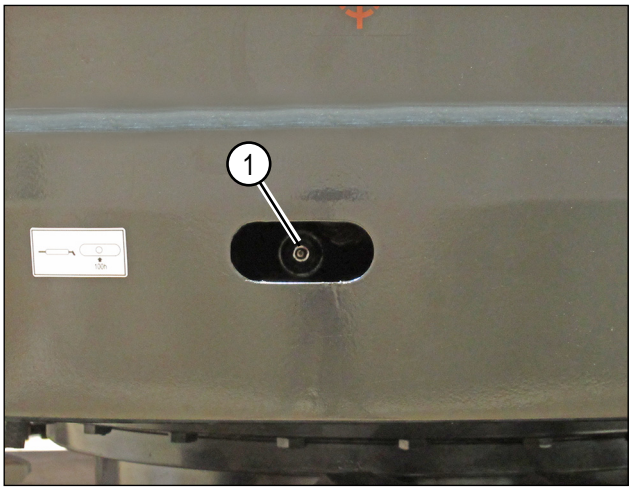


Fig. 5-95 0003182

Boom Swing Pin

NOTE: Only one boom swing pin grease fitting cap is shown.

1. Remove the grease fitting caps (1) from the boom swing pin grease fittings (2).
2. Grease the boom swing pin grease fittings.

   NOTE: Wipe excess grease from around the grease fitting.

3. Install the grease fitting cap.

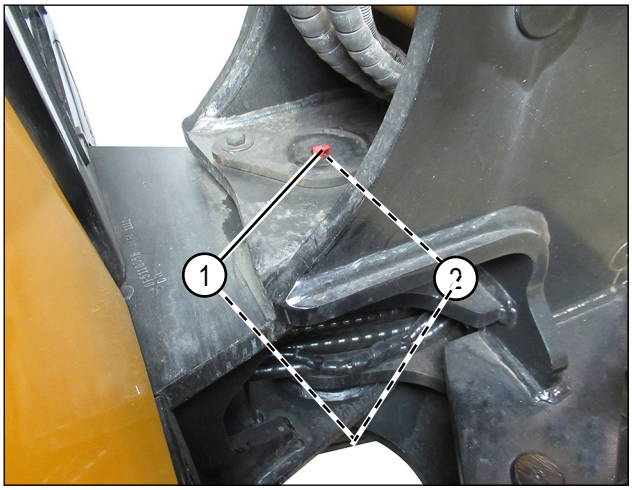


Fig. 5-96 0003184

Swing Bearing

1. Remove the grease fitting cap (1) and grease the two fittings on the swing bearing (2).

   NOTE: Only one fitting is shown. The fittings are 180° offset from each other.

2. Start the engine and raise the bucket 0.8 in.–1.2 in. (20 mm–30 mm) above the ground. Swing the upper structure 45 degrees (1/8 turn) in each direction.
3. Shut down the engine.

   NOTE: Wipe excess grease from around the grease fittings.

4. Install the grease fitting cap.

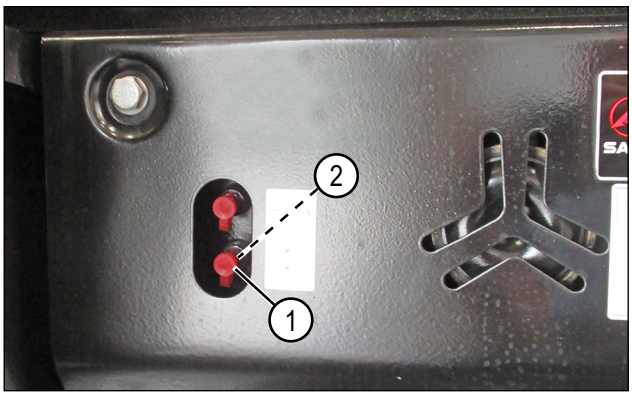


Fig. 5-97 0003826

Swing Pinion Gear

1. Park the machine on level ground as shown (1). Turn the throttle to MIN and run the machine unloaded at low speed for five minutes.

2. Turn the machine off.

Fig. 5-98 0003783

3. Grease the swing pinion gear using the top grease fitting (3).

4. Start the engine and raise the bucket 0.8 in.–1.2 in. (20 mm–30 mm) above the ground. Swing the upper structure 45º (1/8 turn) in each direction.

5. Add grease to the swing bearing until grease appears from the swing bearing seal (2).

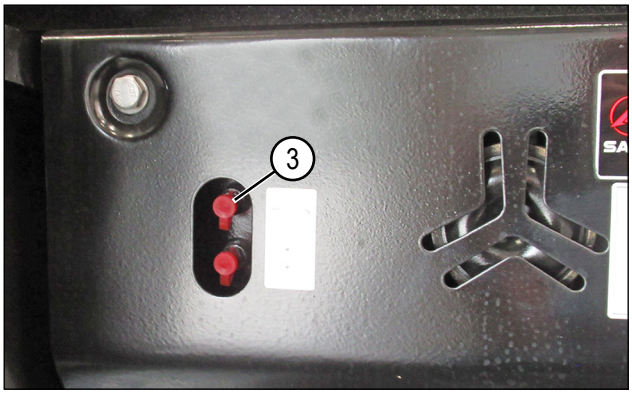


Fig. 5-99 0003826

Bucket

Replace the Bucket Teeth

WARNING!

- **Unexpected machine movement can be dangerous when replacing the bucket teeth. Place the bucket on a stable work surface. Shut down the engine and relieve the hydraulic system pressure.**
- **Roll pins may eject with extreme force when removed. Do not allow anyone to stand in front of the pins during pin removal.**
- **Metal fragments from roll pins and tools may break off during roll pin removal and installation. Wear safety goggles, gloves, and other personal protective equipment (PPE) to prevent serious injury.**

Failure to follow these warnings could result in death or serious injury.

NOTE: Bucket teeth must be replaced before the bucket tooth adapter wears out.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Measure the length (2) of the bucket teeth (1). If the bucket teeth are worn more than the service limit dimension, replace the bucket teeth.
   - The dimension of new bucket teeth is 4.5 in. (114 mm).
   - The minimum service limit of bucket teeth is 2.4 in. (60 mm).

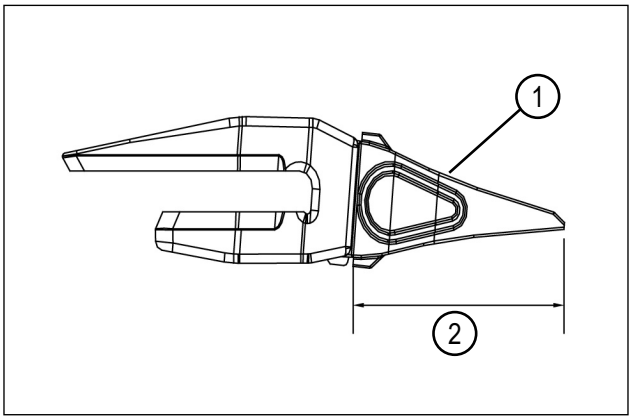


Fig. 5-100 0001646

3. Select a stable work surface. Move the hydraulic controls to the locked position. Keep the bottom of the bucket level on a wooden block (3).
4. Remove the roll pins and worn bucket teeth.
5. Install new bucket teeth and roll pins in the reverse order of removal.

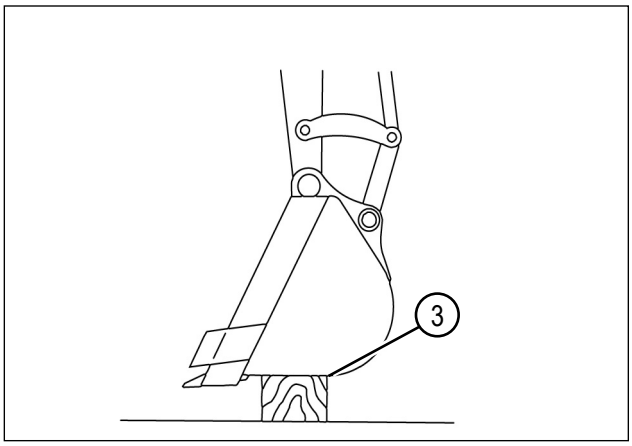


Fig. 5-101 0001647

Replace the Bucket

CAUTION!

- **Keep fingers and other body parts away from pinch points to prevent crushing injuries while removing or installing the bucket. Never put your finger into the pin bore during alignment.**
- **Secure buckets after removal and before servicing.**
- **Bucket pins may be ejected with extreme force when removed forcefully. Do not allow anyone to stand in front of the pins during removal.**
- **Never stand or place your feet or other body part under the bucket when removing bucket pins.**

Failure to follow these precautions could result in injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Support the bucket to prevent it from rolling over when the bucket pin is removed.
3. Remove the fasteners and bucket pins (1).
4. Remove the bucket from the arm. Clean the pins and pin bores.
5. Align the arm with a new bucket. Make sure the bucket is secured and will not move.
6. Install the bucket pins. Install the mounting fasteners and pins into the bucket pins.
7. Grease the bucket pins.

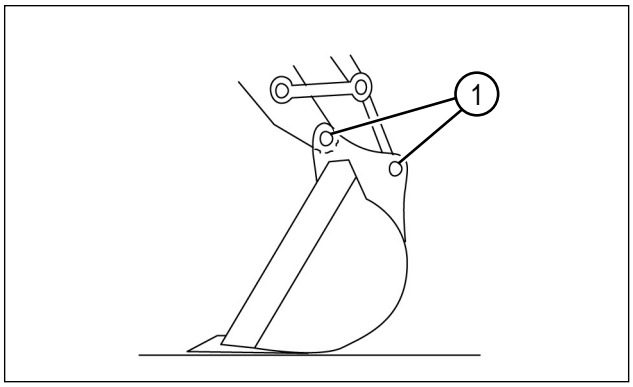


Fig. 5-102 0001650

8. Start the engine and run it at low idle. Operate the bucket slowly in both directions to check for binding.

Check the Sheet Metal

NOTE: Repair or replace sheet metal as needed using SANY-approved parts.

Check for missing or damaged sheet metal panels, doors, and covers. Check for loose connections or missing fasteners. Replace panels, doors, covers, or fasteners as needed.

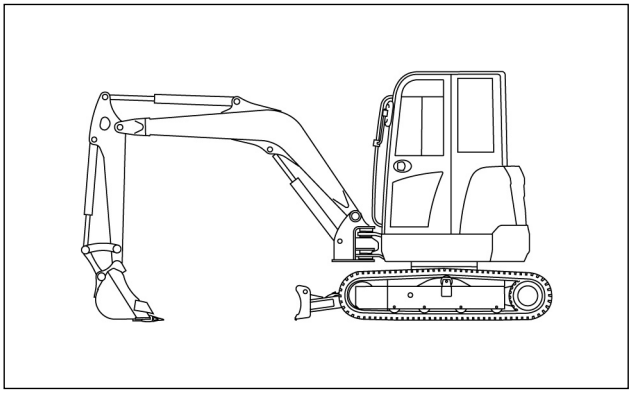


Fig. 5-103 0002925

Check Component Operating Functions

Check the boom work light (1) for proper operation and damage. See “Work Light Switch – Cab Machine” on page 3-10 or See “Work Light Switch – Canopy Machine” on page 3-11.

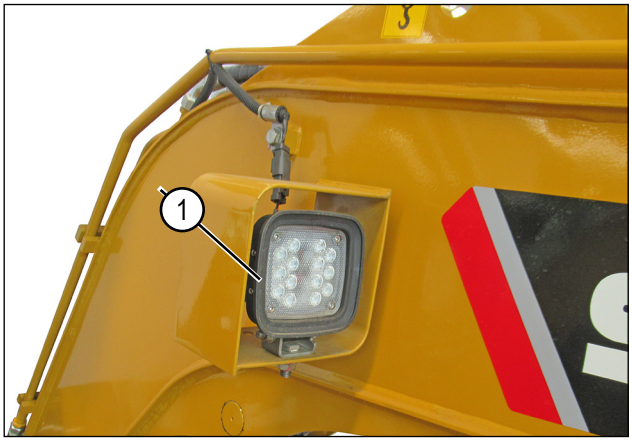


Fig. 5-104 0003860

Check the work light (2) on top of the cab for proper operation or damage. See “Work Light Switch – Cab Machine” on page 3-10.

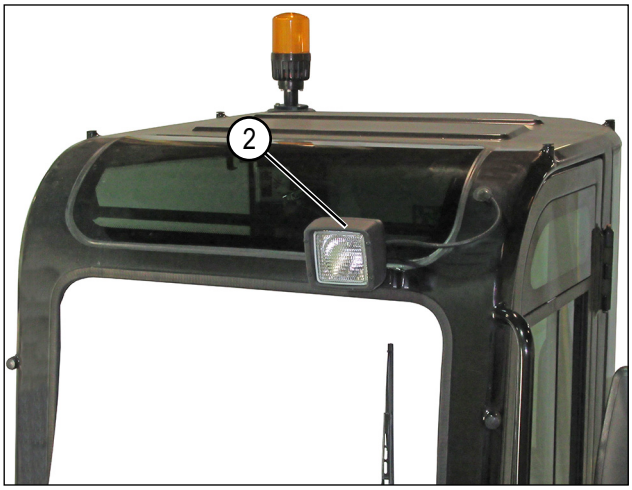


Fig. 5-105 0002980

Check the work lights (3) on top of the canopy for proper operation or damage. See “Work Light Switch – Canopy Machine” on page 3-11.

Fig. 5-106 0003149

Check the windshield wiper (4) for proper operation and to make sure there is no smearing across the windshield during operation. See “Windshield Wiper Switch – Cab Machine” on page 3-9.

Replace the wiper blade with a new one if smearing does occur.

Check for proper operation of the windshield washer nozzle (5). See “Windshield Washer Switch – Cab Machine” on page 3-9.

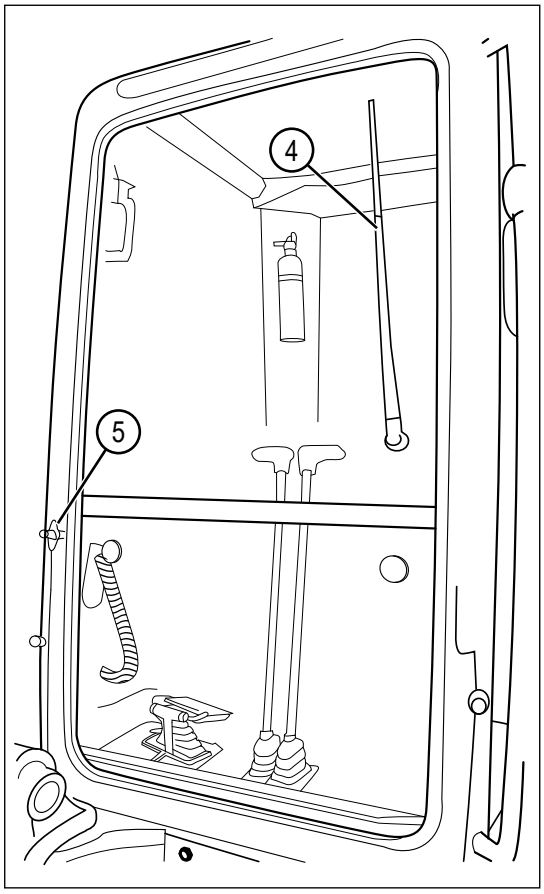


Fig. 5-107 0003803

Check the windshield washer fluid level in the windshield washer tank (6), behind the right rear access door. Fill with clean windshield washer fluid as necessary.

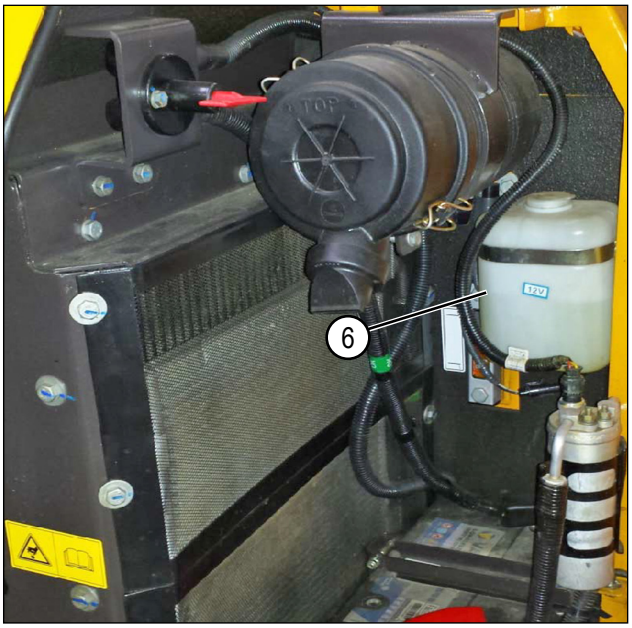


Fig. 5-108 0003781

Check the horn (7) for proper operation.
(See “Horn Button” on page 3-7.)

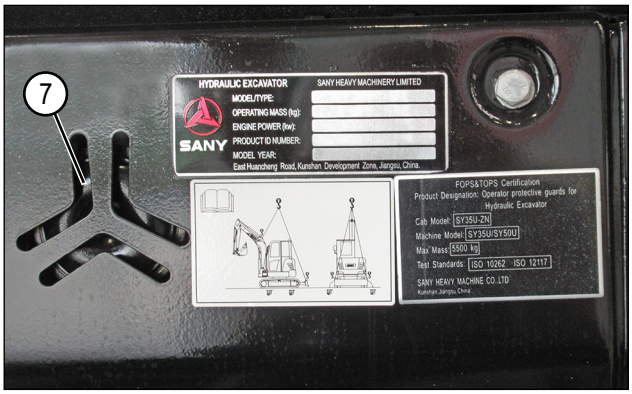


Fig. 5-109 0003827

Check the Operation and Maintenance Manual

Make sure the Operation and Maintenance Manual is in the cab. If this manual is damaged or missing, contact a SANY dealer for a replacement.

Check the Upper Structure and Undercarriage

The machine consists of two major component groups:

- The undercarriage with its various components and assemblies.
- The upper structure with its various components and assemblies.

Check all structural components identified below for cracks or distortion. Notify a SANY dealer if any cracks or distortion are found.

NOTE: The illustration below shows a cab machine. Canopy machines are similar for non-cab-related items.

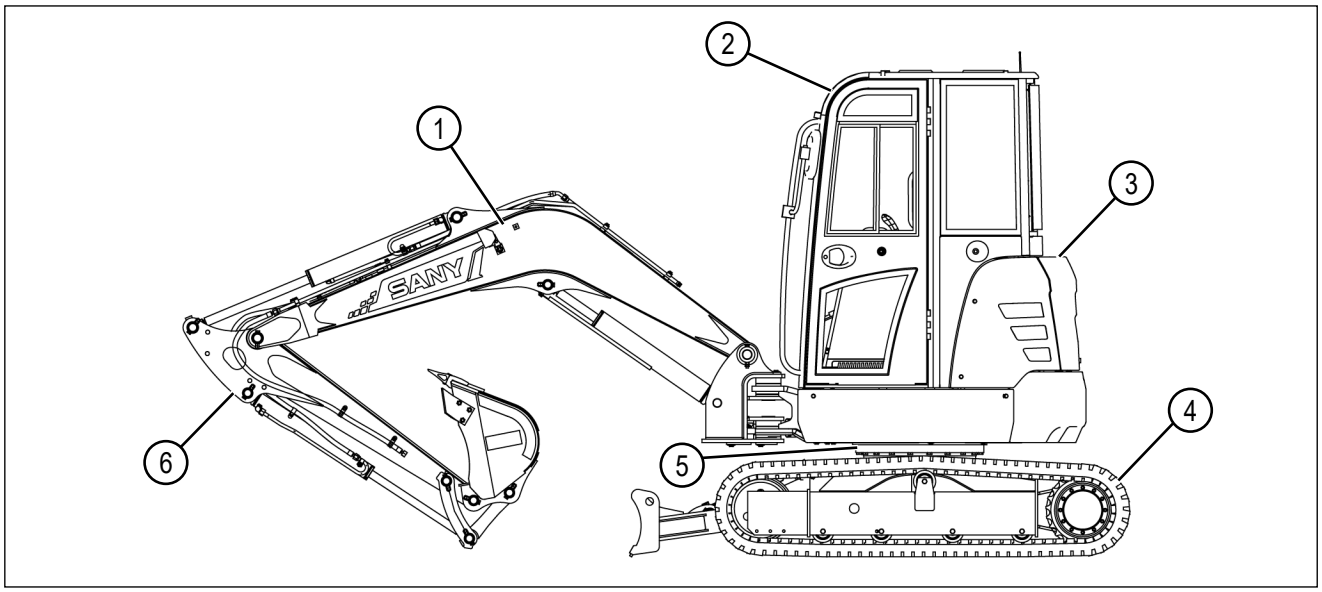


Fig. 5-110 0001462

1) Boom
2) Cab
3) Engine access door
4) Track
5) Swing turntable
6) Arm

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SANY

Specifications

Machine Dimensions 6-2
Working Ranges 6-3
Technical Specifications 6-4
Lift Chart: Blade Down 6-5
Lift Chart: Blade Up 6-6

MACHINE DIMENSIONS

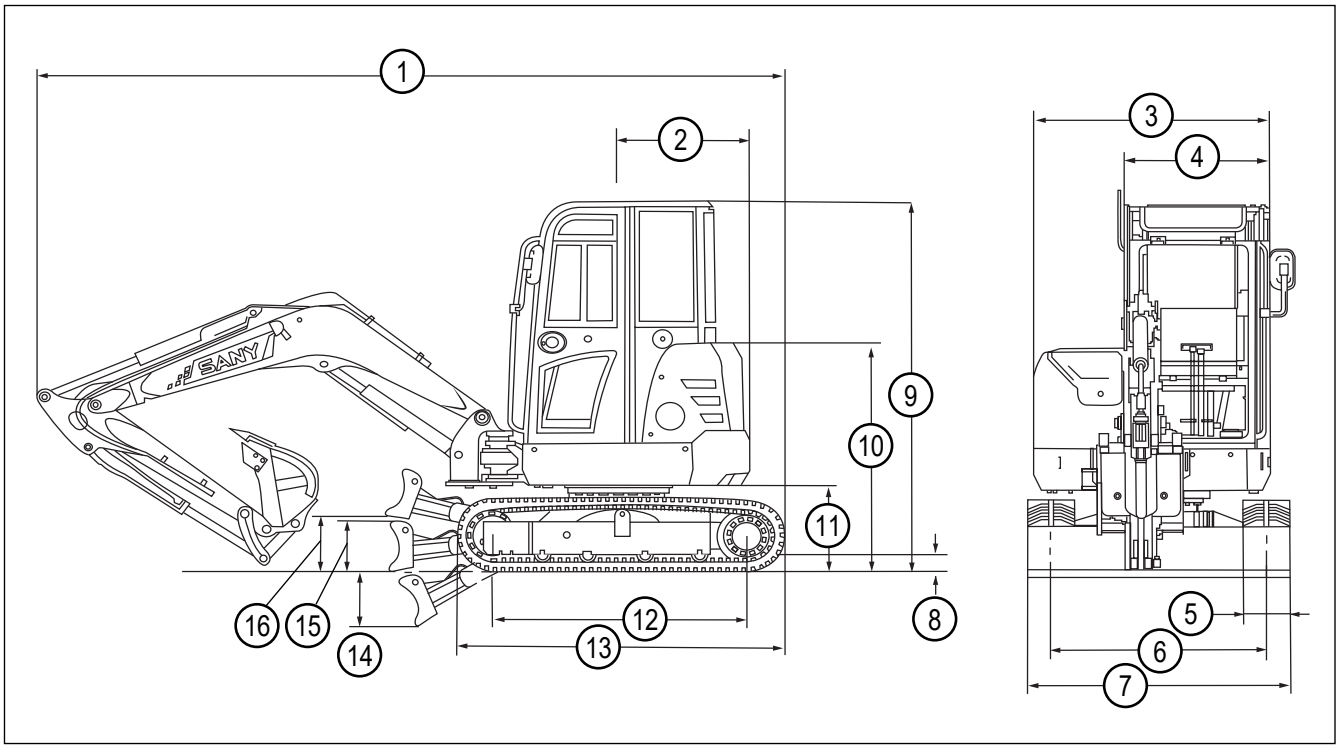

Fig. 6-1

0003761

Item	Description	Specification
1	Transport length	16 ft. 2 in. (4915 mm)
2	Tail swing radius	2 ft. 10 in. (860 mm)
3	Upper structure width	5 ft. 1 in. (1550 mm)
4	Cab width	3 ft. 1 in. (950 mm)
5	Track width (standard shoe)	12 in. (300 mm)
6	Track gauge	4 ft. 8 in. (1420 mm)
7	Transport width	5 ft. 8 in. (1720 mm)
8	Ground clearance (minimum)	12 in. (300 mm)
9	Transport height	8 ft. 3 in. (2515 mm)
10	Engine rear panel height	5 ft. 1 in. (1550 mm)
11	Platform clearance	1 ft. 11 in. (590 mm)
12	Track length on ground	5 ft. 6 in. (1670 mm)
13	Track length	7 ft. 1 in. (2155 mm)
14	Blade maximum digging depth	1 ft. 2.6 in. (370 mm)
15	Blade height	1ft. 2 in. (350 mm)
16	Maximum ground clearance of blade	1 ft. 2.8 in. (375 mm)

WORKING RANGES

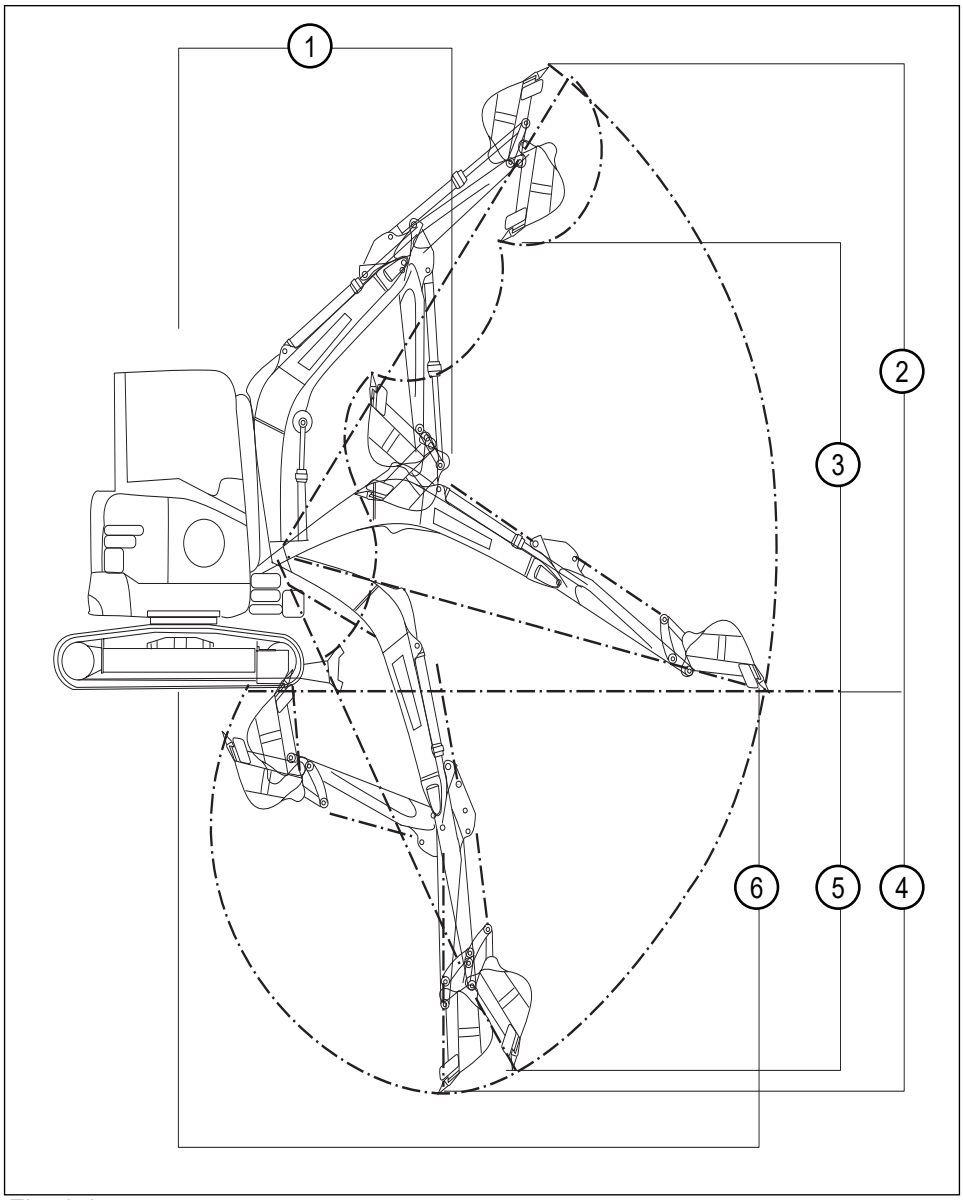

Fig. 6-2 0003762

Item	Description	Dimensions
1	Minimum swing radius	8 ft. 1 in. (2475 mm)
2	Maximum digging height	15 ft. 11 in. (4855 mm)
3	Maximum dumping height	11 ft. 4 in. (3460 mm)
4	Maximum digging depth	10 ft. 2 in. (3105 mm)
5	Maximum vertical wall digging depth	8 ft. 10 in. (2700 mm)
6	Maximum reach at ground level	17 ft. 11 in. (5465 mm)

TECHNICAL SPECIFICATIONS

Description	Specifications
Operating weight (with operator, standard bucket, and full fuel tank)	With canopy: 8367 lb. (3795 kg) With cab: 8499 lb. (3855 kg)
Transport weight (bucket, 15% fuel in tank, no operator)	With canopy: 8117 lb. (3682 kg) With cab: 8333 lb. (3780 kg)
Engine type	Yanmar 3TNV88
Maximum engine power (gross)	24.4 hp/18.2 kW @ 2400 rpm
Engine displacement	97.6 cu. in. (1.6 L)
Maximum arm digging force (SAE)	4092 lb-ft (18.2 kN)
Undercarriage	Belted rubber track
Number of upper rollers	1
Number of lower rollers	4
Fuel tank capacity	10.6 gal. (40.0 L)
Hydraulic tank capacity	10.6 gal. (40.0 L)
Cooling system capacity	1.7 gal. (6.5 L)
Engine oil capacity	1.8 gal. (6.7 L)
Ground pressure	4.6 psi (32.0 kPa)
Boom length	8 ft. 4 in. (2.54 m)
Stick (arm) length	4 ft. 7 in. (1.40 m)
Grade capability (maximum)	35°
Hydraulics	Load sensing with pilot control
Main hydraulic pump	Axial piston with variable displacement
Main hydraulic pump operating flow (maximum)	23.2 gpm (88.0 Lpm)
Main hydraulic pump operating pressure (maximum)	3553 psi (24.5 MPa)
Swing motor	Axial piston with swing brake
Swing speed (maximum)	9 rpm
Swing pressure (maximum)	2988 psi (20.6 MPa)
Travel motor	Axial piston with park brake
Travel speed	1.5/2.7 mph (2.4/4.4 kph)
Travel pressure (maximum)	3553 psi (24.5 MPa)
Travel effort	8273 lb-ft (36.8 kN)
Bucket breakout	6834 lb-ft (30.4 kN)

LIFT CHART: BLADE DOWN

Load Point Height ft. (m)	Rated Capacity lb. (kg)							
	Load Point Radius ft. (m)							
	6.6 (2.0)		9.8 (3.0)		13.1 (4.0)		Lift capacity at max reach	
	End 	Side 	End 	Side 	End 	Side 	End 	Side 
13.1 (4.0)							*1767 (*803)	1452 (660)
9.8 (3.0)					*1800 (*818)	1107 (503)	*1514 (*688)	1008 (458)
6.6 (2.0)			*2205 (*1000)	1676 (762)	*1881 (*855)	1080 (491)	*1476 (*667)	849 (386)
3.3 (1.0)			*3183 (*1447)	1547 (703)	*2279 (*1,036)	1030 (468)	*1529 (*695)	801 (364)
0.0 (0.0)			*3630 (*1,650)	1472 (669)	*2501 (*1137)	994 (452)	*1731 (*787)	816 (371)
-3.3 (-1.0)	*5218 (*2372)	*2745 (*1245)	*3588 (*1631)	1463 (665)	*2380 (*1082)	992 (451)	*2198 (*999)	948 (431)
-6.6 (-2.0)	*4525 (*2057)	*2837 (*1287)	*2677 (*1217)	1520 (691)			*2255 (*1023)	1364 (620)

* Indicates load limited by hydraulic lifting capacity.

NOTE: Lift capacities shown are without power boost feature and do not exceed 75% of minimum tipping loads or 87% of hydraulic capacities. These capacities only apply to the machine as originally manufactured and normally equipped by SANY. Lift capacities do not include a bucket and are in compliance with ISO 10567:2007

NOTE: Least stable position is over the side.

NOTE: The load point is the centerline of the bucket pivot mounting pin on the arm.

LIFT CHART: BLADE UP

Load Point Height ft. (m)	Rated Capacity lb. (kg)							
	Load Point Radius ft. (m)							
	6.6 (2.0)		9.8 (3.0)		13.1 (4.0)		Lift capacity at max reach	
	End 	Side 	End 	Side 	End 	Side 	End 	Side 
13.1 (4.0)							1549 (704)	1452 (660)
9.8 (3.0					1175 (534)	1107 (503)	1069 (486)	1008 (458)
6.6 (2.0)			1797 (817)	1676 (762)	1148 (522)	1080 (491)	904 (411)	849 (386)
3.3 (1.0)			1661 (755)	1547 (703)	1098 (499)	1030 (468)	851 (387)	801 (364)
0.0 (0.0)			1584 (720)	1472 (669)	1060 (482)	994 (452)	876 (398)	816 (371)
-3.3 (-1.0)	3029 (1377)	2739 (1245)	1577 (717)	1463 (665)	1060 (482)	992 (451)	1010 (459)	950 (431)
-6.6 (-2.0)	3131 (1423)	2831 (1287)	1635 (743)	1520 (691)			1463 (665)	1364 (620)

* Indicates load limited by hydraulic lifting capacity.

NOTE: Lift capacities shown are without power boost feature and do not exceed 75% of minimum tipping loads or 87% of hydraulic capacities. These capacities only apply to the machine as originally manufactured and normally equipped by SANY. Lift capacities do not include a bucket and are in compliance with ISO 10567:2007

NOTE: Least stable position is over the side.

NOTE: The load point is the centerline of the bucket pivot mounting pin on the arm.

Optional Equipment

Optional Equipment Selection 7-2
Read Equipment Instruction 7-2
Removal and Installation Precautions 7-2
Equipment Operation Precautions 7-3
Install Optional Equipment 7-4
Remove Optional Equipment 7-6

OPTIONAL EQUIPMENT SELECTION

Consult a SANY dealer before installing any optional equipment to the machine. Depending on the type of optional equipment selected, protective structures (such as front guards or top guards) may need to be installed on the machine.

Only install SANY-approved optional equipment. SANY assumes no responsibility for accidents, loss, or failures caused by any optional equipment.

READ EQUIPMENT INSTRUCTION

Read and understand the optional equipment manual before installing and operating any optional equipment. Do not exceed the manufacturer's specifications for maximum flow and pressure of optional equipment.

If the optional equipment manual is missing or damaged, contact the manufacturer of the optional equipment to obtain a replacement.

Installation and Removal Precautions

NOTICE!

The following precautions must be strictly observed when selecting, installing, and operating optional equipment. Failure to follow this notice can damage the machine or cause it to operate improperly.

- Follow the instructions in this manual and in the optional equipment manual.
- Remove and install equipment only on a firm, level surface.
- Use an appropriate lifting device when handling heavy objects.
- Never stand under a suspended load.
- Make sure the machine is well-balanced and supported whenever installing or removing optional equipment.

For additional information about removal and installation of optional equipment, consult a SANY dealer.

Equipment Operation Precautions

NOTICE!

The following precautions must be strictly observed when selecting, installing, and operating optional equipment. Failure to follow this notice can damage the machine or cause it to operate improperly.

- Prior to the operation, move the machine to a safe area and test its operation.
- Be aware of how the machine will move with an optional piece of equipment, since the machine's center of gravity and working range may change.
- Make sure the machine is well-balanced.
- Maintain a safe distance from all surrounding barriers during machine operations.
- To prevent the machine from tipping over, never swing, lower, or stop the machine suddenly.
- To prevent impact that may cause the machine to tip over, never raise or lower the boom suddenly.
- Install front guards on the machine as necessary per the nature of the optional equipment.

INSTALL OPTIONAL EQUIPMENT

WARNING!

- **Do not release the optional equipment unless it is on the ground or on a solid, supportive surface. Block or support the equipment to prevent rolling or tipping.**
- **Hydraulic systems operate under high pressure. Hydraulic oil escaping under pressure is dangerous. Always relieve hydraulic pressure before disconnecting hoses.**

Failure to follow these warnings could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Relieve hydraulic system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.

NOTICE!

Dispose of hydraulic oil according to all applicable environmental regulations. Failure to follow this notice could damage the environment.

NOTE: The stop valves are located on each side of the arm, if equipped.

3. Turn the stop valve (1) to the closed position.

NOTE: The right side is shown. Repeat for the left side.

4. Place a suitably sized container under the hydraulic connection to catch any residual hydraulic oil.
5. Remove the cap (2) and plug (3) from the stop valve.

NOTE: The right side is shown. Repeat for the left side.

6. Connect the optional equipment to the machine in accordance with the manufacturer’s instructions.

Fig. 7-3 0004798

7. Connect the optional equipment hydraulic lines and operate the optional equipment according to the manufacturer’s instructions.
8. Turn the left and right stop valves to the open position.

9. Adjust the return flow selector valve (3) according to the optional equipment being installed. The return flow selector valve is located on top of the hydraulic tank. It regulates the direction of hydraulic oil flow. There are one-way (4) or two-way (5) positions for operating optional equipment.

   NOTE: A variety of optional one-way and two-way flow equipment is available for use on this machine. A hydraulic breaker is an example of one-way flow equipment; a bucket thumb or shear are examples of two-way flow equipment.

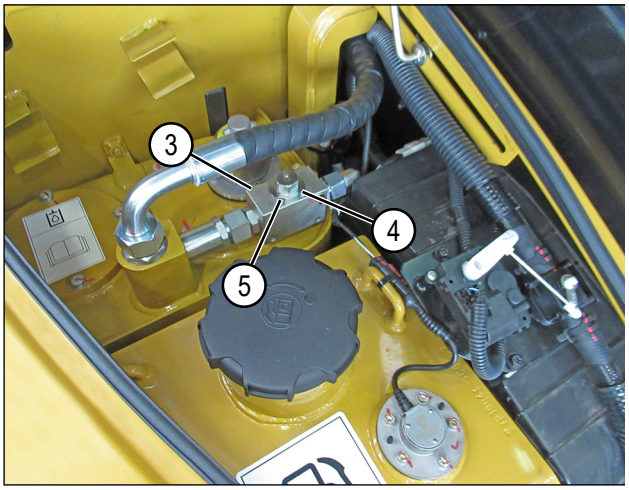

Fig. 7-4 0003772

10. Select the correct operating mode from the monitor. See “Operating Mode Screen” on page 3-43.

11. Check the hydraulic oil level. See “Check Hydraulic Oil Level” on page 5-56.

REMOVE OPTIONAL EQUIPMENT

WARNING!

Do not release the equipment unless it is on the ground or on a solid, supportive surface. Block or support the equipment to prevent rolling or tipping. Failure to follow these warnings could result in death or serious injury.

Hydraulic systems operate under extremely high pressure. Escaping hydraulic oil under pressure is dangerous. Always relieve pressure before disconnecting hoses. Failure to follow these warnings could result in death or serious injury.

1. Prepare the machine for service. See “Maintenance Safety” on page 2-8.
2. Relieve system pressure. See “Relieve Hydraulic System Pressure” on page 5-56.

NOTICE!

Dispose of the hydraulic oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

3. Place a suitably sized container under the hydraulic connection to catch any residual hydraulic oil.
4. Turn the stop valve (1) to the closed position.

   NOTE: The right is shown. Repeat for the left side.
5. Disconnect the optional equipment hydraulic lines in accordance with the manufacturer’s instructions.
6. Install the cap (2) and plug (3) on the hydraulic stop valve.

   NOTE: The right is shown. Repeat for the left side.
7. Disconnect the optional equipment from the machine in accordance with the manufacturer’s instructions.
8. Adjust the return flow selector valve as necessary. See “Return Flow Selector Valve” on page 3-18.

Fig. 7-5 0004798

9. Select the correct operating mode from the monitor. See “Operating Mode Screen” on page 3-43.
10. Check the hydraulic oil level. See “Check Hydraulic Oil Level” on page 5-56.

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