

# Operation Shader

**O**n December 2, 2015, the House of Commons voted in favour of extending RAF air strikes against Daesh targets into Syria. The response was immediate: Tornado GR4s flew from RAF Akrotiri overnight to join Coalition aircraft attacking targets in the Omar oilfield, 35 miles inside Syria. The jets delivered Paveway IV (PWIV) bombs against six precision aiming points chosen to disrupt the field's oil supply, which generated around 10% of Daesh's oil revenue.

The extended operation required additional firepower and RAF Marham despatched a pair of Tornados for Cyprus at 08:30 on the 3rd, Lossiemouth launching six Typhoons and three air spares for the Mediterranean island the following day.

Brimstone, Enhanced Paveway II (EPWII) and Paveway IV, GBU-12 and Hellfire have been the mainstay weapons of the RAF's contribution to Shader, but on June 26 a pair of Tornados

launched a brace of Storm Shadows each against a bunker. Used as a Daesh weapons facility, the bunker took four direct hits, the weapons reportedly penetrating deeply before exploding. Storm Shadow has since found application against similar hard targets.

Early on in the campaign, a typical day's operations saw two pairs of Tornados launched, but as combat has intensified, especially with the Iraqi and allied forces' ground assault on Mosul, it has become the norm for multiple pairs of RAF fast jets and Reaper UAVs to be airborne simultaneously.

The Reaper remotely piloted air system continues to prove particularly effective as a persistent surveillance and targeting asset, with a useful precision attack capability using underwing GBU-12 laser-guided bombs and Hellfire missiles.

Based at Akrotiri alongside the Typhoon and Tornado, the RAF has Sentinel R1 and

Sentry AEW1 aircraft in theatre, the former providing detailed intelligence on enemy ground movements, while the Sentry offers comprehensive communications capabilities and assists in airborne control and deconfliction among the many Coalition assets operational over Iraq and Syria. Airseeker (Rivet Joint) is also intensively active, collecting electronic intelligence.

Without tanker support, the Coalition effort would be impossible and the RAF's Voyager tanker/transport has proven its world-class capability time and again. Reports suggest that Voyager and the very similar Royal Australian Air Force KC-30A have become the tankers of choice among the Coalition air arms.

Voyager's ability to move passengers and freight is important in the constant supply and rotation of materiel and personnel in and out of Cyprus, while the Atlas and C-17 are regulars on the Akrotiri ramp. The Hercules has continued its regular sorties into Iraq, a series of missions that began in 2014 with the air dropping of supplies to refugees trapped on Mount Sinjar. Today's Hercules sorties are typically in support of UK and Coalition personnel working with local commanders in

**One of a pair of Storm Shadow-armed Tornados launches from Akrotiri on June 26. This mission marked Storm Shadow's first use against Daesh targets.** Cpl Tony Rogers/© UK MoD Crown Copyright 2016



**Royal Air Force Reaper, Tornado and Typhoon aircraft continue to attack Daesh targets with great precision across Iraq and Syria. The latter stages of 2016 have seen intensive action around Mosul, as Iraqi forces close in to retake the city**



# The Advance to Mosul

Iraq, flying into sensitive regions were they rely on RAF Regiment Force Protection personnel for their safety on the ground.

Akrotiri has always been of strategic importance to the UK, housing V-force, reconnaissance and other frontline elements during the Cold War, and latterly as an important link in the constant movement of personnel and equipment between the UK and locations in the Middle East and Afghanistan. Now it is on the frontline of operations against Daesh, and not a single fast jet could be launched without the dedication of its security

**Right: The Shader resupply effort keeps the RAF's Air Transport fleet busy. This C-17 was taxiing in at Akrotiri with a load of munitions in March.** Cpl Tony Rogers/© UK MoD Crown Copyright 2016



**Left: An armed Tornado awaits its next Shader mission, in one of Akrotiri's temporary shelters in December 2015.** Cpl Mark Dixon/© UK MoD Crown Copyright 2016



personnel, fire crews, caterers, logisticians, admin staff and a host of others.

Elsewhere in the Middle East, the Combined Air Operations Centre oversees and conducts the air operation. Multiple intelligence feeds, including full-motion video from orbiting Reapers, combine to deliver a detailed picture of events on the ground as they happen. The result is unprecedented situational awareness, enabling target confirmation and deconfliction in co-operation with local commanders, in the midst of a complex battlefield.

As Daesh is constantly driven back, so the air campaign continues at high intensity. The restrictions of space exclude the possibility of *Review* carrying a full account of events, but a précis of operations during October 2016 serves to illustrate the UK's commitment.

**1** A Reaper provided surveillance for a Coalition air strike north-west of Mosul, then used a Hellfire to attack a Daesh position

**2** A Reaper north of Mosul used a Hellfire to destroy a digger being used to construct a defensive position. To the east of Mosul, Tornados used an EPWII and a PWIV against an HQ building and personnel. Later, Typhoons used PWIVs in a simultaneous attack on three Daesh buildings. A second Typhoon pair destroyed a mortar team north of Ramadi, then used Paveways against a terrorist

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strongpoint and transport vehicle in the area around Bayji

**3** Typhoons provided close air support (CAS) to Syrian Democratic Forces attacking Daesh positions in eastern Syria. The jets destroyed a Daesh-held building with PWIV. In northern Iraq, Tornados supported Iraqi forces clearing Daesh from the Tigris valley south of Mosul. They used a PWIV to destroy a terrorist communications installation

**4** A Reaper crew located a large fuel tanker dug-in as part of Daesh defensive positions constructed near Batnay. The tanker was being used as a source of burning oil to create a smoke screen, shielding Daesh fighters from attacking ground forces. The Reaper scored a direct hit with a GBU-12. It then provided surveillance for a Coalition air strike

**5** Tornados bombed an armed truck south of Mosul. In central Iraq, Typhoons attacked a group of terrorists north of Taji with two PWIVs

**6** A Reaper engaged a mortar team and a group of terrorists with Hellfires. A Tornado mission used an EPWII against the entrance to a Daesh tunnel network. In eastern Syria, Typhoons used a PWIV against a Daesh command post

**7** Typhoons over western Iraq used PWIVs to destroy two trucks carrying Daesh extremists as they drove along a desert track. In the Tigris valley, two Tornado flights supported Iraqi troops. A Brimstone from one Tornado pair eliminated a mortar position, while the second pair used two PWIVs and a Brimstone in three attacks that accounted for a large, dispersed group of terrorists

**9** Tornados working over the Tigris destroyed a mortar team and ammunition stockpile near Qayyarah with two PWIVs. North of Mosul, a Reaper worked alongside two Typhoons. It provided surveillance for an artillery bombardment that destroyed a Daesh training camp. It then tracked two terrorists

as they moved to a rocket launching position, where they were seen working under the cover of trees. A Hellfire killed the terrorists and the Typhoons followed up with a PWIV to destroy the rockets

**10** A pair of Typhoons used two PWIVs to destroy the entrances to tunnels beneath an embankment near Qaraqosh. Flying to the north-west of Mosul, they used another Paveway to silence a mortar team on the northern bank of the Tigris. To the north-east, two Tornados used an EPWII to destroy a terrorist anti-tank missile position. They followed up with a PWIV to ensure the destruction of an associated ammunition supply point

**11** Tornados attacked a tunnel, identified as a weapons cache, north-west of Mosul

**12** North of Mosul, a Reaper-fired Hellfire scored a direct hit on an artillery piece hidden beneath a tarpaulin. A Tornado pair used a Brimstone to destroy a rocket-





Armed with four Paveway IV laser/GPS-guided bombs, and fuselage-mounted AIM-120 and underwing ASRAAM air-to-air missiles, this Typhoon was taking fuel from a USAF KC-135 tanker over Iraq on December 22, 2015. US Air Force/Staff Sgt Corey Hook

Below right: RAF Regiment Force Protection personnel travel with the Hercules crews into Iraq. On the ground they provide security to the aircraft, freight and personnel. SAC Helen Rimmer/© UK MoD Crown Copyright 2016

armed truck in the Qayyarah region, while Typhoons bombed a mortar team north-east of Mosul. The Tornado and Typhoon flights then combined for a joint attack on a set of workshops manufacturing explosives. Seven EPWII and PWIV bombs, plus a Brimstone, destroyed the facility and a number of vehicles. A second combined Tornado/Typhoon flight headed to the south-west of Kirkuk, where it destroyed a truck-bomb facility with EPWII and PWIV

**14** PWIV-armed Typhoons successfully bombed five rocket launchers north-west of Mosul. They then supported a Reaper that had located a mortar position and ammunition stockpile. The Reaper attacked the mortar with a GBU-12 and the Typhoons struck the munitions

**16** A Reaper patrolling north-west of Mosul engaged an artillery piece with a Hellfire, then provided targeting for three attacks by Coalition fast jets on terrorist mortar

positions. A flight of Typhoons operated to the west of Mosul, using PWIVs to destroy two buildings; a second flight, to the east, attacked four terrorist positions

**17** A Reaper watched Daesh positions near Qaraqosh to the south-east of Mosul and provided surveillance for a Coalition fast jet attack on a mortar team. It then attacked four targets, accounting for a mortar with a GBU-12. Hellfires destroyed an armed truck and two heavy weapons teams. To the south of the city, a Typhoon flight used a PWIV to dispose of a large truck-bomb

**18** A Reaper used a Hellfire to kill a group of terrorists engaged in combat with Iraqi troops south-east of Mosul. A second Hellfire accounted for another group of extremists and a third destroyed an armed truck. North-east of the city, a pair of Typhoons used PWIVs to destroy improvised explosive devices (IEDs) laid in a defensive belt, as well as a weapons stockpile and Daesh stronghold

**19** A Reaper scouted ahead of Iraqi troops advancing to the south-east of the city. A rocket-propelled grenade team was identified and struck by a Hellfire. The Reaper then provided surveillance for two successful Coalition fast jet attacks on larger groups of terrorists, before conducting a further Hellfire attack itself. Its sensors then spotted a large armoured truck-bomb emerging from cover and being driven at speed towards an Iraqi unit. An immediate Hellfire attack struck the vehicle, which crashed out of control. Another group of terrorists was identified and attacked with a fourth Hellfire. Meanwhile, to the north of Mosul, PWIV-armed Typhoons destroyed two Daesh-held buildings

**20** Reaper support to the south-east of Mosul continued. Hellfires destroyed a truck-mounted heavy machine gun and another vehicle that had been loaded with a mortar and ammunition. Two more Daesh

mortar teams were destroyed with a Hellfire and GBU-12. In the Tigris valley south of Mosul, a Tornado flight intervened in a combat between Iraqi troops and a dispersed group of terrorists. Two PWIVs accounted for the extremists. Meanwhile, two flights of Typhoons patrolled the northern arc around Mosul, where they engaged a rocket-launcher, a sniper team, a Daesh-held building, a pair of heavy machine guns, a stronghold and a command post controlling truck-bomb attacks

**21** A Reaper patrolled north of Mosul, using a Hellfire to destroy a mortar that had opened fire on Kurdish troops. The Reaper moved south-east to support operations around Qaraqosh, where a Coalition aircraft had spotted a fortified tunnel entrance. The Reaper's crew destroyed this with a direct GBU-12 hit. Meanwhile, near Khursabad, Typhoons worked in close co-operation with a Coalition surveillance aircraft to destroy a second tunnel entrance – terrorists were known to be hiding inside. To the north of Mosul they attacked two mortar teams and a heavy machine gun, and near Bartallah they destroyed an armoured truck-bomb positioned in the path of advancing Iraqi troops. In the Tigris valley, a pair of Tornados used a Brimstone to destroy an armed truck. They used a second Brimstone to engage a group of terrorists operating among houses south-east of Mosul

**22** A Reaper flew overwatch for Iraqi troops in and around Qaraqosh as they cleared remaining Daesh positions. Its crew used a Hellfire against several terrorists engaged in a firefight with the Iraqis. A second Hellfire destroyed an anti-aircraft gun in the street. A terrorist mortar was reported firing on friendly forces, and the Reaper successfully hunted this down and eliminated it with a GBU-12. A van was spotted supplying terrorist positions and was destroyed with a Hellfire; a fourth missile accounted for a group of extremists caught in the open »



## OPERATIONS

**23** A Reaper fired a Hellfire at a truck loaded with terrorists. A second Hellfire killed other terrorists as they attempted to hide beneath a staircase in a ruined building. It used a GBU-12 to destroy a heavy machine gun firing on Iraqi troops, then used a third Hellfire to destroy a dug-in mortar near Bartallah. North-east of Mosul, a pair of Typhoons used two PWIVs to destroy two machine gun positions, then carried out a simultaneous attack against two sniper teams, two mortars and another machine gun, spread across a couple of miles of the frontline. All five targets were struck accurately by PWIVs. An eighth Paveway destroyed another mortar team. A second Typhoon flight was also active in the area, working closely with Coalition surveillance aircraft, and dropped PWIVs against two Daesh strongpoints. Tornados patrolled north-east of Mosul. They delivered attacks with an EPWII and two PWIVs, destroying a machine gun team, a terrorist defensive position and an armed truck

**24** A Tornado armed reconnaissance mission north-east of Mosul was diverted to deal with group that a Coalition aircraft had spotted planting booby-traps and IEDs. An EPWII was used. Typhoons flew in the same area, using a PWIV against terrorists engaged in close combat with friendly forces, then, through heavy cloud, delivering a simultaneous strike against four sniper positions. The Iraqi forces reported direct hits on all four targets. Meanwhile, a Reaper flew further support as the Iraqis pushed on from Qaraqosh and Bartallah, and in the course of its mission delivered five attacks. Two Hellfires accounted for a terrorist group and a dug-in mortar. The Reaper then observed Daesh fighters travelling on motorcycles, and followed them until they joined forces with

more extremists. The group was struck with a Hellfire as it gathered outside a building. On the outskirts of Mosul, the Reaper spotted six rocket-launchers ready for firing. A GBU-12 destroyed four, a Hellfire the other two

**25** A Reaper patrolled the area around the village of Ali Rash, home to the Shabak minority, and destroyed an armed truck with a GBU-12. Its crew then tracked a group of Daesh fighters and attacked them with a Hellfire. Before returning to base, the Reaper provided targeting for a Coalition strike on a further Daesh position

**26** A Reaper saw three mortar teams firing on Iraqi forces. It directed Coalition fast jets to two of them and took care of the third with a Hellfire. The Reaper's crew then tracked a terrorist in a car, leading them to a large group manning a defensive position. The Reaper called in Coalition jets, which eliminated the group with a salvo of precision-guided bombs. A second Hellfire attack accounted for a smaller group of terrorists moving on foot. North-east of Mosul, Typhoons provided CAS to an Iraqi advance and successfully used PWIV to destroy four buildings that Daesh had fortified as strongpoints

**27** A Reaper patrolled to the north of Mosul. It kept a sustained watch on the area around a known Daesh supply point and tunnel entrance, ensuring no civilians were present before Coalition jets attacked both targets. It then provided surveillance for a Coalition strike that destroyed a large truck-bomb. The Reaper subsequently observed and destroyed three armed terrorists moving on a pair of motorcycles, using a single Hellfire

**28** A Reaper identified an artillery piece being loading onto a large flatbed truck. It provided targeting for a pair of Paveway-armed Tornados to destroy the gun and vehicle. The Reaper supported a follow-up attack by Coalition aircraft that destroyed a nearby ammunition truck. It then used a Hellfire missile to detonate a large truck-bomb hidden in trees

**29** A Reaper patrolling south of Mosul, along the Tigris valley, spotted a group of terrorists firing RPGs at Iraqi troops and attacked them with a Hellfire. A second Hellfire accounted for a heavy weapons team, before the aircraft provided targeting for a Coalition aircraft that killed a number of terrorists manoeuvring through woodland

**30** A Reaper crew successfully hunted down a mortar that had been firing on Iraqi positions. It was subsequently destroyed by Coalition fast jets. The Reaper used Hellfires against a pair of terrorists moving at high speed on a motorcycle and a team armed with a recoilless anti-tank gun. It then facilitated three further Coalition attacks against groups of terrorists, including another recoilless anti-tank weapon crew

**31** Tornados joined Coalition aircraft in a major co-ordinated attack on a former Iraqi military depot near Haditha in western Iraq. Intelligence had established that Daesh had set up workshops manufacturing weapons in a number of the bunkers at the site. The Tornados used Storm Shadow, chosen because of its penetrative capabilities, to target several of these bunkers. Around Mosul, a Reaper supporting Iraqi troops as they cleared the village of Bazwaya used a Hellfire to destroy an armed truck, then assisted Coalition air attacks against a mortar team and another Daesh position

The Hercules has been involved in the effort to deploy UK training teams to Iraqi and Kurdish fighters inside Iraq. This aircraft was awaiting passengers for the return home during April.

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