



# Royal Air Force

## Aircraft & Weapons

Second Edition (Revised)

# Royal Air Force

## Aircraft & Weapons

### **Per Ardua Ad Astra**

(Through Adversity to the Stars)

An agile, adaptable and capable Air Force that, person for person, is second to none, and that makes a decisive air power contribution in support of the UK Defence Mission.

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Compiled and edited by Jay Myers, Royal Air Force Media and Communications, Headquarters Air Command.

All information has been checked and verified for accuracy at the time of publication. Aircraft silhouettes used throughout the book are for illustrative purposes only and are not intended to replicate proportionality. They are also used to show current and future capability where applicable.

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# Combat Aircraft

## Combat



# ISTAR

## ISTAR





# Typhoon FGR4

The Typhoon FGR4 provides the RAF with a highly capable and extremely agile multi-role combat aircraft, capable of being deployed in the full spectrum of air operations, including air policing, peace support and high-intensity conflict. Initially deployed in the air-to-air role as the Typhoon F2, the aircraft now has a potent and precise multi-role capability. The pilot can carry out many functions by voice command or through a hands-on stick and throttle system. Combined with an advanced cockpit and the HEA (Helmet equipment assembly) the aircraft is superbly equipped for all aspects of air operations.



A Typhoon departs Gioia del Colle at the beginning of a mission to enforce the Libyan No-fly Zone. Sgt Pete Mobbs.

## Combat

Typhoon FGR4

### Powerplant

Two Eurojet EJ200 turbojets

Thrust: 20,000lb each

### Dimensions & Specifications

Length: 15.96m

Wingspan: 11.09m

Height: 5.29m

Air-to-Air Refuelling: Yes

Speed: Mach 2

Max Altitude: 65,000ft

Aircrew: 1 pilot

### Weapon Systems

Missiles: AMRAAM, ASRAAM

Bombs: EPW II, Paveway IV

Guns: Mauser 27mm

Planned to Include: Storm Shadow, Brimstone, Meteor

### Sensors

Radar: Captor ECR 90

Air-to-Air Targeting: PIRATE Infra Red Search & Track

Air-to-Ground Targeting: Litening III

Reconnaissance: Litening III

### Defensive Aids

Electronic Counter Measures

Laser Warning Receiver

Radar Warning Receiver

Towed Radar Decoy



Top and Above: Typhoons take off from RAF Leuchars. SAC Matthew Baker.

# Tornado GR4



Top: Tornado GR4 at Gioia del Colle in support of Op ELLAMY. Cpl Babbs Robinson.  
Above: Ground engineers from 31 Sqn work on the engine of a Tornado GR4 at Kandahar Airfield, Afghanistan. Sgt Ross Tilley.

The Tornado GR4 is a two-seat, all-weather, day/night attack and reconnaissance aircraft. It has been in service with the RAF for more than 30 years, but a combination of major upgrade programmes and numerous continual enhancements has kept the aircraft amongst the forefront of all attack aircraft. Still one of the very few aircraft in the world that is able to operate at low level, day or night and in poor weather, the Tornado is now equipped with a modern precision-guided weapons suite and world-class reconnaissance sensors such as the Reconnaissance Airborne Pod for Tornado (RAPTOR). The aircraft also carries the Litening III Advanced Targeting Pod and the Laser Range Finder and Marked Target Seekers (LRMTS). The RAF has had Tornados deployed to the Middle East region for more than 20 years – further proof of the versatility and capability of this exceptional aircraft.

## Combat

Tornado GR4

### Powerplant

Two RB199 Turbofans

Thrust: 16,000lb each

### Dimensions & Specifications

Length: 16.72m

Wingspan: 13.91m (extended)  
8.6m (swept)

Height: 5.95m

Air-to-Air Refuelling: Yes

Speed: Mach 1.3

Max Altitude: 50,000ft

Aircrew: 1 pilot

1 WSO

### Weapon Systems

Missiles: Storm Shadow, Brimstone, ALARM, ASRAAM

Bombs: Paveway II or III, EPW II or III, Paveway IV

Guns: Mauser 27mm

### Sensors

Radar: Ground Mapping

Targeting: LRMTS, Litening III

Reconnaissance: RAPTOR

### Defensive Aids

Sky Shadow-2 ECM

Boz 107 Chaff Dispenser

Bol-IR Decoy Chaff Dispenser

TERMA AIRCM Pod



Top: A Tornado GR4 equipped with a Litening III pod and Paveway IV bombs takes off from Gioia del Colle on a mission over Libya. SAC Sally Raimondo.  
Above: Training sortie at RAF Marham. SAC Richard Dudley.

# Lightning II

The UK MOD has taken delivery of three Lockheed Martin F-35B Joint Strike Fighters, known in UK service as the Lightning II. The initial Lightning II deliveries will be utilised in the role of Operational Test and Evaluation in the United States. This 5th Generation Short Take-off and Vertical Landing Multi-Role supersonic stealth aircraft will provide the UK with a hugely capable and flexible weapons and sensor platform for decades to come. Designed to operate from established land bases, austere airstrips and the new Queen Elizabeth Class aircraft carriers, the Lightning II will join the Typhoon FGR4 in providing the Combat Air component of UK defence from 2018. The ability to carry a variety of weapons, combined with an advanced sensor suite including the AN/APG-81 AESA Radar, Electro Optical Distributed Aperture System and Electro Optical Targeting System put the UK and Lightning II at the forefront of aircraft and weapon system technology.



## Future Capability

Lightning II

### Powerplant

Pratt & Whitney F135 Turbofan

Max Thrust: 40,000lb with re-heat

### Dimensions & Specifications

Length: 15.6m

Wingspan: 10.7m

Height: 4.36m

Air-to-Air Refuelling: Probe & Drogue System

Speed: Mach 1.6

Max Altitude: 50,000ft

Aircrew: 1 pilot

### Weapon Systems

Missiles: AMRAAM, ASRAAM

Bombs: Paveway IV

Guns: 25mm Gun Pod

Planned Weapons: METEOR, SPEAR, Storm Shadow

### Sensors

Radar: AN/APG81 AESA, IR Search & Track

Electronic Warfare: Full countermeasure suite, AN/AAQ-37 Electro Optical Distributed Aperture System, Electro Optical Targeting System, Secure Datalink Link 16



Lightning II joins Typhoon from 2018, providing the Combat Air component of UK defence.  
© Lockheed Martin



# E-3D Sentry AEW1



The RAF operates the E-3D Sentry aircraft in the airborne surveillance and command-and-control role. While primarily procured as an airborne early warning aircraft, the E-3D has been extensively employed in the Airborne Warning and Control System (AWACS) role. The Sentry's roles include air and sea surveillance, airborne command and control, and weapons control. The aircraft's mission systems can separate, manage and display targets individually on situation displays within the aircraft, or it can transmit the information to ground-based and ship-based units using a wide variety of digital data links. The E-3D also operates as an extensive communications platform.

## Powerplant

Four CFM 56 2A-3 Turbofans

Thrust: 24,000lb each

## Dimensions & Specifications

Length: 46.68m

Wingspan: 44.98m

Height: 12.7m

Air-to-Air Refuelling: Yes

Speed: 460kt

Max Altitude: 35,000ft plus

Range: 5,000nm

Aircrew: 2 pilots, 1 WSO (navigator), 1 air engineer, 10 man mission crew, 1 communications operator, 3 airborne technicians

## Weapon Systems

None

## Sensors

Radar: Northrop Grumman AN/APY-2

Surveillance: Airborne and ground/sea targets



Above: Ready to taxi out from Trapani (Sicily) during Op ELLAMY. SAC Sally Raimondo.

Right and opposite bottom left: Flypast at the RAF Waddington Air Show. Sgt Si Pugsley.

ISTAR

E-3D Sentry AEW1

# Sentinel R1

The Sentinel R1 is the RAF's only long-range wide area battlefield surveillance asset, providing critical intelligence and target tracking information to British and Coalition forces. Using the aircraft's powerful radar the mission crew can identify and track numerous targets over great distances, passing the information in near real time to friendly forces. The mission crew is backed up by a team of intelligence specialists who conduct in-depth forensic analysis of data collected by the aircraft, generating intelligence products that are passed to commanders and decision makers enabling them to plan future operations. The Sentinel R1, which entered service in December 2008, is the most advanced long-range, airborne-surveillance system of its kind in the world. The aircraft has been deployed operationally in Afghanistan since 2009 and provided vital intelligence during NATO operations in Libya in 2011, and French operations in Mali, in 2013.



Both Images: A 5(AC) Sqn Sentinel at Gioia del Colle during support to operations in Libya. SAC Tracey Dobson.

## Powerplant

Two R-R Deutschland BR710 Turbopfans

Thrust: 14,750lb each

## Dimensions & Specifications

Length: 30.30m

Wingspan: 28.49m

Height: 8.23m

Internal Fuel: 19.54 tonnes

Air-to-Air Refuelling: No

Speed: 530kt

Max Altitude: 40,000ft+

Range: 5,000nm+

Aircrew: 2 pilots  
3-man mission crew

## Weapon Systems

None

## Sensors

Raytheon Dual Mode Radar System (DMRS)



Top: Flypast at the RAF Waddington Air Show.

Cpl Paul 'Munch' Robertshaw.

Above: Tactical Ground Station and Sentinel aircraft at RAF Waddington. Cpl Laurence Platfoot.

## ISTAR

Sentinel R1



# RC-135W Rivet Joint



Variants of the RC-135 have been in service with the United States Air Force (USAF) since the 1960s, forming the backbone the United States airborne intelligence collection capability. The RC-135W Rivet Joint is a large, all-weather electronic surveillance aircraft based on the C-135 airframe. The Royal Air Force has purchased three RC-135 Rivet Joint aircraft, currently being converted from KC-135R Stratotanker airframes to RC-135W standard at the L3 Communications facility in Greenville, Texas. The first

aircraft is due for delivery in late 2013, with the final delivery expected in 2017. A programme of continual upgrades has kept the USAF RC-135 fleet at the cutting edge of technology and relevant capability. The three RAF aircraft will continue to benefit from the upgrade programme in turn with USAF aircraft. The RC-135W Rivet Joint is equipped with a variety of sensors, allowing its multi-disciplined crew to intercept and exploit emissions across the electromagnetic spectrum, providing both strategic and tactical level intelligence.



## Future Capability

RC-135W Rivet Joint

### Powerplant

Four F-108 (CFM56) Turbofan Engines

Thrust: 21,600lb per engine at sea level

### Dimensions & Specifications

Length: 41.1m

Wingspan: 39.9m

Height: 12.8m

Air-to-Air Refuelling: Boom

Speed: 478+kt

Max Altitude: 50,000ft

Aircrew: 2 pilots, 1 navigator, up to 21 mission crew

### Weapon Systems

None

### Sensors

Electronic Surveillance



All-weather electronic surveillance aircraft based on the C-135 airframe.

# Reaper MQ9A RPAS

The MQ-9 Reaper is a medium-altitude, long-endurance (MALE) remotely piloted aircraft designed for surveillance, reconnaissance and, if required, ground-attack missions. The aircraft's persistence and array of surveillance sensors make this an increasingly vital system alongside our traditional manned platforms. Reaper is operated by crews of professional pilots, sensor operators and Mission Intelligence Co-ordinators from Ground Control Stations. Two cameras in the nose of the aircraft provide the crew with a forward view using either daylight TV or Infrared, as well as the ability to utilise a targeting pod. An advanced, secure satellite communications system permits the crew to control the aircraft over the horizon. RAF personnel have flown more than 44,000 hours providing essential support to NATO ground forces in Afghanistan.



On Ops in Afghanistan. Cpl Andy Benson.



## Remotely Piloted Air System (RPAS)

Reaper MQ9A RPAS

### Powerplant

Honeywell TPE 331-10T Turboprop

Thrust: 900shp

### Dimensions & Specifications

Length: 10.97m

Wingspan: 20.12m

Height: 3.66m

Air-to-Air Refuelling: No

Speed: 250kt

Max Altitude: 50,000ft

Aircrew: Operating from a Ground Station

1 pilot  
1 sensor operator

### Weapon Systems

Missiles: Hellfire AGM 114

Bombs: Armed with US GBU12 (500lb Warhead)

Guns: None

### Sensors

Radar: Synthetic Aperture Radar

Targeting: AN/DAS-1 Pod (IR/DTV)

Reconnaissance: AN/DAS-1 Pod (IR/DTV)



RAF personnel have flown more than 44,000 hours providing essential support to NATO ground forces in Afghanistan. Cpl Steve Follows.

# Shadow R1



Shadow R1 aircraft of 14 Sqn based at RAF Waddington. SAC Frankie Ling.

The Beechcraft Shadow R1 aircraft of 14 Squadron, RAF Waddington, is part of the Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) group of systems. ISTAR improves a military commander's awareness of what is happening on the ground or in the air, allowing him to formulate sound plans in an operational environment. It is a powerful tool, indispensable when conducting modern day operations.

## ISTAR

Shadow R1

### Powerplant

2 x Pratt & Whitney Canada PT6A-42 turboprops

Thrust: 850shp each

### Dimensions & Specifications

Length: 13.34m

Wingspan: 16.61m

Height: 4.57m

Air-to-Air Refuelling: No

Speed: 294kt

Max Altitude: 35,000ft

Aircrew: 2 pilot

1 sensor operator

### Weapon Systems

None



Jerry Gunner.



# RAPTOR



With a RAPTOR pod under its fuselage, the Tornado GR4 becomes a world-class tactical reconnaissance platform. The system continues to prove its immense utility over Afghanistan. The aircraft is shown at Kandahar Airfield. Sqn Ldr Dylan Eklund.

## Aircraft

Tornado GR4

## RAPTOR

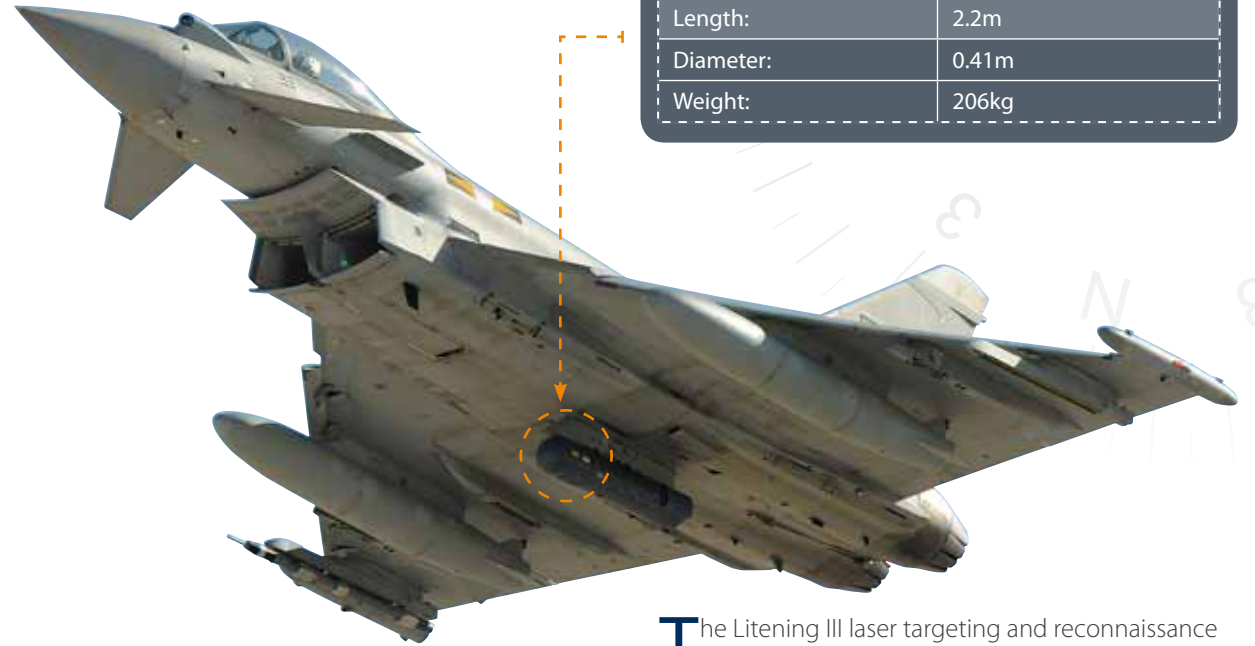
|           |         |
|-----------|---------|
| Length:   | 5.8m    |
| Diameter: | 0.8m    |
| Weight:   | 1,000kg |

The Reconnaissance Airborne Pod for Tornado, RAPTOR, is a stand-off electro-optical and Infrared long-range oblique-photography pod. The pod's high-resolution images can be transmitted via a real-time data-link to image analysts at a ground station, or can be displayed in the cockpit during flight. The RAPTOR system can create images of hundreds of separate targets in one sortie. The stand-off range of the sensors allows the aircraft to remain outside heavily-defended areas to minimise its exposure to enemy air-defence systems.



Imagery captured by RAPTOR during ops in Afghanistan. Sqn Ldr Nicola Wood.

# Litening III



## LITENING III

|           |       |
|-----------|-------|
| Length:   | 2.2m  |
| Diameter: | 0.41m |
| Weight:   | 206kg |

The Litening III laser targeting and reconnaissance pod provides a vital air-to-ground targeting capability, including the ability to laser-designate ground targets for attack by other assets, and a ground reconnaissance and scanning capability, even when the aircraft is flying at maximum speed at low altitudes and undertaking combat manoeuvres.

Above: 11 Sqn Typhoon from RAF Coningsby taking part in Exercise Red Flag 13-3 in Nevada, USA. SAC Gemma Nagi.

Left: This image was taken by a Tornado GR4 Weapons Systems Officer using the Litening III targeting pod during Op ELLAMY in Libya, May 2011.

## Aircraft

Tornado GR4 Typhoon FGR4

# Tanker and Transport

## Aircraft



## Aircraft





# Voyager

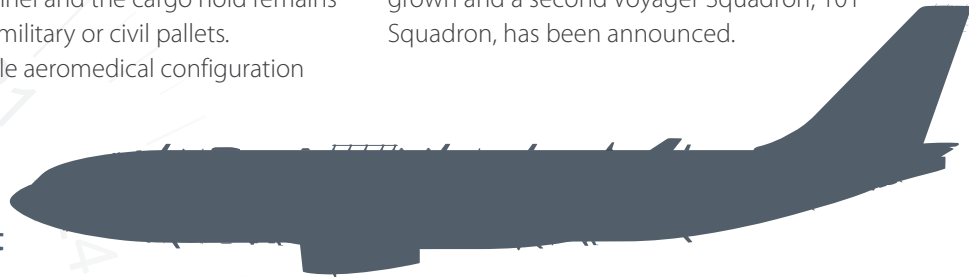


Previously known as the FSTA, Voyager will replace the AAR capability of the RAF's remaining VC10 and TriStars. There are currently 6 Voyagers in RAF service delivering Air Transport (AT) flying. 2013 will see a steady stream of airframes delivered and will total 6 airframes by the end of the year. Voyager is based on the modern A330-200 passenger aircraft and will provide the RAF with a step change in reliability and capability in both the AAR and AT roles.

There are two types of Voyager: the KC2, with two under-wing pods and the KC3, a three-point tanker with an additional centre line hose for larger aircraft. The fuel necessary for refuelling operations, as well as for the aircraft itself, is carried within the existing tanks in the wings and fuselage. This arrangement leaves the cabin free for transporting up to 291 personnel and the cargo hold remains available for freight on either military or civil pallets. Voyager will also have a flexible aeromedical configuration

that includes the ability to carry up to 40 stretchers and three critical care patients.

The RAF will continue to retain responsibility for all military tasks. However, the contractor, AirTanker Ltd, will own, manage and maintain the aircraft and provide infrastructure and support, training facilities and some personnel. In particular, AirTanker will provide Sponsored Reserve pilots and engineers to support Number 10 Squadron, the first RAF Voyager Squadron to operate the aircraft. This unique arrangement allows the RAF to benefit from civil best practice whilst allowing AirTanker to utilise excess capacity by operating some of the aircraft commercially when not required for RAF duty. Since its reformation on 1 July 2011, Number 10 Squadron has steadily grown and a second Voyager Squadron, 101 Squadron, has been announced.



## Tanker and Transport

Voyager

### Powerplant

Two R-R Trent 772B Turbofans

Thrust: 71,100lb each

### Dimensions & Specifications

Length: 58.82m

Wingspan: 60.3m

Height: 17.39m

Air-to-Air Refuelling: Tanker

Speed: 330kt

Max Altitude: 41,000ft

Range: 6,400nm

Aircrew: 2 pilots, 1 Mission Systems Operator for AAR, 8 Cabin Crew for AT

### Mission Systems

Operator: AAR Roles

### Weapon Systems

None

### Sensors

Radar: Weather Radar

Targeting: None

### Defensive Aids

Enhanced Defensive Aids Suite embodiment to be fitted in 2013



Top: 10 Sqn (AirTanker) receives 3rd Voyager aircraft from Airbus. Paul Crouch.

Above: Voyager re-fuelling a C-130 Hercules. Qinetiq.

Opposite: Voyager replaces the air-to-air capability of the VC10 and TriStar. AirTanker.

# C-17 Globemaster III



The C-17 Globemaster III is capable of rapid, strategic delivery of troops and all types of cargo to main operating bases anywhere in the world. The design of the aircraft also allows it to carry out high-angle, steep approaches at relatively slow speeds, thus allowing it to operate into small, austere airfields onto runways as short as 3,500ft long and only 90ft wide. The C-17 can transport 45,360kg of freight more than 4,500nm whilst flying at heights in excess of 30,000ft. The C-17 gives the RAF a long range strategic heavy-lift transport aircraft that can operate close to a potential area of operations for combat, peacekeeping or humanitarian missions worldwide.

## Powerplant

Four P&W F117- PW-100 Turbofans

Thrust: 40,400lb each

## Dimensions & Specifications

Length: 53m

Wingspan: 52m

Height: 16.79m

Air-to-Air Refuelling: No

Speed: 450kt

Max Altitude: 45,000ft

Max Range: 6,000nm

Aircrew: 2 pilots, 1 WSOp

## Weapon Systems

None

## Sensors

None

## Defensive Aids

LAIRCM

Flare dispensers (ALE-47)



Top: Sqn Ldr Dylan Eklund.

Above left: Lynx Mk9A helicopters inside a C-17 Globemaster transport aircraft. Stephen Lympny.

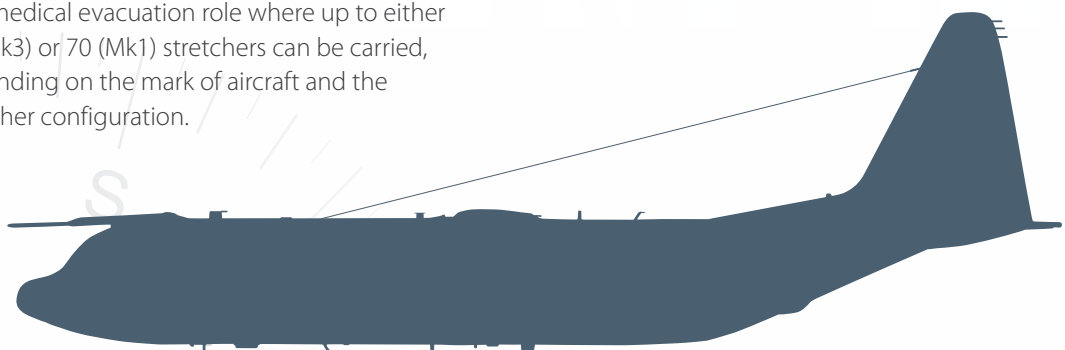
## Tanker and Transport

C-17 Globemaster III



# C-130K Hercules

The main role of the Hercules C-130K is Tactical Air Transport (TacAT), including airborne delivery of personnel or stores by airdrop. The aircraft is particularly valuable in its TacAT role as it can be operated from unprepared and semi-prepared surfaces by day or by night and allows response to crisis situations, such as evacuating UK nationals from war zones. C-130K aircraft may also be used to carry troops, passengers or freight and are capable of carrying up to 128 passengers (Mk 3)/92 passengers (Mk 1); or 15.9 tonnes of palletised freight/vehicles for up to 1,200nm (Mk3) or 17.4 tonnes/1,050nm (Mk1). The freight bay can accommodate a range of wheeled or tracked vehicles, or up to 7 pallets of general freight. The C-130K is capable of operating in the aeromedical evacuation role where up to either 93 (Mk3) or 70 (Mk1) stretchers can be carried, depending on the mark of aircraft and the stretcher configuration.



| Powerplant   |  |
|--|--|
| Four Allison T56-A-15 Turboprops   |  |
| Thrust:  | 19,600lb each  |
| Propeller:   | Hamilton hydromatic four-blade constant speed propeller      |
| Dimensions & Specifications  |  |
| Length:  | 29.77m (CMk1)<br>34.89m (CMk3)                               |
| Wingspan:  | 40.70m   |
| Height:  | 11.70m   |
| Air-to-Air Refuelling:   | Yes  |
| Speed:   | 290kt cruise speed   |
| Max Altitude:  | 40,000ft (max)<br>26,000ft (normal)                          |
| Range:   | 2,900nm (Ferry range)  |
| Aircrew:   | 2 pilots, 1 WSO, 1 flight engineer, 1 WSO, 1 ground engineer |
| Weapon Systems   |  |
| None   |  |
| Sensors  |  |
| CMk1: Hercules Enhanced Vision System (HEVS) consisting of low light television and EO/IR cameras. |  |
| Defensive Aids   |  |
| Defensive Aids Suite   |  |



Top: Flying over China Lake in California, USA.  
Above: Desert touchdown. Fg Off Owen Cheverton.

## Tanker and Transport

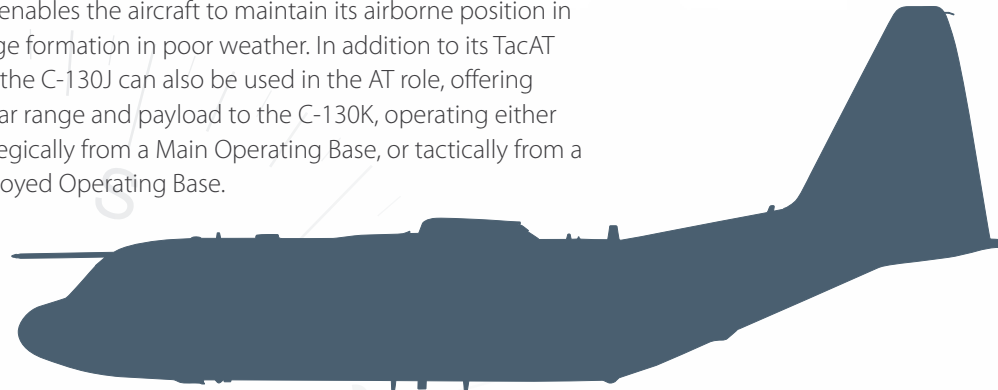
C-130K Hercules

# C-130J Hercules



The main role of the Hercules C-130J is also Tactical Air Transport (TacAT), and its capabilities are broadly similar to that of the C130K. However, its engines and advanced propellers, coupled with a digital engine-control system, give the C-130J increased take-off thrust and better fuel efficiency than its predecessor. The aircraft also has a revised flight deck with modern glass-cockpit and head-up displays allowing two-pilot flight deck operation. The cockpit of the aircraft is fully compatible with the use of night-vision goggles and, like the C130K, it is equipped with station-keeping equipment that enables the aircraft to maintain its airborne position in a large formation in poor weather. In addition to its TacAT role, the C-130J can also be used in the AT role, offering similar range and payload to the C-130K, operating either strategically from a Main Operating Base, or tactically from a Deployed Operating Base.

C-130Js have 6 bladed props, the Ks have 4. The Js have a glass cockpit and either no refuel probe or one mounted on the left of the cockpit (as seen from above); the Ks do not have a glass cockpit and have the refuel probe on the right.



## Tanker and Transport

C-130J Hercules

### Powerplant

Four Allison AE 2100D3 Turboprops

Thrust: 4,700shp each

Propeller: Dowty R391 six-blade variable pitch propeller

### Dimensions & Specifications

Length: 34.34m (CMk4)  
29.77m (CMk5)

Wingspan: 40.38m

Height: 11.70m

Air-to-Air Refuelling: Yes

Speed: 320kt cruise speed

Max Altitude: 40,000ft (max)  
28,000ft (normal)

Range: 2,650nm ferry range (Mk4)  
2,850nm ferry range (Mk5)

Aircrew: 2 pilots, 1 WSO,  
1 ground engineer

### Mission Systems

Operator: AAR Roles

### Weapon Systems

None

### Sensors

None

### Defensive Aids

Defensive Aids Suite



Top: Sqn Ldr Dylan Eklund.  
Above: Stephen McCourt



# TriStar



Top: Sqn Ldr Dylan Eklund.  
Above: A TriStar lands at Masanna Air Base, Middle East. Cpl Neil Bryden.

The RAF has a mixed fleet of TriStars operating in the air transport (AT) and air-to-air refuelling (AAR) roles. The K1 and KC1 aircraft conduct AAR by using centreline hose-and-drogue units, while the C2 is used extensively for transporting up to 266 troops to world-wide destinations in support of exercises and operations. All versions of the TriStar aircraft can operate in the aeromedical evacuation role, including the option of installing a full stretcher fit if required for the repatriation of casualties.

## Powerplant

Three RR RB211-524B Turbofans

Thrust: 50,000lb each

## Dimensions & Specifications

Length: 50.04m

Wingspan: 50.09m

Height: 16.87m

Air-to-Air Refuelling: Yes (not as receiver)

Speed: 375kt  
(Indicated Air Speed)

Max Altitude: 43,000ft

Range: 4,500nm

Aircrew: 4-9 dependant on role or type

## Weapon Systems

None

## Sensors

None

## Defensive Aids

LAIRCM (C2 & KC1)



Top: TriStar in formation with 2 Hawk T1 aircraft.  
Above: TriStar dawn. Fg Off Owen Cheverton.

## Tanker and Transport

TriStar



# VC10



Top: Sqn Ldr Dylan Eklund.  
Above: Preparing to take off in the baking heat of the Middle East. Sgt Ross Tilly.

The RAF's remaining VC10 fleet of 4 airframes comprises the CMk1K and KMk3 variants. The last aircraft in the fleet will be retired in September 2013. The primary role of the VC10 is Air-to-Air refuelling (AAR); however, the CMk1K can also be used in the freight role. Both variants are capable of dispensing fuel from 2 wing pods to fast jet aircraft and additionally, the KMk3 is fitted with a fuselage hose drum unit to enable multi-engined aircraft refuelling behind a centre-line hose. The VC10 is equipped with a flight-management system and the avionics required providing a worldwide capability.

## Powerplant

Four RR Conway Turbofans

Thrust: 20,000lb each

## Dimensions & Specifications

Length: 54.56m

Wingspan: 44.55m

Height: 12.04m

Air-to-Air Refuelling: Yes

Speed: 310kt  
(Indicated Air Speed)

Max Altitude: 43,000ft

Range: 5,500nm

Aircrew: 2 pilots, 1 WSO,  
1 air engineer

## Weapon Systems

None

## Sensors

Basic Weather Radar

## Defensive Aids

None



Top: SAC Taz Hetherington.  
Above: VC10 refuels 2 Typhoon F3s with a Tornado GR4 in formation. Geoffrey Lee.

## Tanker and Transport

VC10

# Atlas (A400M)



Atlas is coming into service as the 2nd Tranche replacement for the C130K to provide a tactical air lift and strategic oversize lift capability. Operated by 2 pilots and a Weapons Systems Operator (Crewman) (WSOp (Cmn)), the aircraft has the ability to carry a 25-tonne payload over 2,000nm to established and remote civilian and military airfields, or by landing on short, unprepared or semi-prepared strips. The aircraft will be capable of operating at high-level altitudes up to 40,000ft. Atlas can carry 116 passengers, or 9 aircraft pallets and 54 passengers, or a total freight weight of 32 tonnes, with loads being delivered by parachute, gravity extraction from the aircraft's rear ramp (influenced by the cargo's own weight), or by landing.

## Powerplant

Four EPI TP400 D6 Turboprops

|            |   |
|------------|---|
| Thrust:    | 11,000shp each                          |
| Propeller: | 8 blade variable pitch fully feathering |

## Dimensions & Specifications

|                        |                        |
|------------------------|------------------------|
| Length:                | 42.2m                  |
| Wingspan:              | 42.4m                  |
| Height:                | 14.7m                  |
| Air-to-Air Refuelling: | Yes                    |
| Speed:                 | 510kt                  |
| Max Altitude:          | 40,000ft               |
| Range:                 | 4,100nm plus           |
| Aircrew:               | 2 pilots, 1 WSOp (Cmn) |

## Weapon Systems

None

## Sensors

|                 |                       |
|-----------------|-----------------------|
| Radar:          | Type to be determined |
| Targeting:      | None                  |
| Reconnaissance: | None                  |

Top right: An Atlas (A400M) test aircraft takes off from RAF Brize Norton. Harland Quarrington.  
Bottom right: SAC Ben Tritta.



## Tanker and Transport

Future Capability

# Agusta A109E



Picture by SAC Adam Fletcher.

The Agusta A109E Power helicopter is operated by No 32 (The Royal) Squadron in the Command Support Air Transport (CSAT) role. It can be flown by a single pilot in all weather conditions, by day and night. It provides site-to-site transportation for senior military commanders and Government Ministers in the UK and near Europe, providing a complementary capability to the fixed wing CSAT aircraft on the Squadron. The twin-engine design gives the pilot greater flexibility when planning routes over built-up areas, and increased safety margins when flying in and out of confined landing sites.

## Powerplant

Two Pratt and Whitney PW206C Turboshfts

Thrust: 561shp each

## Dimensions & Specifications

Length: 13.07m

Rotor: 10.83m

Height: 3.56m

Air-to-Air Refuelling: No

Speed: 168kt

Max Altitude: 10,000ft

Range: 350nm

Aircrew: 1 pilot

## Weapon Systems

None

## Sensors

None

## Defensive Aids

None



Top: SAC Adam Fletcher.  
Bottom: SAC Neil Chapman.

## Smaller Transport Aircraft

Agusta A109E



# HS125 CCMk3



The HS125 is operated by the RAF in the Command Support Air Transport (CSAT) role. Based on one of the most popular civilian business jets, its robust engineering, flexibility of operation and rapid turnaround times have made it a very successful platform for moving small numbers of high priority passengers around the world. It continues to provide essential operational support to military commanders in the Middle East and Afghanistan. More recently the aircraft was vital in supporting the NATO operation in Libya. From the UK it routinely provides a bespoke and flexible passenger transport capability that supports the efficient business of senior Government Ministers and MOD personnel.



## Smaller Transport Aircraft

HS125 CCMk3

### Powerplant

Two Garrett TFE 731-3DR-1H

Thrust: 3,700lb each

### Dimensions & Specifications

Length: 15.46m

Wingspan: 14.33m

Height: 5.36m

Weight: 11.6 tonnes

Internal Fuel: 9440lb

Air-to-Air Refuelling: No

Speed: 320kt

Max Altitude: 41,000ft

Range: 1,500nm

Aircrew: 2 pilots, 1 cabin crew

### Weapon Systems

None

### Sensors

None

### Defensive Aids

Classified



All pictures by SAC Rob Smith.

# BAe146 CCMk2 & BAe146 CMk3



The BAe146 is a quiet but tough aircraft, with a high level of built-in redundancy that enables it to operate for long periods away from base with little external support. The aircraft is extremely versatile, with excellent short field performance, good hot and high airfield capability and the ability to operate from rough landing strips. The RAF has two BAe146 CC Mk2 aircraft that are currently operated in the Command Support Air Transport (CSAT) role. The aircraft has proved to be highly effective on operations, providing essential support to transport military commanders around theatre to allow key face-to-face engagement with their own military personnel, coalition partners and Host Nation leadership. It regularly operates in the Middle East and Afghanistan, and more recently has provided a much needed transport capability during the NATO operation in Libya. In the UK it provides transport to senior members of the Royal Family, senior Government Ministers and MOD personnel. These aircraft have now been joined by two BAe146 C Mk3 aircraft operating in a tactical air transport role supporting operations in Afghanistan. Based on the Quick Change (QC) variant of the civilian BAe146, the aircraft is equipped with a cargo door providing a multi-role capability of a passenger seat configuration or palletised freight.

Although a different role from traditional CSAT, the similarities with the aircraft type means that the same crews can operate both variants.

| Powerplant                       |   |   |
|----------------------------------|---|---|
| 4 x Lycoming ALF502R-5 Turbofans |   |   |
| Thrust:                          | 6,790lb each                                |   |
| Dimensions & Spec                |   |   |
| Length:                          | BAe146 CCMk2                                | BAe146 CMk3   |
| Wingspan:                        | 26.26m                                      | 26.34m  |
| Height:                          | 8.61m                                       | 8.59m   |
| Capacity:                        | 30 Passengers                               | 94 Passengers   |
| Speed:                           | 300kt                                       | 295kt   |
| Max Altitude:                    | 30,000ft                                    | 31,000ft  |
| Range:                           | 1,400nm                                     | 1,200nm   |
| Aircrew:                         | 2 pilots, 2 cabin crew<br>1 ground engineer | 2 pilots, 1 cabin crew<br>1 ground engineer<br>1 loadmaster |
| Defensive Aids                   |   |   |
| Classified                       |   |   |



Opposite top left and above: CCMk2. Photographs by Cpl Dylan Browne.

Opposite bottom left: CMk3 at RAF Northolt with operational paint scheme. SAC Neil Chapman

## Smaller Transport Aircraft

- BAe146 CCMk2
- BAe146 CMk3



# Helicopters

## Helicopters



Chinook HC2/3/4/5/6

P48



Puma HC2

P50



Merlin HC3

P52



## Helicopters



Griffin HAR2

P54



Sea King HAR3/3A

P56



# Chinook HC2/3/4/5/6



Mk4. SAC Andrew Seaward.

The Chinook is an able and versatile support helicopter that can be armed with crew-served weapons to provide self-defence, and can be operated from land or ship in such diverse environments as the Arctic, jungle and desert.

Chinook aircraft are used for trooping, resupply, and battlefield Casualty Evacuation (CASEVAC), and for carrying internal and/or underslung loads. They can carry up to 55 troops (more, usually 24 to 40) and/or up to 10 tonnes of freight. A secondary role includes Search and Rescue (SAR).

In Afghanistan, the aircraft has become known for its emergency response role, in which the rear of the aircraft can essentially be used as an emergency operating theatre. The crew usually consists of two pilots and two crewmen, supplemented by other specialists depending on the specific task.

The Mk3 incorporates long range fuel tanks which greatly increase range and endurance. The Mk4 sees the introduction of a new cockpit display system, mission management system and

## Powerplant

Two Honeywell 55-L-714A Freeturbine Engines

Thrust: 4,168shp each

## Dimensions & Specifications

Length: 30.14m

Rotor: 18.23m

Height: 5.73m

Air-to-Air Refuelling: No

Speed: 160kt

Max Altitude: 15,000ft

Aircrew: 2 pilots  
2 WSOps

## Weapon Systems

Missiles: None

Bombs: None

Guns: 2 x M134 Miniguns,  
M60D Machine Gun

## Sensors

Radar: None

Electro Optics: IR x 2  
LLTV

Targeting: None

Reconnaissance: None

## Defensive Aids

Missile Warning System

Infrared Countermeasures System

Radar Warning Receiver

Chaff and Flare Dispensers



Mk4. SAC Andy Wright.

enhanced crewman's workstation that further increases the aircraft's capability. (When the Mk3s are fitted with updated avionics they will be designated Mk5, just as the Mk2s will morph into Mk4s.)

The Mk6 is a new buy of 14 aircraft differing in structure to the previous marks. They will incorporate a new Digital Automatic Flight Control System (DAFCS) and the updated cockpit of the Mk4 and 5. They arrive in the UK and the end of 2013 and will have a Release to Service by May 2014.

## Helicopters

Chinook HC2/3/4/5/6



# Puma HC2



The Puma HC2 is an upgraded version of the original Puma HC1, bringing the workhorse of the UK's medium battlefield helicopter fleet into the modern era. With more powerful engines, greater range and a modern digital cockpit, the Puma HC2 will be capable of operating in harsh environments, lifting troops, supplies and humanitarian aid to where it is needed. An upgraded self-defence suite and ballistic protection for crew and passengers also means that this helicopter will be well protected in hostile areas. The aircraft can be prepared for transport inside an RAF C-17 in just 4 hours, flown across the globe, rebuilt and flying just as quickly at the other end – truly a mobile battlefield helicopter to support the UK Defence Mission wherever it may be required. Twenty-four Puma HC1 aircraft are to be converted into Puma HC2s in 2013.

## Helicopters

Puma HC2

### Powerplant

Two Turbomeca Makila 1A1 turbines

Thrust: 1,800shp each

### Dimensions & Specifications

Length: 14.08m

Rotor: 15.09m

Height: 4.54m

Air-to-Air Refuelling: No

Speed: 167kt

Max Altitude: 19,700ft

Aircrew: 2 pilots (or 1 pilot, 1 WSO)

1 WSOp

### Weapon Systems

Missiles: None

Bombs: None

Guns: Two 7.62mm GP Machine Guns

### Sensors

None

### Defensive Aids

Missile Warning System

Radar Warning Receiver

Infrared Jammer

Ballistic Protection

Chaff and Flare Dispensers



Pictures courtesy Eurocopter.



# Merlin HC3



A Royal Air Force Merlin from 1419 Flt on tasking in and around Basra City, Iraq. Cpl Scott Robertson.

The Merlin is the first of a new generation of advanced, medium support helicopters for the RAF designed to operate away from base workshops and in difficult terrain. It is an all-weather, day and night, multi-role helicopter used in both tactical and strategic operational roles. Its diverse range of bulky cargo carried internally or underslung can include artillery, Land Rovers or light-strike vehicles and more than five tonnes of freight. The spacious cabin can also accommodate up to 24 fully-equipped combat troops and, when required, will convert to carry 16 stretchers for casualty evacuation or during humanitarian and disaster relief operations.

## Helicopters

Merlin HC3

### Powerplant

Three Rolls-Royce Turbomeca RTM 322 turbines

Thrust: 2263shp each

### Dimensions & Specifications

Length: 22.8m

Rotor: 18.6m

Height: 6.62m

Air-to-Air Refuelling: No

Speed: 167kt

Max Altitude: 15,000ft

Aircrew: 2 pilots (or 1 pilot, 1 WSO)

2 WSOps

### Weapon Systems

Missiles: None

Bombs: None

Guns: Three 7.62mm GP Machine Guns

### Sensors

Radar: None

FLIR: Turret Thermal Imaging

Targeting: None

Reconnaissance: None

### Defensive Aids

Missile Warning System

Laser Warning System

Radar Warning Receiver

Directional Infrared Jammer

Chaff and Flare Dispensers



Top: Prepare to move! Cpl Andy Benson. Above: Pre-deployment training in Jordan. SAC Tommy Axford.

# Griffin HAR2



The Griffin HAR 2 is operated as a multi-role helicopter by 84 Squadron, based at RAF Akrotiri, Cyprus. The Squadron operates three aircraft, supplied and maintained by civilian company FB Heliservices, and operated by experienced military aircrews. The HAR2 is used for Search and Rescue, both over sea and mountainous terrain. Equipped with night-vision goggles and the Griffin's FLIR/TV turret, the crews are capable of conducting

operations at night. Due to the hot climate, the HAR2 is regularly required to provide a vital fire fighting capability using 84 Squadron's Bambi Bucket water drop system.

In the Support Helicopter role, the Griffin HAR2 carries six (eight if operationally essential) fully equipped troops in the dustiest of conditions. The Griffin is also used in its HT1 and HAR2 forms by The Defence Helicopter Flying School (DHFS) at RAF Shawbury and the Search and Rescue Training Unit (SARTU) at RAF Valley.

## Powerplant

Two Pratt & Whitney PT6T- 3D Turboshafes

Thrust: 900shp each

## Dimensions & Specifications

Length: 17.11m

Rotor: 14.02m

Height: 3.48m

Air-to-Air Refuelling: No

Speed: 140kt

Max Altitude: 20,000ft

Aircrew: 1 pilot day operations  
2 pilots night operations  
Winch operator & winchman for SAR role  
Single rear crewman all other roles

## Weapon Systems

Weapons: None

## Sensors

Radar: Weather radar

Targeting: None

Search Reconnaissance: Ultraforce FLIR Turret

## Defensive Aids

None



## Helicopters

Griffin HAR2



# Sea King HAR3/3A



The AgustaWestland Sea King HAR3/3A is used in the Search and Rescue (SAR) role. The aircraft are operated from 6 locations around the UK, with each location supporting two aircraft. There is also a detachment of two Sea King HAR3s providing SAR cover in the Falkland Islands. The standard SAR crew is made up of 4 members: two pilots, one of whom is the aircraft captain; the co-pilot; the radar operator who acts as the Winch Operator at the rescue scene; and the Winchman, normally trained to paramedic standard who will administer Immediate Emergency Care (IEC) and recover the casualty from the rescue location.

Above: 22 Sqn C Flt, RAF Valley. SAC Dave Rose.  
Right: 22 Sqn C Flt. SAC Faye Storer.

## Helicopters

Sea King HAR3/3A

### Powerplant

Two Rolls Royce Gnome jet engines

Thrust: 1,389shp each

### Dimensions & Specifications

Length: 16m

Rotor: 21.5m diameter main rotor

Height: 5.13m

Air-to-Air Refuelling: No

Speed: 140mph

Max Altitude: 10,000 ft

Aircrew: 4 man crew: 2 pilots and 2 rearcrew (Radar/Winch Operator and Winchman, most of whom are qualified paramedics). The Operational Captain is overall command and responsible for the safety of the aircraft and crew. Up to 17 passengers can be carried.

Weapon Systems: None

Defensive Aids: None

Standby Role: Can remain airborne for 2-3 hours with 3,000lb of fuel loaded onboard; able to fly for up to 6 hours with maximum range of 250nm with a full fuel load.

Rescue Aids: Includes a hydraulic winch with 245ft (80m) of steel cable, capable of delivering the Winchman to most casualty locations and lifting up to 3 people simultaneously; a comprehensive navigation suite including AIRWAVE radio and other communications equipment; a processed search radar, crew night-vision goggles and powerful thermal-imaging/colour TV camera with on-board DVCAM recording capability; extensive array of medical equipment carried in the aircraft.



Top: A crew member of 203(R) Sqn, RAF Valley, during a training exercise. SAC Dek Traylor.  
Above: 22 Sqn C Flt on a training exercise in Snowdonia, North Wales. SAC Dave Rose.



# Training Aircraft

## Training Aircraft



## Training Aircraft

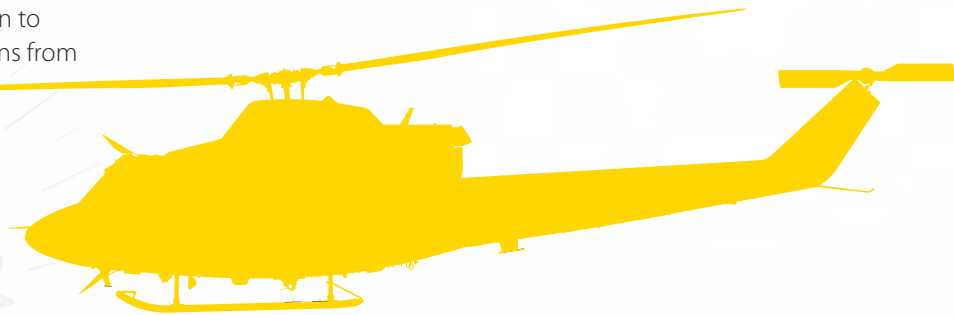


# Griffin HT1

The Griffin HT1 is used as an advanced flying-training helicopter at the Defence Helicopter Flying School (DHFS) at RAF Shawbury and the Search and Rescue Training Unit (SARTU) at RAF Valley. In addition to pilot training, the Griffin is used for crewman training: a very important and integral part of multi-crew operations – especially useful for procedural instrument-flying training and practicing complex emergency-handling techniques. The Griffin is also used in its HAR2 form by No 84 Squadron on SAR duties in Cyprus. With a cruising speed of 120kt (138mph) and an endurance of almost 3 hours, which makes it ideally suited for advanced helicopter training, the Griffin HT1 is ideally suited for Multi-Engine Advanced Rotary Wing training. The syllabus includes general-handling flying, underslung-load carrying, night-vision goggle training, procedural instrument flying, formation flying, low-flying navigation and an introduction to tactical employment, including operations from confined areas.



All pictures by Ian Forshaw.



## Training Aircraft

Griffin HT1

### Powerplant

Two Pratt & Whitney PT6T- 3D Turboshfts

Thrust: 900shp each

### Dimensions & Specifications

Length: 17.11m

Wingspan: 14.02m

Speed: 140kt

Max Altitude: 20,000ft

Aircrew: 4





# Hawk T1



Above: 208 Sqn, RAF Valley. Cpl Paul Oldfield.

The Hawk T1 version is currently used at RAF Valley for fast-jet pilot advanced training with No 208(R) Squadron although this role will increasingly migrate to IV(R) Sqn and the Hawk T2 in the future. The Hawk T1 is also operated by the RAF Aerobatic Team, the Red Arrows, and 100 Sqn. While the Hawk T1 is used primarily in the advanced flying-training role, it is equipped to an operational standard and is capable of undertaking a war role. The T1 has two underwing pylons cleared to carry AIM-9L Sidewinder air-to-air missiles. The cannon can be fired at the same time as any of the pylon-mounted weapons are selected for release or firing. Aiming facilities for the aircraft's attack modes are provided by an integrated strike and interception system, while a Vinten video recording system is used to record the weapon sighting.

## Powerplant

Rolls-Royce Turbomeca Adour Turbofan

Thrust: 5,200lb

## Dimensions & Specifications

Length: 11.9m

Wingspan: 9.39m

Speed: 550kt

Max Altitude: 48,000ft

Aircrew: 1 or 2

Armament: AIM-9L Sidewinder



Top: 100 Sqn. Sqn Ldr Dylan Eklund.  
Above: Training Sortie. Cpl Mike Jones.

## Training Aircraft

Hawk T1



# Hawk T2



The Hawk T2 is a fully aerobatic, low wing, transonic, 2-seat training aircraft with mission avionics that are representative of front-line aircraft. The Hawk T2 is used to train selected personnel to meet the Fast Jet Operational Conversion Unit (OCU) input standards. The aircraft's 'glass cockpit' avionics suite provides a realistic advanced fast jet training platform which, as part of the UK Military Flying Training System (UKMFTS), meets current and future OCU input standards. It allows trainees to be immersed in the more complex tactical environments by 'downloading' training from the OCUs. The Hawk T2 has a data link that gives the pilot synthetic radar for intercept training. The aircraft also has a sensor simulation capability to allow realistic Electronic Warfare (EW) training against Surface-to-Air-Missile (SAM) systems. In addition to significant changes made to the profile of the nose, the tail section has been modified to incorporate side-mounted, unit-root fins forward of the tailplane; a fairing for a Radar Warning Receiver has been added to the fin; and the tailcone has been redesigned to allow a brake parachute to be fitted.

## Powerplant

Rolls-Royce/Turbomeca Adour Mk.951 Turbofan

Thrust: 6,500lb

## Dimensions & Specifications

Length: 12.43m

Wingspan: 9.94m

Speed: 555kt

Max Altitude: 42,000ft

Aircrew: 1 or 2

Armament: Nil. The Mk2 has 7 under-fuselage hardpoints capable of carrying a wide selection of stores. In RAF service as a training platform, the aircraft will employ a wide range of simulated stores including active air-to-air missiles and precision guided munitions.



Top and above: 4(R) Sqn. Flt Lt Paul Heasman.

## Training Aircraft

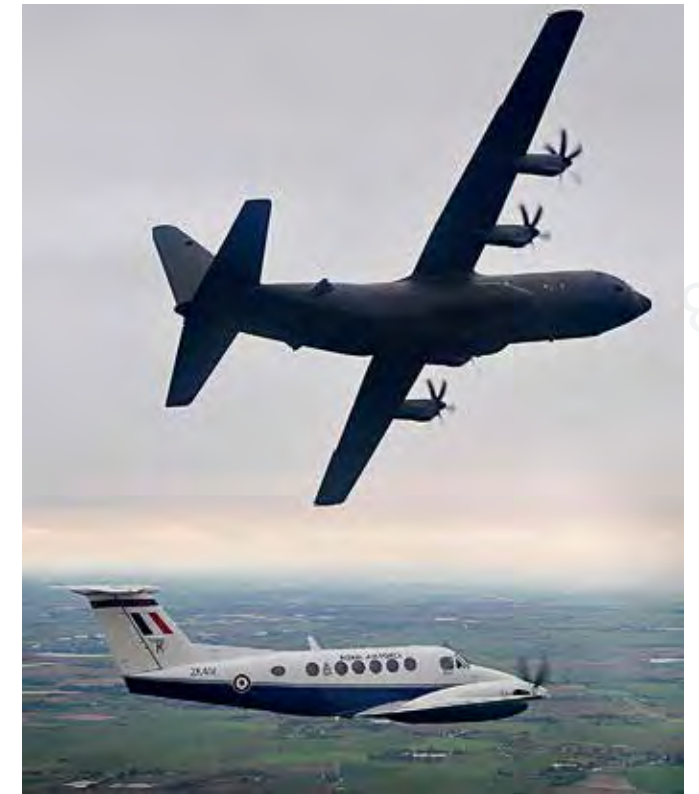
Hawk T2

# King Air B200



The Beech King Air B200 is a twin-engine turboprop monoplane used as an advanced, multi-engine pilot trainer by No 45(R) Squadron, which is part of No 3 Flying Training School based at RAF Cranwell. The King Air course is split into basic and advanced phases. In the basic phase, students learn essential multi-engine techniques such as general handling, asymmetric flying, emergency handling and radio-aids navigation, and consolidate the multi-crew skills acquired on the Multi-Engine Lead-In course. In the advanced phase, the emphasis shifts towards developing captaincy, crew resource management, and managing the King Air's advanced avionics systems. Students learn advanced skills such as formation flying, low-level flying and airways navigation, and are expected to plan and manage composite missions involving several aircraft. On completion of the course students are awarded their coveted pilots' wings, and then undertake conversion to their front-line aircraft type at an Operational Conversion Unit.

| Powerplant                             |             |
|--|-------------|
| Two Pratt & Whitney PT6A-42 Turboprops |             |
| Shaft Horse Power:                     | 850shp each |
| Dimensions & Specifications            |             |
| Length:                                | 13.36m      |
| Wingspan:                              | 16.61m      |
| Speed:                                 | 259kt       |
| Max Altitude:                          | 28,000ft    |
| Aircrew:                               | 2           |



All pictures by Flt Lt Leon Creese.

## Training Aircraft

King Air B200

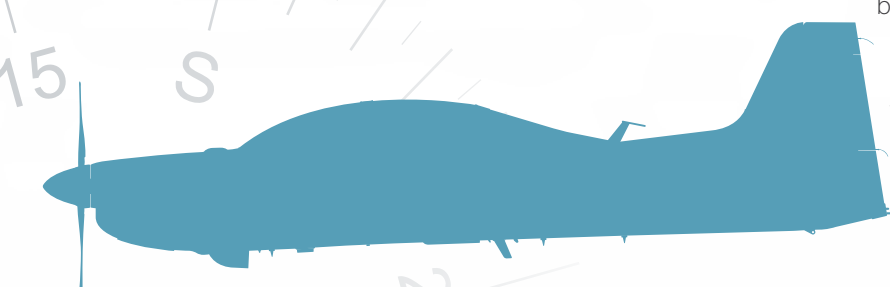


# Tucano T1



Display aircraft flown by Flt Lt Jon Bond.

The Tucano T1 is operated primarily from No 1 Flying Training School, at RAF Linton-on-Ouse, to provide basic fast jet flying training to RAF and RN student pilots. The aircraft handling is similar to that of a jet aircraft and it is fully aerobatic, thus providing an excellent platform for the training of fast-jet pilots in all aspects of military flying. It is used to develop students in a full range of skills, including general aircraft handling, formation flying and low-level navigation and, due to its comprehensive avionics and ice-protection packages, it can be flown in all types of weather, by day and by night. The Tucano's all-weather flying capability, plus its excellent endurance, allows a great measure of flexibility in the training role. Should weather conditions be poor at their home base, crews operating from RAF Linton-on-Ouse can fly low-level sorties to locations as far away as Wales or the north of Scotland.



## Training Aircraft

Tucano T1

### Powerplant

Garrett TPE331-12B Turboprop

Thrust: 1,150shp

### Dimensions & Specifications

Length: 9.86m

Wingspan: 11.28m

Speed: 300kt

Max Altitude: 25,000ft

Aircrew: 2



Above: The Queen's Diamond Jubilee livery.  
 Top left: 72(R) Sqn in Battle of Britain scheme.  
 Bottom left: 72(R) Sqn 1940 desert paint scheme.  
 All pictures by Geoffrey Lee.



# Tutor T1



Picture by Sgt Jack Pritchard.

The Grob 115E, known by the RAF as the Tutor, is used for Elementary Flying Training by all 3 of the Armed Services. Additionally, 14 University Air Squadrons and 12 Air Experience Flights throughout the UK provide Air Experience Flying and Flying Instruction to university students and members of the Air Cadet Organisation.

The Tutor can cruise at 130kt at sea level and climb to 5,000ft in 7 minutes.

This performance, along with a modern instrument and avionics suite, including a Traffic Avoidance System, makes the Tutor an ideal aircraft for Elementary Flying Training.

## Powerplant

Textron Lycoming AE-360-B Piston Engine

Rated Power: 180hp

## Dimensions & Specifications

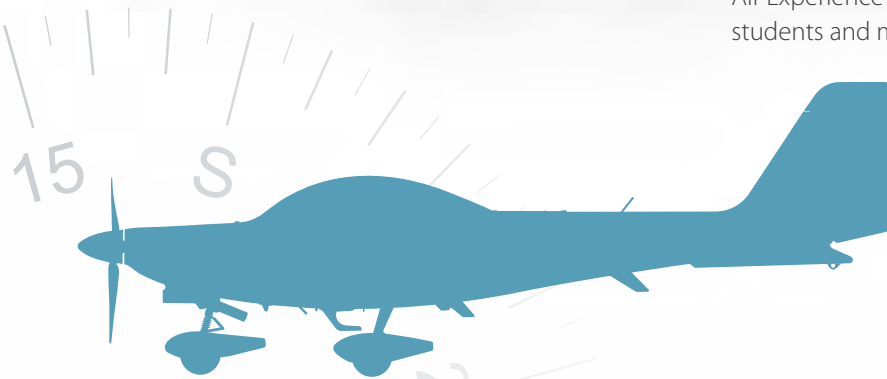
Length: 7.54m

Wingspan: 10m

Speed: 185kt

Max Altitude: 10,000ft

Aircrew: 2

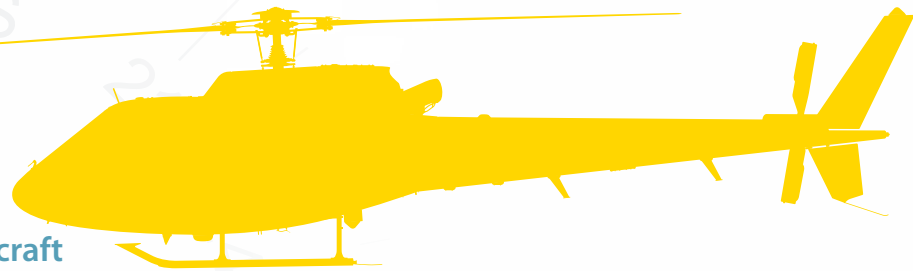


## Training Aircraft

Tutor T1

# Squirrel HT1

The Squirrel HT1 is used by the Defence Helicopter Flying School (DHFS) at RAF Shawbury for Single Engine Basic Rotary Wing (SEBRW) training and Single Engine Advanced Rotary Wing (SEARW) training with No 660 and 705 Squadrons. The Squirrel is an ideal platform to teach the rudiments of rotary-wing flying. The initial flying-training course teaches basic rotary-wing skills and emergency handling. The syllabus includes non-procedural instrument flying, basic night flying, low-level and formation flying, mountain flying and an introduction to winching for RN students. In addition to DHFS, the Squirrel HT1 is used by the Central Flying School (Helicopter) Squadron at RAF Shawbury for instructor training, and by 670 AAC Squadron, based at Middle Wallop, in Hampshire, for operational training.



## Training Aircraft

Squirrel HT1

### Powerplant

Ariel 1D1 gas-turbine engine

Thrust: 625shp

### Dimensions & Specifications

Length: 12.94m

Span: 10.69m

Speed: 155kt

Max Altitude: 16,000ft

Aircrew: 2



All pictures by Ian Forshaw.



# Vigilant T1

The Grob 109B motor glider, known by the RAF as the Vigilant T1, is used by the Air Cadet Organisation to give basic flying and gliding training to air cadets. The Vigilant is currently used by 17 Volunteer Gliding Squadrons (VGSs), located at various sites around the UK. Their role is to train air cadets in basic flying techniques and to enable them to reach a standard where they are able to fly solo. Courses available to the air cadets are the gliding induction course, the gliding scholarship course and the advanced gliding training course. The Vigilant T1 aircraft is also used at the RAF Central Gliding School, at Syerston, in Nottinghamshire, where it is used to train the VGS instructors.



## Training Aircraft

Vigilant T1

### Powerplant

Grob 2500E1 horizontally opposed four-cylinder, air-cooled engine

Thrust: 95lb

### Dimensions & Specifications

Length: 8.1m

Wingspan: 17.4m

Speed: 130kt

Max Altitude: 8,000ft

Aircrew: 2



Top Left: Vigilant T1s at RAF Syerston. Sqn Ldr Dylan Eklund.  
Above: Paul Hincks.



# Viking T1

The Grob G103A Twin II Acro, known by the RAF as the Viking T1, is used by the Air Cadet Organisation to give basic gliding training to air cadets. The aircraft is currently used by 10 Volunteer Gliding Squadrons located at various sites around the UK. Their role is to train air cadets to a standard that will allow them to fly solo. The Viking is used for basic training, high-performance flying and simple aerobatic flying and is a cost-effective, modern glider, ideally suited to its training role with the Air Cadet Organisation. Courses available to the air cadets are the gliding induction course, the gliding scholarship course and the advanced gliding training course. The aircraft is also used at the RAF Central Gliding School, at Syerston, where it is used in the training of the VGS instructors.



Picture by Geoff Parselle.



## Training Aircraft

Viking T1

### Powerplant

The aircraft can be winch launched or aero-towed

Thrust: 0lb

### Dimensions & Specifications

Length: 8.18m

Wingspan: 17.50m

Speed: 119kt

Max Altitude: 8,000ft

Aircrew: 2



Above: Landing at RAF Syerston. Sqn Ldr Dylan Eklund.

# RAF Regiment

RAF Regiment

Communication

P80



Weapons

P86



RAF Regiment

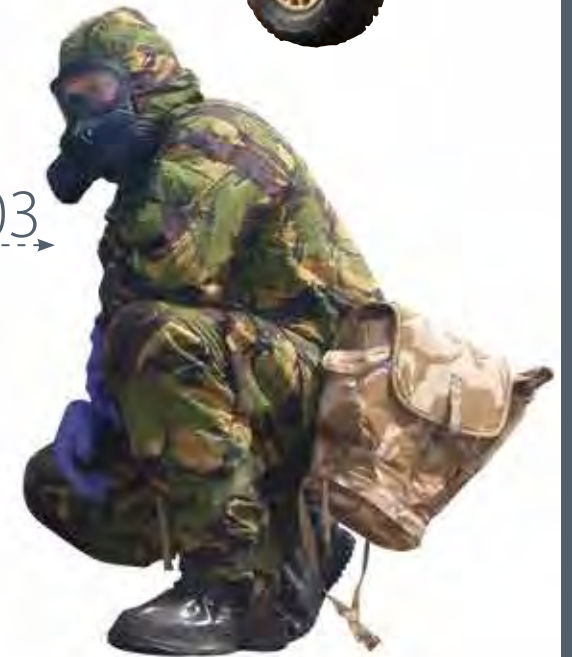
Protective Mobility

P96



Chemical, Biological, Radiological & Nuclear

P103



RAF Regiment



# Bowman

## Communication

### Bowman



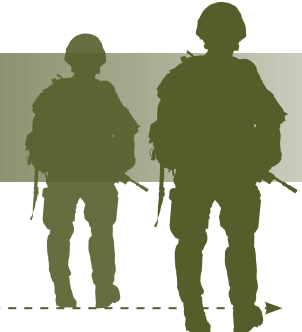
**B**owman is the latest British Military tactical communication system. It consists of a range of HF and VHF radios and is designed to provide secure integrated voice and data between dismounted sections, command vehicles and HQ. The secure interoperability enables RAF Regiment elements to communicate with supporting Royal Navy ships and neighbouring British Land or Amphibious Forces. RN, Army Air Corps and RAF helicopters are now equipped with Bowman systems to enable secure communications for troop movement, casualty evacuation and emergency Close Air Support.

A 51 Squadron commander carries a Bowman radio to communicate with his troops and HQ. Cpl Paul Oldfield.

# Personal Role Radio

## Communication

### Personal Role Radio



### Personal Role Radio

|                 |                          |
|-----------------|--------------------------|
| Weight:         | 1.5kg                    |
| Length:         | 380mm                    |
| Battery Length: | 20 hours' continuous use |
| Range:          | 500m                     |
| Channels:       | 256                      |

**T**he Personal Role Radio (PRR) is a small UHF transmitter receiver that allows operators to communicate over short distances. Effective even through thick cover or the walls of buildings, PRR enable Flight and Section Commanders to maintain command and control whilst out of line of sight. The PRR has greatly increased the RAF Regiments ability to react quickly and efficiently to rapidly changing situations in Afghanistan. The PRR is used within the RAF Regiment by every member of the 8-man section during Phase 1, 2 and 3 training and on all major exercises and operations.

A member of 15 Squadron equipped with PRR on foot patrol Afghanistan. Cpl Mark Webster.



# UK PRC-117(F) and 152

## Communication

UK PRC-117(F) PRC-152

### PRC-117F

|                    |                         |
|--------------------|-------------------------|
| Frequency Range:   | 30 to 512MHz            |
| Tuning Resolution: | 10Hz                    |
| Output Power:      | 1W to 20W (Max)         |
| Weight:            | 4.4kg (without battery) |

### PRC-152

|                    |                    |
|--------------------|--------------------|
| Frequency Range:   | 30 to 512MHz       |
| Tuning Resolution: | 10Hz               |
| Output Power:      | 250mW to 5W (Max)  |
| Weight:            | 1kg (with battery) |

An RAF Regiment Forward Air Controller, attached to Land Forces, utilises the PRC 117(F) to communicate with NATO aircraft on operations.

The Portable Radio Communication PRC-117(F) Multiband Manpack Radio is a man-portable, tactical software-defined combat-net radio covering the 30-512MHz frequency range. The radio is used by RAF Regiment Forward Air Controllers (FACs) for communications (data, UHF and TacSat) with Close Air Support aircraft, support helicopters and battle space management agencies.

The PRC-152 Multiband Handheld Radio (Harris Falcon III) is a portable, compact, tactical software-defined combat-net radio. The PRC-152 is primarily utilised by RAF Regiment FACs attached to a patrol due to the reduced battery requirement and weight. The radio can be used to communicate by voice and data via UHF and TacSat.

Both radios are essential to FACs to co-ordinate complex airspace whilst enabling timely and accurate engagement of the enemy with a multitude of weapons systems.



# Firestorm and Rover 4

## Communication

Firestorm and Rover 4

Firestorm was procured due to an Urgent Operational Requirement for operations in Afghanistan.

The Firestorm system is designed to enable Forward Air Controllers (FACs) to accurately locate the enemy and generate coordinates to enable a precision strike. The system has day and night capability and can be operated as a full system or as modular elements. The Strike Hawk component enables FACs to receive full motion video downlinks from targeting pod equipped aircraft.

Rover 4 is similar to the Strike Hawk of the Firestorm. It utilises a ruggedised laptop to view the downlinked image. Due to its size, Rover 4 is mainly utilised within HQs or static locations.

An RAF Regiment Forward Air Controller uses Firestorm to confirm target locations.





# Glock 9mm and Sig Sauer P226 9mm Pistols

## Weapons

Glock - L131A1 and Sig Sauer L105A2



### L131A1

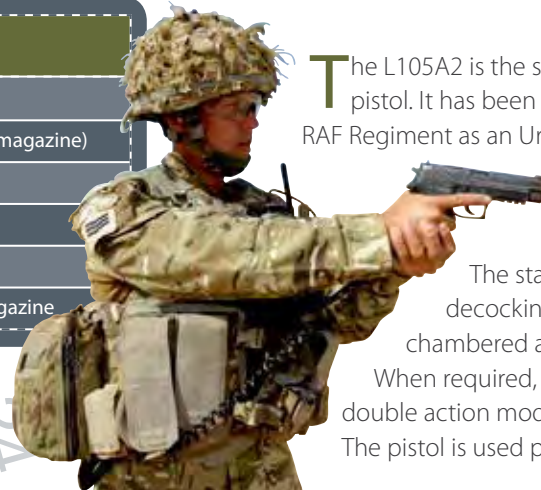
|                |                                   |
|----------------|-----------------------------------|
| Calibre:       | 9mm                               |
| Weight:        | 905g (loaded)                     |
| Length:        | 202mm                             |
| Barrel Length: | 114mm                             |
| Feed:          | 17 round plastic polymer magazine |



The L131A1 General Service Pistol, manufactured by Glock, is the latest addition to the RAF Regt arsenal. The pistol uses the in-service 9 x 19 Parabellum round, held in a high capacity 17rd polymer magazine, and is based on the highly successful Glock 17 line of pistols used by many of the world's police and military organisations. The pistol possesses an integral safety system that does not require an external safety catch and this makes the weapon highly suitable for use in Close Quarters Battle situations and for roles where RAF Regiment gunners require a secondary weapon system close to hand.

### L105A2

|                  |                            |
|------------------|----------------------------|
| Calibre:         | 9mm                        |
| Weight:          | 964g (with empty magazine) |
| Length:          | 196mm                      |
| Barrel Length:   | 112mm                      |
| Muzzle Velocity: | 35m/s                      |
| Feed:            | 15 or 20 round magazine    |



The L105A2 is the standard model Sig Sauer P226A2 pistol. It has been brought into service within the RAF Regiment as an Urgent Operational Requirement for operations in Afghanistan. The pistol is chambered for the 9 x 19mm Parabellem round. The standard SIG P226A2 incorporates a decocking lever that enables a round to be chambered and the pistol safely holstered. When required, the pistol can be drawn and fired in double action mode by simply pulling the trigger. The pistol is used primarily as a self-protection weapon.

An SNCO of 51 Squadron draws his L105A2 pistol. Sgt Andy Reddy.

# Individual and Light Support Weapons

## Weapons

Individual Weapon (L85A2) and Light Support Weapon (L86A2)



### L85A2

|                      |                   |
|----------------------|-------------------|
| Calibre:             | 5.56mm            |
| Weight:              | 4.98kg            |
| Length:              | 785mm             |
| Barrel Length:       | 518mm             |
| Muzzle Velocity:     | 940m/s            |
| Feed:                | 30 round magazine |
| Effective range:     | 400m              |
| Cyclic rate of fire: | 610-775rpm        |

The L85A2 is the Heckler and Koch updated version of the SA80 L85 and is one of the most accurate individual weapons currently available. The recent addition of the Lightweight Day Sight, picatinny rail and drop grip with bipod has greatly increased the rifles utility. The weapon has been widely used on operations in a variety of demanding environments such as Sierra Leone, Iraq and Afghanistan.

The L86A2 is known as the Light Support Weapon (LSW). The LSW has a heavier and longer barrel than the L85A2, allowing greater muzzle velocity and affording greater accuracy. The LSW has an integrated bipod and utilises the same lightweight day sights as the L85A2. For night operations it has an enhanced sight with increased magnification to maintain accuracy at range.

### L86A2

|                      |                               |
|----------------------|-------------------------------|
| Calibre:             | 5.56mm                        |
| Weight:              | 6.58kg (with loaded magazine) |
| Length:              | 900mm                         |
| Barrel Length:       | 646mm                         |
| Muzzle Velocity:     | 970m/s                        |
| Feed:                | 30 round magazine             |
| Effective range:     | 1,000m                        |
| Cyclic rate of fire: | 610-775rpm                    |



An RAF Regiment foot patrol in Afghanistan. The lead members are armed with the L85A2 rifle. Cpl Paul Oldfield.

# Underslung Grenade Launcher and Sharpshooter Rifle



## Weapons

### Underslung Grenade Launcher (L123A3) and Sharpshooter Rifle (L29A1)

#### L123A3

|                      |                                      |
|----------------------|--------------------------------------|
| Calibre:             | 40mm                                 |
| Weight:              | 1.12kg (6.1kg total fitted to L85A2) |
| Muzzle Velocity:     | 76m/s                                |
| Effective Range:     | 350m                                 |
| Cyclic Rate of Fire: | 5-7rpm                               |

The L123A3, Heckler & Koch AG-36 40mm is the current Underslung Grenade Launcher (UGL). It is fitted to the L85A2 and 1 is allocated to every RAF Regiment 4-man Fire Team. The UGL fires a variety of ammunition natures (smoke, penetration and fragmentation) out to 350m.

As an Urgent Operational Requirement for operations in Afghanistan, the L29A1 (Sharpshooter rifle) was chosen as the solution to improve an 8-man sections ability to accurately neutralise targets at extended ranges. The L29A1 is the Lewis Machine Tools LM07.

The rifle has a 16" floating barrel and includes a telescoping stock, folding downgrip, a Harris bipod, a single point sling and 8 x 20 round polymer magazines. It utilises the ACOG 6 x 48 daysight together with a Close Quarter Battle (CQB) sight. For night operations the Magnum Universal Night Sight (MUNS) Image Intensifier (II) is used. A bayonet adaptor accommodates the standard L85A2 bayonet for close-quarter fighting.

#### L29A1

|                  |                                   |
|------------------|-----------------------------------|
| Calibre:         | 7.62mm                            |
| Weight:          | 6.2kg (with full magazine)        |
| Length:          | 924mm (with fully extended stock) |
| Muzzle Velocity: | 802m/s                            |
| Feed:            | 20 round Magazine                 |
| Effective Range: | 800m                              |

An RAF Regiment Force Protection Team supports the Medical Emergency Response Team (MERT) in Afghanistan. The team is armed with (left to right): L123A3 and L29A1. Cpl Laura Bibby.



# Light Machine Gun (L110A2)



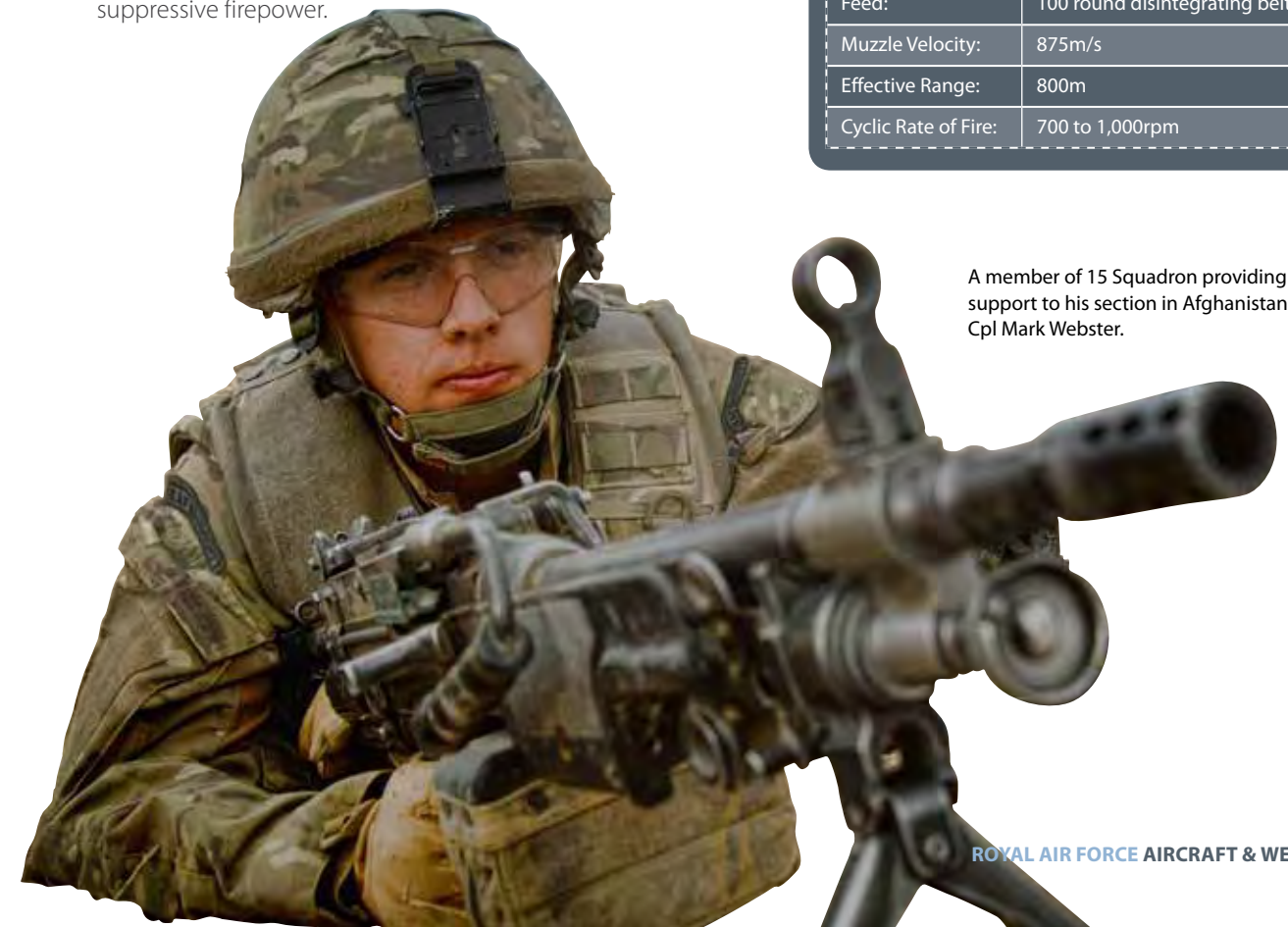
## Weapons

### Light Machine Gun (L110A2)

The L110A2, Light Machine Gun (LMG) was developed from the Minimi Light Machine Gun following the capability gap experienced on operations in Iraq and Afghanistan. The LMG is a belt-fed suppression weapon that provides a RAF Regiment section commander the ability to employ sustained suppressive fire onto an objective out to 300m. Coupled with the LSW, this is a considerable increase in the Sections effective suppressive firepower.

#### L110A2

|                      |                               |
|----------------------|-------------------------------|
| Calibre:             | 5.56mm                        |
| Weight:              | 7.1kg (8.5kg with 100 rounds) |
| Length:              | 914mm                         |
| Feed:                | 100 round disintegrating belt |
| Muzzle Velocity:     | 875m/s                        |
| Effective Range:     | 800m                          |
| Cyclic Rate of Fire: | 700 to 1,000rpm               |



A member of 15 Squadron providing support to his section in Afghanistan. Cpl Mark Webster.



# General Purpose Machine Gun (L7A2)

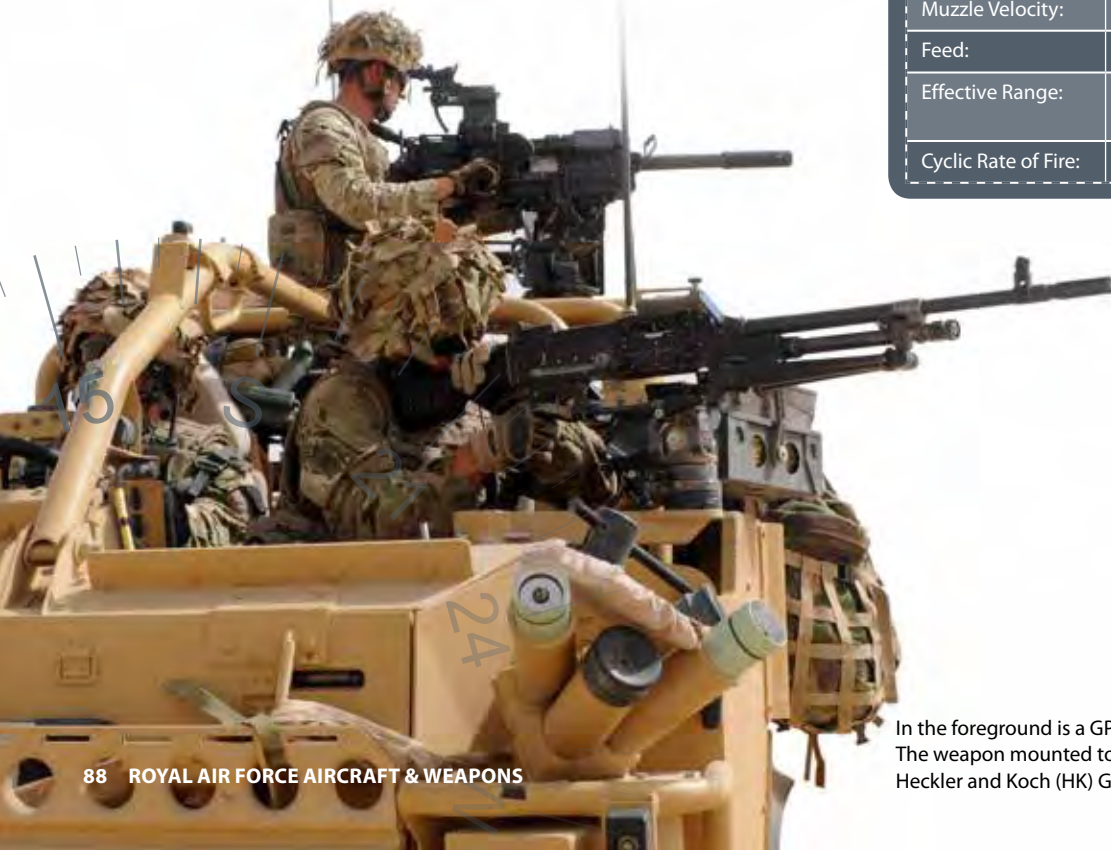


## Weapons

### General Purpose Machine Gun (L7A2)

The L7A2, General Purpose Machine Gun (GPMG) is a 7.62 x 61mm belt-fed general purpose machine gun that can be used as a light weapon, vehicle-mounted or in a sustained fire (SF) role. In the SF role, mounted on a tripod and fitted with the C2 optical sight, it is fired by a two-man team who are grouped within a RAF Regiment Flight's Manoeuvre Support Section. The GPMG can be carried on foot; a fold-out bipod is used to support the GPMG employed in the light role. On recent operations, the GPMG is mounted as a commander's weapon on the Jackal and on the gunner's weapon station on the Panther and Foxhound vehicles.

| L7A2                 |   |
|----------------------|---|
| Calibre:             | 7.62mm                                      |
| Weight:              | 13.85kg (gun plus 50-round belt)            |
| Length:              | 1,230mm (light role)                        |
| Barrel length:       | 629mm                                       |
| Muzzle Velocity:     | 838m/s                                      |
| Feed:                | 100-round disintegrating link belt          |
| Effective Range:     | 800m light role, 1,800m sustained fire role |
| Cyclic Rate of Fire: | 750rpm                                      |



In the foreground is a GPMG fired by the vehicle commander. The weapon mounted to the rear of the Jackal is the Heckler and Koch (HK) Grenade Machine Gun.

# Sniper Rifle (L115A3)



## Weapons

### Sniper Rifle (L115A3)

The L115A3 was brought to service when the need for a long range rifle was identified. The weapon replaced the L96 (7.62mm Sniper Rifle) and was made by the same Portsmouth-based Gunsmiths, Accuracy International. The L115A3 has a scope that can magnify the target up to 25 times, a suppressor to reduce flash and noise, a folding stock and a five-round magazine. The RAF Regiment Snipers operate as a 2-man team. The number 1 will be armed with the L115A3 and the number 2, the team commander, will be armed with the Sniper Support Weapon (SSW).

| L115A3           |             |
|------------------|-------------|
| Calibre:         | 8.59mm      |
| Weight:          | 6.8kg       |
| Length:          | 1,300mm     |
| Muzzle Velocity: | 936m/s      |
| Feed:            | 5 round box |
| Effective Range: | 1,100m plus |



An RAF Regiment sniper pair on operations. The number 1 is armed with the L115A3 sniper rifle.



# Sniper Support Weapon (L29A1)



## Weapons

### Sniper Support Weapon (L29A1)

| L29A1            |                                   |
|------------------|-----------------------------------|
| Calibre:         | 7.62mm                            |
| Weight:          | 6.2kg (with full magazine)        |
| Length:          | 924mm (with fully extended stock) |
| Muzzle Velocity: | 802m/s                            |
| Feed:            | 20 round Magazine                 |
| Effective Range: | 800m                              |

The SSW was procured as an Urgent Operational Requirement (UOR) for operations in Afghanistan and is an adapted version of the L29A1 Sharpshooter rifle. It has been improved from the standard L29A1 with the addition of the L17A2 Schmidt & Bender 3-12 x 50 Sniper Scope and Surefire Suppressor. This capability enhancement greatly improves the snipers pair's ability to locate, identify and neutralise targets with a high degree of accuracy.



A sniper commander from 51 Squadron.

# Grenade Machine Gun (L134A1)



## Weapons

### Grenade Machine Gun (L134A1)

| L134A1               |                              |
|----------------------|------------------------------|
| Calibre:             | 40mm                         |
| Feed:                | 50-round disintegrating belt |
| Effective Range:     | 1.5km for point targets      |
| Cyclic Rate of Fire: | 350rpm                       |

The L134A1, Heckler & Koch (HK) 40mm Grenade Machine Gun (GMG) combines the range of a heavy machine gun with the fragmentation effect of a light mortar. The GMG has increased the RAF Regiment's ability to engage enemy in the open or utilising armoured infantry fighting vehicles and battle tanks. The GMG is fitted to a cupola vehicle mount or can be used from ground-based tripods.



A member of 15 Squadron provides top-cover with the L134A1.



# Heavy Machine Gun (L111A1)

## Weapons

### Heavy Machine Gun (L111A1)

The L111A1, Heavy Machine Gun (HMG) provides integral close-range support from a ground mount tripod or a vehicle cupola.

The performance of the HMG has been enhanced with a new 'softmount' (to limit recoil and improve accuracy) and a quick-change barrel. The HMG provides the RAF Regiment flight and section with increased capability at greater ranges (1,500-2,000m) when support from Close Air Support or mortars is not available.

| L111A1               |                              |
|----------------------|------------------------------|
| Calibre:             | 12.7mm                       |
| Weight:              | 38.15kg (gun only)           |
| Length:              | 1,656mm                      |
| Barrel Length:       | 629mm                        |
| Muzzle Velocity:     | 915m/s                       |
| Feed:                | 50 round disintegrating belt |
| Effective Range:     | 2,000m                       |
| Cyclic Rate of Fire: | 485-635rpm                   |



II Squadron firing their HMGs from the Jackal. Sgt Steve Blake.

# 60mm Mortar and 81mm Mortar (L16A2)

## Weapons

### 60mm Mortar and 81mm Mortar (L16A2)

The Hirtenberger M6-895 60mm Mortar is currently in service within RAF Regiment flights. The RAF Regiment only operate the lightweight handheld variant of the 60mm mortar. It can be fired in both the direct and indirect fire role at a rate of 1-12 rounds per minute.

| 60mm Mortar        |            |
|--------------------|------------|
| Base Plate Weight: | 4.8kg      |
| Barrel Weight:     | 5.3kg      |
| Sight Weight:      | 3.8kg      |
| Range:             | 180-3,800m |



A member of 51 Squadron prepares to fire the 60mm mortar.

The L16A2 81mm Mortar is a RAF Regiment Squadron level indirect fire support weapon, which is capable of providing accurate High Explosive, smoke and illuminating rounds out to a maximum range of 5,650m. A RAF Regiment Squadron has 4 x L16A2 mortars, each crewed by a 4-man team. The mortar teams are grouped under the RAF Regiment Squadron's Support Weapon Flight.



| L16A2            |                    |
|------------------|--------------------|
| Calibre:         | 81mm               |
| Weight:          | 35.3kg (in action) |
| Barrel Length:   | 1,280mm            |
| Muzzle Velocity: | 225m/s             |
| Max Range:       | 5,650m (HE)        |
| Rate of Fire:    | 15rpm              |
| Bomb Weight:     | 4.2kg (HE L3682)   |

One of 15 Squadron RAF Regiment's 81mm mortar detachments fire illumination rounds during operations. LA(PHOT) Paul Punter.



# NLAW (K170A2)

## Weapons

Next-Generation Light Anti-Armour Weapon (NLAW) (K170A2)

The K170A2, Next-Generation Light Anti-Armour Weapon (NLAW) is a section weapon system that is a fire-and-forget, shoulder launched missile, carried and operated by one man and incorporates a Single Shaped Charge, High Explosive Anti-Tank (HEAT) warhead that initiates by sensor or on impact. It is capable of firing in one of two attack modes selected by the operator: Overfly Top Attack (OTA) or Direct Attack (DA). The system also incorporates a guidance system that uses Predicted Line of Sight (PLOS) for engagement of moving targets. It is capable of firing its projectile with high velocity and accuracy from open and enclosed spaces at ranges between 20m and 600m.

| K170A2           |  |
|------------------|--|
| Calibre:         | Warhead 150mm<br>Launcher 115mm                |
| Weight:          | 12.7kg   |
| Length:          | 1m   |
| Warhead:         | Single Shaped Charge, High Explosive Anti-Tank |
| Effective Range: | 20-600m  |



The NLAW is carried by an RAF Regiment Section.



# Javelin

## Weapons

Javelin

| Javelin          |                                     |
|------------------|-------------------------------------|
| Weight:          | 11.1kg (Missile)<br>24.3kg (System) |
| Length:          | 1.39m                               |
| Warhead:         | High Explosive Anti-Tank            |
| Effective Range: | 200m-4.5km                          |

Javelin is a medium-range anti-tank guided weapon. It is an enhanced version of the American weapon proven on operations in Iraq and Afghanistan by US forces. The UK version has two significant enhancements – a more effective sight system and a tripod (for firing and observation). Although designed primarily to destroy tanks and light armoured vehicles, RAF Regiment patrols utilise the Javelin's enhanced surveillance and target acquisition for operation at night or in poor visibility in Afghanistan. The integrated sight allows the firer to acquire the target, lock-on, fire-and-forget. This means that as soon as the missile is launched, the firer can acquire another target or move position. Javelin has an Overfly Top Attack mode and Direct Attack Mode of operation. Javelin is a crew-served weapon operated by a firer and a controller/observer. The controller/observer commands the weapon and assists with loading, identifying targets.

An RAF Regiment Javelin team prepares to fire. Sgt Andy Reddy.



# ATV (Quad) and Vixen+

## Protective Mobility

ATV (Quad) Vixen+

The latest All Terrain Vehicle (ATV) replaces the Honda 450 ATVs and LOGIC SMT120b Trailers. The ATV has been delivered to Afghanistan and is utilised by the RAF Regiment to move ammunition and supplies in difficult to access areas or included on foot patrols. The ATV is also used to quickly move casualties to a safe extraction location.



### ATV (Quad)

|            |                  |
|------------|------------------|
| Crew:      | 1                |
| Top Speed: | Limited to 50mph |

### Vixen+

|           |                   |
|-----------|-------------------|
| Crew:     | 3 (+ 4 dismounts) |
| Armament: | L85A2 and LMG     |



The Vixen+ is the latest upgrade to the Snatch Land Rover based on the Land Rover heavy duty chassis, a militarised version of the Land Rover Defender 110. The Vixen+ is an advanced up-armoured patrol vehicle that affords protection from enemy gunfire and improvised explosive devices. It provides the RAF Regiment patrols a platform to operate in the urban and rural environment with the ability to dismount a 4-man fire team from within.

Vixen+. James Macdonald.

# Jackal

## Protective Mobility

Jackal

Jackal is a high-mobility weapons platform, with a unique air-bag suspension system allowing rapid movement across varying terrain. On operations, the RAF Regiment currently utilise Jackal (version 2) within a patrol to provide rapid manoeuvrable fire support. The Jackal has the capacity to store ammunition, fuel, water and supplies to support itself and its crew over 800km. Jackal has a General Purpose Machine Gun (GPMG) for the vehicle commander and the top gunner can be armed with either the Heavy Machine Gun (HMG) or Grenade Machine Gun (GMG).

### Jackal

|           |                   |
|-----------|-------------------|
| Crew:     | 3                 |
| Armament: | GPMG, HMG and GMG |

Here, the Jackal is armed with 2 x GPMGs. The vehicle gunner can mount either a General Purpose Machine Gun (GPMG), Heavy Machine Gun (HMG, 5 calibre) or Grenade Machine Gun (GMG) on the vehicle's central mount.





# Coyote

## Protective Mobility

Coyote

### Coyote

|           |                  |
|-----------|------------------|
| Crew:     | 3 - 4            |
| Armament: | GPMG, HMG or GMG |

The Coyote is a 6 x 6 wheel drive variant of the Jackal 2. The extra two wheels increase the overall weight, but also raise the payload that can be carried to 1.5t. This greatly enhances the RAF Regiment ability to move ammunition and supplies to support patrols on operations.



Personnel of 51 Squadron on patrol to ensure the security of Camp Bastion. Cpl Laura Bibby.

# Foxhound

## Protective Mobility

Foxhound

### Foxhound

|           |           |
|-----------|-----------|
| Crew:     | 3 - 8     |
| Armament: | 2 x GPMGs |

Personnel of 5 Force Protection Wing (5FP) trial the Foxhound armoured vehicle while providing external security for Camp Bastion. Cpl Laura Bibby.



The Foxhound is a light protected patrol vehicle (LPPV) with specialised protection against improvised explosive devices (IEDs).

The design is modular, and all of the components can be removed easily. The protective pod where up to 6 people can sit is interchangeable to allow the vehicles to be reconfigured from a troop carrier to a supply vehicles or ambulance.

The RAF Regiment utilises the Foxhound for patrols in Afghanistan. The 6-man crew can dismount to conduct foot patrols, vehicle checkpoints or interact with the locals.



# Ridgeback

## Protective Mobility

Ridgeback



### Ridgeback

|           |                  |
|-----------|------------------|
| Crew:     | 2                |
| Armament: | GPMG, HMG or GMG |

Ridgeback belongs to the family of mine-protected, multi-role and medium vehicles that were produced by the US manufacturer Force Protection Inc. Ridgeback was designed in order to suit a wide range of military operations. The RAF Regiment utilise the 4 x 4 layout fitted with the Remote Weapon Station to move troops within their Area of Operations. Ridgeback was designed in order to be well protected from blast effects and mines and has proven very effective in Afghanistan. The large and armoured plates provide the crew with the necessary protection. The crew will be protected from IEDs and rocket-propelled grenades (RPGs).



# Mastiff

## Protective Mobility

Mastiff

Mastiff is a heavily armoured, 6 x 6 wheel drive patrol vehicle which carries 6 people, plus 2 crew. The RAF Regiment utilise this heavily armoured vehicle for road patrols and convoys. Incorporating the highest levels of survivability, the Mastiff includes a V-shaped steel hull, run flat tyres, shock-mounted seating and internal spall liners. With a maximum speed of 90kph, Mastiff can be armed with a 7.62mm machine gun, 12.7mm heavy machine gun or 40mm grenade machine gun.

### Mastiff

|           |                     |
|-----------|---------------------|
| Crew:     | 2: carries 6 people |
| Armament: | GPMG, HMG or GMG    |



A Mastiff is utilised by 34 Squadron on patrol. Sgt Corrine Buxton.





# Panther

## Protective Mobility

### Panther

**P**anther is a Command and Liaison vehicle. It is equipped with a Remote Weapon Station that enables the crew to control and fire the 7.62mm general purpose machine gun, utilising the day and night sighting system, from the safety of the armoured vehicle. The RAF Regiment has used Panther on operations in Afghanistan and has future utility in contingent operations. The Panther is air-transportable and can be underslung beneath a CH47 (Chinook) helicopter.

### Panther

|           |              |
|-----------|--------------|
| Crew:     | 2            |
| Armament: | GPMG and HMG |



B Flight 63 Squadron on patrol around Kandahar Airfield, Afghanistan. SAC Neil Chapman.

# LRT and IBDS

## Protective Mobility

### Chemical, Biological, Radiological and Nuclear

**T**he Light Role Team (LRT) is a rapidly deployable, expeditionary capability that provides Chemical, Biological, Radiological and Nuclear (CBRN) reconnaissance and specialist advice to the commander on the ground. A LRT comprises a Command and Cargo vehicle fully loaded with, Detection Identification, Monitoring and Analysis Equipment and is manned by specialist CBRN operators from the Defence CBRN Wing based at RAF Honington. Each LRT is trained to deploy and operate alongside expeditionary forces and some teams are Para and Commando trained.



**T**he Integrated Biological Detection System (IBDS) is manned by specialist Chemical Biological, Radiological and Nuclear (CBRN) operators from RAF Regiment's Defence CBRN Wing at RAF Honington. IBDS is fully equipped with a range of monitoring and analysis equipment specifically designed to detect the release of biological warfare agents. The system is installed in a 14ft container which provides the crew with Collective Protection in order that they can conduct their mission safe from CBRN threats. IBDS can be mounted on a vehicle or ground dumped and can be transported by either fixed wing aircraft or helicopter.

Left: Picture by James Macdonald.

# AIM –120 AMRAAM

The AIM-120 Advanced Medium Range Air-to-Air Missile incorporates an active radar with an inertial reference unit and a datalink microcomputer system. In a typical BVR engagement, AMRAAM is launched from a range of 20nm-plus and is then guided by its own inertial navigation system, while receiving command-guidance updates from the launch aircraft via the data link. The missile's own monopulse radar then detects the target and guides the weapon to impact.



## Aircraft

Typhoon FGR4 Lightning II

| AIM-120 AMRAAM              |   |
|-----------------------------|---|
| Dimensions & Specifications |   |
| Length:                     | 3.66m   |
| Diameter:                   | 0.18m   |
| Span:                       | 0.53m   |
| Weight:                     | 157kg   |
| Performance                 |   |
| Range:                      | Over 20nm                                     |
| Speed:                      | Mach 2.5+                                     |
| Sensor:                     | Inertial mid-course/<br>Active radar terminal |

# AIM –132 ASRAAM

## Aircraft

Tornado GR4 Typhoon FGR4 Lightning II

The Aim-132 Advanced Short Range Air-to-Air Missile is a highly manoeuvrable, heat-seeking, air-to-air missile able to counter sophisticated infrared (IR) countermeasures. The weapon is the world's first IR missile to use a sapphire-domed staring array detector that detects the whole target aircraft. The missile has a fire-and-forget capability, thus the pilot can engage multiple targets with several missiles simultaneously. Following release, the missile accelerates to speeds in excess of Mach 3 while being guided to the target using its IR seeker.

## AIM-132 ASRAAM

### Dimensions & Specifications

|           |       |
|-----------|-------|
| Length:   | 2.9m  |
| Diameter: | 0.17m |
| Weight:   | 87kg  |

### Performance

|         |   |
|---------|---|
| Range:  | Approx 8nm                              |
| Speed:  | Mach 3+                                 |
| Sensor: | IR staring array with inertial guidance |



Opposite and above: Typhoon operating from Gioia del Colle to enforce the No-Fly Zone during Op ELLAMY. Cpl Babbs Robinson.



# Meteor



Both pictures courtesy MBDA UK.

## Future Capability Aircraft

Typhoon FGR4 Lightning II

### Meteor

#### Dimensions & Specifications

|           |       |
|-----------|-------|
| Length:   | 3.67m |
| Diameter: | 0.18m |
| Weight:   | 185kg |

#### Performance

|         |   |
|---------|---|
| Range:  | Classified                                    |
| Speed:  | Mach 4+                                       |
| Sensor: | Inertial mid-course/<br>Active radar terminal |

The Meteor air-to-air missile is expected to enter front-line service on RAF Typhoon aircraft in 2015/2016. Meteor is designed around an air-breathing ramjet that boosts the weapon away from the launch aircraft and then remains under power until warhead detonation, giving the missile the energy to pursue and destroy the fastest and most agile aircraft at range. Its warhead carries impact and proximity fuses so targets can be destroyed even if the missile does not score a direct hit.

# Mauser Cannon



## Aircraft

Tornado GR4 Typhoon FGR4

The Mauser BK-27 is a 27mm cannon is a single-barrel, high performance, breech-cylinder gun operated by a fully automatic, electrically fired gas-operated system at a selective rate of 1,000 or 1,700rpm. Targeting of the cannon is done through the aircraft's head-up display. The cannon has a very high muzzle velocity and its high rate of fire, coupled with its ability to fire several different types of high-explosive and armour piercing rounds, makes it equally suitable for both interceptor-type aircraft and ground-attack aircraft alike.



Mauser Canon. SAC Lisa Conway.

# ALARM



Both pictures by SAC Tracey Dobson.

## Aircraft

Tornado GR4

## ALARM

### Dimensions & Specifications

|           |       |
|-----------|-------|
| Length:   | 4.3m  |
| Diameter: | 0.24m |
| Span:     | 0.72m |
| Weight:   | 260kg |

### Performance

|         |                      |
|---------|----------------------|
| Range:  | Classified           |
| Speed:  | Supersonic           |
| Sensor: | Passive Radar Homing |

The Air Launched Anti-Radiation Missile (ALARM) is designed to destroy or suppress the use of enemy ground-based air-defence radar systems. ALARM operates by homing onto the radar energy emitted by the target radar and can loiter in the area if the radar is switched off. It can also be pre-programmed to box-search for specific hostile radars after launch and then attack the highest priority threat.

# Brimstone



## Aircraft

Tornado GR4 Typhoon FGR4

Brimstone is an advanced, rocket-propelled, radar-guided weapon and can seek and destroy armoured targets at long range. For indirect mode, weapons are launched when the targets and their position are not visible to the attacking aircraft, whereas in direct mode, the pilot uses an onboard sighting system to select the target. The target can lie off the aircraft's track obviating need for the pilot to manoeuvre to release weapons.

Dual Mode Brimstone is a precision (DMB) ground attack missile originally developed in response to an urgent operational requirement for RAF fighters deployed in Iraq. Conversion of the basic anti-armour weapon involves modification to the existing millimetric wave seeker with the addition of a semi-active laser. The man-in-the-loop weapon is now being used against a range of vehicle and fixed targets.

## Brimstone

### Dimensions & Specifications

|           |      |
|-----------|------|
| Length:   | 1.8m |
| Diameter: | 0.3m |
| Weight:   | 49kg |

### Performance

|         |  |
|---------|--|
| Range:  | 10nm+  |
| Speed:  | Supersonic   |
| Sensor: | Millimetric Wave Radar (Legacy),<br>Millimetric Wave Radar/<br>Semi Active Laser (DMB) |





# Storm Shadow

Storm Shadow is a long-range, stand-off, air-launched missile and is arguably the most advanced weapon of its kind in the world. The missile is equipped with a powerful UK-developed conventional warhead and is designed to attack important hardened targets and infrastructure such as buried and protected command centres. Mission and target data is loaded into the weapon's main computer before the aircraft leaves on its mission. After release, the wings deploy and the weapon navigates its way to the target at low level using terrain profile matching and an integrated Global Positioning System (GPS).



Picture by SAC Simon Armstrong.

## Storm Shadow

### Dimensions & Specifications

|         |         |
|---------|---------|
| Length: | 5.1m    |
| Span:   | 3m      |
| Weight: | 1,300kg |

### Performance

|        |          |
|--------|----------|
| Range: | 300nm+   |
| Speed: | Mach 0.8 |

## Aircraft

Tornado GR4 Typhoon FGR4 Lightning II

# Paveway II & Paveway III

## Aircraft

Tornado GR4

Paveway II is a precision laser-guided bomb (LGB) that can be dropped from low to medium level and is homed onto its target by the airborne LITENING III pod or from troops on the ground using a laser designator. The bomb's guidance package steers the bomb onto the source of reflected laser energy. Paveway III is a larger, upgraded LGB and is designed specifically to defeat hardened targets such as protected underground command posts. Paveway III equips Tornado GR4 aircraft.



## Paveway II & Paveway III

### Dimensions & Specifications

|         |                            |
|---------|----------------------------|
| Length: | 3.68m (PII) 4.45m (PIII)   |
| Width:  | 0.42m (PII) 0.92m (PIII)   |
| Weight: | 546kg (PII) 1,140kg (PIII) |

# Enhanced Paveway II & Paveway III



The Enhanced Paveway II and III laser-guided weapons incorporate Global Positioning Technology to give the RAF the ability to strike static, mobile and armoured targets accurately in all weathers and for 24-hours a day. Both EPWII and EPWIII are based on the laser-guided bombs Paveway II and Paveway III respectively. Once released, EPW is fully autonomous in cases where there is cloud cover over the target that may obstruct the laser and prevent weapon guidance.



Right: Typhoon, having completed the first multi-role mission for the type over Libya during Op ELLAMY. Cpl Babbs Robinson.

## Aircraft

Tornado GR4 Typhoon FGR4

### Enhanced Paveway II & Paveway III

#### Dimensions & Specifications

|         |                               |
|---------|-------------------------------|
| Length: | 3.68m (EPWII) 4.39m (EPWIII)  |
| Width:  | 0.42m (EPWII) 0.92m (EPWIII)  |
| Weight: | 545kg (EPWII) 1130kg (EPWIII) |

# Paveway IV



## Aircraft

Tornado GR4 Typhoon FGR4 Lightning II

### Paveway IV

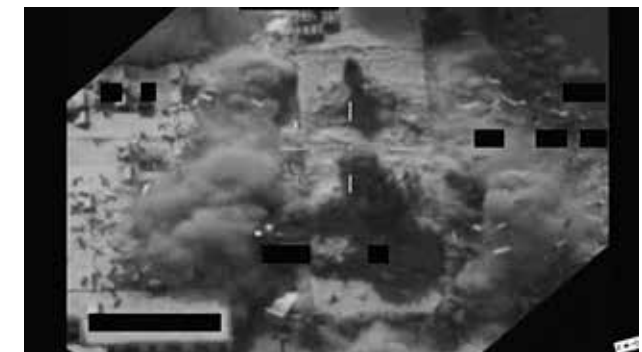
#### Dimensions & Specifications

|         |       |
|---------|-------|
| Length: | 3.1m  |
| Width:  | 0.42m |
| Weight: | 225kg |

This advanced and highly accurate weapon is a state-of-the-art precision guided bomb. Equipped with the latest Global Positioning Guidance technology, Paveway IV is a low-cost, all-weather, 24-hour precision bomb capable of destroying the majority of general-purpose targets while significantly minimising collateral damage. Currently carried on Tornado GR4 with clearance work ongoing on Typhoon.

Top: Tornado GR4 at Gioia del Colle operating in support of Op ELLAMY. Cpl Babbs Robinson.

Bottom: This (sequence of imagery) as seen by the Litening III targeting pod from a Tornado GR4 demonstrates a Paveway IV attack against a target in May 2011 during Op Ellamy. The Paveway IV engages the target, penetrating the building just below the cross hairs. The shockwave and explosive energy is seen exiting the building to the left and right and through the weapon's entry hole. A second bomb enters the building shortly after. The buildings in close proximity (bottom left of main target) remain undamaged.





# 7.62mm General Purpose Machine Gun



The GPMG (General Purpose Machine Gun) ARD (Air Role Derivative) L112A1, is fitted to both Merlin and Puma aircraft. It is a belt fed, gas-operated 7.62mm calibre machine gun that can be operated from both sides, and the rear ramp (Merlin only) of the aircraft. This differs from the standard GPMG as it has a fixed gas regulator as well as a few other subtle differences. It is operated from aircraft mounts that allow it to be used securely and restrict movement to stop any possible damage to the aircraft during operation. The weapon is operated manually with a cyclical rate of fire between 600-800 rounds per minute.

## Helicopters

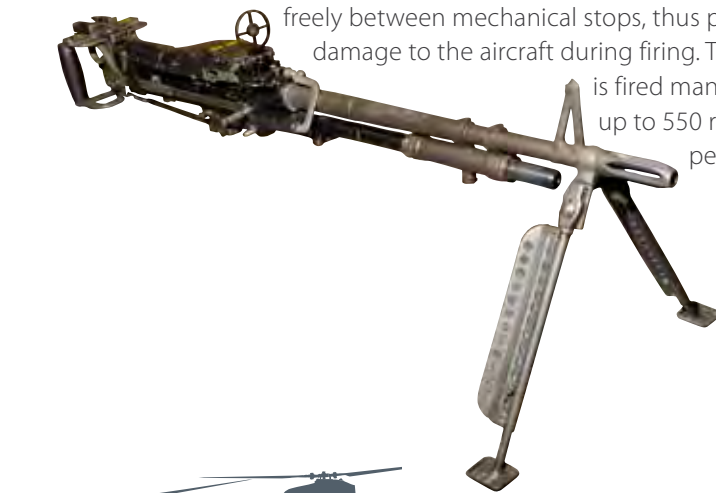
Merlin Puma

# M60D Machine Gun and M134 Minigun

## Aircraft

M60D Machine Gun – Chinook M134 Minigun – Chinook

The M60D machine gun is a 7.62mm calibre gas-operated machine gun mounted on the Chinook helicopter and can be fired from either side of the cabin, or from the aircraft's rear ramp. The gun is attached to a mount fixed to the aircraft that permits it to swivel freely between mechanical stops, thus preventing damage to the aircraft during firing. The gun is fired manually at up to 550 rounds per minute.



The M134 Minigun is a 7.62mm air-cooled, percussion-fired, multi-barrelled rotary gun, which is mounted to all marks of Chinook helicopter. The gun is electrically driven from the aircraft's 115V AC supply and is mounted on either the port or starboard side of the aircraft in the escape hatch or the cabin door respectively. The gun is fired manually, using belt-fed ammunition at up to 4,000 rounds per minute.






Both pictures by Cpl Ashley Keates.











# Aircraft Recognition Challenge

## What's what?






### Test your knowledge.

Simply photocopy the two pages, write the name of the aircraft in the space provided, and then check your answers against the page numbers indicated.

|   |  |
|---|--|
|  P6    |  |
|  P8    |  |
|  P10   |  |
|  P12  |  |
|  P14 |  |
|  P16 |  |
|  P18 |  |

|  |  |
|--|--|
|  P20   |  |
|  P26   |  |
|  P28   |  |
|  P30   |  |
|  P32   |  |
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Aircraft



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(Through Adversity to the Stars)

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