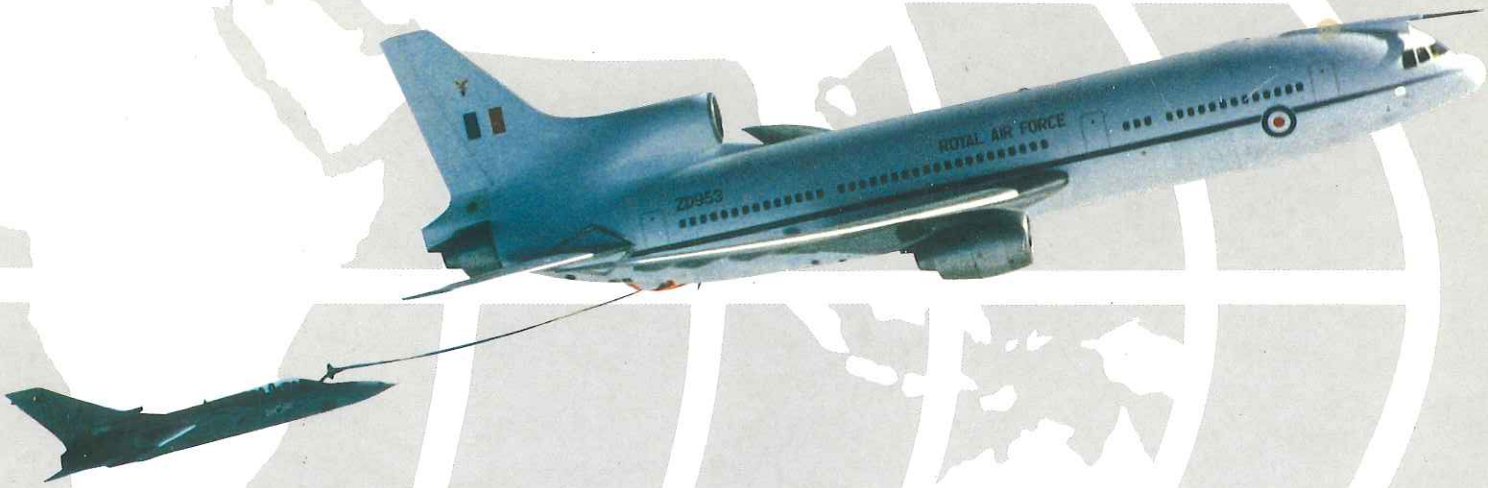
GOLDEN EAGLE '88



GOLDEN EAGLE '88

As Commander-in-Chief of the men and aircraft taking part in Exercise GOLDEN EAGLE, I am pleased to welcome you to the detachment. The role of the detachment is to demonstrate the United Kingdom's commitment to long standing defence agreements and to cement our relationships with our allies around the world. During the Exercise, the Tornado F3 and supporting tankers and transport aircraft will visit and operate in many countries in the Far East and complete an East-about return to the UK, (the first ever by an RAF fighter aircraft), via the Pacific Ocean and the United States.

The deployment represents much of the best that the United Kingdom can produce — high technology aircraft and systems and highly trained crews well able to demonstrate our operational capability and professional expertise. I hope you will gain from your visit an insight into the performance of the Tornado aircraft and the calibre of the men who fly and service them.

This booklet contains details of just some of the companies who contribute to the construction of the Royal Air Force's equipment. They are all concerned with producing specialist equipment to a high standard and, collectively, they have combined to bring about a major improvement in the UK's air defence posture. This booklet will enable you to study the work of these companies in detail.

P R Harding
Air Chief Marshal
Air Officer Commanding in Chief
Strike Command

Hercules C Mk I

GOLDEN EAGLE '88

TriStar KC1 with Tornado F3

Tornado F3

1 No. 29 (F) Squadron is the Royal Air Force's first operational Tornado F3 Unit and has been operating the aircraft in the United Kingdon Air Defence role since April 1987. Formed in 1915, the Squadron has always had a fighter role and is currently based at RAF Coningsby, Lincolnshire. The Tornado F3 will eventually equip 7 UK Air Defence Squadrons.

2 No. 101 Squadron operates the VC10K air-to-air refuelling aircraft from RAF Brize Norton, Oxfordshire. The aircraft are used to refuel a variety of other receiver aircraft but they operate mainly in support of United Kingdom Air Defence Forces. The Squadron has a long honourable history of operating bomber aircraft and has operated the VC10K since May 1984.

3 No. 216 Squadron are also based at Brize Norton, Oxfordshire and operate the TriStar in the strategic tanker/transport role. Since 1985 the unique and highly capable TriStar has been a considerable asset to the Royal Air Force's capability to mount long-range air operations.

4 Royal Air Force Lyneham, Wiltshire, is the home of the RAF's Hercules Wing and the base for Nos 24, 30, 47 and 70 Squadrons who operate the ubiquitous tactical transport in both its C MK1 and C MK3 stretched variants. Support crews for Golden Eagle are provided by this Wing.

5 Royal Air Force Strike Command is the Headquarters formation controlling operational UK Air Forces and as such, deploys the aircraft involved in Golden Eagle. The Headquarters is situated at RAF High Wycombe in Buckinghamshire.

VC10 K3 Tanker

CONTENTS

COMPANY

BEAUFORT

Typical Airscrew Assembley.

Single-Seat Liferaft.

Multi-Seat Liferaft.

INFORMATION

GOLDEN EAGLE

Beaufort Air Sea Equipment has been involved in the design, development and manufacture of survival equipment for over 40 years. As a selected Design Contractor for MOD RAF safety equipment we continuously upgrade pilots' equipment to match the increased performance requirements demanded by new generation aircraft. For Tornado pilots we supply the Immersion Coverall, Flying Coveralls, Anti-G Suit, Aircrew Lifepreserver and Single Seat Liferaft.

Working closely with RAF, we ensure that each development is fully tried and tested to meet the exacting performance critera. Having invested substantial resources in R & D, we are able to provide products to meet the particular requirements of other nations' armed forces. We currently export to more than 40 countries and our success is based on quality and reliability.

- Aircrew Lifepreservers
- Anti G Trousers
- Immersion Suits
- Pilots Coveralls
- Cold Weather Suits
- Aircrew Combat Coveralls
- Knee Boards
- Water Carriers
- Single Seat Liferafts
- Multi Seat Liferafts
- Passenger Lifejackets
- Passenger Coveralls
- Landing Pads
- Simulator domes

ADDRESS

BEAUFORT AIR-SEA EQUIPMENT LIMITED
Beaufort Road,
Birkenhead,
Merseyside L41 1HQ
Tel: 051-652 9151
Telex: 629478

COMPANY

BRITISH AEROSPACE

BRITISH AEROSPACE

INFORMATION

TORNADO F.3 (AIR DEFENCE VARIANT)

The Tornado F.3 Air Defence Variant (ADV), like the Tornado Interdictor Strike (IDS) aircraft, is produced by Panavia Aircraft GmbH, a tri-national company set up jointly by British Aerospace, Messerschmitt-Bolkow-Blohm of Germany and Aeritalia of Italy. Two RB-199 MK 104 engines built by Turbo Union (a joint company established by Rolls-Royce, Motoren und Turbinen-Union, and Fiat), power the aircraft, each engine producing in excess of 16,000 lb (71 KN) of thrust with reheat and 9,000 lb (40 KN) dry. The RB-199 MK 104 has an extended tail-pipe, resulting in increased reheat thrust compared to the MK 103 engine in the Tornado IDS.

The ADV has been designed to be the primary element of the UK Air Defence System well into the next century. It will operate autonomously at long range and engage multiple targets in quick succession at high or low altitude.

To date, British Aerospace has delivered over 100 aircraft to the RAF, while export orders have been received from the Sultanate of Oman's Air Force and the Royal Saudi Air Force.

The ADV's excellent range, loiter capability and quick supersonic dash, in excess of Mach 2, make it well suited to the task. It can patrol for periods in excess of two hours without air-to-air refuelling, at over 300 nautical miles (555 km) from its base, including an interception with air combat. Provision is made for air-to-air refuelling while on Combat Air Patrol (CAP) to greatly increase this capability.

The ADV can carry four Sky Flash medium range air-to-air missiles, four Sidewinder air-to-air missiles and a 27mm Mauser cannon for shorter range engagements. Sky Flash can engage targets at all altitudes down to 250 ft (76m). The Foxhunter Air Intercept (AI) radar can detect targets at distances of up to 100 nm (185 km).

The ADV has a reprofiled front fuselage section which accommodates the Air Intercept Radar. It is also longer than the IDS, to accommodate the external carriage of two pairs of Sky Flash missiles, and an extra internal fuel tank.

The inboard fixed leading-edge sections are swept at 68 degrees rather than 60 degrees on the IDS.

Additionally the ADV incorporates a dual IN system and an automatic wing-sweep facility.

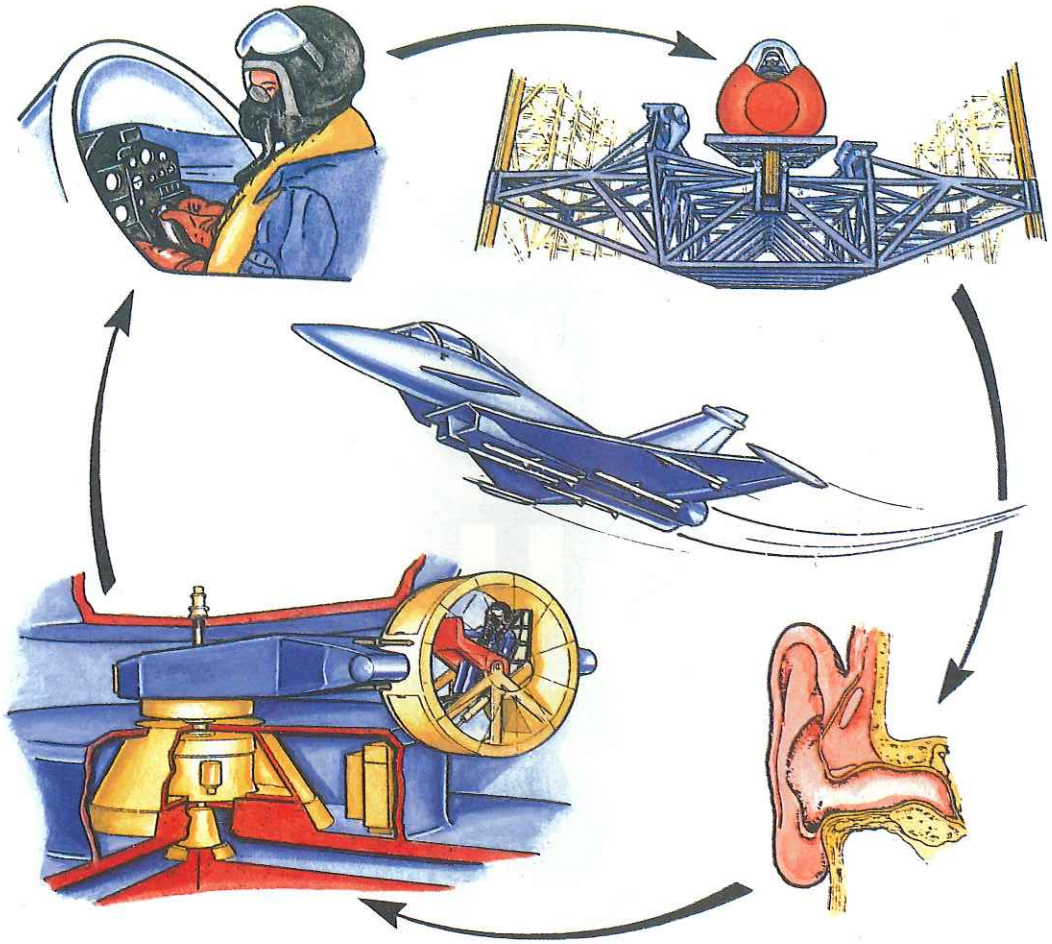
ADDRESS

BRITISH AEROSPACE PLC
11 Strand,
London.

COMPANY

BRV

Brown & Root Vickers Limited



Brown and Root Vickers (BRV) was formed in 1987 from a merger of the Project Engineering and Management Division of Brown and Root UK, and the Design and Projects Division of Vickers. BRV operates from two locations, in London and in Eastleigh.

BRV Eastleigh orginated from the Vickers Supermarine Aircraft company and became established as an imaginative, innovative, Project Contracting Organisation with skills in all engineering disciplines. Markets include Aerospace, Nuclear, Defence, Transport and Industrial Automation.

BRV is a non manufacturing unit but it maintains its own team of Quality Assurance Engineers and Inspectors and accepts full responsibility for the equipment it supplies. The quality system has been assessed by the British Standards Institute to BS 5750 Part 1 and by the UK Ministry of Defence to AQAP 1 and 13.

INFORMATION

The following list includes projects which embody examples of innovation which has significantly contributed to technical success, reliability or operational safety.

- Tension Leg platform Mooring Technology
- Five Degrees of Freedom Flight Motion System
- Aircraft Tyre Wheel and Brake Test Dynamometers
- Deep Oil Well Drilling Simulator
- Centrifuges for Physiological Investigations
- Ship Model Towing Carriage
- Semi Automated Assembly Facility for Munitions
- Weapons Stripdown Facility
- Substantiation Test Rigs for Aero Jet Engines
  - Horizontal and Vertical Spin Rigs
  - Fatigue Test Rigs
  - Shaft Torsion Rigs
- Hydraulic Power Packs and Control System for Thames Flood Barrier
- Guillotine Doors for covered Ship Building Berth
- Railway Maintenance Workshops
- Engine Test Cells, Super and Supersonic
- Advanced Manufacturing Technology, robotics
- Mobile Power Pack Repair Facilities for Armoured Fighting Vehicles
- Nuclear Engineering Transportation Systems and Gloveboxes

ADDRESS

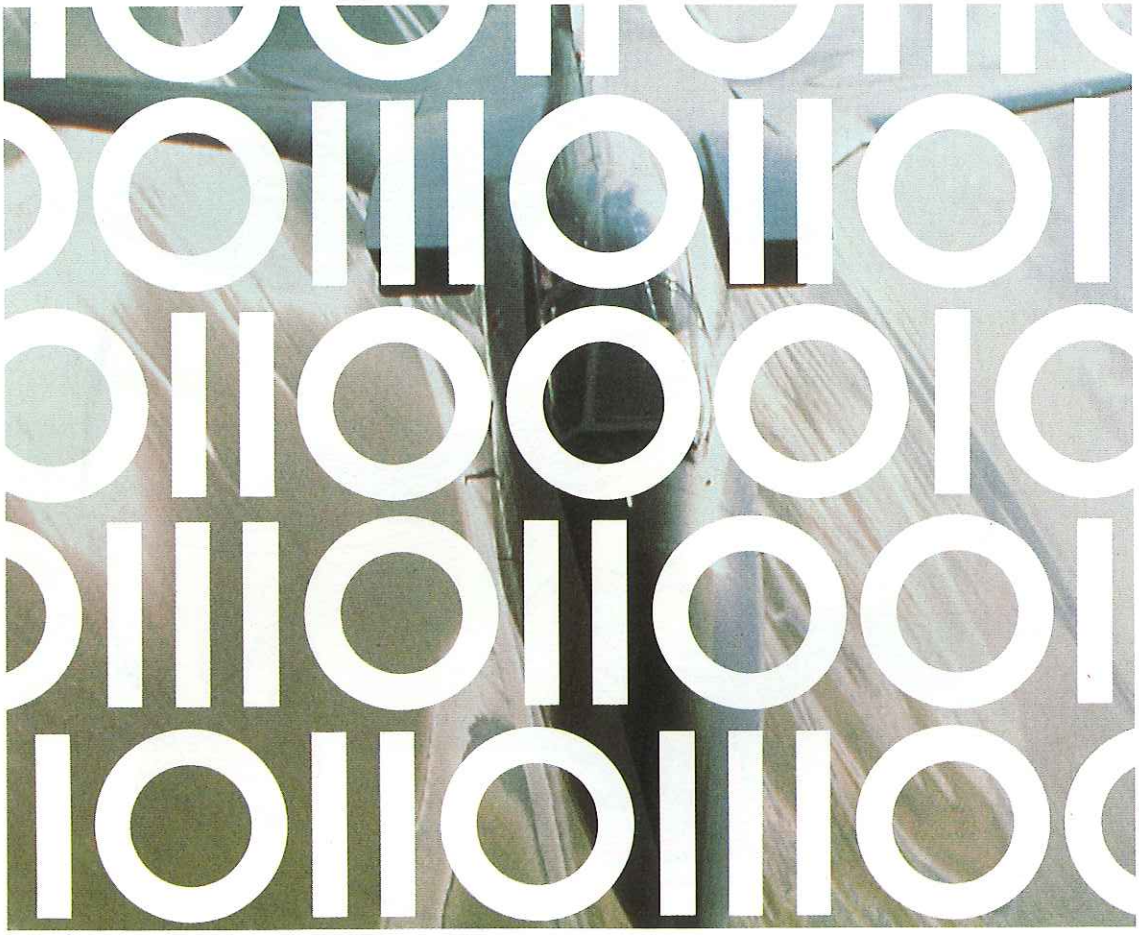
Brown & Root Vickers Limited
Wessex House, Market Street
Eastleigh, Hampshire SO5 4FD, England
Tel: (0703) 619722
Telex: 477313 BRVEAS-G
Fax: (0703) 619808

COMPANY

Cossor

A **Raytheon** Company

Cossor Electronics Limited



INFORMATION

INFORMATION

Cossor has a long history in radar, dating back to the late 1930s when it was selected to supply the display and receive systems for the Chain Home Series of stations which guarded the British coast during the war.

Today, the company is a world leader in secondary radar, supplying complete systems for both civil air traffic control and military identification friend or foe (IFF) systems.

The Cossor range of IFF systems is comprehensive and includes equipment for land, sea and in the air.

On the ground a prime example is the British Aerospace Rapier; Cossor's IFF has been provided for all its field standards, including the new Rapier 2000. At sea, Cossor systems are used by the Royal Navy and overseas navies for ships of all sizes. All front line Royal Air Force aircraft are fitted with Cossor IFF transponders, and over 1,000 aircraft worldwide also have Cossor transponders installed.

CRYPTOGRAPHIC SYTEMS

Cossor's latest IFF systems offer a full Mark XII compatible cryptographic facility

The ground based equipment (the IFF 890 series) can be applied to a wide range of weapon systems; the airborne transponder equipment (the IFF 4700 series) has been fitted to the Harrier GR5, and is designed for installation in many aircraft types.

Additionally, Cossor offers a unit which is used in conjunction with existing IFF interrogators and transponders to add a full cryptographic capability. It is known as the Cossor Interrogation and Reply Cryptographic Equipment (CIRCE), and uses the latest VLSI technology to achieve maximum security in the smallest possible volume.

CIRCE enables a nation to implement its own nationally secure IFF system, with discrete coding tailor-made to individual requirements.

ADDRESS

Cossor Electronics Limited
The Pinnacles, Harlow
Essex CM19 5BB
Tel: (0279) 26862
Telex: 81228
Fax: (0279) 410413

COMPANY

EASAMS

Command Control and Communication and Air Defence

Photographs courtesy of UK Ministry of Defence, British Aerospace and Westlands

INFORMATION

EASAMS experience is based on 25 years of success in completion of defence projects for Army, Navy and Air Forces. Today's multiple threats demand high levels of effectiveness and availability from command, control and weapon system solutions. Designing and developing systems to meet these needs is EASAMS business.
EAMACS provides a powerful aid to Command Systems incorporating as it does the latest technology in graphics processing and manipulation. EAMACS has been adopted by both maritime and military customers.
EASAMS in the forefront of development of battle management systems has recently been contracted to supply the UK Army with ADCIS – an advanced low level Air Defence Command Information System designed to allow the Air Defence Command minute by minute control of weapon platforms. The system protects friendly air forces whilst allowing weapon platforms freedom to engage hostile aircraft.

TOTAL COMMITMENT

EASAMS has been involved in the TORNADO Interdictor/Strike (IDS) and Air Defence (ADV) programmes from the start. In 1972 EASAMS was awarded the contract for IDS avionics design, development and integration as leader of an international consortium. The IDS system is effective under stress, easy to operate and reliable.

For ADV EASAMS has maintained the maximum commonality consistent with the introduction of the Foxhunter AI radar, Skyflash missiles and JTIDS. Current responsibilities include system design and integration for JTIDS and the production of the on-board system software.

To support TORNADO in service with the RAF EASAMS has designed and supplied training and maintenance systems. These include In-Service Software Maintenance Facilities for the evaluation and investigation of operational software, an Avionics Ground Training Rig (AGTR) and TORNADO Air Intercept Trainers (TAIT).

EASAMS is involved in TORNADO from concept to completion. Our commitment is total.

ADDRESS

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Fax: (0276) 683468

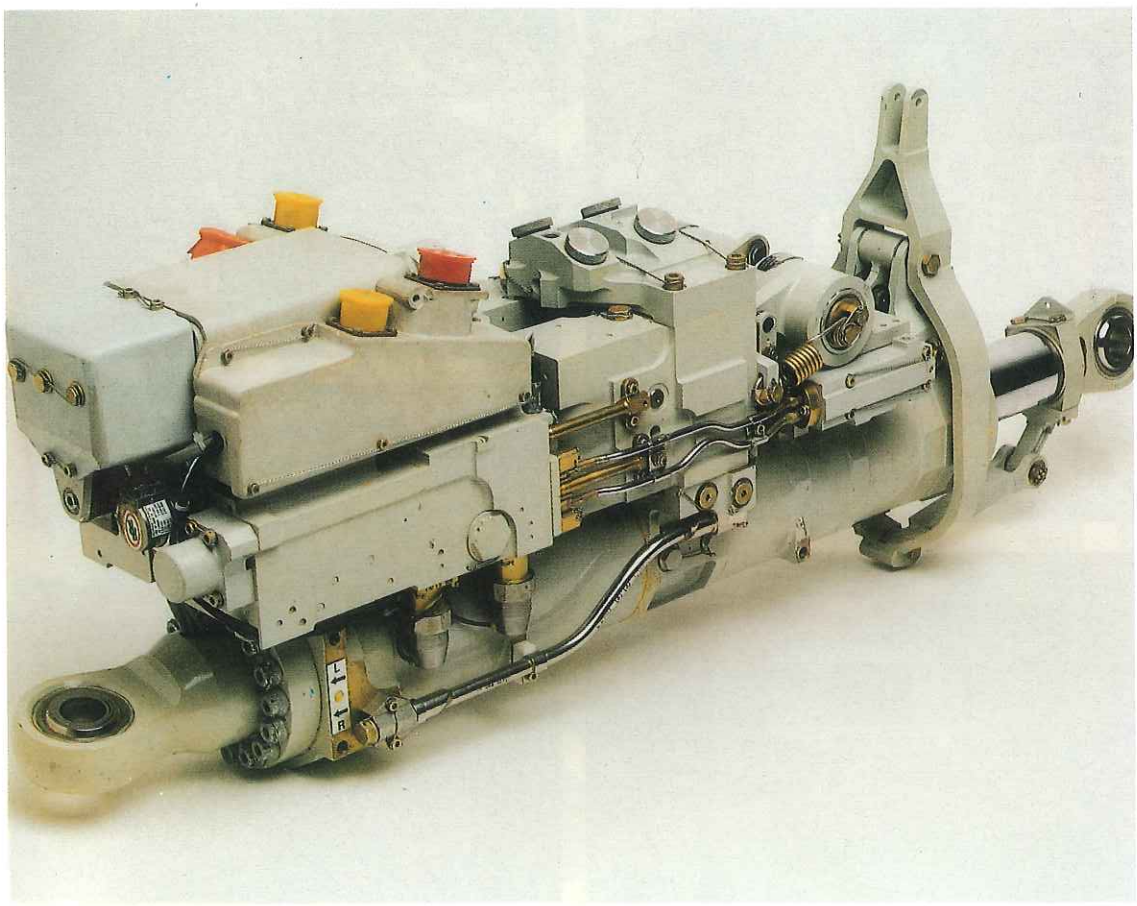
ESAMS (Malaysia) Sdn Bhd
Jalan 215 – Templer,
Petaling Jaya,
Selangor, Malaysia.
Tel: Kuala Lumpur 771188
Telex: MA 37617

ESAMS Limited
PO Box 143
North Ryde
NSW 2113, Australia
Tel: (02) 887 2811
Telex: AA70186

COMPANY

Fairey Hydraulics

FAIREY GROUP LIMITED



Illustrated is the taileron actuator designed and manufactured for the Tornado by Fairey Hydraulics

INFORMATION

The Tornado's fly-by-wire control system is produced by a consortium of British, West German and Italian companies. The primary hydraulic-powered flying controls were all designed by Fairey Hydraulics with Fairey manufacturing the taileron actuator (two per aircraft), the rudder actuator being manufactured under licence in West Germany by Indramat and the spoiler actuators and valve packages built under licence in Italy by Magnaghi Oleodinamica SpA.

The Tornado's automatic flight control system incorporates extensive self-monitoring and built-in test capabilities and is capable of integrating automatic control signals from the aircraft avionics with manual inputs from the pilot. The most fundamental advance in Tornado is that the system is normally electrically signalled – or "flown-by-wire". This system incorporates control system lane redundancy to fulfil the integrity requirements of failure survival. The multiplexing is triplex in the avionics and the outer loop feedback for the main actuator, with quadruplex inner loop signalling within the acutator and its immediate control circuitry.

Programmed requirements from the avionic equipment together with the demands from the pilot are synthesised to provide optimum control surface movements for particular flight manoeuvres. At the command of the pilot or in the event of severe malfunction, reversion of the taileron actuator to mechanical control is initiated. This reversion is smoothly accomplished through clutches and a trimming device which ensure that there is no transient loss of control and the minimum aerodynamic disturbance during transition. The high operating pressure of the aircraft hydraulic system at 4,000 psi nominal has enabled Fairey Hydraulics to keep dimensions of the actuators to a mimimum, thereby permitting their accommodation in slender supersonic aerofoils or small rear fuselage locations.

ADDRESS

FAIREY HYDRAULICS LIMITED
Cranford Lane, Heston,
Hounslow, Middlesex TW5 9NQ
Tel: 01 759 2666
Telex: 22230
Fax: 01 897 7953

COMPANY

FERRANTI INTERNATIONAL

FERRANTI DEFENCE SYSTEMS LIMITED

The Ferranti Defence Systems Ground Replay System

INFORMATION

FERRANTI INTERNATIONAL AND THE TORNADO F3

The contribution of Ferranti International to the success of the Tornado F3 in its operational role is significant. It covers radar, the navigation system, the video recording and ground replay system, the Cassettee Preparation Ground Stations, attitude indicators, airborne battery chargers and ground power control units. All these equipments and systems are successors to a long an successful line of systems produced for the Royal Air Force and forces throughout the world.

Ferranti Defence Systems Limited designed and manufactured the first high powered mono pulse radar to enter squadron service anywhere in the world. It proved highly successful during the RAF Lightnings' 30 years of service. Then followed Blue Parrot for the Buccaneer, Blue Fox for the Sea Harrier, elements of the Tornado IDS radar under licence and many helicpoter radars. These radar systems are in service throughout the world. Ferranti Defence Systems designed, developed and are now producing the transmitter, illuminators and antenna platform for the Tornado F3 aircraft: two of the more complex units in the Foxhunter radar. To date 1780 of both units have been delivered.

The twin FIN 1010 inertial navigation system produced by Ferranti Defence Systems have a similar successful lineage stemming from the Harrier systems of the 1960s. The system is very accurate, reliable and versatile with a rapid alignment capability which does not require the usual external devices which might not be available on forward airfields.

The video recording system incorporates a camera together with a five channel recorder, all the channels being capable of replay and viewing simultaneously on the Ground Replay System.

The Cassette Preparation Ground Station (CPGS) permits Tornado F3 crews to pre-plan sorties' accurately and quickly and insert the flight planning information into the aircraft system using a date store loaded through the CPGS.

All the Ferranti International systems are of proven performance and have the reliability and quality already demonstrated in the many successful aircraft now flying throughout the world. Ferranti International is proud to provide systems for the Royal Air Force Tornado F3 and wish the Royal Air Force success on their world tour.

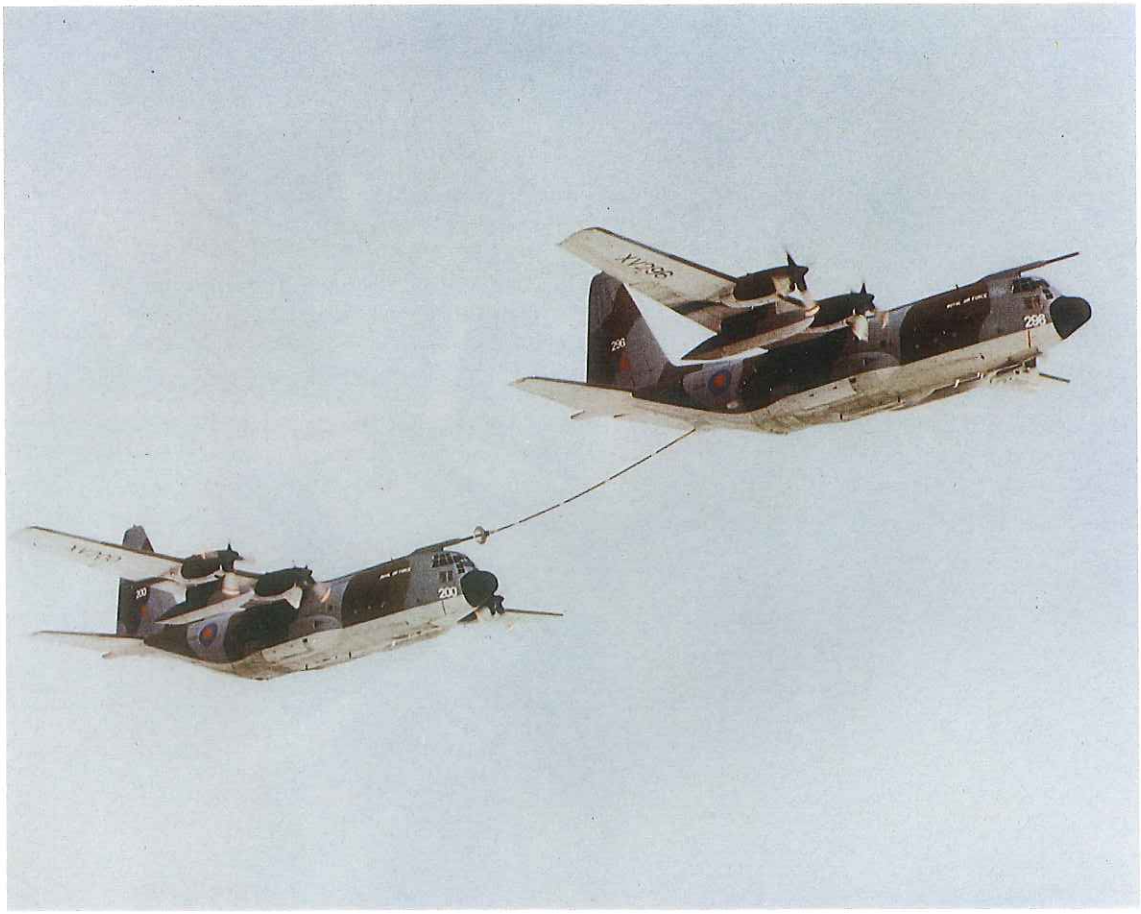
ADDRESS

FERRANTI DEFENCE SYSTEMS LIMITED
Crewe Toll, Ferry Road,
Edinburgh EH5 2XS
Tel: 031-332 2411
Telex: 72141
Facsimile: 031-332 0690

COMPANY

FLIGHT REFUELLING LIMITED

FLIGHT REFUELLING LIMITED



RAF VC10 tanker and RAAF F18 receivers

INFORMATION

Flight Refuelling Limited's products include Air to Air Refuelling equipments, towed Target Systems, Aircraft Drop Tanks and both Target and Surveillance RPVs.

Directly relevant to Golden Eagle, the Company supplies the 2250 ltr Drop Tanks for Tornado, and supplies the Air to Air Refuelling equipment fitted to the Tristar and VC10 aircraft.

Air to Air Refuelling provides extended reach, Missions impossible with unrefuelled aircraft become possible. Operational flexibility is increased, and the number of aircraft required for a particular task is reduced. Air to Air refuelling is a true force enabler and force multiplier.

The Company (FRL) has more than 30 years experience in supply of In Flight Refuelling systems for service use. FRL's Air to Air Refuelling equipments are fitted to Victor, C-130 Hercules, L-1011 Tristar, and VC10 aircraft of the Royal Air Force and have been selected for fitment to KC10 and KC135 aircraft of the United States Air Force. The equipments both centre-line and wing pod, have also been fitted to B-707, and agreement has already been reached for conversion of other aircraft.

ADDRESS

FLIGHT REFUELLING LIMITED
Brook Road, Wimborne,
Dorset BH21 2BJ England
Tel: (0202) 882121
Telex: 41247
Fax: 0202 88096

FLIGHT REFUELLING LIMITED

RAF VC10 Tanker and RAAF F18 Receivers

Mk 32 Series Refuelling Pod

This latest generation equipment has now been in service use with the RAF for 4 years, and has set new standards in reliability and maintainability for this category of equipment. It has most recently been selected for use by the United States Air Force and the Royal Australian Air Force.

The pod is particularly suited to conversion of existing aircraft to dual role capability. It features state of the art digital electronic control and built in test equipment, does not incorporate a traditional hydraulic system, and is independent of aircraft primary power. It is thus readily interchangeable between aircraft type, and is projected to be in mixed fleet service with an increasing number of operators.

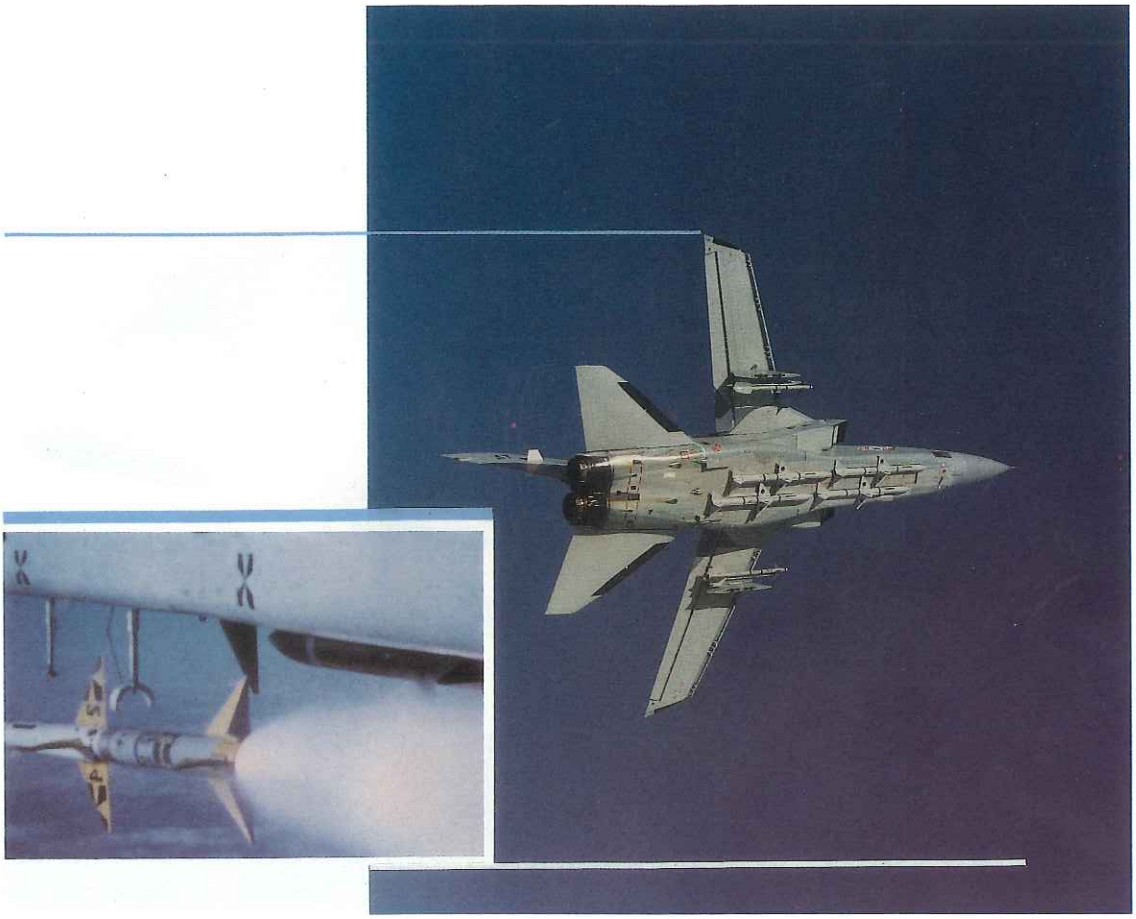
FRL Air to Air Refuelling equipment is designed to be interoperable with all Western World probed receiver aircraft types.

FLIGHT REFUELLING LIMITED
Brook Road, Wimborne,
Dorset BH21 2BJ England
Tel: (0202) 882121
Telex: 41247
Fax: 0202 88096

COMPANY

FN FRAZER-NASH

Frazer-Nash Defence System Limited



INFORMATION

SKY FLASH EJECT LAUNCHER

Crucial to the prime role of the Tonrado ADV, the performance of the Frazer-Nash Sky Flash Eject Launcher is superior to that of any other missile eject systems in service today. The equipment provides the fighter crew with the unique ability to release all four of the semi-buried Sky Flash medium range air to air missiles 'throughout the aircraft flight envelope' and without the more usual restrictions associated with aircraft missile release. Thus, irrespective of speed, altitude, turn or angle of attack, missiles can be released with complete confidence and safety.

The technology involved utilises slow burn cartridge technology combined with an advanced gas management system which imparts to the missile a sustained acceleration over a long stroke. This enables reliable and consistent control over missile pitch during the launch cycle and ensures safe transition through the adverse aircraft flow field and correct alignment for motor fire and target acquisition.

The launchers are in service with all air defence Tornados and are operated by the Royal Air Force and air forces in the Middle East.

AMRAAM EJECT LAUNCHER

Typical examples of the adaptability of the launcher can include the conversion of the Tornado launcher to carry and eject the Hughes Advanced Medium Range Air to Air Missile (AMRAAM). The adaptation allows no compromise in terms of ejection performance whilst ensuring positive missile constraint in roll and yaw during carriage and launch.

ADVANCED RAIL LAUNCHER

Recognising the logistics, cost and maintenance problems associated with the existing system of dedicated rail launchers being required for each new missile type entering service, Frazer-Nash has evolved an advanced rail launcher which can be readily adapted at 1st and 2nd line level to accept a range of different missile types. This 'Common Rail Launcher' is adaptable to all appropriate aircraft carriage methods at either 30 or 14 inch centres and through a modular system can itself carry a range of short and medium range air to air missiles as well as certain air to ground missiles. Typical flexibility could include AMRAAM, Sky Flash, Sidewinder and ASRAAM but overall capability is considerably greater.

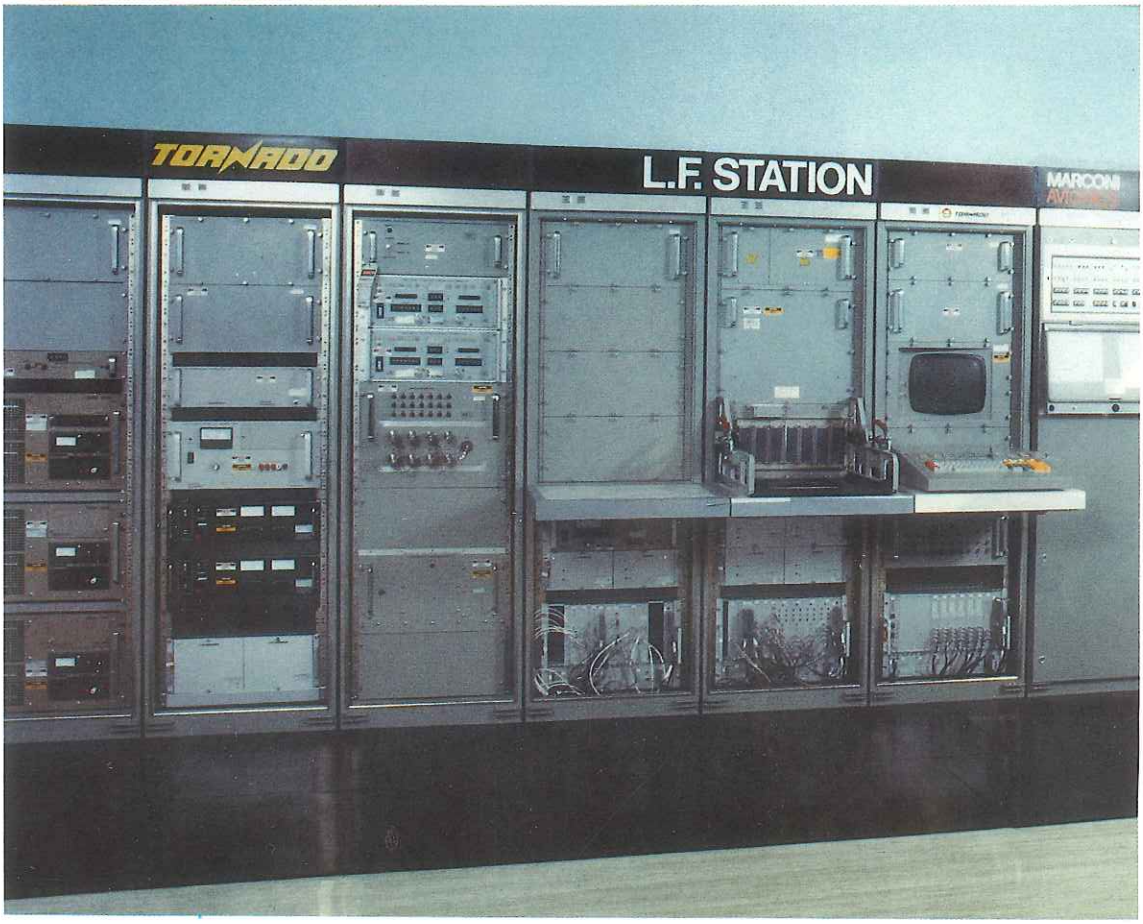
ADDRESS

Frazer-Nash Limited
Randalls Way, Leatherhead
Surrey KT22 7TX England
Telephone: (0372) 379717
Telex: 929947 G
Fax: (0372) 377879

COMPANY

GEC AVIONICS

GEC Avionics Limited



INFORMATION

AUTOMATIC TEST EQUIPMENT DIVISION
TORNADO AUTOMATIC TEST SYSTEM — TATS

GEC Avionics are proud to be associated with the support of the Tornado. The program management and supply of Automatic Test Equipment (ATE) was carried out by a GEC Avionics team, dedicated to Europe's largest-ever single contract for this type of ATE.

From the beginning of the aircraft program, it was considered essential to take advantage of the benefits of Automatic Testing and the Tornado Automatic Test System (TATS) has proved its value in the Air Forces of the United Kingdon, Germany and Italy.

At Intermediate level, Tornado avionics are tested on TATS which comprises 4 separate ATEs covering low frequency and digital, video, radio frequency and microwave technologies. Units suspected of being faulty are removed from the Tornado aircraft and put on the relevant ATE for confirmation of the fault, diagnosis and re-test after repair. Test programs for over 100 different LRUs are stored on magnetic disc as part of the system. A single operator has the ability, via the ATE, to quickly pin-point faults down to SRU level.

Logistics support of TATS is well established and following initial provision of comprehensive documentation and both practical and theoretical training courses by GEC Avionics, Air Force personnel are becoming self-sufficient in the use of TATs.

Apart from the benefit of quicker turn around of removed LRUs, automatic test equipment provides other benefits over multiple special-to-type test equipments including: reduced maintenance man hours per aircraft; lower cost of training; wider use of semi skilled technicians, thereby releasing highly skilled technicians for more demanding jobs; reduced spares holding and repeatable accuracy of test and diagnosis.

In the particular case of TATS, future users will benefit greatly from the mature status of the hardware and software.

ADDRESS

GEC Avionics Limited
Automatic Test Equipment Division
Airport Works, Rochester, Kent ME1 2XX
Telephone: (0634) 44400
Telex: 96246
Fax: (0634) 816263

COMPANY

GEC AVIONICS

GEC Avionics Limited

Key

1 SPILS Computer
2 CSAS Control Panel
3 CSAS Pitch Computer
4 AFDS Computer
5 AFDS Control Panel
6 Autothrottle Actuator
7 Pitch Stick Position Transmitter
8 Triplex Rate Gyro
9 Roll/Yaw Position Transmitter
10 SPILS Control Panel

INFORMATION

AUTOMATIC FLIGHT CONTROL SYSTEM FOR THE TORNADO AIRCRAFT

The triplex fly-by-wire system for Tornado is produced by a consortium of UK, German and Italian companies with GEC Avionics as the prime contractor.

The Automatic Flight Control System incorporates extensive self monitoring built-in-test capabilities and comprises:

Autopilot and Flight Director system (AFDS)

- Fail safe autothrottle
- Fail safe autopilot including terrain following
- Fail safe autotrim
- Fail operational flight director
- Digital computing

3-axis Command Stability Augmentation System (CSAS)

- Automatic stabilisation
- High integrity fly-by-wire manoeuvre demand system
- Gain scheduling to optimise response over flight envelope
- Gain scheduling to optimise performance for various wing sweep configurations

Spin Prevention and Incidence Limiting System (SPILS)

- Fail safe spin prevention and incidence limiting
- Carefree handling qualities at high incidence

ADDRESS

GEC Avionics Limited
Combat Aircraft Controls Division
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Telex: 96333 or 965450
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COMPANY

GEC AVIONICS

GEC Avionics Limited

Digital Colour Map

INFORMATION

GUIDANCE SYSTEMS DIVISION DIGITAL COLOUR MAP

Advances in digital data storage techniques, combined with developments in colour raster displays, have been exploited by GEC Avionics to produce synthetic map presentation on multifunction shadow mask or flat screen cathode ray tubes.

Innovative digitising techniques are used to transform paper maps into pixel display format to supplement existing digital databases. Other sources of data, such as satellite photography, feature and elevation databases, and vector databases, can readily be utilised.

The map is displayed at any required scale selectable by the pilot, and can be zoomed to provide precise scale matching with sensor information on the display. Other features include continuous scrolling, rotation, de-clutter and variable colour palette. The map information can be overlaid with up-to-date navigation warnings, threat and intelligence data.

The Solid State storage medium gives the advantages of reliability and ruggedness plus fast data manipulation — changes in scale are virtually instantaneous. Moreover, it enables extensive map coverage with easy and fast update and amendment in the field, while still providing excess storage capacity for future system expansion.

UK MOD has placed a production order for the Digital Colour Map Unit for the Harrier GR7. After flight testing in fixed and rotary wing aircraft in the UK, the unit has been undergoing extensive flight testing by the US Navy as part of a GEC Avionics Night Attack System.

ADDRESS

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Guidance Systems Division
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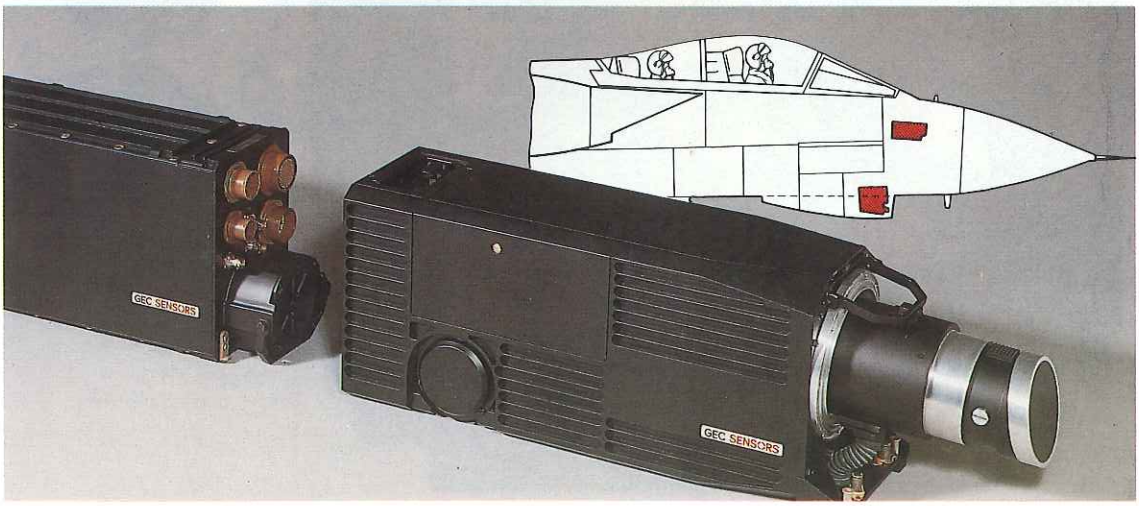
COMPANY

GEC SENSORS

1955 AIRBORNE DISPLAY DIVISION
1987 AIRBORNE DISPLAY DIVISION
1987 AIRBORNE DISPLAY DIVISION
1988 INSTRUMENT SYSTEMS DIVISION

GEC Sensors Limited



INFORMATION

"GOLDEN EAGLE"
ELECTRO-OPTICAL SURVEILLANCE DIVISION

GEC Sensors is proud to be a member of the GEC-Marconi Group which is Europe's leading electronic systems company. The Company's business is international, providing the world's civil and military markets with advanced high-technology systems for air, land and sea applications.

Within GEC Sensors is the ELECTRO-OPTICAL SURVEILLANCE DIVISION which, as one of the world's leading designers and manufacturers of complete electro-optical systems, contains a talented team of over 500 experienced professionals.

As the prime contractor to the UK Ministry of Defence for the highly successful range of Class II Thermal Imaging Common Modules — TICM II — EOSD has built a wealth of infra-red technology experience which is currently being exploited through major system contract for Night Attack FLIRs, FLIR turrets for airborne surveillance and Remotely Piloted Vehicle (RPV) applications. With emphasis placed upon innovation to enhance equipment performance and reliability, the Division has an unrivalled background in sensor, stabilisation and signal processing technologies.

Current examples of EOSD's ingenuity are the Atlantic NAV/Attack FLIR and a Modular FLIR system:-

(i) Atlantic NAV/Attack FLIR — is a retrofit pod-mounted system designed to give night and poor weather capability to a range of ground attack aircraft for high speed low level missions. Atlantic has been flown extensively in the USA and Europe fitted to a General Dynamics F-16 aircraft.

(ii) Modular FLIR — this system will be integrated into the fuselage of the Royal Air Force Tornado GR1 and Harrier GR5 aircraft to enable close support missions at night and in poor weather conditions. The same system is being supplied for the US Marine Corps' AV-8B.

EOSD has, during the past three years, undergone a period of rapid expansion thus building up a comprehensive organisation to deal with the wide variety of programmes now being undertaken by GEC Sensors.

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Electro-Optical Surveillance Division
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COMPANY

GEC SENSORS

GEC Sensors Limited

"GOLDEN EAGLE"
AIRADIO PRODUCTS DIVISION

From the earliest days of Aviation the Marconi Company has supplied radio communication and navigation equipment into civil and military aeroplanes, at home and abroad.

Since those early days there have been great strides in the range and capability of Airadio equipments. Modern technology has led to the provision of compact, lightweight and rugged designs which can operate reliably in the adverse environment of aircraft, and which enables safe and comfortable air transport world-wide. Thus, the Company's record of achievement has been accomplished by the determination to succeed through this new technology and resourceful management.

In order to fulfil its target for success the business of the Airadio Group has been sub-divided into two Divisions, each operating autonomously and engaged in some of the most advanced and specialised work in its field. It is here that the AIRADIO PRODUCTS DIVISION plays a leading role in developing airborne radio coimmunication and navigation equipment, command and communication systems and Doppler velocity measuring sensors.

Current examples of APD's ingenuity are the TACAN Type AD2780 series and AD3500 communication system equipment:-

(i) AD2780 series — these tactical navigation units measure the range and bearing to a ground station beacon, from 0-300 miles/0-360°, with Analogue, Digital and Tandem Control capabilities.

(ii) AD3500 — this is a new advanced radio communication system being supplied to the RAF for installation in their latest front line aircraft — the Harrier GR5. The AD3500 has been designed to meet the growing requirement for reliable communications in today's hostile battlefield conditions where security and protectioin against jamming are essential.

Applications for technology outside the avionic product range have also been developed from research and development programmes, in ground transport and artillery calibration applications. Work undertaken in the Airadio laboratories, besides being devoted to GEC Sensors' concepts, often includes similar work or feasibility studies sponsored by external agencies.

INFORMATION

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ADDRESS

COMPANY

HOUCHIN

HOUCHIN LIMITED

INFORMATION

The Houchin model 680 ground power unit is fully approved by the Royal Air Force for use with armed Tornado Aircraft. Type testing has shown that it meets the exhaustive Magerd 5301 electrical and electromagnetic compatibility requirements in all respects

The unit, rated at 48Kw, 200V, 400Hz has been sold to both U.K. and overseas Ministries of Defence who use it in support of Tornado and other aircraft.

Powered by a well tried industrial diesel engine and fully supported by Houchin's product support organisation the model 680 offers low noise, high reliability ground power in a military environment. Standard features include automatic fire detection and extinguishing and cold start aid whilst derivatives of the unit include 28VDC transformer rectifier output and hydraulically driven self propulsion and towing facility.

Houchin's military product range also includes other ratings of ground power units, truck mounted units, frequency converters, transformer rectifiers, air start units and cooling trolleys.

ADDRESS

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Chart Road, Ashford
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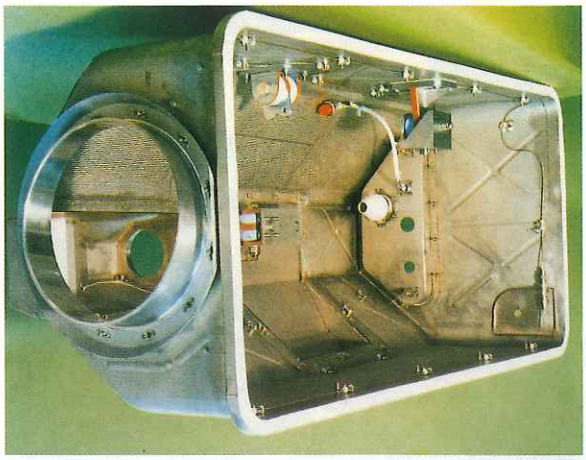
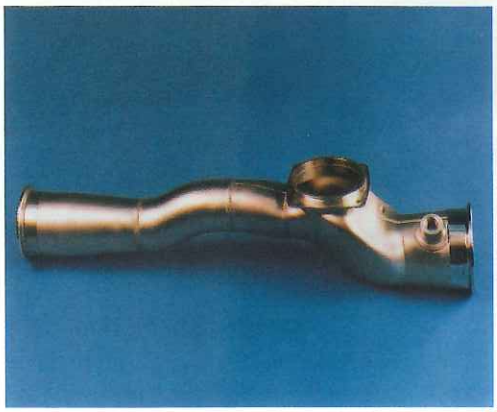
COMPANY

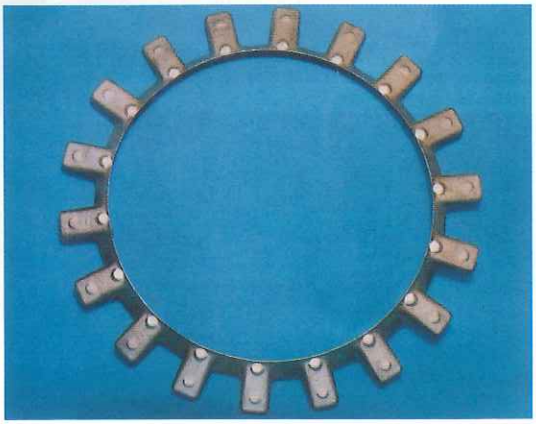
INSUMAT LIMITED



Titanium Enclosure for an A.P.U.



Fabricated and Hydroformed Duct.



One Piece Exotic Alloy Pressing

INFORMATION

INSUMAT LIMITED, a wholly owned subsidiary of Hawker Siddeley Group plc, designs and manufacturers a wide range of aerospace fabrications and associated equipment, which is supplied to customers worldwide. The Company is best known for its lightweight metal encapsulated thermal insulation which is fitted to a wide range of military and civil aircraft. Whilst insulation remains an important product, Insumat Ltd. has rapidly expanded into Aerospace Fabrication, Specialist Presswork and Composite Ductwork.

INSUMAT LIMITED has invested to develop new manufacturing methods, often using the more unusual materials, in order to produce components that are of lighter weight and lower cost. "In-house" design capability greatly facilitates this objective as design, quality and production staff work together to supply a product that is delivered on time, to the required quality, in a cost effective manner.

Quality is of paramount importance and the Company is approved to N.A.T.O. Standard A.Q.A.P.1 which covers all design manufacturing and quality assurance procedures. Many other approvals are held including the C.A.A., British Aerospace, Rolls-Royce, General Electric, Allied Signal Aerospace, Textron Lycoming, Textron Aerostructures, Boeing Vertol.

- AERO FABRICATIONS
  Structures and components including engine intakes and exhausts, APU enclosures and silencers, doors, hatches, pipes and ducts.
- THERMAL INSULATION
  Lightweight robust high performance metal encapsulated insulation and 'soft' fabric covered insulation.
- SPECIALIST PRESSWORK
  Capabilities include hot creep forming, die quenching, rubber and fluid forming. Materials include nimonic, inconel, titanium and Jethete.
- COMPOSITE DUCTWORK
  One piece construction lightweight ducts of unusual shapes and sizes, using modern resins and glass, carbon fibre and Kevlar reinforcements.
- FLAME BREAKOUT SHIELDS
  As fitted to Rolls-Royce RB211 series of engines and the A300, A310 and A330 Airbuses, and ATR 42 aircraft programmes.

ADDRESS

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Telex: 437417 INSUHQ G
Fax: (0452) 611333

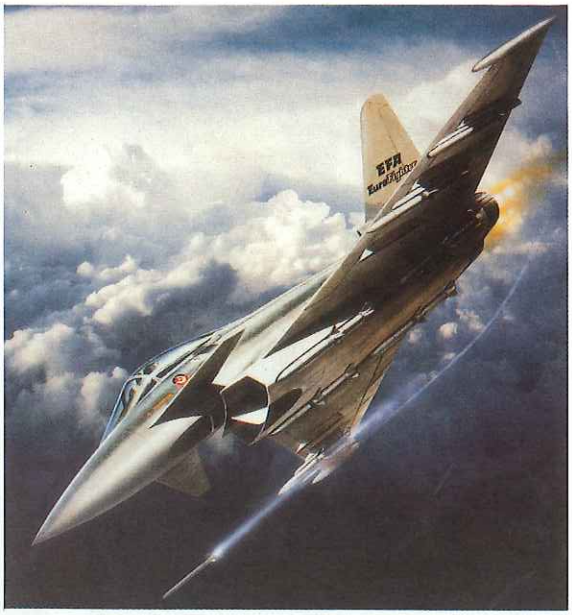
COMPANY

Logica

Logica Space and Defence Systems Limited

EM101

Tornado



EFA

Super Lynx

Photographs courtesy of UK Ministry of Defence, British Aerospace and Westlands.

INFORMATION

Logica has been designing and implementing advanced computer systems for almost 20 years for the aerospace, military and emergency sectors. Logica's broad range of work and research for military forces worldwide has enabled it to build up necessary skills and to transfer key technologies between different areas of work.

A primary area of Logica's work is the application of advanced computing techniques to aviation systems. Its capability and experience encompasses avionics software, digital hardware and overall systems. Activities range from laboratory research in advanced techniques, such as speech recognition and image processing, to the development of operational military systems. Logica provides onboard and ground-based image, sonar and radar processing systems for aircraft, in addition to monitoring and control facilities.

In ever more complex and hostile environments, the design of military aircraft computer systems has to be addressed in ways which are both cost-effective and robust. Logica is able to study mission requirements, ensure all possible solutions are evaluated and produce a detailed system specification and design. Logica can also assist in any aspect of simulation throughout all stages of avionic and ground support system development.

Extensive work on formal methods for high reliability safety critical software development has enabled Logica to become involved in a number of strategic military and space programmes where stringent safety has to be applied in hostile conditions. Combat platforms are increasingly designed to incorporate architectures which are fault tolerant and reconfigurable. Logica uses sophisticated techniques which help a system maintain integrity and reconfigure dynamically in the event of damage or failure.

Logica is establishing a comprehensive Ada capability with its introduction as the preferred language by the UK MoD. The company has already built up experience on many projects using Ada.

Logica operates within strict quality assurance procedures approved by the UK MoD and NATO.

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Photographs courtesy of UK Ministry of Defence, British Aerospace and Westlands

COMPANY

Lucas Aerospace

LUCAS AEROSPACE LIMITED

Digital Engine Control Unit (DECU). Developed and produced by Lucas for the RB199 engine which powers the Tornado ADV aircraft.

High lift and wing sweep control unit for Tornado. Exceptional hydraulic actuation technology contributory to Tornado's remarkable agility and handling.

INFORMATION

A major contributor to NATO and other military programmes, not only in the air but on land and at sea, Lucas Aerospace has a worldwide presence through its manufacturing subsidiaries, associated companies and support operations.

In a period of unprecedented growth Lucas Aerospace is increasing its presence in the Asia-Pacific region – Australia, Hong Kong, Indonesia – and also significantly in the USA.

Lucas Aerospace supplies equipment for every military aircraft in the Free World, notably on the Tornado F3 and also on the TriStar Tanker which form the basis of Exercise GOLDEN EAGLE.

These two projects typify the range of systems and equipment expertise which make Lucas Aerospace unique:

Tornado

- Electronic Fuel Control System
- Main Electrical Power System
- Hydromechanical Fuel Control System
- Pitch Feel Simulator
- High Lift and Wing Sweep Control Unit
- Electromechanical Actuation Systems
- Thrust Reverser and Nozzle Actuation Systems
- Electric Starter
- Air Valves
- Windscreens
- Intake Ice Protection
- Electroluminescent Cockpit Panel Lighting
- Contactors and Switchgear
- Reheat Control

TriStar

- Hydromechanical Fuel Control Unit
- Electronic Speed and Temperature Limiter
- Complete Cold Fan Thrust Reverser
- Electromechanical Actuation Systems
- High Energy Ignition System
- Air Valves
- Gearboxes
- Switchgear
- Thermal Controller
- Camera Dome

ADDRESS

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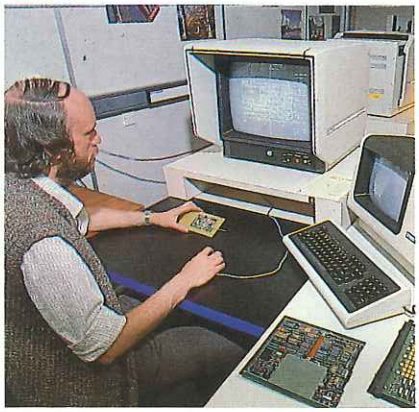
COMPANY

MEL



MEL Buildings Crawley. Microwave Integrated Circuit facility. CAD techniques for designing minature PCBs.

INFORMATION

CORPORATE

MEL is part of the worldwide Philips Group and within the International structure of Philips forms part of the Philips Defence and Control Systems Group (DCS). This is an international federation of Philips Defence companies who collaborate with each other, to the benefit of customers.

As a high technology organisation specialising in the design, development and production of defence electronics, MEL concentrate on Communications, Electronic Warfare, Avionics and Integrated Product Support.

First class modern research and manufacturing facilities are located at Crawley near London Gatwick International Airport, at Dunfermline, Scotland, and at Stittsville, in Canada.

MEL benefits from the huge (£1000 million pa) investment that Philips makes in R&D and in particular has a very close working relationship with the Philips Research Laboratory (PRL) at Redhill, only six miles from MEL's main plant.

Anticipating technolgical change and developing new techniques, sub-systems and systems that will satisfy the future strategic and tactical needs of customers is given high priority within the Company. The impact of artificial intelligence and other future technologies goes hand-in-hand with advanced systems modelling and work on projects that includes very small multispectral sensors, SMART munitions, secure communications and future man-machine interface requirements.

New systems recently emerged from the on-going R&D programme have included a very compact and unique Narrow Band Secure Voice (NBSV) unit which provides high grade voice security for current "in-service" radios operating in the HF/VHF and UHF Bands. The NBSV unit features a built-in acoustic noise suppression system to cancel the noise of engines, rotor blades, etc. prevalent in helicopters, fixed wing aircraft and tanks.

Another new system is SETTER. This is a multi-role mobile battlefield ESM system that detects, identifies and pinpoints the location of enemy ground and airborne radars at long range. SETTER shows where enemy air defence systems are located – information which is vital for the success of own force Air Operations.

ADDRESS

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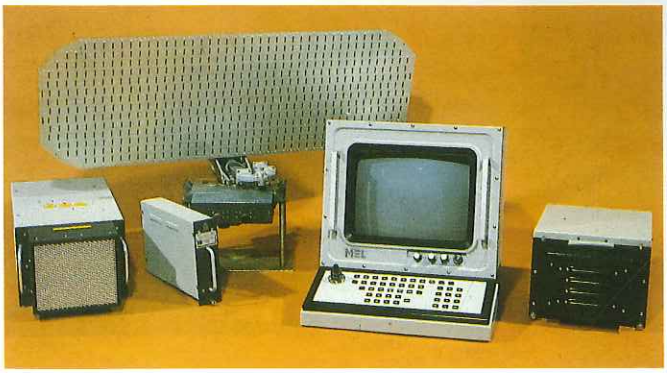
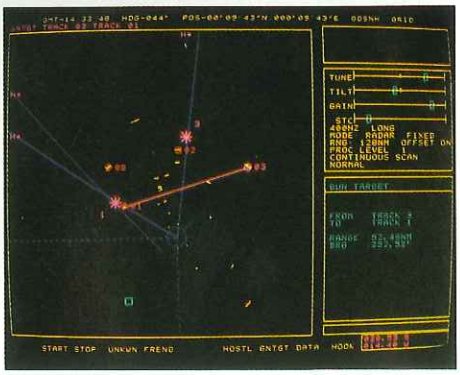
MEL





Australian Sikorsky S-70B, inset smaller pictures of SUPER SEARCHER equipment and screen displays.

AVIONICS DIVISION

MEL's Avionic Systems Division capitalises on the Company's product, sub-systems, man-machine interface and software expertise to develop integrated, airborne radar-based systems for surveillance OTH and training applications.

In particular, the Company's skill in constructing compact high-integrity sensor, processing, communications and display equipment, enables the Avionic Systems Division to produce total systems for helicopters and fixed wing aircraft. These capabilities position MEL to act as a main contractor to Governments, Government Agencies and OEMs.

The Division's family of modular airborne search radar systems — MAREC, SUPER MAREC, SEA SEARCHER and SUPER SEARCHER — are in service round the world, employed in maritime surveillance and ASW/ASVW roles. SEA SEARCHER is in service with the Royal Navy.

Super Searcher

Off the coastlines of a number of countries, particularly in the Southern hemisphere, MEL's most advanced system, SUPER SEARCHER is demonstrating perfect performance in Westland Sea King and Sikorsky Hawk helicopters and fixed wing aircraft such as the Embraer Bandeirante. This advanced radar, developed to be the core of a Central Tactical System (CTS), clearly presents a total operational scenario. A single operator can integrate information from a variety of sensors to locate, display and track numerous sub-sea, surface and airborne threats.

The operator can also co-ordinate ASW forces, fighters and guide on-board active or semi-active missiles such as SEA SKUA, or provide over-the-horizon guidance for third party missiles, including EXOCET, HARPOON, PENGUIN and OTOMAN.

Outstanding radar coverage and detection performance, role adaptability and stretch potential based on modular software provide a flexible system that can be tailored in single or multiple screen configurations to match existing and future mission requirements.

SUPER SEARCHER represents value for money coupled with long term, low cost of ownership.

New Pulse Compression version of Super Searcher

Avionic Systems Division is now extending the performance of Super Searcher by giving it a pulse compression compatibility. This involves the incorporation of a new Travelling Wave Tube (TWT) transmitter and pulse compression receiver. Other elements of the new system are based wherever possible on existing proven Super Searcher hardware.

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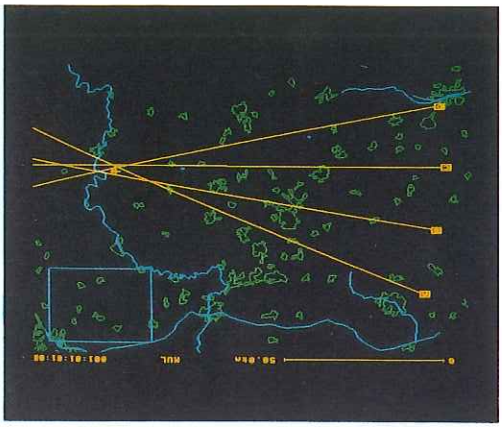
COMPANY

MEL



With MEL's SETTER you have the means to programme the sophisticated defensive electronics of today's fighter aircraft.

INFORMATION

ELECTRONICS WARFARE

Over a period of thirty years, MEL has established an outstanding track record of world 'firsts' in Electronic Warfare, including the Instantaneous Frequency Measurement of radar emissions, and the first fully integrated naval electronic warfare suite.

MEL also produced the world's first mobile fully-netted battlefield ESM system.

Setter

Supremacy in electronic warfare is now recognised as vital to the winning of future land engagements.

SETTER, MEL's multi-role, mobile ESM system, detects, analyses, classifies, identifies and pinpoints the location of radars at long range.

A SETTER system consists of a number of sensor stations installed in soft-skinned or armoured vehicles, linked by a digital data net. One station will act as Master Station responsible for system control, radar emitter location and communication with a Command and Control Centre, which could include an MEL Electronic Warfare Support System. This is a software package incorporating an EW database customised to support the user's target EW systems.

An ergonomically designed SETTER console enables operators to work quickly and accurately to maintain a dynamic picture of battlefield deployment on colour monitors displaying data information/analysis pages, maps and grids.

Deployed to survey an area of border or coastline, SETTER provides several categories of intelligence, including the distribution of radars and radar-related weapons, an understanding of enemy tactics and an early indication of a potential aggressor's hostile intentions.

On the battlefield, SETTER gives an assessment of enemy deployment, indicates lines of advance and shows where enemy air defence systems are positioned — information which is vital for the success of own force Air Operations.

In addition, by locating accurately radars known to deploy with armoured formations, SETTER provides passive targeting of terminally guided weapons or fighter ground attack against such formations.

If SETTER saves only one combat aircraft by showing the location of enemy AA defences, it will have paid for itself.

ADDRESS

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COMPANY

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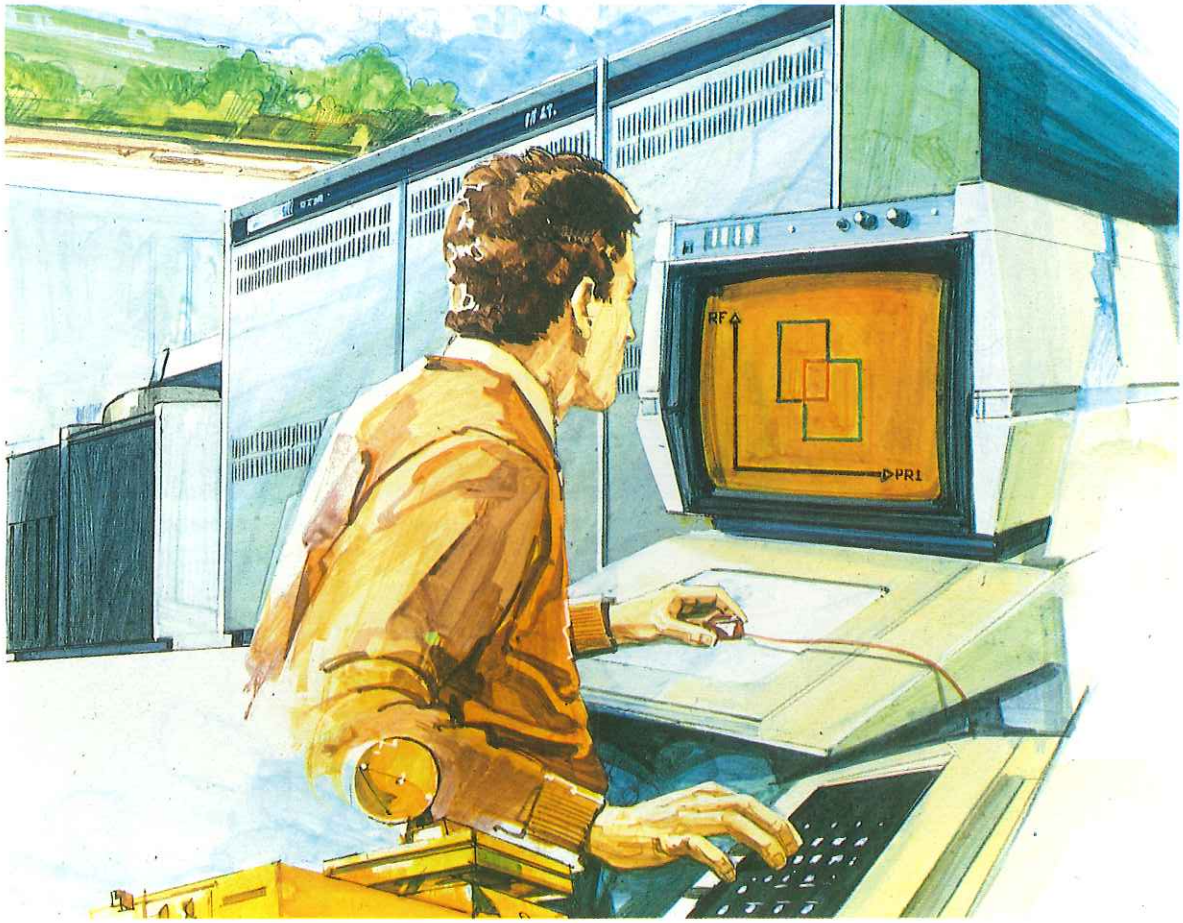

INFORMATION

ELECTRONIC WARFARE SUPPORT SYSTEM

The MEL EW Support System is a ground based software package incorporating a specifically designed EW database which can be customised to support the user's target EW system. The System includes a powerful Man-Machine Interface, colour graphics displays and sophisticated algorithmic processes which provide an EW data analysis, ELINT, an automated EW library creation facility and programmable support of EW equipment installed on board aircraft, warships etc.

The System provides:

- a complete database structure on which the user's EW data can be loaded
- easy access to, and maintenance of the EW data
- an automated EW library creation facility for user's EW equipment from a centralised EW database
- programmable support of the EW receiver (where applicable)
- an EW data analysis capability
- ground base Ambiguity Analysis
- many user friendly features
  - HELP facility
  - automatic library documentation
  - automatic log file creation
  - report print capability
- complete 'turnkey' system

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COMPANY

MEL

INFORMATION

PRODUCT SUPPORT

Expensively purchased equipment needs to be kept in good repair, up-to-date and operationg at its full potential.

MEL's dedicated Product Support Division (PSD), which operates as a separate autonomous business, provides a comprhensive and cost-effective range of Post Design, Field Support and Repair/Refurbishment Services that ensures new systems are brought smoothly into operation and thereafter are kept working at peak efficiency. The Division also provides technical publications and training courses to upgrade the skills of equipment operators and maintainers, together with, all-through and refresher training courses in electronics which specifically cater for students of different levels of experience and ability. These courses are held at the MEL Training School at Crawley in England and also in many countries overseas.

Originally the Product Support Division supported only MEL supplied equipment throughout the world. Today, the Division is a finely-tuned organisation that also supports equipment hardware and software supplied by many other manufacturers, including companies from the United States of America and Canada.

In addition, the Division, which is quality approved to NATO Standard AQAP 1, currently holds contracts with the British Ministry of Defence and many overseas armed forces and Governments. In avionics, services range in sophistication from operating a spares holding facility for airborne weather radars first supplied to China in 1959, to providing software support for advanced electronic equipment supplied to the British MoD by a leading American manufacturer.

An important activity undertaken as part of the overall product support package is the repair and refurbishment of in-service items ranging from small sub-units to complete systems. The Product Support Division factory contains all the facilities required for the repair and refurbishment to 3rd line level and beyond.

The technical facilities and management expertise within the Division enables it to provide:

- Third and Fourth Line Maintenance
- Repair and Refurbishment
- Spares Holding and Despatch
- Post Design Services (PDS)
- Field Support Engineering
- Software Support
- Computerised Configuration Control of Major Systems
- Customer Training
- Support Documentation and Technical Handbooks
- Programme Management
- Repair Workshop Set-up and Management

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COMPANY

SENTRY RDS SCOUT

RDS (Electronics) Limited

INFORMATION

SENTRY 2000/5000

The Sentry is a self contained portable intruder detection system using established Passive Infra-Red detection technology coupled with radio transmission of an alarm signal from the unit to a remote location.

Because of this and the fact that the unit has a built-in power source no external wiring is required. The Passive Infra-Red detector head uses a dual element Pyro-Electric Sensor to establish changes in thermal radiation caused typically by a human target.

When a target is detected an alarm signal is passed via the radio link to a remote location normally on the same site where the signal is received and decoded automatically to give an audio and visual alarm and activate an automatic telephone dialling unit if required.

A range of detection heads are available to cater for differing locations.

SCOUT 2000/5000

The Scout is a covert detection variant of the Sentry. It contains the same Passive Infra-Red detection system and electronics incorporated into a shortened pillar which can be pushed into the ground via a steel spike.

Sentry and Scout can be used together to provide optimum protection on various sites.

Features

- Portable for rapid deployment in temporary security situations
- High discrimination hence extremely low false alarms
- Can be used internally or externally
- Anti-theft device fitted
- On board battery charger
- Choice of radio systems
- One radio receiver can monitor large number of transmitters

Duration of use

About 50 hours on its internal battery which will automatically cause an alarm on the radio receiver when it is in need of recharging. The time to recharge a battery, no longer able to sustain a Sentry or Scout in operation, will be 8-12 hours to restore it to a full state of charge.

Outputs (optional)

Both Sentry and Scout can be fitted with a dry change-over relay to facilitate an output to signal or switch additional security devices, e.g., CCTV cameras.

Protection of Key Facilities

The RDS system is a cost effective intruder detection system, WIRELESS, portable so there are no installation costs.

ADDRESS

RDS Electronics Limited
Unit 12/13 Halcyon Court, Stukeley Meadows Industrial Estate
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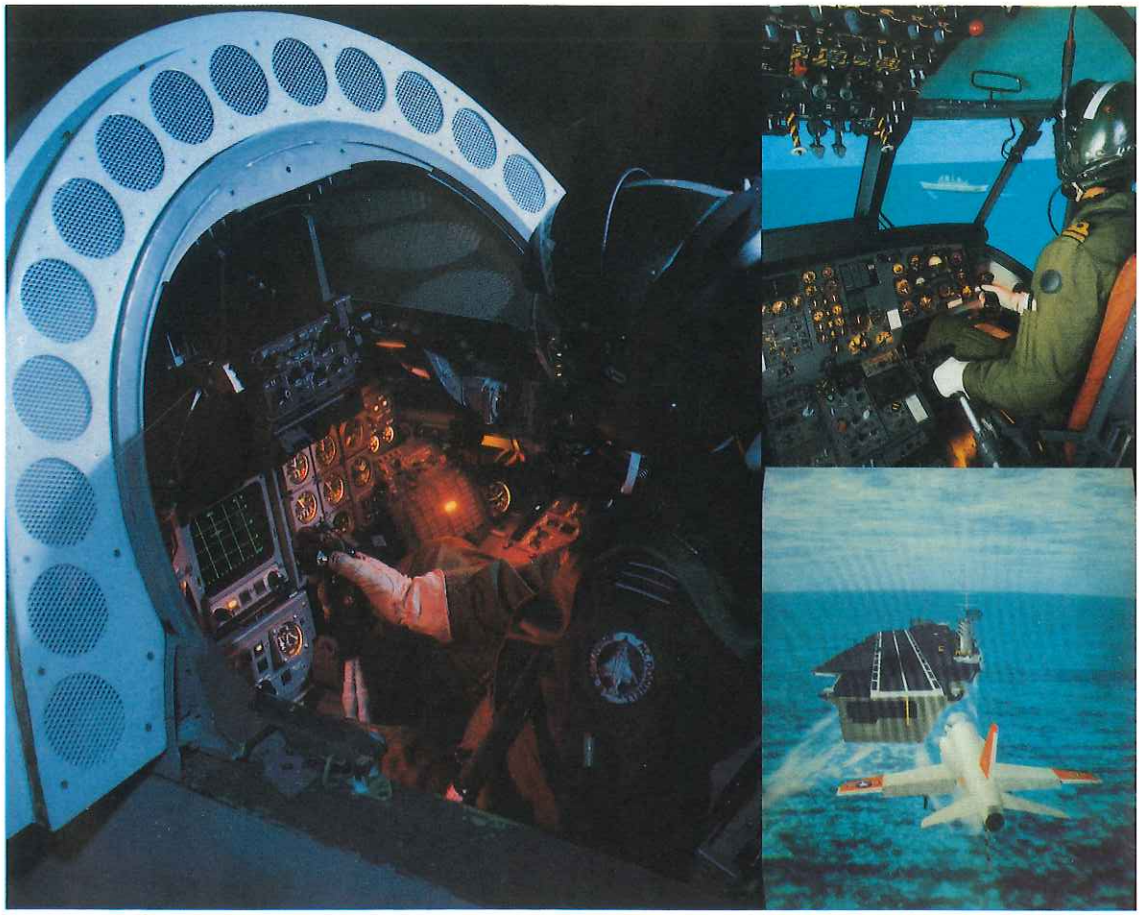
COMPANY

REDIFFUSION Simulation

Rediffusion Simulation Limited



INFORMATION

Today's military flight training requirements, extending from crew conversion and evaluation, to full operations, are the most exacting the simulator industry has ever had to face.

To create a meaningful response, more and more demands are being placed on the simulator manufacturer to understand, and interpret real training issues. That understanding is at the heart of Rediffusion Simulation's commitment to its customers. And it extends from today's training requirements to those of tomorrow, where the training programmes for the next generation of aircraft can only be tackled from a base of knowledge, experience and mutual cooperation.

As a world leader in the design and application of advanced training technology, our military experience spans almost half a century, from the development of the first fully electronic navigation trainers in World War II, to simulators for today's most complex combat and support aircraft — both fixed and rotary wing.

What that experience has taught us, above all else, is that, given the diversity of current operational requirements, no single approach will come anywhere near meeting all military training needs. That's why Rediffusion is placing increasing emphasis on detailed front-end analysis, to determine the precise training objectives, before designing the strategies and systems to meet them.

It's an approach well proven on simulator programmes such as the Tornado GR1 and Tornado F3, currently in service with the UK's Royal Air Force. And for helicopter applications, advanced training systems have been supplied for the Lynx, Super Puma, Bell 206B, Chinook and SeaKing — the Royal Navy's latest and most sophisticated anti-submarine warfare training equipment.

For all these programmes, and others, we've developed visual simulation techniques that are unrivalled in their ability to recreate the total environment of the full mission scenario.

And right now we're working on major programmes that stretch right across the globe, from the B-1B and T-45 in the United States, to the Tornado, Hawk, E-3A AWACS and the maritime reconnaissance Nimrod, in the Middle East, Europe, and the UK.

ADDRESS

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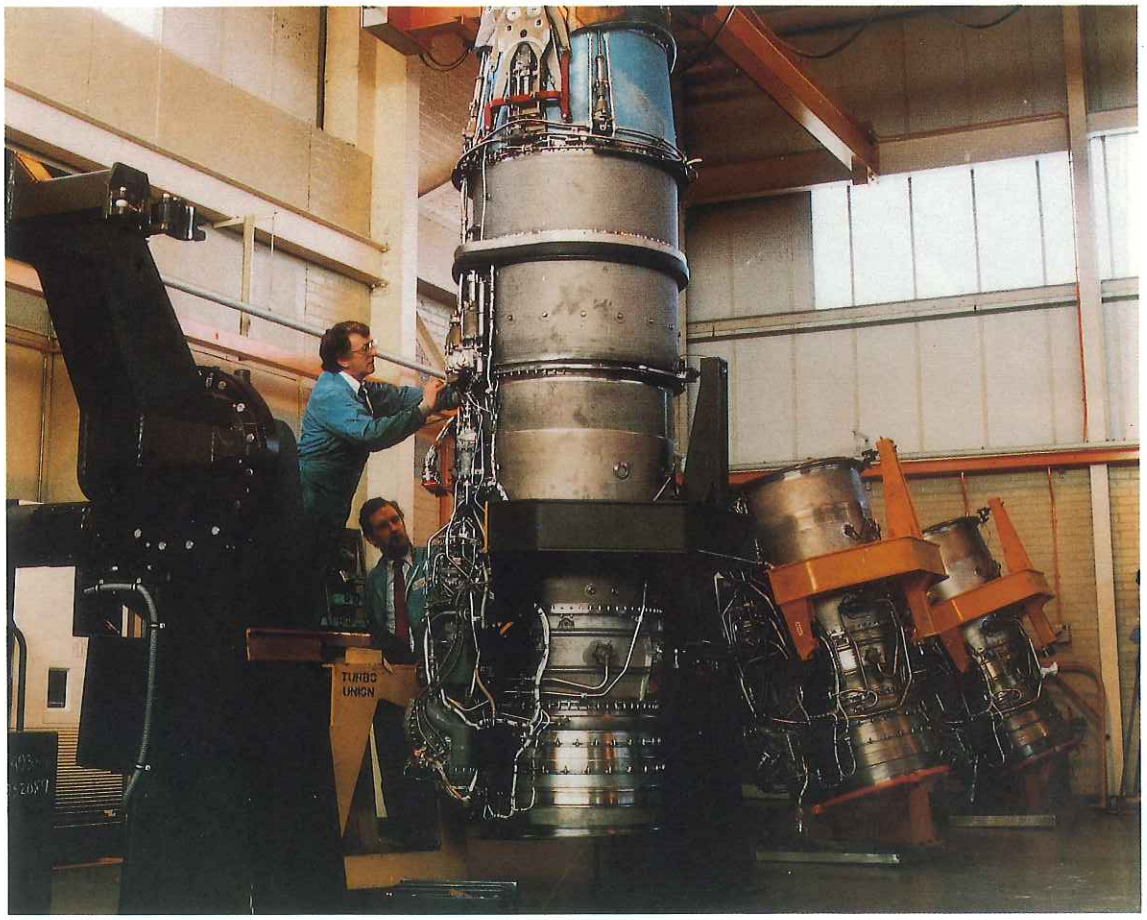
Rediffusion Simulation is a subsidiary of Hughes Aircraft Company

COMPANY

Rolls-Royce plc



INFORMATION

Rolls-Royce is one of the three major aero engine manufacturers in the western world able to produce a wide range of powerplants up to the the highest thrusts for civil and military applications. In all, 1,200 customers operate more than 27,000 Rolls-Royce gas turbines. The company's products are in operation with more than 280 airlines, 110 armed forces in 87 countries and 700 executive and corporate operators. More than 185 industrial customers use its aero engine derivatives for power generation and gas and oil pumping, while the warships of 25 navies are also powered by Rolls-Royce gas turbines.

The group employs 42,000 people worldwide, of whom 90 per cent work in the United Kingdom. The parent company, Rolls-Royce plc, is organised into three main business groups — Civil, Military and Industrial and Marine — supported by Corporate Engineering and Supply Groups.

The main military programmes at the moment are the Turbo-Union RB199, with Germany and Italy, for the Tornado, and the Pegasus.

A Rolls-Royce Pegasus powers the Harrier, the only operational fixed-wing aircraft in the western world capable of vertical take-off and landing. This characteristic depends on its Pegasus engine and its swivelling nozzles. In service with the RAF and the Royal Navy, the Harrier has also been bought by the United States Marine Corps, and by the Spanish and Indian navies. Over half the Pegasus engines delivered so far have been exported.

Following from the RB199, the next major military engine programme in Europe is the EJ200 for the European Fighter Aircraft, being developed jointly by Britain, Germany, Italy and Spain. This project is expected to provide a substantial proportion of Rolls-Royce's military workload during the 1990s and into the next century.

The British Aerospace Hawk is probably the best-known application for the Rolls-Royce Turbomeca Adour engine. It is the RAF's advanced jet trainer and has been successful in export markets, including the US Navy, Middle East and Africa.

The Rolls-Royce Viper is an outstanding example of the potential longevity of engine design. It came into service 30 years ago as a cheap powerplant for a target drone, and has sold more than 5,000 units in over 20 different aircraft types, including the Aermacchi MB326 and MB339 trainers.

Nearly 1,000 helicopters in more than 20 countries use Rolls-Royce engines. The latest is the RTM 322, jointly developed by Turbomeca.

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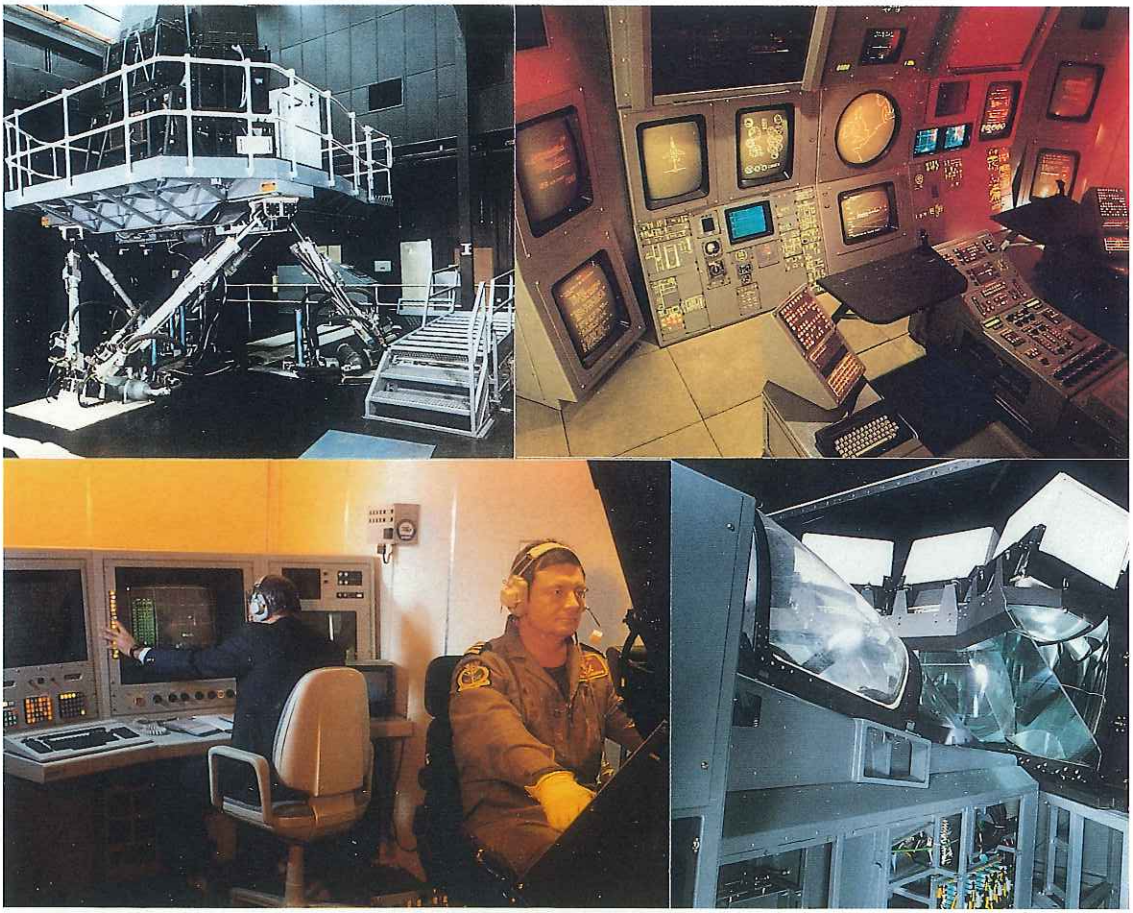

INFORMATION

To gain maximum performance in combat; to carry out flight refuelling with maximum speed and efficiency, top quality training of top quality aircrew is of the essence.

Today's advanced mission simulator, for aircraft such as the Tornado, performs with fidelity inconceivable just ten years ago.

Advances in microprocessor computing, giving realistic as-aircraft behaviour, are matched by advances in human factors expertise, extracting maximum training benefit from the simulator.

This is achieved by initial analysis of the requirement: student evaluation, training objectives, existing training programmes etc. Selection of appropriate training devices follows. At the final specification stage, networking of the various training systems is emphasised for overall management potential. The end result is highly effective training.

Singer Link-Miles has unique experience in design and manufacture of the high technology elements of tornado mission simulators for the Royal Air Force. As prime contractor to BAe the company supplied full mission simulators for tornado ADV and IDS for the Royal Saudi Air Force. The contract includes Tornado part task trainers, mission simulators for Hawk, and IMAGE cgi. In addition to Tristar, the company has produced KC-10 mission simulators for USAF aircrew training. The most recent was fitted with AWARDS, the company's panoramic display system, and IMAGE IIIT cgi with flight refuelling database.

"A new page in simulator history" – Singer Link-Miles mission simulators for the latest Harrier GR Mk 5 were ordered by the RAF as alternatives to two-seat trainer versions of the aircraft.

The company is the major supplier of simulators to the UK Ministry of Defence and sole supplier on Harrier and Sea Harrier.

Military types simulated include Tornado (x14), Harrier (x9), Jaguar (x7), Hawk (x6), Hercules (x6), Nimrod and helicpoter types (x6).

The company is also a world leader in simulation systems for the training of commercial aircrew and the crews of submarines and fighting vehicles.

Integrated and stand-alone training systems success – conceived, cost-effectively executed and assured by Singer Link-Miles Limited.

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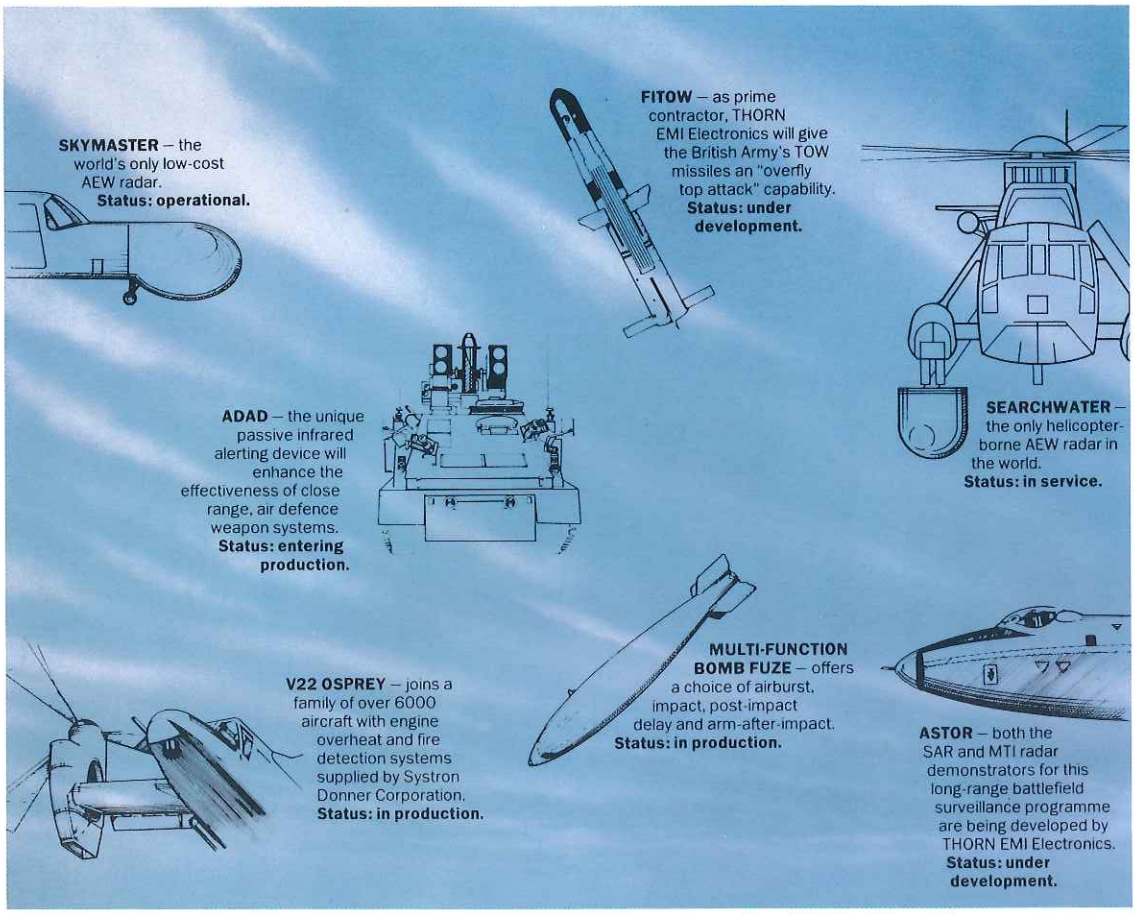

CAPABILITY IN AEROSPACE

Over 80 aircraft types worldwide incorporate equipment supplied by THORN EMI Electronics. An impressive record in the design and manufacture of products and sub-systems is matched by a capability in systems design and project management.

The only European manufacturer of an operational airborne early warning (AEW) radar, THORN EMI Electronics occupies a leading position in the development of airborne surveillance radars. Skymaster, the latest, is a compact and lightweight multi-role radar which can operate from many fixed wing aircraft and helicopters.

As the leading European company in the design and manufacture of proximity fuzes, THORN EMI Electronics has an exceptional capability in critical weapon sub-systems. In many guided weapon programmes the company is responsible for analysing overall weapon system concepts and assessing the relative performance of different sub-systems.

The increased emphasis on fuzing in modern guided weapons is highlighted by the selection of the company as prime contractor for a growing number of missile projects. Significant among these is the programme to develop the Further Improved TOW anti-tank missile.

Experience of missile fuzing covers the development and manufacture of active radar fuzes for such missiles as the RAF's Sky Flash missile.

To this established technology, the company has added expertise in active infrared fuzing which is being increasingly adopted for missile fuzes. Major development and production contracts include the fuze for ALARM, the RAF's new anti-radar missile and the fuze for the new Rapier 2000 missile.

Expertise extends to the manufacture of electronic fuzes for conventional munitions. Typical of these is the multi-function bomb fuze (MFBF), in production for the RAF. Suitable for a range of medium capacity bombs, MFBF has programmable modes, including air burst and various post-impact delays. Special fuzing systems are also supplied for the SG357 runway cratering sub-munition, which forms part of the RAF's JP233 low-level airfield attack system.

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The Royal Air Force gratefully acknowleges the special help provided for Exercise GOLDEN EAGLE 88 by the following companies:

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