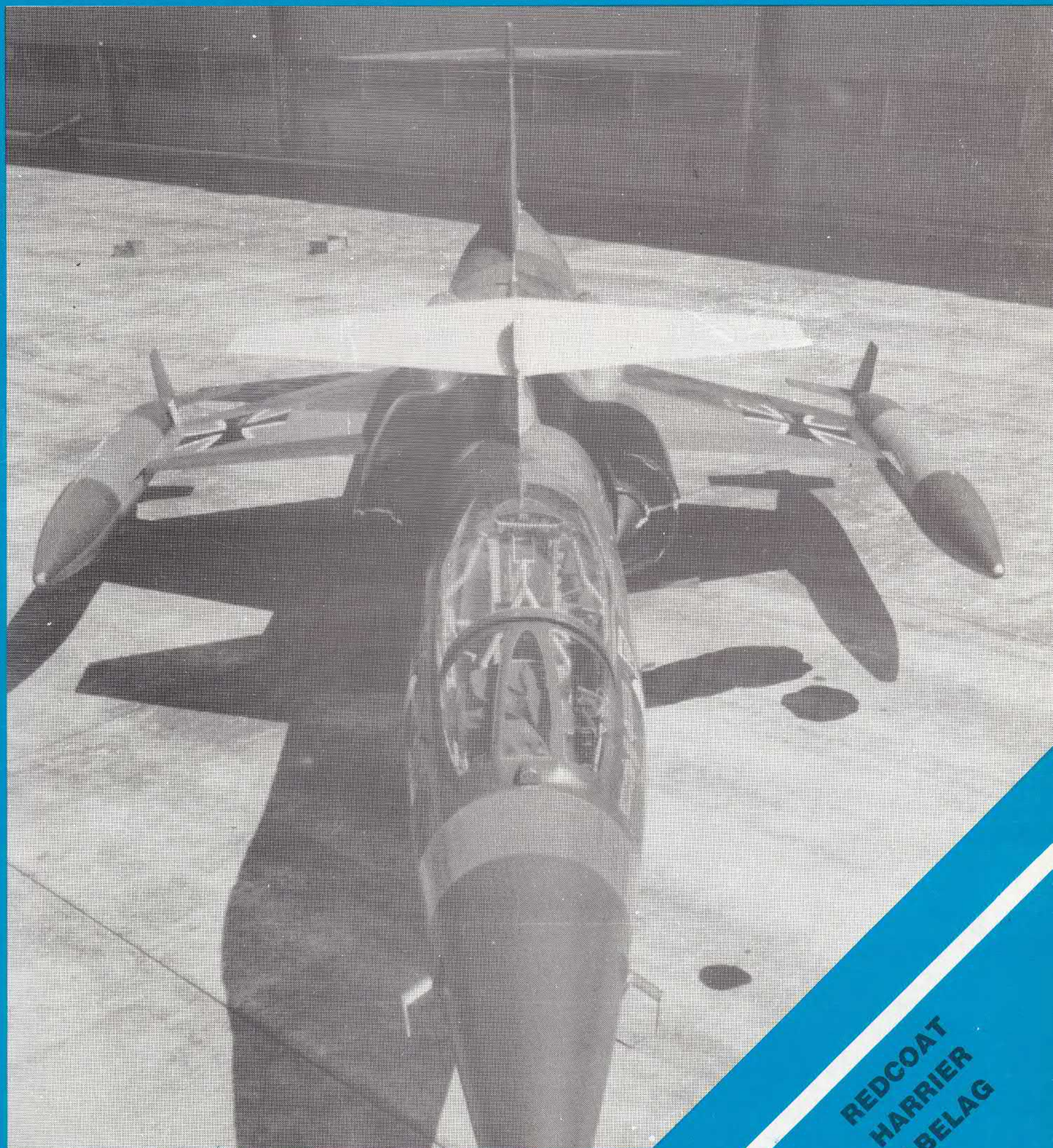


FLASH



REDCOAT
HARRIER
ABELAG

Canadian aggressors

(COLD LAKE, ALBERTA, CANADA). The Canadian Air Force operates its own 'aggressors'. Dual-seat CF-5s of No.419 and 434 Squadrons at CFB Cold Lake have been given different kind of camouflage schemes. The CF-5Bs are normally used for pilot training, but twice a year Cold Lake is the centre for Maple Flag exercise, and then the aircraft are used to simulate enemy air defence tactics.



COVER PHOTO: F-104G Starfighter 23-91 (later re-serialled 98-36) was the only aircraft available to MBB to test the new developed 'fly-by-wire' flight control system. For flight test purposes the aircraft had to be equipped with a second tailplane. For a technical report see page 6 & 7. (MBB)



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EDITORIAL

Washing off the ashes of Riyadh

It is very embarrassing to have 301 people die of suffocation on your doorstep. And in your aircraft. Just as embarrassing as having 577 people burn on your runway in your fog. It hurts your image abroad. It's even worse if you're a country which is just gaining some respectability. You've just washed off the taint of civil war, dictatorship or a dastardly zionist-inspired ITV film. Now you can start all over again, washing off deposits of Skydrol smoke and various organic ashes. It makes you want to curl up in a dark corner and shut up for the next fifty years.

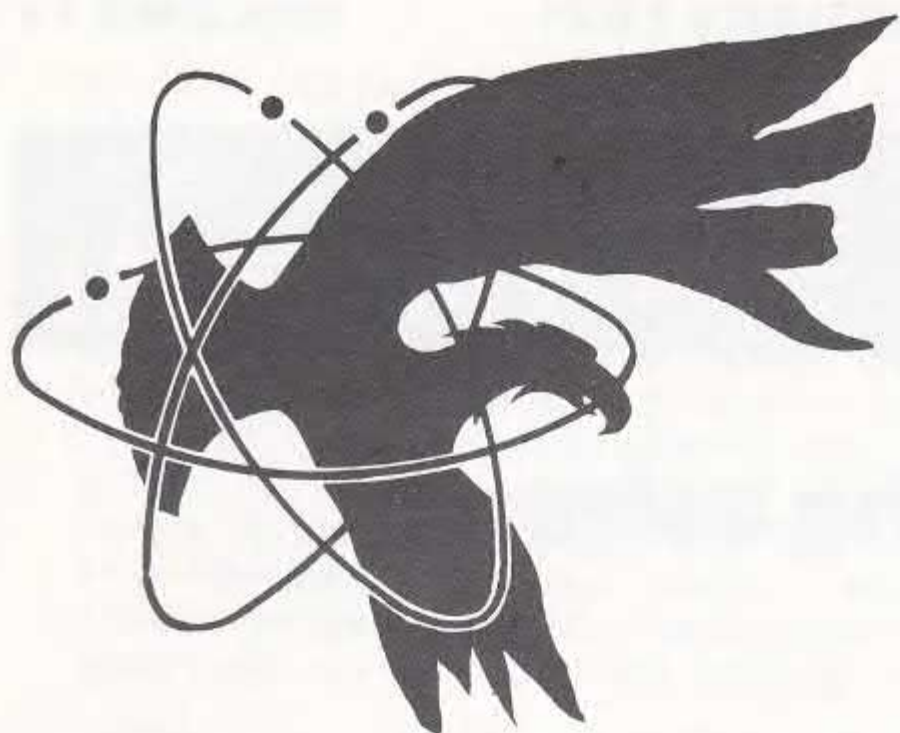
Unfortunately that won't stop foreigners discussing the cause of your predicament, or writing about it in their newspapers and aviation magazines. They are, after all, insensitive ghouls. Or could it be that they are less worried about who's embarrassed, and more about reducing the likelihood of the accident repeating itself?

Let us examine the case of HZ-AHK, the Saudia TriStar which burnt out on a taxiway at Riyadh Airport on 19 August 1980. After the fire 301 corpses were counted. No-one aboard survived. Nevertheless the aircraft had made a successful emergency landing after turning back from 50 miles out. Needless to say, this accident has disquieted many, and indeed fascinated many. Ever since 19 August last year a lot has been written about the accident, and some of it has since been proven false or at least distorted. Because a lot of it has been speculation. But not unfounded speculation. In the face of silence from Saudia (except for one statement blaming the dead pilot for contributing to the accident) and the Saudi government, unofficial reports have given details of what happened at Riyadh Airport. These have been used to build up a picture of the events, which has been continually revised as more reports surfaced. But in the meantime a number of causes or contributing factors had been suggested which must have caused the Saudi government even more embarrassment than the original accident.

The major embarrassment must have been the report, later proven incorrect (see page 16), that an order was given by Riyadh tower to the captain of HZ-AHK to clear the runway to allow a royal flight to take off. This would, it was suggested, have delayed the emergency evacuation which the captain had told the tower he wanted to execute. During that delay, it was suggested, the occupants died. It is now known that the departure of the royal flight did not contribute to the deaths on board HZ-AHK. This knowledge did not arise from any official Saudi statement, but not, one assumes, because the Saudi government was too busy calculating the damage this inaccurate report had done to its image. Saudi Arabia doesn't share the Western European or North American tradition of a relatively free flow of information from the government to the outside world. Saudi Arabia is, however, an ICAO member, and is undoubtedly aware of its responsibility under that membership to investigate an aviation incident on or over its territory, and to publish a report on it.

The aviation community awaits this report with interest. It is to be hoped, for Saudi Arabia's image abroad, that it will lay the blame for the accident where it belongs, wherever that is. It is also to be hoped that, if the blame is not laid at the door of a Saudi person or organization, this will be done in a more subtle way than in the report which laid the full blame for the Tenerife runway collision at the (dead) feet of the KLM captain. Saudi Arabia cannot afford any more unnecessary blows to its image in a time of increasing anti-Arab sentiment.

Jacob Struben



MILITARY AVIATION NEWS

Dutch Atlantic ditched in Atlantic

(VALKENBURG, HOLLAND) SP-13A Atlantic 255 of the MLD's No.321 Sqn ditched in the Atlantic Ocean, some 130 km (80 miles) north west of Malin Head, Ireland, at 1030 hrs on 15 January. The aircraft was on a surveillance flight, keeping an eye on a Soviet fleet unit, including the aircraft carrier Kiev. Weather conditions were very bad, with high winds and snow. Control difficulties were experienced, possibly due to elevator icing, and half an hour after the trouble started, the Atlantic was set down on the rough sea. All twelve crew members left the aircraft, but three drowned. The survivors were picked up by two Sea King HAS.2s of No. 819 Sqn, RNFAA and flown to a hospital in Derry, Northern Ireland. Here they recovered from the intense cold suffered during the two hours they spent in the life rafts. After the accident, the MLD decided to fly its Atlantics only if absolutely necessary for the time being, pending the preliminary accident investigation. There is as yet no certainty about the cause of the accident, and the aircraft are not officially grounded. They are just not flying, by way of precaution should the cause lie with the aircraft. The MLD hopes to retrieve the tail section of 255, examination of which, it is expected, will help the investigation. The other Atlantic operators have been informed of the MLD decision, and are continuing normal operations.

NATO's initial E-3 flies for the first time

(SEATTLE, USA) The first NATO E-3A made a short ferry flight from Renton to Boeing Field, Seattle, on 18 December 1980. The basic aircraft had been finished by Boeing's Renton plant, and will be fitted with the distinctive rotating radome (or "rotodome"), including the radar and IFF antenna, at Boeing Field. The aircraft is expected to arrive at Dornier's Oberpfaffenhofen works in March of this year, and to be delivered to Geilenkirchen, the NATO E-3A Main Operating Base (MOB), in February 1982.

The first E-3A crew is presently at Tinker AFB, Oklahoma, U.S.A., for training, and consists of 16 West Germans and one Norwegian. Crews Nos.1 to 7 will be trained at Tinker AFB, the rest at Geilenkirchen with the NAEWF Training Center (NTC). Crew integrity is not a goal, and individuals will rotate from crew to crew. A minimum E-3s crew is 17, including a mission crew of 13 (a special purpose console operator, a radar control operator, a computer operator, a communications operator, and nine situation display operators), and flight deck crew of 4 (a pilot, a co-pilot, a navigator, and a flight engineer). Usually there will be back-up crew-members as well, depending on the mission. Responsibility aboard the aircraft is divided between the Pilot-In-Charge, who is responsible for the conduct of the flight as far as flight safety is concerned, and the Mission Director who is in charge of the mission as far as tactics, fulfilment of the mission goals are concerned.

F-15C Eagle 79-033 of 32 TFS taking off from Soesterberg on 21 November 1980. The aircraft was delivered together with 79-026, 030, 031, and 032 to 32 TFS on 14 November, and by 21 November had not yet been painted in squadron markings. 'Scramble' reports that 79-034 was delivered on 25 November, bringing the squadron up to a strength of nineteen F-15Cs and two F-15Ds.





The first Hawk T.51 to be handed over to the Ilmavoimat (Finnish air force), HW-302, left for Finland from Dunsfold on 16 December 1980. The aircraft is seen here on a publicity photo flight over England. (British Aerospace)

France starts delivering Mirage F.1s to Iraq

(LARNACA, CYPRUS) France started delivering Mirage F.1s to Iraq, which is still at war with Iran, on 31 January. Six aircraft were flown to Larnaca by French pilots, and loaded into Jordanian C-130s. The Mirage F.1s carried no national markings, but although it was originally stated by Cypriot and French spokesmen that the aircraft were destined for the Royal Jordanian Air Force, it soon became clear that the Jordanian C-130s flew straight to Baghdad. Other reports said that the Mirage F.1s were flown under their own power to Iraq, by Iraqi pilots. The French ministry of foreign affairs confirmed on 1 February that the Mirage F.1s were in fact delivered to Iraq, in compliance with a treaty made with Iraq in 1977. Iraq has 60 Mirage F.1s on order.

Swiss air force to buy PC-7s

(BERN, SWITZERLAND). The Swiss air force has, after a long evaluation process, involving the lease of two production aircraft for integration in the normal air force training programme, decided to go ahead with requesting forty Pilatus PC-7 Turbo-Trainers, for delivery between 1981 and 1983. The PC-7 is a much modified development of the Pilatus P-3 of 1953 vintage, which serves with the Swiss air force as a primary and basic trainer, and will be replaced by the PC-7.

F-16/101 first flight for USAF/US Navy programme

(EDWARDS AFB, CA, USA) General Dynamics F-16/101 75-745, originally the first pre-production F-16A made its first flight from Edwards AFB on 19 December. The test programme is primarily intended to test the General Electric F101 turbofan of 29,000 lbs thrust, as an alternative power plant for the USAF's F-16s and the US Navy's F-14 Tomcats. The F-16's standard F100 engine delivers 25,000 lbs thrust. The test programme was halted on 7 January pending the investigation into an incident on that day, when 75-745 had to make an engine-off emergency landing due to a fuel leak.

● A brief ceremony at Beauvechain, Belgium, recently marked the achievement of combat-ready status by 349ème Esc., 1ère Wing Tous Temps, on F-16s. The squadron, the history of which goes back to January 1943, when it was founded as No.349 (Belgian) Sqn, RAF, in Nigeria, is the first European F-16 unit to become combat-ready.

FROM A FACILE PEN.....

Open days, air shows, and other feasts

A small number of open days and air shows have already been announced for this season. We do advise anyone intending to visit any of these to check with the organizers that the event is taking place as planned. Air shows have, in previous years, been cancelled, postponed, or shifted to another field. This listing gives date, location, and organizer.

23 and 24 May. RAF Mildenhall, UK. 513 TAW, USAFE

04 to 14 June. Le Bourget, France. GIFAS. Not all days are open to the public.

13 June. Bitburg AB, W.Germany. 36 TFW, USAFE. In connection with the TigerMeet

27 and 28 June. RAF Greenham Common, UK. IAT Committee, RAF Benevolent Fund.

12 August. RAF St. Mawgan, UK. RAF

12 September. Vlb Soesterberg, Holland, KLu.

There will be three open days organized by the Dutch Navy and Army. These may produce some aircraft, though this is not certain. On 20 June the barracks at Oirschot, near Eindhoven, will be open. The Navy's "fleet days" are at Den Helder on 26, 27, and 28 June. And on 19 September the Opleidingscentrum Infanterie at Harderwijk will open its gates to the adoring public.

Concorde as a Tu-26 Backfire simulator

A British Aerospace (BAe) owned Concorde has occasionally been used as a fast, high-flying 'target' for practise intercepts by RAF Lightnings and Phantoms. The Concorde has been described as similar in size to the Tupolev Tu-26 Backfire. These practice intercepts were stopped in August 1980 by the defence spending moratorium, and are unlikely to be resumed, although the effectiveness of the Concorde as a Tu-26 simulator is not in doubt, as far as is known.

Canadian Hornets to total 137

The CAF will get at least 137 CF-18 Hornets, following a reduction in the amount the Canadian government has to pay the US government for R&D (research and development) costs. This means that the CAF will not have to reduce its order to 129. The R&D levy has been removed entirely from the price tag on twenty CF-18 attrition aircraft the CAF has on option.



Three little-known Nord N.2501D Noratlas were operated on behalf of the Bundesmarine by the civilian Passon group until December 1980. Based at Nordholz, the former Luftwaffe aircraft acted as targets for naval anti-aircraft training. These photos show 99-14 (c/n 152, ex 53-20), and 99-15 (c/n 154, ex 53-31) together with C.160D 50-85 of LTG.62, at Hamburg/Finkenwerder in late 1980. The other Nora was 99-13 (c/n 138, ex 53-19). Two of the Noras have been scrapped, the third is now preserved at Uetersen, W. Germany. (MBB)

Myrtle Beach 'Warthogs' exercise for European operations

(MYRTLE BEACH AFB, SC, USA) The European commitment of 354TFW was evident from five exercises over the last year. One of these involved a deployment of fourteen A-10As to Leck in West Germany, where apart from conventional ground attack (close air support) training missions, sorties practicing chemical warfare and air-to-air combat were flown. Close air support was also practised during Maple Flag 5, at CFB Cold Lake, Canada. Cold Lake is in an area closely similar to Central European terrain.

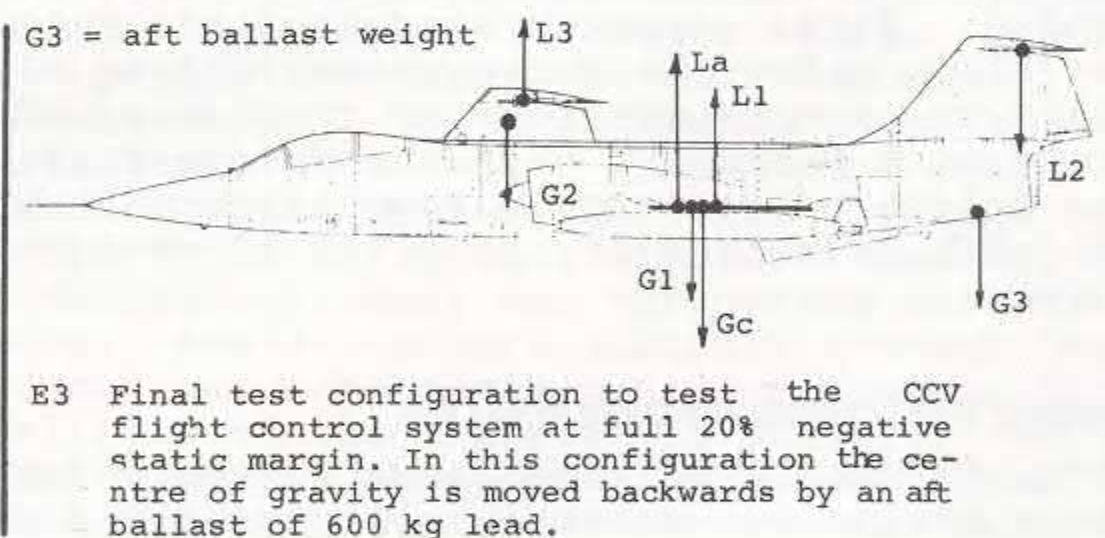
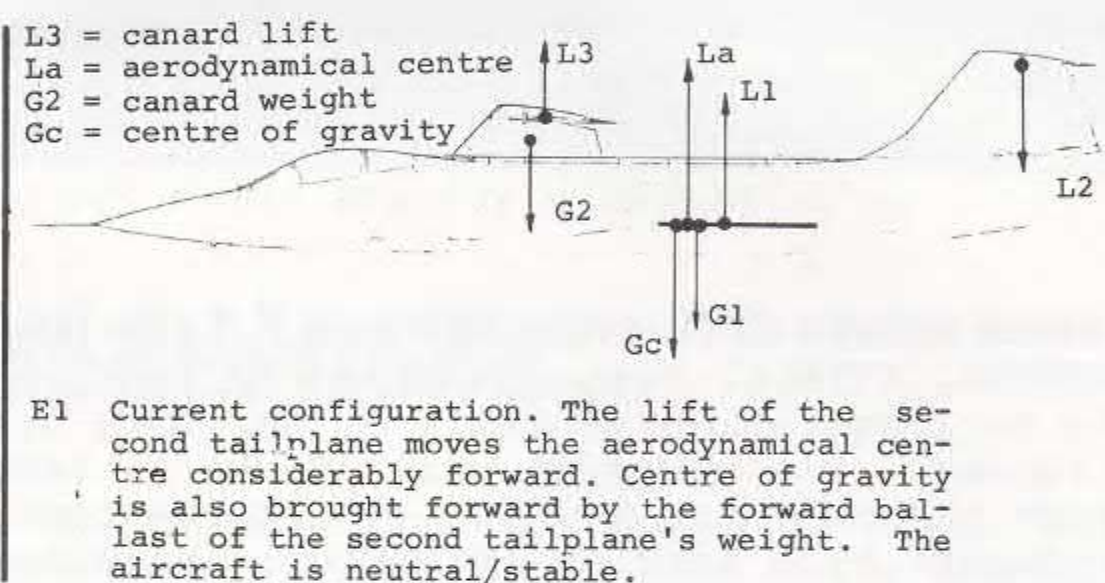
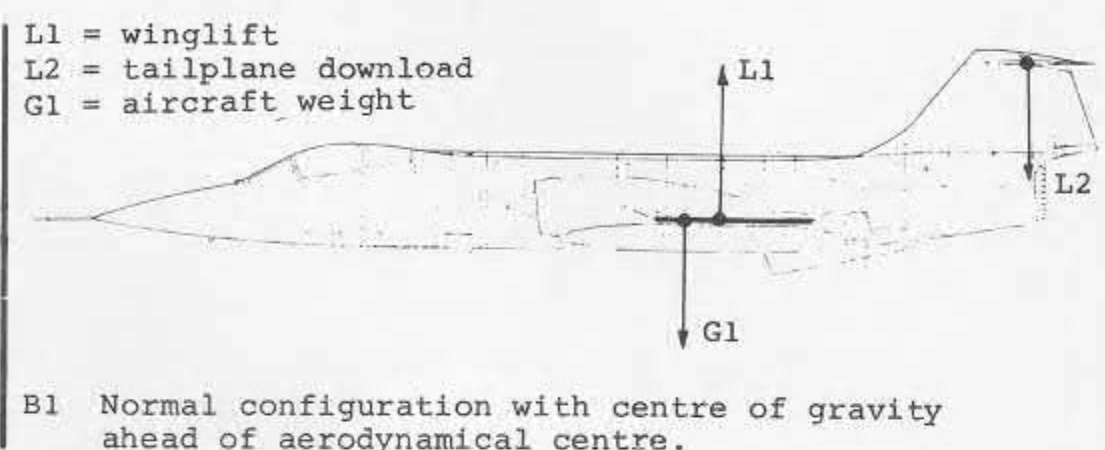
The FOL (Forward Operation Location) concept was exercised during Thunderhog II. A-10As deployed to a FOL training site near Myrtle Beach AFB, the only such European-style site in the US, as well as to two nearby civilian airfields (Camden and Georgetown Airports, SC). The FOL training site enabled 354 TFW to practice hiding its aircraft in cover of trees, guarding the site against intruders, as well as operating the A-10As from such sites.

Anti helicopter operations were practiced by two A-10As at Fort Rucker, Alabama, a major US Army Training and Doctrine Command base. US Army helicopters simulated enemy attack helicopters, possibly with the Mil Mi-24 (Hind) in mind. This was part of a tactics development programme which the USAF and US Army have set up jointly under the name of J-CATCH.

Finally, on 21 January eight A-10As of 354 TFW deployed to Eielson AFB, Alaska, to join an Alaskan Air Command exercise, Brim Frost 81. This exercise, lasting till 7 February, will give the wing experience in cold-weather operations, which will be useful, should the wing ever deploy to Norway. The FY 1981 budget of the USAF, approved on 15 December 1980 by Congress, includes money for sixty A-10s, thirty of which are to be "combat-ready trainers". These two-seat aircraft are likely to be designated A-10Bs. No orders have yet been placed for the two-seat Night/Adverse Weather version of the A-10.

Strange looking Starfighter

At first sight it seems a weird idea of MBB to equip such a beautiful design as the Starfighter with a second tailplane. But the search for ways to new designs in combat aircraft for high manoeuvrability required MBB to take this drastic measure. Control Configured Vehicle (CCV) technology allows a weight reduction of up to 15% in a combat aircraft, leading to high manoeuvrability. Such a reduction is essential in saving on the procurement and operating costs of future weapon systems. Exploration by MBB of CCV technology is one of the lines of research by this company in new combat air-



YAH-64 and Trojan collide

(PALOMAR AIRPORT, CA, USA) The fourth Hughes YAH-64 prototype and a US Army T-28D Trojan chase plane collided off Encinitas Beach, near Palomar Airport, at 1030 hrs. on 22 November 1980. The two aircraft were returning from a test flight over the Pacific when the accident happened. Both aircraft crashed, and both YAH-64 pilots, as well as a Hughes flight test photographer in the Trojan's back seat, died. The Trojan's pilot bailed out safely.

MLD Wasps withdrawn from use

(DEN HAAG, HOLLAND) In order to speed up integration of the SH-14B and SH-14C Lynx helicopters into the MLD, it was decided in January to withdraw all AH-12A Wasps from service immediately. Originally, the Wasps were to have stayed in service till the end of 1981, and in reserve for some time after that. It has now been decided that this would cost too much in terms of money and of man-hours. All ten SH-14Bs, and four of the eight SH-14Cs on order, have been delivered to 860 Sqn, based at De Kooy. 860 Sqn is the former AH-12A unit.

with two tailplanes

craft technologies. Other lines are fibre-reinforced materials and system derefinements.

In 1976 MBB started a flight programme on F-104G 23-91 (since reserialled 98-36) which had been modified as a Control Configured Vehicle (CCV) demonstrator.

How to convert a stable Starfighter into an unstable 1-0-4

Usually aircraft are constructed to act stably in cruise flight. The centre of gravity is placed ahead of the centre of lift (aerodynamic centre). A download on the tailplane trims out the nose-down pitching movement of this construction.

Constructed to be highly stable, the Starfighter resists strongly to changes in flight attitude. If in cruise flight the aircraft's nose pitches up, the angle of attack increases, causing in turn the lift to increase. Because of the stable margin construction, the nose-down pitch moment will increase, restoring balance.

A Starfighter has a positive static margin of 20%, but to test MBB's newly developed flight control system, a 20% negative static margin was needed on the CCV demonstrator.

To construct such an unstable negative static Starfighter, MBB equipped the CCV testbed with several devices. Under the aircraft's exhaust pipe 600 kg of lead was added as aft ballast. This extra weight moves the centre of gravity to its aft, tip-up limit.

Secondly a tailplane was mounted on the forward fuselage. This tailplane causes the aircraft's aerodynamical centre to move forward. In this unstable negative static condition, MBB will be able to study the handling characteristics of the CCV flight control system aboard the aircraft. The less stable an aircraft, the higher the workload for the pilot becomes. Modern aircraft, like the F-16, have therefore been equipped with a stability Augmentation System (SAS). This system senses and cancels out small disturbances. In exploring CCV technology MBB went a step beyond this SAS system, and increased the authority of the system mounted in 98-36 to 100%. This highly reactive CCV flight control system is now being tested in the Starfighter to control this artificial unstable aircraft.

CCV Starfighter tests entered decisive phase

On 20 November 1980, CCV Starfighter 98-36 made its first flight with the destabilizing canard surface mounted just aft of the cockpit. CCV project pilot Nils Meister flew the aircraft in the fly-by-wire mode throughout the 45-minute test flight. The maximum speed reached was 350 knots (Mach 0.65). The aircraft was flown in the neutral/stable region, with the aim of checking out the effectiveness of the CCV system. Of particular interest to the Starfighter experts was the fact that despite the considerably reduced stability, two low level passes were made over the runway at MBB's flight test centre Manching. In the next flight the mechanical back-up systems were tested, after which the actual test flying could commence.

JvTQ



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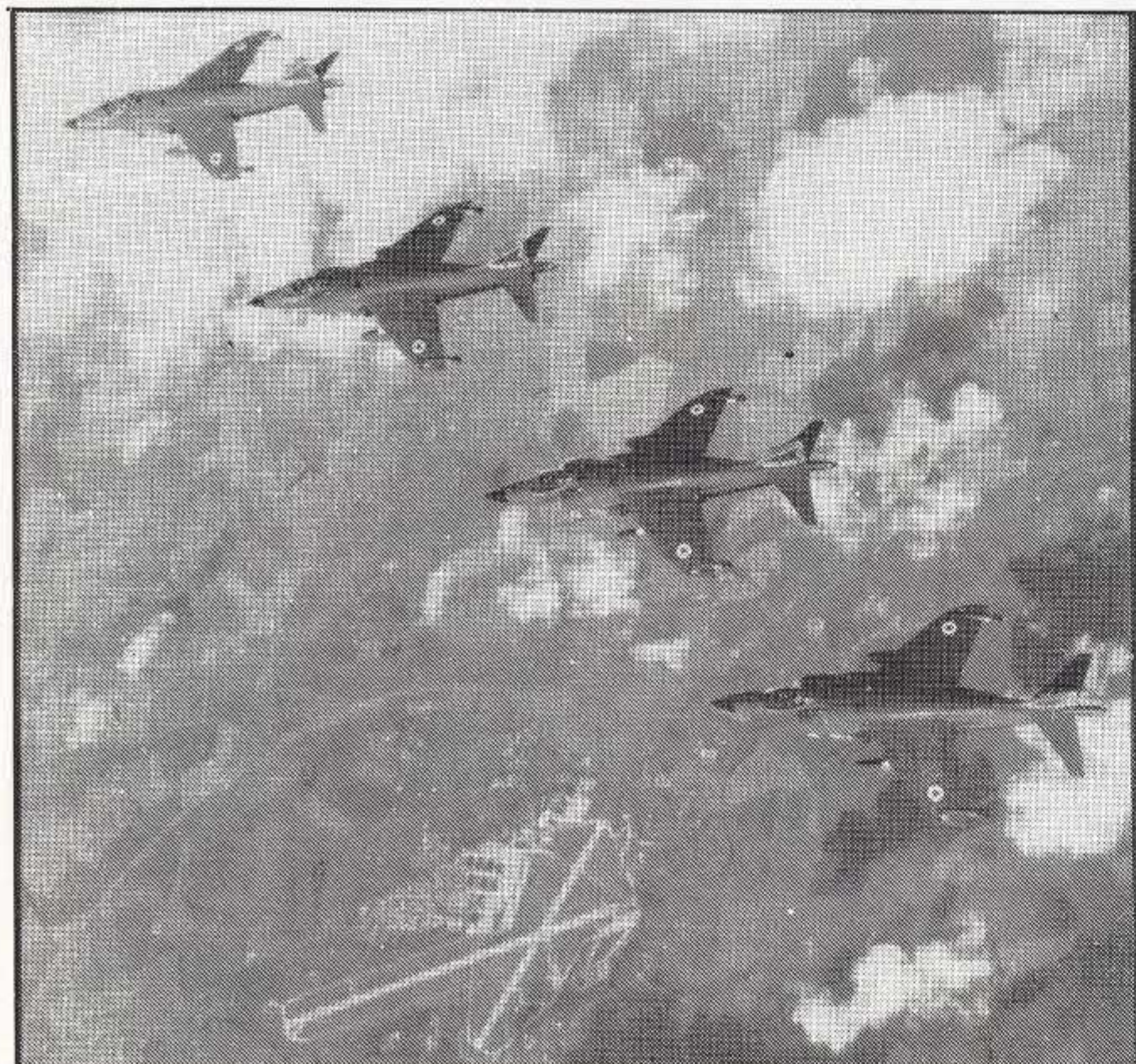
Vectored thrust changes the wind

The Harrier concept is finding its tactical niche

(KINGSTON-UPON-THAMES, U.K.). Prior to selling the Harrier, the concept has to be sold first. The Harrier concept consists of the possibilities that are offered by a V/STOL combat aircraft. Possibilities which mainly consist of operations from short and non-standard runways, which allows a basing of the Harrier close to the Forward Edge of the Battle Area (FEBA).

The Harrier concept is quite unique and changed the tactics applied to aerial warfare. Because of fears for the consequences of these changes, the Harrier concept has not yet been generally accepted.

A formation of four Sea Harrier FRS.1s of No. 800 Sqn. This squadron started operations from the HMS Invincible on 29 October 1980, just after this Command Cruiser left Portsmouth. Late January the third Sea Harrier unit, No. 801 Sqn, was formed at Yeovilton. Once operational, No. 801 Sqn will replace No. 800, the latter moving to HMS Hermes. (BAe)



"The Harrier is the most misunderstood fighter" said Mr. John W. Fozard, Chief Designer Harrier 1963-1978, and now Divisional Marketing Director of British Aerospace, Kingston-Brough Division. "Air arms tend to find it politically and professionally embarrassing to admit they need the Harrier. They perceive penalties of Harrier-off-base operations, which in fact are not penalties".

As they are authorities on V/STOL technique, persons within British Aerospace, such as John Fozard, have been making great efforts to lobby interest in the Harrier concept. As a result much has been written about it, and many magazines have devoted numerous articles to the subject, including this one.

But in spite of these efforts the resistance against the Harrier concept has been maintained, except with two air forces (RAF and USMC) and three naval air arms (RN, Spain, and India).

If the Egyptian air force had been free to choose

How, then, does one get over air arms' reluctance to buy Harriers? John Fozard: "A scare, such as the Egyptian air force getting wiped out on the ground in two days, is needed, it would seem. Would the Israelis have dared mount these preventive strikes if they had been anything but certain as to where the Egyptian aircraft were? Nevertheless, the shock effect of the Six Days' War seems to have worn off".

If this would be the only argument for the Harrier concept, the Egyptian air force would be the most eager of all air forces to purchase the Harrier. But there's more to it. Instead of the solution offered by John Fozard, NATO chose to improve the defence systems of its air bases, i.e. with anti-aircraft-artillery (AAA) and hardened shelters.

The Harrier concept involves a choice in tactics. The Harrier is best put to use close to the battlefield as an anti-armour close-air support aircraft. Another classical NATO aircraft in this role is the A-10 'Warthog'. Both aircraft, however, are operated on different tactical concepts. The A-10 can remain airborne for three hours and can carry an extensive weapon load. An A-10 can therefore make several attacks in the battlefield area, and in between loiter just outside the area, awaiting a briefing for a next target.

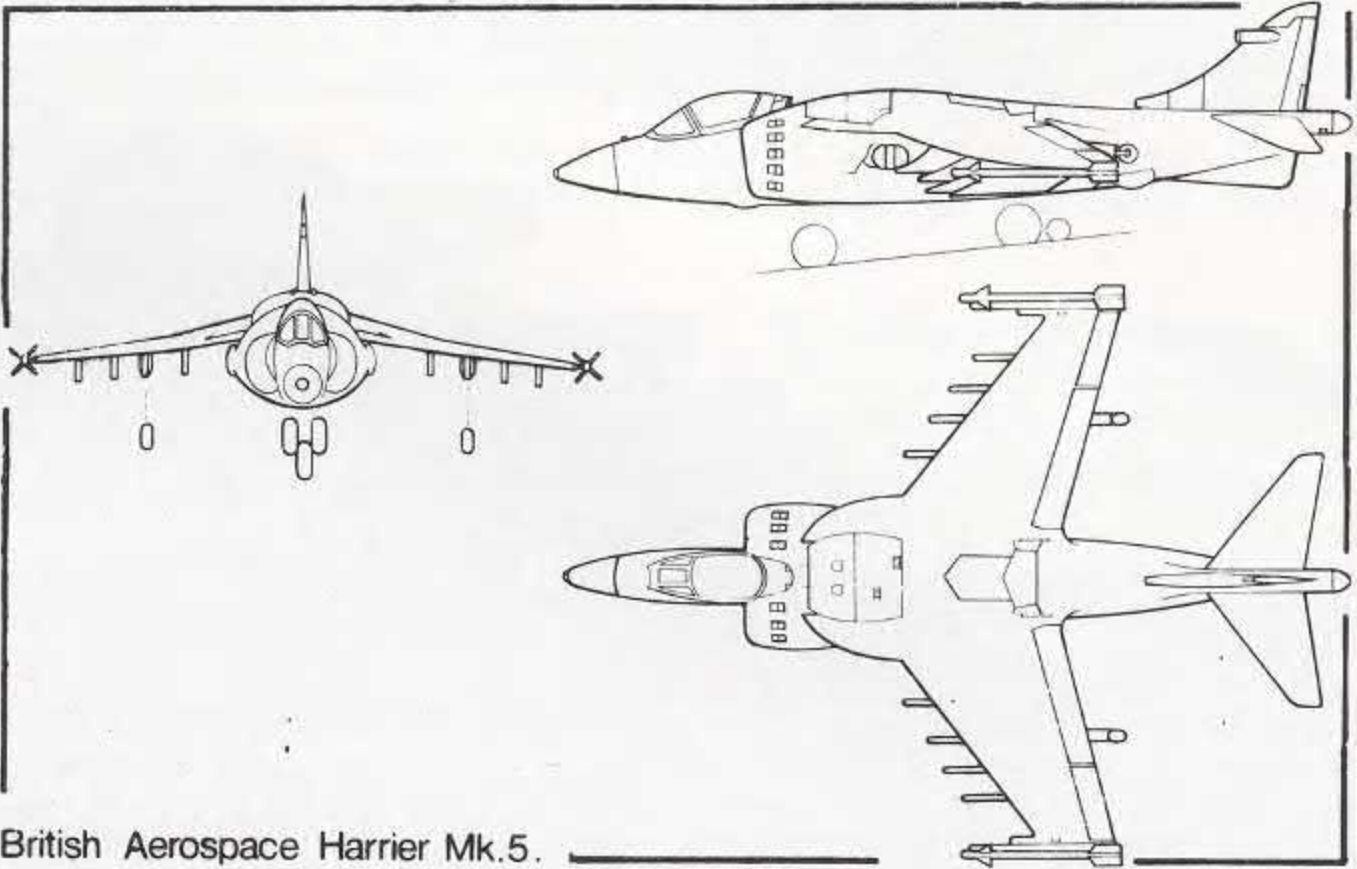
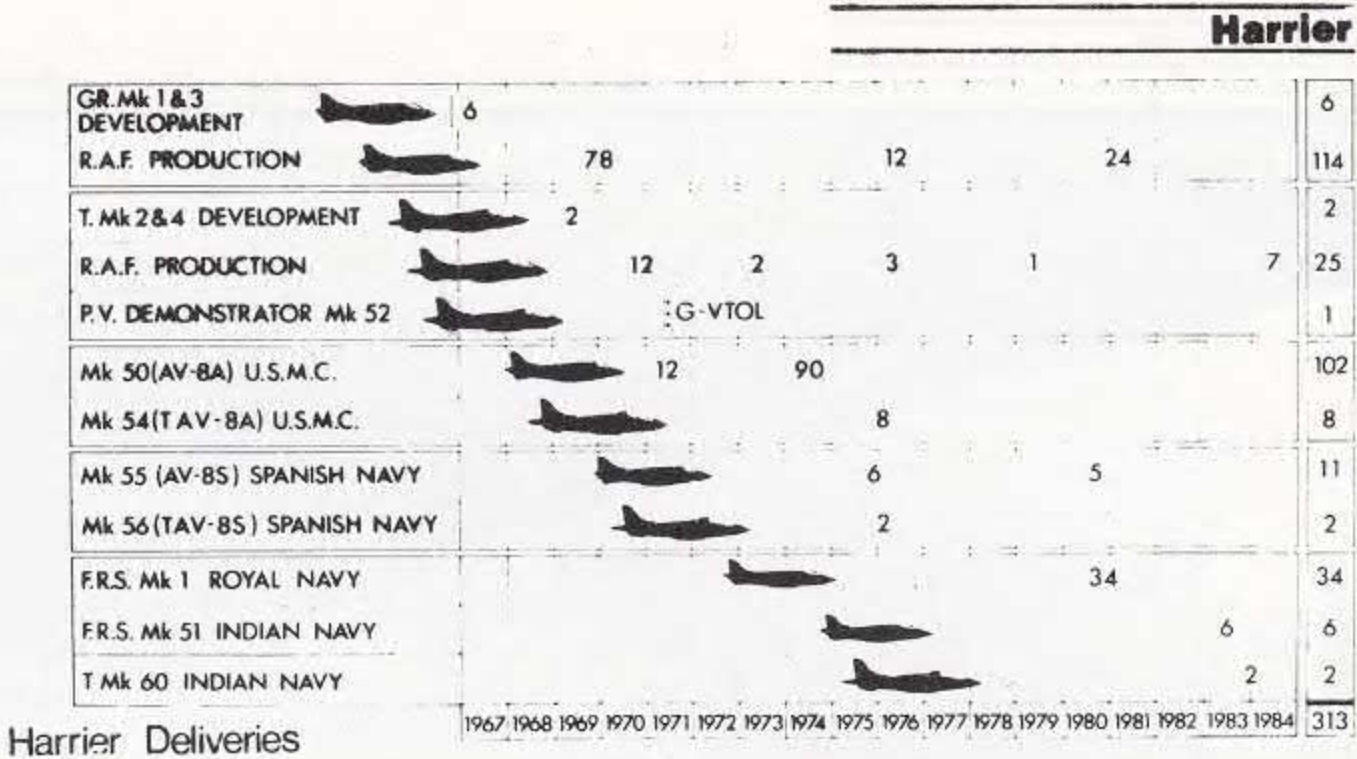
The Harrier has a short flight endurance and a low weapon load. A Harrier is therefore supposed to make a one-pass-and-hit attack. Contrary to a conventional combat aircraft, like the A-10, the Harrier has the advantage to be able to operate from 'dispersed sites', located just behind the FEBA. The reaction time between tasking and on-target can be eight to eleven minutes. This quick reaction can be crucial at the outbreak of war. If this should ever happen conventional air bases will be subject to heavy enemy attacks, in an attempt by the enemy to suppress all air activities. The aircraft on these air bases might be protected by hardened shelters, but not so runways. 'Instant concrete' and rubble are unsatisfactory solutions, if only because it takes time to fill the holes.

A2 billion dollar aircraft carrier or V/STOL aircraft

The use of the Harrier concept at sea seems to be more acceptable, both economically and operationally. History has proven the importance of air power at sea. But because of the enormous expense involved, only the US Navy and the Aeronavale remained to operate large conventional aircraft carriers. Both the US and the French navies seem to be determined to go ahead with this traditional concept. This conventional concept fits in the Naval Projection role, which means the application of military power overseas. A more practical role, and economically more attractive, is the Sea Control role. Whereas the Projection role is based on consequences of worldwide responsibilities, the Sea Control role is based on keeping the seas open for national and friendly surface traffic of all kinds, both naval and commercial. The Sea Control role is a very appropriate mission in modern naval power and the Harrier, or the V/STOL aircraft in general, plays a key role in it. According to John Fozard the F-18 may well be the last conventional carrier fighter. This can be considered a bold statement, but there's clearly a world-wide trend towards smaller platforms.

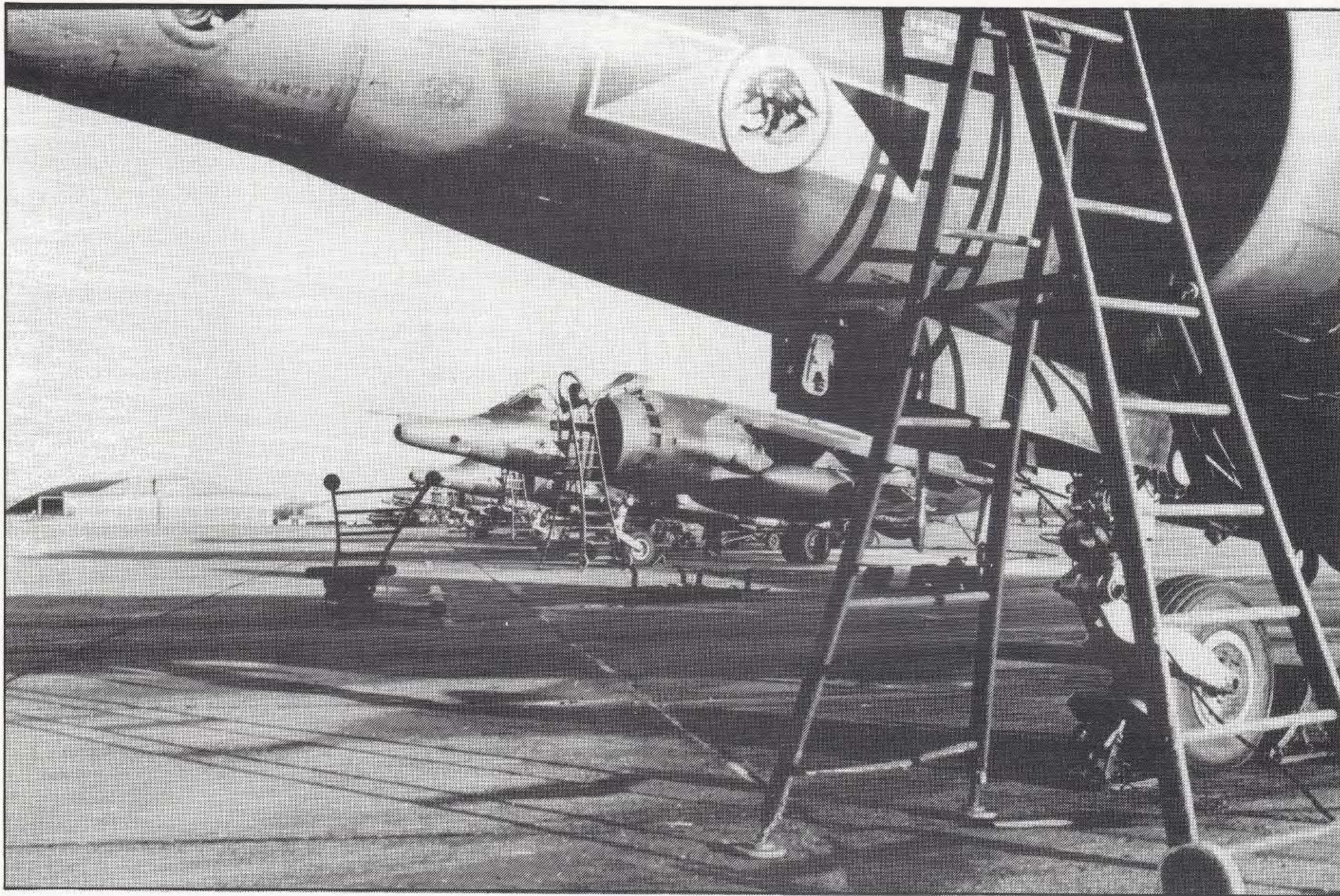
Progress in V/STOL leading towards supersonic Harriers

Both in the UK and in the US developments are going on to improve the performance of the Harrier. Initially both countries joined in the AV-16 project, but the British government withdrew as development of the uprated Pegasus 15 engine proved too expensive. In the UK, British Aerospace focused on the Sea Harrier, while in the US McDonnell-Douglas developed the AV-8B. Rolls-Royce, meanwhile, continued research on the Pegasus engine to increase thrust. Rolls-Royce has already indicated the possibility of a doubled thrust of the Pegasus engine up to 40,000 lbs, although this would require a new core of technology, which will take some years to develop. In the near future developments will be less revolutionary. When the AV-8B enters service with the USMC in 1985, the improvements will be mainly in the Harrier's payload/range capability. This will to a large extent meet the improvements wanted by the USMC for operations outside the Central European scenario. The servicemen of the RAF have different needs. Because of the closeness of dispersed sites to the FEBA, the RAF is requesting different improvements on the Harrier. Generally mentioned in this respect are improved turning performance, reduction of drag and replacement of the analog (mechanical) systems by digital (electronic) nav./attack systems to improve accuracy. Some of these improvements will be included in the next Harrier version to be bought by the RAF, the Harrier GR.5. This could be either the AV-8B or the BAe Harrier GR.5K. The current fleet of Harrier GR.3s is expected to stay in service into the late 1980s. Some GR.3s may be replaced but a mixed fleet of GR.3s and GR.5s could be in service in 2000. The future for the Harrier, and V/STOL aircraft in general, seems to be changing for the better. The prejudices against the Harrier concept are slowly diminishing. The original reluctance to accept the Harrier concept might well have something to do with the fact that the publicity around the Harrier has often exaggerated the possibilities of V/STOL.



Flexible basing is the key word for RAF's Harrier Force. In practise No.1 Squadron is assigned to AMF and exercises twice a year in Norway. Nos. 3 & 4 Squadrons are based in W.Germany and deploy to dispersed sites several times a year. Another Harrier Force commitment is to the No.1417 Flight. (RAF)

Although hardly able to lift from the ground at that time, people in favour of V/STOL combat aircraft often gave the impression the whole range of conventional tactics and the accompanying conventional aircraft had become obsolete at once. Nothing is less true. There are still many problems which must be solved by researchers in the V/STOL business to produce an V/STOL aircraft for the role of e.g. the Tornado. Meanwhile it seems inevitable that the Harrier will become a more integrated part of NATO in the near future. Even the USAF seems to acknowledge this, and is considering the supplementing of their standard combat fighter fleet of F-15s, F-16s and A-10s, with AV-8Bs.



Doing the job of an army weapon....

The Harrier concept at work

(RAF WITTING, U.K./RHEINDAHLEN, W.GERMANY). Over a quarter of a million hours have now been flown by Harriers. All this flying has proved that the Harrier does not impose a much higher workload on the pilot as far as flying is concerned, than any conventional aircraft. Only during hovering the work rate is fairly high because of the extra control movements needed.

To become an RAF Harrier pilot it takes approx. 80 sorties with No. 233 Operational Conversion Unit at RAF Wittering. The other Harrier unit at Wittering is No. 1 Squadron, which is assigned to the Allied Command Europe Mobile Force (AMF). The remainder of the Harrier Force, Nos. 3 and 4 Squadrons, are based at Gütersloh, and are committed to Central Europe.

Instructors 'chasing' Harriers in a landrover

In length, the Harrier OCU course is virtually identical to the Jaguar OCU course. It comprises between 70 and 80 flying hours. Also the syllabus is very similar during the tactics phase of the course. Unlike the Jaguar OCU, No. 233 OCU has separated Basic and Advanced courses. B Squadron of No. 233 OCU teaches the Harrier student to fly the Harrier. A Squadron teaches the Harrier pilot to use the vectored thrust in combat situations, as well as ordinary close air support tactics. Initially no training syllabus existed for any V/STOL combat aircraft at all, and when the first RAF Harriers entered service, the then Harrier Conversion Team operated GR.1s only. This necessitated B Squadron sorties with instructors following Harrier student pilots around RAF Wittering in a radio-equipped Landrover. Although these sorties are now done first by the students in Harrier T.4s, with the instructor in the backseat, on the first few solo sorties practising hovering manoeuvres, the student is still 'chased' by an instructor-equipped Landrover.

Over the years items have been added to the syllabus, or changed, as required by changes in the squadron aircraft, such as the conversion of the Harrier fleet to GR.3 standard. Nowadays the syllabus doesn't change much. Student pilots arriving at 233 OCU are now usually 'green' (first tour pilots). Their Harrier squadron is usually their first squadron, and their first operational tour of duty. Coming from the Hawk, the 'green' pilots go to RAF Ternhill prior their arrival at the OCU. At RAF Ternhill the pilots get a six hour course in helicopter handling to give them some experience with flying at slow speeds, in confined space, and using unusual movements such as backwards, sideways, and vertical flight. The six hours are just long enough to give this air experience, but too short to allow the pilot to develop routine control movements, which is a helicopter are not at all similar to those in a Harrier.

Swing the arrow from flying to hovering

The most critical stage in a standard Harrier mission, is during the Vertical Landing (VL), when speed drops below the normal aerodynamical stalling speed. Because of the limited airflow the aircraft lift is too low to remain airborne, and the ailerons, rudder and tailplane become ineffective. To remain airborne the thrust has to be vectored down ('Swinging the arrow', as it is known in the V/STOL trade). When the engine nozzles are vectored downwards, air automatically flows through the Reaction Control System (RCS). The RCS comprises four shutter valves located at the extremities of the aircraft (see panel) and can be operated by the pilot to control the aircraft during hovering. Returning from a mission and recovering by vertical landing, the aircraft's weight and the wind are the pilot's most important factors. The aircraft's weight correlates to the thrust to be applied.

The wind is important in two ways. A head wind prevents re-ingestion of the hot air from the engine exhausts which circulates back from the ground. If this hot air should be re-ingested, the engine thrust would decrease, causing the aircraft to drop suddenly.

If the wind angle changes, the pilot has to react by operating the valves of the RCS. A sudden side wind might cause an airflow over one wing causing lift, while the other wing would remain stationary. If the pilot wouldn't react with the roll valve in the wing tips, it would cause the aircraft to roll over.

The basic course with B Squadron of No. 233 OCU takes some 47 sorties for the student pilot to learn how to fly the Harrier. In these initial stages of training, 'green' pilots have an advantage over second or third tour pilots with much operational experiences. The flying techniques of the Harrier differ much from conventional aircraft. In the operational training phase the more experienced pilot has it easier.

The advanced course of A Squadron of No. 233 OCU is an introduction to all kinds of air-to-ground weapon deliveries. At the end of this course the student pilots and instructors of No. 233 OCU deploy to RAF Lossiemouth for exercise Tartan, to put their training to use on unfamiliar ranges in Scotland.

Low thrust in warm weather, high thrust in cold weather

Upon completion of the course with No. 233 OCU, the Harrier pilots go to the operational Harrier units, of which No. 1 Squadron is also based at RAF Wittering. Upon arrival with the squadron the Harrier pilots are 'polished up' in rocket firing, dive bombing and other kinds of weapon deliveries. Also three sorties are flown practising air-to-air refuelling.

No. 1 Squadron has two main commitments of quite differing nature. Like all Harrier units, No. 1 Squadron contributes to No. 1417 Flt. in the British dependency of Belize, till 1973 known as British Honduras. When in 1975 Belize faced the threat of invasion by its neighbour country Guatemala, the British government decided to station a detachment of Harriers in Belize. It was deemed impossible, or at least unpractical, to have a sufficient amount of soldiers in Belize to counter the Guatemalan threat. A very small number of Harriers has helped to stabilize the situation. In Belize there's just one airfield, Belize International Airport, but the Harriers also operate from deployed sites. The Belize experience has shown that improvements to the Harriers since 1975 have made the type more weather-resistant. Harriers in Belize now follow the normal inspection and maintenance schedules with only slightly more work to be done e.g. the engines have to be washed regularly to remove fine, abrasive coral dust which blows inland from the beaches.

The weather is the other extreme, compared to Belize, when No. 1 Squadron deploys to Northern Norway as part of its ACE Mobile Force training schedule. Here the Harriers operate under weather conditions as cold as -25°C . Providing certain precautions are taken (e.g. the aircraft's metal should not be touched by bare skin) no great problems have occurred here, except for rubber seals becoming brittle, which can lead to more frequent hydraulic leaks.

Operations in these differing weather conditions have shown that the Harrier performs better in cold weather. In the tropical heat of Belize, the hot air reduces the thrust of the Harrier Pegasus Mk.103 engine. Because of its AMF commitment No. 1 Squadron has also operated in NATO's south flank where the hot weather had the same effects on the V/STOL performance of the Harrier.

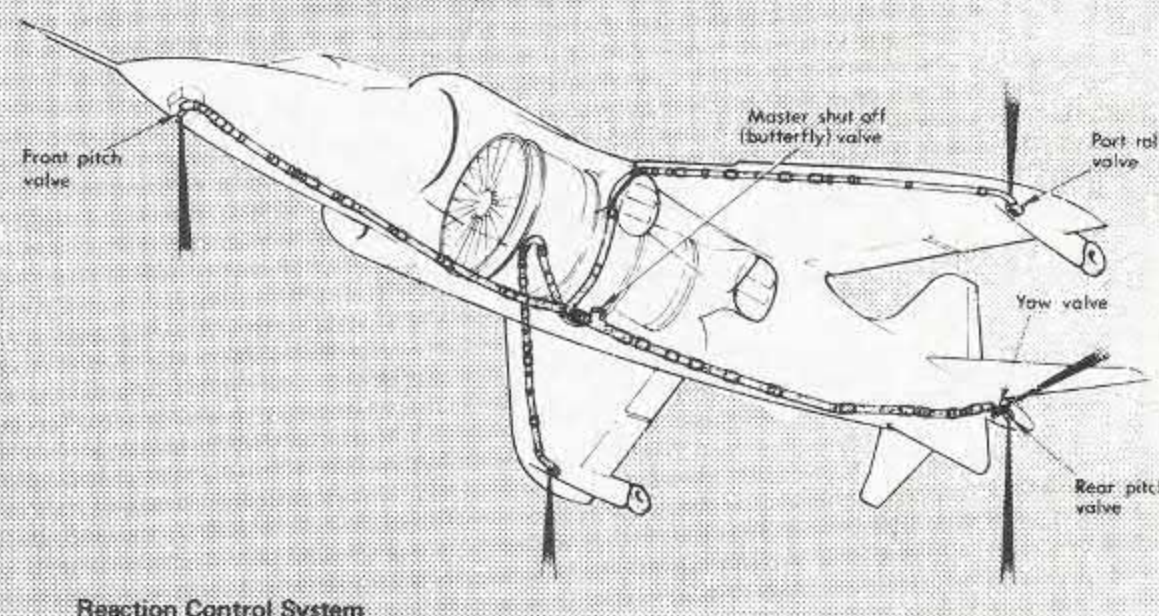
An industrial area at the edge of a town as an Harrier dispersed site

A few times a year Nos. 3 and 4 Squadrons deploy to dispersed sites. On these occasions the Harriers of both units, which are assigned to RAF Germany, leave their peace-time base, RAF Gütersloh,



HARRIER TALK SPOKEN HERE

- VTO** Vertical Take Off
VL Vertical Landing
STOVL Short Take Off & Vertical Landing. Ever since the Harrier entered RAF service, this mission profile has been applied. It allows a greater weapon load to be carried at take-off.
RCS Reaction Control System. This system includes valves located at the extremities of the Harrier. Air flows through the RCS ducts automatically when engine nozzles are vectored downwards. The shutters of the RCS are driven by a linkage from the flying controls:
 The rear (nose down) RCV shutter is linked to the tailplane.
 The yaw (tail left/right) RCV shutter is linked to the rudder.
 The roll (wings up/down) RCV shutter is linked to the ailerons.
 The front (nose up) RCV shutter is directly linked to the pilot's control column



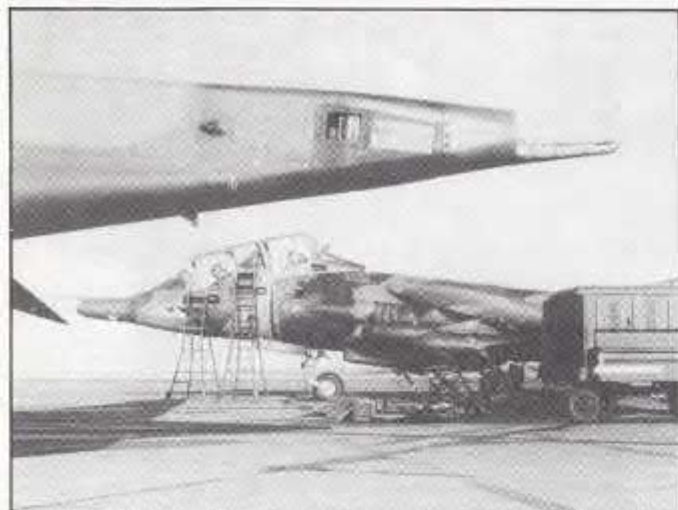
Reaction Control System

VIFFING USMC pilots have developed the air combat fighter abilities of the Harrier by use of thrust Vectoring In Forward Flight (VIFF). The thrust vectoring can either be applied to make short turns, or to stop suddenly causing the attacking aircraft to overshoot.

The RAF also introduced Viffing in Harrier operations, although low-level flying is still preferred to shake off attackers. Putting Viffing to practice is only possible with an unarmed Harrier, while during exercises in the US and Canada it has been proven that the Harrier can outfight advanced air defence aircraft, just by low-level flying.

FEBA Forward Edge of Battlefield Area. In this part of the Battlefield the Harrier concept will come into its own. Operating from dispersed sites, the Harrier Force can be in the area in 10 minutes. An Army commander can request Harrier assistance to eliminate e.g. a large tank formation.

Swing the arrow V/STOL performance with constant throttle (thrust output) and with varying nozzles (thrust vectors).



Showing the tail boom of a Harrier T.4, this photo illustrates the rear pitch reaction valve. Located at four sides of the boom, the valves can 'blow' the tail in four different directions.

to operate from prepared strips in wooded areas (see FLASH 9/80 p.12/13).

Here the Harrier concept comes into its own. The V/STOL capability can be applied to operate from rural or semi-rural surroundings, with 600 to 900 feet long grass, or road surface as runway. Sites for wartime use have to a large extent already been selected and surveyed. But a choice of which site to use, should a war break out, depends on the actual military situation. The distance between the sites and the Forward Edge of the Battle Area (FEBA) is the important factor. If it were to be necessary to fall back constantly, this would disrupt operations. Many retreats to move to rearwards locations would also disrupt the condition of the surroundings, making the sites easy to detect by enemy intelligence persons, analysing satellite photos for changes in the surroundings compared to previous satellite photos. A small hangar-like building (e.g. a supermarket or factory) with a small piece of road in front, is therefore considered to be an ideal site.

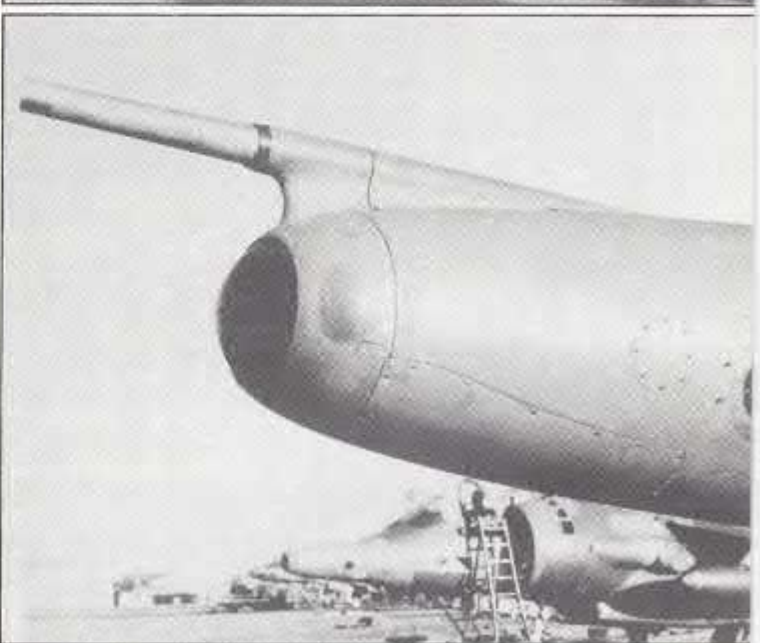
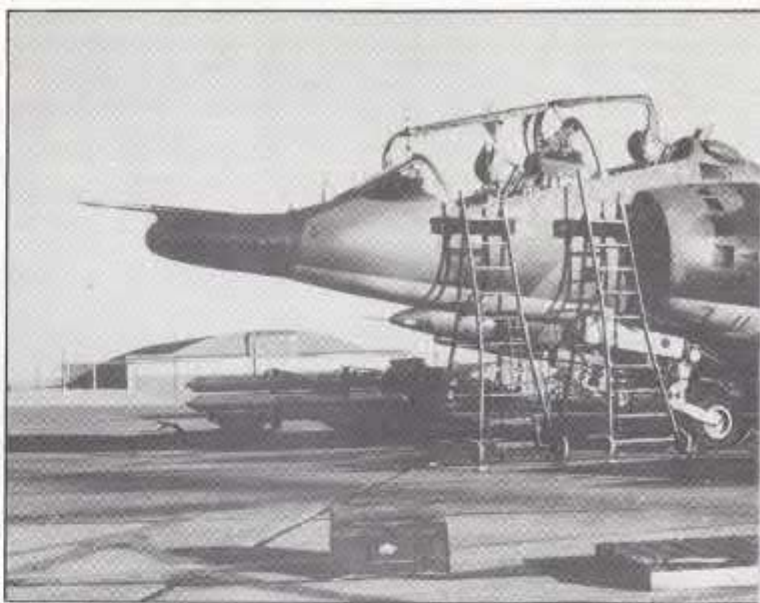
The average distance to the FEBA will be 10 minutes flying time. Spending 10 minutes in the FEBA and 10 minutes to get back, a Harrier would take 30 minutes to complete its mission. The turn-around time back at the site takes 30 minutes, which makes a Harrier mission rate of one per every hour. Sortie rates during field deployments are normally very high. Three exercises in 1974 showed these achievements:

| | | | |
|---------------------|--------|--------|--------------------------|
| Exercise Big Tee | 12 a/c | 3 days | 364 missions |
| Exercise Oak Stroll | 28 a/c | 3 days | 1120 missions |
| Exercise on base | 31 a/c | 8 days | 88 ² missions |

When deployed in the field the Harriers are dispersed in small groups at several sites, usually clustered around a logistics park. The park contains armament and fuel, the latter being stored in rubber pillow tanks laid on the ground. Aircraft spares and engineering support are transported by the squadrons to the sites, as are also command, control and intelligence (evaluation) facilities. Support and operations of the Harrier squadrons in the field require a greater number of men and vehicles than are usually provided on an airbase. This argument is often perceived by reluctant air arms. In fact, compared to an armoured regiment, which is generally accepted to have to be mobile, a similar Harrier use would need only about 20% more in men and trucks.

There seems to be one problem with Harrier operations from dispersed sites. Last year during exercise Hill Foil a local German farmer kicked up a fuss when his land was about to be used for Harrier operations. Later it emerged that the farmer had not been warned and was unaware of what was about to happen to his land, till engineers started building up the support facilities there.

JvTD



TOP: RAF Wittering, located west of Peterborough, C No. 233 Operational Conversion Unit, both operations made at this RAF station in January, on the flight T.4 XW934/W.

MIDDLE: British Aerospace is currently delivering a GR.3 X2907/C of No.233OCU is part of this batch.

BOTTOM: Standard to all Harrier GR.3s now, is the L Marked Target Seeker (LRMTS). Also mounted of the cockpit is the windvane, which is



Cambridgeshire, is the base of No. 1 Squadron and flying Harrier GR.3/T.4s. Photos on this page were taken from the flight line of 233 OCU which included this Harrier

batch of 24 new Harrier GR.3s to the RAF. Harrier was delivered to the RAF late 1980.

range-finder, also known as Laser Ranger and also is a F.95 oblique camera. Just in front of the cockpit is the importance to the pilot during hovering.

FUTURE HARRIER DEVELOPMENTS

AV-8B ADVANCED HARRIER

The USMC issued a requirement for 336 Advanced Harriers to replace their AV-8As and A-4 Skyhawk, presently in service. In co-operation with McDonnell-Douglas two AV-8As (158394 and 158395) have been converted to YAV-8Bs, while retaining the Pegasus 11 engine, the aircraft incorporated a number of changes improving the performance, e.g. supercritical wing, redesigned intakes, and a raised cockpit. The AV-8B offers twice the AV-8A payload/range performance.

The flight test programme of the YAV-8Bs lasted from November 1978 till Summer 1979. During late 1979 the 2nd prototype (158395) crashed due to an engine failure.

The next phase in the AV-8B programme will be the production of four full-scale development AV-8Bs of which the first is expected to fly in October 1981.

AV-8B PLUS

A programme to equip the AV-8B with the Hughes APG-65 radar presently used in the F-18 Hornet. Installation of this radar either will necessitate an enlargement of the Harrier's nose cone or reduction of the radar's antenna surface area.

AV-8C

McDonnell-Douglas evaluated an AV-8C for service Life Extension Program to keep the USMC AV-8As flying till new aircraft are available. This modified AV-8A incorporated improved lift, defensive electronic countermeasures, and a flare-chaff dispenser. The prototype crashed off the coast of California in September 1980 while operating from USS Tarawa for shipboard clearance.

The current status of the AV-8C programme is unknown, but it is likely to be continued, and will finally lead to the modification of all USMC AV-8As currently in service.

AV-8SX SUPERSONIC HARRIER

Recently reports have appeared in Aviation Week & Space Technology of a programme proposed by McDonnell-Douglas and Rolls-Royce concerning a supersonic version of the Harrier.

A Harrier version which could attain a speed of Mach 1.6 is likely to take away the last doubts about this type.

New technology to be included in the Pegasus 11 allows an overall increase of thrust of 50%. Supersonic flying with the Harrier has always been a problem of the air-intakes. To keep the supersonic shockwaves out of the intakes, the intakes have to be reduced in size, but this would automatically lead to a drop in engine thrust. With the use of Plenum Chamber Burning in the front nozzles, extra engine thrust becomes available to compensate for this reduction.

HARRIER GR.5

This is the designation of the RAF for the replacement of the Harrier GR.3s currently in service.

HARRIER GR.5K

The entry of British Aerospace for the RAF Harrier GR.3 replacement. The design is to include an advanced wing for high subsonic performance. This design is also known as the 'Big Wing Harrier'.

Continuous delay by the RAF in specifying this requirement might be an indication that the RAF is awaiting the results of the studies on the Pegasus 11-35 (with Plenum Chamber Burning). A combination of the advanced wing and the Pegasus 11-35 engine is also known as the 'Super Harrier'.



Six months of suspended Buccaneer operations

(RAF LAARBRUCH, W.GERMANY). Nine Buccaneer S.2Bs from RAF Station Laarbruch participated in a Red Flag exercise, when one of the aircraft crashed in the Nevada desert. The RAF has become a traditional participant in this U.S. Air Force exercise. Operating from Nellis AFB, the aircraft fly highly realistic 'war-time' missions over a six-week period. At a large nearby range low level flying can be practised as the minimum altitude AGL (Above Ground Level) at the range is 100 ft. During Red Flag the Buccaneer pilots have an excellent opportunity to practise their war-time mission which is deep-penetration low-level strike/attack. Flying at low level over the Nevada desert on 7 February 1980, a four-ship formation of RAF Buccaneers noticed that they had been detected by F-5E 'Aggressors'. Following standard procedure, the formation broke up to disrupt the attack. During this manoeuvre the starboard wing of one of the aircraft broke off, causing the aircraft to crash and killing both crew-members.

From an operational point of view

At first sight the wreckage of the Buccaneer showed great resemblance to the wreckage of a Buccaneer that had crashed six months earlier. Proven to have been a 'one-off' accident, the latter crash was brought about by a wing-folding lock failure, also causing the wing to break off. The Detachment Commander at Nellis AFB, Group Captain R.J. Kemball, passed on his findings to MoD (Ministry of Defence) in London. Pending the investigation MoD imposed a temporary suspension of all flying activities by RAF Buccaneers.

An RAF investigation team arrived at Nellis AFB 24 hours after the accident. The severed starboard wing confirmed the suspicion of metal fatigue. Two days after the accident the suspension of all RAF Buccaneer operations was officially imposed by the Vice Chief of the Air Staff.

Of the nine aircraft at Nellis AFB, XV345 had crashed, and XV864 and XV340 were shipped back to BAe's plant at Brough, UK, for fatigue tests. The remaining six Buccaneers got an interim investigation and repair and were flown back to RAF Laarbruch in May.

The suspension of Buccaneer operations was not an official grounding of the type. During the six-month period the aircraft at the two Buccaneer bases, RAF Honington and RAF Laarbruch, maintained their operational readiness. The problems with the metal fatigue were not considered to be serious enough to effect operations in case of emergency. Although not flying, the Buccaneers were kept ready for operations at all times. The Rolls-Royce Spey Mk.101 engines were started up every now and then and the aircraft were taxied around on their air base's taxi-tracks.

To keep the Buccaneer pilots current on flying, several Hunters were taken out of storage. Both RAF Laarbruch and RAF Honington had equipment and knowledge to operate the Hunter, as this type was also operated there prior to the Buccaneer accident for training purposes, with No.237 OCU. If another type had been chosen, e.g. the Hawk, it would have taken about six months to obtain enough aircraft and to start up operations. As many Hunter T.7s as were available were taken from storage, and each Buccaneer squadron flew with approximately eight Hunters. Single-seat Hunter F.6s were also used but these were not very realistic in simulating a Buccaneer mission as the F.6 lacks accommodation for the navigator.

With the Hunters the pilots flew low-level missions, night missions, and navigation missions. Extra drop tanks were installed to double the aircraft's range. Some Hunter vs. Hunter air combat

ROYAL AIR FORCE NEWS RELEASE

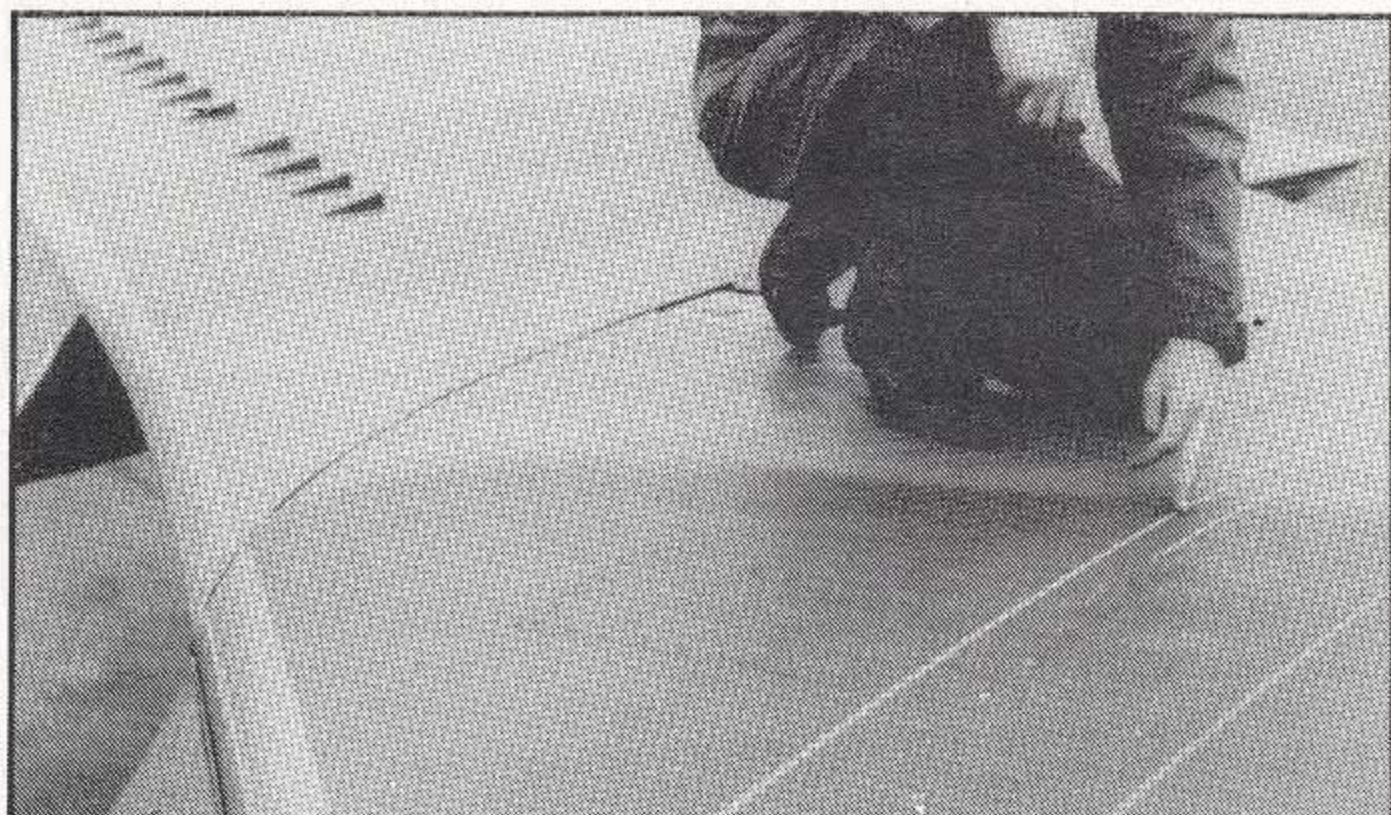
MINISTERIAL STATEMENT ON RAF BUCCANEERS

This afternoon Mr Francis Pym, the Secretary of State for Defence, gave the following answer to a question tabled by Mr Bruce George, MP, concerning the future of the Buccaneer strike/attack aircraft in RAF service:-

"RAF Buccaneers will be resuming normal flying immediately. Following the crash of an RAF Buccaneer in Nevada on 7 February, cracks due to metal fatigue were found in the mainplane front spar of the crashed aircraft. As a precaution, all peacetime non-operational flying by RAF Buccaneers was suspended pending the outcome of technical investigations. It is now clearly established that the accident on 7 February was caused by the failure of the aircraft's starboard wing when subjected to loadings which in its fatigued state it was unable to withstand. The RAF board of enquiry is now being finalised and a summary will be published in due course.

To restore full confidence in the integrity of the Buccaneer airframe each aircraft was subjected to stringent inspection; two aircraft were totally dismantled; flight trials were undertaken to revalidate the fatigue test specimen; and a detailed repair scheme was devised. Experts from RAE Farnborough and the Accident Investigation Branch have been closely involved in all this work.

Over half of the Buccaneer fleet was found to be either intact or with minor cracks which have now been repaired. I am now satisfied with the safety of these aircraft, and they will shortly resume unrestricted peacetime flying. The remaining aircraft, where more substantial cracks were found, can be recovered to front-line flying with more extensive repairs and the economics of this are being considered. Hitherto, we have maintained our full Buccaneer declaration to NATO, on the basis of availability in war. It is now clear that initially, and possibly also in the longer term, this declaration must be reduced. We shall be discussing with the NATO Authorities the future size of the declared force."



This is where the troublesome front wing-spar is located
(All photos by Gerd Lammers)



Buccaneer S.2B XN977/G of No. 15 Sqn returning from a mission at RAF Laarbruch during late January 1981.

training was done, as well as dissimilar ACT with other types.

War-time mission profiles were exercised in a flight simulator. The suspension of Buccaneer operations doubled the utilization of the simulators at Honington and Laarbruch.

Fatigue caused cracks in the steel front wing-spar

The RAF Accident Investigation Branch discovered metal fatigue in the starboard front wing spar of the crashed aircraft. Inspection of all Buccaneers revealed that many other spars suffered from metal fatigue as well. To find the cracks, the skin of the aircraft had to be removed, since there are no access panels for inspections of front spars. The cracks that were discovered differed in quantity and in seriousness. No relationship could be found between the status of the different spars and the amount of flying hours or age of the airframes.

A complication was the fact that the wing spars are made of steel. This caused the investigations into the matter to last considerably longer, as experience with the behaviour of steel in aircraft is limited. One and two Buccaneers, respectively, were shipped to the fatigue test facility of British Aerospace at Brough in March and April. Two aircraft were totally dismantled to establish the extent of the fatigue and related problems. The third Buccaneer was used as a flying test bed. later a repair scheme was drawn up. In service RAF aircraft maintenance crews meanwhile polished away the minor cracks. The wider cracks could not be polished away, as this would reduce the strength of the spar. Wings with severe cracks were exchanged for sound wings from other aircraft to make a maximum amount of Buccaneers fit for flying.

At first the extent of the problem was unknown, and all possible solutions were studied, including the purchase of replacement aircraft. Senior RAF officers remembered the fate of the Valiant bomber, to which the Buccaneer problem initially showed much resemblance. The Valiant also suffered from metal fatigue and in 1965 it was decided to with-

draw the type from service. However, there was a major difference then. The Valiant could immediately be replaced by Victors and Vulcans. For the Buccaneer the replacement, the Tornado GR.1, is still five years away.

Buccaneers back in their element

When more facts became available the status of the Buccaneer fleet proved to be not as bad as was at first thought. Following a meeting in May of senior RAF engineers and technical experts from the Royal Aircraft Establishment, the Ministry of Defence announced that flying activities would be resumed by mid-summer. Of the 85 Buccaneers in RAF service, signs of metal fatigue had been discovered in about 40. The waiting was for the RAF to assess the final results of the test programme on the Buccaneers in the fatigue test rigs at Brough.

In the morning of 28 July 1980, Station Commander RAF Laarbruch, Group Captain Kemball, was informed that the suspension of flying was to be lifted that afternoon. After the official announcement by Mr. Francis Pym, then Secretary of State for Defence, in Parliament, all RAF Buccaneers could resume normal flying immediately. One hour after the announcement the first Buccaneers took off from RAF Laarbruch. Although pilots like to fly the 'evergreen' Hunters, there was a feeling of relief when the suspension of Buccaneer operations was lifted. To get current on the Buccaneer again, all pilots had to do a re-familiarization course first. Two months afterwards all pilots were current again. Since not all Buccaneers have been repaired the squadrons are short of aircraft and are therefore still operating some extra Hunters.

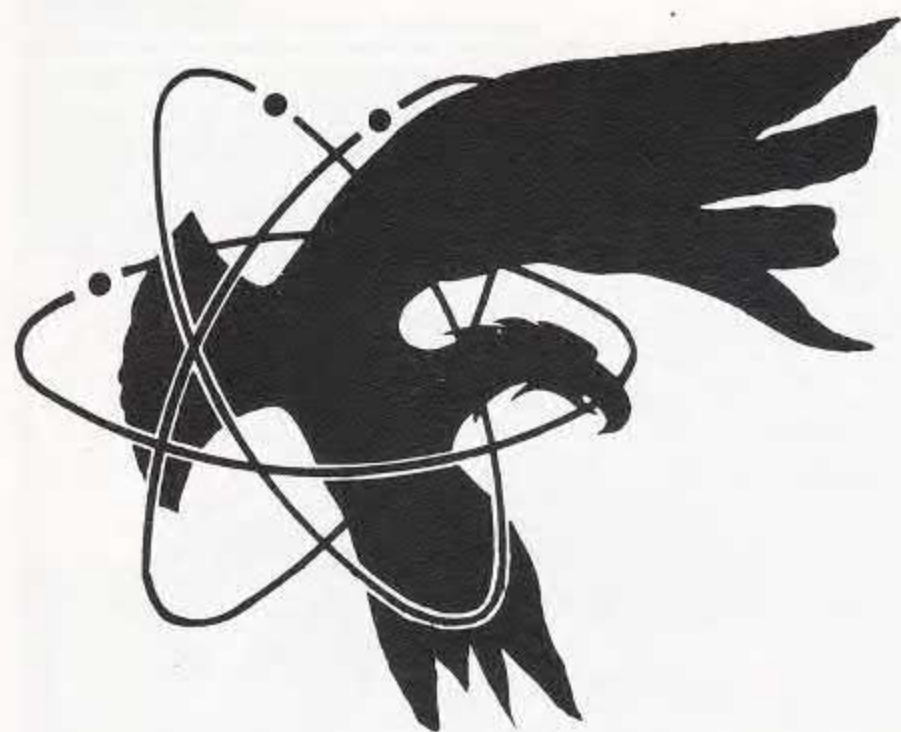
A decision on the fate of the Buccaneers with severe cracks has not yet been taken. Any time now an announcement is expected by Mr. John Nott, the new Secretary of State for Defence, whether the aircraft will be repaired or not. The fatigue problems with the Buccaneers did not have any effects on the plans for the replacement of the Buccaneers by Tornados. According to plan, this is to take place in five years' time.

JvT

Late February 1980, several Hunters were taken from storage and issued to the Buccaneer units.

Hunter T.7 XL613/91 is one of the 'evergreens' to have remained at Laarbruch by late January 1981.





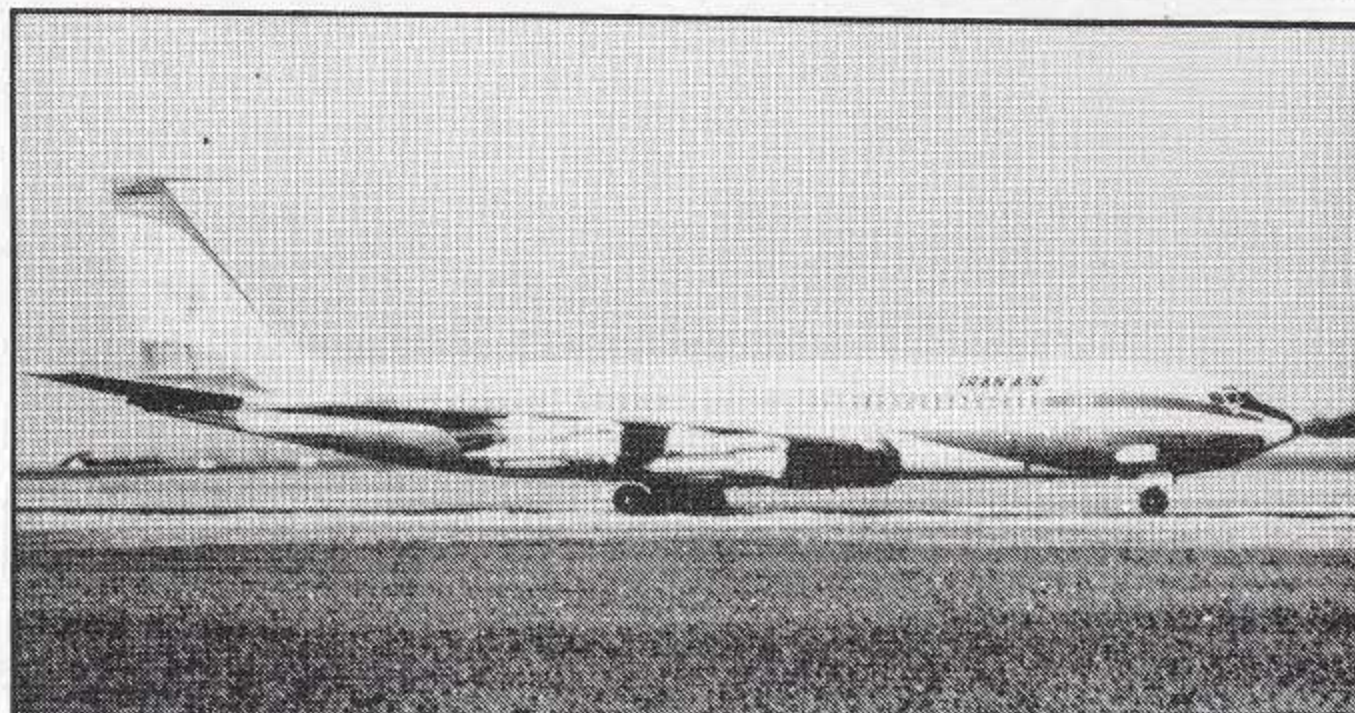
AIRLINE NEWS

After 18 months, a new DC-10 customer

(LONG BEACH, CA, USA) Ghana Airways is the first new DC-10 customer since late 1979. In December 1980 the airline ordered a single DC-10-30 which will in effect replace the airline's VC-10-1102 9G-ABO. The VC-10 was withdrawn from service between Accra, Ghana and Heathrow in December. As the DC-10 will not be delivered before early 1982, Ghana Airways is wet-leasing a DC-10-30 from KLM in the meantime. The Accra-Heathrow service was reportedly extended to Amsterdam in January. When Ghana Airways' own DC-10 is delivered, it will also serve the Accra-Roma route, as well as any future routes to Europe.

Other recent DC-10-30 orders were placed by CPAir, for one aircraft to be delivered by June 1982, and by Finnair, for one aircraft which will be delivered in August of this year. The CPAir aircraft is the airline's seventh, and when this is delivered, CPAir will start phasing out its DC-8-63 fleet. The Finnair DC-10 is the company's third.

o Air Florida has reportedly bought DC-10-30s N82NA and N84NA from PanAm, which acquired the aircraft when it took over National Airlines. The aircraft will fly scheduled services between Miami and Europe, and will probably be used for transatlantic charters as well. N84NA was delivered to PanAm recently, but didn't enter service, and was stored, together with N82NA, at Marana, FL.



The more or less happy end of the Tehran hostage-taking in January has led to the lifting by the EEC countries of a trade embargo against Iran. In the evening of 22 January the first Iran Air Boeing 707 to land at Schiphol since the embargo ended arrived, and was loaded with 24 metric tons of fertilized chicken eggs and 107,500 day-old chicks. The aircraft departed for Iran on 23 January. It is interesting to note that at least two Iran Air 707s operated flights from Schiphol during December 1980, well before the end of the embargo. EP-IRK (illustrated) was there on 12 December, and EP-IRL on the 23rd. (photo by Ton Jochems)



Western Airlines has started scheduled services between Anchorage, Alaska, and Gatwick, UK. The service connects with a Western flight to Honolulu, Hawaii. The flights are operated by DC-10-10s, like N915WA shown here, at Gatwick on 28 December.



Thirty-nine A.300s were delivered to airlines during 1980, including the first aircraft for SAS, PIA, Alitalia, Cruzeiro do Sul, TDA and SIA. Laker Airway's first A.300B4-203, G-BIMA, was delivered to Gatwick on 8 January. This was the first A.300 to be delivered in 1981. Iberia is due to get its first A.300 in early March. TDA's first A.300B2 F-WZEO/JA8464 is illustrated in this photo taken at Hamburg/Finkenwerder in August 1980. (photo by Ilja Nowski)

FROM AN AIRLINE PEN

Yet more about that Saudia TriStar

Reports that instructions from Riyadh tower contributed to the deaths of 301 people on board Saudia TriStar HZ-AHK have been proved false. The radioed instruction, reported by a DC-8 crew holding off Runway 01 (FLASH No.123, page 17), was for a fire engine, which had come to assist HZ-AHK, to clear the runway. This happened more than two minutes after HZ-AHK had turned off the runway, and before the seriousness of the fire aboard the TriStar was known. The fire engine was told to clear the runway so that a royal flight could take off.

The cause of the accident is now believed to be a design or maintenance fault, complicated by other factors. The fire seems to have started when an hydraulic fluid, Skydrol, leaking for some time, ignited after contact with an electrical wire. The insulation of this wire had been rotted through by the leaking fluid. Skydrol smoke is known to be very poisonous, and this is believed to have killed all occupants of the aircraft, even before the passenger cabin caught fire. All this remains speculation while official investigations continue under Saudi government responsibility.

Caption correction

In FLASH No.124 we wrongly credited a photo of F.28 VH-FKF to Ton Jochems (page 17). In fact the photographer was Peter Edsall. On page 22 we omitted to credit an aerial photograph to KLM.



Saudia order launches new Airbus A.300 version

(BLAGNAC, FRANCE) On 16 December 1980 Airbus Industrie received what may be the most important order of 1980. Saudia ordered eleven A.300B4-600s for delivery from early 1984. This launches the 'B4-600 which is the first A.300 version to incorporate technology developed for the A.310 on any large scale. The major difference between the 'B4-600 and existing A.300s will be in the rear fuselage, which will be similar to the A.310's, and increase overall cabin length. Furthermore there will be aerodynamic improvements and weight reductions, leading to more fuel efficiency. The engine, however, has not yet been selected, and Rolls-Royce hopes that Saudia will choose the RB.211, which is already in service on Saudia's TriStars. The cock-

pits will be of the Forward Facing Crew Cockpit type, in which the flight engineer faces forward and has an overhead instrument panel. The FFCC can easily be adapted to two man operation.

Other Airbus orders recently placed were for three A.300B2 for VASP Brazilian Airlines, for delivery by late 1982. These will also have FFCCs. MEA lodged a letter of intent to buy five A.310s initially, possibly to be followed by fourteen more. These may also be powered by RB.211s. During November 1980 five A.300s were ordered by unnamed customers, and two A.300B4-200s on order by Cruzeiro do Sul were transferred to VARIG. These will be delivered in June 1981 and June 1982. Total orders now stand at 230 A.300s and 76 A.310s.

Two Yemens, two Dash 7s. Yemenia's first Dash 7, 4W-ACK (top) will be used on regional services from Sana'a, the capital of the Arab Republic of Yemen (north Yemen). 70-ACM (bottom) is the third Dash 7 for Alyemda, the airline of the Democratic Republic of Yemen (south Yemen). (both photos DHC)





Redcoat: vegetables and airships

(HOPLEY, SURREY, UK) Redcoat Cargo Airlines may be small, may operate a single sixteen year old Canadair CL.44D4-2 and a twenty-one year old Bristol Britannia 235F, but it is neither an old-fashioned company, nor even a very conventional one. The only old-fashioned thing about it is the name of one of its subsidiaries, The Redcoat Airship Company Ltd.

Redcoat was set up by four people, Harry Green, Kevin McPhillips, Mike Owen and Lynn Wilson, in 1977 in order to provide British exporters to the West African coastal countries (except Nigeria, already well covered by other airlines) with the first and, up to now, only regular split charter flights to that area. This tapping into a previously neglected market was the first hint of Redcoat's unconventionality.

The airline turns to farming

The second hint, by now becoming pretty hard evidence, of the airline's innovative thinking, was provided when Redcoat bought farm land in the

Gambia, to grow its own produce. This was done to provide the aircraft returning to the UK with a return load, which couldn't be provided by West African shippers. These countries, which don't share Nigeria's oil wealth, export next to nothing to the UK. Return loads are nevertheless very important to Redcoat, as their rates for cargoes to West Africa only cover costs.

Should there have been any doubt remaining as to Redcoat's decidedly different approach to the air cargo business, then the airline's announcement of 11 July last year (1980) must have convinced everybody. Why, anyway, did Redcoat announce that it had ordered four Skyship R40 rigid airships from Airship Industries Ltd? Rigid airships, after all, haven't been around since 1939.

Airships, romanticism and necessity

Kevin McPhillips, Redcoat's marketing director, and one of the founders, put the reason quite succinctly: air travel by fixed wing aircraft is a luxury. Redcoat has seen fuel costs increase by 200% over the last two years, and views the threat of increased scarcity with great concern. It was concluded that, if the airline wished to survive as a commercially viable operation, an alternative form of air transport was needed.

The choice fell on the rigid airship with internal cargo hold. A development company was set up, The Redcoat Airship Company Ltd, to co-ordinate the design and testing of the Skyship R40 (Rigid, 40 metric tons payload). The major considerations which led to this decision were improved safety legislation and technology, fuel-efficiency, and high payload.

The demise of the rigid airship in 1939 was at least in part due to the then current use of hydrogen as a lifting medium. Unfortunately, this is highly inflammable, and would be prohibited for use in commercial airships. It has, therefore, been replaced by the inert gas (non-inflammable) helium. Helium also has the advantage of being cheap. On the technology side, such post-1939 items as weather radar will be used, greatly enhancing safety. In fact, as Mr. McPhillips stated, the Skyship R40s will be fully airways equipped, as required by whatever legislation will apply to commercial airships in 1985, when Redcoat will start operating them.

SPLIT AND FULL CHARTERS

Redcoat Cargo Airlines operates both split and full charters. Full charters are mostly ad hoc, i.e. when and where the customer wants to. Some contracts are for a series of flights. For example, Redcoat operated frequent flights from RAF Brize Norton to Belize under an MoD (UK Ministry of Defence) contract for nineteen months. This contract was ended in December 1980. Some full charters are flown for humanitarian aid agencies, such as Oxfam. Split charters, on the other hand, are flights shared by several customers. In Redcoat's case, regular split charter space is offered to the Africa Bulge, the west coast of Africa west of Nigeria. The actual itinerary depends on the particular cargoes on board. The advantage of split charters is that they offer shippers cheap air transport, without the need to charter an entire aircraft. BCAL is Redcoat's only competitor on the UK-Africa Bulge route, but the former charges IATA rates, and the use of passenger configured Boeing 707s on these routes (except to Accra, Ghana, where DC-10s are used) restricts the size of the cargoes.

Skyship will use quarter of fuel burned by aircraft

Redcoat has calculated that, over any given distance, a Skyship R40 would use only 25% of the fuel used by conventional fixed wing aircraft. This means, of course, that fuel will account for a much smaller proportion of total operational costs. In July 1980 it was calculated that the Skyship R40s will operate "up to 29 percent cheaper than current narrow bodied freighter aircraft can". Redcoat also noted that "Any future oil price increases will further enhance the airship's advantage over conventional aircraft and will give it a commercial advantage over the Boeing 747 jumbo jet." An airship uses less fuel than fixed wing aircraft because a) it doesn't need engine power to get lift, and b) its maximum speed is much lower. In the case of the Skyship R40, this maximum speed is 177 km/h (95.3 knots - figures of July 1980). Power is supplied by four Pratt and Whitney PT6A-50s, propelling an airship weighing 113,804 kg (250,890 lbs) maximum. By comparison, the DHC-7, also powered by four PT6A-50s, has a maximum take-off weight of only 19,958 kg (44,000 lbs).

The enormous weight of the Skyship R40 is reflected in its size and its payload. The latest maximum payload figure is 75 metric tons, which limits its range to 800 km (500 miles). At ranges over 4000 km (2500 miles) the maximum payload is 50 metric tons. This compares to a payload of slightly more than 40 metric tons, the maximum for a Boeing 707-320C. The Skyship R40's cargo hold will be much larger than a 707's, so that quite large (so called "outsize") items can be carried.

There are many other advantages of airships. There are also some drawbacks. No vehicle devised by human beings is going to be perfect. The chief disadvantage is its slow speed. However, this could, legislation permitting, be solved by using landing sites very near factories or customer's warehouses. This would reduce the time the cargo spends traveling to and from airfields considerably. One thing is certain, airships will not be using Heathrow's cargo terminal.

Redcoat is actively looking for a UK base, where shipments for its split charter flights could be collected and loaded. A maintenance base is also needed, not necessarily on the same site. Mr. McPhillips mentioned that Redcoat is looking at sites in areas like Corby in Northamptonshire, an old industrial town with good road connections and a bad unemployment problem. No decision has yet been taken, and may not be until there is more clarity concerning the law on such airship landing sites.

The airship is being re-invented by two small British companies which will undoubtedly be accused of indulging in nostalgia. Nevertheless, they are carefully, coolly responding to an incontrovertible trend in aviation, not by making a conventional aircraft or engine more fuel-efficient by fractions of percentages, but by radically different think-

ing. In the process they may well be re-designing aviation. To quote from Redcoat's announcement of July last year: "The airships currently on order will be used solely for freight however, an airship in passenger configuration is a likely future development." A message to Sir Freddie Laker, perhaps? JJSD

P.18: Redcoat's first Britannia, G-AOVS, pioneered regular split cargo charters to the West African coast. G-AOVS has since been replaced by Britannia G-BHAU.

(Redcoat)
Top: Redcoat's recently acquired CL.44, G-BRED, is seen loading oil pipes at Luton Airport, UK, the airline's operations base.

(Redcoat)
Middle: Airship Industries and The Redcoat Airship Company are collaborating in the development of this 640 ft. rigid airship for introduction into service (by Redcoat Cargo Airlines) in 1985.

(Redcoat)
Bottom: 'Redair' Britannia G-BRAC, at Luton in early 1980. The Redair titles were painted on for the filming of BBC TV series 'Buccaneer', which was loosely based on Redcoat's own history. Unfortunately the aircraft was lost on 16 February 1980 after take-off from Boston's Logan Airport. CL.44 G-BRED has replaced G-BRAC.





This Cessna T.210N OO-CNV, was frozen to the ground the night before at the icy platform of Abelag.

Abelag's variety of aircraft and operations

Abelag is....

(BRUSSEL NATIONAL AIRPORT, BELGIUM). Abelag flew with airliners, Abelag is flying with helicopters, business jets, piston engined light aircraft and turboprops. Abelag will fly commuters. This variety of aircraft is representative for an even larger variety in operations of Abelag. They can get you a pilot license, helps you buying a plane, will install the required avionics, does your overhaul, repairs your crashed plane, handles your aircraft when you visit Brussel and arrange further transport into town. They even help you if you don't want to fly yourself anymore but want to be flown, what else do you want?

Dealership....

Abelag has been well established as a Cessna dealer since 1970; currently the company is a full line dealer for the Cessna piston engined aircraft in Belgium, and an exclusive dealer for Cessna turboprops, the Conquest and Corsair, in the Benelux. To facilitate the sales of turboprops in Holland, an agreement has been reached between Abelag and the Dutch dealer, ASH BV, for sale support (e.g. certification). No agreement however exists concerning the piston engined aircraft. Dealership of Cessna piston engined twins and singles are not exclusive ones. In contrast with Piper, which has exclusive regional or national dealers, a Cessna dealer is permitted to sell aircraft in a colleague's region; however, he is not allowed to advertise his aircraft outside his own area. People buying from a foreign dealer might benefit financially as cost prices can vary due to differing dollar exchange rates. When the Belgian and Dutch exchange rates differ from each other, and differ from the dollar, it could be advantageous for a Dutchman to buy in Belgium, or the other way around.

Avionics might be another reason for not buying your Cessna from your regional dealer. Avionics could differ in installation prices, but also in availability. Abelag for example is authorized to install complex instruments, like the auto pilot, and weather radar, while the company also repre-

sents ARC, Bendix, Collins, Edo Air, King, Narco, Sperry, Sunair, and RCA to name but a few of the main avionics producers.

Last but not least the company is able to give the potential customer quick service. Due to the fact that the European Marketing Center of Cessna is situated at the same field, spare parts are obtainable within one day. Not only customers, but other dealers too, go to Abelag for this service. The relationship between Abelag and the Cessna European Marketing Center is like a retail business and a wholesaler. Cessna Europe does not sell piston engined aircraft and turboprops directly to customers. Abelag orders aircraft through Cessna Europe, but can make their own decision whether to take delivery of the aircraft at Brussel, Wichita or Reims (France). When the aircraft is a new type to either Abelag or the customer it is desirable to take delivery of the aircraft at Wichita, as the pilots can follow a free conversion course there on the type. Additionally, a ferry flight carried out by Cessna costs more than it would if the company sends its own pilots.

Dealership

The Cessnas which are sold by Abelag are mainly singles, especially the time proven ones like the Cessna 152, 172 and 182. The twin engined market is running slow and small because of high Avgas costs, high interest rates and the availability of second hand turboprops at prices similar to those of new piston engined twins. The choice is not difficult then, as the turboprop is more fuel efficient.

Dealership sales comprise 20 to 25% of Abelag's total annual turnover. Sales in Abelag's best year stood at 34 aircraft (1978). Last year was one of the worst with 15 aircraft sold, while 1979 saw 25 sales. Of these quantities only one or two per year are twins.

Abelag is active in second hand aircraft and act sometimes as a broker too. As a broker they were involved in sales of two Citations and three Learjets in recent years.



Cessna 421 OO-LFF is used for air taxi services. This aircraft is likely to be replaced by a Cessna 425 Corsair, this year.

The dealership for Cessna does not include the Citation series. Cessna has always kept the marketing for this bizjet in its own hands. As this policy is still current, Abelag received a negative reaction to their request for expansion into the bizjet field. At the same time, Abelag decided to take up dealership of the Gates Learjet, not only to include jet aircraft in their package, but also as they were planning to use Learjets for air taxi operations.

Air taxi operations....

The air taxi branch of Abelag is currently undergoing a modernization of the diversified fleet. Originally the fleet consisted of four Cessna

Abelag uses two Enstrom F.28As, which were kept in service for various purposes after determination of the Benelux Enstrom dealership. In Belgium helicopter operations have too many restrictions, while operating costs are high too to make them attractive for private or business use.

Helicopters are for example prohibited from flying over cities, and may operate only out of airfields. The Dutch RLD refused to certificate the F.28 and F.280 for flying operations.



twins, one of which is still hanging on for cheap taxi services for new customers still anxious that air taxi services would be too expensive for them. Two Cessna 441 Conquests have been delivered over the last year to replace the 421s, while a new Learjet 35A was also taken into service. The latter will replace a Learjet 25B which is up for sale. The Learjet 24D will be replaced, too, in the future by a '35. Abelag is still satisfied with the Learjet 24/25, especially where maintenance and engines are concerned. However as the fuel prices are still increasing, it became necessary to replace the aircraft. Fuel consumption of the '35 is approximately 30% better than the Learjet 24/25, with the same amount of fuel, the '35 has 30% increased range. The increased range has already proved to be useful. During December last year the Learjet 35 toured Africa, after it had just returned from the States. With the '25B such a tour would be unprofitable (because of the high amount of fuel stops needed), but it's shaped for a Learjet 35.

Learjets make about 600 flying hours a year, while the piston engined aircraft and turboprops fly around 500 hours. The two helicopters make about 400 hours each, on utility work such as checking high tension wires.

Most of the flying hours of the air taxi service are made for regular customers, who have a contract with the executive air service. The market however, for air taxis remains stable. "Do you know a market which grows nowadays?" said Guy Visselé, director of sales, Abelag, although their taxi service is the largest and most experienced one in Belgium. The crew of a flight normally consists of one experienced and one student pilot, to give the latter realistic training. Flight training is also done at their own pilot training centre on simulators.

Cessna Pilot Center and aircraft maintenance....

Abelag has 13 pilots under contract, including two licensed helicopter pilots and two flight instructors. The flight instructors are based at Grimbergen, the general aviation field of Brussel, at Abelag's Cessna Pilot Center. During the summer season the flight instructors are supplemented by free lance instructors. The Cessna Pilot Center at Grimbergen operates nine singles, including customer's planes. About 5,000 hours are flown annually and currently 180 students are in various stages

of the different courses. All theoretical and practical training courses, which can be followed in Dutch, English and French, up to IFR CPL, are run at the Pilot Center. Practical multi engine aircraft training is conducted at Zaventem (Brussel). At Zaventem Abelag also maintains a maintenance and repair centre. As fixed base operator, Abelag has been approved by the F.A.A. as an Approved Repair Station, by the Belgian Civil Aeronautics Administration and the Dutch RLD. Aircraft registered in these three countries can be overhauled or repaired at Zaventem. Except for the main overhaul, all other categories of maintenance on engines are approved to be done by Abelag maintenance centre.

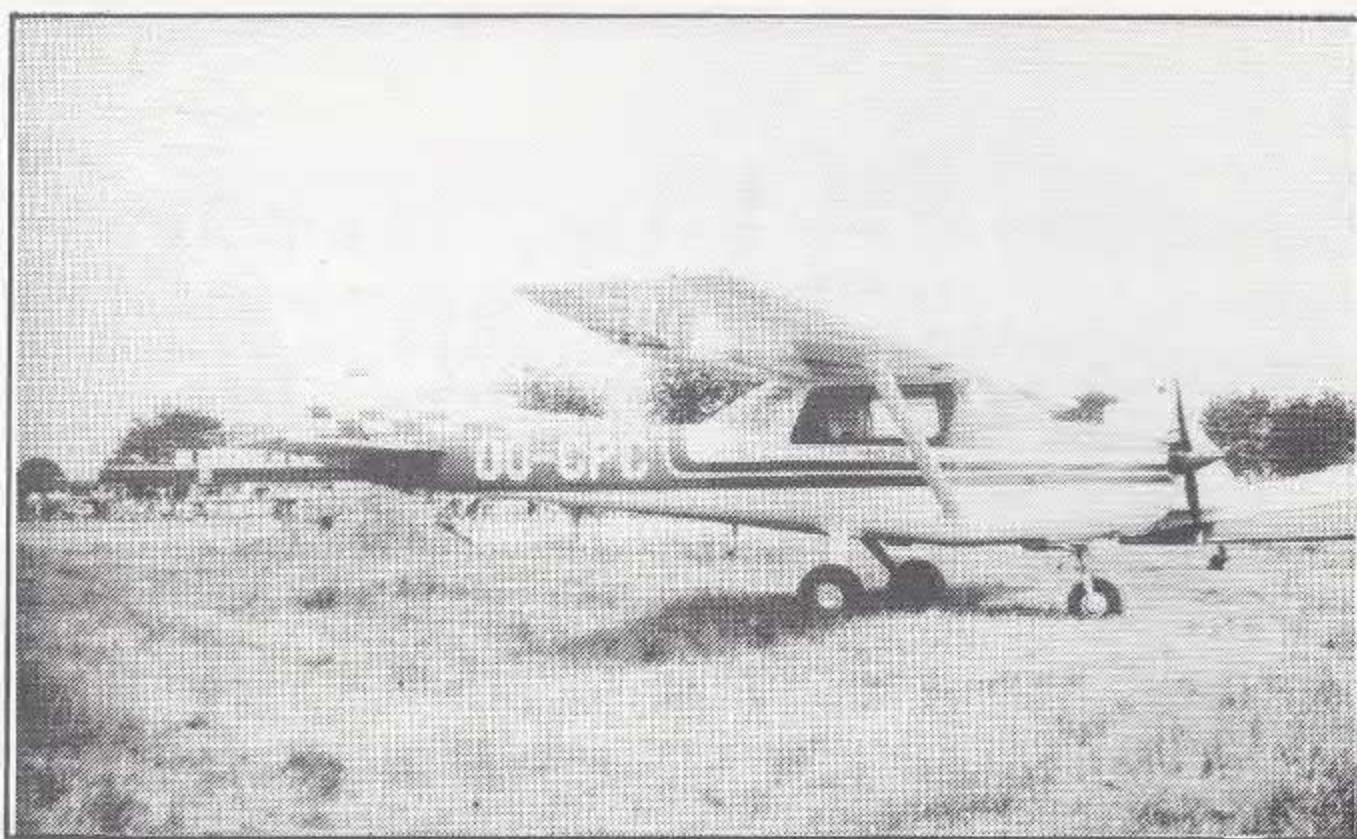
Aircraft handling....

The FAA Approved Repair Station certification does not only affect maintenance, but it is also the reason for companies and governments to use the Abelag's aircraft handling service. Governments regularly use these facilities when they visit Belgium for meetings of the E.E.C. or NATO. Before arrival of a governmental or private aircraft, arrangements can be made through Abelag's private radio frequency for further transportation into town. After arrival at the airport, the aircraft can be refuelled and, in the event of a malfunction having occurred during flight, repaired. The passengers and crew meanwhile are handled by the special customs and passport control facility and afterwards can use the conference room, communications and other facilities of Abelag. This timesaving, compared to handling at airline terminals, is much appreciated; on the day FLASH visited Abelag, three governmental aircraft were handled, from a HS.125 of the Irish Army Air Corps up to a C-135C of the USAF. About ten private aircraft ranging from a BAC 1-11 to a Cessna 210 were also parked outside the Abelag terminal.

Charter and commuter airline....

Abelag (25 %), Sunair International (52 %) and Belgavia (23 %) set up Abelag Airways in May 1979. Abelag Airways started flying activities with a Boeing 707, but without any charter contracts. The flights conducted through 1979 were mostly outside Belgium (97 %), i.e. for foreign customers, and showed a profit. However the owner of Sunair, Mr. van Moorkerk, saw in Abelag Airways the possibility to fly Sunair's IT charters at cost price, while Abelag's idea had been diversification of commercial activities. With two Boeing 737s on order, Abelag bought itself out and the airline's name was changed into Air Belgium.

It was the difference in interest which made Abelag to decide to quite with Abelag Airways. However, as Guy Viselé of Abelag told FLASH, the company is still interested in diversification of its commercial activities. Especially attention has been paid to commuter services. Unfortunately, SABENA still has a monopoly, enforced by law, on flights flown from Belgium by Belgian airlines. As a result it is currently only possible to fly commuter services under a SABENA contract. Contracts made (like those with European Air Transport or Publi Air) are short terms ones, which enables SABENA to take over a good service itself whenever they are interested. If a route is judged to be unprofitable by SABENA, the national airline can still refuse to allow a private airline to operate that route. Services between Brussel and Eindhoven (Holland), Luik and London (U.K.) and Charleroi London will or already have been dropped. Abelag has its eyes on such services, but doesn't want to be ruled by SABENA. Therefore Abelag tries to bring about deregulation within Europe, through the Association des Compagnies Charter Européennes (A.C.E.). Abelag is a member of this group, while the senior vice president of Abelag is the general secretary of A.C.E.. The group tries to reach deregulation of airline services within Europe in about three years. Then SABENA will lose its monopoly, they will not be able to prohibit flying of a route by other Belgian companies, and then there will be an Abelag willing, and, hopefully, able to start commuter services. CvdH □



00-CPC, an Aerobat, is operated by the Cessna Pilot Center at Grimbergen, Brussel's general aviation field.



Abelag is an FAA Approved Repair Station which authorizes them to repair American registered aircraft. The owner of this Cessna 401 N81EG, which had a landing accident in Austria, therefore decided to transport the aircraft to Abelag for the necessary repair work.



Abelag can handle aircraft like this Learjet, as well as much larger aircraft like the C-135C in the background.



HS.125-700B 238 frequently visits Brussel bringing in Irish officials for the E.E.C.. The aircraft is one of the many VIP planes using Abelag's handling service, and the special custom facilities nearby.



Above left: PH-KAE, Bolkow 208C has seen many owners, and now left for England. Above right: Due to over-capacity, PH-NZJ a Bo.105 of KLM Helicopters, was sold to Aero Gulf. Below: PH-HEY was sold to make room for a Turbo Trush which should have arrived by now.

| Reg | Type | C/n | Remarks | |
|--------|-------------------------------|-------------|------------------------------------|---|
| PH-CEY | 1962 Reims Cessna F.150L | 0828 | Air Service Holland BV | to St.Vls. Zestienhoven |
| PH-EVF | 3081 Reims Cessna F.152 | 1770 | Air Service Holland BV | to FAN BV |
| PH-FDW | 3084 Fokker F.27-200 | 10326 | Fokker BV | ex PH-FDW, CR-LEO, D2 - LEO, D2-TEO (new) |
| PH-FTX | 3087 Fokker F.27-500 | 10596 | Fokker BV | to N334MV (out) |
| PH-FTU | 3011 Fokker F.27-200MPA | 10595 | Fokker BV | to Angola Gov't (out) |
| PH-GAC | 2127 Reims Cessna F.150L | 0981 | H.J. Goessens | to St.Vls. Zestienhoven |
| PH-HAK | 2328 Cessna 182P | 182-63986 | Rooswinkel Transport & Verhuur | to HEVA Verkoop & verh. |
| PH-HEY | 2459 Piper PA-36-285 | 36-7660100 | A.A.A. Heyboer | to E.K.L.P. Groenland |
| PH-HOK | 2439 Fokker S.11.1 Instructor | 6272 | B. Krom | to R. Lettinga |
| PH-HOL | 2178 Fokker S.11.1 Instructor | 6270 | Int. Belegging Soc. BV | stored Hilversum (out) |
| PH-IBU | 2753 M.S. Ralley 235E | 13125 | Aviation Francaise BV | to Binderijgroep Vianen |
| PH-IET | 2799 Piper PA-44-180 Seminole | 44-7995098 | Netherlands European Air Serv. | to Recr. Amerika BV |
| PH-KAE | 1608 Bolkow BO 208C | 636 | W.M. van Doorn | to U.K. (out) |
| PH-KDM | 3035 Piper PA-28-161 | 28-8016286 | Netherlands European Air Serv. | to Vld Holland Noord BV |
| PH-LEG | 2560 Reims Cessna F.150M | 1403 | W.J. Groen | to W. Ploeg |
| PH-LUU | 2222 Reims Cessna F.172L | 0861 | Armita Nederland BV | to A. van Toll |
| PH-MIC | 2101 Piper PA-23-250 Aztec | 27-7405329 | H.A. Kapteyns BV | to P.M.C. de Wit |
| PH-MIR | 2514 Reims Cessna F.172N | 1603 | Vliegclub Schiphol | to Air Service Holland. |
| PH-MJB | 2671 Piper PA-28R-201 | 28R-7837227 | B.R.M.J. Buijs | to BV Skadoc 1977 |
| PH-MTA | 2831 Mooney M.20J | 24-0782 | A.M.A. Sales | to Vliegclub Schiphol |
| PH-MYL | 2437 Cessna 182P | 182-61400 | Air Service Holland BV | to Vld Holland Noord BV |
| PH-NZJ | 2592 Bolkow BO.105D | S-137 | KLM Helicopters BV | to Aero Gulf (out) |
| PH-PDG | 3095 Piper PA-28-161 | 28-8116079 | Netherlands European Air Serv. | ex N8291R dd 24/11 (new) |
| PH-PLT | 3090 Cessna 421B | 421B0593 | BV Machinefabriek Plevier | ex OO-LFG (new) |
| PH-ROL | 3092 Robin R.2112 | 180 | Stichting Vliegschool Zestienhoven | (new) |
| PH-SBM | 2633 Reims Cessna F.172N | 1637 | C. Heyning | to S.H. Mulder |
| PH-SDA | 3075 Piper PA-28R-201 | 28R-8018101 | Netherlands European Air Serv. | to Grootland Holding BV |
| PH-SDB | 3089 Piper PA-28-161 | 28-8016322 | Netherlands European Air Serv. | to Grootland Holding BV |
| PH-SKT | 1997 Reims Cessna F.172M | 0936 | Skylight BV | (out) |
| PH-SSF | 3091 DHC-6-310 Twin Otter | 704 | Schreiner Airways BV | ex C-GDGI (new) |
| PH-SYL | 3094 Piper PA-28RT-201 | 28R-8118026 | Netherlands European Air Serv. | ex N8296L dd 17/12 (new) |
| PH-TMP | 3093 Piper PA-38-112 | 38-80A0078 | Netherlands European Air Serv. | ex OO-HKF (new) |
| PH-196 | 503 Prefect | 739 | Aero Club Salland | (out) |
| PH-301 | 972 K 8 B | 8079 | Vliegclub Midden Zeeland | destroyed by fire (out) |
| PH-431 | 2366 ASK 13 | 13529 | F. Bosveld | to H.A. van Haaster |
| PH-445 | 1918 ASK 13 | 13377 | Vliegclub Midden Zeeland | destroyed by fire (out) |
| PH-482 | 2121 Standard Libelle 201B | 504 | N. van Driel | to T. Hoekstra |
| PH-505 | 2171 Standard Libelle 201B | 542 | J.A. Tebak | (out) |
| PH-624 | 2771 LS 3 A | 3232 | E.M.C. Bruning | to J.C. Kerstens |
| PH-658 | 2864 HB 21 | 21016 | Zeeland Soaring BV | destroyed by fire (out) |



FOREIGN MILITARY AIR ARMS TO EUROPE DFL.19,50
In this book authors Stuart M. Jessup and Andy G.W. Mort-
wer make an attempt to record most of the serials of foreign
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1021 B-24 Liberator
1022 A-7 Corsair II
1023 B-52 Superfortress
1024 F-15 Eagle
1025 P-38 Lightning
1027 F-104 Starfighter

1029 F-4U Corsair
1030 BF.110
1032 F-14 Tomcat
1033 F-86 sabre
1034 B-25 Mitchell
1036 F-6F Hellcat
1037 A-26 Invader
1038 F-5
1039 Spitfire
1040 P-80/T-33
1041 C.202
1042 B-36

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