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**Autor:** Dodd, Norman L.

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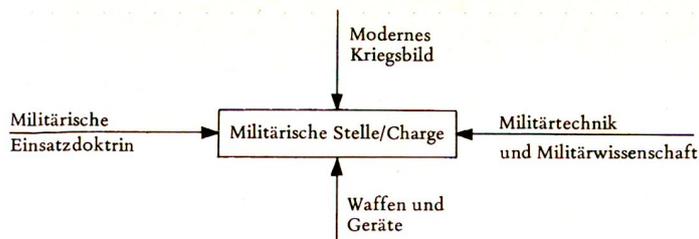
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## The Incredible Harriers

Colonel Norman Dodd

*Anmerkung der Redaktion.* Wir gedenken, in den kommenden Heften über Kampfflugzeugtypen zu informieren, die bei der dringend notwendigen Erneuerung unserer Flugwaffe in Erwägung gezogen werden könnten, und beginnen mit einem Aufsatz aus englischer Quelle über den Harrier. Sbr

Im Zusammenhang mit dem Ausbildungsempfänger sind seine Kenntnisse und Fähigkeiten, seine Interessen und seine Motivationen zu ermitteln, damit der Ausbildungsplan die persönlichen Voraussetzungen möglichst genau trifft.

Mit der Analyse der Umwelt sollen die weiteren Lebensbereiche und ihr Einfluß auf die militärische Stelle beziehungsweise auf den Ausbildungsplan ermittelt werden.

Aus der Analyse dieser Bestimmungsgrößen werden die Richt- und Informationsziele abgeleitet.

In den Richtzielen werden die allgemeinen Ausbildungsabsichten dargelegt.

Im weiteren werden aus der Analyse der Curriculumdeterminanten sowie dem Richtziel die Informationsziele entwickelt. Sie schreiben dem Auszubildenden konkret vor, was der Lernende tun können muß, wenn das Lernziel erreicht sein soll.

Sind alle Informationsziele ermittelt, so sind sie zu sequenzieren, das heißt in eine lernoptimale Reihenfolge zu bringen. Damit ist der Ausbildungsplan entworfen.

Anschließend wird der Ausbildungsplan von einer zweiten Gruppe validiert, das heißt, es wird nach bestimmten Kriterien überprüft, ob der Ausbildungsplan möglichst objektiv den ermittelten Ausbildungsbedürfnissen entspricht.

Auf Grund des Ausbildungsplanes erfolgt die Planung und Durchführung der praktischen Ausbildung, die laufend einer Erfolgskontrolle (Evaluation) zu unterwerfen ist, welche zu überprüfen gestattet, ob die Informationsziele erreicht werden und die praktische Ausbildung sowie der Ausbildungsplan in Ordnung sind.

### Ausblick

An Hand eines solchen Curriculummodelles, das hier nur in aller Kürze vorgestellt wurde, wird gegenwärtig die zentrale Grundschule für Instruktionsunteroffiziere entwickelt, die ihren Betrieb 1975 aufnehmen soll.

On the 1st October 1969 the Royal Air Force formed the first squadron in the world equipped with the Hawker Siddeley Harrier GR Mki vertical/short take off and landing (VSTOL) close support aircraft.

Although the introduction of this revolutionary aircraft brought many logistical problems in its train it has also exceeded the high expectations made during its extensive trials.

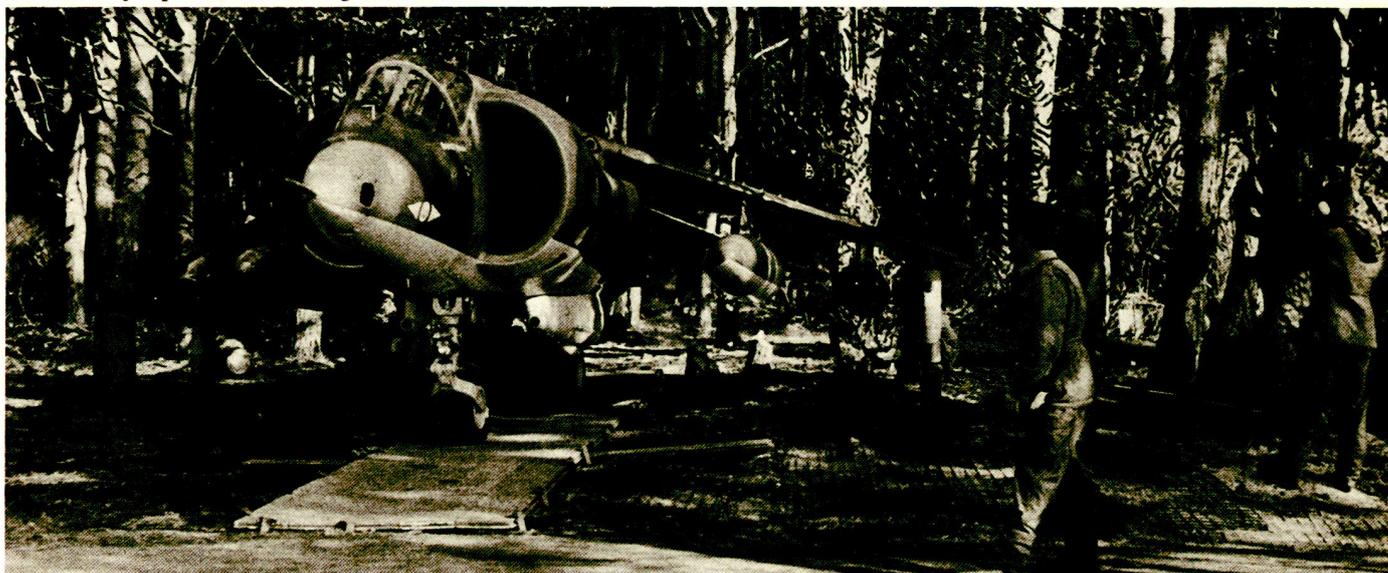
It soon became apparent that, given suitable logistical support, it could operate efficiently and successfully for extended periods from forest hides and clearings in forward areas making use of short quickly prepared 'runways' or, under some circumstances from none at all.

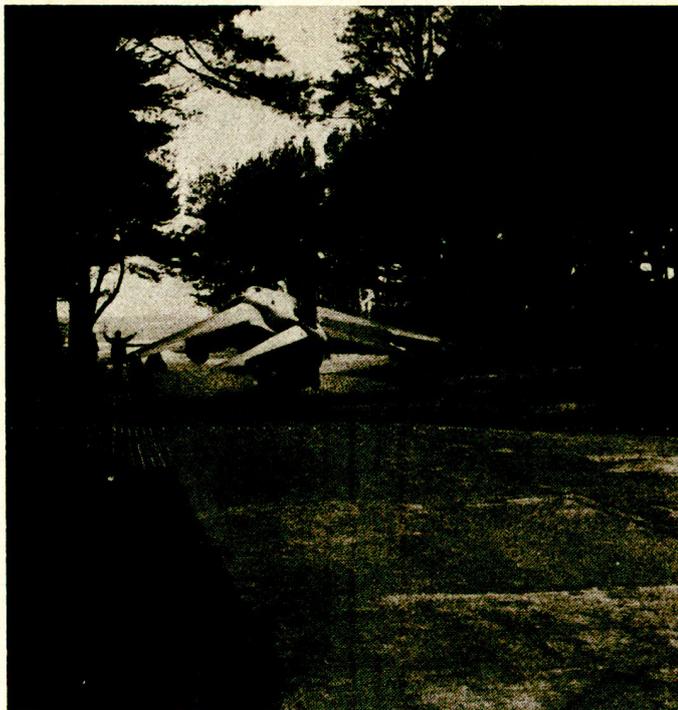
The Harriers are powered by Rolls Royce Pegasus vector thrust turbo fan engines which, by means of two pairs of rotatable nozzles, can vector the exhaust gases from 18 degrees forward of the vertical to full aft. The first models have the Pegasus 102 engine but those supplied to the US Marine Corps and to future RAF squadrons have the more powerful 103 and 105 models. These more powerful engines permit the full use of the vertical take off capability carrying the maximum load of 5000 lbs of armaments and full fuel tanks.

The Harrier has a wing span of 25 ft 4 in and an overall length of 46 ft 1 in. It has a high rate of climb; 10000 ft can be reached in under 40 seconds and it can attain a speed in level flight of about Mach 0.95 and is supersonic in a dive. It has a radius of action of about 400 miles and a ferry range of about 2000. It can, of course, be re-fueled in flight.

The five weapon pylons, four underwing and one under the fuselage, can carry the 5000 lb load. In the RAF squadrons this is in various combinations of the NATO standard tactical weapons including rockets, free fall, cluster and retarded bombs and two 30 mm Aden cannons can be mounted externally in pods on either side of the lower fuselage. The US Marine Corps include in the armament of their Harriers the Zuni 5" rockets,

1. A Harrier jump set in a camouflaged forward hide-out.





2. A Harrier moves from its woodland hide to a short «runway».

550 lb fire bombs, 28 lb and anti personnel bombs, 2.75 in rockets and Mk 81 Snakeye 250 lb retarded and free fall bombs.

The Harriers' comprehensive navigation and attack system is specially designed for high speed low level operations and includes the Ferranti inertial navigator. This system provides an accuracy of one nautical mile per hour of flying time and has the advantage of being self contained and independent of external aid. It does not radiate and is therefore free from detection and interference. From take off to target the pilot is guided with the correct heading information however complicated the route

and whatever the weather – and after the attack he will be guided home.

Immediately the first squadron became operational test exercises were under way in Scotland, Norway and Germany to discover and solve the problems of operating in various climates and away from permanent airfields. In some of these exercises the squadron has operated from one area but more usually and more realistically from two flight sites each of four aircraft and situated some miles apart. In war each squadron will expect to have three flights and possibly three areas.

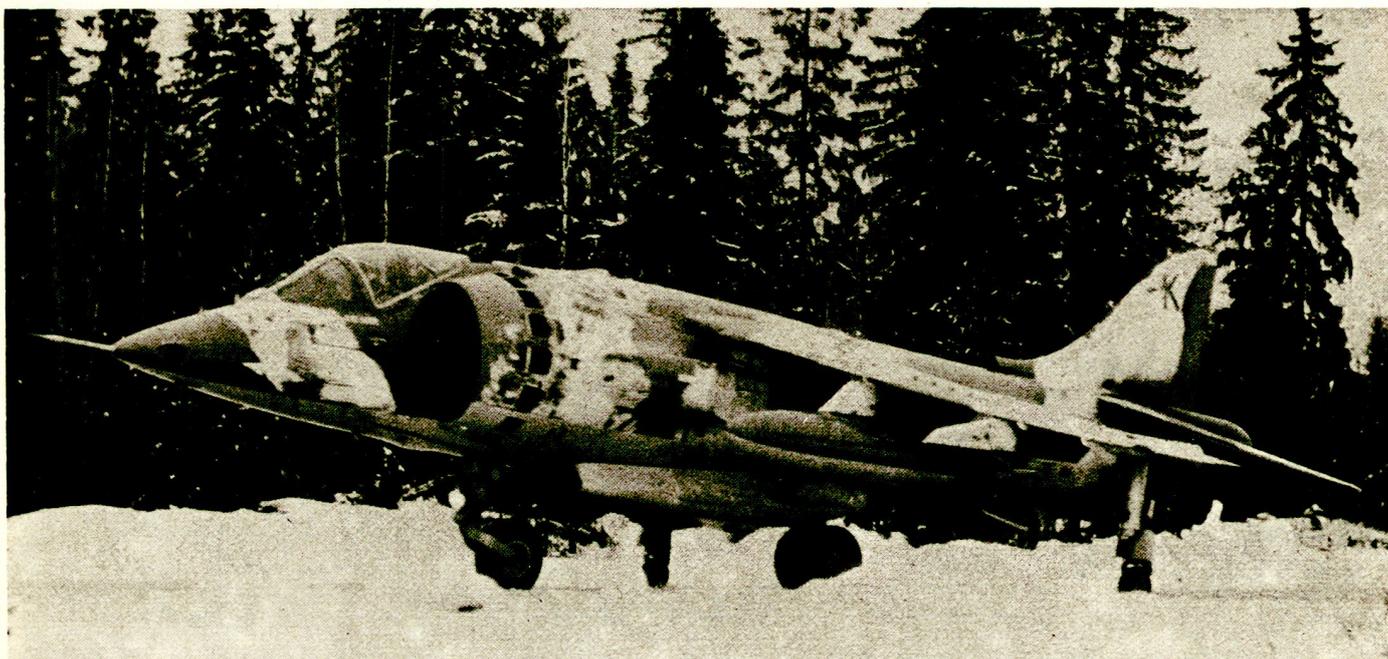
The necessity of having some form of hardened pad for vertical take off had already been foreseen; the tremendous down draft when the engines are vectored vertical for take off throws up debris which can easily be drawn into the engines with subsequent damage and danger. The best temporary pad or runway is a stretch of autobahn or metalled road but for true 'hide' operations metal Mexipad carpets have been constructed. These are easily laid for take off pads and are connected together with Pierced Steel Planking to form temporary taxiways. This can also be used to connect the hide to the road or hard field used as a short runway.

The Harriers are fitted with their own generators for starting up and can therefore operate for short periods away from a power supply. However the support squadron will normally have mobile generators available for this and to provide power for the field workshop which are able to carry out all the normal maintenance and repairs necessary. In America recently engine changes were carried out in the field in three and a half hours and the aircraft was back in the air after a ground test in five hours.

The fuel storage problem has been solved by the use of large inflatable pillow tanks which can be dug in or sandbagged around for protection. Each tank contains 10000 gallons and are re-filled by road tankers during the hours of darkness. To keep a constant check on the quality of the fuel an air portable laboratory is part of the re-fueling squadrons equipment.

Ammunition supply is, if possible, by the use of heavy load

3. A Harrier using a snow cleared runway in a forward area.



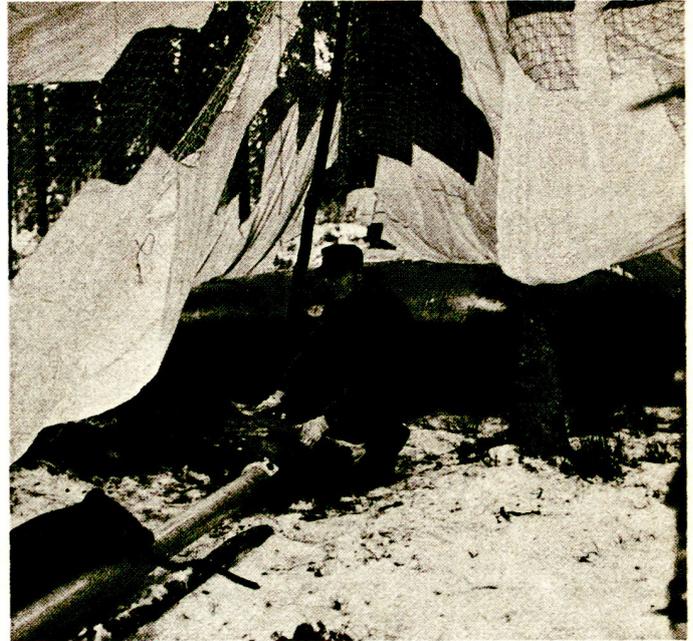


4. A Harrier operating in Norway.

carrying helicopters; if these are not available then lorries have to be used.

Local ground and air defence of the flight and squadron areas is the responsibility of the RAF Regiment though all members of the Harrier squadrons have their own personal weapons and all parts of the hide areas are linked by Walkie Talkie radios. Units of the RAF Regiment are equipped with all normal infantry weapons including mortars and machine guns. The AA defence units are presently being re-equipped from 40 mm Bofors guns to the Rapier anti aircraft missiles. This system is mobile and the missile is easy to guide because the operator only has to track the target, the missile is then automatically guided onto the target.

For the tasking of the aircraft and briefing of pilots a tented or mobile operations room is sited in the squadron and flight areas. The briefing and de-briefing is the task of the Ground



5. Mobile fuel tanks in a Harrier support area.

Liaison Officer, he and the ops room are in radio communication with the ground forces they are supporting, normally to the Brigade Air Support Operations Centre (BASOC). The ops room is also on the air force command system to the Allied Tactical Air Force HQ thereby permitting the squadron to be tasked from the highest level also and so using air powers greatest assets – flexibility and speed of operation.

The Harrier squadrons pride themselves on their speed of reaction to requests for close support of the ground forces. Over sustained operations in recent exercises air support against ground targets up to fifty miles away was provided within 13 minutes of the request being submitted in the forward areas and this included communication time and take off from fully camouflaged sites.

The role of the US Marine Corps also calls for a high sortie rate from austere bases within 100 to 150 miles. In a recent trial in the United States six Harrier AV-8As of VMA 513 flew 375 missions in ten days; the Department of Defence requirement is 252 sorties in these circumstances. Incidentally the US Marine Corps are delighted with their Harriers; they have tested them in various climatic conditions including temperatures reaching 55 degrees C in the High Californian Desert.

For an air force which is almost certain to be outnumbered as the RAF would be in Europe the V/STOL Harriers have much to commend them. Large air bases are very liable to be destroyed in the early stages of a major war but the vertical take off aircraft can survive by disappearing into the woods, forests and even villages or farm complexes for an area of only about 500 by 500 metres can hold the squadron HQ, one flight, the fuel, workshops, logistical area and ops room. Their speed, manoeuvrability and reliability have been proved under adverse conditions of terrain and climate. Both the RAF and the British Army consider that they are on to a good thing and are pressing on with improvements in techniques to ensure that the Harrier is the close support aircraft of the Seventies.