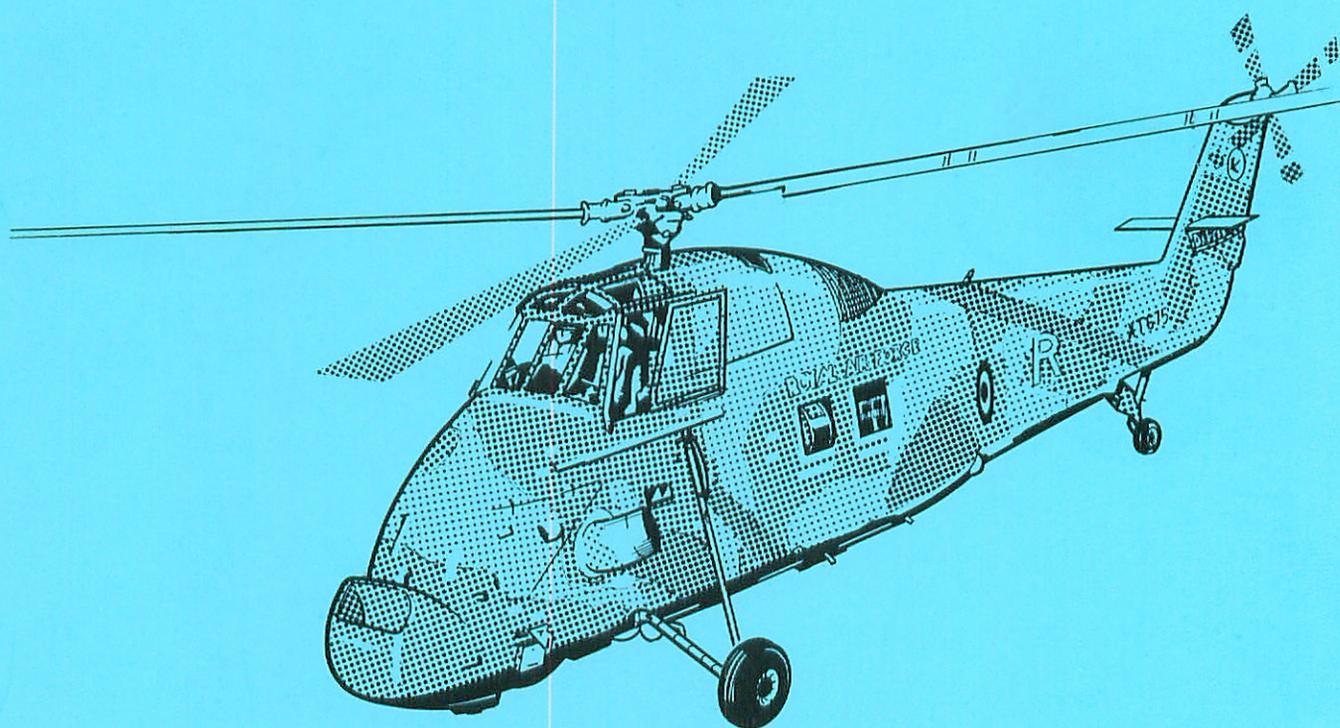


THE RAF WESSEX DETACHMENT IN OMAN

Wing Commander J.R. Dowling, MBE, DFC, AFC
and P.R. Wood



Ministry of Defence

AIR HISTORICAL BRANCH

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THE RAF WESSEX DETACHMENT IN OMAN 1974

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FOREWORD

BY HEAD OF AHB(RAF)

In the last few years oral history has become fashionable. AHB(RAF) was among the first to use the technique of interviewing officers, airmen and officials involved in operations of historic significance.

There is nothing magical about oral history. A tape recorded interview is valuable to the historian when it becomes a prose transcript to fill out and illuminate the often sparse official documentation.

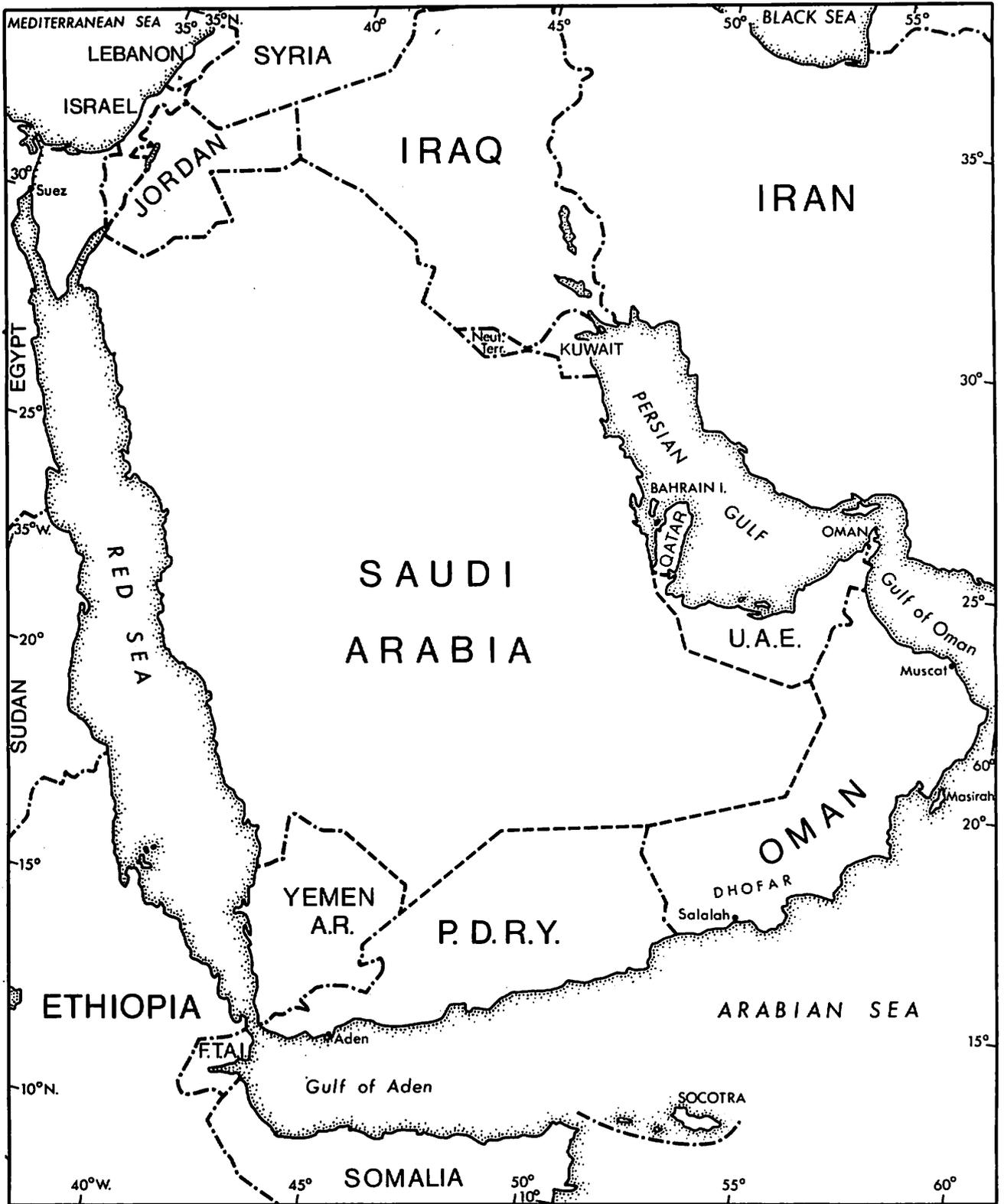
In particular it has been found necessary to discuss with officers and airmen those standard operating techniques and practices which are second nature at the time of operations but are usually lost to posterity by being unrecorded in documents earmarked for preservation.

The study now printed is based upon edited tape recordings made with members of the Wessex detachment from RAF Odiham which served in Oman in 1974. It is hoped it will be of direct use in training as well as being an interesting historical account.

E B HASLAM

ACKNOWLEDGMENTS

The authors would like to thank Sqn Ldr A S Tarwid and Flt Lt C M G Pemberton for patiently answering their questions and allowing themselves to be recorded. Also Flt Lt B C Barrett for supplying information about the work of the ground personnel, and FS G Bond for the loan of the photographs taken in the course of the detachment.



The Middle East in 1974

INTRODUCTION

In April 1974 the British Government agreed to the Sultan of Oman's request for the loan of helicopters to assist him in his struggle against the dissidents operating in his western province of Dhofar. The unit which the Ministry of Defence arranged to send consisted of four Wessex helicopters, five pilots, four crewmen, one engineering officer and 26 ground personnel. In the course of the next eight months it logged a total of 1,487 flying hours (an average of 450-500 hours per pilot); carried 2,750 short tons of freight, 15,000 passengers, 16 casevacs and 25 medevacs; and took part in six artillery moves and six large-scale offensive operations. (1)

Its primary tasks were the traditional ones of supply, troop movement and casualty evacuation, but many others came its way, familiar and otherwise, demonstrating again - on this occasion in a hot, monsoon-prone and mountainous terrain - not only the value of the helicopter but also its extreme versatility. For the air and ground crews it was judged to be a valuable experience if also a strenuous one.

What follows is an account of the operations undertaken by this Wessex detachment, based primarily on tape recordings made by the detachment commander and one of his pilots. Background material has been obtained from published sources - to avoid too high a level of security classification; note has also been taken of the official papers currently in the possession of the Air Historical Branch, but without direct reference being made to them.

A SPECIAL RELATIONSHIP (2)

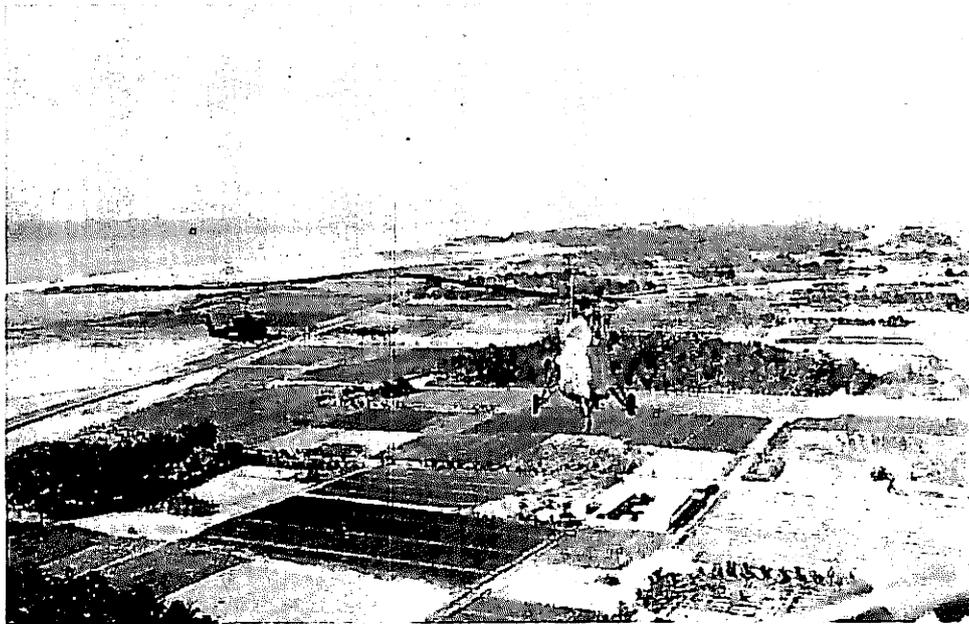
The Wessex detachment which arrived in Oman in April 1974 was but one instance of the help given by Britain to the rulers of that country. The first formal agreement between Britain and Oman had come in 1798 when the British were anxious to protect a lucrative shipping lane from harassment by pirates and at the same time counter French influence in the area. A further treaty followed in 1873.

For many years the relationship between the two countries was inclined to languish. The area as a whole was a backwater. Oman itself was undeveloped and impoverished. The interior, largely mountainous, was dominated by feuding tribes, and the Sultan's writ would seldom run much beyond the country's two fertile plains, one around Muscat in the north, and the other around Salalah in the south-west.*

With the discovery of oil in the Persian Gulf area, however, the importance of a country which - with Iran - could control the tanker lanes to the west was likely to increase. Britain, with her traditional Middle East connections, now had good reason to maintain a relationship by which her strategic requirements in the area could be attained, at seemingly little cost: a stable domestic regime in the sultanate and its freedom from foreign influence. The RAF too had an interest, as the staging facilities which Oman could offer at Masirah and Salalah were a valuable link in Britain's system of eastbound air transport and reinforcement routes.

In the years of rapid change after the Second World War, the situation became increasingly complex. Five factors were emerging: a long-standing boundary quarrel with Saudi Arabia which led to the Sultan seeking British help in 1955 (the RAF played a considerable part in the ensuing campaign); intermittent feuding between the turbulent tribesmen of central Oman and their Sultan; fears of expanding communist influence and the certainty of growing Arab nationalism; and not least mounting British embarrassment at being asked to provide direct military assistance which the uncharitable might denounce as imperialist intervention. The diplomatic cost of ensuring that Oman remained a more or less stable, independent country - and of retaining the staging facilities which it offered - was thus rising sharply and was likely to go on doing so.

*Oman has an area of 82,000 sq miles (rather smaller than that of the United Kingdom) and a population of only 750,000. There is no manufacturing industry and before the discovery of oil such wealth as there was came from dates, limes, fruits, vegetables and tobacco grown in the plains and exported, along with dried fish and frankincense; the mountains provide some pasture for livestock, the chief source of tribal wealth.



A helicopter formation approaching Salalah with the fertile coastal plain below

Britain's embarrassment was therefore predictable when in 1957 the Sultan again asked for military aid. On this occasion the crisis was ostensibly an internal one - another tribal uprising against the Sultan - but by now the rebels were in part Saudi trained and had Egyptian support; and once again Saudi Arabia might be seeking a territorial advantage. In so delicate a diplomatic situation with much at stake the coveted answer was a swift conclusion obtained by minimal force and an equally swift withdrawal of the air and ground forces sent to help the Sultan. Some sort of conclusion was indeed obtained: a combined air and ground attack decisively defeated the enemy, but enough of the rebels escaped to the Jebel Akhdar, Oman's highest mountain, for Britain to be confronted with the very situation she wished to avoid: a choice between a hazardous assault up mountain slopes and a slow and diplomatically damaging war of attrition. The former was beyond the resources of the Sultan's army while the rebels were still flushed with confidence; the latter was therefore attempted, in the form of blockade and harassment, mainly by air attack. Results were slow to come, but in time rebel morale was known to have fallen sufficiently for a frontal assault to be an acceptable risk. Led by the SAS, it

succeeded, but once again the rebel leaders were able to escape, at the cost of abandoning their last foothold on Omani soil.*

But wherever they were, they - or others of like mind - remained a potential hazard and the Sultan's decision to expand his army and build up an air force of his own came as a considerable relief to the British government. With British backing for his armed forces, and for his civil administration, the Sultan, it was now hoped, would be able to deal on his own with any future crisis, internal or external, so freeing Britain from the stigma of direct intervention.**

*For a full account of the part played by the RAF in this and the 1955 campaigns, see Sir David Lee, Flight from the Middle East.

**In the exchange of letters between Britain and Oman in July 1958 the British Government made three promises:

'In pursuance of the common interest of Your Highness and Her Majesty's Government in furthering the progress of the Sultanate of Muscat and Oman. Her Majesty's Government in the United Kingdom have agreed to extend assistance towards the strengthening of Your Highness's Army. Her Majesty's Government will also, at Your Highness's request, make available Regular officers on secondment from the British Army, who will, while serving in the Sultanate, form an integral part of Your Highness's Armed Forces. The terms and conditions of service of these seconded British officers have been agreed with Your Highness. Her Majesty's Government will also provide training facilities for members of Your Highness's Armed Forces and will make advice available on training and other matters as may be required by Your Highness.

'Her Majesty's Government will also assist Your Highness in the establishment of an Air Force as an integral part of Your Highness's Armed Forces, and they will make available personnel to this Air Force. Your Highness has approved the conclusion of an agreement for the extension of the present arrangements regarding civil aviation and the use by the Royal Air Force of the airfields at Salalah and Masirah.

'We also discussed the economic and development problems of the Sultanate and Her Majesty's Government agreed to assist Your Highness in carrying out a civil development programme which will include the improvement of roads, medical and educational facilities and an agricultural research programme.' (3)

And this - up to a point - he was able to do when rebellion broke out again in 1963, in the Dhofar, the extreme western province of the country. It was ideal guerrilla terrain, mountainous, sparsely populated and roadless. The cause of this uprising was, as often before, the deep dissatisfaction felt by a very independent breed of tribesmen, who had never known the discipline imposed by central authority, against a Sultan whose instincts in many respects were little better than feudal. In addition the oil boom in the Persian Gulf and the opportunities it offered of lucrative employment brought the Dhofaris into contact not only with a vision of unimagined wealth, but also with the marxist and nationalist ideas fermenting in the region. For all these advantages however the rebels made little headway; their number was small and they could manage only spasmodic forays, the most flamboyant of which was an attempt to assassinate the Sultan in 1966. What they needed was foreign help and a reliable source of arms, but the Saudi connection had now been severed.

With the independence of Aden in November 1967, however, the Omani rebels acquired a radical neighbour, impoverished but ready to assist and be a channel for any foreign help that could be found. The character of the rebellion now changed - from tribal to ideological - and a programme was put forward of extreme radicalism, aiming at widespread popular support throughout Oman. Land was to be collectivised, and agricultural committees and model farms set up; those who disagreed were likely to be shot.

In the favourable conditions of the Dhofar, the rebels now began to do better. With only a few hundred men in the field, trained across the border in the People's Democratic Republic of the Yemen (PDRY)* and as far afield as China and infiltrated into the Dhofari mountains, the rebels were able to gain a firm grip on the province, by a mixture of promises and threats, and compel the Sultan to devote a disproportionate amount of his limited resources in dislodging them. Ultimately, however, the rebellion would succeed only if it could both maintain its momentum and spread beyond the Dhofar, particularly into the northern area of the country around Muscat. This it twice failed to do.

To oust the rebels from the Dhofar two things were needed, a concerted military policy employing the lessons learned in other anti-guerrilla campaigns, and a determination to bring modern government with its amenities and disciplines to the province. There was hope of both once the old Sultan had been deposed in 1970 and his son had come to power. The first plan was to control the rebels by establishing a number of strong points from which the Sultan's patrols could operate. In the extreme west a spectacular eyrie had been built

*Known from November 1967 to November 1970 as the People's Republic of South Yemen.

high in the mountains, where they reached close to the sea. Known as Simba, it overlooked not only the PDRY border but also the most convenient route for rebel infiltrators, and their supply trains, to use. Salalah itself was defended by two inner strongpoints, called Hedgehogs, manned by the RAF Regiment, and by an outer line of army posts, known as Dianas, manned by local troops under British officers; some distance west of the town was the Hammer Line, a strong defensive line running north from the plain up into the mountains.



Hedgehog Bravo, one of the two inner strongpoints defending Salalah

The results of the new policy were somewhat mixed; the rebels were driven back from the Salalah area into the mountains where their activities were considerably restricted during the dry months, but when the monsoon came, the Sultan's patrols were withdrawn and the rebels were able to reassert themselves.

In 1973 the anti-guerrilla strategy was taken two steps further. First the Sultan's patrols were left in the mountains throughout the monsoon season. Second, it was decided to build a further defensive line - to be known as the Hornbeam Line - stretching right across the mountains from the sea to the desert beyond, dividing the province into more manageable compartments.

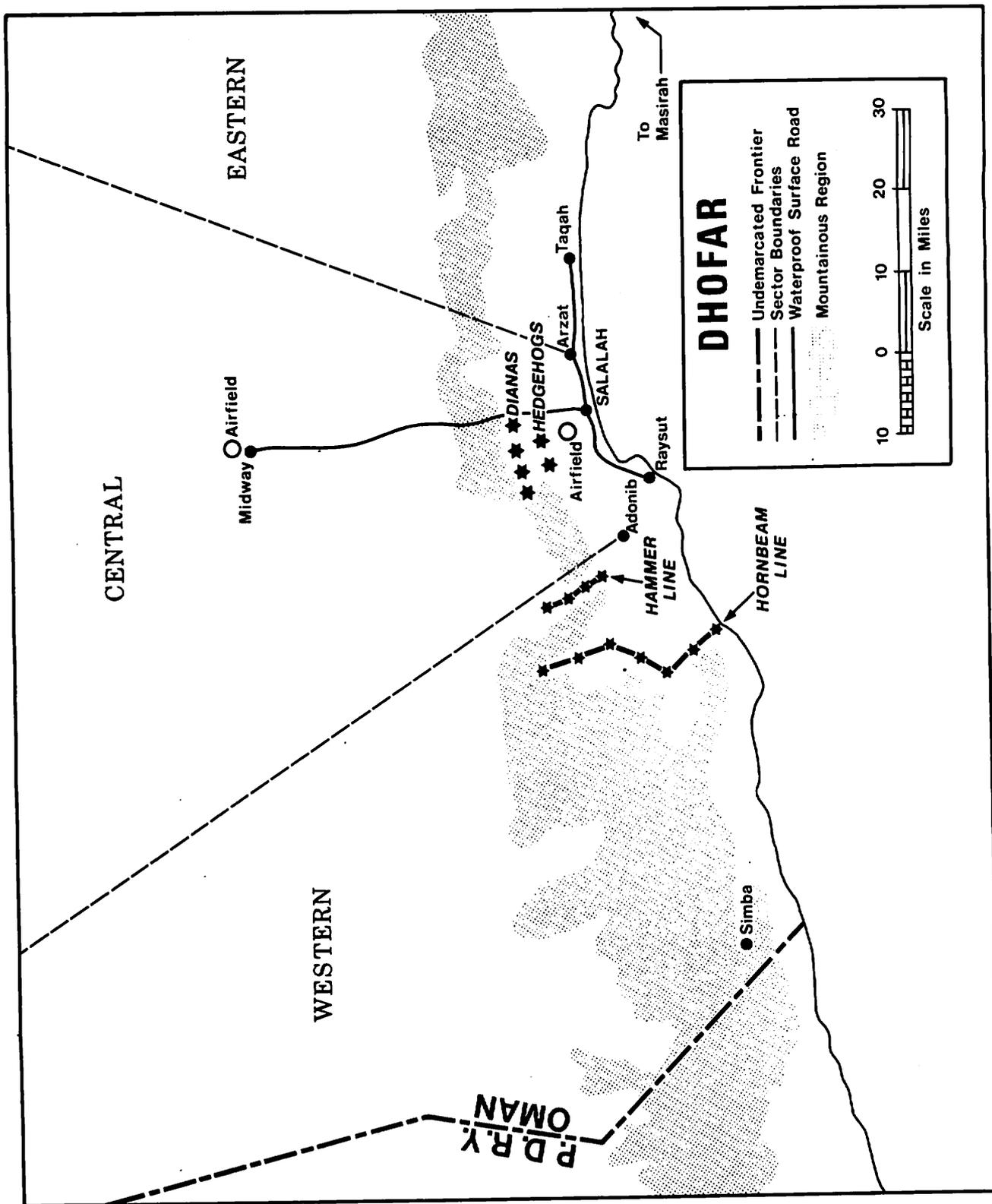
Within these the Sultan could operate intensive patrols to mop up existing rebels and prevent, or at least restrict, further infiltration. And once the mopping up process had begun civil administration teams could move in and by their labours persuade the people of the province that the central government had more to offer them than the rebels.

The construction of the new line however, requiring the movement of vast quantities of barbed wire and other materials, made the supply problem - always difficult - very acute indeed. In the mountainous terrain of the Dhofar little moved except by helicopter, or in the case of the rebels by camel. The helicopter element of the Sultan's new air force (SOAF) was thus faced with a vast increase in its normal task of troop movement and supply at a time when it was also proposed to increase the number of offensive patrols operating against the rebels and when its own numbers were reduced to less than ten, some of which had to be stationed in the Muscat area. What was worse, it was obviously desirable that the Hornbeam Line should be completed before the onset of the monsoon in late June or early July. Hence the Sultan's approach to Britain for the loan of a helicopter flight.*

*The Sultan's air force, formed only in 1958, was equipped with BAC 167 Strikemaster light jet attack aircraft, Skyvans and Agusta-Bell 205 helicopters. Aircrew were either seconded RAF officers or former British servicemen employed on contract.

The Sultan's army was approximately of brigade strength, officered in the main by British seconded or contract officers.

Facing them in 1974 was a hard core of insurgents numbering perhaps 800 with a further 1,000 for whom fighting was only a part-time occupation. The training and indoctrination of many of the hard core had begun at a very early age across the border in the PDRY with a few of the most promising pupils being sent on to graduate in the Soviet Union. The main rebel armament consisted of automatic and semi-automatic rifles, mortars and anti-tank and anti-personnel mines, mostly of Russian or Chinese manufacture. They had no air support; rumours of rebel helicopter activity could be discounted in the absence of any hard evidence that it existed. (5)



The Dhofar Province in 1974

DESPATCH

Once the diplomatic details had been agreed, events began to move fast. Odiham had already been warned in late February 1974 to prepare four Wessex HC 2 helicopters from No 72 Squadron for a possible move to Oman. On 21 March orders came for the final preparations to be made and the aircraft despatched. Seventeen days later they were in the Dhofar and ready to operate.

The process of preparation and despatch had begun with the selection of the four aircraft best suited to the tasks ahead.* They were resprayed in desert camouflage, some radio equipment not needed in Oman was removed and a number of modifications carried out. This work took four days to complete.

Meanwhile two teams of engineering tradesmen from No 72 Squadron had been chosen, first to break the helicopters down and load them into the two Belfasts which would fly them out to Masirah, and then to fly out themselves - by Hercules - and reassemble them. All the spares and equipment needed for reassembling the helicopters in Masirah and servicing them while they were in Oman would go in the Belfasts.

The first Belfast left Odiham on 29 March but was delayed at Akrotiri and did not reach Masirah until late on 2 April - to find that the second Belfast which should have been 24 hours behind it had in fact arrived two days earlier and that its two helicopters had already been assembled and airtested.** The *second* two Wessex were immediately assembled and all four were ready to fly by 4 April. The engineering detachment then returned to Odiham. In all, dismantling and assembling the four helicopters had accounted for just one thousand engineering manhours, some of them in hangar temperatures of over 100 degrees Fahrenheit; a total of nearly seven hours flying was logged in the course of the airtests and shakedown. (7)

In the meantime the aircrews and ground personnel to form the detachment on loan to the Sultan had arrived at Salalah, their operating base, in four Hercules, together with the helicopter packups. The pilots were then sent over to Masirah, with the detachment engineering officer and a number of technicians, to bring the aircraft back. As the distance between the two airfields was some 360 miles, a refuelling point, guarded by Omani troops and stocked with enough spares to meet any mischance, was established half way. The trip back to Salalah was then accomplished without incident. (8)

*XR 511, XR 525, XS 678 and XT 675.

**By the two aircrews sent out with the engineering detachment. The Belfasts were routed to Masirah rather than Salalah because they were considered, in the conditions of the time, too vulnerable to enemy fire. (6)

FIRST IMPRESSIONS

The situation which presented itself when the Wessex arrived in Salalah on 6 April 1974 contained, as might have been expected, a fairly even balance of advantage and disadvantage.

The detachment was designed to be self-supporting in everything except food and accommodation which were to be supplied by RAF Salalah. In some respects however the accommodation available was not ideal. Ground personnel were to use part of a hangar for major inspections, but found the intense heat under cover too trying and preferred to work out in the open; their rest room was a small tool shed, the lack of air-conditioning being compensated for in some degree by the presence of a refrigerator. The pilots and crewmen from the detachment shared the SOAF crew room - no more than 15 feet square but air-conditioned - which also had to serve as an office for the two helicopter commanders. Spare time therefore tended to be spent in the crews' own quarters.



Wessex XT 675 in SOAF colours

These were generally good, officers and SNCOs being quartered in permanent air-conditioned buildings. Other ranks were put into tents when they first arrived. However, as the detachment commander noted in his final report: 'It quickly became obvious that their efficiency would be impaired unless they were properly accommodated. Pressure was therefore brought to bear on SOAF and within two weeks accommodation in permanent buildings was secured.' (9)

THE TASKS AHEAD

Operationally the prospect was one of intensive flying for many months to come. The first task would be the laborious one of completing the construction of the Hornbeam Line. At the same time - and for the foreseeable future - there were the routine transport tasks in areas where surface movement was limited or impossible: resupply (particularly to ensure that outposts were well stocked before the monsoon began and with it the risk that flying might be restricted for days at a time), trooplifts, and casualty and medical evacuation.

In addition there were more specialised tasks: taking patrols into forward areas from where they could flush out and mop up the enemy (the Dhofar Brigade's primary task); offensive operations in conjunction with the ground forces; the movement of batteries; co-operation with the army in throwing cordons round villages; attracting enemy fire; directing air strikes; and controlling artillery fire. (10)

In any of these operations there was always a risk in the target area from enemy fire - rifle or mortar.* In the last weeks of the detachment there were also rumours that the rebels had acquired Sam 7s; there were no reports of any being fired while the detachment was still in Oman but the rumours had at least the effect of causing Wessex and SOAF pilots alike to re-examine their flying tactics, whether it was now wiser to fly low level or keep to a height well above mortar fire. (11)

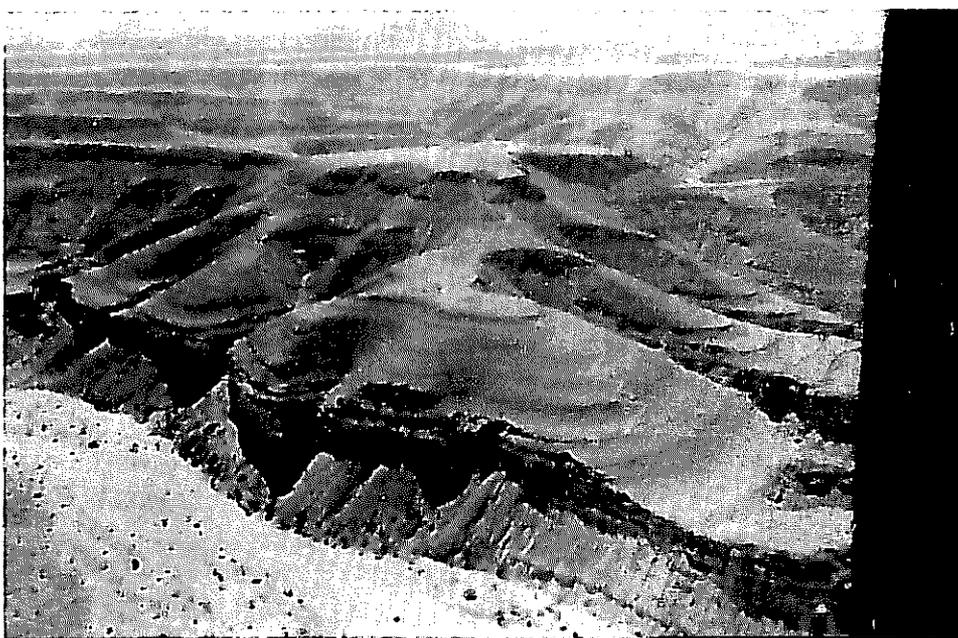
One happy feature of the detachment was its close co-operation with the other British elements in Oman, notably the Strikemaster pilots and the British Army officers with the Omani ground forces. This was all the more effective because the British element was very small in number and personal contact was therefore easy.

On the more important operations jet top cover was available and the Strikemaster pilots could be asked to direct the helicopters on to the target; and if the enemy was attacking an intended landing site they could be used to bomb the area around it.

*One of the most powerful enemy weapons captured was a formidable Russian machine gun.

Co-operation with the ground forces too could be very close when there were British officers with them, * particularly as the latter came through experience to appreciate the problems which the helicopters commonly encountered. Understanding of this kind could help to reduce the risks from enemy gunfire and alleviate some of the other problems of flying. (12)

These were by no means negligible - in that environment - in daylight and good weather, but at night (primarily for casualty evacuation) and during the monsoon they were vastly more taxing.



Typical of the jebel - Oven position on the northern tip of the Hornbeam Line

The main problems to be faced in the first weeks stemmed from the nature of the terrain - 'hot and high' - with temperatures varying between 25 and 42 degrees Centigrade and heights between sea level and 8,000 feet. The operational area however was of reasonable size - about 4,000 square miles** - and it was therefore possible for the pilots to get to know it quickly, familiarity with the area being one of the better guarantees of safe and successful operations.

*But see p 36.

**The Simba fortress was some 80 miles only from Salalah.

To make matters easier at the beginning the Wessex pilots were able to fly with the SOAF helicopter force whenever opportunity offered, to spy out the land and observe the techniques adopted by the SOAF pilots.

So acute however was the need for helicopter lift in the first weeks that the Wessex detachment was integrated into the SOAF tasking system within 24 hours of its arrival - and reconnaissance of this kind could be fitted in only as operational demands allowed. (13)

FUEL AND COMMUNICATIONS

In some respects of course - notably fuel, radio communications and tasking - the detachment was moving into a well established organisation. In the case of fuel, the system of refuelling points developed by SOAF was working effectively, with each forward location carrying its own stock of fuel in drums and supplied with a pump. For the Wessex therefore it was a matter of carrying an adequate fuel supply (1,600 lb was the standard load on resupply missions) to take it to the location and give it reasonable working time there. It could then refuel at the location.



Refuelling in Cork wadi with local Omani helpers

Casualty and medical evacuation flights required more elaborate treatment and for these (where the helicopters could be working to a radius of up to 180 miles from Salalah) fuel stocks had been widely prepositioned and there would always be a refuelling point within 20 minutes flying time.

Responsibility for maintaining these stocks rested with the SOAF operations room at Salalah which kept a close eye on the state of supplies and would know from day to day how much was available at each location. Supplies were delivered by SOAF Skyvan if there was a landing strip available - otherwise by the helicopters themselves.

On some tasks it was necessary to carry fuel in the aircraft, particularly on flights beyond Midway, the airfield in the north of the province.* The procedure then was to refuel on arrival at Midway, pick up the drums of fuel there, refuel at the destination from the drums and then again at Midway on the return flight. (14)

As for radio communications there were three operational frequencies available to the Wessex in Oman: UHF for air traffic control at base; HF to contact the brigade operations room at Salalah (where there was always a controller on duty whenever flying was in progress) and the various regimental headquarters; and the Blue Sarbes for short range contact with individual locations, regiments, companies and platoons wherever they might be, in forward positions or on patrol. The system proved adequate in the main with two qualifications: the HF tended to be virtually useless in the morning and at night, and the Blue Sarbe was both very insecure (sets had fallen into rebel hands and the enemy could sometimes be heard talking on them in English and even Cantonese) and also on occasion very cluttered. Strike aircraft would therefore move to the Red Sarbe during an operation, when a vast amount of information would be passing between the pilots and the forward air controller, and any helicopters accompanying them would do the same.** (15)

*For example, on one occasion a civilian was picked up and taken to hospital from a point some 150 miles north of Midway. The airfield there was built originally to support Salalah by air during the monsoon season when air and sea communications were liable to interruption. By 1974 it had a 6,000 ft runway capable of taking Hercules aircraft and was linked to Salalah by road.

**The Sarbe family of radio beacons with a speech facility of limited range (some three miles) were colour coded according to frequency.

TASKING, UTILISATION AND SERVICEABILITY

The SOAF system of tasking into which the Wessex detachment was assimilated was simple - so simple in fact that the reins were sometimes thought to be too loosely held. Requests for lift were to be lodged with brigade headquarters in time for them to be passed to the tasking cell (attached to the SOAF operations room at Salalah) at least 24 hours before the required operation. There they would be scrutinised by the flight lieutenant in charge and allocated a priority before being sent across to one or other of the flights for action.* In this way the flight commanders would normally know their basic commitments for the following day in the course of the preceding afternoon.

Many of the tasks were routine or soon became so: supply operations, for example, entailing the delivery of a given number of pounds of freight to a chain of army posts, all rapidly becoming familiar to the crews, or troop deployments involving the movement of Omani soldiers from one location to another. In such cases the instructions given by the tasking cell were usually adequate and needed no amplification. Where the task was more complex it would be the responsibility of the pilot to obtain any further information he needed from the unit concerned.

The more flexible system of allocating a helicopter and crew to an army unit for a specified number of hours (say from 8 am to 5 pm) was soon introduced and became standard practice. The pilot was then free to undertake any task not involving contact with the enemy and would take his instructions directly from the unit commander. For practical purposes a further refinement followed: the helicopter commanders would also lay down the number of hours which could be spent flying in addition to specifying the overall period for which the helicopter would be at the beck and call of the ground unit. In this way the ground crews were provided with a day to day forecast of the number of hours for which each helicopter would be actually operating, vital information if servicing schedules were to be maintained and with them the availability of aircraft in a small detachment. (16)

*The SOAF helicopter flight or the Wessex detachment.



Dawn resupply from Mugsayl on the Hornbeam Line

Where the tasking system was perhaps inadequate - and the reins were said to be too loosely held - was in the processing of spur of the moment requests for helicopter lift, often no more than a simple inquiry from an outlying unit about the availability of helicopters in its area. The objection here felt by pilots was not to additional tasks as such - all they normally involved was more fuel and more flying time - but to the vague and often ill-considered way in which they were passed on to the pilot by the tasking cell, usually with no details given or even a direct order, and no assessment of priority. The result often enough was that the pilot would arrive to undertake the new task only to find that he was no longer required. What was needed in the SOAF tasking cell was the management expertise and facilities of a forward tactical headquarters - much more than a single tasking officer would have - making it possible to assess new demands as they came in and give the pilot a definite order of priorities. (17)

In all, the tasking system in operation in Oman gave the pilot a fair measure of independence, since he would be outside the detachment commander's immediate control for hours at a time, responding exclusively to the

demands made on him by the unit to which he had been allocated, and restricted only by the knowledge that his writ of independence did not extend beyond carrying out routine tasks in the way the unit commander requested. Other operations - for example, the deployment of a reconnaissance patrol into a forward area outside defended positions - would need the detachment commander's consent. Independence of this kind, in the latter's view, developed valuable qualities: the younger pilots were 'very keen and very able', but they needed 'a restraining hand at times to save them from the consequences of their enthusiasm and from endangering their passengers and their aircraft'. (18)

In all this activity SOAF headquarters at Muscat, some 600 miles from the operational area in the Dhofar, played little part. The two helicopter units were in practice left very much to manage their own affairs with the local SOAF air commander (a seconded RAF wing commander) keeping a benevolent but distant eye on proceedings through his own staff. (19)

Utilisation was therefore very much a matter for the detachment commander within the guidelines laid down in the agreement with the Sultan. Under this the Wessex were tasked for 40 hours per aircraft per month, or 160 hours per month for the whole detachment, but as payment was to be by the number of hours actually flown and the Ministry of Defence in London was willing for the detachment to meet all reasonable requests, without endangering serviceability, the actual total was likely to be substantially higher with a correspondingly greater burden falling on aircrew and ground personnel alike.

In the outcome owing to the shortage of helicopter lift in Oman at that time the detachment flew an average of between 180 and 220 hours a month or some 200 hours in all more than had been originally budgeted for. (20)

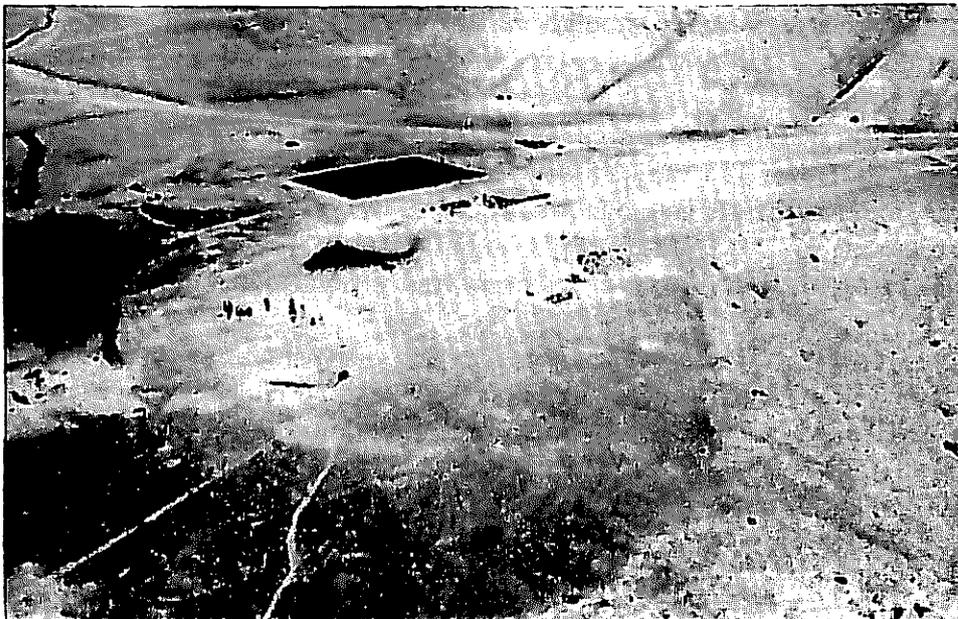
What had contributed substantially to this achievement was the fact that an average serviceability rate of 75 per cent (or three helicopters always available) had been maintained throughout the eight months of the detachment.*

This was in itself noteworthy: the combination of heat and the sandy conditions in the Dhofar province meant that heavy wear on the Wessex engines had to be expected. Indeed experience at Sharjah suggested that the engines might have to be changed as often as every five to ten hours. In the event 12 engines were changed in the course of the detachment, but probably only four or five of these changes were directly due to local conditions. A contributory factor to this low rate of engine change was almost certainly the use of correct flying techniques, and of membranes in the forward

*See below pp 22-24.

areas, which helped to reduce wear and tear to a minimum.* (21)

Another example of careful flying techniques being adopted to save wear concerned tyres. In the first weeks of the detachment the rate at which they were being changed was alarming and the detachment commander discovered that his pilots had widely differing ideas of how landings should be made in that kind of terrain where the surface looked sandy but had hard volcanic rock underneath. The desirable technique was therefore 'to land with nil speed and nil height, constantly reducing speed and height, but with normal forward movement until the touchdown was made without any forward movement'. The result was a virtually imperceptible landing at the cost of 'the highest concentration and effort'. (22)



**Bole position on the Hornbeam Line with the 80ft
square neoprene membrane in position**

*Membranes were available on some locations on the Hornbeam Line to protect aircraft from the dust and sand thrown up on landing and taking off. Those used in Oman consisted of neoprene plastic sheeting, 80 feet square and weighted at the edges. They were put down by the troops and secured with rocks, and stood up very well to the wear and tear of Wessex and 205 landings; the only damage was by enemy fire.

PILOTS AND CREWMEN

A further factor contributing to the high utilisation rate was the practice of using crewmen as second pilots. The detachment was undeniably short of pilots for the concentrated flying which lay ahead of it in an area where to fly with two pilots in each aircraft was virtually essential.

Over the eight months of the detachment pilots flew 75 hours a month on average as first pilot, and perhaps as much as 80 hours, with totals of between 450 and 500 hours over the whole period. Co-pilot time added considerably to this total. No strict limit was placed on pilots' hours ('with two pilots in an aircraft it was not important'). The detachment commander would keep an eye on each pilot's total, if he was in the area, but it would often amount to seven or eight hours a day. The pilot had also to be available continuously seven days a week over the whole eight months, with three days' local leave and ten days at home. (23)

The root cause of this pressure was the need to fly two up - 'single pilot flying was uncommon until the very end of the detachment'. The main reason for flying with two pilots once they were all familiar with the area was that most of the flying was done over terrain where the enemy was making frequent border crossings. A pilot therefore on a mission to supply a number of locations in such an area had a choice: he could fly high but if he did so, he was faced with a considerable problem. Leaving one location to resupply the next perhaps no more than two miles away he would have the laborious task of climbing to 4,000 feet in a spiral above the first location, flying in a straight line to the second, and then spiralling back down again, taking possibly ten minutes to cover the two miles. Additionally, the Wessex was not the most effective of aircraft at 8,000 feet (the locations were on average some 4,000 feet above sea level), especially in high temperatures and could not reach any great speed under those conditions.

The alternative was to fly low level with the risk of being shot at by infiltrators waiting for nightfall to cross the line.

Two pilots were therefore needed for safety's sake, 'otherwise we should have been happy to fly singly. Indeed, perhaps towards the end we were getting a little complacent - we had been up and down the Hornbeam Line for perhaps a 1,000 hours and nothing had happened.' But with one pilot only there was always a risk: 'on one occasion one of the 205s was flying a reconnaissance and had been tempted down too low and was fired on. The pilot was shot and everyone else killed because there was only one pilot in the aircraft.'

The second pilot had other uses too and there were many occasions on which his help was vital: particularly as a navigator to guide a pilot into a location at night and for low flying, especially when there was a risk of being shot at. (24)

But with the intensity of operations required of the detachment flying with two pilots posed practical problems. It was possible first because all four aircraft were seldom in the air at the same time. With three aircraft airborne, 'two would carry two pilots and the third a pilot and a crewman in the left hand seat'.

The second element was therefore the use of crewmen as co-pilots: 'all were able to fly the aircraft and all were able to bring it back should the pilot be injured. Two were in fact capable of instrument flying and could take the aircraft up and climb to 5,000 feet without the pilot touching the controls, even through thick cloud.' (25)



Members of the detachment. Back: Sgt Bond, Sqn Ldr
Tarwid, Flt Lt Mansfield. Front: Flt Lt Wright,
MALM Marriott

THE GROUND CREW

On the ground the problems faced - though typical in some ways of this kind of operation - were substantial. The engineering personnel, for example, had been drawn from a number of different units, but owing to the unfavourable time factor no refresher training had been possible before departure and there had been no opportunity to assess individual abilities.* In fact, most of the engineering personnel had only a limited knowledge of the equipment they were to use and 'only those few airmen drawn from Odiham's strength were familiar with the pack ups, the publications, documentation and specialist tools and procedures'.

Many were somewhat out of practice and took some time to master the more difficult component changes and the engineering officer himself carried out or directly supervised 'most of the diagnosis of the more obscure defects, particularly during the early part of the detachment'.

In general, however, the situation improved rapidly. 'The more experienced fitters tried to involve the less experienced in all the rectification work in order to improve experience levels.' Attitudes changed too and 'it was made clear that we were there to fly and that we should take a pride in how much flying we did regardless of the effort it might take. We would accept nothing less than 100 per cent serviceability, spares permitting, save in exceptional circumstances.'

In bringing about this improvement, two factors were of particular importance. The first was the obvious (and growing) success of the detachment and the value of the work it was doing. The tasking pattern itself 'proved to be an incentive to the servicing personnel to get as many aircraft on task as possible. As most of the "bread and butter" work of the helicopters was the resupply of forward areas cancellation of the task was out of the question. Bad weather or aircraft unserviceability simply meant postponement or extending the duration of the task.' The casevac standby also helped to keep morale high. 'Seeing the state of those brought back heightened the airmen's sense of urgency. Provision of the casevac standby made a great contribution to the morale of the troops on the Jebel and the importance of this was not lost on the Wessex personnel.'

*Only six of the ground crew were serving on Wessex units when they were selected for the detachment, but most of the others had worked on the aircraft at some time.

The second factor was the gradual improvement in the facilities for recreation, with barbecues, trips to local beaches, visits by helicopter to outlying villages and by fixed wing aircraft to Muscat. When the detachment's stay in Oman was extended to eight months, two weeks' home leave was granted and although passage arrangements were very uncertain three groups were despatched and returned within the allotted time. (26)

SERVICING PROBLEMS

The working pattern was arduous. If no 200 or 400 hour servicings were in hand the servicing personnel were divided into two shifts with 24 hours on duty and 24 hours off, beginning at midday. On Friday, the traditional Muslim week-end day off, one shift worked a double shift, so ensuring that everyone had at least one full day off every two weeks. When a 200 or 400 hour servicing was due a third team was formed from the two shifts and it worked until the servicing was completed.*

Aircraft were serviced to the same periodic schedule as that operated at home, a system which, however, 'proved to be a great hindrance to good aircraft availability'. To achieve its monthly flying target the detachment had to fly some eight hours a day with the result that each aircraft would spend an average of 22 hours a day on the ground. 'When it became due for servicing, however, it might then become unavailable for two to three weeks continuously.' In the engineering officer's judgment, therefore, 'the use of a progressive/opportunity servicing system would ensure that work could be carried out in short starts on a day to day basis improving aircraft availability considerably'.

In general, improvisation was the essential ingredient in producing the high serviceability rate achieved in the course of the detachment. One of the worst problems, for example, was the constant shortage of spares. Local holdings were inevitably very small and deliveries were slow, ceasing altogether during the Cyprus crisis and taking a long time to build up again afterwards. 'The lack of instantly available spares meant that all the aircraft would seldom be fully serviceable at the same time', although the standby aircraft was normally so, particularly its radio and navigation aids.

*Working after dark was discouraged, the Askari airfield guards being reportedly trigger happy, although in the event 'there was only one shooting incident of the airfield, the shot being allegedly aimed in the general direction of a RAF policeman or, more likely, his dog'.

The response to this situation was twofold. First, every effort was made not to hold up routine servicing through lack of spares. If what was needed was not available, the defect would be deferred until the necessary spares arrived, perhaps some weeks later. The result was that when a 200 or 400 hour servicing was completed the aircraft might have 20 or 30 deferred defects to be rectified in the course of the following month or so.*

Second, aircraft would be matched to their tasks. Radios and some other components could be transferred easily from one aircraft to another, 'but when this could not be done good planning and liaison between aircrew and ground crew ensured that an aircraft was suited to its task. For example, long tasks involving numerous short legs normally demanded a fully serviceable auto stabilisation equipment (ASE) system and a torquemeter whereas a straight-forward, short single leg transit could manage without ASE and could fly on fuel flow alone without a torquemeter.'**

The servicing facilities at Salalah were predictably limited when compared with those available at a normal RAF station. One major facility found lacking was a tie down base which everyone on the detachment had been brought up to believe essential, but as it was unlikely to be provided quickly an alternative procedure had to be devised. The conclusion reached after considerable discussion and the perusal of all the available publications was that 'far from being essential, the tie down facility is really a rather expensive "belt and braces" luxury. It was decided that by carrying out slightly more extensive untethered ground runs and a cautious initial air test followed by a thorough airborne response and performance test, no significant hazard would exist. In fact, this proved to be the case.'

Doubt too was thrown in the course of the detachment on the validity of the Power Performance Index checks (PPIs), which compared various performance parameters (gas generator RPM, power turbine inlet temperature, torque and aircraft weight). It was generally assumed that these checks would reveal any excessive compressor wear, which, if it went unnoticed,

*The engineering officer comments: 'One can imagine the reaction to this practice on a squadron in the UK served by a second line organisation.'

**Some more serious defects - cracks or structural damage - needed quick but effective temporary repairs. 'One such repair restructured part of the tail pylon of an aircraft which had hit a sangar (the stone breastwork round a hollow) while entering a restricted landing area. No one seemed to notice the slightly altered profile after the repair had been completed and even after several months of flying the repair was still perfectly sound.'

might lead to a compressor stall and engine failure. However, the results obtained during the detachment often appeared unrepeatable even on the same flight and once or twice symptoms similar to incipient compressor stall during acceleration were reported, but, on checking, the PPI was good. The situation was never satisfactorily resolved during the detachment and the loss of XS 678* in November was partially due to a failure to recognise a lowering of stall margin.'

Two other problems taxed the ingenuity of the ground crews: corrosion and the difficulty of servicing ancillary equipment. Salt laden sand was a constant hazard, attacking the easily corrosible magnesium alloy structure of the Wessex, and no wholly satisfactory remedy was found. 'Despite our efforts with washing, carrying out additional checks for corrosion and applying protective treatments it proved impossible to prevent some corrosion developing. It may have been worth considering leaving the surrounding surfaces perfectly dry and relying on the sand being blown away. Either method, on the face of it, would appear equally unreliable.'

Aircraft servicing problems were usually overcome quite quickly, but the servicing of ancillary equipment (MT, ground equipment, lifting tackle safety equipment) was much more difficult. These tasks were strictly the responsibility of RAF Salalah, but with their limited resources they could not give the detachment the service it needed and they lacked the necessary expertise. In the end safety equipment was serviced by specialist tradesmen paying periodic visits from Cyprus. For the rest, the servicing was 'completed satisfactorily in the main, but often after considerable delay and frustration had been caused'. This is, however, a problem characteristic of long range detachments, since the servicing of ancillary equipment is normally the responsibility of a base organisation where specialist trades can be borne economically. (27)

OPERATIONS: BREAD AND BUTTER PROBLEMS

Before facing the problems which would arise out of flying in the monsoon and at night, the detachment had other difficulties to overcome in the course of ordinary routine operations.

When the Wessex arrived the Hornbeam Line was still uncompleted and they had to take their share of delivering construction stores (mostly steel spikes and barbed wire) not to a central compound but to the exact positions required

*See below pp 41-42.

by the ground forces - usually at 50 yard intervals along a wadi. For the pilot there was the hazard of flying up the wadi, fully loaded, unsure of the wind direction and sometimes aware that the rebels were using that particular wadi to cross the line. 'You would be sitting there trying to put the stores down exactly where they wanted them, because if you did not do so, the whole load might go tumbling down the hill because it was so steep.' (28)

When the Hornbeam Line was complete, with barbed wire running along its whole length and army posts sited at intervals on the mountain tops, it proved rather less successful than had been hoped. Rebels were still infiltrating across. It was therefore decided to establish further army posts on the slopes of the wadis, sited initially on what were nothing more than narrow ledges. Here the helicopters had to land, first to establish the post (bringing with them all the materials required for building a defensive position) and then later to resupply it.

There were two problems: first, the complication of landing down wind in a situation where it might be impossible to do a circuit to come into the wind because the terrain below was in enemy hands. Approaches had therefore to be very carefully planned 'with a close eye to the payload and the power in hand'.* (29)

Then there was the difficulty of landing on a narrow sloping ledge where there was room for only one wheel. The aircraft could easily start to slip even with the brakes on and 'with troops jumping down on to a ledge which was only about three feet wide you could not afford to lift off because anyone jumping out could easily have rolled straight down into a ravine'. So the pilot had to accept that the aircraft would slide a little. 'Once you had committed yourself to landing troops, that was it, because they had literally only about three feet between them and a sheer drop, and as they had to unload their equipment as well you could not move.' (31)

*Another of the problems of wadi flying was the frequent change of wind. 'You would be flying up and down a wadi, and up over ridges and hills, and one minute the wind would be coming from one direction at between 30 and 40 knots and then you would go somewhere else and conditions would be entirely different. At that weight, height and temperature, there could be some very nasty experiences if the pilot did not get the wind right. It was sometimes difficult to know where the wind was coming from - you could not throw a smoke grenade out every time. But the troops on the ground were very good at putting up smoke.' (30)

SER	TO	RET VIA	LOAD	TIME
1.	POLO		U/SL AMMO/INTERNAL EQPT	
		BOLE	P/UP EMPTIES BURMAILS & NETS	
		OVEN	DROP EQPT	
		CORK	DROP EMPTIES P/UP U/SL WATER TO POLO	
		POLO	DROP WATER	
		ASHOQ	P/UP 1 PAX	
		MUGHS		
2.	POLO		U/SL DEFENCE STORES/ 1 PAX	
		BOLE	P/UP EMPTIES BURMAILS & NETS	
		CORK	P/UP U/SL WATER TO POLO	
		POLO	DROP WATER	
		MUGHS		
3.	ASHOQ		U/SL RATS/INTERNAL EQPT	
4.	ASHOQ		U/SL AMMO	
5.	REEF		U/SL AMMO/WATER/INTERNAL EQPT	
6.	KILLI		U/SL WATER/INTERNAL EQPT P/UP 1 PAX	
		K NORTH	P/UP EQPT	
7.	PIPE		U/SL WATER/INTERNAL EQPT	

PAX FOR SALALAH

The detachment's tasks for 11 November 1974

In time it was possible to build platforms for the helicopters to land on, but until these had been completed, the Wessex were used in preference to the SOAF 205s to establish and resupply these positions, primarily because the latter with their skids would have had far greater resonance problems than the Wessex which merely put one wheel down on the rocks.* (32)

SPECIALITIES: RECONNAISSANCE PATROLS

If the main work of the detachment was resupply there were plenty of other tasks to add variety. Some of these were both exacting and hazardous, picking up reconnaissance patrols from the Hornbeam Line for example and moving them forward into their operational areas (for them to go on foot might take a day or more in that kind of terrain). Some were routine patrols sent out to search the wadis for traces of rebel infiltration, others had special assignments where speed was essential - to follow up perhaps a report from a reconnaissance aircraft that a particular waterhole was being used by rebels making their way across the line. On such occasions, the patrol would be flown in as near as possible to the waterhole without alerting the enemy. To give some degree of cover smoke was provided, the procedure (worked out in detail beforehand by the air and ground forces) being for the aircraft to pass a particular point on the Hornbeam Line at an agreed time. The flying time between that position and the site chosen for the landing would be, say, five minutes; four and a half minutes before the helicopters were due at the site the gunners on the line would put up smoke, which then came up to meet the aircraft as they landed. They would drop down into it, discharge their troops and take off again still screened from the enemy.** (34)

The helicopters were also on call to lift the men out again - in fact, with the patrols in radio contact with their regimental headquarters an aircraft could be orbiting overhead while the men on the ground were still in contact with the enemy. It would then land, sometimes within minutes of the engagement

*Another reason was that SOAF helicopters carried Arab crewmen and there was an inevitable language barrier between them and their pilots (see pp 36, 40). The latter could not afford to spend very much time at the hover - concentrating on holding the aircraft as it rested on one skid and never quite knowing what was going on at the back. (33)

**Another hazard was that there was no way of knowing for certain whether the landing site had been mined; the pilot had therefore to choose the roughest ground available.

being over and with no certainty that the enemy had left the area.* (35)

Large-scale Offensive Operations

In the course of the detachment the Wessex took part in a number of large-scale offensive operations. The purpose was usually to flush out a group of rebels whose infiltration eastwards towards Salalah had come to the attention of the intelligence authorities; on one occasion the target was a conference of dissidents in a remote area of the mountains and on another the intention was to land Omani troops in enemy-held territory.**

Operations of this kind had to be mounted very quickly, usually within 24 hours or so, before the information went cold and the rebels moved on. The helicopter commanders were always called in at an early stage of the planning (both the Wessex and the SOAF 205s would be taking part), but the tactics were usually the same.

The requirement would invariably be to land the maximum number of troops in the first wave; all available helicopters would therefore be taking part, perhaps 12 in all, operating in groups of four, with either the Wessex or the 205s leading, but with the two types never mixed together.

In these operations the aircraft would be approaching and landing on sites which were completely unsecured; at best they would have been paid a fleeting visit by the Sultan's special forces in the previous day or two. The precise whereabouts of the enemy at the time of landing was therefore unknown: they were presumed to be a mile or two away still, but they might have set up an ambush in the meanwhile. (38)

In these fluid conditions there was no question of the aircraft landing together nor 'could we orbit in the area if we were late or if the aircraft on the landing

*On one occasion four injured soldiers were picked up within five minutes of the patrol disengaging; for this the pilot concerned, Flt Lt R A Forsythe, received the Sultan of Oman's Distinguished Service Medal. SAS patrols were also lifted out - it was considered too dangerous for them to be lifted in. These pick ups were carried out very quickly, the pilot flying in at low level, not seeing the landing site until it had actually been reached. (36)

**Intelligence on both sides was good, both profiting from the common practice of changing sides at frequent intervals. The rebels also had the advantage of being able to send spies down to work in Salalah where information was not difficult to come by. (37)

site was delayed for any reason'. They flew in at strict minute intervals, which was difficult in itself because of the clouds of sand which they threw up on landing and taking off. Each landed as soon as the one before had taken off - 'we had to pause a moment before landing, otherwise we should have been entirely on instruments. But we found that with judging speed on the final approach one minute intervals were quite sufficient.' (39)

The troops once landed would move forward to planned positions a thousand yards or so nearer their ultimate objective. There they would wait until the next wave of helicopters had brought in the guns. Water, stores, ammunition and food followed, and the helicopters would continue to supply the forces on the ground as long as the operation lasted - a sizeable additional burden, because all the established positions on the Hornbeam Line and elsewhere had to be supplied at the same time. (40)

These resupply operations too were not without their problems, particularly for any pilot who had not been in the area before. Not only was there the hazard of enemy fire - on one of these operations two of the pilots had shots landing round their aircraft - but the flying itself needed careful calculation. 'You would probably go at low level - this was one time when you really did want someone who was good at navigation in the lefthand seat - you would fly close to the ground, say 25 feet, with your load, and if you did not get it right first time and overshot the target, you were in great difficulties. You would have to climb up or go back and start again.' (41)

But the results of these offensive operations were impressive. No opposition was ever encountered in the course of the landings. The enemy positions were taken and the rebels rounded up. On one occasion, early in the detachment, a large quantity of arms and ammunition was captured, which the rebels had been stockpiling to use once the monsoon had come and conditions were more favourable for guerrilla activity. (42)



Men of the Sultan's Northern Frontier Regiment
inside a Wessex

SUNDRIES: BATTERY MOVES

The main problem with moving a battery was that once the move had started, it had to be finished however much the weather deteriorated, because it was impossible to leave a few men behind in a position where they would be unable to defend themselves.* A further difficulty was that the terrain at every landing site was sandy. In consequence the helicopter was invariably operating in a cloud of sand, a situation which demanded the closest co-operation between the pilot and the crewman. As a result the Wessex with their two engines and British crewmen were the inevitable choice for these tasks - in preference to the SOAF 205s. (44)

*On one occasion the last delivery was made in darkness with a very low cloud base. (43)

Throwing Cordons Round Villages

There was a division of opinion between the Wessex detachment and the SOAF crews about the wisdom of taking part in an operation which involved helping the ground forces to throw a cordon round a village. The latter were very much against operations of this kind; the Wessex detachment considered that in that terrain the risk of landing some 1000 yards from a village was generally acceptable,* and if intelligence reports suggested that there was a rebel meeting of some kind about to take place in a particular village and the troops wished to flush it out, 'the only way for them to do so on the likely time scale was to use helicopters'. (45)

Attracting Enemy Fire

An unusual task was that of attracting enemy fire in order to give SOAF strike aircraft the chance to attack or the army a target to flush out. One one occasion a camel train escorted by a large number of rebels was trying to move east through the Hornbeam Line to the area directly north of Salalah. The rebels were hiding in caves by day, taking the greatest care to conceal themselves, and only cooking their meals at night. To pinpoint them helicopters went to the area at night and flew on a preset track up and down the wadi where they were thought to be - with all their lights on to attract their fire. The ruse worked and the rebels opened up allowing the Strikemasters waiting above to identify their exact positions and attack. The helicopters had meanwhile dropped parachute flares and with the whole area well lit up the strike aircraft knew when to pull out.

Repeated every night for five nights, with three sorties a night, these tactics proved highly successful and with jet cover were not considered unduly risky.** (46)

Directing Air Strikes

Helicopters were also used to direct Strikemaster attacks. This was a complex task: for example, if the pilot of the strike aircraft was not picking up the right target the helicopter would try to direct him on to it by describing the exact position ('the second wadi from such and such a landmark'). Positioning the helicopter was therefore all important; to get too far away from the aiming point

*The final decision lay with the detachment commander.

**Both Wessex and 205s were used but the former with their two engines were considered the sounder choice.

was to risk everyone losing contact with it. 'You would not know the direction of attack and so you had to orbit keeping the target in sight the whole time - and then when the attack began get away from the area because the strike aircraft would pull up sharply after the attack.' In these situations the crewman was very useful ('better in fact than the army officer who was also in the helicopter'), because the pilot would try to position the aircraft in such a way that if he himself could not see the target the crewman could and would direct him on to it.* (47)

THE MONSOON SEASON

To add to the problems of what were mostly to become routine tasks were two further difficulties, flying in the monsoon and flying at night. In the Dhofar area the monsoon season usually started towards the end of June and would last for ten to twelve weeks - in 1974 however the season was rather shorter than usual. The main feature was cloud - well layered stratus type cloud which was no danger to aircraft - rolling in from the sea and covering the plain of Salalah and the mountains behind from a base of 300 feet at best, but often 150 feet or less, up to between 3500 and 5000 feet. Visibility below the cloud was good except close to Salalah where it was reduced by spray coming in off the sea.

With the cloud might come rain and sometimes high winds, rising on occasion to 75 or 80 knots but seldom lasting for more than about two hours. Normally in the monsoon season the wind was only slight and there was always ample warning of a high wind, perhaps half an hour or more, the portents being a rising cloud base and a vast cloud of sand sweeping across the Salalah plain. Visibility would then fall to nil, goggles would be worn and all aircraft were secured. For the fixed wing aircraft this was easy, because concrete platforms had been provided for them; for the helicopters standing on very hard ground with no soft layer below it was difficult, and they would be secured between buildings with the blades tied down and the vents taped to prevent the radio and electrical departments filling with sand. (49)

* 'It was very exhausting', the pilots found, 'to do that sort of flying for very long.' A task which tended to be unwelcome was the control of artillery fire. Unlike the former Army Air Corps pilots in SOAF, RAF pilots had had no experience in this field, but 'they sometimes had to do it and they improved with experience'. (48)



Typical cloud cover in monsoon conditions

Cloud seldom stopped the Wessex from flying, partly because the techniques to be used during the monsoon season had been thoroughly practised in the weeks before it began, and partly because growing familiarity with the terrain, in itself one of the essential ingredients in the success of the coming weeks, made many things possible that might otherwise have seemed unlikely.* In fact, when working on the Hornbeam Line the helicopters operated - and without accident - with the cloud base as low as 70 feet. (51)

On routine missions an aircraft taking off from Salalah would fly south-south-west towards the sea until it was above the cloud, and then turn on course for its destination. If the position to be supplied was on top of the jebel it would

*'For much of the time it would have been impossible to operate without having seen the terrain. Having been warned of the monsoon, the detachment was very careful to note on landing how high the ground was and where the best areas for a descent would be if there was cloud around.' (50)

normally be out of the cloud. The pilot would therefore fly north above the cloud to a point some 15 or 20 miles inland where the cloud abruptly ceased. He would then 'descend and come in low level underneath the cloud, which would be about 150 feet above the jebel'. It was now that familiarity with the terrain became especially important, because the pilot would be flying along the wadis - always keeping within a mile or so either side of the line - using his local knowledge to avoid known enemy positions and other hazards. (52)

Sometimes in the eastern jebel the pilot would arrive over the target to find it covered by thick cloud. He would then look for a hole through which to descend: 'a minute hole, sometimes so small that we had to go down vertically, and as we spiralled down we were going in and out of cloud throughout the spiral. At about 2500 feet the hole would enlarge itself a bit to let us see the ground and then finally we would break through a mile or so from the position.'

If the landing site was not secure and there was low cloud about the pilot would then take a cautious look at the terrain ahead, go back up into the cloud, fly for two or three minutes more, come out of the cloud again, take another look, and so on until he finally reached the landing site. 'It was a mixture of visual and IF flying - if the enemy was about, it was better to show oneself for just a few seconds and then dart back up into the cloud.' (53)

Some locations were particularly difficult because they were half way down the mountainside. The only way to supply these was to come in from the north over the top of the mountains, make for one of the locations which was visible, then do a timed run into a known clear area (observed during practice before the monsoon) and finally start a descent down to a known safe height. 'If you broke cloud, you would continue on down and perhaps come in under the cloud and resupply the position. If you did not break cloud at that height, you would have to climb up again and try some other method.' One alternative was to go out over the sea, descend to 200 feet, probably clear of the cloud, and come in again at low level. (54)

When an offensive operation* was mounted during the monsoon season, the first wave of aircraft would leave Salalah - in a stream at one or two minute intervals - climb to between 3000 and 5000 feet above the cloud, checking in with one another as the aircraft emerged into the clear air. The stream would then fly to a pre-determined point, usually on the north side of the jebel. Here the aircraft would descend in safety and make a low level approach to the landing site, taking every advantage of the lie of the land to achieve a degree of surprise.

*See pp 28-29.

Once the position had been secured, later sorties would fly directly to the landing site, still keeping tight formation at one minute intervals. The aircraft would again come in from the north, but with no longer any need to achieve surprise, they would make directly for the landing site at normal height and drop straight down into it. (55)

Returning to Salalah under monsoon conditions provided no great problems; there were established tracks in and out, separated by about five miles, and both radio beacons and GCA were available. Some pilots preferred to home on a radio beacon* and then make a radio compass descent. This was a procedure that had been practised frequently before the monsoon began and on the flat Salalah plain was simple enough when wind conditions were normal - it was used right down to about 150 feet, cloud being broken about half a mile from the airfield. 'The system was for each aircraft to come overhead and try to establish its position as accurately as possible. It would then call "Whisky One descending" and then "Whisky Two descending". The second call would be on a turn inbound, followed by a flat turn breaking the cloud.' (57)

Other pilots preferred to use the GCA and go well out to sea, taking advantage of their two engines, and be picked up on their return at about three miles. But this method had two disadvantages: to use it could take much longer than a radio beacon descent if there were several aircraft about, because the GCA equipment, being old, could handle only one aircraft at a time. The other problem was sea spray obscuring the aircraft as it came in; this however could be overcome: 'if they lost you on radar, you could still fly with the needle centred and continue on down, because they could still give you the heights to be at.' (58)

CASUALTY EVACUATION AND THE TECHNIQUES OF NIGHT FLYING

The final hazard was that of night flying in the Omani type of terrain, arising very often out of another of the detachment's duties: to provide a standing casualty (and medical) evacuation crew for one day in every three.** It was a

*There were two beacons at Salalah at this time: the original had a range of only about 15 miles; the second, installed during the detachment, was much more powerful and could be picked up at 30 to 40 miles. (56)

**SOAF crews were available for the other two days. For British personnel injured in Oman there was a field surgical team at Salalah, with two surgeons, an anaesthetist and a team of orderlies. Most of the injuries which came their way were caused by mines, and their presence was a vital factor in sustaining morale, the majority of contract officers saying that they would not have signed on had there not been a British field surgical team at hand. (59)

task which contained a large element of tedium, periods of waiting broken by an immediate scramble to any of the positions on the Hornbeam Line. But the flying, especially at night, could be exacting. (60)

When the Wessex first arrived in Oman the detachment commander insisted - despite SOAF requests - that his crews should not take part in the standby until they had had time to become familiar with the terrain and local flying conditions, a process which took about three weeks to complete. To further reduce the risks a landing site register was kept jointly with SOAF giving the exact height of each location, the direction of approach and a note of any obstructions. In addition, the standby crew would be chosen for their very recent knowledge of the area concerned. 'They would then know exactly where the main landing site was and its configuration. This increased the safety factor at night because everyone knew what to expect.' The ground situation was also of vital importance and crews would seek a briefing on this before they left. (61)

On a night sortie there were two main problems: navigation and communications. Ahead of the crew was a flight of perhaps 80 miles across mountainous country, flying 'purely by the time and distance method'. Sometimes 'the helicopter would be flying in complete darkness, especially during the monsoon season, never seeing the ground'. But outside the monsoon, and particularly in moonlight, the wadis would stand out prominently and navigation would be comparatively simple. 'The pilot might pass through a black patch with nothing visible and then suddenly there would be an enormous wadi running across the track - he would not know the exact position but he would know that he had crossed the wadi and if he could see a bend in it he could plot his position more accurately.' (62)

Then, as the helicopter began to approach the landing site, the first of a number of communications problems arose. Hitherto contact had been by HF (whenever interference allowed). At ten or fifteen miles' distance the pilot would hope that the troops on the ground would switch on their Blue Sarbes for him to home on, but with Omani troops at the landing site, and no British officer, this might well not happen and no contact be made on the Sarbe until the aircraft was almost overhead. (63)

Even then there was the problem of language. 'The Omanis would hear a helicopter, call it on the Blue Sarbe and talk away in Arabic which none of the pilots could understand.' In fact, the general opinion was that the language problem was one of the worst aspects of the whole detachment. 'A pilot would come overhead of the location and try to find out exactly where the casualty was. He would not want to descend into an unsafe area and would always be loath to go below 4000 feet without knowing precisely where to go.' (64)

Finally, the pilot would hope to see lights appear on the ground, but here again there were problems: first, that the lights would not be switched on until the men on the ground were quite sure that the aircraft was friendly (there were rumours that the rebels had acquired helicopters but they were never substantiated). In consequence, the lights might not come on until the helicopter was on its final approach; 'it was therefore homing in darkness with the pilot looking out for the lights while he judged the time.' (65)

A second problem was that the pilot had to expect any pattern of lights - or none at all. In time a triangular pattern was developed for use by the Omani troops very similar to the RAF 'T', three lights in a triangle, the bottom two white and the top red, with 25 yards from top to bottom and 30 yards between the two white lights. But despite the efforts of SOAF not all units had the necessary equipment and not all knew how to use it. 'Sometimes three white lights would appear and without any communication with the ground it was very difficult because they could be approached in three different ways - it was easiest when landrover lights could be switched on for the final approach.' (66)

So, whatever might be going on down below, the aircraft would come across the top of the landing site at 4000 feet with one pilot looking out and the other flying on instruments. The former would see whatever lights there were and talk the latter into a spiral descent bringing the aircraft on to its final approach about 300 to 400 yards out at about 250 feet. Normally the pilot looking out would then take control to avoid the momentary disorientation caused by turning from instrument to visual flying. (67)

Again, what was usually a relatively simple operation - a spiral descent - could be made hazardous by the absence of an intelligible system of lights on the ground. This however was a problem without an easy solution. SOAF had nothing corresponding to the RAF MAOTs - and even if it had, it would have been unable to provide the numbers required. And without British officers on the ground or Arabic speaking pilots in the air an element of risk would inevitably remain. (68)

CONTINUATION TRAINING - AND USING THE WINCH

At the pace of operations demanded of the detachment little continuation training was needed, except for night and instrument flying, and winching. All the pilots carried out brief periods of night flying and instrument training - this was in addition to the intensive instrument flying training which took place in the weeks before the monsoon - and they 'also did some radar training to see what it was like'. (69)

More interesting was the monthly spell of training on the winches - all the aircraft flew with their winches despite the waste in weight because they might be called on at any time to carry out a rescue sortie direct from the forward area. The object of the winch training was not only to keep the crewmen in practice but also to ensure that all the pilots could operate the winch, if a double lift was needed, and could even be lowered as well. (70)

In the event the winch was used only once when a British Army casualty, injured by a mine, had to be evacuated from a wadi where the helicopter had no room to land. The detachment was also asked on one occasion by the Station Commander at Masirah whether it could carry out a rescue operation from a ship which was breaking up on the rocks nearby. It could well have been done but the Army authorities would not allow two of the Wessex to leave the Dhofar area for the time needed. The plan had been however for Masirah to position fuel by Andover on a disused airstrip some 70-80 miles south of Masirah on the mainland. In the event some 3000 goats and all the crew were taken off the ship before it sank. (71)

COMPARISONS

The perhaps inevitable element of ill feeling which existed at the beginning of the detachment between the SOAF and Wessex crews lasted for at most six weeks. Some of the SOAF men had flown Wessex helicopters before and had been based at Sharjah. They therefore knew something of the problems which this type of aircraft would encounter in Oman, sand ingestion and a variety of engine malfunctions in particular.

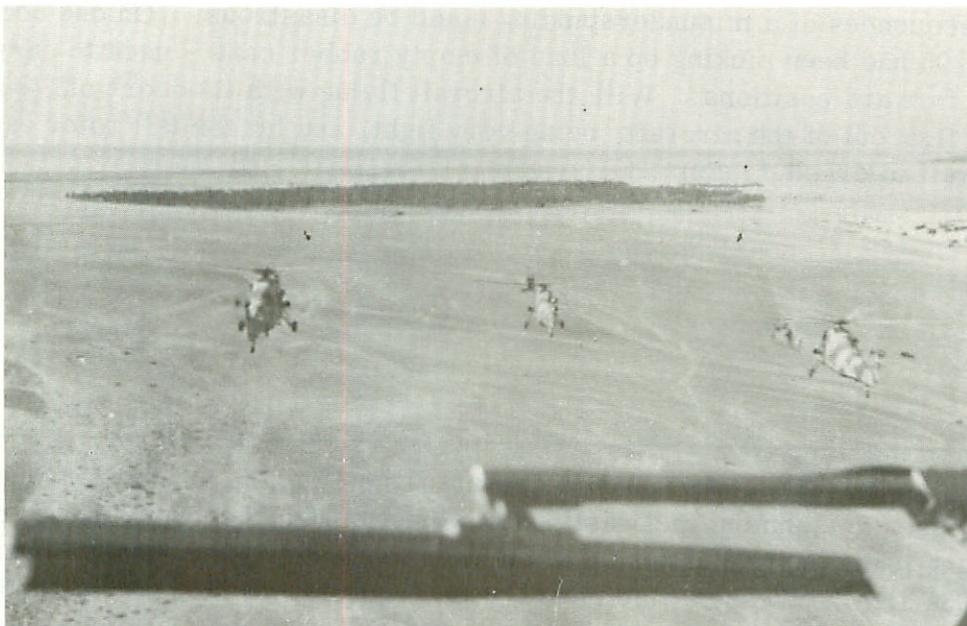
The Wessex did indeed have some drawbacks in the kind of conditions to be found in Oman; it had some difficulty in flying at height and when doing so was rather slow, reaching perhaps only 65 mph with a full load at 8000 feet compared with the 205's 90 mph. The SOAF helicopters therefore continued to do the Simba run, while the Wessex concentrated on the Hornbeam Line where it met the conditions it liked - low level flying especially - and in which with a full fuel load it had considerable endurance.* (72)

* 'The 205 was a superb aircraft in that environment, very simple to fly and by and large easy to maintain. But servicing problems were beginning to appear, particularly the fact that the work was being carried out by outside contractors whose men could not be sent to repair an aircraft in the field until bonuses had been agreed - and that took time.' (73)

The Wessex also had its particular strong points, as has already appeared: it was better than the 205 at one wheel touchdowns, at moving batteries, and with the added margin of safety of its two engines at a number of other tasks, notably that of attracting enemy fire.

SOAF helicopter pilots had long been left to carry on in their own way with the least possible interference from SOAF headquarters in Muscat. There were no checks and few visits; the QHI at Muscat would convert a new contract pilot to type and give him some insight into the type of operations being carried out in the Dhofar. At Salalah the new pilot would have a theatre conversion course with one of the more experienced pilots; thereafter he would be on his own apart from the broad guidelines laid down by the unit commander. (74)

The SOAF pilots were observed to carry out some continuation training in the period before the monsoon, but a common failing among the contract men was the lack of instrument qualification, and attempts to have them qualified were frustrated by a shortage of aircraft and time. The consequence was that when the monsoon came much of the burden of flying in the Dhofar fell on the seconded pilots, while the others went north to work in the Muscat area. (75)



Four Wessex and three SOAF 205s in formation to celebrate the Sultan's birthday

A CFS report summed up the position succinctly: SOAF pilots were excellent operationally but were less well endowed when it came to procedure - for example, what to do when an engine caught fire. (76)

Where the SOAF helicopter unit was at its greatest disadvantage was in the matter of crewmen - there were too few of them and they could speak only Arabic which none of the pilots could understand. SOAF had a training programme for crewmen (including teaching them English) but it was faced with two insuperable problems: very few Omanis came up to the required standard for training and there were very few flying hours available for training - all being needed for tasking. (77)

The language problem too was acute, being sometimes a limiting factor, sometimes perhaps the cause of accidents. When, for example, the pilot asked his Arab crewman how the load looked, he would seldom be able to give a better answer than that it 'looked good' or 'not good'. If the crewman said that it looked 'not good', all that the pilot could do was to look in the mirror underneath the aircraft, which showed him the hook but not the load. If the aircraft seemed to be flying satisfactorily he could go on, perhaps dropping part of his load out of the net along the way. Alternatively, he could go back and check. (78)

The consequences of a misunderstanding could be disastrous. On one occasion a SOAF 205 had been picking up a load of empty rubber cans - used to carry water to forward positions. With the aircraft flying with its doors off, one of the cans flew out of the aircraft, being very light, and hit the tail rotor causing the aircraft to crash.* (79)

*The Iranian Air Force sent 205s to operate from Salalah, but to the amusement of the Wessex detachment their activities were limited: they would carry no underslung loads and would not fly at night or in cloud. As a result it was the SOAF 205s and the Wessex which were often required to evacuate sick and injured Iranian soldiers operating with the Omanis. These occasions were 'absolutely horrific: the Iranians could speak no English and when you arrived at the location you could never find out where they wanted you to land. It was too dangerous to use landing lights and the Iranians had no idea about what pattern of lights to put out.' (80)

XS 678

Happily the RAF detachment had only one serious mishap, which occurred on 20 November almost at the end of its time in Oman. That it happened so late was some compensation; had it been earlier the detachment would have lost an important part of its strength for several critical weeks.

The aircraft - XS 678 - was working on a routine resupply of positions on the Hornbeam Line and was moving slowly away from a load at Cork (at the extreme northern end of the line) when the power turbine inlet temperature (PTIT) on the starboard engine rose rapidly to 800°C. 'The aircraft was flown forward to complete the clearance of the load in order to land and while doing this the pilot closed down the starboard engine. As he did so, the port engine ran up to take all the load, then ran down before the aircraft had landed. XS 678 yawed violently and hit the ground very hard in a near vertical descent. There were no injuries. It was found subsequently that there was a fault in the starboard fuel computer which accounted for the original defect. The stall margin on the other engine was found to be very low and it is most likely that it stalled during acceleration and ran down.'

When the engineering personnel came to inspect the damage they found the aircraft resting on its underside and leaning over to starboard with the main rotor blades almost touching the ground on that side. 'There was considerable damage to both the port and starboard main undercarriage assemblies and their supporting structure, and the tail wheel yoke assembly was fractured. Some structural damage was also sustained on the starboard side.'

In this situation there were four possibilities: to replace the engines, support the aircraft on sandbags and fly it back to Salalah, landing on sandbags there; to break the aircraft down and lift the pieces back to Salalah by Wessex; to try to borrow an Iranian CH53 to lift the damaged aircraft back; or to borrow a desert truck from local contractors and transport the fuselage back to Midway or Salalah.

The first possibility was considered too dangerous, the second would require more precise data on component weights than could be obtained easily, and the third was only an outside chance. Steps were therefore taken to borrow both a desert truck fitted with a crane and an earthmover. The two vehicles then made their way along desert tracks and the wadi bottom to the site of the crash, making up the road and widening it where necessary. Meanwhile, 'by jacking up the aircraft, supporting the underside on sandbags, then removing the jacks, building up the area under the jack, and repeating the process

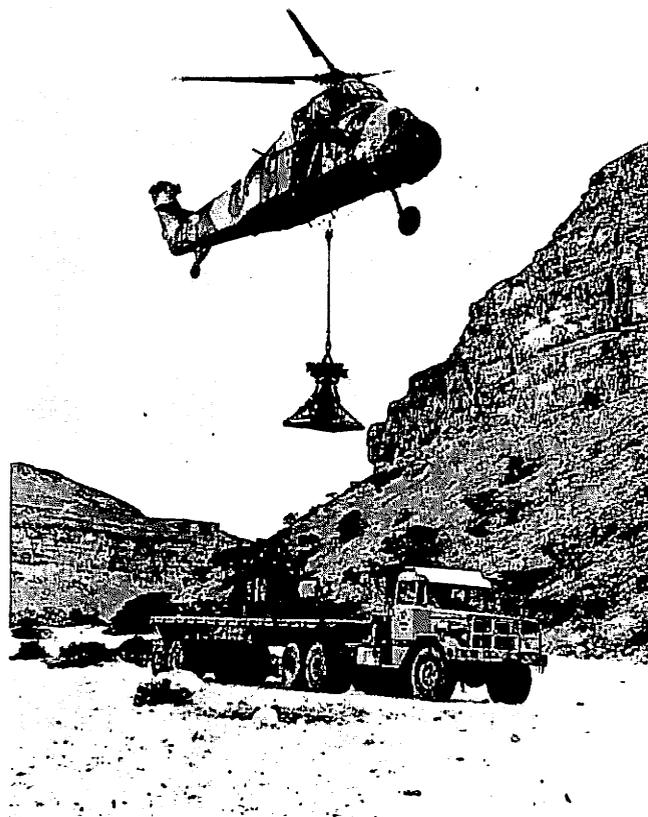
several times, the aircraft was raised to a level position.' Engines, rotor blades and as many other items as possible were removed and returned to Salalah.

When the truck arrived the crane was used to remove the main rotor head and gearbox, and the tail pylon; the aircraft was then mounted on a transportation cradle. 'The truck was positioned 20-30 yards in front of the Wessex and the earthmover constructed a ramp up to the rear of it. Sections of roller conveyor were laid up to the truck and the fuselage winched, on its transportation cradle, into the back of the truck.' The vehicles then returned to Midway where the fuselage was further stripped, transferred to a Hercules (with just half an inch of headroom to spare), and flown to Masirah and on home for repair. (81)

RETROSPECT

In his summing up the detachment commander was unequivocal: the detachment had been a very valuable experience. The level of expertise required of aircrew was as great as in the Malayan jungle: the pilots were faced with 'hot and high' conditions, the problems of sand, and above all the need to make split second decisions where 'there was no time to make corrections, because you had already committed yourself ... nothing was quite certain and everything happened very quickly. Put another way it was good mental training: to make decisions and learn by mistakes' - in situations where the penalty for making mistakes could be a substantial diminution of the detachment's effort. (82)

For the detachment commander it was a particularly exacting time. Apart from his flying duties and his responsibilities for the day to day running of the detachment all major decisions on the use of the helicopters were his, and he had in addition the less tangible task of shepherding his pilots along the way. He would fly on average about twice a week with each of them, alternating as captain, and getting to know the capabilities of each and who might be best for a particular task. He also ensured in the first few weeks of the detachment that every pilot was checked out on formation leading. This he considered very important: 'In the ordinary way the younger pilots do not get the chance to learn how to lead - on an important operation this is normally the function of the flight commander. But it is better for him to be number five or seven sometimes so that he can see the mistakes made and the younger pilots can get their chance to lead and know that they can do it. The situation in Oman required this and by the end of the detachment all the pilots were capable of leading a formation through cloud and at night.' (83)



Recovering the main rotor gear box of Wessex
XS 678 which crashed in Cork wadi

On the problems of navigation, particularly at night, one point had emerged clearly: the prime requirement was not so much a highly sophisticated navigation aid, but familiarity with the terrain. 'After all we had taken enormous trouble to get to know the lie of the land and the areas where we could fly ...'; without that familiarity the only useful aid would have been 'a portable VORDME giving range and distance, and if it existed some sort of inertial navigation system'. (84)

Night goggles too might have helped; 'but the trouble was that you could not get the necessary length of approach in a bad area, and to stay within the safe area provided for you you had to make a spiral descent, which meant that you were only on your final approach for about 300 yards - but even then goggles might have helped.' (85)

In sum, the Wessex detachment had been present in Oman at an important turning point in the war against the rebels. It had made a contribution of very considerable value to the construction and maintenance of the Hornbeam

Line, which had itself played an integral part in the Sultan's military strategy with the result that by early 1976 the rebels had been cleared from the western part of Dhofar province and flushed back across the border. The struggle was not necessarily over, as it might be renewed in other forms, but at least in the task of bringing one phase to a successful conclusion much had depended on a small detachment, four Wessex helicopters, their crews and the ground personnel who supported them.*

*The return to the United Kingdom of the detachment and its aircraft was the reverse of the procedure used for its despatch to Oman in April. An aircraft breakdown party was sent out to Masirah arriving there on 7 December by Britannia. The Wessex were dismantled with little difficulty and loaded into two Belfasts, arriving back at Odiham on 11 and 13 December. (86)

NOMINAL ROLL OF THE RAF WESSEX DETACHMENT IN OMAN 1974*

OC	Sqn Ldr A S Tarwid
Pilot	Flt Lt S G Wright
Pilot	Flt Lt R A Forsythe
Pilot	Flt Lt B R Mansfield
Pilot	Fg Off C M G Pemberton
C'man Ldr	MALM T E Marriott
C'man	FS J D Mayes
C'man	FS J M Watson
C'Man	Sgt G Bond
Eng Off	Flt Lt B C Barrett
A Fitt P	Chf Tch/A/FS K V T Adams
A Fitt E	Chf Tch L F Cartwright
A Fitt E	Chf Tch E J Kearsey
A Fitt A	Chf Tch P J Sullivan
A Fitt P	Sgt E J R Adams
A Fitt A	Sgt K Adkins
A Fitt A	Sgt C Inglis
A Fitt P	Sgt D E P Kentish
L Fitt AC	Sgt D E Lloyd
Suppl 1	Cpl J Davies
L Fitt NI	Cpl L J Humphries
A Fitt P	Cpl R S Lindsay
A Fitt P	Cpl T M O'Donoghue
A Fitt E	Cpl J E Snook

*Ranks shown are those held at the time of the detachment.

A Fitt A
A Fitt A
A Fitt A
L Fitt AC
A Mech A
A Mech P
Suppl 1
L Mech AC
A Mech A
A Mech A
A Mech P
A Mech E
A Mech P

Cpl B Yarnall
Jnr Tch A Fraser
Jnr Tch P J Owen
Jnr Tch R E Petch
SAC M D Andrews
SAC K M Burrows
SAC F H Coulson
SAC V C E Davis
SAC K W Drodge
SAC W P Hay
SAC W J Punch
SAC M J Matthews
SAC N J Thacker

**THE SULTAN OF OMAN'S AWARDS TO MEMBERS
OF THE DETACHMENT**

Distinguished Service Medal

Sqn Ldr A S Tarwid
Flt Lt R A Forsythe

Commendation

Flt Lt B R Mansfield
FS J D Mayes

LIST OF ABBREVIATIONS

CFS

Central Flying School

MAOT

Mobile Air Operations Team

QHI

Qualified Helicopter Instructor

SOAF

Sultan of Oman's Air Force

LIST OF REFERENCES

This study is based primarily on cassette recordings of interviews which the authors held with Sqn Ldr Tarwid and Flt Lt Pemberton and on material provided by Flt Lt Barrett. Additional information may be found in the detachment commander's report of 24 January 1975, the report on the deployment of the Wessex helicopters to Masirah (No 72 Sqn ORB, April 1974, Annex B) and the report on their recovery (ibid, February 1975, Annex D).

1. Det Cdr's report, p 8.
2. A number of books and articles have been published on Oman in recent years, but this section is based in the main on Sir David Lee's Flight from the Middle East; John Townsend, Oman: The Making of the Modern State, 1977; D L Price, Oman: Insurgency and Development (Conflict Studies No 53 January 1975); Penelope Tremayne, 'Guevara through the Looking Glass: a View of the Dhofar War (RUSI, September 1974) and 'War and Armed Propaganda' (Army Review, December 1975); and Geoffrey Barraclough, Survey of International Affairs, 1956-58, 1959-60.
3. Price, op cit, p 18.
4. Price, op cit; Tremayne, op cit; Tarwid 1A passim.
5. Statesman's Year-Book, 1974; Jane's All the World's Aircraft, 1973-74.
6. Det Cdr's report, p 3.
7. No 72 Sqn ORB, April 1974, Annex B.
8. Tarwid 1B 382; Det Cdr's report, pp 2-3.
9. Ibid, p 9, Barrett para 17.
10. Ibid, p 4; Tarwid 2B 103.
11. Tarwid 4A 440; Pemberton 5B 142.
12. Tarwid 2B 303; Pemberton 5B 79.
13. Det Cdr's report, pp 5, 10.
14. Tarwid 3A 278.
15. Det Cdr's report p 6; Tarwid 3A 336; Pemberton 5A 284.
16. Tarwid 1B 327, 3A 56.
17. Pemberton 5A 424.
18. Tarwid 3A 206.

19. Tarwid 1B 352.
20. Tarwid 3A 168.
21. Det Crd's report p 10; Tarwid 3A 246; Barrett para 19.
22. Tarwid 4B 1, 2B 245.
23. Tarwid 1B 488.
24. Pemberton 5A 530, 5B 497.
25. Tarwid 3B 218.
26. Barrett paras 1-11.
27. Ibid paras 12-28.
28. Pemberton 5A 735.
29. Tarwid 3B 243.
30. Pemberton 5A 606.
31. Tarwid 2B 267.
32. Tarwid 3B 243.
33. Ibid.
34. Tarwid 4A 144, 216.
35. Tarwid 3B 178.
36. Tarwid 4A 188, 240.
37. Tarwid 4A 460.
38. Tarwid 3A 377.
39. Tarwid 3A 377; Pemberton 5A 735.
40. Tarwid 3A 377.
41. Pemberton 5B 003.
42. Tarwid 3A 377.
43. Tarwid 3B 479.
44. Ibid; Tarwid 4A 360.
45. Tarwid 4A 268.
46. Tarwid 4A 1; Pemberton 5B 43.
47. Tarwid 4A 75.

48. Pemberton 5B 712.
49. Det Cdr's report p 5; Tarwid 1A 238, 442; Pemberton 5A 1.
50. Pemberton 5A 178.
51. Ibid; Tarwid 3B 440.
52. Tarwid 1B 1.
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55. Tarwid 3A 503, 3B 1.
56. Pemberton 5A 1.
57. Tarwid 1B1, 3B 47.
58. Pemberton 5A 1.
59. Tarwid 2B 329.
60. Ibid.
61. Tarwid 1B 190, 3B 365.
62. Tarwid 3B 71, 423.
63. Tarwid 3B 71.
64. Pemberton 5A 321.
65. Tarwid 3B 71.
66. Tarwid 1B 190; Pemberton 5B 402.
67. Pemberton 5A 265.
68. Pemberton 5B 402.
69. Tarwid 4A 378; Pemberton 5B 199.
70. Ibid.
71. Pemberton 5B 177; Tarwid 4A 390.
72. Pemberton 5A 623.
73. Pemberton 5B 256.
74. Pemberton 5A 701.
75. Pemberton 5B 230.
76. Pemberton 5A 623.

77. Pemberton 5A 392.
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79. Ibid.
80. Pemberton 5B 366.
81. Barrett paras 29-33; Report p 12.
82. Tarwid 4A 484.
83. Tarwid 4A 294.
84. Pemberton 5A 233.
85. Pemberton 5B 429.
86. No 72 Sqn ORB, Feb 1975, Annex D.

Ministry of Defence

AIR HISTORICAL BRANCH
1977

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