

## HUMAN FACTORS OF AIR OPERATIONS IN THE SOUTH ATLANTIC CAMPAIGN

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## INTRODUCTION

On 2nd April 1982 Argentina invaded the Falkland Islands and a task force was assembled to regain sovereignty (Operation Corporate). It was primarily a naval and army operation, but the Royal Air Force was involved from an early stage. Because of the distance of over 7,000 miles (11,300 km) from the United Kingdom to the Falklands and the absence of forward airfields, it was anticipated that the air operations would be difficult. The only suitable airfield on the Falklands was in Argentinian hands and airfields on the South American continent were not available for operational purposes, although at a later stage Montevideo was used as a casualty receiving port for both Argentinian and British casualties.

Apart from aircraft which could operate from ships the only other option was to use Ascension Island which is almost exactly mid-way between the United Kingdom and the Falklands. Flights to Ascension were accomplished very easily, but the support of the Task Force from Ascension required extended flights of up to 6,800 miles (11,000 km). This posed operational and logistical difficulties and considerable problems for the aircrew.

From the earliest phases of the operation the medical staffs at the Headquarters of Royal Air Force Strike Command and at the Royal Air Force Institute of Aviation Medicine were involved with advice on human factors for the aircrew and ground personnel. These included considerations of the aircraft role, crew task in flight, duration and frequency of flights, number of sorties per detachment and length of detachment, problems of supervision and management, changes in work associated with unusual patterns of rest, rest facilities and other aspects such as feeding, bowel and urinary functions, morale and motivation.

The operation posed two particular problems - sorties of very long duration and intensive rates of work. Previous studies carried out during the early 1970s on reinforcing the Far East from the United Kingdom had involved exercises with transport aircraft (Atkinson, Borland & Nicholson, 1970; Mills & Nicholson, 1974), and these had indicated that sorties around 20 hours duration were acceptable and that with some augmentation of the crew the duration could be extended to 30 hours. However, there was less information on the problems associated with frequent sorties of such duration over several weeks. Studies on aircrew in both civil and military transport operations provided some idea of the maximum workload which would preserve an acceptable sleep pattern, and this guideline was used (Nicholson, 1972) (Fig. 1).

It was evident at a very early stage that the guidelines would be far exceeded, particularly in the maritime reconnaissance and in some transport roles. However, there was a limit to the workload which

would prove to be acceptable, and it was the balance between flight safety and acceptable operational risk during war which had to be considered. During the operation flying rates were frequently extended for all aircrew (Fig. 2) and so it was decided to make hypnotics available from the early stages of the campaign along the lines suggested elsewhere (Nicholson, 1983).

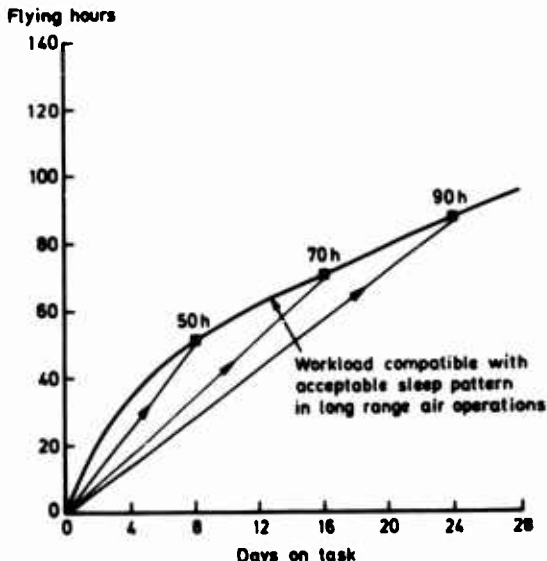


Figure 1

Workload (flying hours) of long range transports believed to be compatible with an acceptable sleep pattern (from Nicholson, A.N., Aerospace Medicine, 1972, 143, 138-141).

Temazepam was used widely. The majority of aircrew used 20 mg to get to sleep at various times of the day and experienced good sleep without side or residual effects. They were advised to take the hypnotic at least 8 hours before flights and whenever possible were given an initial test dose to assess any untoward effects, although none were encountered. In many cases there was no time available to give the test dose and such was the usefulness of the drug that crews found they could fly 6 hours after taking temazepam without any ill effect. The effectiveness of this hypnotic was amply proven by many hundreds of aircrew during the campaign.

The aircraft participating in the South Atlantic operations were the Harrier GR3, Phantom FGR2, Victor K2, Vulcan B2, Nimrod MR Mk 2, Hercules C 130, VC10, Chinook HC1 and the Sea King HAR 3. Only the Harriers and Chinook were based from within the Falklands area during the hostilities - all others operated from Ascension Island. After hostilities had ended on 11th June the runway at Port Stanley airfield was repaired and on 25th June the first Hercules landed there from Ascension. Subsequently Sea Kings and Phantoms have been based in the Falklands. During the operation no incidents or accidents were attributable to human error. This was a good reflection on the management, and control, and the training and calibre of the aircrew themselves. A brief account of each group of aircraft and crews will make this clear. In each category the flying hours are quoted, but of course duty hours were considerably in excess of this.

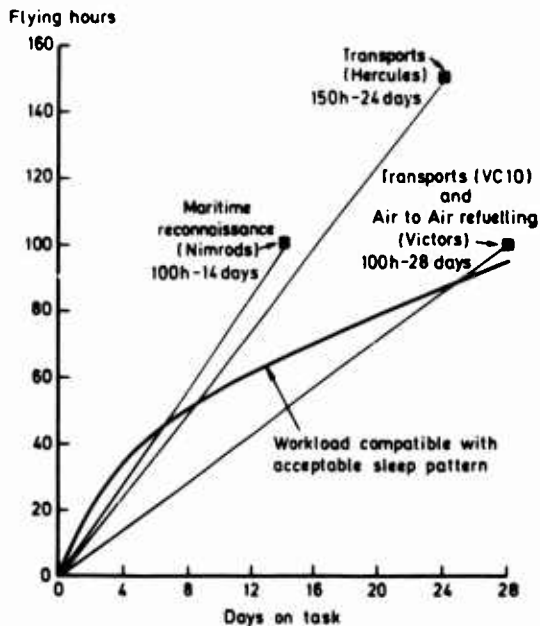


Figure 2

Workload (flying hours) of long range transports and other aircraft in similar roles during South Atlantic Campaign.

**Hercules.** The accepted flying rate in peacetime for Hercules crews was a maximum of 120 hours per month - though this has seldom been achieved. During Operation Corporate it was extended to 150 hours per month and this could involve six long range sorties, with sortie durations of up to 28 hours if a landing in the Falklands was not possible. Most very long sorties occurred after cessation of hostilities and were achieved with augmented crews which involved an extra pilot and navigator. Prior to this normal crews were flying up to 19 hours at a stretch and over a 3-month period some crews reached 360 hours. The very long sorties were only possible with air-to-air refuelling (AAR) and this was an entirely new task because the aircraft had never been used in this role before. The problems associated with AAR from jet Victor tankers to turbo prop Hercules were considerable and because of speed differentials required a "toboggan" descent for both aircraft during the refuelling procedure - resulting in a 10,000 ft. loss of altitude. This had to be done twice on the Southbound leg of a round trip so that if the aircraft could not land in the Falklands it would be able to use Ascension - 3,500 (6,500 km) miles away - as the only diversion (Fig. 3).

**Victor.** Air-to-air refuelling was a major requirement in the campaign, and the Victor proved indispensable. The aircraft operated on a daily basis out of Ascension and continue to do so. Refuelling procedures are complicated, and up to 14 aircraft were required to position one aircraft in the Falklands total exclusion zone (TEZ). The Victor crews flew sorties of variable duration (2-14 hours), but on a frequent rota involving flying hours up to 100 per month (Fig. 4).

**Vulcan.** The Vulcans flew several long range bombing sorties of about 16 hours duration involving 2 or more refuelling procedures during flight. They were individually planned sorties and crews had adequate time to prepare for each flight, so that fatigue was not a problem. The long range sorties were flown with an extra tanker-qualified pilot, and were the longest bombing sorties ever achieved by the Royal Air Force.

Figure 3

Route structure for Hercules (transport) aircraft. These aircraft operated between United Kingdom, Ascension and Falkland Islands. Some operations south from Ascension involved return flights to the Falklands without landing (duration up to 28 hours) and with air-to-air refuelling.



**Nimrod.** Nimrod crews operated highly intensive fleet surveillance sorties on short detachments flying up to 100 hours in 2 weeks (Fig. 4). Sorties would vary from 6-hour flights to about 20 hours. Crews were augmented with one extra pilot and engineer. The aircraft spent many hours in transit and required air-to-air refuelling, which had previously not been attempted with this aircraft.

**Helicopters.** Helicopters were in short supply and this was compounded by the loss of 3 Chinooks on SS Atlantic Conveyor. The remaining Chinook flew intensively on the Falklands during the phase from the San Carlos landings to the recapture of Port Stanley - lifting most of the heavy equipment (guns) and up to 81 troops at a time. Other RAF helicopters involved were Sea Kings, both in Ascension and latterly on the Falklands. All helicopter crews flew up to 10 hours per day with a maximum of 120 hours per month - this compares with a peacetime maximum of 75 hours per month.

Figure 4

Flight pattern of Nimrod (maritime reconnaissance and Victor (air-to-air refuelling) aircraft involved flights from Ascension Island into the South Atlantic.



**VC10s.** VC10s operated from UK to Ascension and were extensively used throughout the campaign (Fig. 5). The crews were not unduly stretched although their normal peacetime flying rates increased from about 20 hours per month to about 100 hours per month. The crews were on schedules similar to normal route flying although sorties were more frequent. VC10s were also used in the aeromedical evacuation role, and 11 flights from Montevideo conveyed 565 casualties to the United Kingdom.

**Harrier GR3.** Harriers were flown off HMS Hermes initially and subsequently also from land bases on the Falklands. Although several sorties were flown daily, they were all in daylight and aircrew were able to rest and sleep adequately at night. Ferry flights from the United Kingdom to Ascension and from Ascension to the Falklands were involved in getting many of the Harriers to the South Atlantic and pilots flew up to 9-hour solo flights on these. However, the stimulus of air-to-air refuelling and first-ever carrier landings ensured high arousal and no pilots complained of fatigue or boredom. Previous experience with long range air-to-air refuelling had been gathered during such operations to the Far East (Mills & Nicholson, 1974).

Figure 5

Route structure for VC10 (transport) aircraft operating between United Kingdom and Ascension Island via Dakar.



During the South Atlantic Campaign advice on human factors proved of great significance in determining the frequency of sorties and the number of sorties flown by each crew. Flight Supervisors were given clear directives about crew scheduling and flight medical officers monitored all aircrew. The aircrew on Ascension Island were given priority for accommodation to ensure good rest facilities and their feeding was closely supervised. Hypnotics were extensively used for the first time with very beneficial results. A total of some 1,000 RAF aircrew were involved in Operation Corporate and morale and motivation remained at a very high level throughout the campaign.

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