FALKLAND ISLANDS

REPORT ON LAND AERODROMES IN THE FALKLAND ISLANDS

SEPTEMBER 1978

UNITED KINGDOM CIVIL AVIATION AUTHORITY

CONTENTS

CORRIGENDA: Report on Land Aerodromes in the Falkland Islands

Page 15 Para 2.2 — Amend Table to read:-

Total Revenues	83.0
Subsidy	72.3

Page 23 Para 5.2 — Amend the total of the last Table to read £13,500 (not £7,500)

Page 24 Para 5.3 — Amend second column of tabulation to read:-

£000
Reduced Service
5 Islander Sites

83.0
13.5
4.0

100.5

Page 26 Para 7 — Amend the tabulation to read as follows:-

	1978/79 Current forecast £000	1978/79 Revised forecast £000	Short Run Islander service £000	Long Run Islander service £000
Total Costs	100	155	221	222
Total Revenue	55	83	101	113
Subsidy	45	72	120	109
%	45%	47%	54%	49%

Page 26 Para 7 line 19 — Amend £12,000 to read £18,000

Page 26 Para 7 line 20 — Amend £54,000 to read £48,000

Annex: Table 3 — Amend the item "FIG" to read:-

3 Councillors @ 1 R/T per month = 3 x 12 x 2, 72 per annum.

Govt trips approx 100 per annum

Visitors approx 100 per annum

TOTAL TRIPS: 798

Average costs per pax £42 approx

Current average fare £10

∴ additional revenue £32 per pax

Amend the item 'Additional Revenue' to read:-

Medical Hourly	£12,480
798 x £32	£25,536
Less current Medical Charter	(9,900)
	£28,116

24 October 1978
DOSO/CAA

Part One: Introduction

1 INTRODUCTION AND TERMS OF REFERENCE

1.1 At the request of the Ministry of Overseas Development, following proposals made by the Falkland Islands Government for the introduction of an Islander land-plane service at the Falkland Islands, arrangements were made with the Directorate of Operational Services Overseas, of the Civil Aviation Authority for CAA specialists to carry out an investigation into the practicability of these proposals. Mr R J Wainwright a Senior Operations Officer, and Mr T Davies, an Economic Adviser, visited the Falkland Islands for this purpose over the period 16-26 August 1978.

1.2 The Terms of Reference for this visit were as follows:

In view of the request of the Falkland Islands Government for aid funds to supply an Islander Aircraft:

a) to examine at least four landing strips already completed and as many sites as possible where landing strips are planned or under construction.

b) to appraise the suitability of these strips from the point of view of safety standards and operations in all weathers.

c) to investigate the adequacy of arrangements for constructing and maintaining the landing strips to a satisfactory safety and operational level.

d) to discuss with FIGAS the organisation and manning levels of a proposed enlarged air service.

e) to obtain data to enable a. an evaluation to be made of the proposed scheduling and fare structure of the air service including an assessment of load factors, b. the information obtained under d) above to be analysed in order to evaluate the feasibility of introducing an Islander service to the Falklands and to examine the financial implications of such an introduction.

2. Previous Studies

2.1 A transportation study for the Falkland Islands was carried out by Peat, Marwick and Mitchell in May 1971: their report recommended eventual replacement of the float-plane service by a landplane service. It was suggested that a survey should be made locally to establish suitable natural surface aerodromes, which would then be developed and maintained by the local settlements.

2.2 A CAA team, reporting in October 1973 on the operating procedures of the Falkland Island Government Air Service, rejected these proposals in favour of continuation of the float-plane service; their rejection was based primarily on considerations of the difficulties of establishing suitable aerodromes (mainly in view of reported soil conditions) and of the effect of variable strong winds on light aircraft handling characteristics. It must be remarked here that the CAA representatives did not, at that time, have the opportunity of inspecting for themselves any potential aerodrome sites, and were obliged to rely upon local advice.

2.3 The Peat/Jameson Study Internal Communications 1977, carried out by the ODM, considered that there was no justification, on economic grounds, for the purchase of a new aircraft.

3. Acknowledgements

3.1 The authors would like to express their appreciation of the assistance given by Mr H Massingham, Chief Secretary. Mr J Kerr, Director of Civil Aviation. Mr Rowlands, Finance Secretary, the members of the "Future of FIGAS Committee"and the Officers of the Falkland Islands Government departments: we would also particularly like to thank those in the 'camp' settlements who helped with the inspection of the airfield sites.

PART TWO: OPERATIONAL EVALUATION

1. Aerodrome Requirements and Criteria

1.1 Aerodrome sites in The Falkland Islands have been selected, and in some cases already developed, by the farm settlements to accord with specifications circulated by the Falkland Islands Government Air Service (FIGAS). These specifications have been based upon FIGAS assessment of Islander aircraft performance data provided by the manufacturer; the Islander aircraft is operationally and in cost-effective terms the most suitable aircraft for the FIGAS requirement. FIGAS required, as far as could be practicable, the establishment at each aerodrome of one main runway aligned into the prevailing wind, with a secondary runway preferably at right angles to the main runway.

1.2 The manufacturers advice on the Islanders' field length requirements, under the conditions prevailing in the Falkland Islands (International Standard Atmosphere (ISA), Sea level, zero wind component, level wet-grass runway surface, maximum take-off and landing weights) was as follows:

Take-off Distance to 50 ft	1550 ft (515 yds)
Landing Distance from 50 ft	1780 ft (590 yds)

(Note: distances to and from 50 ft. are used in determining runway length requirements under normal 'balanced field' conditions.)

1.3 The aerodrome specifications issued by FIGAS (but described here in ICAO terms) were as follows:

Runway length	1560 ft (520 yds)

(Note: this runway length specification is apparently based upon the take-off distance advised by Britten-Norman)

Runway width	90 ft (30 yds)
Strip length	1680 ft (560 yds)
Strip width	210 ft (70 yds)
Overall longitudinal slope	1.5%
Transverse slope	3.3%

(Note: in the FIGAS documentation the term 'strip' is used to denote 'runway', and the strip is described as the 'surrounds')

The FIGAS specification requires that "the aerodrome shall have clear approach and take-off areas at each end of the runway area."

1.4 Bearing in mind that this specification is intended to serve a specialised 'community service' operation by a Government air service, it is in general terms in reasonable accord with the specification required for an aerodrome serving public transport operations by Islander aircraft in the United Kingdom. The latter would require a runway width of 60 ft (compared with the 90 ft FIGAS specification), a strip width of 200 ft as against 210 ft. called for by FIGAS; and strip ends or under-shoot/over-run areas at each end of the runway of 100 ft length as compared with 60 ft required by FIGAS. The FIGAS specification, therefore, more than meets the basic public transport aerodrome specifications in terms of runway and strip width, but falls short in terms of strip length, or over-run areas; this should be easily remedied in preparing the basically simple farm settlement aerodromes. Slope limits for public transport aerodromes are as follows:

Overall longitudinal slope:	Runway 2%	
	Strip 3%	
Transverse slope	: Runway 2%	
	Strip 3% (but 5% at runway/strip edge to facilitate drainage)	

It will be seen that the FIGAS specifications for slopes are comparable with these public transport aerodrome standards.

1.5 As a means of controlling obstructions in the take-off and approach areas at public transport aerodromes, take-off climb and approach areas and surfaces are established for all runways. These areas originate at the strip end with an inner edge width of 200 ft; sides diverge away from the runway at 10% opening out to a final width of 1250 ft. The surface of the area rises away from the strip end at a slope of 1 in 20: as far as is practicable no significant obstruction should penetrate this slope. It is suggested that FIGAS should apply these take-off and approach area and surface criteria in order to achieve the "clear approach and take off areas" referred to in paragraph 1.3.

1.6 Aerodrome planning criteria for aerodromes for this type of aircraft recommend that runway alignment should be based upon cross-winds not exceeding 10 knots: it will obviously not be possible to observe the recommendation in the conditions prevailing in the Falkland Islands, especially at those aerodrome sites where it may not be practicable to provide more than one main runway. However, it has been satisfactorily demonstrated that the Britten-Norman Islander is capable of operating at take-off and at landing in conditions of 30 knots cross wind; recent operational experience has confirmed that the Islander is relatively easy tc control in a 25 knot cross-wind, both in the take-off and landing case, with no undue pilot fatigue, and it is considered that this would be an acceptable limitation to observe.

On the basis of the wind-rose information compiled in 1972 for the Cape Pembroke aerodrome study (which is, we consider, reasonably representative of wind conditions generally in the Islands) approximately 90% of flight operations (within the hours of 0500 and 1700) could be conducted on a single East/West aligned runway within a 25 knot cross-wind limitation.

1.7 The selection by FIGAS of the 1560 ft.take-off distance instead of the 1780 ft. still air wet grass landing distance as the basic runway length requirement for airfield development could, in principle, impose some restrictions upon the use of the airfields in wet grass conditions. However, the effect of wet grass on landing is difficult to measure or to forecast with accuracy - it can vary considerably with the type and length of grass, the degree of wetness, and the extent to which the grass covers the ground surface.

The landing distance of 1780 ft, is moreover, calculated on the basis of an actual landing distance increased by a factor of 1.43 for British Civil Airworthiness Requirement purposes; the actual landing distance on wet grass in still air at maximum landing weight will be more of the order of 1200 feet than 1780 feet. Actual landing distances could, in practice, also be reduced at many of the Falkland airfield sites by crossing the landing threshold at a lower altitude than the 50 feet used for performance and planning calculations or, in zero or light wind conditions, landing uphill where there is any significant longitudinal slope to the runway. Therefore, although wet grass conditions could impose some restriction in the landing case, these restrictions are unlikely to be excessively limiting, and the minimum runway length of 1560 feet is considered acceptable bearing in mind the nature of FIGAS operations. It is, of course, essential that pilots should be at all times aware of wet grass conditions at all airfields.

2. Inspection of Aerodrome Sites

2.1 Thirteen aerodrome sites were inspected: they were situated at the following settlements:

Darwin; Keppel Island; Saunders Island; Rincon Grande; Pebble Island; Salvador; San Carlos; Hill Cove; Fox Bay East; Fox Bay West; Walker Creek; North Arm; Chartres.

Darwin, North Arm, Hill Cove and Fox Bay can be considered to be major settlements, having populations of more than 50 persons.

2.2 Site inspections were necessarily brief, because of the limited time available and the difficulties associated with travelling from settlement to settlement. Detailed surveying and measuring could not be undertaken, and it is necessary to rely upon the accuracy of the site surveys carried out by FIGAS (Messrs Hooper and Kanagasabai) as far as site measurements are concerned. The sites were inspected in respect of suitability of location, adequacy of runway and strip area, location of obstructions and, in particular, ground surface conditions.

2.3 The ground condition generally was found to be much more favourable than had been expected. At virtually all the sites the soil state was said to consist of a 9-10 inch layer of fibrous peaty soil on clay or shale/clay. These conditions were confirmed on sites where the top soil had eroded exposing the lower layer, or where excavation allowed the sub-soil to be seen. At most of the sites inspected drainage did not appear to provide any significant difficulties: little standing water was observed, and remedial work on soft areas appeared to be necessary only in isolated patches of ground. Rainfall is generally not excessively high in the Falkland Islands (an average of 26 inches per annum), and the soil appears to dry out fairly quickly after rain. Rain falls "little and often"; the intensity of rainfall is low and daily falls exceeding 0.5 inches are rare. Local advice from all sources during the inspection was that the ground is rarely any wetter or softer than as seen.

2.4 Site preparation consists mainly of rotavation and re-seeding in areas of rough grass or natural coarse vegetation, followed by compaction by rolling. At those sites where fitting is required to remedy eroded patches, ditches or other depressions, shingle or sand is generally available for this purpose. At locations which have already been improved, in

past years, by cultivation by rotavating and re-seeding for grass, the soil condition was firm and hard and quite acceptable for Islander operation at the present time. It is considered that, in the case of sites where rotavation and re-seeding has been carried out recently, some time must elapse before aircraft operations can take place on a regular and frequent basis. Grass is relatively slow growing in the Islands, according to the Falkland Islands Grassland Development Officer; it would be sensible to allow time for grass to grow and to form a durable mat, and for the surface to settle and harden. Use of such newly prepared areas before proper consolidation and growth had taken place could lead to rutting of the surface and tearing of the grass mat, by aircraft braking or by turning on the relatively soft surface. Such damage could be repaired by filling and re-seeding, but it would mean that the strip would take an even longer period of time to consolidate and settle into a thoroughly reliable condition. The opinion of the Falkland grassland specialist staff is that proper compaction and growth of an adequate grass mat could take up to two years to achieve.

2.5 Brief summaries of the characteristics and the availability of each of the aerodrome sites, based upon this inspection and upon the survey details provided by FIGAS, are as follows:

i) Darwin: the aerodrome site consists of a large open field capable of providing three runway directions. A main runway of approximately 520 yards length of firm compacted established grassland is available for immediate use by Islander aircraft; the adjacent areas have been rotavated as preparation for the two other runways. The site is capable of extension by adjustment of the fenced boundaries.

ii) Chartres: Two landing grounds are currently available, one of approximately 500 yds length on a 270/090 degree alignment and one of 600 yards length on a 300/120 degree alignment. Both could be used immediately for limited Islander operations (say two flights per week), the limitation to allow for further settlement and compaction and grass growth. The most southerly runway is preferred: the northern strip has been built up to give excessive downward slope along the runway length edges.

iii) Pebble Island: comprises one main runway of approximately 580 yds (aligned 310/130) and a secondary of 525 yds (aligned 230/050), recently prepared by rotovation and re-seeding and now reasonably compact. The aerodrome could be used now for limited operations (say two flights per week) provided that work on remedying a soft patch on the edge of the main runway has been completed. A ten-foot high water tower located off the south-east end of the main runway is apparently an obstruction in the approach to the landing threshold: this can be adjusted however by displacing the landing threshold to provide clearance over the tank: the runway between the tank and the displaced threshold would however, remain available for take-off purposes.

iv) Fox Bay ~~West~~ East: a landing ground having one main SE/NW runway approximately 540 yds in length. Recently rotovated and reportedly now with a surface in the same condition as Chartres airfields. An inspection from the air only was possible, as excessive crosswind prevented landing. If the surface is indeed as satisfactory as reported it could be available now for limited operations (as proposed for Pebble and Chartres), to allow for further settlement and grass growth.

v) Fox Bay ~~East~~ West: observation from the air only was possible. The prepared runway area appeared to be water logged and covered at least one quarter of its surface by water: it seems unlikely to qualify as a suitable aerodrome.

vi) North Arm: comprises one main runway of 600 yds length on a north/south alignment, having a firm smooth surface of well-established turf; a secondary runway site, needing some improvement, is available with 500 yds length on a 220/040 alignment. Improvement to the main runway can be achieved by hedge and fence removal, to incorporate part of the local racetrack into the strip area to improve strip width and to give improved clearance of adjacent buildings. The main runway could be used now on a limited operations basis; the limitation in this case would probably be one of temporary reduction in the permitted operating weight at the aerodrome due to limited useability of a recently rotavated area at the southern end of the main runway area.

vii) Salvador: this aerodrome is currently used by Cessna Sky Hawk light aircraft. A main runway of 660 yards on a 210/030 alignment can be obtained from extending and re-aligning the present runway to give the maximum clearance of a hangar, and to obtain an improved strip area on either side of the runway: the present strip area is unsatisfactory, with excessively deep gullies on one side. However, the present runway area has a good firm established turf surface, and could be used now for limited aircraft operations at operating weights appropriate to the existing runway length. A proposed secondary runway of 520 yards, aligned 350/270, was inspected, and should be acceptable once the necessary work has been carried out. Consideration should be given to the future re-location of the existing hangar.

viii) Rincon Grande: an aerodrome site, not yet developed, providing two runways of approx. 500 yds each, one aligned 25/07 and the other 30/12. Both have excellent potential being flat, dry and having a good surface (9" peaty soil on hard clay). Both runway and strip areas will need further levelling and improvement, which should be effected reasonably easily, and should provide excellent runway facilities.

ix) Hill Cove: the primary E/W runway site proposed here was quite unacceptable in terms of flight safety. A secondary runway of 580 yds on a N/S alignment, with a good established grass surface was proposed: high ground at the northern end of the runway could induce turbulence and could constitute an obstruction in the take off phase. Use of this runway could only be at pilot's discretion in limited wind conditions: recommendations already made locally are that aerodrome sites should be sought elsewhere in Hill Cove area.

x) Walker Creek: two potentially satisfactory runway sites were inspected. Both required considerable preparation by way of rotovating and re-seeding; one required considerable filling but this was considered to be quite practicable using shingle from the beach. Subject to early completion of this work both strips could be usable within two years.

xi) San Carlos: two potential runway sites were inspected. It is doubtful whether a site of satisfactory length can be provided here: a short runway of 480 yds, allowing for restricted use in particular wind/weather conditions, may be possible.

xii) Keppel Island: one potential runway site was inspected, in a flat location providing reasonable well-drained surface conditions of peaty top soil on hard clay. The site was level with no obstructions. However, it is likely that only approximately 400 yards of usable distance will be available, and use of this would be limited to particular weight and wind conditions: it must be doubtful that this will be a practicable proposal.

xiii) Saunders Island: two landing strip sites were inspected. Both had been prepared apparently enthusiastically with little prior consultation with FIGAS. Both strips were unacceptable: one on the basis of excessive slope, the other on the grounds of excessive longitudinal undulations. It is possible that other sites, located further from the settlement, may be found.

2.6 Greater attention should be paid at these airfields and sites to the improvement of the strip area on each side of the runway and at each end of the runway. These areas do not need to be prepared to the same standard as the runway but should be in such a condition that an aircraft can run on to them without damage and can move back to the runway in safety: excessive slopes at the runway edges should be avoided. As far as may be practicable, the level strip area should extend out to 100 feet on each side of the runway centreline, and 100 feet beyond the runway ends. Where slopes might have significance in determining the best runway alignment (as for example at Walker Creek and Saunders Island) it would be prudent to use a theodolite to check levels before actually carrying out any extensive improvement work).

2.7 Following inspection of these aerodrome sites, which gave a good indication of the general terrain and of the soil conditions at potential aerodrome sites, and following discussion with the DCA on the criteria which should be applied to future site selection and development, it is thought that suitable regular use aerodromes can eventually be developed at the following twelve locations:

Port Louis/Green Patch, Douglas Station, Salvador, Rincon Grande, Teal Inlet, Fitzroy, Darwin, Walker Creek, North Arm, Pebble Island, Chartres and Fox Bay.

The possibility of developing aerodromes for regular use at the following is less certain, but cannot at this stage be ruled out:

San Carlos, Saunders Island, Port Howard, Port Stephens, Hill Cove, Port San Carlos and Dunnose Head.

2.8 The timing of availability of these aerodromes must be uncertain; at least five could be used now, and the others brought into service as they become available and this may take some time. Limited staff are available for site surveys, which should desirably be carried out in two stages: initially, to select a site and then secondly, to approve the properly marked out runway and strip area before any extensive development is undertaken. On sites where slopes are critical it would be sensible to take levels, using a theodolite, at least over the proposed centreline. Once sites have been approved further development depends mainly upon the availability of labour and rotavators and compacting rollers, etc. Equipment for carrying out the necessary improvements to the aerodrome surfaces is available within the Islands, but may in some cases have to be borrowed from other settlements or from the Grassland Development Unit, involving movement of equipment by sea: no equipment or assistance is likely to be provided by the Public Works Department. Allowing for all these factors, and the need for compaction, settlement and grass growth on new sites, and the provision of safety equipment, it would seem reasonable to allow up to, probably, two or two and half years before all of these aerodromes are fully developed and equipped for unrestricted Islander operations. It would, in fact, be unwise to be too hasty in the selection and development of aerodromes, and more prudent to take some care to develop aerodromes in the best and safest locations (which will not necessarily be the nearest and most convenient).

3. Airfield Maintenance.

3.1 Maintenance of grass airfields is simple and well within the capability of the local settlement populations; it will consist mainly of filling or rolling of rutted or damaged areas, and re-seeding or patching with turf of any worn grass areas. Maintenance should be on a continuous basis: ruts or depressions should be rolled or filled as

soon as they develop, and any torn grass immediately rolled back into the ground. Where possible, damaged area should be marked so that pilots' landing may avoid them as far as possible, to provide time for grass growth or consolidation.

4. Technical Staff - FIGAS

4.1 Having regard to the reduction in Beaver flying that should result from the introduction into service of an Islander aircraft, there should be no difficulty in maintaining FIGAS operations, at least over the initial period when only a limited number of aerodromes will be available, with the present pilot strength. However, one Falkland Island pilot-trainee is presently under training in Scotland, and should be ready for duty with FIGAS in May/June 1979, having qualified on Islander aircraft. The addition of a fourth pilot to the FIGAS strength will probably result in mild over-staffing, but should allow Senior Pilot to reduce his flying commitment and release him for other duties.

4.2 Adequate arrangements have been made concerning maintenance staff. It is intended that the two seconded RAF NCOs will be retained, to be supplemented by a licensed civil maintenance engineer currently in training in the UK, and who will be qualified on Island aircraft. It is also intended to recruit an apprentice, providing a total staff of four - one above the present strength.

5. Conclusions on Operational Aspects

5.1 As a result of these inspections of airfield sites, it is agreed that the development of small natural-surface aerodromes is feasible and practicable at many of the farm settlements.

5.2 Seven aerodromes could be used, at least on a limited use basis, immediately: these are Port Stanley, Darwin, Chartres, Pebble Island, Fox Bay West (subject to the remarks contained in para 2.5(iv)), North Arm and Salvador.

5.3 It is considered that regular use aerodromes can eventually be developed at, at least, a total of thirteen sites (including Port Stanley). (An eventual total of up to nineteen sites could be assumed for economic assessment purposes.)

5.4 These aerodromes will permit satisfactory operation of Islander aircraft, which is considered to be the aircraft best technically and operationally suited to the conditions prevailing in the Falkland Islands, during daylight hours under Visual Flight Rule conditions.

PART THREE: ECONOMIC EVALUATION

1. BASIS OF ASSESSMENT

1.1 This section examines the economic and financial implications of introducing an Islander service to the Falklands. As a basis for this the current financial position of existing services are reviewed, costs and revenues are then forecast for the proposed service. Finally an assessment is made of the possible impact of the Stanley-Darwin road on the air service.

1.2 As discussed elsewhere in the report the timing of availability of the aerodromes is uncertain. The proposed introduction of an Islander service has therefore been appraised on two bases. The first assumes only 5 aerodromes are available for immediate use and indicates the probable short run (ie 1-2 years ahead) financial results. The second review covers all probable and possible sites (ie approximately 19) and should indicate the longer run financial performance with the full potential of the Islander realised.

2. The Existing Service

2.1 The primary source of financial information is the F.I.G. Estimates for 1978-79. This provides past and forecast revenues and detailed cost breakdowns for the air service (FIGAS). This cost and revenue data is reproduced in Table 1 in the Annex of Tables, for the years 1976/77-1978/79, together with 1975/76 data which was supplied directly by F.I.G. The main costs and revenues are summarised as follows.

	1975/76 Actual	1976/77 Actual	1977/78 Estimate	1977/78 Revised Estimate	1978/79 Forecast
	£000	£000	£000	£000	£000
Fixed Costs	32.2	30.4	36.5	40.5	44.2
Variable Costs	71.5	29.7	43.5	46.7	56.2
Total Costs	103.7	60.1	80.0	87.2	100.4
Total Revenues	39.2	16.5	52.0	35.0	55.0
Subsidy	64.5	43.6	28.0	52.2	45.4
(%)	62%	73%	35%	60%	45%

There were serious disruptions to FIGAS in 1976 and 1977 due to problems with pilots and aircraft. These are reflected in the very poor results shown especially in 1976/77 and to some extent in 1977/78. The improvement forecast for 1978/79 is due to two factors; increased flying hours, now

that the previous problems are resolved, leading to increased traffic and secondly a fare increase introduced on 1 July 1978. This latest fare increase was quite significant, raising the flat rate charged per adult passenger from £6.00 to £8.00 and the non resident mileage rate to 25p per mile. An analysis of FIGAS weekly returns for 1977/78 indicates preliminary results of the year's operations. Revenues received should accrue to approximately £32,000, compared to the estimate of 35,000; passengers carried will be just over 3,000 for 1100 hours flying. These figures are of course subject to revision and verification. Unfortunately actual cost data for 1977/78 was not yet available at the time this study was made.

This helps to confirm the 1978/79 revenue forecast of £55,000. Barring unforeseen problems, 1,300 hours flying time per annum should be possible for the two Beavers. Assuming passenger traffic increases accordingly (and there is no evidence of lack of demand) then approximately 3,700 passengers may be expected. Given the recent 30% fare increase and the charter arrangements with Medical Dept. then revenues of approximately £55,000 should be achieved in 1978/79, implying a subsidy of 45% of total costs.

2.2 It became apparent during discussions of FIGAS econimics that the information contained in the "Estimates" does not adequately reflect the true financial burden placed on Falkland Islands by FIGAS. The "Estimates" denote costs and revenue attributed to FIGAS on a budgetary basis, but there are other costs (and benefits) which are incurred but which are not recorded against the air service. One example of this, aircraft depreciation, was recognised by the 1977 Internal Communications Study team. Table 2, in the Annex to this Report, attempts to quantify the additional costs which should be attributed to FIGAS. It is perhaps necessary to state here that these revised costs do not imply any change in the actual level of resources devoted to FIGAS or indeed any increase in expenditure by the air service. Instead this is an attempt to attribute all costs to FIGAS which are currently 'borne' elsewhere e.g. via a development fund or on the 'housing' budget. Mr Rowlands (Financial Secretary to FIG) and his staff provided considerable help and Table 2 draws heavily upon work prepared by them. Mr Rowlands agreed in principle to the calculations as presented in Table 2 but of course all responsibility for the data rests with the authors. The revised cost estimate for 1978/79 is approximately £155,000 compared to £100,000 shown in the Estimates.

It is similarly true that the revenues contained in the Estimates do not adequately reflect the true benefits of the air service. Except for the recent Medical Service charter arrangements three areas of government use the air service, Medical, Education and FIG itself, and pay only the standard subsidised fare. To the extent that FIGAS cannot recover full costs from these departments this imposes a larger budget allocation on FIGAS (ie subsidy) and a smaller allocation on these departments (who buy air transport below cost). While it may be desirable to subsidise FIGAS and allow the general public reduced fares on social grounds this argument should not apply to the various sections of F.I.G. It is therefore suggested that the air service be credited with the full value of transportation provided to government sections. Since such intergovernmental payments are merely 'transfers' this procedure implies no change in resource usage by the Colony - it simply reduces the apparent subsidy to the air service and increases that of the government departments. (There is a further beneficial side effect for the relevant departments who are now faced with a more realistic comparison of alternative expenditures). The most appropriate transfer price to be charged for government transfer should reflect the full cost of the journeys involved. As an approximation the forecast average cost per passenger has been used. The additional revenue for 1978/79 is calculated at £27,000, the details are shown in Table 3, in the Annex, and are based on discussions with the Senior Medical Officer, Superintendent of Education and Clerk to the Council.

Combining the two calculations above the revised estimate for 1978/79 costs and revenues are

	£000
Fixed Costs	99.1
Variable Costs	56.2
Total Costs	155.3
Total Revenues	82.0
Subsidy	73.3
%	47%

Although there is little change in the degree of subsidy the absolute amount indicated rises by almost £30,000

3. Islander Operations

3.1 The terms of reference for this study included an evaluation of the proposed scheduling and fare structure of the air service including an assessment of load factors. There were no firm proposals concerning the method of operation of the Islander aircraft. During discussions with Mr Massingham (Chief Secretary, FIG), Mr Kerr (DCA) and with members of the 'Future of FIGAS" committee the essential principles for operating such an aircraft were recognised. The current Beaver service

has no fixed schedule but operates 'on request' by advance booking (of varying periods) and to an itinerary decided by the density of the desired traffic flows. Passengers to the same rough geographical areas are often steered onto the same days of travel but urgent or delayed travel needs can cause significant diversions. It was recognised that a continuation of this operating procedure would not utilise the greater capacity of the Islander to any advantage: some additional passengers could be carried but an equally likely consequence would be a significant increase in flying hours (and hence costs). Conversely it is evident that the standard scheduled service, offering specified service at particular times would be a gross over-provision of services to settlements of widely different population and travel demands. The most appropriate solution to emerge during discussion was a compromise whereby the Islander aircraft would provide services to specified settlements, on an advance booking basis as now, but on particular specified days. Except in emergencies the Islander would not serve these settlements at any other time. Such a procedure should allow any increase in traffic carried (see below) to be accommodated by the Islander's increased seating capacity - with no increase in total flying hours by the air service. The aim would be to ensure that demand for and the supply of air capacity coincided both geographically and by day of week - this should maximise the efficient usage of Islander flying time. In the time available it was not possible to prepare precise details of which settlements should be served and on which days. However the principles outlined above were discussed with the FUTURE OF FIGAS COMMITTEE and it was agreed that these indeed represented the underlying FIGAS proposals for an Islander service. The economic evaluation has therefore been prepared on this basis.

An assessment of load factors for the proposed service would indicate how efficiently the Islander will be used. Without a carefully specified operating plan any attempt to forecast load factors can only be very approximate. Moreover it is uncertain whether such calculations would be very helpful in evaluating proposed Islander services. Firstly there is no suitable basis for comparison with the present Beaver service, mainly because of the Beaver seating configuration. Excluding the pilot, the Beaver has four seats, a 3-place bench seat and one in co-pilot position, for adult occupation. There are also two seats aft which can be used by younger children. Thus depending upon the nature of the load, seating capacity is either four or six. This makes the standard calculation of load factor via passenger distance travelled and seat distance offered, quite inappropriate. A traffic survey was conducted (on a sample basis of the first week in each month 1977/78) and shows the following passenger distribution per trip.

Pax	Max Pax/Trip Frequency	Min Pax/Trip Frequency
0	2	53
1	3	28
2	5	5
3	14	6
4	25	1
5	27	1
6	14	-
7	3	-
8	1	-

Load factors calculations based on 4 seats are obviously wrong, since nearly half of the sample flights carried more than 4 people. Conversely a basis of 6 seats is inappropriate because of the limit of 4 adults on the aircraft seating capacity. A further problem associated with standard load factor calculations arises from the flying pattern derived from the geography and traffic flows of the Falklands. Approximately 80% of traffic on the air service (source: FIGAS passenger statistics survey) is to or from Stanley, in a radial pattern to points west of a N - S line through Stanely. Not only will this result in sectors of low seat occupancy (at the 'end of the line') as shown in the table above, it will also result in some passengers flying a greater distance than necessary over intermediate stops. The actual distance flown by passengers is not therefore particularly meaningful, nor consequently is a distance-weighted load factor. (This is reinforced, it is believed correctly, by residents paying a larger proportionate share of the fares through a fixed element, rather than on a mileage basis). This does not obviate the need for some measure of the efficiency of Islander usage. It is suggested that two measures are used, passengers carried per flying hour and average passengers carried per sector - neither of which is constrained by seating configuration.

From an alalysis of FIGAS weekly returns for 1977/78, the Beavers carried 3,130 passengers in 1,090 flying hours or 2.9 pax/hour. From the traffic survey for 1977/78, an average of 2.7 passengers were carried per sector. Taking only the long run passenger estimates for illustrative purposes, total passengers per annum are forecasts (below) at 5,000, of which 1,300 are assumed to require a retained beaver service (again see below). On the basis that there is no increase in total flying hours then the Islander should carry some 3,700 passengers using 800 flying hours or 4.6 pax/hr on approximately 4.3 pax per sector on average, assuming the same number of sectors flown. These

These represent an increase in passengers carried of 60% (per hour or per sector) compared to an increase in seating capacity from 4 to 9 (+ 125%) or 6 to 9 (+ 50%). Considering the type of service offered, the geographic pattern of flying and the nature of demand, an average unweighted sector load factor of just under 50% does not look too unreasonable for the proposed Islander service.

4. Additional Costs of an Islander Service

4.1 As mentioned above two estimates are made of the additional costs incurred by an Islander service; short run assuming only 5 airstrips are available for immediate use and long run assuming 18/19 strips can be used. In each case fixed costs (detailed in Table 4 in the Annex) will be identical. The main items of additional fixed costs are as follows. As mentioned earlier in the report, one additional pilot and one engineer are currently under training; from discussions with the FIGAS flying staff and with the RAF maintenance staff these should suffice to meet the increased workload from the additional aircraft. Salaries for the additional staff have been assumed at the mid-point of the S.4 salary band (source F.I.G. estimates 1978/79). Minor increases are foreseen in overheads, one major element is an allowance for insurance. Although insurance rates of 2% of aircraft value can be generally obtained it has been thought necessary to allow 5% of aircraft value because of lack of experience with land based aircraft and the general operating conditions in the Falklands. Depreciation costs are assessed for the Islander at £33,800 p.a. based on the Britten-Norman quotation of 21/4/78 for an initial price of $408,214, with amortisation on an annuity basis, including interest at 8%, over 10 years. Although there may be grounds for a different cost of capital, in the absence of any major reason to the contrary we have adopted the rate, 8% used in the 1977 Internal Communications Study. In addition, the US dollar/sterling exchange rate has changed since April 1978 but since the price quotation is in dollars any such currency changes would no doubt be compensated in price changes: the April exchange rate of $1.80 + £1 has therefore been used. Previously, depreciation charges have not been incorporated into FIGAS cost estimates; such charges represent the annual cost of capital consumed by the air service and so it is essential that depreciation allowances be identified and stated to reflect the full cost to the Colony of the air service. (It might also be of longer term use to provide a depreciation fund out of which future replacement aircraft may be purchased, so avoiding major calls on other budgetary sources.) A depreciation allowance of £6,539 pa has been allowed for the purchase of a new Hangar, again on an annuity basis including interest at 8% over a period of 50 years. An estimate of

£80,000 for the capital cost of the hangar, including all groundwork and access, was obtained from the Public Works Department. An allowance was made for relocating the present Beaver Hangar, using the same depreciation basis but over 20 years.

4.2 Long Run Variable Costs

Variable costs have been estimated assuming no increase in flying hours for the air service, with the Islander providing the bulk of capacity, utilising 800 hrs flying time. Beaver costs are estimated at current fuel consumption rates and fuel prices and at 1978/79 estimated hourly maintenance costs (source F.I.G. Estimates, basis of 1,300 hrs flying) Islander fuel costs are estimated using fuel consumption rates as supplied by Britten-Norman and a fuel price of £1.30 per gallon, an estimate derived by discussions with Mr Kerr (DCA). It is not possible to simply quote standard maintenance costs for the Islander since engineering labour costs, for only one aircraft, are fixed. Islander spares and overhaul costs were therefore derived as follows. An allowance of £10,000 per annum (800 hrs) was agreed with Mr Kerr for overhauls outside the Falklands (for such items as engines, instruments etc); this compares to the 1978/79 estimate of £18,000 for the Beavers (1,300 hrs flying). Britten-Norman provided FIGAS with a comprehensive 2 year spares holding list, including prices. It is estimated that perhaps one quarter of annual spares requirements (in value) will actually be consumed (spares include 2 engines, 2 props, a whole tailplane, flaps, a complete vacuum system etc). Further discussions with Loganair indicate that major 'removed' items can be refurbished as spares at approximately two thirds the 'new' price, less refurbishing cost. The refurbished value of such major items has been calculated, less the £10,000 overhaul charge above, and credited to spares cost. The resultant cost is approximately £16,000 p.a. or £20/hr at an annual utilisation of 800 hrs. Two data sources are available which suggest this estimate is not unreasonable. A major operator of Islander aircraft estimates a total maintenance cost of approximately £16,000 per aircraft in 1978/79, this figure reflecting economies of fleet size. A smaller operator forecasts total maintenance costs of £24.50 per hour. Both of these lend credence to our estimate - the detailed calculations are shown in Table 5 of the Annex. One final adjustment has been made. It is probable that Beaver spares will become more expensive in future, allowance has therefore been made for a doubling in price over the next 10 years, and have credited the Islander with this (discounted) saving. Variable costs are detailed in Table 5.

The main cost items can be collated as follows, from Tables 4 and 5.

	Current Service	Islander (short run)	Islander (long run)
Salaries, wages, overheads (incl. Beaver depreciation)	99.2	120.7	120.7
Islander depreciation	-	33.8	33.8
Islander, Hangar etc.	-	8.9	8.9
Total Fixed Costs	99.2	163.4	163.4
Variable Costs	56.5	57.8	58.5
Total Costs	155.7	221.2	221.9

The apparent anomoly of increasing variable costs with increased Islander usage is of course a reflection that total operating costs are slightly greater for the larger aircraft but, with the greater number of seats, cost per seat is significantly reduced. This will also be reflected in the Islander short/long run comparison; although costs are similar the revenue earning capability in the short run is considerably restricted. Finally assuming that the target of 5,000 pax per annum can be achieved and no additional flying is incurred, cost per passenger boarded will increase only slightly from £42 to £44. The absolute increase in expenditure is of the order of £60,000-£65,000.

Two items of possible expenditure are not included in these estimates for FIGAS operating costs. The first is emergency fire fighting equipment which could cost from £1,000-£3,000 per settlement (for 18 settlements). The final cost of this equipment is uncertain, as is who shall bear the cost of it - this has not therefore been included in this evaluation. Secondly, the cost of preparation of the airstrips is quite uncertain, since this will depend primarily on the work required at each site. It is thought that the Islanders possess much of the necessary equipment eg rotovators and seeders while labour will be provided by the settlements themselves. Should FIG be required to provide assistance its nature is so uncertain as to preclude estimation at present.

5. Additional Revenue

5.1 In order to gain a clearer view of the impact of the Islander on FIGAS revenues only increased revenue from changes in traffic is estimated, possible fare increases have been excluded (but are touched on below). Because of the fundamental change which an Islander aircraft imposes there is no completely satisfactory basis for traffic forecasts. It is admitted that our traffic projections are tentative and open to discussion. However it is believed that the results

show the general effects of introducing the Islander. The first stage in assessing potential demand was to analyse traffic flows between the various settlements and to/from Stanley. From a sample, of the first week in each month, traffic origin and destination was derived. The proportion of traffic was calculated for two cases; Islander operations to/from

(a)	Stanley	Fox Bay
	Darwin	North Arm
	Chartres	Pebble Island

and secondly

(b)	List(a) plus	Rincon Grande
	Port San Carlos	Walker Creek
	San Carlos	Teal Inlet
	Douglas Station	Saunders Island
	Green Patch	Carcass Island
	Fitzroy	Kepple Island
	Pt Louis	
	Salvador	

These cases represent the short term case of restricted use and the long run situation of maximum Islander usage (the precise specification of each list is not important). The traffic survey indicated that the Islander service could carry 40% of current total passenger traffic for case (a) and 65% of traffic for case (b). The immediate consequence is of course that some floatplane capability must be retained to serve the remaining traffic or else this traffic would be required to reach, somehow, settlements served by the Islander. The first solution is thought preferable since many of the air service costs are fixed and would not be avoided if the Beavers were discarded. Furthermore the Beavers can fulfil a very useful secondary role for emergency use - so allowing the Islander to be retained on the normal service pattern - and also where minimal passenger loads are encountered, so avoiding inefficient use of the higher capacity aircraft. Finally some emergency capability must be retained for periods when the Islander is grounded for routine maintenance and overhaul. Two methods are used to forecast passenger traffic - both are tentative. The table below shows annual traffic statistics for the past 10 years.

Year	Passengers Carried
68	3700
69	3867
70	3683
71	3911
72	4225

Year	Passengers Carried
73	4327
74	4666
75	5213
76	3364
77	2484
77-78(financial)	3130

Source: FIGAS

This shows a steadily increasing traffic flow, exceeding 5,000 passengers in 1975 but severely curtailed by the accident in 1976 and the subsequent problems. The most recent data shows a significant return to traffic growth. Given that there will be no constraints on capacity it is estimated that 5,000 passengers per annum is feasible for the proposed service. The alternative was to review potential traffic in 1978/79 for those settlements potentially served by the Islander, ie 3,700 x 65% = 2,400. An increase in capacity of at least 50% (6 seats to 9 seats on the Islander) could accommodate 1,200 additional passengers ie 4,900 in total for the air service. Both methods assume no limitation on passenger demand below the target of 5,000. This assumption should not be unreasonable given the fact that this traffic level was reached only 3 years ago (subsequently demand was constrained by capacity). Nor has recovery been affected, apparently, by fare increases. Traffic in the first quarter of 1978 was 134% higher on first quarter 1977 (which was affected by capacity problems) in spite of an approximate 30% increase in fares. The increase in traffic in the second quarter was 30%, with the same fare increase - this same level of gorwth is required to reach 5,000 passengers per annum on the Islander/Beaver service. During many conversations with users of the service the level of air fares was specifically raised - no one regarded the level as excessive or a restraint on travel, 'reasonable' was a common description. Although this is not particularly good evidence, it does not suggest any resistance to the current fare levels which might preclude the necessary traffic being achieved. Furthermore several users of FIGAS stated they could make further use of the air service if more seats were available on a regular basis - these included the S.M.O., Superintendent of Education and Clerk to the Council. It should be mentioned that the tentative (regional) operating pattern was discussed with these gentlement, none of whom envisaged any problems but rather welcomed an improved service. A traffic level of 5,000 pax p.a. has therefore been adopted for revenue forecasts.

In the case of restricted use of the Islander in the early years a similar forecast was made on the basis of 40% of current

traffic being served by the Islander. Traffic was estimated at 4,400, an approximate 20% increase.

5.2 Earlier, revenues were calculated on the basis of current fares plus full recovery of costs from government users. This is extended to our forecast, including higher government usage as follows. Dr Bennett, S.M.O., advised he could make fuller use of the air service for transporting patients to/from hospital - a 25% increase in general medical patients has been assumed. Mr Lamin, Superintendent of Education outlined the plans for development of the school and hostel at Stanley, with up to 60 pupils. With no change in teaching methods this would entail 120 further passengers per annum. Moreover the tentative plans for altering the educational structure could result in up to say 300 additional journeys per annum. F.I.G. usage has been estimated to increase by 25% in the light of repeated comments concerning the current lack of capacity for government use. The details are as follows:

	1978/79 estimate	Additional Traffic
Medical	286	60
Education	240	120 (possibly 420)
F.I.G.	236	60
Other	2938	1060
	3700	1300

Additional revenue is assessed at the 1978/79 forecase average fare (approx. £10) level for the general public and at average cost for government use - this results in:

additional Government use	£10,600
additional public use	£10,600
higher Government transfer price for existing traffic (£44 vide £42)	£1,500
	£22,700

Traffic and revenue for the reduced level service was calculated proportionately as follows:

additional Government use	£6,000
additional public use	£6,000
Government transfer price(as above)	£1,500
	£7,500

5.3 Possible freight traffic is extremely difficult to forecast. Freight traffic on the Beaver service has been severely restricted, of the order of 10,000 lbs uplifted per annum which is an insufficient guide to potential freight traffic. After discussion with both FIGAS and potential users it appears that a demand for air freight does exist, but as yet it is unquantifiable. For example, Mr Short of Falkland Supplies stated he is currently important 16 cases of fresh fruit and vegetables per week from the mainland. If only 2 per week were sent up to Camp this would constitute 5,000 lbs of freight per annum. Similarly Mr Bake (from Hill Cove) discussed the possibility of providing soft fruit for Stanley - possibly up to 1,500 lbs of strawberries alone. There is also potential demand for carriage of farm spares and machinery. We have made a possibly optimistic allowance of 50,000 lbs per annum - equivalent to 200 lbs (or one passenger) on each flight. If an average yield of 15p is achieved then total additional freight revenue will be £7,500 (reduced to £4,000 for the reduced service). This estimate must be regarded as tentative.

Total revenues are assessed as:

	£000 Full Service 18 Islander sites	£000 Reduced Service 5 Islander Sites
1978/79 Revenue Forecast	82.0	82.0
Additional Pax Revenue	22.7	7.5
Additional Freight Revenue	7.5	4.0
	1 2.2	93.5

5.4 Fares

Current fares policy for passengers and freight seems quite adequate. The structure of fares imposes a substantial fixed charge for passengers, commensurate with the high proportion of FIGAS fixed costs. Mileage differentials are reduced for residents which is, we gather, a social necessity. There would seem little need to change this fare structure. One suggestion made was to charge a higher rate for Beaver transport, so as to increase Islander utilisation - this is possible but it is believed that the benefits from the small additional revenue earned could be exceeded by social antagonism from those settlements unable to receive the Islander. There is therefore no pressing argument for changes in the fare structure. As with most previous reports the fare level appears low, with an approx. 50% subsidy. F.I.G. has of course increased fare levels significantly in both 1977 and 1978. It is believed that fares should continue to rise, at least in line with inflation (perhaps smaller annual

increases on this basis would be more socially acceptable than infrequent large increases). Air fares do not appear as a major burden on the community, there is probably some scope for fare increases, above the inflation rate, so as to gradually reduce the subsidy. However these should be carefully guaged and be kept fairly small so as not to interfere with projected traffic growth. It is noted that there has been no increase in mail revenue since 1973, again increases at least in line with inflation seem appropriate.

6. The Effects of the Darwin Road

The effects of the proposed Stanley-Darwin Road were calculated in the I.C. Study in 1977 on the basis of over one third of FIGAS traffic flying between points either directly on the proposed line of the road or potentially to be linked to the road. We discussed the road building programme with Mr Mason, Director of Public Works. The planned completion date for the Stanley-Darwin link is 1981, but it is also feasible that the road may not be completed until 1982 or even until 1983. Mr Mason concurred that it might be more appropriate to assume the latter for completion date in respect of FIGAS planning purposes. This has significant implications for the air service, for there would be perhaps four years before any diversion occurred. Furthermore extension of the road to North Arm and San Carlos could be similarly delayed pending completion of the link to Stanley. We do not therefore regard it as appropriate to anticipate traffic diversion from FIGAS to the road for these spur points in the foreseeable future. The proportion of FIGAS traffic flying between points on the line of the road is 18½%, based on our sample survey. Not all of this will divert and some may even be replaced by substitute traffic. We have assumed 15% of traffic will divert. However the affect on revenue is likely to be much smaller: it is highly probable that government traffic will remain on the air service; medical for fairly obvious reasons, education because children are the passengers and F.I.G. because of the time element. Revenue loss is therefore assessed at the standard passenger rate, equivalent to a total of £7,500. Variable costs are reduced by a nominal 5%.

7. Conclusions

A joint Islander/Beaver service could be introduced carrying up to 5,000 pax. per annum. Islander services would have to be restricted to particular settlements on specified days, however a fixed schedule is not appropriate. It is assumed that public fares will remain subsidised, but transfer prices for government traffic could be raised to cover full costs with little change to actual resource costs.

The various implications for costs and revenues of such a service can be summarised as follows.

	1978/79 Current forecast £000	1978/79 Revised forecast £000	Short Run Islander service £000	Long Run Islander service £000
Total costs	100	155	221	222
Total revenue	55	82	94	112
Subsidy	45	73	127	110
%	45%	47%	57%	50%

Effect of Road after 1983:

Total costs	219
Total revenue	104
Subsidy	115
%	53%

The main points are easily seen. Total costs increase by about £65,000 per annum. If a reasonable number of airstrips can be built then additional revenues may approach £30,000, or only £12,000 if only a few strips are available initially. Implied increases in subsidies are approx. £37,000 or £54,000 in these respective cases. All of these incorporate the changes to cost allocation and to government transfer prices as suggested in the report. Any increase in fares and or freight and mail charges should improve this result, but only slightly.

PART FOUR: FINAL SUMMARY OF CONCLUSIONS

1. It is concluded that the development of small natural surface aerodromes is feasible and practicable.

2. Seven aerodromes could be brought into service immediately, although in some cases on a limited use basis: other aerodromes can be developed and brought into service over the next two to three years.

3. These aerodromes will permit operation of Islander aircraft, which are considered to be technically and operationally well-suited to the operating conditions in the Falkland Islands, during daylight hours under Visual Flight Rule conditions.

4. A regular air service could be provided, based mainly on Islander aircraft but with the Beaver float-plane in a secondary role. Such a service should operate to particular settlements only on specified days; a "time-tabled" scheduled service would be, however, too elaborate for the requirement.

5. The likely additional cost of this improved service would be approximately £65,000 per annum. Additional revenues of between £12,000 and £30,000 should be earned, dependent upon the number of airfields eventually available.

ANNEX

Table 1. F.I.G.A.S. ESTIMATES

	1975/76 Actual £	1976/77 Actual £	1977/78 Approved estimate £	1977/78 Revised estimate £	1978/79 Forecast £
Salaries and wages	28331	26935	32116	34558	37905
Overheads:					
Heat, light, power	1585	1488	1680	3200	3000
Incidentals	7	19	30	54	100
Insurance	881	880	933	1648	1405
Labour & transport	1115	323	600	240	500
Hangar Equipment	83	161	350	651	500
Protective Clothing	159	98	150	150	250
Rent		4	8	8	4
Insurance of private aircraft		500	600		500
TOTAL FIXED COSTS	32160	30408	36467	40509	44164
Fuel	49608	3894	27500	27500	32250
Materials & spares	10622	8979	4000	4000	6000
Overhauls outside Colony	11287	16791	12000	15150	18000
TOTAL VARIABLE COSTS	71517	29664	43500	46650	56250
TOTAL COSTS	103677	60072	79967	87159	100414
REVENUES	39218	16493	52000	35000	55000
SUBSIDY	64459	43579	27967	52159	45414
(%)	(62%)	(73%)	(35%)	(6%)	(45%)

Note: excludes 'special' non-recurrent expenditure

Source: F.I.G.

Table 2. REVISED FORECAST OF FIGAS COSTS 1978/79

	£
Salaries and wages (as table 1)	37905
Overheads (as Table 1)	6259
Fixed Costs (as Table 1)	44164
Additional Fixed Costs: Beaver and Hangar depreciation (as per W.P.6 of I.C. Study 1977, including interest @ 8%, annunity basis over 10 years)	19258
Vehicle depreciation with interest @ 8% annuity basis over 12 years. Replacement cost of £5000)	663
Miscellaneous expenditures (assessed 7½% of items 4, 6, 7, 12, 13 in FIG Estimates: Miscellaneous)	1097
Meteorology (10% allowance)	1329
Air Traffic Control (assessed at 50% of ATC wages and Telecomm. Maintenance Contract)	5950
OAP contributions (FIG)	390
OAP Supplementary Pension (FIG)	4140
Administration (assed by Fin. Sec. Dept. FIG)	22160
Total Additional Costs	54987
Total Fixed Costs	99151
Total Variable Costs (as Table 1)	56250
Total Costs	155401

Source: base data FIG
additions as shown

Table 3. ADDITIONAL REVENUES 1978/79

Transfer price for government traffic calculated at full cost

Total FIG flights calculated as follows:

Medical		
1)	Dr's visits 2 per week x 1 hour x 52 weeks = 104 hrs p.a. Hourly cost 1978/79 = £120 Total costs £12,480	
2)	Emergency trips 1 - 2 per month Emergency (false) trips 1 - 2 per month say 3 p.m. = 36 per annum	
3)	General pax 200-300 p.a. say 250 p.a.	
Education	40 children at Darwin 40 x 3 terms x 2 directions 240 p.a.	
FIG	3 Councillors @ 1 R/T per month = 3 x 12 x 2, 36 per annum Government trips approx 100 p.a. Visitors approx 100 p.a. TOTAL TRIPS 762 Average costs per pax, £42 approx Current average fare £10 ∴ additional revenue £32 per pax.	
Additional Revenue	Medical Hourly	£12480
	762 x £32	£24384
	less current Medical charter	(9900)
		£26964

Source: Medical - SMO
Educ - Supt of Educ
FIG - Clerk to the Council

Table 4. ADDITIONAL FIXED COSTS OF ISLANDER SERVICE

	Base 1978/79 £000	Additional Costs £000
Salaries and wages	37.9	8.0 (2 staff, mid pt of S4)
Overheads:		
Heat and light	3.0	3.0 (+100% for new hangar)
Incidental	.1	-
Insurance	1.4	7.3 (5% purchase price)
Labour and transport	.5	-
Protective clothing	.25	-
Hangar equip.	.5	.25 (say +50%)
Rent	-	-
Insurance of Private a/c	.5	-
Vehicle depreciation	.7	
Beaver + Hangar depreciation	19.3	
Misc.	1.0	
Meteorology	1.3	
ATC	6.0	
OAP (govt)	.4	.2
OAP (suppl)	4.1	.5
Admin	22.0	2.2 (say + 10%)
Sub-total	99.2	21.5
Islander Depreciation	-	33.8 (@ 8% over 10 years)
Hangar Depreciation	-	6.5 (@ 8% over 50 years)
Annual Cost relocation of Beaver Hangar		1.9 (8% over 20 years)
Maintenance cost of new road		.5
Total addition of Fixed Costs		64.2

Source: base data, FIG estimates + Table 2
additions, FIGAS, PWD

Table 5. VARIABLE COSTS OF ISLANDER SERVICE

		£
A)	Current costs of Beaver	
	Fuel	
	1300 hrs @ 20 gals/hr @ £1.25 per gal	32,500
	Maintenance 1300 hours @ £18.5/hr	24,000
	Source FIGAS — Total	56,500
B)	Islander 800/Beaver 500	
	Beaver costs	
	Fuel 500 hrs as in A	12,500
	Maintenance 500 hours as in A	9,200
		21,700
	Islander costs	
	Fuel 800 hrs @ 27 gals/hr @ £1.30/gal	22,900
	Maint. 800 hrs @ £20/hr	16,000
		38,900
	Savings on Beaver maintenance (£18.5 per hr discounted 7% over 10 yrs)	2,100
	Total	58,500
C)	Islander 500/Beaver 800	
	Beaver costs	
	Fuel 800 hrs as in A	20,000
	Maintenance 800 hrs as in A	14,800
	Islander costs	
	Fuel 500 hrs as in B	14,300
	Maintenance 500 hrs as in B	10,000
	Savings on Beaver maintenance (as in B)	1,300
	TOTAL	57,800

D) Derivation of Islander Spares & Overhaul Cost

2 year spares holding as per B-N spares	$114,580
consumeable fluids	$ 1,469
Per Annum cost spares	$ 57,290
25% usage	$ 14,322
Value of refurbished items: less (Price x ⅓) items as follows	$ 6,029
2 x engines	
2 x props	
2 x vacuum pump	
altimeter	
airframe instruments	
main flight controls	
Vacuum system	
Engine indicating system	
Oleo legs	
Consumeable fluids	1,469
Total	$ 9,762
+ 10% CIF	$10,738
Overhaul charge	$18,000
	$28,738

£15,965 @ $1.80 = £20/hr for 800