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FALKLAND ISLANDS  
AIRCRAFT ACCIDENT REPORT

PILATUS BRITTEN-NORMAN ISLANDER VP-FAY

REPORT ON THE ACCIDENT AT HILL COVE SETTLEMENT AIRSTRIP,

FALKLAND ISLANDS, ON 12 FEBRUARY 1980

The aircraft was on the ground at Hill Cove Settlement Airstrip, on 12 February 1980, at 12.30 hours. The aircraft was a Pilatus Britten-Norman Islander VP-FAY, registration number G-ALPH, and was owned by the Falkland Islands Civil Aviation Authority. The aircraft was on the ground at Hill Cove Settlement Airstrip, on 12 February 1980, at 12.30 hours. The aircraft was on the ground at Hill Cove Settlement Airstrip, on 12 February 1980, at 12.30 hours.

Owner: Falkland Islands Government  
Operator: Falkland Islands Government Air Service  
Aircraft Type: Pilatus Britten-Norman Islander BN-2A-27  
Nationality: Falkland Islands  
Registration: VP-FAY  
Place of Accident: Hill Cove Settlement Airstrip  
Falkland Islands  
Latitude 51°30' South  
Longitude 060°06' West  
Date and Time : 12 February 1980 at 1235 hours Local Time  
(1535 hours GMT)

All times in this report are Local Time  
ie GMT - 3 hours.

#### Synopsis

The aircraft overran the 36 airstrip at Hill Cove when landing downslope, in calm conditions, on a very slippery surface. The report concludes that the cause of the accident was that the aircraft landed on a surface which had such a low coefficient of friction that it could not be stopped in the runway remaining from the point of touchdown. Contributory factors were the pilots' relative inexperience in Islander operations; their lack of knowledge of the aircraft's wet grass landing performance data, of the exceptionally slippery nature of the surface, and of the wind over the airstrip; and the fact that the touchdown was made unduly far down the strip.

1 Factual information

1.1 History of the flight

The aircraft took off from Stanley Airport at 11.20 hours under the command of the Chief Pilot of the Falkland Islands Government Air Service (FIGAS) who occupied the starboard pilot's seat. It was fully serviceable on take-off. The port pilot's seat was occupied by a co-pilot performing the functions of a pilot-in-command (P1 U/S) under the supervision of the captain.

The aircraft landed at Douglas Station airstrip at 11.35 hours, where the engines were shut down and re-started before it took off again at 11.46 for Pebble Island airstrip. The aircraft landed there at 12.13 where the engines were again shut down, the aircraft becoming airborne again at 12.20 hours for Hill Cove airstrip, carrying three adult and three child passengers. The crew reported that during both these flights the aircraft remained serviceable, and in particular, that the wheel brakes operated normally and effectively. The aircraft approached Hill Cove airstrip from the north-east at 800 feet AMSL. As there was no wind sock the crew estimated from water indications that the wind was northerly at about 10 knots. They decided to use runway 36 and to make a right hand circuit to it.

After a right hand base leg the aircraft was lined up at about 500 feet AMSL (450 feet above the touchdown elevation) with full flap down and an indicated airspeed of 65 to 70 knots. The 36 runway strip at Hill Cove initially slopes upwards to a point 325 feet from the threshold markers and from there slopes downwards. As both crew members had experienced an uncomfortable bump when the aircraft ran over this 'crest' on previous occasions they decided to make the touchdown just beyond it. The crew and ground witnesses were agreed that the aircraft was somewhat high on the approach. The handling pilot stated that the approach was a low power one, and that the throttles were fully closed as the aircraft crossed the runway threshold at which time the indicated airspeed was 65 knots.

The aircraft touched down well beyond the crest, on the down slope portion of the landing strip about 750 feet beyond the threshold markers, so leaving about 1005 feet to go to the end markers. The nose wheel was lowered almost immediately and the P1 U/S commenced braking. Realising that the deceleration rate was inadequate he called "Brakes" and the captain also commenced braking. Two passengers who were looking at the starboard main landing gear noticed that although the wheels rotated after touch down they soon locked and were not turning whenever they observed them during the remainder of the landing run. They, and witnesses on the ground, saw much water thrown up by the aircraft wheels.

The aircraft continued towards the end of the strip where it yawed some ten degrees to the right and ran through empty 40 gallon oil drums marking the strip end, the port landing gear leg striking one of them. The aircraft continued downhill for another 105 feet until it was stopped by a thick gorse hedge from falling over a 24 foot sheer drop onto a rocky beach. During this time the idle cut outs were operated by the P1 U/S. Once the aircraft had come to rest and the propellers had stopped turning the aircraft was evacuated without further incident.

After the aircraft had been pushed clear of the hedge the crew made a damage check. They found that the port undercarriage fairing and the ADP aerial under the fuselage were damaged. The port engine was the only one which had gone into the

hedge and no damage to it or its propeller was noticeable. It was first hand-turned, then started up and run at idle power by the captain, then a full power check was carried out and the propeller pitch control lever was operated through-out its range, including feathering. The engine was reported to have performed normally, there was no unusual vibration at all, and the P1 U/S observing the propeller behaviour from a position near the port wing tip could see no unusual movement. The captain then started the starboard engine and carried out a taxiing trial which included a brake check. The aircraft appeared to be fit to fly and so he decided to return to Stanley Airport rather than accept the delay that would ensue if maintenance engineers were flown out from Stanley to inspect the aircraft. The return flight was made with 3 child passengers and was uneventful.

#### 1.2 Injuries to persons

None.

#### 1.3 Damage to aircraft

There was impact damage to the port main undercarriage leg fairing and its front-spar, to the port engine nacelle box section side panels, and to the ADF sensor aerial mounted under the fuselage. There was also a compression split in one of the port engine lord bearings indicative of the engine having been displaced rearwards. The port propeller was out of track by about  $\frac{1}{4}$  inch; this was discovered during a track check - it could not be detected by visual inspection alone. Because of the out of track condition the engine and propeller were both changed.

#### 1.4 Other damage

None.

#### 1.5 Personnel information

(a) Commander:	Male aged 57, occupied the starboard cockpit seat. Director of Civil Aviation Falkland Islands and Chief Pilot, FIGAS.
Licence:	Falkland Islands Commercial Pilot's Licence first issued on 30 September 1954, valid for life, rated in Group 1 on PBN-2A-27 Islander, and DH(C)2 Beaver Floatplane.
Medical certificate:	Renewed on 28 November 1979 and valid at the time of the accident. Endorsed: to wear spectacles and carry a second pair.
Instrument rating:	None.
Certificate of test:	None.
Flying experience:	Total hours all types - 10,548 Total hours in command - 10,258 Total hours on Islander - 58

Total hours in last 28 days  
 - Islander 17.00  
 - Beaver 0.25

Previous landing at Hill Cove airstrip: 8, of which the last was on 8 February 1980.

(b) Co-pilot: Male aged 24, occupied the port cockpit seat and was flying the aircraft as P1 under supervision.

Licence: Falkland Islands Commercial Pilot's Licence first issued on 6 October 1979, valid for life, rated in Group 1 on the PBN-2A-27 Islander, the DH(C)2 Beaver Floatplane, and various Cessna single engine types.

Medical certificate: Renewed on 2 February 1980, with no restrictions, and valid at the time of the accident.

Last certificate of test: On 21 July 1979 in the United Kingdom on PBN Islander.

Instrument rating: UK Instrument Rating awarded 20 June 1979.

Flying experience: Total hours all types - 576  
 Total hours in command - 480  
 Total hours on Islander - 53  
 Total hours in last 28 days  
 - Beaver floatplane 49.30  
 - Islander 8.30

Previous landings at Hill Cove airstrip: 3, of which the last was on 29 January 1980.

Pilots of FIGAS do not undergo "Certificate Test" check flights as required by the AN(OT) Order, Article 20(4). While it appears that no exemption of this requirement has been given, one was gazetted under Article 72 of the Colonial Air Navigation Orders 1961 to 1972, on 8 January 1976.

## 1.6 Aircraft information

### 1.6.1 Airworthiness

The aircraft (Constructors Serial No. 872) was manufactured in Romania in 1978 for Pilatus Britten-Norman (PBN) and exported to PBN Bembridge Airport from whence it was issued with United Kingdom Certificate of Airworthiness for Export No. E-1892-1 on 14 August 1979 prior to export to the Falkland Islands. It was issued with Falkland Islands Certificate of Registration No. 24 on 9 October 1979, being assigned the registration mark VP-FAY. However it was never issued with a Falkland Islands Certificate of Airworthiness (C of A) and so did not have a valid C of A at the time of accident.

The aircraft had been maintained in accordance with an approved schedule and had a total of about 271 flying hours at the time of the accident. The last scheduled inspection (every 100 hours) was carried at 221-20 hours. The next inspection (every 50 hours) had been due at 271-20 hours but at 269-10 hours the Director of Civil Aviation had granted a 5 hour extension to 276-20 hours.

The last Certificate of Maintenance (No. 601) was issued at 17.00 hours on 20 December 1979 when the 100 hour inspection was completed. The period of validity was for 100 hours. This certificate was signed by the two Royal Air Force Chief Technicians employed by FIGAS, in respect of the aircraft's engine, airframe, instruments and electrics; and by a radio engineer employed by the Posts and Telecommunications Department in respect of the radio equipment. None of these three persons held an aircraft maintenance engineer's licence as described in Article 9(4) of The Air Navigation (Overseas Territories) Order 1977 (ANO(OT) 1977). The radio engineer alone had been authorised by the Governor to issue Certificates of Maintenance under Article 9(4) although the Gazette Notice of 8 March 1978 doing so contains an error in that it refers to Article 92 instead of 9(4). Because of the absence of similar authorisation for the two RAF Chief Technicians the Certificate of Maintenance was invalid. No technical log was in use as required by ANO(OT) 1977 Article 9(6) and the Governor had apparently not granted an exemption to this Article, but FIGAS were in the process of preparing a format of a technical log for the Islander at the time of the accident. Notwithstanding these two discrepancies there was no evidence to suggest that the aircraft had not been properly maintained or that it was not fully airworthy when it was presented for flight on the morning of 12 February. The evidence of the two pilots is that the aircraft was fully serviceable when it took off from Stanley Airport at 11.20 hours and remained so throughout the flights to Douglas Station and Pebble Island, suffering damage only when it overran the runway on landing Hill Cove.

The aircraft was fitted with hydraulically operated disc brakes without anti-skid units. The main undercarriage wheels were fitted with Goodyear 700 x 6 Flight Custom tyres which were in good condition, the depth of the grooves being 5 mms on all 4 main wheels and 4 mms on the nosewheel.

#### 1.6.2 Weight and balance

FIGAS were not using load sheets to control the Islander aircraft weight and balance at the time of the accident as required by ANO(OT) 1977 Article 28 (4) nor had any exemption apparently been granted, although a specimen sheet was in the course of preparation. The captain stated that a standard load pattern was used which involved filling the aircraft's seats in a certain order and that passenger weights were estimated, not established by weighing as required under paragraph 2 of Schedule 15 to ANO(OT) 1977. During the investigation the captain drew up a weight and balance schedule showing the aircraft's loading as he believed it to be on take-off from Pebble Island. It showed the take off weight as 5476 lbs and the Centre of gravity (C of G) as being slightly outside the aft limit. However, when the calculations were checked later in the investigation it was discovered that two mistakes had been made. Correcting these errors resulted in a weight of 6223 lbs and a C of G within limits. On this basis the landing weight at Hill Cove was estimated as being 6168 lbs. The maximum take-off weight is 6,600 lbs and the maximum landing weight 6300 lbs.

#### 1.6.3 Aircraft's landing performance

The landing distance required by the Islander operating onto a dry tarmac runway is shown in a chart of Section 7 of the flight manual. Notes with this chart

state that for operations from dry grass runways with freshly cut grass and firm subsoil the distances for a dry tarmac runway should be increased by 10 per cent. No mention is made here of wet grass operations. British Civil Airworthiness Requirements (BCAR's) only require consideration to be given to hard surfaces and to dry grass runways, and this data is provided in the main body of the flight manual. However PBN provide performance data for operations from wet grass airstrips in an advisory flight manual supplement - Supplement No. 26 to Section 7, titled "Advisory Information and Performance Relating to Operations on Grass Surfaced Runways" which states in part:

#### "Landing Distance Required

Establish the Landing Distance required for a hard, dry surface from figure 14 of Section 5 of this manual, for the appropriate conditions; then:-

- (a) For operation on a dry grass runway, increase the hard dry surface distance by 10 per cent, or:-
- (b) For operation on a wet grass runway, increase the hard dry surface distance by 30 per cent.

Note ...

For some airfields, where the grass surface retains its hardness when wet, or if the surface becomes particularly slippery for any other reason, this factor should be increased to 50 per cent. If doubt exists, take the 50 per cent factor.

- (c) The Landing Approach Speed Variation with Aircraft Weight, given in Section 5 does not change for grass runway operation."

Supplement 26, being advisory only, is only placed in a flight manual when it is made up for an individual aircraft if the customer has asked for it. Due to an administrative error by PBN Supplement 26 was not offered to FIGAS, and so was not included in VP-FAY's flight manual when the aircraft was sold to them by PBN. However during negotiations with the Falkland Islands government in March 1978 PBN had been asked to quote the minimum safe field length for Islander operations on wet short grass and in a telex dated 7 April 1978 had given figures for such surfaces and for dry tarmac runways. The conditions stated were 6,300 lbs weight under International Standard Atmosphere (ISA) conditions at sea level and zero wind. Figures were given for level surfaces and for a 2% adverse slope. The wet grass distances quoted were 30% greater than those for the dry tarmac, and the figure given for the wet grass 2% adverse slope landing case was 1840 feet. No figure was given for the particularly slippery case requiring a 50% increment mentioned in Supplement 26, nor was there any indication in the telex that a worse case than that quoted might exist. There was also no mention of Supplement 26 itself. The telex stated that "the wet grass figures given are advisory and are not part of approved flight manual data. These will therefore be subject to agreement with local operating airworthiness authority".

#### 1.7 Meteorological information

The local forecast in operation for 12 February 1980 was as follows:

"Winds light mainly North and will become strong to gale Southerly in West Falkland by late morning or early afternoon and in East Falkland

in the afternoon. Weather occasional showers with some sunny periods especially in North in the afternoon."

Information from a meteorological aftercast, the aircraft's crew, its passengers, and witnesses on the airstrip was used to compile a picture of the weather at the time of the accident. This was as follows:

Surface wind. This was estimated as northerly about 10 knots by the crew from the appearance of the sea at Hill Cove. However witnesses on the ground reported the wind as calm and the crew accepted that on the airstrip itself this may well have been so.

Cloud. There was no low cloud.

Visibility. 25 Kilometres.

Weather. Although there was no precipitation at the time of the landing there was shower activity in the area and there had been intermittent showers at Hill Cove since 0800 hours. Records showed that 6.3mm of rain had fallen at Hill Cove settlement in the 24 hour period ending 0900 hours local on 12 February.

Temperature. 10°C.

Humidity. Nearly 100% during the period 0900 hours to 1200 hours, resulting in little or no evaporation of surface water during that period.

#### 1.8 Aids to navigation

Not applicable.

#### 1.9 Communications

No facility for ground/air VHF radio communications existed at the Hill Cove airstrip although PICAS Information Sheet No. 2 issued in July 1978 had expressed the hope that settlement farms with airstrips approved for Islander operations would equip themselves with Airband VHF Transceivers.

At the time of the accident any communication between Hill Cove and the Islander would have had to be by HF radio-telephony (RTF) link between the farm manager's house and Stanley RTF Station, by telephone to Stanley Air Traffic Control, and then by VHF or HF RTF to the aircraft. No messages were passed in either direction by this means before the accident.

#### 1.10 Aerodrome and ground facilities

The airstrip at Hill Cove is 180/360 degrees magnetic and lies at a mean height of 50 feet on ground which slopes down in a northerly direction to the sea. The width of the field was about 270 feet and the landing distance available was 1755 feet, each end of this being marked by a line of empty 40 gallon fuel drums lying on their sides lengthwise across the ends of the strip and secured to wooden stakes pegged into the ground. There were no other runway or other markings.

The airstrip had been assessed in 1978 by an inspection team when Islander operations were being planned and trial landings had been carried out there



during the Islander work-up period. However no accurate survey had been carried out prior to the accident. After the 1978 assessment a data sheet was completed which gave the length of the airstrip as 1764 feet and the slope as being approximately 2% down to the north. A survey carried out after the accident determined that the length of the landing distance available was 1755 feet, and that on 36 the overrun was 105 feet and ended in a thick gorse hedge that grew on the edge of a vertical drop of 24 feet onto a rocky beach. The survey established that, while the overall gradient of 36 was a 1.8% down slope to the north, there were two main gradients. From the 36 threshold markers there was a 2% upward slope for 325 feet to a 'crest' and from that point there was a down slope of 2.6% to the end markers and onwards to the gorse hedge.

The airstrip lay on old established pasture with a firm subsoil. The grass growing on the strip at the time of the accident was about 6 inches high and was lush. The grass was extremely wet and water droplets which could be seen lying on the blades dripped off when the grass was disturbed. There was no water lying in pools on the surface of the ground. The aircraft's wheels had left track marks on the grass from a point measured as being about 750 feet beyond the threshold onwards to the gorse hedge. There were no ruts. There was no wind sock, fire extinguishing or crash rescue equipment at the airstrip although it is understood that such equipment was in store at Stanley waiting to be issued to selected airstrips of which Hill Cove was one.

The airstrip at Hill Cove was under the control of the settlement farm manager. Before each aircraft movement it was his practice to drive over the airstrip in a Landrover to inspect its condition and to see that it was clear of obstacles. The manager had received no training in these duties although he had had discussions with FIGAS representatives and had received FIGAS Information Sheets 1 and 2 dealing with landing strips. However he was unaware of the large difference that very wet grass could make to an aircraft's landing run and so when he found the grass on the airstrip very wet he did not realise the possible danger and made no attempt to get a warning message passed to FIGAS or to the pilot.

#### 1.11 Flight recorders

None carried.

#### 1.12 Wreckage and impact information

The aircraft struck one of nine oil drums, which delineated the upwind end of the landing distance available, with its port undercarriage leg. This made a large dent in the drum - which flew high into the air - and caused damage to the leg and the port nacelle area. After over running the airstrip the aircraft continued downhill for a further 105 feet until it was brought to rest by a gorse hedge on the edge of a 24 feet sheer drop onto a rocky beach.

It was not possible to calibrate the aircraft's airspeed indicator system, but the airspeed indicator instrument was removed and calibrated in the flight workshop of HMS Endurance. In the range of 50 to 70 knots the instrument was found to read 1 knot below the true figure.

#### 1.13 Medical and pathological information

None.

#### 1.14 Fire

There was no fire.

#### 1.15 Survival aspects

None.

#### 1.16 Test and research

None.

### 2 Analysis

#### 2.1 Cause of the accident

Early in the investigation it became apparent that the immediate cause of the accident was that the aircraft had landed on a surface so slippery that it could not be stopped within the 1005 feet of airstrip remaining from the point of touch down. The investigation therefore centred on establishing the sequence of events which led up to the accident, and also the surrounding circumstances of the flight.

The evidence of the aircraft's behaviour during the landing run and of the condition of the airstrip surface together indicate that the airstrip surface was extremely slippery and that this was because there was a very wet grass layer on a firm subsoil. Such a surface can give very low braking coefficients, possibly of the order of 0.1  $\mu$ . While it was not possible to establish exactly what value of braking coefficient pertained on this occasion it is safe to say that it would fall into the worst category of surface described in Supplement No. 26 to the flight manual, requiring a 50% factor.

Because of an administrative error by PBN, Supplement No. 26 was not included in VP-FAY's flight manual when it was exported to the Falkland Islands, as it should have been. Information on the variations in performance when operating off wet grass instead of dry tarmac is so important (to all aircraft, not only the Islander) that Supplement No. 26 should be included in each Islander flight manual when it is initially compiled regardless of whether the purchaser asks for it or not. This is because any Islander could be operated into a wet grass airstrip at various times in its life whether or not this was envisaged when it left the factory. Such a procedure would also be administratively simpler and less likely to fall down as it did on this occasion.

The misassessment of the wind over the airstrip by the crew was the result of there being no wind sock or other wind indicator on the airstrip. Once the crew had decided that there was a headwind of 10 knots the decision to land on 36 followed. Although the airstrip had not been surveyed it had been assessed before it was approved for use and both pilots were familiar with it. The differences in slope and length between those measured in the post-accident survey and the planning assessment were small and did not contribute to the accident.

The actual landing distance available was 1755 feet and the airstrip data sheet showed a length of 1764 feet. These figures compare with scheduled landing distances required, in the calm conditions which actually pertained, of 1807 feet for wet grass (30% factor) and 2035 feet for particularly slippery wet grass (50% factor). In a 10 knot headwind, as estimated by the crew before the landing, these figures would have been 1599 feet and 1849 feet. It is impossible to be

certain what the Captain's decision on a landing at Hill Cove might have been if he had been aware of the Supplement No. 26 data and had used it either on the ground in planning or in the air before landing, because of his lack of accurate knowledge of the wind and of the state of the airstrip surface. However even if he had assumed a 10 knot headwind and wet grass (30% factor) he would have realised that a late touchdown could not be accepted.

Thus the several factors of the crew's relative inexperience on type, their lack of knowledge of the information contained in Supplement 26, the lack of a wind indicator on the airstrip, the lack of radio communication with the strip, the farm manager's lack of knowledge of the significance of the very wet grass - which state he might have been able to have relayed to the crew earlier in the day, and the fact that neither crew member had experienced such extremely slippery conditions in the Islander before, all combined to result in a landing being made under conditions in which the landing distance required by the aircraft exceeded that available. The situation was made worse by the fact that the aircraft crossed the threshold 7 knots faster than the recommended speed of 58 knots and touched down about 750 feet beyond the threshold, thus cutting significantly into the safety margins built into the landing distance required data. Although the aircraft would have been able to stop within the strip length remaining from the touch down point if the grass had been dry, there was no chance of stopping on the very slippery surface which existed. It was not possible to establish whether it could have been stopped within the airstrip if the touch down had been made close to the threshold. Regardless of the crew's lack of knowledge of the contents of Supplement No. 26 two further points can be made. Firstly, the Captain as DCA and Chief Pilot should have been aware of the data given in the telex of 7 April 1978, and thus that the 36 strip at Hill Cove was at best marginal in light winds when wet. Secondly, both pilots should have realised by the final stages of the approach, that the touch down point was going to be unacceptably far down a strip which they could reasonably assume to be wet, and so should have carried out a missed approach.

## 2.2 The airstrip

The fuel drums used to mark the ends of the airstrip were too substantial for safety, as evidenced by the amount of damage the aircraft sustained when it struck one in overrunning. Frangible, lightweight, or flat markers should be used for runway markings.

The absence of edge markings along the length of the strip may have contributed to the aircraft's unduly late touchdown by increasing the difficulty the pilots had in combating the visual illusion caused by the downsloping terrain in the approach and landing areas.

When the Islander operation was planned it was envisaged by FIGAS that airstrips would be equipped with a wind sock, a VHF airband transceiver, and fire/crash equipment. The absence of the first two of these played a part in the accident and the third might well have been required. Such equipment should be provided at Hill Cove and at other airstrips as appropriate.

The Hill Cove farm manager who was in charge of the airstrip had received no training in his duties and was unaware of the significance of the very wet grass. It would be prudent for a controller and a deputy to be formally appointed for each airstrip and for them to be given appropriate local training in their duties. These duties should include the assessment of the condition of the airstrip surface and passing a timely warning if it is in any way unsatisfactory.

## 2.3 Aircraft documents

The introduction of load sheets and technical logs by FIGAS was recommended in a UK CAA report in 1974<sup>1</sup> and also in the report into the accident to DHC-2 VP-FAK in 1976<sup>2</sup>. The captain's uncertainty during the investigation of the aircraft's weight and centre of gravity position at the time of the take off from Pebble Island highlights the importance of introducing load sheets now. Similarly sound operating practice requires the use of a technical log.

## 2.4 Operations manual and training

The intended Islander section to the FIGAS Operations manual is an important document and it should be completed as soon as possible. Similarly some document covering pilot training on the Islander should be introduced. This could be produced in the form of the training manual required by ANO(OT)1977 Article 26 or perhaps more simply as part of the Islander section of the Operations manual.

The 1974 CAA report also recommended that FIGAS introduce certificates of test as then required under the Colonial Air Navigation Orders 1961 to 1972. On 8 January 1976 the then Governor of the Falkland Islands granted FIGAS exemption from this requirement under the same order. In the United Kingdom the pilots of even the smallest commercial operators have to undergo such tests and it is suggested that FIGAS introduce these in accordance with ANO(OT) Article 20(4).

In view of the isolation of FIGAS from the rest of the aeronautical world it is suggested that a periodic inspection visit by a member of the UK CAA Flight Operations Inspectorate would be of great benefit in cross-fertilisation of ideas and in maintaining operations standards over the years. A similar recommendation was made in the report on the accident to Beaver VP-FAK.

## 2.5 Return flight to Stanley

Although the damage to the aircraft appeared superficial to the crew when they inspected it at Hill Cove and the powerplants appeared to be performing satisfactorily significant damage had been sustained. With hindsight it can be seen that it was imprudent for the captain to have carried passengers on the return flight to Stanley Airport, although it did not seem so to him at the time.

## 3 Conclusions

### a Findings

- i The two pilots were properly licensed and sufficiently experienced to carry out the flight.
- ii The aircraft did not have a valid certificate of airworthiness.
- iii The aircraft had been maintained in accordance with an approved schedule but the unlicensed aircraft engineers had not been granted the authority to sign certificates of maintenance.
- iv The aircraft was serviceable when it took off from Stanley Airport and remained so until it overran the airstrip at Hill Cove.
- v The aircraft's weight and centre of gravity were within the prescribed limits although no load sheet was in use and passenger weights were estimated.

1 Falkland Islands - Report on a study of the Operating Procedures of the Falkland Islands Government Air Service.

2 DHC-2 Beaver Floatplane VP-FAK, Report on the accident at Mare Harbour, Falkland Islands, on 14 October 1976.

vi The aircraft's flight manual did not contain Supplement No 26 as this was omitted in error by Pilatus Britten-Norman Ltd when it was compiled prior to export to the Falkland Islands. Nonetheless the same information was available within FIGAS but was not known to either pilot.

vii Because the Hill Cove airstrip did not have any form of wind indicator the crew had to assess the wind from water signs. In doing so they judged it to be northerly at about 10 knots when it was probably about calm over the airstrip itself. This led the crew to elect to land downslope on runway 36 instead of upslope on runway 18.

viii The absence of any compatible ground/air radio communication equipment at Hill Cove prevented the captain from seeking information about the surface wind and the state of the airstrip.

ix The captain accepted the PI U/S's decision to aim to touch down beyond a crest 325 feet beyond the threshold. However the aircraft in fact touched down about 750 feet beyond the threshold, although it should have been apparent to the crew by the final approach stage that touchdown was going to be unduly far down an airstrip which was likely to be wet.

x The airstrip had very wet lush grass growing on a firm subsoil giving a surface which had an extremely low breaking coefficient, at least comparable with the worst case mentioned in Supplement No 26 to the Islander flight manual.

xi Normal braking technique failed to arrest the aircraft and it crossed the end of the airstrip after a ground roll of about 1005 feet, sustaining damage from impact with one of the drums which marked the end of the landing distance available. The aircraft then continued for a further 105 feet until it came to rest in a gorse hedge.

xii There were no casualties but the aircraft sustained damage to the port nacelle area and to the propeller.

xiii The captain was imprudent in not having the aircraft inspected by an aircraft engineer before flying it back to Stanley Airport on a passenger carrying flight.

b Cause

The cause of the accident was that the aircraft landed on an airstrip surface which had such a low coefficient of friction that it could not be stopped in the distance remaining after touchdown.

Contributory factors were:

i The two pilots' inexperience on this type of operation.

ii The pilots' lack of knowledge of the aircraft's wet grass landing performance data.

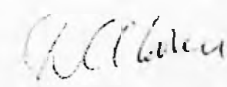
iii The pilots' lack of knowledge of the exceptionally slippery nature of the surface and of the wind over the airstrip.

iv A touchdown made unduly far down the airstrip.

4 Safety recommendations

It is recommended that:

- 4.1 FIGAS introduce load sheets and technical logs for Islander operations.
- 4.2 An Islander section be incorporated in the FIGAS operations manual.
- 4.3 FIGAS introduce an Islander training manual and consider appointing an Islander training captain.
- 4.4 The Falkland Islands Government should consider instructing FIGAS to introduce the certificate of test required by Article 20(4) ANO(OT)1977.
- 4.5 All Islander airstrips should be accurately surveyed and approved or licensed in accordance with Article 66 of ANO(OT)1977.
- 4.6 An airstrip controller and a deputy should be appointed for each airstrip and trained in their duties.
- 4.7 Islander airstrips should be marked in accordance with the provisions of Section VIII, Schedule 14, ANO(OT)1977, as appropriate, using approved materials.
- 4.8 Islander airstrips should be equipped with wind indicators; fire/crash equipment to appropriate scales; and, wherever possible, VHF airband radio transceiver equipment.
- 4.9 The Falkland Islands government should invite the UK CAA to send a Flight Operations Inspector on an advisory inspection of FIGAS in the near future, and at regular intervals thereafter.
- 4.10 Pilatus Britten-Norman should include Supplement No 26 in every Islander flight manual on initial issue.

  
D A Cooper  
Inspector of Accidents

5 November 1980