

**AAIB Bulletin No: 7/95**

**Ref: EW/C95/5/5**

**Category: 1.1**

**Aircraft Type and Registration:** De Havilland Canada DHC-8-311 Dash 8, G-BRYJ

**No & Type of Engines:** 2 Pratt & Whitney PW-123 turboprop engines

**Year of Manufacture:** 1991

**Date & Time (UTC):** 23 May 1995 at 1102 hrs

**Location:** Jersey Airport

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 2 + 2                      Passengers - 42 + 2

**Injuries:** Crew - None                              Passengers - None

**Nature of Damage:** Underside of rear fuselage abraded

**Commander's Licence:** Airline Transport Pilot's Licence

**Commander's Age:** 58 years

**Commander's Flying Experience:** 10,600 hours (of which 3,300 were on type)  
Last 90 days - 200 hours  
Last 28 days - 65 hours  
Last 24 hrs - 1 hour 30 minutes  
Previous rest period - 36 hours

**Information Source:** AAIB Field Investigation

### **History of the flight**

The commander states that the first officer flew a well conducted approach to Runway 27 at Jersey, where the wind was 280°/15 kt. However, the first officer reports that the normal flare to about 4° nose-up did not arrest the rate of descent, so he continued to increase the pitch angle. The ensuing touchdown was firm and the underside of the rear fuselage contacted the runway.

The Flight Data Recorder readout shows that, over the 30 seconds prior to touchdown, the speed had gently reduced from  $V_{REF}$  plus 10 kt to  $V_{REF}$  (105 kt). It remained at this until two seconds before touchdown, when the speed dropped to  $V_{REF}$  minus 5 kt, as the pitch attitude was increased from the original 4° to 8°. The initial touchdown registered 1.9 g and resulted in a small bounce, which was followed by a 1.3 g touchdown as the pitch angle was increased to 9.7°. At this point, the underside of the rear fuselage scraped along the runway and activated the "TOUCHED RUNWAY" warning light. Following this, despite up-elevator being progressively increased to almost full deflection, the pitch angle rapidly decreased and the nose gear contacted the ground. The landing run was continued and the aircraft was taxied to the apron and shut down without further event.

Having disembarked the Jersey passengers, the commander and first officer went outside to inspect the damage, as did a Station Engineer. It was agreed that the scrapes were superficial and mainly a matter of paint loss and no damage was visible from inside the hull. The commander then consulted the Minimum Equipment List and went to telephone the company Flight Operations Manager and the Chief Engineer to describe the damage, returning with the information that the flight could be continued, unpressurised, provided that the damaged area was inspected after every sector flown.

The flight schedule was therefore continued and the sector to Paris flown unpressurised at FL 90. At Paris, the commander and two British Airways engineers made another thorough inspection of the damage, which confirmed the previous diagnosis. The return sectors, Paris to Jersey and Jersey to Bristol, were flown in the same manner, with inspections after each. At Bristol, ground engineers made another inspection and suggested that, as a precaution, the aircraft should be flown directly to its main engineering base at Plymouth. This was done.

### **Examination of aircraft**

It was apparent that the underside of the fuselage had been scraped over a length of 19 inches in the area of frame No 642.50. Aft of this point the underside of the fuselage begins to slope upwards to the tail. The area of interest, which is ahead of the rear pressure bulkhead, is illustrated in the accompanying diagram.

A photograph of the damage is also appended, although it should be noted that at the time of the AAIB inspection, the damaged area had been treated with paint stripper in preparation for the structural repair. The damage would definitely have appeared more superficial when it was inspected immediately after the sectors flown. In particular, it was apparent that the paint quality was such that it was difficult to discern the rivet lines, and in consequence, the locations of the frames and stringers. Inspection of the fuselage interior in the affected area revealed no evidence of damage.

The fuselage skin panels in this area consisted of two alloy sheets bonded together. These in turn were conventionally riveted to the frames and stringers. The left and right panels butted together on the aircraft centreline, the join being covered by internal and external butt straps. The inner strap was considerably wider than the outer, which had been abraded away where it straddled frame No 642.50. The skin either side was also severely abraded, slightly more so on the right-hand side, and the two layers of the skin panel had worn away, exposing the inner butt strap. The skin was scratched as far forward as the next frame, with the damage again being slightly more severe on the right-hand side. The TOUCHED RUNWAY switch mounting plate, mounted to the left of the centreline, and which stood slightly proud of the skin, had been abraded on its rear corners. The frangible disk that covered the switch, together with the external switch components, were missing.

### **Additional information**

Although the aircraft had been equipped with a tail bumper, the ground/fuselage "contact line", at a high pitch angle whilst landing, passes closer to the fuselage underside than to the tail bumper. The operator has now removed the bumper (and had planned to do so prior to the accident), in accordance with Service Bulletin No 832111.

According to the operator, the aircraft manufacturer had received no reports of similar events on this type of aircraft. However, a note in the Maintenance Manual cautions that the fuselage shell can contact the runway in the event of a heavy landing. Although tail bumper contact had not occurred in the operator's experience, it can occur in the event of over-rotation during takeoff, when the main gear oleos are at maximum extension.

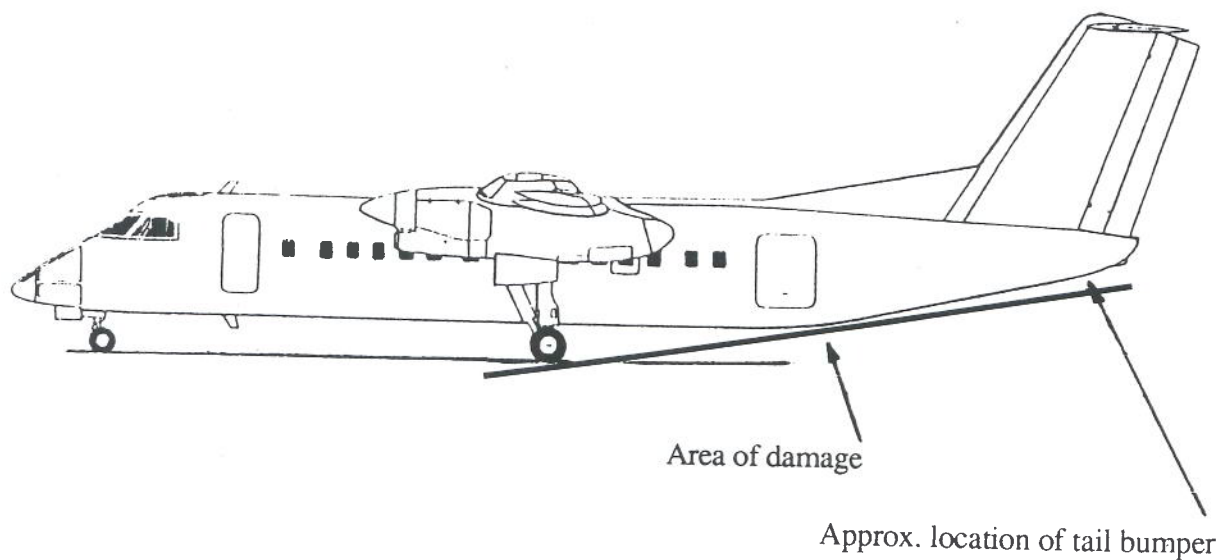
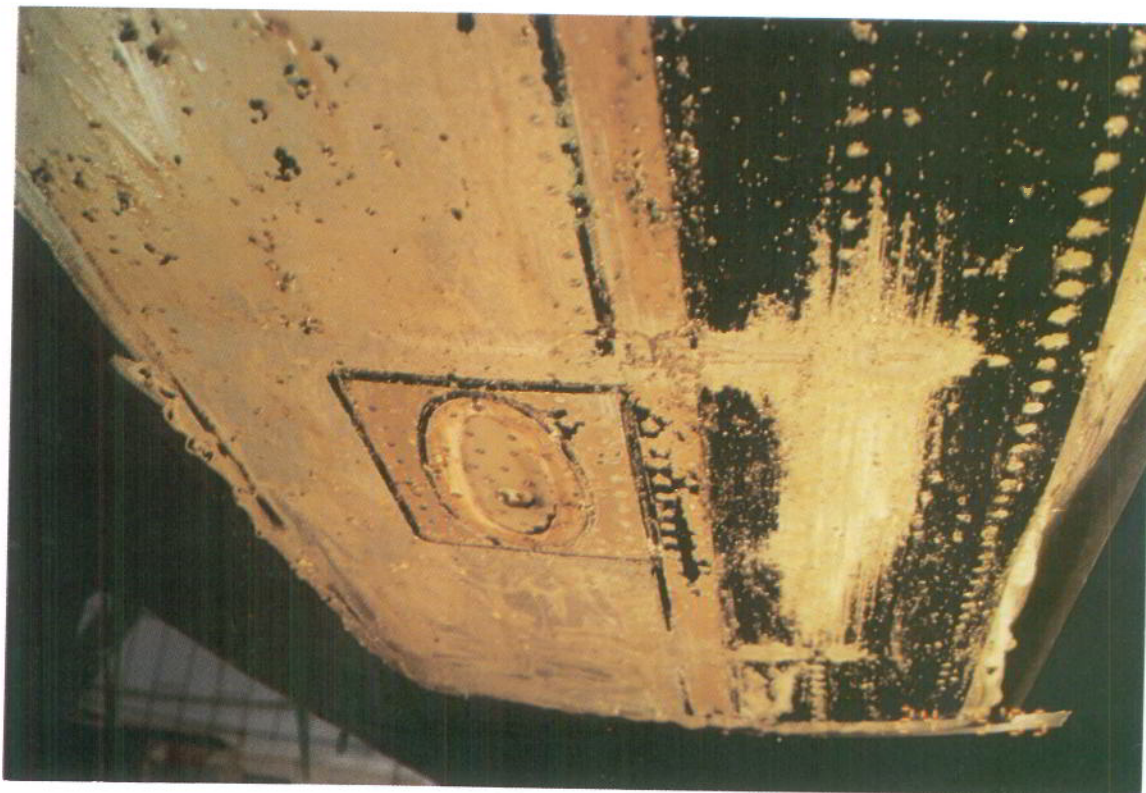


Diagram showing ground contact line at a high pitch attitude



View on underside of G-BRYJ looking forward. Note "touch runway" switch mounting plate to the left of the centreline  
(NB. Surface treated with paint stripper at time of photograph)

**AAIB Bulletin No: 7/95**      **Ref: EW/G95/04/19**      **Category: 1.1**

**Aircraft Type and Registration:** Fokker F28-4000, PH-CHF  
**No & Type of Engines:** 2 Rolls-Royce Spey 555-15 turbofan engines  
**Year of Manufacture:** 1978  
**Date & Time (UTC):** 21 April 1995 at approximately 0937 hrs  
**Location:** Birmingham Airport  
**Type of Flight:** Public Transport  
**Persons on Board:** Crew - 5      Passengers - 76  
**Injuries:** Crew - None      Passengers - 1 Serious  
**Nature of Damage:** None  
**Commander's Licence:** Airline Transport Pilot's Licence (Netherlands)  
**Commander's Age:** 45 years  
**Commander's Flying Experience:** 11,430 hours (of which 687 were on type)  
Last 90 days - 132 hours  
Last 28 days - 37 hours  
**Information Source:** Aircraft Accident Report Form submitted by the pilot,  
and further enquiries by the AAIB

The aircraft had parked on Stand 41 at 0927 hrs after a flight from Amsterdam. The passenger door was opened on arrival with the upper parts of the handrails disconnected in preparation for the attachment of the passenger loading bridge. The handling agency's ramp agent allocated to meet this arriving aircraft was detained on another assignment. The absence of any ramp agents was reported to the handling control centre, and another ramp agent was detailed to put the loading bridge onto the aircraft.

On arriving at the stand, the agent found the loading bridge set at too high a position for the F28, and assessed that it would cause further delay to the passenger disembarkation if the airbridge was to be lowered. He therefore asked the cabin attendant to disembark the passengers using the aircraft's integral stairs. These were deployed, but the cabin attendant requested assistance from the ramp agent in order to reach the left handrail. She then apparently secured it into position. Passenger disembarkation proceeded normally until the last two passengers, a husband and wife, were about to disembark. The time was approximately 0937 hrs. The lady had some difficulty walking, and was aided by a walking stick. Before assistance could be offered to negotiate the stairs, the lady transferred her walking stick into her right hand and leaned upon the left handrail, which collapsed on application of her weight. The lady fell about two metres onto the ramp surface, sustaining several serious chest, neck and head injuries.

The handling agency was informed that urgent medical assistance and an ambulance was required, and informed the Airport Switchboard Operator at around 0940 hrs. The duty nurse arrived from the terminal at 0947 hrs. The ambulance was at the airport access road at 0954 hrs, and was escorted to the scene shortly afterwards.

On 24 April, after being treated in hospital, the injured lady and her husband were flown home on the same aircraft. Prior to boarding, the commander tested the handrails whilst carrying out his pre-departure inspection. On checking the left handrail, it again collapsed when weight was applied. The handrail was then correctly latched in position. Subsequent attempts to dislodge it had no success.

The handrail is normally locked into position by two retaining spigots, one above and one below. Each work independently, so that in the event of a single failure, the other should retain the handrail in the locked position. To the front of the spigots is a quick release device. Subsequent engineering inspection of the handrail on this aircraft revealed no unserviceabilities which could account for its collapse, despite several cycles of operation.

To prevent any repetition of this situation, the introduction of alignment stripes, or equivalent, on the handrail is being considered by the operator. Additionally, crew members have been briefed on the inspection for correct locking of the handrail.

**Aircraft Type and Registration:** Gulfstream Aerospace Gulfstream IV, IRL 250 (military)

**No & Type of Engines:** 2 Rolls-Royce Tay 611-8 turbofan engines

**Year of Manufacture:** 1991

**Date & Time (UTC):** 12 April 1995 at 1422 hrs

**Location:** Belfast City Airport

**Type of Flight:** Military VIP

**Persons on Board:** Crew - 4                      Passengers - 10

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Minor to left winglet

**Commander's Licence:** Military

**Commander's Age:** 35 years

**Commander's Flying Experience:** 4,014 hours (of which 995 were on type)  
Last 90 days - 87 hours  
Last 28 days - 45 hours

**Information Source:** Aircraft Accident report Form submitted by the pilot

After landing the aircraft was directed by ATC to park, without marshaller assistance, on the apron to the northern side of the airfield. As the aircraft manoeuvred between a parked BAe 146 aircraft and the apron fence the left winglet of the Gulfstream struck the left wing leading edge of the BAe 146. The aircraft was stopped and the passengers disembarked normally.

At the time of the accident the BAe 146 was parked parallel to the apron boundary with its right wing tip 3.66 metres from the apron edge. This gave a maximum of 24.23 metres of manoeuvre space available between the left wingtip of the BAe 146 and the opposite apron fence. The wing span of the Gulfstream is 23.72 metres.

The speed at impact, estimated by the pilot, was less than 3 kt. The damage to the Gulfstream was inspected by maintenance personnel and the aircraft was returned to service. The BAe 146 suffered a small dent to the leading edge 1.2 metres inboard from the wingtip.

**Aircraft Type and Registration:** McDonnell Douglas DC-9-32, G-PKBM

**No & Type of Engines:** 2 Pratt & Whitney JT8D-9A turbofan engines

**Year of Manufacture:** 1974

**Date & Time (UTC):** 16 April 1995 at 0920 hrs

**Location:** Stand B4, London Heathrow Airport

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 6                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Right aileron control tab damaged

**Commander's Licence:** Not relevant

**Commander's Age:** Not relevant

**Commander's Flying Experience:** Not relevant

**Information Source:** Incident Investigation Report and Ramp Alert submitted by the company and AAIB enquiries

The driver of an electrically operated Hamech baggage tug was to collect empty baggage containers from the aircraft's rear hold. As the tug manoeuvred towards the hold, it hit the right aileron and damaged the control tab; the aircraft was taken out of service while the tab was replaced. Although the aircraft crew were on board, they played no part in the accident.

Drivers are required to approach the aircraft at right angles and to stop about 20 feet from it; this not only confirms that the brakes are working effectively but reduces the final approach speed. The tug should then follow the line of the wing towards the fuselage before turning the vehicle away from the wing to face the rear. This procedure was not followed; the tug was turned in the opposite direction and consequently hit the right aileron.

As part of their induction course, all staff are shown the correct way to approach an aircraft; a Ramp Alert notice, dated 19 April 1995, was issued by the company Ramp Training and Safety Manager reminding personnel of the correct procedure.

## INCIDENT

**Aircraft Type and Registration:** Airbus A300B4-603, D-AIAR

**No & Type of Engines:** 2 CF 6-80C2A3 turbofan engines

**Year of Manufacture:** 1990

**Date & Time (UTC):** 12 May 1995 at 0829 hrs

**Location:** London Heathrow Airport

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 2 + 8                      Passengers - 170

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** None

**Commander's Licence:** Airline Transport Pilot's Licence

**Commander's Age:** 45 years

**Commander's Flying Experience:** 13,000 hours (of which 2,500 were on type)  
Last 90 days - 200 hours  
Last 28 days - 65 hours  
Previous rest period - 36 hours

**Information Source:** AAIB Field Investigation

## Synopsis

The incident occurred when a Lufthansa A300-600, using the callsign DLH 4043, took off without take-off clearance, from a lined-up position on Runway 09R. When airborne, the A300 passed above and behind two ground vehicles which had just crossed the runway, south to north at Block 83, and a taxiing B747 which had also just crossed the runway, north to south at Block 85. Both the ground equipment and the B747 were physically clear of the runway, though neither had called "runway vacated".

## History of the flight

The Lufthansa aircraft had arrived at the back of a queue at the holding point for Runway 09R. For some of the previous departures, the Standard Instrument Departure (SID) altitudes had been amended because of a special flight in the area. Those ahead of the Lufthansa, to whom it applied, were

individually instructed by ATC to maintain 3,000 feet after takeoff until further advised. This was followed by an instruction to line-up and they were then given take-off clearance.

The Aerodrome Departure Control frequency was busy during this period and a transcript of the RT messages preceding the incident is given at the end of this report.

The Lufthansa aircraft had not been given an amended SID by the time that it lined up on the runway. The crew therefore no longer expected one and, believing that the next transmission to them, shown in the transcript, constituted their take-off clearance, acted accordingly. Several seconds later, whilst accelerating to a speed around 100 kt, the crew saw the runway crossing traffic and decided, as there was ample room either to abandon the take-off or continue it in safety, that the better option was to continue. The aircraft passed above and behind the obstructions and, when they commented to ATC that to clear them for takeoff whilst ground traffic was crossing the runway was not a good idea, they were told that take-off clearance had not been given. They apologised to ATC and later, on return to London, visited ATC to discuss the incident. On hearing the playback of the ATC recorded tape, they agreed that the mistake had been theirs.

## **Analysis**

There have been five previous similar occurrences at major UK airports since 1990 and there is no common factor between all six events, although the two previous occurrences at Heathrow appear to have resulted from the crew not hearing an instruction. Nevertheless, considering the density of traffic, and many pilots who do not have English as their first language, it is a credit to both the controllers and the operators that so few similar events have occurred.

On this occasion, as the ATC recording shows, there is no doubt that the crew were mistaken in their interpretation of the final message from ATC. The message was quite clear and, despite two small and immediately corrected errors in the text, it is not considered that the controller contributed to the build-up of the incident. There must therefore be another reason for the misinterpretation of this ATC message.

English is not the first language of the crew involved and, although their command and use of that language is almost perfect, the speed of delivery and the density of the RT traffic at this particularly busy time was such that total comprehension must have been difficult.

It was not known by the aircrew how long the temporary restriction to the SID was going to continue. Based upon the order of the instructions given to the preceding aircraft (SID amendment, then line-up, then take-off), there was little reason for the Lufthansa crew to expect an altitude restriction if one had not already been given by the time their aircraft was lined up. They therefore expected that, having



**EXTRACT FROM HEATHROW AERODROME DEPARTURE CONTROL RT  
TRANSCRIPT**

TIME	TO	FROM	INFORMATION
0827:24 ---	EIN 153	TOWER	SHAMROCK ONE FIVE THREE CONTACT HEATHROW ONE THREE FOUR DECIMAL NINE SEVEN
	TOWER	EIN 153	ONE THREE FOUR NINE SEVEN ONE FIVE THREE
	BAW 676	TOWER	SPEEDBIRD SIX SEVEN SIX CLEARED TAKE-OFF NINE RIGHT THE WIND IS NORTHERLY TEN
	TOWER	BAW 676	CLEARED FOR TAKE-OFF SPEEDBIRD SIX SEVEN SIX
	DHL 4043	TOWER	LUFTHANSA FOUR ZERO FIVE THREE LINE-UP NINE RIGHT (Incorrect flight number used)
	TOWER	DHL 4043	LUFTHANSA FOUR ZERO FOUR THREE LINE-UP NINE RIGHT
	BMA 5EV	TOWER	MIDLAND FIVE ECHO VICTOR WHEN THE LUFTHANSA 'A' THREE HUNDRED DEPARTS LINE-UP NINE RIGHT
	TOWER	BMA 5EV	MIDLAND FIVE ECHO VICTOR WHEN THE LUFTHANSA 'A' THREE HUNDRED DEPARTS LINE-UP
	BAW 284	TOWER	WHEN THE LUFTHANSA DEPARTS ER LINE-UP MIDLAND FIVE ECHO VICTOR
	TOWER	BAW 284	SPEEDBIRD TWO EIGHT FOUR AFTER THIS DEPARTING BRITISH AIRWAYS SEVEN FIVE SEVEN CROSS NINE RIGHT
	LEADER 8	TOWER	AFTER THE BRITISH AIRWAYS SEVEN FIVE SEVEN TAKING- OFF NOW CROSS NINE RIGHT SPEEDBIRD TWO EIGHT FOUR
	TOWER	LEADER 8	LEADER EIGHT PLUS ONE AFTER THE DEPARTING BRITISH AIRWAYS SEVEN FIVE SEVEN CROSS NINE RIGHT
	DHL 4043	TOWER	BRITISH AIRWAYS SEVEN FIVE SEVEN LEADER EIGHT PLUS ONE
	TOWER	DHL 4043	LUFTHANSA FOUR ZERO FIVE THREE CORRECTION TO THAT ER LUFTHANSA FOUR ZERO FOUR THREE NOT ABOVE ER FOUR THOUSAND FEET TILL ER CORRECTION THREE THOUSAND FEET TILL ADVISED BY LONDON CONTROL
--- 0828:30			LUFTHANSA FOUR ZERO FOUR THREE NOT ABOVE THREE THOUSAND TILL ADVISE- ----- .....(continuing transmissions)..... -----

**AAIB BULLETIN No: 7/95**      **Ref: EW/A94/11/1**      **Category: 1.1**

**INCIDENT**

**Aircraft Type and Registration:** Boeing 747-436, G-BNLA

**No & Type of Engines:** 4 Rolls-Royce RB211-524 H turbofan engines

**Year of Manufacture:** 1989

**Date & Time (UTC):** 10 November 1994 at 1906 hrs

**Location:** Buenos Aires, Argentina

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 20      Passengers - 240

**Injuries:** Crew - None      Passengers - None

**Nature of Damage:** Substantial to No 4 engine

**Commander's Licence:** Airline Transport Pilot's Licence

**Commander's Age:** 53 years

**Commander's Flying Experience:** 14,000 hours (of which 1,300 were on type)  
Last 90 days - 185 hours  
Last 28 days - 95 hours

**Information Source:** AAIB Field Investigation

The aircraft departed Buenos Aires, from Runway 11 at 1900 hrs (1600 hrs local time), for its non-stop flight to London Heathrow. The weather at the time was fine with a temperature of 24°C, calm winds and CAVOK conditions. The aircraft was being operated with a 'Heavy Crew' complement which included an additional captain and first officer.

At approximately 1,300 feet and at a speed of 190 kt during the initial climb the crew heard a series of loud bangs sounding similar to severe engine surging. The commander noticed the EGT strip instrument for No 4 engine rise and turn red as it exceeded the limits. As he retarded the thrust lever for No 4 engine the EICAS (Engine Indication and Crew Alerting System) indicated 'FIRE ENGINE No 4' and the fire warning bell sounded. The commander initiated the recall items from the engine fire checklist by closing the thrust lever, selecting the fuel lever to shut off and firing the first fire extinguisher bottle. Thirty seconds later, with the fire indications still present, he fired the second

extinguisher bottle. Sensing the engine failure the automatic flight system indicated a level acceleration whereupon the flaps were retracted on the speed schedule. During the 'clean up' the first officer, who was the flying pilot, transmitted a 'MAYDAY' to the tower. Once 'clean' the aircraft took up a heading for the first waypoint and was climbed to 6,000 feet, a height above sector safe altitude and the minimum height for fuel jettison.

Shortly after the initial fire warning the second captain entered the flight deck and, with the agreement of the commander, started the fuel dumping procedure. At this stage the aircraft was 100,000 kg above its maximum normal landing weight. The second first officer, who was now also present on the flight deck, was sent by the commander to carry out a visual inspection of the No 4 engine from the rear of the cabin as a fire indication was still showing on the EICAS. The SCCM (Senior Cabin Crew Member) was also summoned to the flight deck and was told that the aircraft would be landing immediately. He returned to the cabin and broadcast the pre-recorded 'emergency landing' public address. Some moments later the second first officer returned to the flight deck and reported that no fire was visible on the No 4 engine. The commander now decided not to return to land immediately but to continue jettisoning fuel down to the maximum normal landing weight. This took approximately 1 hour and was carried out in VMC conditions at 6,000 feet over the River Platte estuary clear of built-up areas. During this time a cabin crew member was briefed to remain at door R5 to observe and report on the condition of No 4 engine.

With the fuel jettison complete the crew manoeuvred the aircraft to commence a procedural three engine autoland approach onto Runway 11 which was carried out without further incident. The emergency services and the resident company engineer attended the aircraft as it landed to examine the engine and brakes. With no further apparent problems the aircraft was escorted by the emergency services as it taxied to the stand. The passengers and crew deplaned normally.

The commander reported that although the emergency procedures could have been carried out adequately by the two flight deck crew alone, the presence of the 'heavy crew' was a bonus and led to greater flexibility in resource management.

### **Initial Examination by the Operator**

On initial examination, the engine was found to have suffered an internal failure leading to burning through of the panels forming the outer fairing of the engine core within the bypass duct and the leaking combustion gases had torched across the bypass airflow region of the duct before damaging the cold nozzle and elements of the thrust reverser which, in normal operation, form the inner skin of the duct. No externally visible damage to the engine cowl was present and the remainder of the aircraft was undamaged.

A propulsion specialist was dispatched by the operator to Buenos Aires to examine the aircraft. He carried out an assessment of the internal condition of the damaged No 4 engine to determine its remaining structural integrity and hence its suitability to remain on the wing for a proposed ferry flight.

Inspections were carried out on the remaining three engines in order to confirm that they were still in the condition predicted by the operator's condition monitoring programme. It was confirmed that there was no evidence of an increased likelihood of premature failure on any of them. A decision was then made to carry out a three-engine ferry of the aircraft back to the UK.

The visible damage on the internal faces of the bypass duct was patched with aluminium alloy panels and speedtape and the fan blades were all removed. A blank was fitted to the intake of the engine core. A return flight to London Heathrow, using a ferry-qualified crew, was carried out utilising two intermediate stops en route.

### **Examination of Aircraft on Return to the United Kingdom**

Examination of the aircraft on its arrival at London Heathrow by AAIB and the operator confirmed that major burn damage had occurred at approximately the 4 o'clock position (looking forward). On removal of the temporary repair panels covering the core engine damage within the bypass duct, the blades of the high pressure (HP) turbine could be seen through the hole in the casing.

### **Detailed Examination**

The power unit was removed and transported to the premises of the operator's overhaul contractor. A strip examination was carried out in the presence of the operator's propulsion specialists, representatives from the manufacturer and an Engineering Inspector from the AAIB. It was established that the engine inner casing had burnt through in the region of the trailing edge of the 1st stage nozzle guide vanes (NGVs) and the tip seal of the HP turbine, as a result of a gas flow occurring in an approximately tangential direction on exit from the NGVs centred in approximately the 3-30 position.

This had initially allowed combustion gases to escape into the cooling air cavity before burning through the outer casing of the engine core and locally destroying the metal panels forming the fairing of the core within the bypass flow. In addition, the inner skin of the cold nozzle and elements of the thrust reverser (ie skins forming the outer boundary of the bypass flow) was locally heat damaged. Severe burning, holing and cracking of the Intermediate Pressure (IP) turbine casing and cooling air manifold had also occurred, together with local damage to the HP/IP support structure. Although extensive mechanical damage to most of the turbine stages was found, it was considered that this was all associated with debris from the original burn through area passing through the turbines and becoming trapped between the blades and the nozzle guide vanes.

Examination of the combustion system revealed that a section of the meterpanel at the upstream end of the combustion liner had become displaced in such a way that the faces of the heat shields were angled towards the outside of the engine rather than lying at right angles to the flow direction. This displacement was the result of circumferential cracking occurring between a group of adjacent cooling air slots at the inner circumference of a section of the meterpanel, allowing the latter to distort under the influence of the gas path load. This resulted in complete or partial disengagement of fuel spray nozzles from positions 3 to 7 and modification of the downstream flow pattern such that the hotter areas near the centre of the flame pattern came into contact with the outer wall of the gas path. This, in turn, resulted in loss of the outer platforms of two HP NGVs and local burn through of HP turbine seal segments.

No defects or damage were found upstream of the meterpanel, although small deposits of an apparently organic substance were found on most of the fan blades. No corresponding deposits were found on any of the compressor blades or stators, or elsewhere in the core engine. The deposits from the fan blades were analysed by specialists of the Bird Strike Avoidance Team of the Central Science Laboratory of the Ministry of Agriculture Fisheries and Food to establish whether any biological evidence of a bird strike existed. They were found not to be consistent with bird remains but were believed rather to be the result of insect ingestion.

### **Laboratory Examination**

The damaged section of the meterpanel area was cut away from the combustion liner and was examined by the materials laboratory of the engine manufacturer, as were a number of corresponding sections removed from in-service examples of other engines which exhibited cracking in similar areas. It was determined that the components were all dimensionally and materially correct. It was also established that the cracking phenomenon was the result of a low cycle thermal fatigue effect which, when sufficiently developed, allowed a high-cycle fatigue mechanism to become dominant.

### **Other Service Experience**

Most meterpanels in this type of combustion liner develop some degree of in-service cracking in the area of the cooling air slots (ie the area of origin of this failure). These do not, however, normally inhibit the continued use of the component, without any displacement of the meterpanel occurring, for some 20,000 hours or 3,000 cycles. The component involved in this incident, however, had only completed some 12,918 hours and 1,741 flight cycles. A similar displacement of a meterpanel has been found to have occurred on another unit with a different operator in which the combustion liner had completed fewer hours and cycles than the incident component but no in-flight problem was experienced.

## **Engine Condition Monitoring**

A retrospective study of recorded modular performance data not used for routine engine trend monitoring revealed two rapid short-term parameter changes, the first of which, beginning approximately 90 flight cycles before the incident, was thought to be the result of the alteration of the flame pattern as a result of the initial displacement of the meterpanel. The parameters affected included Turbine Gas Temperature (TGT). This parameter is recorded by all operators of the engine type and its change during the 90 cycles up to the incident exceeded that normally expected during 1,000 cycles of operation.

## **Fire Detection**

The damage to the engine also resulted in destruction of wiring associated with the fire warning and overheat detection systems. The logic of the aircraft warning system interpreted the open circuit condition of this wiring as being a continuation of the fire after it was, in fact, successfully extinguished. The EICAS flight deck fire warning thus remained present throughout the flight.

## **Fire Protection Considerations**

The burn-through occurred in a radial position such that the resulting torching occurred harmlessly into the bypass duct, only impinging on the inner surface of the cold nozzle and onto thrust reverser panels. Consideration was given to the possibility and consequences of such a burn through occurring at the 12 o'clock position, ie in line with the pylon and the interservices fairing. It was established that a firewall separates all flight critical components mounted in the 12 o'clock position from the engine core. It was also understood that the engine has been shown to satisfy the certification requirement calling for this firewall to be effective for the total time period normally assumed to separate the start of flame break-out and completion of crew post-fire actions.

## **Airworthiness Follow-Up Action**

The manufacturer has produced a Non Modification Service Bulletin (NMSB) for circulation under its CAA approval system to all users of the engine type and closely related types (ie all RB211-524 G and H and a small number of RB211-524D4 engines; the latter have a similar combustor but operate at a lower rating and are not thought to be subject to the problem). The NMSB details an internal borescope inspection technique to detect any displacement of the heat shields/meter panel and calls for

its implementation at all routine inspections otherwise undertaken and at any time that an excessive shift in TGT trend is detected. The NMSB calls for removal of any engine within five flights of an abnormality in the meterpanel and/or disengagement of a fuel spray nozzle from the burner seal being observed.

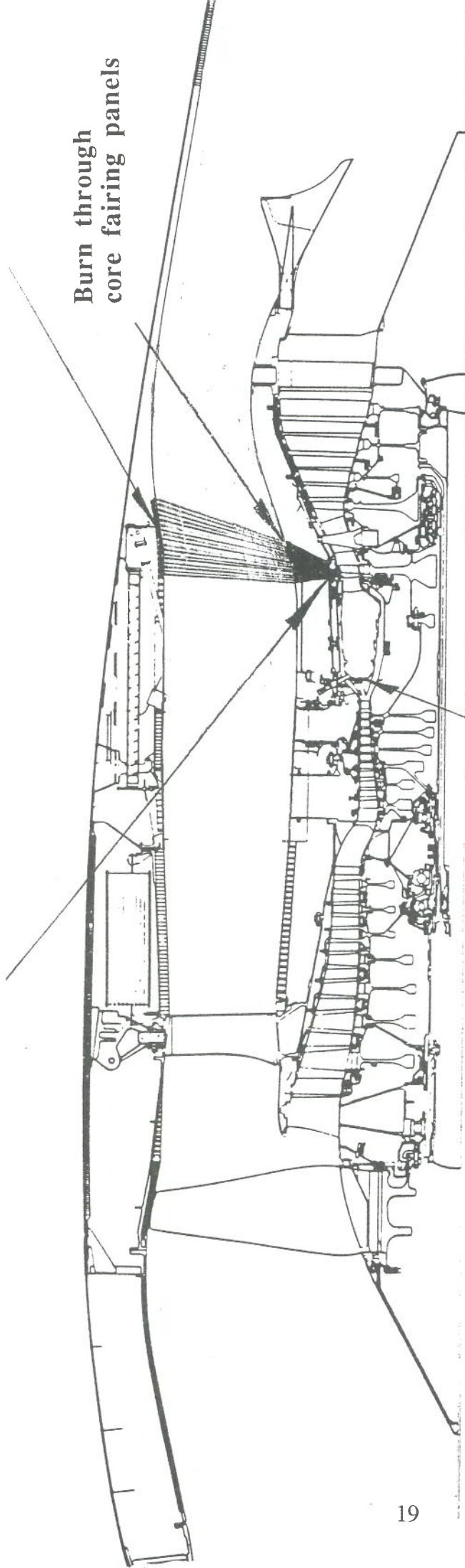
The manufacturer has also recently introduced into production a modified combustor head manufactured from C 263, in place of the existing Nimonic 75 material. The meterpanel, which is attached to the head, is already manufactured from C 263, but the opportunity has also been taken to incorporate within it some minor changes to the arrangement of cooling air holes and some slight geometric alterations. Although this design change, which is detailed in Service Bulletin 72-9764, was made for reasons unrelated to the problem of meterpanel failure, it is thought that the design will reduce the tendency for cracking to occur in the area of the cooling air slots and reduce or eliminate the possibility of this type of failure.

Burn through  
engine core casing

Burn damage on reverser  
panels and cold nozzle

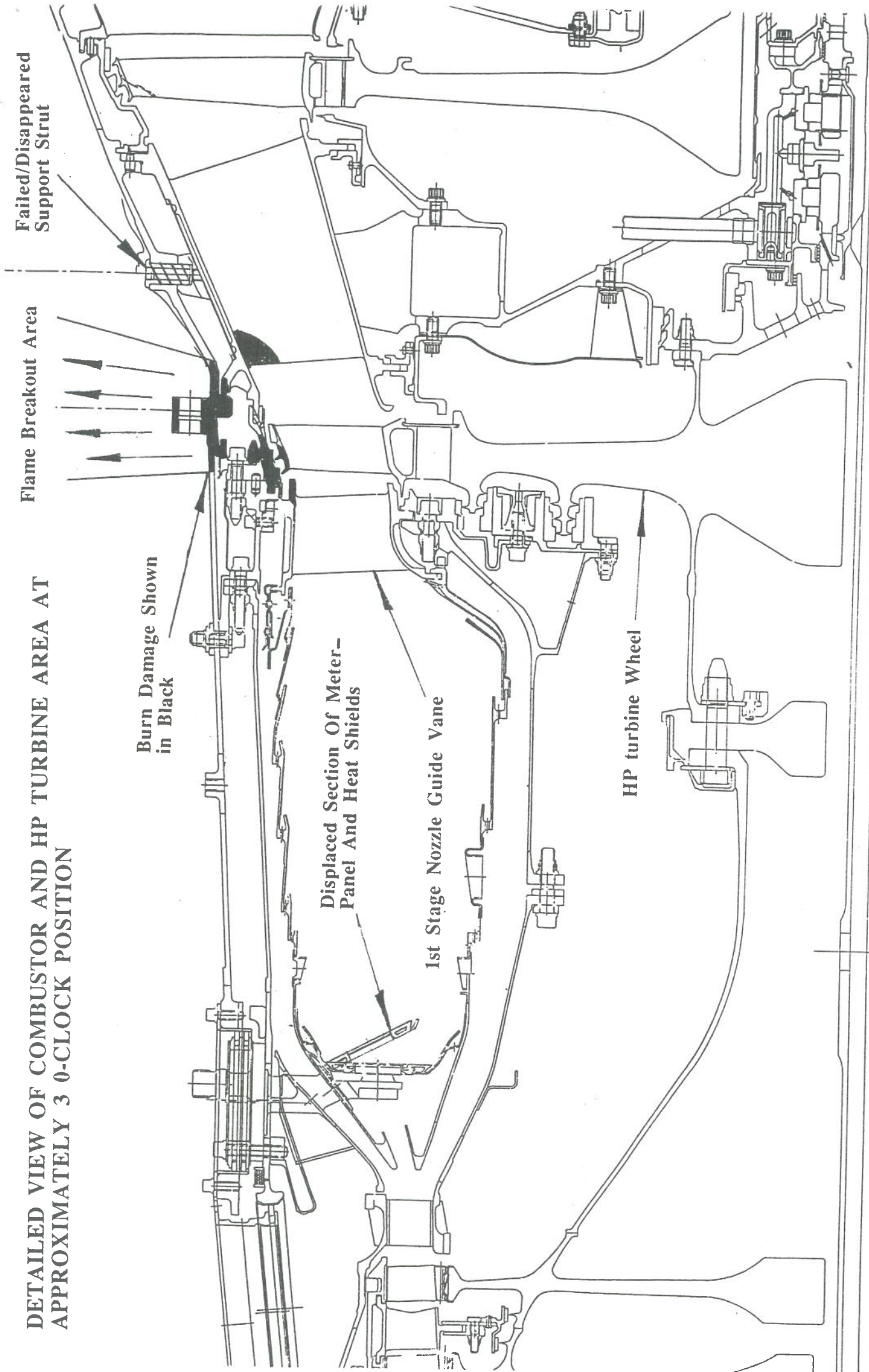
Burn through  
core fairing panels

Meterpanel



SECTION OF RB 211 524 H ENGINE SHOWING POSITIONS OF  
MAJOR BURN DAMAGE AND DISPLACED METERPANEL

**DETAILED VIEW OF COMBUSTOR AND HP TURBINE AREA AT  
APPROXIMATELY 3 O-CLOCK POSITION**



**INCIDENT**

<b>Aircraft Type and Registration:</b>	Boeing 747-436, G-BNLL	
<b>No &amp; Type of Engines:</b>	4 Rolls-Royce RB211-524G2-19 turbofan engines	
<b>Year of Manufacture:</b>	1990	
<b>Date &amp; Time (UTC):</b>	28 March 1995 at 0231 hrs	
<b>Location:</b>	Seoul, South Korea	
<b>Type of Flight:</b>	Scheduled Passenger	
<b>Persons on Board:</b>	Crew - 20	Passengers - 383
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Slight fire damage to No 4 engine core fairings	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	N/K	
<b>Commander's Flying Experience:</b>	15,215 hours (of which 2,100 were on type) Last 90 days - 126.5 hours Last 28 days - 41.5 hours	
<b>Information Source:</b>	AAIB Field Investigation	

Shortly after takeoff from Runway 32R at Seoul, there was a fire warning from the No 4 engine. The crew executed the fire drills, extinguishing the warnings, and, after dumping 106 tonnes of fuel, landed uneventfully back at Seoul. An inspection by ground engineers, monitored by the airline's powerplant engineering section, revealed some fire damage to the core engine fairing panels and sooting of the core engine around the aft end of the high pressure compressor. It was decided to investigate the problem in the UK and so the fan blades of the No 4 engine were removed, the core engine blanked and the aircraft ferried, non-revenue, back to London Heathrow.

The engine was removed from the aircraft and the core fairing panels and thrust reverser duct removed. This revealed that the fire damage was most severe in the arc between 6 and 9 o'clock as viewed from the rear of the engine, but that there was some evidence of the effects of fire around most of the circumference of the core engine, in the zone of the aft end of the HP compressor and the fuel manifolds. There was also some smoke blackening around the core engine support stays and the fire detection system wiring inside the core fairing was damaged.

Initial inspection had shown that the wirelocking of all the pipe union nuts of the high pressure fuel system within the core fairing were intact and in the correct sense. The wirelocking was removed and the torque tightness of all union nuts recorded. This revealed that one union, from the manifold to the one of the six pigtails (triple branched burner nozzle feed pipes) adjacent to the position of the greatest evidence of fire, was loose; being tightened to only 30 lb.inches torque rather than the required 250 lb.inches. All other unions on the high pressure fuel system in this zone were found to have been correctly tightened.

The union nut was restored to its position before the torque check was done and a leak test performed. This showed that there was a fuel leak from the joint which started when the pressure was raised above 200 psi. When the joint was tightened up to the correct torque it did not leak, even at the maximum achievable fuel pressure of 1400 psi. This particular pigtail had been changed in May 1993, whilst the engine was on the wing; since when the engine had run 10,369 hours with 1,365 starts.

The operator instituted a search of their records to identify any other fuel manifold disturbances which had occurred whilst the engines were fitted on aircraft. All the affected engines were subjected to a special inspection to check the torque tightness of the fuel system unions and for fuel leaks from the manifold system. They are also formulating a new, duplicate inspection procedure for the torque tightening of the critical high pressure fuel connections on the engine.

Note damaged wiring loom

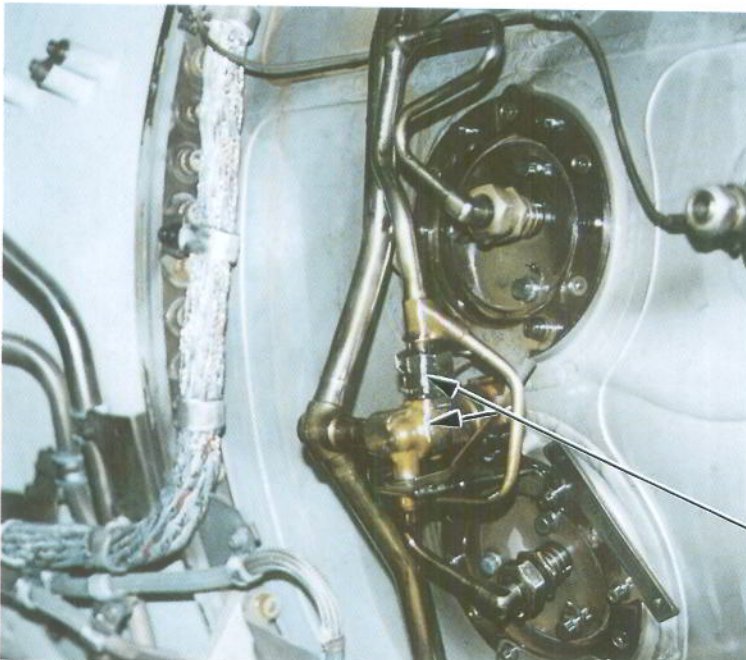


Fig 1a Union nut after tightening to correct torque

note changed position of line on nut relative to that on manifold

Union nut found to be undertightened

White line on nut and manifold show position of nut as found.

Figure 1 Combustion Case detail on right side of engine

**INCIDENT**

**Aircraft Type and Registration:** Boeing 767-200ER, N332AA

**No & Type of Engines:** 2 CF680A turbofan engines

**Year of Manufacture:** 1987

**Date & Time (UTC):** 8 May 1995 at 0845 hrs

**Location:** 25 nm south east Benbecula

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 13                      Passengers - 141

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** None

**Commander's Licence:** N/K

**Commander's Age:** 59 years

**Commander's Flying Experience:** N/K  
Last 90 days - N/K  
Last 28 days - N/K

**Information Source:** Aircraft Accident Report Form submitted by the operating company and telephone enquiries

As the aircraft crossed the west coast of Scotland en route from Chicago to Dusseldorf, an 'electrical burning' smell was experienced on the flight deck. The crew donned oxygen masks and smoke goggles and, having reported smoke on the flight deck and declared a full emergency, diverted to Glasgow. The commander reported that the symptoms improved slightly when the right-hand generator was taken off-line. The aircraft landed safely at Glasgow, and the passengers were all disembarked normally.

Upon boarding the aircraft at Glasgow, maintenance personnel found it to be free of visible smoke but they did note a smell of burning in the cockpit, most notably in the area forward of the instrument panel. The instrument panel and surrounding area was checked visually for indications of overheating, but nothing abnormal was found. The residual smell quickly dissipated, frustrating further efforts to locate the source.

The aircraft was test flown to London Heathrow with maintenance personnel on board. During this flight, numerous functional checks of electrical components and systems were carried out in an effort to reproduce the symptoms. No smoke or unusual smells could be detected at any stage. Upon arrival at Heathrow, further checks were carried out but again nothing abnormal could be found. As a precaution, the forward instrument panel lighting dimmer unit was changed and the aircraft ferried back to the operator's maintenance base in Chicago for further investigation, again with maintenance personnel on board; this flight also passed without incident and no unusual smells or smoke were reported.

Extensive checks of the aircraft at Chicago failed to identify the source of the problem. As a precaution, the main battery charger was replaced, together with all of the instrument panel dimmer units and the aircraft was then returned to service. No reports of smoke or burning smells were received subsequently. However, approximately one week later, the forward equipment cooling fan failed after frequent tripping of the associated circuit breaker. This fan supplies cooling air to the region forward of the instrument panels and was reported to have been 'warm to the touch' during the post-incident checks.

**INCIDENT**

**Aircraft Type and Registration:** Fokker F50, G-UKTC

**No & Type of Engines:** 2 Pratt & Whitney PW125B turboprop engines

**Year of Manufacture:** 1992

**Date & Time (UTC):** 14 April 1995 at 1143 hrs

**Location:** Norwich Airport

**Type of Flight:** Positioning

**Persons on Board:** Crew - 5                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Right inner mainwheel departed aircraft

**Commander's Licence:** Airline Transport Pilot's Licence

**Commander's Age:** 29 years

**Commander's Flying Experience:** 3,700 hours (of which 189 were on type)  
Last 90 days - 108 hours  
Last 28 days - 60 hours

**Information Source:** Aircraft Accident Report Form, investigation report submitted by the operator and AAIB enquiries

The aircraft had undergone work related to defect rectification on the evening of 13 April. One of the defects worked upon involved the removal and replacement of the right inner mainwheel. On the following day the aircraft took off, at 1143 hrs, on a positioning flight to Aberdeen. Soon after takeoff an object was seen to fall from the aircraft. It was subsequently confirmed that the object was the right inner mainwheel. Fuel was burned off, and the aircraft then landed back at Norwich at 1405 hrs, without further incident. The aircraft was removed from the runway to a hangar and jacked for inspection. The detached wheel was recovered for examination. Apart from the separation of the wheel, there was no other damage to the aircraft.

Examination of the aircraft showed that the inner bearing was still in place on the right inboard axle, was of the correct type and appeared correctly fitted. However upon removal of the bearing it was found that the bearing and reinforced seal, as normally fitted, had been prevented from 'seating' correctly by an additional reinforced seal which should have been removed when the wheel was last

replaced. This additional seal was approximately 1/4 inch thick and had therefore displaced the wheel assembly off the axle by 1/4 inch. There was also a further additional seal which had been installed on the outer bearing. Checks were carried out which showed that the effect of this displacement was to prevent the locking bolts from entering the corresponding slots in the castellated ring on the axle. This could not be seen with the axle nut in place. The right inner wheel normally rotates in an anti-clockwise direction when viewed from the axle nut side, and therefore the nut, if not correctly locked, has a tendency to loosen under wheel rotation.

The Aircraft Maintenance Manual showed the mainwheel assembly and described the removal and replacement of a mainwheel. After removal of the wheel the Maintenance Manual called for removal of the inner bearing. It did not indicate that the reinforced seal was a separate item, although it did call for an examination of the axle for damage. The fact that the bearing and reinforced seal were separate items was not reflected in the re-assembly instructions or in the relevant diagram, although it was referred to in the component description as a "metal reinforced bearing seal".

In September 1994, Fokker issued Revision 1 of a Service Experience Digest (SED) first issued in December 1991. This referred to a total of five previous cases of loss of a mainwheel on F27/F50 aircraft, which have similar mainwheel locking systems. In the SED, Fokker concluded that "...the loss of the wheel could have been prevented if the procedure in the Aircraft Maintenance Manual was followed more strictly." and "...Notwithstanding this, Fokker still investigates the possibilities to facilitate the installation of the mainwheels.". In Fokker's view the presence of the additional seal on the outer bearing indicated that the wheel was not assembled in accordance with the aircraft Maintenance Manual.

Fokker Aircraft has advised the operator that it is considering clarification of the Maintenance Manual.

**Aircraft Type and Registration:** Messerschmitt BF109G-2, G-USTV

**No & Type of Engines:** 1 Daimler-Benz DB 605A piston engine

**Year of Manufacture:** 1942

**Date & Time (UTC):** 13 May 1995 at 1409 hrs

**Location:** Duxford Airfield, Cambridgeshire

**Type of Flight:** Aerial Work - display flight

**Persons on Board:** Crew - 1 Passengers - None

**Injuries:** Ground crewman seriously injured

**Nature of Damage:** None

**Commander's Licence:** Basic Commercial Pilot's Licence

**Commander's Age:** 39 years

**Commander's Flying Experience:** 4,791 hours (of which 32 were on type)  
Last 90 days - 80 hours  
Last 28 days - 17 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The engine has an inertia starter which is rotated by a handle on the right side of the nose of the aircraft. This procedure involves two ground crewmen; one stands on the right wing root near the leading edge and the other stands on the right mainwheel. When the initial action has been completed, the crewman on the wheel leaves the immediate area; when the crewman on the wing has removed the starter handle, the pilot operates the 'ignition retarder' with his right hand and the starter clutch engage handle with his left hand. The crewman would normally remain on the wing until the engine had started. He would then move aft along the wing root and jump the short distance to the ground.

On this occasion the throttle lever had been set about 1/2 inch too far open and when the engine started the RPM rose rapidly to 2,000, about twice the normal value. The crewman moved aft but the higher than normal slipstream caused him to lose his balance; as he jumped from the wing he slipped and fractured the lower part of his left leg. The emergency services were soon on the scene and the injured crewman was taken to the local hospital. The aircraft continued with its planned flight.

As a consequence of this accident the procedure has been changed and pilots have been instructed not to activate the starter until the crewman on the wing has jumped to the ground and both crewmen have left the immediate area.

**AAIB Bulletin No:** 7/95

**Ref:** EW/G95/05/32

**Category:** 1.3

**Aircraft Type and Registration:** Aeronca Champion 7AC-4621, G-OTOE

**No & Type of Engines:** 1 Continental A65-8 piston engine

**Year of Manufacture:** 1946

**Date & Time (UTC):** 31 May 1995 at 2030 hrs

**Location:** Coombe Farm, Crediton, Devon

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Aircraft destroyed

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 54 years

**Commander's Flying Experience:** 943 hours (of which 340 were on type)  
Last 90 days - 12 hours  
Last 28 days - 11 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The pilot was making a curved base leg to land on Runway 13 at the farm strip, where wind was two knots from the north west. Approaching short finals, his attention was diverted to a deer in the field below and he consequently overshot the runway extended centreline. As he tightened the turn to correct this, he realised that both the height and the speed were too low, so he levelled the wings, moved the stick slightly forward and applied power. By this time, the aircraft was below the height of a row of trees ahead and in the opinion of the pilot there was nothing else that he could do except reduce the forces of the impending impact by closing the throttle and raising the nose.

The aircraft struck the trees about six feet above ground level and then dropped, nose down, into a four foot deep ditch. Both of the occupants' lap and diagonal harness remained intact and, having switched off the fuel and magnetos, they left the aircraft through the door. There was no fire.

AAIB Bulletin No: 7/95

Ref: EW/G95/03/16

Category: 1.3

**Aircraft Type and Registration:** Aerosport Scamp, G-BOOW

**No & Type of Engines:** 1 Volkswagen 1834 piston engine

**Year of Manufacture:** 1987

**Date & Time (UTC):** 23 March 1995 at 1230 hrs

**Location:** Earls Colne Airfield, Essex

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Nose landing gear collapsed and propeller blade damage

**Commander's Licence:** Basic Commercial Pilot's Licence

**Commander's Age:** 46 years

**Commander's Flying Experience:** 492 hours (of which 9 were on type)  
Last 90 days - 9 hours  
Last 28 days - 6 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot,  
and enquiries by the AAIB

Prior to this flight, the propeller pitch had been adjusted in an attempt to improve the performance of the aircraft. The aircraft subsequently took off from the wet grass Runway 24. During the initial climb, the pilot noted that he was not getting sufficient climb performance and elected to make an immediate re-land onto Runway 06. At the end of the landing run, at low speed, the nose landing gear sank into an area of soft ground and collapsed. As the aircraft sank onto its nose, the engine stopped and one propeller blade was broken.

The wind was southerly at 5 to 10 kt, and the airfield was fairly active that day with movements generally using Runway 24. No adverse comments were recorded from other pilots regarding the state of the runway surface.

**Aircraft Type and Registration:** Auster J1U Workmaster, G-APMH

**No & Type of Engines:** 1 Lycoming O-360-A2A piston engine

**Year of Manufacture:** 1958

**Date & Time (UTC):** 21 May 1995 at 1750 hrs

**Location:** Lude Airstrip, Blair Atholl

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Damage to both main landing gear legs, propeller bent and engine shock loaded

**Commander's Licence:** Private Pilot's Licence with Night Rating

**Commander's Age:** 33 years

**Commander's Flying Experience:** 1,159 hours (of which 902 were on type)  
Last 90 days - 55 hours  
Last 28 days - 32 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The airstrip at Lude has a grass surface which was short, dry and in good condition. The surface wind was estimated to have been southerly at about 6 kt and the pilot elected to land in a southeasterly direction. Initially the approach was high and so he executed an 'S' Turn which then left him lower than he wished. About 250 metres before the threshold the aircraft was stabilised on the approach with full flap and suitable power selected. Just before the threshold, the aircraft started to sink rapidly; the pilot applied power and the aircraft cleared the boundary fence but landed heavily about 5 metres into the strip. The right main landing gear started to collapse and, after about 100 metres, the propeller impacted the ground. The aircraft came quickly to a halt. The pilot shut down the engine and switched off the fuel and electrics before he and the passenger left through the normal access doors. Both wore full upper torso restraint and escaped without injury.

**Aircraft Type and Registration:** Cessna F150G, G-AVGV

**No & Type of Engines:** 1 Rolls-Royce O-200-A piston engine

**Year of Manufacture:** 1967

**Date & Time (UTC):** 8 May 1995 at 1210 hrs

**Location:** Bagby Airfield, Yorkshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Damage to nose landing gear, left wing, propeller and engine cowlings

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 51 years

**Commander's Flying Experience:** 223 hours  
Last 90 days - 2 hours  
Last 28 days - 2 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The pilot was landing on grass Runway 24; the surface wind was 280°/15 to 20 kt. On short final the aircraft experienced windshear which caused it to stall and the left wingtip struck the ground. It subsequently bounced, departed the runway to the left and came to rest on rough cultivated ground. The occupants were wearing lap and diagonal upper torso restraint and escaped without injury.

Hangars to the right of the threshold are known to cause turbulence in the wind condition prevailing. The pilots of the next two aircraft to land after the accident experienced marked windshear as they approached the runway threshold.

**Aircraft Type and Registration:** Cessna F150L, G-BAIP

**No & Type of Engines:** 1 Continental O-200-A piston engine

**Year of Manufacture:** 1973

**Date & Time (UTC):** 30 May 1995 at 1330 hrs

**Location:** Beverley Airfield, Humberside

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Aircraft destroyed

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 58 years

**Commander's Flying Experience:** 127 hours (of which 116 were on type)  
Last 90 days - 14 hours  
Last 28 days - 10 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The wind was 300°/5 kt and the pilot was landing on Runway 30. The landing was very heavy and resulted in a collapsed nose landing gear, a buckled fuselage and extensive other damage. The pilot states that she can give no reason for this accident.

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Ref: EW/G95/05/09

Category: 1.3

**Aircraft Type and Registration:** Cessna 210N Centurion, G-SUIT

**No & Type of Engines:** 1 Continental IO-520-C piston engine

**Year of Manufacture:** 1981

**Date & Time (UTC):** 9 May 1995 at 1605 hrs

**Location:** Edinburgh Airport

**Type of Flight:** Private

**Persons on Board:** Crew - 2                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Fuselage under surface and propeller blades damaged

**Commander's Licence:** Commercial Pilot's Licence

**Commander's Age:** 44 years

**Commander's Flying Experience:** 2,192 hours (of which 300 were on type)  
Last 90 days - 86 hours  
Last 28 days - 30 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The student was on an approved Instrument Rating course, and flew an ILS to Runway 25 followed by a go-around from Decision Altitude. After the go-around he positioned visually on a right-hand downwind for landing on Runway 08. Runway 08 is 799 metres long and lies about 900 metres to the south of the threshold of Runway 25. Because of the relative position of the two runways the manoeuvre carried out necessitated a very short downwind leg for Runway 08.

The student had a high workload in the short time available, visually orientating himself after an instrument approach and manoeuvring the aircraft, whilst carrying out the necessary checks. The instructor was also fully occupied in keeping a good look-out, monitoring the student's flying and having to make two RT "Downwind" calls and two "Finals" calls, because of the high density of radio traffic. Neither the student nor the instructor noticed that the landing gear had not been extended.

The aircraft settled onto the underside of the fuselage and slid to a stop on the runway centreline. There was no fire and, having made the aircraft safe, both crew disembarked through the normal exits. ATC immediately operated the omni-crash alarm and initiated an "Aircraft Accident", which was downgraded ten minutes later and then cancelled.

**Aircraft Type and Registration:** Denney Kitfox Mk 3, G-BURB

**No & Type of Engines:** 1 Rotax 582 piston engine

**Year of Manufacture:** 1993

**Date & Time (UTC):** 6 May 1995 at 1306 hrs

**Location:** Wellesbourne Mountford Airfield, Warwickshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1 Passengers - 1

**Injuries:** Crew - None Passengers - None

**Nature of Damage:** Severe damage to the whole aircraft

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 39 years

**Commander's Flying Experience:** 217 hours (of which 25 were on type)  
Last 90 days - 7 hours  
Last 28 days - 4 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

In conditions of no wind, the pilot made a normal approach to land on the grass Runway 36 and flared at about 65 mph. The touchdown was firm and the aircraft bounced about three feet into the air. The pilot states that he then held the controls still to await the second touchdown, but the aircraft bounced again, this time much higher, so he centralised the controls and applied full power to make a go-around. The aircraft then yawed and rolled to the left towards some parked aircraft and, the pilot, believing that control had been regained, attempted to turn back to the right. This caused the right wing to drop and the aircraft to spiral nose down into the ground. It cartwheeled before coming to rest upright and facing south. There was no fire, and the accident was attended by the aerodrome fire service and the local authority emergency services.

Both occupants were wearing four point harnesses and, although neither sustained serious injury, the pilot needed to assist the passenger, who was dazed and had a bruised back, from the cockpit. Both were then taken to a nearby hospital for examination and then released.

**AAIB Bulletin No:** 7/95                      **Ref:** EW/C95/5/1                      **Category:** 1.3

**Aircraft Type and Registration:** Denney Kitfox 4-1200 Speedster, G-UMST

**No & Type of Engines:** 1 Rotax 912-UL piston engine

**Year of Manufacture:** 1994

**Date & Time (UTC):** 5 May 1995 at about 1435 hrs

**Location:** Newmill Farm, Dolphinton, Lanarkshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - Fatal                      Passengers - N/A

**Nature of Damage:** Aircraft destroyed

**Commander's Licence:** Private Pilot's Licence with IMC and Night Ratings

**Commander's Age:** 22 years

**Commander's Flying Experience:** 217 hours (of which 126 were on type)  
Last 90 days - 28 hours  
Last 28 days - 7 hours

**Information Source:** AAIB Field Investigation

### **History of the flight**

The aircraft, which was based at Portmoak Airfield, Kinross, was flown to Newmill Farm, Lanarkshire. The purpose of the flight was to assess the feasibility of using a particular field as an airstrip; it landed at about 1300 hrs. Two further flights of about ten minutes duration were made from the field, each time with a passenger. The pilot then planned to return to Portmoak to pick up a passenger and fly to the island of Mull, off the west coast of Scotland.

There were two witnesses to the aircraft's departure; they stood about halfway along the field's western boundary fence, about 400 metres from the start of the take-off roll. One was the pilot's grandfather who had played the major part in the aircraft's construction. The other was a family friend who had been a passenger on one of the two previous flights.

At about 1435 hrs, the aircraft took off in a southwesterly direction and was flown level as it passed the two witnesses; they estimated that it was at a height of about 20 feet agl and its speed was about 90 kt. Shortly afterwards it entered a steep climb to about 300 feet agl. The left wing was then seen to "slice" down and the aircraft appeared to enter a left-hand spin or tight spiral; the witnesses said that the engine noise "stopped" at or shortly after the apex of the climb. The aircraft struck the ground after about 1½ turns and caught fire almost immediately.

### **Impact parameters**

The aircraft struck the ground with a high rate of descent and negligible forward speed, rotating in yaw counterclockwise (viewed from above) consistent with the aircraft having been in a developed spin to the left. The pitch attitude at impact was of the order of 40 degrees nose down, and the resulting impact forces had caused extensive disruption of the nose and cabin sections of the fuselage. The ground at the impact point comprised a very hard soil, and no impact depressions of significance were produced.

Post-impact fire had destroyed much of the wreckage; particularly the forward fuselage, engine bay, and the fuel tank locations in the inboard wings. Each of the propeller blades had been totally destroyed in the ground fire, only small fragments remaining inside the hubs, and the engine was partially destroyed by fire.

### **Build quality**

The aircraft had been built to a very high standard, and was extensively equipped.

### **Airframe and flying controls**

Detailed examination of the wreckage at the accident site established that the aircraft was structurally complete and intact at the time of impact. All flying control surface hinge fittings were intact at impact, and the hinges were free-moving. Numerous failures were evident in the flying control linkage system; however, with the exception of the left rudder cable which had become detached from the rudder pedal due to post-impact burning of the swaged fitting, each of these failures was caused by overload consistent with the forces imparted to the system by the impact. The impact positions of the flying controls could not be determined because of disturbance of the control system linkages in and around the cockpit area during the initial stages of the impact. However, the electrically actuated pitch trim tab was set to an approximately neutral position.

## **Fuel system and powerplant**

The absence of any significant ground impact marks and the destruction of the propeller blades precluded any assessment of engine power at impact.

The main fuel selector valve was at the ON position. The fuel valves at the outlet of each wing tank were destroyed by the fire and their pre-impact positions could not be ascertained. Most of the aluminium and rubber hose fuel tubing connecting the wing tanks to the collector tank, and between the collector tank and the engine, had been destroyed by the fire. The extent of the fire and its distribution indicated the presence of a significant quantity of fuel in both main tanks at the time of impact. The collector tank survived the impact and suffered only superficial fire damage, raising the question of a possible lack of fuel in the collector. However, the fuselage tubes to which the tank was attached were deformed in a manner consistent with significant inertial loading at impact, implying the presence of a significant mass of fuel in the collector tank at impact, this fuel subsequently draining out through damaged fuel lines in the engine bay area, thereby feeding the engine fire whilst limiting fire damage to the tank itself.

The throttle control in the cockpit was at the fully forward (full throttle) position, but the knob had been struck forwards heavily during the impact, sufficient to bend the shaft through 90 degrees, rendering its post-impact position unreliable. The remaining elements of the throttle linkage system exhibited conflicting indications of throttle position, and it was not possible to establish a pre-impact throttle setting. The induction air, hot air control cable, however, appeared to have been set to the cold position at impact.

Fire had destroyed both carburettors and the ignition systems, and had caused extensive damage to the engine casing and cylinders. The engine was subject to a bulk strip examination at AAIB Farnborough and was found to be mechanically sound, with no evidence of any pre-impact abnormality. The starter free-wheel clutch unit was torque checked for possible slip in the drive sense. Post-accident heating in the ground fire prevented any positive conclusions from being reached regarding the pre-impact performance of the clutch, but no tendency to slip was evident during the tests.

The propeller fitted to this aircraft was a three bladed unit with composite blades mounted in a metal hub assembly; the pitch of which could be adjusted on the ground. Insufficient blade material survived to allow the pitch setting to be determined, but the pitch setting had reportedly been optimised for cruise performance.

## **Pilot's flying experience**

The pilot's flying experience was initially on gliders and he achieved Silver Badge standard. In July 1992 he started PPL training on the Piper PA-28; this was completed, after 35:40 hours flying, in February 1993. After 4:20 hours experience in a Kitfox IV, he first flew G-UMST on 13 August 1994. This initial Kitfox flying was under the guidance of a pilot with considerable experience on the aircraft type. He first flew the aircraft solo on 21 August 1994 after 9 hours experience. He was considered to have been a good pilot whose gliding experience had contributed to his ability to fly the Kitfox accurately to its limits.

In the United States of America, in January and February 1995, he added an IMC and night rating to his licence. It was his intention to complete the necessary training to obtain a Commercial Pilot's Licence and a start was made on this in March 1995.

## **Medical and Pathology**

There was no evidence of any pre-existing medical condition which would have contributed to the accident. Post-mortem examination indicated that the pilot died instantly from injuries commensurate with the impact; there was no evidence of smoke inhalation.

**AAIB Bulletin No:** 7/95      **Ref:** EW/G95/05/20      **Category:** 1.3

**Aircraft Type and Registration:** DH82A Tiger Moth, G-ANFI

**No & Type of Engines:** 1 De Havilland Gipsy Major 1F piston engine

**Year of Manufacture:** 1941

**Date & Time (UTC):** 18 May 1995 at 1630 hrs

**Location:** Old Warden Airfield, Bedfordshire

**Type of Flight:** Private

**Persons on Board:** Crew - 2      Passengers - None

**Injuries:** Crew - 1 Minor      Passengers - N/A

**Nature of Damage:** Damage to propeller, lower wings, and right main landing gear

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 38 years

**Commander's Flying Experience:** 160 hours (of which 57 were on type)  
Last 90 days - 9 hours  
Last 28 days - 7 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The owner of the aircraft was the handling pilot at the time of the accident. He was accompanied by another pilot, who held a flying instructor rating and had a total of 11,449 hours flying experience, of which over 400 hours were on type. After undertaking some local flying, it was decided to practice some circuits. The accident occurred on the second circuit while practising what was described as a performance/precautionary approach for a final landing.

The initial part of this approach was judged to be too high to achieve a touchdown near the threshold of Runway 04. Power was reduced to correct the glidepath, and then increased in order to maintain it and to reduce the rate of descent. Approaching the threshold, it was realised that the rate of descent was too great and more power was applied. This did not prevent the tailskid from contacting a wooden fence post on the downwind side of a minor road adjacent to the airfield boundary. The aircraft crossed the road and the main landing gear contacted the wooden airfield boundary fence. The aircraft pitched down onto its nose, impacting the ground several yards into the airfield, but short of the threshold.

The propeller disintegrated, both lower wings were damaged, and the right main landing gear was fractured. The aircraft remained on its nose without turning over. There was no fire, and the occupants vacated after completing the appropriate emergency drills.

The wind was reported as northerly at 5 to 10 kt. The pilot attributed the cause of the accident to an error of judgement.

**Aircraft Type and Registration:** Druine D31 Turbulent, G-AWMR

**No & Type of Engines:** 1 Volkswagen 1390 piston engine

**Year of Manufacture:** 1970

**Date & Time (UTC):** 18 May 1995 at 1320 hrs

**Location:** Inverness Airport

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Tailskid separated; severe damage to entire empennage

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 35 years

**Commander's Flying Experience:** 103 hours (of which 2 were on type)  
Last 90 days - 2 hours  
Last 28 days - 2 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

Whilst taxiing from the holding point towards the active runway, the tailskid of the aircraft caught in the metal protective arch across the top of a centreline light. This broke the lens of the light and removed the tailskid assembly from the aircraft.

The centreline lighting at the airport is presently being upgraded with flush fitting lights.

**Aircraft Type and Registration:** Grumman AA-5 Traveller, G-BBSA

**No & Type of Engines:** 1 Lycoming O-320-E2G piston engine

**Year of Manufacture:** 1974

**Date & Time (UTC):** 6 May 1995 at 1435 hrs

**Location:** Cumbernauld Airfield, Strathclyde

**Type of Flight:** Private

**Persons on Board:** Crew - 1 Passengers - 2

**Injuries:** Crew - None Passengers - None

**Nature of Damage:** Damage to propeller, engine cowl, wheel fairing and engine firewall; one Airfield Approach Light destroyed

**Commander's Licence:** Private Pilot's Licence with IMC and Night Ratings

**Commander's Age:** 50 years

**Commander's Flying Experience:** 152 hours (of which 14 were on type)  
Last 90 days - 4 hours  
Last 28 days - 4 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The aircraft was approaching to land on Runway 26 at Cumbernauld after a flight from Newcastle Airport. Full flap was selected and the approach appeared to be progressing normally, until approximately 125 yards from the threshold when the aircraft started to sink. Full power was applied and the nose was raised, but the aircraft touched down heavily on its main landing gear in the grass undershoot area, destroying one approach light. The aircraft bounced, then finally touched down on the runway surface. The aircraft was taxied clear of the runway, then the three occupants quickly vacated by the normal means.

The Air/Ground Radio Operator noted that the surface wind was from 260°/5 kt. The pilot considered that possible downdraught/windshear may have occurred at the critical time, but contemplated that a higher approach speed would have helped. A loading calculation indicated that at the time of landing, the aircraft was some 73 lb below its maximum permitted operating weight.

**Aircraft Type and Registration:** Grumman AA-5A Cheetah, G-CCOL

**No & Type of Engines:** 1 Lycoming O-320-E2G piston engine

**Year of Manufacture:** 1979

**Date & Time (UTC):** 8 May 1995 at 1700 hrs

**Location:** Elstree Aerodrome, Hertfordshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Damage to nose landing gear, propeller and lower nose cowling

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 70 years

**Commander's Flying Experience:** 180 hours (all on type)

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The wind was 310°/15 to 20 kt and the aircraft was landing on Runway 26. At about 15 feet above the runway, the aircraft began drifting to the left, across the grass beside the runway, so the pilot applied right rudder in an attempt to regain the centreline. The aircraft then dropped onto the runway and porpoised twice, breaking the nose landing gear.

There were no injuries, no fire and the pilot, whose lap and diagonal harness had remained intact, evacuated the aircraft from the sliding canopy.

**Aircraft Type and Registration:** Jodel D112, G-BDJD

**No & Type of Engines:** 1 Continental A65 piston engine

**Year of Manufacture:** 1977

**Date & Time (UTC):** 15 April 1995 at 1300 hrs

**Location:** Charterhall Airfield, Berwickshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1 Passengers - 1

**Injuries:** Crew - None Passengers - None

**Nature of Damage:** Damage to right main landing gear and main wing spar

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 35 years

**Commander's Flying Experience:** 552 hours (of which 9 were on type)  
Last 90 days - 52 hours  
Last 28 days - 10 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The main runway at Charterhall is oriented 07/25. The pilot reported that on returning to the airfield after a one hour local flight, the wind direction had changed to become 360°/15 kt. He therefore elected to land on a more into wind runway (02). Whilst slowing to around 10 to 15 kt, the right main landing gear contacted stones which were piled about 12 inches high. The stones were the same colour and texture as the runway surface and were not seen prior to the impact. The aircraft was shut down, and the occupants vacated by the normal means. Subsequent inspection revealed that the landing gear leg was bent back around 10°, and there was some damage to the main wing spar.

The pilot noted that he had not checked the condition of Runway 02 for some months. The entry in Pooley's Flight Guide indicates that Runway 02 is disused, but the operator indicated that it is in fact used on occasions of strong crosswinds across the main runway. The airfield is ex-military, and was decommissioned in 1946. The general surface condition of the runways is noted as being rough.

An aftercast from the Meteorological Office indicated that at the time of the accident, there was an unstable northwesterly airstream established over the area, with visibility 30 km or more, scattered cloudbase 2,500 feet, with the surface wind 330°T/10 to 15 kt, and the wind at 2,000 feet 350°T/25 kt.

**Aircraft Type and Registration:** Jodel D120 Paris-Nice, G-BKCW

**No & Type of Engines:** 1 Continental C90-14F piston engine

**Year of Manufacture:** 1965

**Date & Time (UTC):** 20 May 1995 at 1015 hrs

**Location:** Dundee Airport

**Type of Flight:** Private

**Persons on Board:** Crew - 2                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Both undercarriage legs collapsed; propeller broken and right wing damaged

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 51 years

**Commander's Flying Experience:** 138 hours (of which 76 were on type)  
Last 90 days - 10 hours  
Last 28 days - 2 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The purpose of the flight was to familiarise the pilot with this type of aircraft. It had been agreed before the flight that the non-handling pilot would occupy the left seat, which was equipped with the only set of brakes, leaving the right seat to be occupied by the handling pilot, who was not familiar with this aircraft.

The intention had been to spend an hour in the circuit and three uneventful touch-and-go landings had been completed. On the fourth, the right wheel contacted the ground first, initiating a swing to the right. The pilot applied full left rudder, which stopped the right swing but immediately caused a sharp swing to the left, which developed into a ground loop. The non-handling pilot states that it happened so quickly that there was not time to use the brakes and, in any case, he would not have done so because of the danger of tipping the tailwheel aircraft over.

There was no fire and both occupants were able to leave the aircraft through their respective doors.

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Ref: EW/G95/04/10

Category: 1.3

**Aircraft Type and Registration:** Morane Saulnier MS.880B Rallye Club, G-AXHS

**No & Type of Engines:** 1 Rolls-Royce Continental O-200-A piston engine

**Year of Manufacture:** 1969

**Date & Time (UTC):** 14 April 1995 at 1430 hrs

**Location:** Carlisle Airport

**Type of Flight:** Private (Training)

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Damage to nose landing gear

**Commander's Licence:** Student Pilot

**Commander's Age:** 64 years

**Commander's Flying Experience:** 465 hours (of which 180 were on type)  
Last 90 days - 0 hours  
Last 28 days - 0 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot and  
AAIB enquiries

The pilot was in the process of revalidating his PPL and was in the latter stages of the required flying, with the General Flying Test to be completed. This particular aircraft had not been flown for several months and on the day before the flight the pilot, who was also the owner, had given the aircraft a thorough inspection, during which it was found that there was no fuel on board. 128 lb of AVGAS 100LL was therefore uplifted. The engine was then run for between 15 and 20 minutes and shut down. The radios and the fuel drains were checked and the engine run again. The associated power checks were satisfactory. The aircraft was then shut down without flying that day.

On the following day, the intended flight was delayed until the afternoon when the visibility had improved. The aircraft was again thoroughly checked and the engine started normally. The aircraft was taxied a significant distance before the power checks were carried out, which were normal. The aircraft then backtracked along the entire runway before turning into wind and beginning the take-off roll. The takeoff was normal until about 250 feet agl when the engine lost power. The pilot shut the engine down and force landed in an adjacent field, however during the landing the nose landing gear lower casting fractured. The Flying Instructor stated that the pilot's actions were exceptional and that he had safely landed his aircraft in the field with minimal damage.

Examination of the aircraft some hours later showed that there was little fuel in the carburettor, although it was not possible to determine if this had been lost in the period intervening after the forced landing. The carburettor was removed and will be sent for examination/overhaul, but thus far no defects have been found. The pilot considered that a 'rich cut' may have occurred. An aftercast from the Meteorological Office at Bracknell showed that at the time of the accident there was a scattered cloudbase between 2,500 and 3,500 feet, visibility between 6 and 10 km, and the surface wind was 240°/12-17 kt with a temperature of 14°C and a dewpoint of 6°C. Comparison with a chart showing conditions conducive to carburettor ice formation showed that serious carburettor icing could have occurred at both glide and cruise power settings.

**AAIB Bulletin No:** 7/95

**Ref:** EW/G95/04/06

**Category:** 1.3

**Aircraft Type and Registration:** Morane Saulnier Rallye 150ST, G-BECD

**No & Type of Engines:** 1 Lycoming O-320-E2A piston engine

**Year of Manufacture:** 1976

**Date & Time (UTC):** 8 April 1995 at 1830 hrs

**Location:** Top Farm, Tadlow, Hertfordshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Substantial to nose and main landing gear, propeller, engine cowling and underside of fuselage with shock loading to engine; damage beyond economic repair

**Commander's Licence:** Private Pilot's Licence with Night Rating

**Commander's Age:** 43 years

**Commander's Flying Experience:** Approx 430 hours (of which approx 60 were on type)  
Last 90 days - 6 hours  
Last 28 days - 6 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The pilot was carrying out a normal 'short field' approach to grass Runway 33 at Top Farm. The runway, which is 380 metres long and 15 metres wide, was dry and the surface of short grass was firm. The weather was fine with a light northwesterly breeze, however, at the time of the approach the sun was setting and the haze layer was reducing visibility into sun to an estimated 4 km.

The pilot flared the aircraft with a view to touching down at the beginning of the runway. The main landing gear however contacted the surface in a field several metres before the threshold and 5 metres before a farm track and ridge surrounding the airfield. The aircraft bounced momentarily before the nose landing gear struck the ridge. On impact the nose gear collapsed and the aircraft slewed to the right before coming to rest approximately 25 metres from its initial touchdown point. The pilot and passenger, who were both wearing full safety harnesses, were uninjured.

The pilot reported that he had misjudged the final approach, which was flown in failing light conditions, due to lack of visual cues. The large flat freshly rolled featureless field on short finals, which had no trees or hedges, did not provide him with enough visual cues for height reference in the later stages of his approach.

**Aircraft Type and Registration:** Pereira GP3 Osprey II, F-PIRA

**No & Type of Engines:** 1 Lycoming O-320-A2B piston engine

**Year of Manufacture:** 1990

**Date & Time (UTC):** 12 May 1995 at 0900 hrs

**Location:** Barton Aerodrome, Manchester

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Damage to landing gear

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 37 years

**Commander's Flying Experience:** 635 hours (of which 14 were on type)  
Last 90 days - 25 hours  
Last 28 days - 14 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The aircraft was refuelled at Barton prior to an intended flight to Leicester. The pilot then taxied to the threshold of Runway 09 where he carried out the usual power checks before taking off. However, after turning right downwind, and at a height of approximately 300 feet agl, the engine started to 'surge' markedly in power. With the electric fuel boost pump still switched on, the pilot selected the other fuel tank and applied carburettor heat, but to no avail. By the time the pilot had finished his attempts to deal with the problem, he had missed his opportunity to land back on Runway 09, having passed well to the north of the centreline. He therefore continued in a gentle turn to the right, losing height all the time, before being constrained into attempting a downwind landing on Runway 24. In the event the aircraft landed on the rough ground adjacent to the runway, sustaining damage to the landing gear.

The pilot/owner suspects that the engine problem was caused by dirt within the carburettor. He has shipped the aircraft back to France, where he is awaiting an expert investigation of the engine. Any pertinent information arising out of this investigation will be reported in a future addendum to this Bulletin.

**Aircraft Type and Registration:** Piper L18C (Modified) Super Cub, G-BTUR

**No & Type of Engines:** 1 Continental C90-14F piston engine

**Year of Manufacture:** 1953

**Date & Time (UTC):** 21 April 1995 at 1550 hrs

**Location:** Cumbernauld Airport

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Propeller bent and engine shock loaded; minor fuselage damage

**Commander's Licence:** Private Pilot's Licence with IMC Rating

**Commander's Age:** 49 years

**Commander's Flying Experience:** 298 hours (of which 15 were on type)  
Last 90 days - 10 hours  
Last 28 days - 9 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The pilot had recently acquired an interest in the aircraft and was undergoing familiarisation flights; the weather was good with a surface wind of 080°/05 kt. Following a satisfactory dual flight using Runway 08, the pilot carried out a successful solo circuit on the same runway. A second circuit was uneventful until the landing. The touchdown appeared normal, although the tailwheel was slightly off the ground but, shortly afterwards the aircraft began to swing to the right; the pilot was unable to correct this swing and G-BTUR went off the side of the runway. As it reached the grassed area the aircraft tipped over onto its nose. The pilot was surprised that he had been unable to correct the swing and initially suspected brake binding on the right wheel. However, no fault was subsequently found and the pilot considered that the accident may have been caused by his inexperience on type.

**Aircraft Type and Registration:** Piper L18C (Modified) Super Cub, G-CUBB

**No & Type of Engines:** 1 Lycoming O-360-C2A piston engine

**Year of Manufacture:** 1953

**Date & Time (UTC):** 2 May 1995 at 1420 hrs

**Location:** Bidford Airfield, Warwickshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Extensive to rear fuselage and empennage; lesser damage to port wing outboard section and aileron

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 63 years

**Commander's Flying Experience:** 67 hours (of which 11 were on type)  
Last 90 days - 18 hours  
Last 28 days - 9 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

Having completed all the checks, full power was applied for takeoff. A noticeable tendency for the aircraft to turn to the right was not corrected sufficiently or early enough to prevent the aircraft groundlooping at about 30 mph. The rear of the aircraft swung around and hit the corner of a glider trailer. Although the pilot had over 400 gliding hours, he was inexperienced on type and considered that he might have applied brake instead of rudder to correct the swing.

**Aircraft Type and Registration:** Piper PA-28-180 Cherokee, G-AVYL

**No & Type of Engines:** 1 Lycoming O-360-A4A piston engine

**Year of Manufacture:** 1968

**Date & Time (UTC):** 15 April 1995 at 0929 hrs

**Location:** Perth Aerodrome

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 2

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Nosewheel leg and fork bent

**Commander's Licence:** Private Pilot's Licence with IMC and Night Ratings

**Commander's Age:** 47 years

**Commander's Flying Experience:** 408 hours (of which 180 were on type)  
Last 90 days - 4 hours  
Last 28 days - 2 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

At the end of a local flight, the pilot returned to Perth for a landing on Runway 34, a grass runway 620 metres long; the weather was good with a surface wind of 360°/15 to 20 kt. As turbulence was experienced on finals, the pilot maintained an approach speed of 70 kt. Over the threshold the aircraft floated longer than expected and, after touching down, the pilot thought that there was a possibility that G-AVYL would not stop before the end of the runway. Therefore, she turned the aircraft to the left and the nosewheel contacted the runway numbers set in the grass. Subsequently, she noticed that G-AVYL was difficult to steer and the damage was discovered after parking. The pilot considered that the accident was caused by too much speed over the threshold and an extended flare.

**Aircraft Type and Registration:** Piper PA-28-180 Cherokee, G-DEVS

**No & Type of Engines:** 1 Lycoming O-360-A3A piston engine

**Year of Manufacture:** 1962

**Date & Time (UTC):** 2 April 1995 at 1040 hrs

**Location:** Leicester Aerodrome

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Bent nose landing gear, propeller blade damage, right wingtip scraped

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 62 years

**Commander's Flying Experience:** 172 hours (of which 26 were on type)  
Last 90 days - 4 hours  
Last 28 days - 1 hour

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The aircraft was attempting to land on Runway 28 after a flight from Blackbushe. The pilot noted that the wind was from 210 to 230° at 7 gusting 15 kt. He stated that the final approach was flown using a crabbing technique. The flare was carried out too high, the aircraft touched down heavily on the main landing gear, and became airborne again. A gust caused it to veer towards the right-hand edge of the runway. A go-around was initiated, but the aircraft touched down off the side of the runway before climbing away.

On the second landing, everything seemed satisfactory until the nosewheel touched down. The aircraft then swerved sharply to the left and the right wingtip scraped the ground. The aircraft was brought to a halt, shut down, and the passengers vacated normally.

The pilot considered that the nose landing gear had been bent during the first touchdown, and the propeller tips during the second landing. He reflected that perhaps a crabbing technique initially, changing to a low wing into wind at the final stage, would have been better.

An aftercast from the Met Office indicated that the surface wind was from 250° at 15 gusting 20 kt.

**Aircraft Type and Registration:** Piper PA-28-181 Cherokee Archer II, G-BOOF

**No & Type of Engines:** 1 Lycoming O-360-A4M piston engine

**Year of Manufacture:** 1978

**Date & Time (UTC):** 4 May 1995 at 1200 hrs

**Location:** Norwich Airport, Norfolk

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Burst nosewheel tyre and damage to nose gear assembly

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 45 years

**Commander's Flying Experience:** 88 hours (of which 17 were on type)  
Last 90 days - 18 hours  
Last 28 days - 11 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

After a cross-country flight, the pilot made his approach to Runway 27; the surface wind was light and variable and the visibility was 6 km in haze. On landing, the nosewheel touched down first and this caused the aircraft to balloon. The pilot attempted to control the subsequent aircraft manoeuvres but G-BOOF bounced twice before eventually coming to rest just off the end of the runway. In his report, the pilot acknowledged that he did not initially round out sufficiently and then, following the first bounce he should have carried out an immediate go-around.

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Ref: EW/G95/05/07

Category: 1.3

**Aircraft Type and Registration:** Piper PA-28R-200 Cherokee Arrow II, G-RONG

**No & Type of Engines:** 1 Lycoming IO-360-C1C piston engine

**Year of Manufacture:** 1973

**Date & Time (UTC):** 8 May 1995 at 0900 hrs

**Location:** Stapleford Tawney Airfield, Essex

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Propeller destroyed and engine shock loaded; minor damage to fuselage underside

**Commander's Licence:** Private Pilot's Licence with Night Rating

**Commander's Age:** 73 years

**Commander's Flying Experience:** 1,676 hours (of which 474 were on type)  
Last 90 days - 22 hours  
Last 28 days - 7 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The pilot had been for a 50 minute local flight with his son as passenger. On returning to the airfield he was given permission for a straight-in approach to Runway 04L and lined up with the runway at approximately three miles with the intention of carrying out a flapless landing. The pilot thought he had completed the normal landing checks but realised too late that he had landed with the landing gear retracted. Both occupants were using lap and diagonal harnesses and there were no injuries.

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Ref: EW/G95/05/02

Category: 1.3

**Aircraft Type and Registration:** Piper PA-28R-200-2 Cherokee Arrow II, G-BBFD

**No & Type of Engines:** 1 Lycoming IO-360-C1C piston engine

**Year of Manufacture:** 1973

**Date & Time (UTC):** 4 May 1995 at 1105 hrs

**Location:** Barton Aerodrome, Manchester

**Type of Flight:** Private (Training)

**Persons on Board:** Crew - 2 Passengers - 2

**Injuries:** Crew - None Passengers - None

**Nature of Damage:** Propeller bent; severe damage to nose landing gear and mounting; main landing gear doors destroyed and lower engine cowlings distorted

**Commander's Licence:** Commercial Pilot's Licence with Instructor Rating

**Commander's Age:** 25 years

**Commander's Flying Experience:** 1,050 hours (of which 10 were on type)  
Last 90 days - 150 hours  
Last 28 days - 55 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The wind was 210°/10 to 15 kt and the pilot was carrying out a short field landing on Runway 20. The pilot states that during the final approach, he allowed the airspeed to fall below that suitable for the operating weight of the aircraft. During the flare, the aircraft dropped heavily onto the runway and bounced, causing the nose landing gear to collapse.

The lap and diagonal harnesses of the pilot and passengers remained intact. There was no fire and the occupants of the aircraft disembarked through the main door.

<b>Aircraft Type and Registration:</b>	Piper PA-30 Twin Commanche, G-BKCL	
<b>No &amp; Type of Engines:</b>	2 Lycoming IO-320-B1A piston engines	
<b>Year of Manufacture:</b>	1969	
<b>Date &amp; Time (UTC):</b>	12 May 1995 at 0650 hrs	
<b>Location:</b>	Leeds Airport	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 2
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Right main landing gear collapsed; damage to right wing, tip tank, right propeller and rear fuselage	
<b>Commander's Licence:</b>	Private Pilot's Licence with Night Rating	
<b>Commander's Age:</b>	44 years	
<b>Commander's Flying Experience:</b>	5,200 hours (of which 110 were on type) Last 90 days - 16 hours Last 28 days - 7 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

During takeoff, at a speed of about 65 kt in no wind, the left engine suddenly lost power and the aircraft swung violently to the left. The pilot immediately closed the throttles, but the aircraft crossed the edge of the runway, striking a runway light which collapsed the right main landing gear, and traversed a grass area before coming to rest at holding point 'V', facing the runway. Whilst still traversing the grass, the pilot had feathered both engines and carried out the emergency drills.

Seeing the aircraft leaving the runway, the Air Departures Controller had sounded the crash alarm and the Airport Fire Service attended the accident, foaming the ruptured brake lines and the fuel escaping from the right tip tank. There was no fire and the occupants left the aircraft through the main door. The passenger's lap straps and the pilot's full harness fulfilled the requirements without failure.

**Aircraft Type and Registration:** Piper PA-32R-300 Cherokee Lance, G-BEHH

**No & Type of Engines:** 1 Lycoming IO-540-K1G5D piston engine

**Year of Manufacture:** 1976

**Date & Time (UTC):** 9 May 1995 at 1830 hrs

**Location:** Hibaldstow Airfield, near Humberside

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Propeller, hub and crankcase broken; flaps and hinges damaged beyond repair

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 35 years

**Commander's Flying Experience:** 246 hours (of which 38 were on type)  
Last 90 days - 25 hours  
Last 28 days - 15 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

During a practice engine failure to land on Runway 08, the pilot made a go-around and retracted the landing gear as he climbed away into a practice bad weather circuit. Although he carried out the remainder of the pre-landing checks, he omitted to re-lower the landing gear. The aircraft slid to a halt without further event and, having switched the fuel and electrics off, both occupants left it through the passenger door.

<b>Aircraft Type and Registration:</b>	Piper PA-34-200T Seneca II, G-BMUT	
<b>No &amp; Type of Engines:</b>	2 Continental TSIO-360-E piston engines	
<b>Year of Manufacture:</b>	1975	
<b>Date &amp; Time (UTC):</b>	29 May 1995 at 1051 hrs	
<b>Location:</b>	Guernsey Airport	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 5
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to nose landing gear and forward fuselage; propeller damaged and engines shock loaded	
<b>Commander's Licence:</b>	Private Pilot's Licence with IMC and Night Ratings	
<b>Commander's Age:</b>	50 years	
<b>Commander's Flying Experience:</b>	318 hours (of which 22 were on type) Last 90 days - 39 hours Last 28 days - 28 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and a report by a passenger	

The aircraft was on a VFR flight from France and a normal approach was made to Runway 27 at Guernsey; the surface wind was light southwesterly. Following the initial firm touchdown, the aircraft bounced at least twice. The pilot said that he noticed that the passenger in the right seat, a commercial pilot and instructor, had his hands on the control column. The aircraft then touched down nose first and the nose landing gear collapsed. It stopped on the runway and after carrying out the shutdown checks, both occupants escaped without injury.

The pilot considered that he was distracted and had suffered a momentary lapse of concentration when he noticed that the passenger had his hands on the control column. He in no way wished to infer that the passenger had attempted to take control or had applied any pressure to the controls. The passenger reported, however, that he had not touched the control column until after the nose landing gear had collapsed.

**Aircraft Type and Registration:** Piper PA-34-220T Seneca III, G-WIZO

**No & Type of Engines:** 2 Continental TS10-360-KB piston engines

**Year of Manufacture:** 1981

**Date & Time (UTC):** 8 May 1995 at 0852 hrs

**Location:** Elstree Aerodrome, Hertfordshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Left propeller and main landing gear leg damaged

**Commander's Licence:** Private Pilot's Licence with IMC and Night Ratings

**Commander's Age:** 49 years

**Commander's Flying Experience:** 802 hours (of which 304 were on type)  
Last 90 days - 26 hours  
Last 28 days - 6 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The aircraft landed on Runway 26; the surface wind was northerly at 10 kt. The pilot reported that the aircraft bounced slightly on landing but he did not realise that any damage had occurred until after he had parked when it was pointed out to him.

The repair agency reported that the left propeller was damaged beyond repair. The left engine was tested for shock loading but none was found. The left main landing gear leg was bent and needed to be replaced.

**Aircraft Type and Registration:** Piper PA-38-112 Tomahawk, G-EDNA

**No & Type of Engines:** 1 Lycoming O-235-L2C piston engine

**Year of Manufacture:** 1978

**Date & Time (UTC):** 13 May 1995 at 1310 hrs

**Location:** Sleaf Airfield, Shropshire

**Type of Flight:** Private (Training)

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Propeller tips bent and lower engine sub frame members bent; nose gear assembly damaged

**Commander's Licence:** Student Pilot

**Commander's Age:** 55 years

**Commander's Flying Experience:** 30 hours (all on type)  
Last 90 days - 19 hours  
Last 28 days - 5 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The student pilot had completed a satisfactory dual flight which included various circuits and a practice engine failure after takeoff. He was sent for a solo circuit detail immediately afterwards. Runway 01 was in use and the weather was good with a surface wind of 350°/15 kt.

On his first approach he was maintaining a constant speed of 70 kt when, over the threshold, the aircraft suddenly seemed to lose lift; the pilot increased power but G-EDNA made a heavy landing and bounced. A further circuit was carried out but the pilot considered that the aircraft was producing less than normal power and so made a further circuit to land. After shutting the aircraft down, he noticed that the propeller tips were bent.

**AAIB Bulletin No:** 7/95

**Ref:** EW/G95/04/27

**Category:** 1.3

**Aircraft Type and Registration:** Slingsby T61F Venture T Mk 2, G -BUFN

**No & Type of Engines:** 1 Rollason RS Mk 2 piston engine

**Year of Manufacture:** 1977

**Date & Time (UTC):** 21 April 1995 at 1344 hrs

**Location:** Goodwood Aerodrome, Sussex

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Left outrigger detached; trailing edge and three ribs of the left wing cracked; underside of the rear fuselage and the mainwheel braking plate damaged

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 58 years

**Commander's Flying Experience:** 236 hours (of which 177 were on type)  
Last 90 days - 17 hours  
Last 28 days - 8 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The wind at Goodwood was 080°/12 kt and strong thermals and turbulence had been reported to be present on the final approach to Runway 06. It was the rule of the aircraft ownership syndicate to make glide approaches for landings on grass surfaces and the pilot was complying with this instruction. At 100 feet over the runway threshold severe windshear was encountered and, despite retracting the airbrakes and lowering the nose to regain airspeed, he was unable to prevent the aircraft from dropping heavily onto the runway.

**Aircraft Type and Registration:** Taylorcraft BC12-65, G-BOLB

**No & Type of Engines:** 1 Rolls-Royce A65-8 piston engine

**Year of Manufacture:** 1941

**Date & Time (UTC):** 13 May 1995 at 1100 hrs

**Location:** East Batch Farm, Gloucestershire

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 1

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Propeller tips, spinner, tail fin, rudder and lift strut damaged

**Commander's Licence:** Private Pilot's Licence with IMC Rating

**Commander's Age:** 43 years

**Commander's Flying Experience:** 277 hours (of which 87 were on type)  
Last 90 days - 6 hours  
Last 28 days - 4 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The flight was planned to take off downhill and as nearly into the 310° to 350°/5 to 15 kt wind as possible. To this end the aircraft was taxiing downwind and uphill, parallel to the strip. The pilot was correcting a swing to the left, using right brake and a burst of engine power, when a gust of wind caused the tail to lift slightly. To correct this, he applied up elevator and both wheelbrakes. The aircraft tipped up onto its nose and the propeller stuck in the ground.

Both occupants left the aircraft and the pilot saw that fuel (MOGAS) was pouring out of the air vent in the tank filler cap onto the hot engine. There was, however, no fire and having tried but failed to right the aircraft, the pilot then went to find help. About five minutes later, another gust of wind flipped the aircraft over onto its back.

**Aircraft Type and Registration:** Aerospatiale AS350B Ecureuil, G-PLMA

**No & Type of Engines:** 1 Turbomeca Arriel 1B Gas Turbine Engine

**Year of Manufacture:** 1979

**Date & Time (UTC):** 5 May 1995 at 1915 hrs

**Location:** Near Lochgilphead, Strathclyde

**Type of Flight:** Aerial Work

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - Fatal                      Passengers - N/A

**Nature of Damage:** Aircraft Destroyed

**Commander's Licence:** Airline Transport Pilot's Licence (Helicopter and Gyroplanes)

**Commander's Age:** 52 years

**Commander's Flying Experience:** 8,800 hours (of which 380 hours were on type)  
Last 90 days - 100 hours  
Last 28 days - 90 hours

**Information Source:** AAIB Field Investigation

### History of the Flight

The company was involved in the underslung transfer of fish within Scotland and the accident pilot had been recruited on a 2-monthly contract for April and May. He had flown intensively on underslung operations during April but had regular days off and had commenced a fresh sequence of tasking on 4 May. On that day he began a period of duty at Dalcross at 0555 hrs and came off duty at Salen, on the Island of Mull, at 1815 hrs; throughout the day he had been accompanied by his ground handler and they were accommodated at Salen for the night of 4 May. For 5 May, the company operations manager had arranged a relief pilot to take over some of the flying for a period during the day; this had been done following an increase in tasking and all the participants were briefed on the new company plan.

The pilot and his ground handler came on duty on 5 May at 0505 hrs and took off at 0535 hrs. Having completed the task involving movement of fish they landed at 1200 hrs. The relief pilot then continued with other tasks from 1245 hrs until 1630 hrs when he landed at Loch Glashen and met the first pilot

who had driven there in the relief pilot's car, arriving at 1400 hrs. As the two ground handlers prepared the equipment for refuelling the helicopter, the two pilots discussed the programme for the rest of the day. There were two further tasks to be completed, and the company plan was for the relief pilot to do the first, however, the pilots agreed between themselves that both tasks would be done by the original pilot.

The pilot started the penultimate task at approximately 1645 hrs and completed the first six lifts uneventfully. For the seventh lift, the pilot left Loch Glashen at 1955 hrs and was instructed by radio to unload the fish at an alternative site. Having completed this he then flew to Meal Mhor to drop an empty bucket, following which he landed and got out of the helicopter to talk to the lorry driver who was waiting with a load of fish for transfer. He informed the driver that he would return in 5 minutes and flew off with the unloaded sling and hook below the helicopter. Shortly after he departed, the helicopter was seen to turn to the right and then continue up Loch Fyne.

Various eye and ear witnesses were aware of the last moments of the helicopter's flight. Some reported that it seemed to be flying lower than they had seen before and some commented that the engine note changed just prior to impact. Additionally, all of those who saw it commented that the helicopter was rotating and that it was pitching up and down in the last moments of flight. At this late stage witnesses reported that they could not see anything hanging underneath G-PLMA. Two witnesses reported that one door appeared to be open and one young witness stated that she could see papers coming out of an open door.

### **Aircraft and Equipment Description**

The aircraft has a three-bladed main rotor rotating clockwise, as viewed from above, driven by an engine and gearbox mounted on the cabin roof. Directional control is effected by a two-bladed tail rotor positioned on the right side of the tail boom, rotating anti-clockwise as viewed from the right. The tail rotor gearbox is bolted to mounting fittings in the top of the tail boom and is driven from the main gearbox by a segmented drive shaft. The tail boom carries a horizontal stabiliser on each side forward of the tail rotor disc and an upper and a lower vertical fin just aft of the tail rotor.

The pilot occupied the right-hand of two forward seats, each consisting of a glass fibre reinforced plastic (GRP) moulding with two steel attachment rails bolted to the base. His harness consisted of two lap straps, each terminating in a stitched loop shackled to a floor fitting at the side of the seat, and two shoulder straps anchored by an inertial reel bolted to the seat back.

The underslung load sling seen being carried by G-PLMA on its departure for the last flight was approximately 6 metres long and comprised a steel hook and a 5 kg steel ball weight carried on a 13 mm diameter steel cable, 4.6 metres long, which was attached via a swivel assembly to a 0.85 metre long woven nylon springer rope. The latter was shackled to a cargo hook carried beneath the belly of the helicopter and manually releasable by the pilot by means of a cyclic stick lever.

### **Crash Site**

The helicopter crashed on the eastern shore of Loch Gilp (an inlet on the west coast of Loch Fyne), 2 nm from Lochgilphead. The ground in the area of the crash site sloped gently upwards towards the east but was somewhat uneven and rocky in parts. Crash site and wreckage examination indicated that the helicopter impacted the ground while rolled right, pitched nose down and yawing to the left, on an easterly heading, with a high descent rate and little forward speed. Initial ground contact was onto rocks, causing detachment of the right landing gear skid. The aircraft then rolled right, contacting the ground with the main rotor blades and the right horizontal stabiliser, before inverting and then coming to rest on its left side 7 metres from the initial ground impact point.

Portions of the helicopter were not located with the main wreckage, indicating that they had detached before the main part of the aircraft had struck the ground. The tail rotor gearbox cover, the aft 1.5 metres of the tail boom, including the vertical fins, electrical cables from within the tail boom, the tail rotor aft drive shaft and the window from the cabin right door were found 55-85 metres from the initial impact point on the beach of the Loch to the west of the main crash site between high and low tide levels. The tail rotor gearbox with tail rotor attached was found embedded in the ground 35 metres to the north of the initial impact point. The tip portion of one tail rotor blade had detached. The underslung load sling, a small fairing from the aft end of the tail boom and the detached portion of tail rotor blade were not recovered, in spite of extensive searching. The evidence from witnesses indicated that the sling and the missing portion of tail rotor blade probably fell into the Loch.

### **Wreckage Examination**

The helicopter sustained severe damage, including detachment of most of the above-floor structure of the forward part of the cabin, partial separation of the remains of the tail boom from the fuselage and gross damage to the main rotor head. The cabin floor remained generally intact and the evidence did not suggest that major incursion into the cabin space had occurred either during or after impact. Severe fretting damage was apparent at the point where the main mounts for the tail rotor gearbox onto the tail boom had fractured, consistent with a period of operation with a gross tail rotor imbalance. Markings showed that both fins had been struck by the tail rotor blades, forcibly in the case of the lower fin, consistent with contact after the tail rotor gearbox mounts had failed.

The pilot's seat detached from the floor following fracture of the GRP moulding on one side and distortion of the attachment rail on the other. His harness remained fastened but the left lap strap released from its floor attachment as a result of failure of stitching in the webbing strap. The pilot remained in his seat, which came to rest outside the cabin, with the harness around him and attached to the seat by the shoulder strap inertial reel and to the helicopter floor by the right lap strap. The pilot was also retained by the electrical lead of his headset which remained plugged into a fixed socket mounted near the centre of the cabin floor; the headset was worn under a helmet with a chin strap and thus remained effectively attached to the pilot.

### **Post-Mortem Examination**

The post-mortem examination revealed no evidence of any condition which may have contributed to the accident.

### **Formal Investigation**

The Chief Inspector of Air Accidents has ordered a Formal Investigation into this accident to be carried out in accordance with The Civil Aviation (Investigation of Air Accidents) Regulations 1989.

**AAIB Bulletin No:** 7/95      **Ref:** EW/G95/05/26      **Category:** 2.3

**Aircraft Type and Registration:** Aerospatiale AS350B2 Ecureuil, G-PLMH

**No & Type of Engines:** 1 Arriel 1D1 turboshaft engine

**Year of Manufacture:** 1988

**Date & Time (UTC):** 23 May 1995 at 0930 hrs

**Location:** Near Stornoway

**Type of Flight:** Aerial Work

**Persons on Board:** Crew - 1                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Propeller blade damaged and Starflex arm broken; tail boom kinked and main fuselage wrinkled; engine and transmission shock loaded

**Commander's Licence:** Airline Transport Pilot's Licence (Helicopters)

**Commander's Age:** 44 years

**Commander's Flying Experience:** 6,200 hours (of which 2,500 were on type)  
Last 90 days - 65 hours  
Last 28 days - 23 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot and enquiries by the AAIB

The pilot was involved in transferring underslung loads to a field site; the weather was good with a surface wind of 180°/10 kt. After approximately 25 minutes work, the pilot manoeuvred to deposit an underslung load. His previous load had been retrieved from the large polyester bag used to protect the contents, and the empty bag, net and strop were positioned on the ground ready to be placed inside the aircraft for the next run; the empty bag had been folded up and was under the net and strop. The pilot released his load and then positioned G-PLMH for landing. He was then approximately 6 metres to the east of his released load and about 8 metres to the north west of the empty bag. As he approached the touchdown point, he was monitoring the various ground items and did not notice any undue movement. However, as he touched down, he was suddenly aware that the empty bag had inflated and was airborne. Almost immediately it was drawn into his main rotor and the helicopter started vibrating. The pilot shut down the engine and secured G-PLMH.

<b>Aircraft Type and Registration:</b>	Enstrom 280C Shark, G-BGWS	
<b>No &amp; Type of Engines:</b>	1 Lycoming HIO-360-E1AD piston engine	
<b>Year of Manufacture:</b>	1976	
<b>Date &amp; Time (UTC):</b>	22 April 1995 at 1355 hrs	
<b>Location:</b>	Bonehurst Farm, Bramley, Surrey	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to tail rotor, tail rotor gearbox and drive shafts, and vertical stabilisers	
<b>Commander's Licence:</b>	Commercial Pilot's Licence	
<b>Commander's Age:</b>	32 years	
<b>Commander's Flying Experience:</b>	189 hours (of which 169 were on type) Last 90 days - 1 hour Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and telephone enquiries to the insurance and overhaul agencies involved	

The aircraft had been flown without incident from Goodwood Airfield to a private landing site near Dunsfold, where it was shut down. A little over 1 hour later, at 13:40 hrs, the aircraft departed for a 20 minute flight in the local area, carrying the pilot and one passenger.

The pilot reported that as he approached his turning point just short of Guildford, "a split second yaw occurred, almost as if it were turbulence". The engine indications were checked and found to be normal. Shortly afterwards, while passing overhead Bramley, the engine suddenly failed and the pilot executed an immediate autorotative forced landing into a field. During the flare and touchdown, the tail struck the ground causing damage to the tail rotor, vertical stabilisers, and associated components. Neither occupant sustained injury.

The aircraft was subsequently recovered by road to its maintenance base. The maintenance organisation reported that the engine was visually inspected and a fuel drain sample taken, with nothing unusual being found. After removal of the damaged tail rotor drive system components, the

engine was started and ran normally. The fuel system and magneto were removed and taken to an approved overhaul agency where they were subject to rig testing and more detailed examination; all components functioned satisfactorily. To date, no explanation for the engine failure has been found.

A review of UK incident/accident reports involving engine failures on Enstrom helicopters of all types yielded two instances of engine failure for which no satisfactory explanation could subsequently be found. Of these, one occurred as the collective lever was being lowered and the throttle closed during a practice autorotation; the other failure led to a satisfactory forced landing, the aircraft subsequently being flown out.

**AAIB Bulletin No: 7/95**      **Ref: EW/G95/04/18**      **Category: 3**

**Aircraft Type and Registration:** Thunder AX10-160, G-ONPI

**No & Type of Engines:** Two 'burners'

**Year of Manufacture:** 1990

**Date & Time (UTC):** 1 April 1995 at 0620 hrs

**Location:** Northend Farm, Chiddingfold, Surrey

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 1      Passengers - 7

**Injuries:** Crew - None      Passengers - None

**Nature of Damage:** Balloon destroyed

**Commander's Licence:** Commercial Pilot's Licence

**Commander's Age:** 37 years

**Commander's Flying Experience:** 846 hours (of which 255 were on type)  
Last 90 days - 2 hours  
Last 28 days - 1 hour

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The wind was light and the balloon was being flown from a 200 metre by 100 metre field, with 40 to 50 foot high trees at the downwind end. During the lift-off, despite using the second burner, it was apparent to the pilot that the balloon was not climbing as expected and was not going to rise above the trees. She therefore pulled the 'rip line' to abandon the takeoff, but the basket struck the trees some 10 to 20 feet above the ground and then fell as the envelope deflated.

The envelope was destroyed whilst disentangling it from the upper branches.

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3/94	Boeing 737-2Y5A, 9H-ABA at London Gatwick Airport on 20 October 1993	June 1994
4/94	Boeing 747-243, N33021 at London Gatwick Airport on 7 February 1993	August 1994
5/94	Cessna 550 Citation II, G-JETB at Southampton (Eastleigh) Airport on 26 May 1993	July 1994
6/94	Piper PA-31-325 C/R Navajo, G-BMGH 4 nm south east of King's Lynn, Norfolk on 7 June 1993	November 1994
1/95	Boeing 747-436, G-BNLY at London Heathrow Airport on 7 October 1993	January 1995
2/95	Airbus A320-212, G-KMAM at London Gatwick Airport on 26 August 1993	January 1995
3/95	Vickers Viscount 813, G-OHOT near Uttoxeter, Staffordshire on 25 February 1994	March 1995
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