AIRCRAFT ACCIDENT REPORT 6/82

Accidents Investigation Branch

Department of Trade

Report on the accident to Lockheed Jetstar 1329-N267L at Luton International Airport on 29 March 1981

LONDON
HER MAJESTY'S STATIONERY OFFICE

List of Aircraft Accident Reports issued by AIB in 1982

No	*Short Title*	*Date of Publication*
11/81	Piper PA 38–112 Tomahawk G–BGGH Wood Farm, Kiddington, Oxfordshire May 1980	February 1982
1/82	Pilatus PC–6/B2–H2 Turbo Porter G–BHCR Peterborough (Sibson) Aerodrome February 1981	April 1982
2/82	McDonnell Douglas DC10–30 N 83 NA London Heathrow Airport September 1980	September 1982
3/82	Maule M–5–235C G–LOVE Cranfield Aerodrome Beds September 1981	September 1982
4/82	Cessna Citation 500 G–BPCP St Peters Jersey Channel Islands October 1980	November 1982
5/82	Piper PA28 (Cherokee) G–AVBJ and G–AXZC Hamble Aerodrome Hants April 1981	October 1982
6/82	Lockheed Jetstar 1329 N267L Luton International Airport March 1981	

Note: Addendum at the time of going to press.

With reference to the fourth and fifth paragraphs on page 17 of the Report, the Air Navigation Order, Schedule 9, Article 19, Part B, Ratings, has now been amended to specify that a holder of a Private Pilot's Licence and an Instrument Meteorological Conditions rating, shall not fly "when the aeroplane is taking off or landing at any place if the flight visibility below cloud is less than 1 nautical mile".

However, any pilot who holds a current Instrument Rating, and who is not flying a public transport aircraft, is still entitled to carry out an instrument approach in weather conditions which would preclude a public transport operation. Safety Recommendations 4.1 and 4.2 therefore stand.

ISBN 0 11 513510 3

Department of Trade
Accidents Investigation Branch
Bramshot
Fleet
Aldershot
Hants GU13 8RX

13 October 1982

The Rt Honourable Lord Cockfield
Secretary of State for Trade

Sir,

I have the honour to submit the report by Mr C C Allen, an Inspector of Accidents, on the circumstances of the accident to Lockheed Jetstar 1329–N267L which occurred at Luton International Airport, on 29 March 1981.

I have the honour to be
Sir
Your obedient Servant

G C Wilkinson
Chief Inspector of Accidents

Accidents Investigation Branch

Aircraft Accident Report No 6/82
(EW/C741)

Registered Owner and Operator:		Alco Aviation Incorporated
Aircraft:	*Type:*	Lockheed Jetstar
	Model:	1329
	Nationality:	United States of America
	Registration:	N 267 L
Place of Accident:		Luton International Airport Latitude 51° 53′ North Longitude 00° 22′ West
Date and Time of Accident:		29 March 1981 at 1953 hrs All times in this report are GMT

Synopsis

The accident was notified to the Department of Trade at 2120 hrs on 29 March 1981 by Luton Air Traffic Control (ATC), and the investigation was commenced early the next morning.

The aircraft made a surveillance radar approach (SRA) to the Luton runway 08 at night, in conditions of low cloud and poor visibility and landed well past the touchdown zone. It then over-ran the end of the runway, became airborne over a 10 metre deep escarpment, struck the ground and caught fire. The seven passengers escaped from the aircraft through a hole in the fuselage and the commander exited through his direct vision (DV) window; all of them sustained relatively minor injuries. The co-pilot received severe spinal injuries and was unable to vacate the cockpit without the assistance of the rescue services. The external and cabin fires were extinguished by the aerodrome fire service who were then delayed in entering the cabin by the concentration of smoke and the lack of breathing apparatus.

It is concluded that the accident was caused by the commander's action in attempting a landing from a non-precision approach without sufficient visual reference.

1. Factual Information

1.1 History of the flight

The aircraft was on a private business flight from Lagos, Nigeria, to Luton with a crew of two and seven passengers on board. After leaving Lagos at 1155 hrs a refuelling stop was made at Hassi Messaoud, Algeria, before the flight continued to Luton. The aircraft arrived at Luton with sufficient fuel to hold overhead for a least 30 minutes and, if required, to divert to Gatwick, where the weather was good.

At 1939 hrs radio-telephony (RTF) contact was established with Luton Approach Control who confirmed that they had radar contact with the aircraft. The weather conditions observed at Luton at 1920 hrs included surface wind 020°/12 knots, visibility 900 metres in fog, cloud 8 oktas at 200 feet. This observation was transmitted to the aircraft with the additional information that the runway visual range (RVR) for runway 26 was 1000 metres, and for runway 08 in excess of 1100 metres. The controller advised the aircraft that the runway in use was 08 and that a new Instrument Landing System (ILS) with co-located Distance Measuring Equipment (DME) had been recently installed. After confirming that the runway in use was 08 but that the ILS was associated with runway 26, the controller offered the crew the choice of an ILS approach to runway 26 or an SRA to runway 08. On learning that the wind was variable between 010° and 040°, 8–12 knots, the commander elected to carry out an SRA on runway 08 and was informed by the controller that the SRA would terminate half a mile from touchdown. He also told the crew that the Obstacle Clearance Limit (OCL) was 250 feet above aerodrome elevation and requested them to 'CHECK YOUR MINIMA'. This instruction was acknowledged and it was confirmed that the crew would use QNH* as the altitude reference. The commander afterwards stated that he decided to use a decision height of 'around 300 feet'. At 1949 hrs Luton Approach advised the crew that the RVR on runway 08 was 900 metres and asked them to contact Luton Radar. This message was also acknowledged.

Tapes and transcripts of the RTF conversation between the aircraft and radar controller indicate that the approach was entirely normal. At a half mile range the aircraft was on track with the heading described as 'GOOD', when the approach was terminated by the controller, in accordance with normal practice in relation to an SRA approach in the UK. The commander states that he maintained a constant altitude, the precise value of which he is uncertain, until the co-pilot called that the runway lights were in sight, and then looked out to see runway lights just to the right of the aircraft. He called for landing flap, manoeuvred the aircraft onto the runway centreline and landed normally. He did not use the aircraft's landing lights 'because of the visibility'. The co-pilot stated that he had previously had a fleeting glimpse of the approach lights, then subsequently had visual contact with the runway lights and called that they were in sight. Neither pilot had any clear recollection of the location of their touchdown point and both said that they had been expecting an advisory call from the controller when the aircraft was over the touchdown zone. After touchdown the commander applied reverse thrust and normal braking. He then saw the red stopbar lights marking the end of the runway and increased his braking effort, but was unable to prevent the aircraft leaving the end of the runway. The aircraft continued to skid over 65 metres of grass before becoming airborne again for a distance of 30 metres whilst passing over a 10 metre deep escarpment. It finally struck the boundary fence and the ground almost simultaneously about 152 metres east of the paved surface at a speed estimated as approximately 45 knots (see Appendix 1).

*QNH is the corrected mean sea level barometric pressure at an airfield or for a specific area, and is used to indicate the altitude of an aircraft above the mean sea level datum.

The commander subsequently stated that after landing the deceleration and control of the aircraft on the ground appeared to be entirely normal. Because of poor visibility, the Tower controller was unable to see the aircraft; however, RVR observers were stationed at two separate locations approximately 110 metres north of the runway centreline; the observers at the western end were positioned opposite a point 300 metres in from the runway 08 threshold, and the observer at the eastern end was in line with a point on the runway 400 metres in from the start of the runway 26 paved surface. The observers at the western end reported to the controller that they had seen the aircraft fly past their position at an estimated 100 feet above the runway, maintaining height, before it disappeared into low cloud or fog, and affirmed that it was overshooting (executing a missed approach). The observer at the other end then reported that he had seen an aircraft pass his position at high speed and apparently on the ground. However, his view of its further progress to the east was obstructed by the structure of the observation tower. The crew of a Rapid Intervention Tender (RIT) *en route* to relieve the eastern observer overheard this exchange and the watch officer left the vehicle to investigate on foot. He heard the sound of aircraft engines and returning to the RIT, obtained ATC approval to enter the runway to initiate a search. He then activated the aerodrome fire service. The crew of the RIT found the aircraft within two minutes of the reported time of the accident and told ATC of its location.

The aircraft had come to rest with the engines still running and the forward part of the fuselage rolled to the left ahead of a vertical split in the fuselage structure. The commander shut down all but one of the four engines and noticing signs of fire, vacated the aircraft through the left direct vision (DV) window. He afterwards stated that the position of the injured co-pilot lying across the centre console precluded the closing of the fourth engine idle cut-off lever at that time. He thereupon went to the main door but, because the sill was in contact with the ground, was unable to open it. He had noticed a fire under the tail of the aircraft and realised that the cabin had now also caught fire. He therefore returned to the left DV window in an unsuccessful attempt to extricate the co-pilot.

After their arrival, the crew of the RIT promptly extinguished the cabin fire. Shortly afterwards, the aerodrome fire service foam tenders also arrived and extinguished the fire under the fuselage and tail. Firemen attempted to enter the cabin through the gap in the fuselage to search for survivors but were initially unsuccessful because of the concentration of toxic smoke in the cabin. They were not wearing breathing apparatus, due to an industrial dispute. The cabin was damped down, searched and declared clear of survivors. Six of the passengers were found in the vicinity, having vacated the aircraft through the fuselage rupture, and the seventh was later found at an airport security gate-house. All received minor injuries.

The co-pilot, who was unable to move unaided, was removed from the aircraft under medical supervision approximately 1 hour and 30 minutes after the accident.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	–	–	–
Serious	1	–	–
Minor/None	1	7	

1.3 Damage to aircraft

Aircraft destroyed.

1.4 Other damage

An aerodrome boundary fence was damaged when it was struck by the aircraft's landing gear.

1.5 Personnel information

1.5.1 Commander

Age: 53	Male
Licence:	Current Airline Transport Certificate (USA) with the Instrument Rating renewed on 10 February 1981. Ratings – aeroplane multi-engine land including L–1329 Jetstar, DC3, DC4, G–159, with a 1st Class unrestricted medical certificate dated 2 February 1981 and valid at the date of the accident.
Flying experience:	Total hours: 12,650 Total hours on L–1329: 2,630

1.5.2 Co-pilot

Age: 58	Male
Licence:	Commercial Pilot Certificate (USA) Ratings – aeroplane single and multi-engine land, DC3 and DC4, Instrument Rating, with a 2nd Class medical certificate dated 22 August 1979, and valid only for exercising the privileges of his Private Pilot Certificate at the time of the accident. He was required to wear corrective lenses.
Flying experience:	Total hours: over 15,000 Total hours on L–1329: over 300

1.6 Aircraft information

Type:	Lockheed 1329 Jetstar
Constructor's Number:	No. 5067
Date of Manufacture:	1965
Total Airframe Hours:	Recorded total of 4,777.7 hours until the 22 March 1981
Engines (4):	Pratt and Whitney JT 12A model 6A
Certificate of Airworthiness:	A USA Standard Airworthiness Certificate in the Transport Category was issued on 12 January 1977, its validity depending on adherence to the approved Federal Aviation Authority (FAA) maintenance schedule during this time.
Maintenance:	All recorded maintenance and rectification work conformed to the specified FAA schedules, and no record of any defect or repair likely to have contributed to the accident was found.
Certificate of Registration:	The Certificate of Aircraft Registration, issued 12 March 1980, bore the name of the previous owner, but Alco Aviation Incorporated had earlier submitted an Aircraft Registration Application to the FAA, and this was being processed.

The aircraft was originally fitted with a braking parachute, but this had been removed and the selector switch placarded to this effect. The landing distance data contained in the Airplane Flight Manual is not predicated on the use of a braking parachute. Under the prevailing and most adverse conditions experienced at Luton, the landing distance required for runway 08 (extracted from the Flight Manual) was 5,200 feet, (1585 metres). Federal Aviation Regulation (FAR) Part 121 requires that the landing distance required is increased by 15% if a runway is wet. In this case the landing distance required would have been 5,980 feet (1823 metres). The landing distance available on runway 08 was 7,087 feet (2160 metres).

Maximum weight authorised for take-off:	40,921 lb (18578 Kg)
Maximum weight authorised for landing:	35,000 lb (15890 Kg)
Estimated landing weight:	28,200 lb (12803 Kg)
Centre of gravity at maximum take-off: weight:	25.4% mean aerodynamic chord (MAC) and within the aircraft's weight and centre of gravity envelope throughout the flight.

1.7 Meteorological information

The accident took place at night in conditions of poor visibility.

Weather observations at Luton airport are made by suitably qualified ATC staff, and RVR measurement is by observers counting the number of runway lights in sight from a known location. The number of lights visible is reported to the tower, and from this information an RVR value is extracted from an approved table.

The weather recorded at 1920 hrs was wind 030° (T) at 12 kt, visibility 900 metres, fog, cloud 8 oktas at 200 feet, temperature + 10 °C, dewpoint + 10°C, QNH 1004 millibars. The RVR for runways 08 and 26 were in excess of 1100 metres. The 1950 hrs observation was similar except that the visibility was recorded as 800 metres with the RVR on runway 26 1000 metres, and runway 08 in excess of 1100 metres; the cloud base was measured at 100 feet aal (above aerodrome level). A special observation made at 1956 hrs recorded a wind of 030 (T) at 10 kt, visibility 800 metres in fog, with the sky obscured. The RVR for runway 26 was 700 metres and for runway 08 900 metres.

An aftercast of the weather within 10 nautical miles of Luton between 1900 hrs and 2000 hrs was prepared by the Meteorological Office, as follows:

> General Situation: The area lay in an east-north-easterly airstream with a warm sector over, and to the west of, Luton. A slow moving cold front lying northeast to southwest and to the east of Luton marked the boundary of considerably improved weather to the east of the area.
>
> Surface wind: north-north-east at approximately 10 kt.
>
> Cloud: 8 oktas stratus base 400 to 800 feet above mean sea level (amsl) and covering hills, with thick layers of stratocumulus and altocumulus, tops 10,000 to 12,000 feet.
>
> Surface visibility: less than 1000 metres in hill fog, otherwise 1000 to 2000 metres.
>
> Weather: extensive hill fog. Occasional light rain or drizzle.

The RVR recorded at 1946 hrs for runway 26 was 800 metres, reducing to 700 metres at 1952 hrs. For runway 08 the RVR recorded at 1948 hrs was 900 metres and the next logged observation was at 2057 hrs giving an RVR of 350 metres. The RVR remained at or below 350 metres until the final log entry at 2359 hrs.

The weather at London (Gatwick) airport, the designated alternate, was recorded at 1950 hrs as wind 350° at 03 kt, visibility 4500 metres in smoke, cloud 1 okta at 12,000 feet, and 5 oktas 25,000 feet. The weather remained substantially the same throughout the relevant period during that evening, as did the similar weather conditions observed at London (Heathrow) airport.

1.8 Aids to navigation

A comprehensive set of Jeppesen Airway Manuals covering Europe and Africa were on board the aircraft, and the commander states that he had on display the Luton ILS plate, but that the SRA plate was missing.

The aircraft was fully equipped for flight under Instrument Flight Rules (IFR), Nav 1 being selected to 119.15 MHz, the Luton runway 26 ILS frequency, and Nav 2 to frequency 115.6 MHz, Lambourne VHF omnidirectional range (VOR). The numbers 1 and 2 automatic direction finding (ADF) receivers were selected to frequencies of 386 KHz and 367 KHz respectively. These frequencies do not relate to any relevant *en route* or approach facilities within the UK airspace. The Luton non-directional radio beacon (NDB) co-located with the ILS outer market, operates on a frequency of 345.5 KHz and was serviceable at the time of the accident.

The frequency of the Luton runway 26 ILS was changed from 119.1 MHz to 119.15 MHz and a co-located DME introduced with effect from 27 March 1981; the change of frequency and the introduction of DME was relayed to the crew by ATC.

ACR 430 – 3 cm surveillance radar was in use for this approach and after notification of the accident, was not re-adjusted. It was subjected to an examination by the relieving watch supervisor, accompanied by the duty telecommunications technician, who reported that the bracketing markers were correctly positioned relative to the approach line and that the approach line azimuth for a surveillance radar approach was properly aligned.

1.9 Communications

The flight made contact with London Control on frequency 125.8 MHz at 1933 hrs and received a clearance to route Lambourne to Luton NDB. At 1936 hrs the co-pilot requested a readability check and was answered by London Control 'I'M READING YOU FIVES NOW'. The reply to this was 'OK I JUST SWITCHED ANOTHER RADIO THANK YOU'. At 1939 hrs the flight was asked to contact Luton Radar on 129.55 MHz and the RTF recording indicates that communications were satisfactory thereafter. At 1949 hrs contact was established with Luton Radar on 128.75 MHz and an SRA to runway 08 commenced. During the latter stages of the approach the controller advised 'ONE MILE – ALTITUDE NINER ZERO ZERO FEET – YOU'RE ON TRACK – LEFT THREE DEGREES ZERO SEVEN EIGHT TO HOLD THE CENTRE LINE – THREE QUARTERS OF A MILE – YOU'RE ON TRACK AGAIN HEADING ZERO SEVEN EIGHT – HALF A MILE FROM TOUCHDOWN – YOU'RE ON TRACK – HEADING IS GOOD – ON THE CENTRE LINE – CLEAR TO LAND – LOOK AHEAD – RADAR STANDING BY'. This was acknowledged at 1953 hrs by the word 'ROGER', followed by a drawn out unintelligible exclamation from an unknown source. There was no further RTF communication with the aircraft.

The commander stated that he was monitoring the RTF communications by means of a loudspeaker mounted in the cockpit.

1.10 Aerodrome information

Luton International Airport is operated by Luton Corporation and is situated 2.8 km east of the town at an elevation of 525 feet amsl. The main runway 08/26 is 2160 metres long and 46 metres wide with an asphalt surface and friction course. The threshold elevation of runway 08 is 515 feet. The runway surface was damp at the time of the accident.

The Civil Aviation Publication (CAP) 168 (Licensing of Aerodromes) sets out the recommended* runway dimensions and includes advice on the utilization of clearways, stopways, runway strip ends and runway end safety areas (RESA). A strip end should have a minimum length of 60 metres, and the RESA should normally have a minimum length of 90 metres, commencing at the end of the strip. RESA's are intended to minimise the risks arising when an aeroplane over-runs or undershoots a runway. Variations to CAP 168 practice which had been notified to the CAA by the airport authorities included information that there was no RESA at the eastern end of runway 08.

Where the CAP 168 recommendations* on the dimensions of a RESA cannot be met, the declared landing distance available for that runway would normally be reduced. However, as the establishment of Luton airport and its current operational level pre-date these recommendations, the CAA had considered the topographical considerations and had agreed with the airport management that a reduction of the landing distance available on runway 08 on these grounds would be unrealistic.

Runway 26 is the primary instrument approach runway with white high intensity centre-line approach lights with crossbars and red low intensity centre line lights with a single crossbar. The landing threshold is displaced 85 metres along the runway and is marked by high intensity green lights with wing bars. The approach lights to runway 08 comprise a single line of high intensity white centre line lights with low intensity red lights and a crossbar. The whole length of this runway is available and the threshold is again marked by high intensity green lights with wing bars. The runway lights are of the white, high intensity, type. All the aforementioned lighting systems were reported to have been switched on and selected to an intensity of 100% at the time of the Jetstar's approach. Visual Approach Slope Indicators (VASIs) are positioned on both runways, the runway 08 VASI, set to a 3° glideslope, being selected on and to 80% intensity at the time of the accident.

1.11 Flight recorders

Not fitted nor required.

1.12 Wreckage and impact information

1.12.1 On site examination of the wreckage

There were no clearly identifiable tyre marks on the runway and it was not therefore possible to establish the points of touchdown or initial braking. Wheel tracks in the grass overrun area indicate that the aircraft left the end of the runway 15 metres right of the centre line, heading 090° (M). The main wheel tracks showed evidence of substantial braking being applied at the time.

*See also sub-paragraph 1.14.3

On reaching the edge of the escarpment, the aircraft continued in a descending trajectory, during which the airport boundary fence was struck by the landing gear. The aircraft then struck the ground in a flat, laterally level attitude, and at an estimated forward speed of 45 knots. Both main gear assemblies were torn off by the impact, and the nose gear was fractured and forced rearward into the lower fuselage underfloor area. As a result of the impact and consequential 50 metre ground slide, fuel lines were damaged and both auxiliary tanks were found to be ruptured and empty. 38 US gallons (144 litres) of fuel were recovered from the No 1 main tank, 98 US gallons (371 litres) from the No 2 tank, 102 US gallons (386 litres) from the No 3 tank, and No 4 main tank was found to be empty. There was evidence of a significant fuel spillage, and that the fire had broken out at a point 10 metres behind where the aircraft came to rest. A metre wide gap had been opened up on the left side of the fuselage, running vertically across the roof, and located just forward of the wing leading edge. The gear was locked down, the leading edge and trailing edge flaps were extended to the landing position; all four reverse thrust clam shell doors were deployed to the extended (reverse thrust selected) position. The brake anti-skid system was found to be switched ON.

The forward section of the fuselage had rolled 30° to the left, rendering the outward opening passenger door unuseable. The overwing emergency exits were removed by firemen who reported that the right overwing exit was initially blocked by debris, and that the latch on the left exit had to be forced by means of a crowbar.

The fire was initially concentrated under the tail of the aircraft, and subsequently progressed forward along the fuel spillage under the fuselage, entering the cabin through the disrupted structure. The cabin was severely damaged by the fire, which appears to have spread mainly aft of the gap in the fuselage. There was, however, severe scorching to the top of a vinyl screen which separated the vestibule and flight deck area from the cabin.

Both the commander's and co-pilot's altimeters were found to have their subscales set to 1005 millibars, which coincides with the QNH transmitted to the crew by ATC.

1.12.2 Subsequent detailed examination

The wreckage was recovered from the accident site in order to facilitate a more detailed examination.

Examination of the landing gear indicated that the damage that had accrued was consistent with ground impact damage, and that the gear was down and locked at the time of impact.

The main wheel brake packs revealed normal wear, with no sign of overheating or any other abnormality.

All tyres were serviceable and unworn, and were correctly inflated. All four main wheel tyres were found to have a single light patch of rubber reversion on the tread, consistent with the onset of aquaplaning. Although the runway was reported as damp, it is considered probable that the aquaplaning occurred during the aircraft's excursion over the wet grass.

Both pilots' seat belts and upper torso restraints (ie full harness) were found to be in good condition with no evidence of damage or defect. The inertia reels, which lock the upper torso restraint in the event of a sudden deceleration, functioned normally. During the examination it was noticed that the shoulder straps on both seats would not retract fully into their respective seat backs because the slot in the eye, through which the straps pass over the top of each seat back, restricts the doubled strap from entering and passing through. This resulted in some slack in both shoulder harnesses, but did not affect the operation of the restraint mechanism when inertia loaded, or the freedom of the harness when released at the release handle.

The aircraft appeared to have been in good condition, and well maintained. There was no evidence of any mechanical failure, or system unserviceability which could be regarded as a contributory factor to the accident.

1.13 Medical and pathological information

The commander received minor head and chest injuries, and the co-pilot severe spinal injuries during the impact sequence. The passengers suffered cuts and contusions of a generally minor nature.

1.14 Fire

1.14.1 Fire and rescue cover at Luton Airport

The scale of equipment available to the Luton Airport Fire Services was as follows:

(a) One Rapid Intervention Tender carrying 200 kg Monex dry powder and 50 kg BCF.

(b) Three foam tenders carrying 1,400 gallons of water and 150 gallons of foam.

(c) One Emergency Equipment Vehicle (EEV).

(d) One Ambulance.

(e) 6 sets of Breathing Apparatus (but see sub-paragraph 1.14.3).

During aircraft emergencies the ambulance and EEV are manned by personnel from the marshalling and baggage handling units.

Luton Airport is promulgated in the UK Air Pilot as a Category 7 aerodrome.

1.14.2 Fire Service involvement

The fuel system was damaged by the initial impact and a small fire originated under the tail in the vicinity of the rear mounted engines. The fire then spread forward and entered the cabin area through the gap in the damaged fuselage and rapidly intensified. The watch officer and fireman crewing the RIT located the aircraft within two minutes of the accident and after unlocking the perimeter fence gate, approached the wreckage.

The RIT was then driven to the left side of the aircraft and the cabin fire promptly extinguished by dry powder directed through the rupture in the fuselage. At this time the three Aerodrome Fire Service foam tenders arrived at the scene. Personnel from two tenders extinguished the fire still burning under the tail and fuselage while the third tender stood by. After ascertaining from ATC that there were reported to be 9 persons on board, the watch officer returned to the aircraft where two firemen were attempting to enter the cabin; however this proved impossible, due to the density of smoke and toxic vapours inside and the fact that they were not wearing breathing apparatus. After the interior had been damped down with a mixture of foam and water, the firemen were able with some difficulty to search the cabin for survivors. The cabin was found to be empty and subsequently six passengers were located in the immediate vicinity. After a further search by the Bedfordshire Fire Service, who arrived at the site at 2012 hrs, it was learned that the seventh passenger had made his way to the airport security gatehouse. The aircraft was secured and after the co-pilot had been removed at 2125 hrs, the incident was declared closed.

The approximate amounts of media used were:

1,000 gallons of water – 60 gallons of foam – 200 lb of dry powder.

1.14.3 Breathing apparatus – historical background

Three sets of breathing apparatus were purchased by the Luton Airport Management in 1972 and a further three in 1973, since when they had been properly stored and maintained in a serviceable condition. The CAP 168, published in April 1972, did not require the acquisition or use of breathing apparatus, and because of this and the prevailing financial climate the requisite training in its use was not commenced. A revised edition of CAP 168 containing a reference to breathing apparatus was published in December 1978. The relevant extracts from Chapter 8, Rescue and Fire Fighting Service, current at the time of the accident, are reproduced below:

'12.2 Respiratory Protection Equipment for Aircraft Rescue and Fire fighting operations.

12.2.1 Experience has shown the need for respiratory protection for personnel required to enter an aircraft during rescue and fire fighting operations. The following minimum scale of equipment should be available at Category 5 aerodromes and above:

Not less than 4 sets of breathing apparatus with 1 spare cylinder for each set.

12.2.4 It is essential for users to have a thorough knowledge of breathing apparatus and its capacity, and for adequate safeguards to be provided when the equipment is in use. Wearers must be fully conversant with the operational procedures laid down by the Central Fire Brigades Advisory Council'.

In the current edition of CAP 168 the word 'should' has replaced 'shall' in a number of references and 'requirements' have been altered to 'recommendations'. According to the CAA this change has been made because CAP 168 is only a guidance document and in order that CAA Inspectors may exercise their discretion in cases where the new licensing criteria are difficult or impossible to implement; also where time is required to obtain equipment and complete training of personnel.

In 1978 an attempt was made to start the requisite training, but because of an industrial dispute this was not accomplished. The Luton Airport firemen were in dispute with the Borough of Luton over conditions of service and would not undertake the training that was then available. It was the understanding of the Luton Airport management that sub-paragraph 12.2.1 of the CAP 168 reference constituted a recommendation and was not therefore mandatory.

Following the accident, and after representation to the CAA by the AIB, the CAA Director of Aerodrome Standards informed the Airport Director that the CAA regarded the introduction of breathing apparatus operationally at Luton as a mandatory requirement, and requested that this be achieved as soon as practicable.

The Airport Director informed the CAA Director of Aerodrome Standards on 1 July 1981 that an agreement had been reached with the aerodrome firemen, and that training would begin as soon as possible. The equipment was brought into full operational service on 12 June 1982 and is reported to meet the CAA aerodrome licensing requirements.

Of relevance is the paragraph in CAP 168 pertaining to the inspection of Rescue and Fire Fighting Services at licensed aerodromes, and this is reproduced in full:

> 'INSPECTIONS
>
> The Authority's Inspectors will inspect the Rescue and Fire Fighting Services at licensed aerodromes at least once per year. These inspections may be conducted without prior warning to the licensee.
>
> The Authority's Inspectors will need to be satisfied that the Rescue and Fire Fighting Service is operating as an effective unit and will require to see evidence that the licensee has made a full assessment of the operational requirements and that the necessary procedures and practices have been introduced. The licensee may be required by the Inspector to provide a full scale demonstration to establish the effectiveness of any element of the emergency arrangements. When this is called for, prevailing operational conditions will be taken into account.
>
> The Authority's Inspectors will wish to see documentary evidence relating to the qualifications of personnel employed for rescue and fire fighting duties, including Certificates of Competence in appropriate cases. They will wish to examine the records of local training and evidence of exercises, including those with other emergency services. Records of the inspections, tests and maintenance of all equipment and appliances used by the Rescue and Fire Fighting Service should be available for examination'.

1.15 Survival aspects

The 9 occupants all survived the accident and apart from the co-pilot, sustained relatively minor injuries. Both pilots subsequently stated that they had not been wearing upper torso restraint (shoulder harness) at the time of the accident: the commander, on account of discomfort from an old injury; the co-pilot, because the inertia reels were inoperative. However, both inertia reel restraint mechanisms operated satisfactorily when functioned after the accident. It proved impossible to assess for certain whether the extent of the co-pilot's injuries was affected by the lack of upper torso restraint.

Luton Airport is situated on the top of a hill and has a steep embankment, some 10 metres deep, commencing 65 metres from the eastern end of runway 08.

There is evidence of a flash fire between the point of initial impact and where the aircraft came to rest, indicating that the fuel system was damaged on the initial impact. The aircraft came to rest substantially level with the fuselage forward of the leading edge wing root rolled 30° to the left, causing the passenger door to be in contact with the ground and therefore, unuseable. The right overwing emergency exit was found to be blocked by debris, and due to distortion of the fuselage, it was impossible to open the left overwing exit by normal means. The disruption between the forward and rear sections of the fuselage, created a gap in the left side and across the roof, and it was through this gap that the 7 passengers vacated the aircraft before the fire reached the cabin. Because of his injuries the co-pilot was unable to leave the aircraft unaided and by the time the commander left the aircraft via his DV window, the cabin was on fire. A vinyl screen door, situated between the cabin and cockpit/wardrobe area, showed evidence of severe scorching on the top 8 inches, and is thought to have significantly impeded the progress of the cabin fire towards the cockpit, thus affording the co-pilot some protection.

A recent AIB study, summarised in Aircraft Accident Report No 6/78 (Boeing 707 G–APFK at Prestwick) suggests that the greatest danger to people surviving impact forces in an aircraft accident is the risk of post-impact fire, particularly if the fire is allowed to enter the cabin. Post-impact cabin fires usually originate from a source outside the aircraft, such as a fuel fire, that finds its way into the cabin through a door, hatch, or disrupted structure. Many cabin furnishings and materials emit dense toxic smoke when subjected to intense heat; in these circumstances disorientation, incapacitation, and the consequential death of survivors can occur very quickly.

1.16 Test and research

1.16.1 Samples of the cabin furnishing and materials were sent for detailed analysis to the Royal Aircraft Establishment at Farnborough. The following materials were identified:

(a) Seat Squab with Trim

Yellow foam	– polyurethane
White packing	– Polyurethylene terephthalate
Red plastic	– vinyl chloride/ester copolymer

	Threads in red plastic	– nylon 6.6
	Chair fabric, canvas base	– cotton
	Chair fabric, pile	– wool
(b)	Window Curtain Material:	jute
(c)	Soundproofing Material:	mineral wool surrounded by transparent chlorinated polyester film

(d) Simulated leather and foam, interior trim: vinyl chloride/ester copolymer with phthalate plasticiser, backed with cotton fabric; white foam: polyurethane.

(e) Plastic coated panel, interior trim: metal panel has cotton fabric bonded to it with a phthalate/alkyd resin (chlorinated) on one side; the coarse backing on the other side is wool.

(f) Carpet: wool pile on polypropylene canvas; foam backing: polyurethane.

(g) Wood trim: vinyl chloride/ester copolymer backed with cotton.

Organic materials such as the above will emit toxic carbon monoxide under certain conditions and those containing nitrogen, for example polyurethane and wool, can produce hydrogen cyanide. Chlorinated polymers are the source of the toxic irritant, hydrogen chloride. The emission of smoke and toxic gases will vary as to the type and amount of any specific material, and as to the source and intensity of the fire.

AIB Aircraft Accident Report No. 6/78 recommended that 'further research should urgently be undertaken into the prevention and control of aircraft interior fires'. A sizeable research programme is currently being carried out by the FAA in the USA, with some additional and complementary work being undertaken by the CAA in this country.

1.16.2 A number of measurements and calculations were made, based on the observations of eyewitnesses to the aircraft's progress.

(a) An RVR observer at the western end of the runway saw the aircraft disappear from sight into mist or fog, at the time it was in line with an easily identifiable and prominent obstruction light. A line through his location and the position of the light indicates that the aircraft was still flying level at a point approximately 460 metres down the runway from the runway 08 threshold.

(b) This observer's companion was able to relate the aircraft's apparent height to part of the structure of the vehicle which they were manning and with the assistance of a surveyor, it was calculated that the aircraft was very approximately at a height of 100 feet above the runway as it passed abeam the observer's vehicle.

(c) The co-pilot's last recollection of the indicated airspeed (IAS) was during the final stages of the approach when, with approach flap extended the IAS was 137 to 140 knots. The commander stated that, with landing flap selected, he was flying at his correct landing reference speed (target threshold speed) of 126 knots.

1.16.3 Fuel samples taken from the aircraft were sent for analysis and were found to conform to the required specification.

1.17 Additional information

1.17.1 Aerodrome Operating Minima

The aircraft was operating under the provisions of United States Federal Aviation Regulations (FARs) Part 91 – General Operating and Flight Rules. One of the provisions contained in Part 91 is that persons operating a civil aircraft of United States registry outside the United States shall, when within a foreign country, comply with the regulations in force there, relating to the flight and manoeuvres of the aircraft. The passenger complement of the Jetstar comprised the owner, together with six associates and friends, and the flight was not therefore for the purpose of public transport as defined in the UK Air Navigation Order.

Aerodrome operating minima in respect of non-public transport aircraft are not the subject of legislation or regulation in the UK, although the UK Air Information Publication (AIP) contains recommended minima for such flights in piston engined aircraft not exceeding 5700 kg Maximum Total Weight Authorised (MTWA). The relevant minima for an SRA to Luton runway 08 is a decision height of 310 feet above runway threshold (QFE), or 835 feet amsl (QNH) and an RVR of 900 metres.

Supplementary Instruction No 7/1978 contained in the CAA Manual of Air Traffic Services requires a controller to advise pilots of non-public transport aircraft of the recommended AIP minima when instrument approach instructions are issued, and for this purpose they may assume that an aircraft whose callsign does not contain a company prefix is non-public transport. Controllers are not permitted to differentiate between an aircraft which is turbine powered, or which is above 5700 kg MTWA, or to recalculate the approximate minima.

The United Kingdom recommended landing minima for public transport aircraft with an MTWA in excess of 5700 kg are contained in the Aerad Flight Guide. For an SRA to Luton's runway 08, terminating at ½nm from touchdown, the decision height is 250 feet QFE (765 feet QNH) with an RVR of 1000 metres. For a non-precision approach, an approach ban is in force in respect of public transport aircraft at any time the RVR goes below the minimum established for that approach.

The Jeppesen Airway Manuals carried on the aircraft referred to the RVR approach ban, and mentioned that it applied to public transport aircraft. USA FAA recommended minima contained in the current Jeppesen Luton approach plate, not carried on the aircraft, with regard to the runway 08 SRA, were a Minimum Descent Altitude (MDA) of 255 feet above aerodrome altitude, or 750 feet QNH, and an RVR of 1200 metres. A note on the relevant SRA approach plate also contained the information that the approved UK minimum RVR was 1000 metres, but again the crew did not have this information available.

MDA, as defined by the FAA and when related to a non-precision approach, is the decision height expressed in altitude above mean sea level.

1.17.2 Surveillance Radar Approach procedures

During an SRA approach in the UK the controller will, in addition to passing alterations of heading to maintain approach path centreline, also advise the height or altitude for each reported range from touchdown. At a range of 2nm or ½nm, depending upon the accuracy of the radar installation, the controller will terminate the approach, the pilot having been previously informed of the termination range in force. The controller would not routinely advise a pilot when the aircraft is over the runway threshold or touchdown zone because the instrument approach procedure has been completed before these points are reached, and it is assumed that the pilot will have initiated the appropriate landing, circling, or missed approach manoeuvre.

According to the FAA Instrument Flying Handbook, revised in 1980, a controller in the USA will provide guidance in azimuth only, but will pass the recommended height at each mile range on request. Before descent on the final approach the controller will advise the pilot of the relevant MDA, and also of the missed approach point (MAP). The MAP concept may be generally described as being a position over the landing threshold or a radio navigational facility sited on the airfield for a non-precision approach. The MAP is usually determined by the pilot timing his approach from a known fix at the appropriate groundspeed, and the Instrument Flying Handbook further notes that in the USA pilots will normally be provided with navigation guidance until reaching the MAP; they will be instructed to execute a missed approach if the prescribed visual reference has not been established.

1.17.3 Licence validity and expiration of medical certificates

An FAA Commercial Pilot Certificate requires at least a current second class medical certificate in order to retain its validity. In these circumstances, a second class medical certificate would expire twelve months after the end of the month during which the medical certificate was signed. A second class medical certificate related solely to a Private Pilot Certificate, would not expire until twenty-four months after the month of the date of signing.

An interpretation by the FAA of FARs 61.118 and 61.120, indicates that a Private Pilot Certificate was an inappropriate qualification for this type of flight. FAR 61.120 specifies that the second-in-command of an aircraft type certificated for more than on required pilot (such as the Jetstar) must meet the same requirements as the pilot-in-command under FAR 61.118, which states that a private pilot may not, '. . . .for compensation or hire, act as pilot in command of an aircraft'. This is further clarified by amendment 6.1-8 under the preamble, dated May 4, 1964, which specifies, in part, that '. . . . a private pilot shall not pilot aircraft for hire'. Both pilots were employed by Alco Aviation Incorporated to operate the aircraft on this, and other flights.

2. Analysis

2.1 General

There was every indication that the aircraft, its equipment and the ground navigational aids at Luton were fully serviceable at the time of the attempted landing. The commander was properly qualified and experienced for the flight. The co-pilot was well experienced but, because his second class medical certificate, which was a pre-requisite of his Commercial Pilot Certificate, had expired at the date of the accident, he was not at that time suitably qualified to undertake the flight. There is no evidence to suggest that either pilot was not fully fit for the flight.

As the aircraft approached Luton Airport the commander was confronted with reports of a very low cloud base and poor visibility. He had the choice of either an SRA approach to runway 08, an ILS approach to runway 26, or a diversion elsewhere. Of these three alternatives, the SRA is a non-precision approach in which, due to limitations in the accuracy of the system, the controller's instructions terminate at half a mile from the threshold. In the case of the second alternative, the extra precision normally offered by an ILS approach would have been offset by the disadvantages of landing, in poor visibility, with a tailwind component. Although a landing on runway 26 with this component would have been within the aircraft's Flight Manual limitations, it must be postulated that the commander would have been more prudent, in such marginal conditions, to select the remaining alternative of a diversion to an aerodrome such as Gatwick, which was not too distant and experiencing excellent weather.

The aircraft was making a private category flight and therefore, under the provisions of the UK legislation, the commander was entitled to commence an approach, whatever the state of the weather. In fact, the last RVR for runway 08, a visibility of 900 metres, reported to the crew before they commenced their approach, would have inhibited such an approach had they been engaged in a public transport operation. In addition, the RVR was considerably lower than the minimum value recommended for an approach to this runway in the Jeppesen approach chart; that the commander did not have this with him was an unfortunate omission, in view of the fact that Luton had always been the intended destination airfield.

The accident focuses attention on what, in the UK, remains an anomalous situation, in that aircraft engaged on private flights, however many passengers are carried, may make an approach whatever the weather, whereas those engaged in public transport operations, often with more experienced crews and higher levels of equipment, may not. There have been a number of previous cases in recent years in which private aircraft have come to grief in similar circumstances. It is therefore recommended that the CAA introduce an approach ban, applicable to private flights, similar to that which applies to public transport flights under adverse weather conditions.

A further consideration is that the 'recommended weather minima' recently promulgated by the CAA, concerning private flights, apply only to piston-engined aircraft below 5700 kg MTWA. Whilst this must be an improvement over the previous state of affairs in which no weather minima whatsoever were published for private flights, larger private category aircraft, such as executive jets, with their higher approach speeds, remain at risk.

It is therefore recommended that minima for the remaining categories of private aircraft in terms of speed and weight, on the lines of those already introduced in the USA, should be established.

An additional comment on the commander's decision to make a radar assisted approach to runway 08 is relevant, in view of the fact that he did not have an appropriate approach chart available in the aircraft. Its absence deprived him of any indication of the minimum descent altitude and published minimum RVR, and perhaps more importantly, of the missed approach procedure. In fact, the commander's self-determined decision height of 'around 300 feet' was presumably the height above aerodrome elevation and based on the radar controller's message that the OCL was 250 feet; it would appear to have been a sensible value to choose, provided it had been adhered to. However, the lack of the approach chart showing the missed approach procedure may well have influenced the commander's decision in favour of attempting a landing when the weather conditions encountered in the final stages of the approach mitigated against this. It is relevant to point out that, if he was in doubt about the missed approach procedure, the commander could at any stage have asked ATC for assistance.

In the course of the investigation it became apparent, both from eye-witness accounts and meteorological observations, that the cloud-base at the time was considerably lower than 300 feet above the runway and was probably of the order of 100 feet. It must therefore be concluded that, after the radar approach was terminated, the commander descended below his decision height, without proper visual reference, until the runway lighting came into view - a bad practice which is completely at variance with good airmanship and which invites an accident. In this case, by the time the commander had orientated himself with respect to the lighting, the aircraft was already overhead the runway and to the left of the centreline. In the circumstances, it was not surprising that a considerable portion of the paved surface had been overflown before the commander was able to align the aircraft and touch down on the centreline; and that, in consequence, the aircraft overran the far end of the runway. The commander had no means of establishing his position relative to the runway after the SRA talk-down had been completed; therefore, having reached his decision height, he should have commenced the missed approach procedure.

It must be mentioned that both pilots claimed, after the accident, that they had been expecting a call from the radar controller when over the landing threshold (or 'MAP'), in accordance with standard USA procedures. However, experienced as they were in flying overseas, the pilots should have been well aware that, when flying in or over the airspace of a foreign state, it was their responsibility to acquaint themselves with, and conform to, the local regulations and procedures; this is a well-known, internationally agreed, convention. As regards aircraft registered in the USA, crews' responsibilities in this respect are set out in FAR Part 91. Therefore the commander should have known that, under UK procedures, no such call is routinely given. This is due to equipment limitations inherent in the non-precision nature of the approach.

2.2 The overrun

There is no doubt that, had the Jetstar crossed the threshold at the appropriate approach speed and touched down in the normal zone, it should have been able to stop before the runway end, with full allowance for the reduction in braking effectiveness due to the damp

surface. However it is probable that, by the time the commander had realised that the aircraft had touched down a considerable distance down the runway, there was in fact insufficient length remaining in which to accomplish a missed approach (go-around) procedure; no such action was attempted and the aircraft continued its progress under heavy braking and with full reverse thrust selected, until it left the end of the paved surface at a speed significantly in excess of 45 knots. Although there was some evidence on the mainwheel tyres of slight aquaplaning, it seems probable that this occurred as the aircraft passed over the unconsolidated overrun area.

When the aircraft finally came to rest at the bottom of the escarpment, the engines were still running. It must be commented that, had the crew appreciated the inevitability of an overrun and closed the idle cut-off levers earlier, the fire might have been prevented.

In the circumstances of the overrun the commander was fortunate to escape severe injuries, in view of the fact that he was not wearing upper torso restraint as he was required to do under the stipulations of FAR Parts 91. 200 and 121.311. The co-pilot, who had also declined to wear upper torso restraint on the grounds that the inertia reel restraint mechanism was inoperative, was seriously injured and was only rescued with considerable difficulty. Subsequent checks of the inertia reel mechanism showed it to be functioning normally.

Although not directly related to the cause of the accident, a pertinent matter arising from the investigation is that runway 08 at Luton Airport had been the subject of what may best be termed a 'dispensation' by the CAA, as regards the recommendations contained in CAP 168 that aerodromes of this category should have a strip end of 60 metres followed by a RESA, or consolidated overrun area, of *minimum* length 90 metres. In fact it had a total of 65 metres of grass overrun, of which 60 metres constituted strip end.

The purpose of a RESA, as stated in CAP 168, is 'to minimise the risks arising when an aeroplane overruns or undershoots a runway'. Perhaps understandably, the CAA have been reluctant to impose a retrospective requirement for a RESA, or for the reduction of declared distances, where technical constraints and economic considerations would result in such a course of action being unnecessarily punitive. However, the presence of a 10 metre deep escarpment, some 65 metres from the end of the paved surface of runway 08, would not appear to be compatible with the spirit of the objectives quoted above.

Although CAP 168 has only the status of a guidance document, and the associated ICAO Annex 14 contains only a Recommendation, not a Standard, in respect of RESAs, it is surely desirable that, in a country which considers itself as in the forefront of aviation, the standards to be sought should in general be higher than the minimum found to be acceptable to the majority of members of ICAO.

The Jetstar is the second aircraft to overrun this escarpment in eight years and in view of the continued growth of Luton as an international airport, it is recommended that the feasibility of establishing an adequate RESA at the eastern end of the runway be re-examined by the CAA and the airport authority.

2.3 Fire and rescue

The initiative of the watch officer in the RIT, in calling out the aerodrome fire service before it had been established that an accident had occurred, was undoubtedly instrumental in ensuring that the aircraft fire was extinguished much more rapidly than would otherwise have been possible. However, the location of the RIT at the eastern end of the airfield was entirely fortuitous; had the fire service been alerted in the normal way it is possible that they would have had to carry out their poor visibility search procedure, with the resultant likelihood that the fire would have been well established on their arrival at the aircraft. In this event the co-pilot's survival could have been in doubt. As it was, the lack of breathing apparatus delayed the search for survivors and caused the firemen some distress and a degree of hazard. It was fortunate indeed that none of the passengers was incapacitated by the force of the impact and that they were all able to extricate themselves through the gap created by the disruption of the fuselage. Had a similar accident occurred to a larger aircraft whilst landing at Luton, the absence of breathing apparatus could have seriously delayed the knock-down of a cabin fire and the rescue of survivors.

2.4 Licensing and inspection of aerodromes

Luton Airport is licensed by the CAA under the provisions of CAP 168, the current edition of which was published in December 1978. As well as including a number of amendments, the text of this edition was also adjusted in order that Aerodrome Inspectors might use their discretion in cases where the aerodrome authority could not comply with the updated requirements, or needed time to implement them. It was thought that in some cases, a deficiency in one area might well be counterbalanced by the facilities available in another.

Given this latitude, a factor which should have been taken into account in the CAA Aerodrome Inspectorate's* assessment of the minimum scale of safety equipment to be required at Luton was that the aerodrome differs from most recognised international airports in the UK in possessing topographical features that will almost inevitably result in an aircraft receiving substantial damage following a serious undershoot or overrun accident. Accordingly, the risk of a cabin fire breaking out in these circumstances must be commensurately higher.

The cabin of the Jetstar, like that of most passenger carrying aircraft of similar age, contains a large number of organic materials which, when heated to a critical temperature, will emit gases, including carbon monoxide, hydrogen cyanide and hydrogen chloride, which are both irritant and toxic. This is a characteristic which is well-known to airworthiness authorities and which has formed the subject of a number of safety recommendations as a result of investigations into previous accidents. Although a sizeable research programme is being undertaken in the USA, with some additional and complementary work being carried out by the CAA, the whole subject of survivability following aircraft interior fires, posing as it does such complex problems, has been under study for a considerable period of time. Accordingly, it is recommended that greater urgency and effort be injected into the associated research so that improved safety standards may be promulgated as soon as possible. In addition, it is patent that research is urgently required into methods of rendering significantly less hazardous the interiors of the very large number of aircraft already manufactured to the earlier standards.

* A division of the Directorate of Aerodrome Standards.

In view of the considerable likelihood of the generation of noxious gases in the cabin in the event of such an aircraft fire, it is clear that the ready availability of breathing apparatus was highly desirable at Luton, as a Category 7 Airport licensed for use by large public transport aircraft. There was no other apparatus readily available that would have facilitated an equally expeditious entry into a smoke-filled cabin. Although the airport management had, quite properly, provided the required apparatus as far back as 1973, it had not been introduced into service at the date of the accident because, due to an industrial dispute, the firemen concerned refused to undertake the necessary training in its use.

The current edition of CAP 168 clearly states that not less than 4 sets of breathing apparatus should be available (as indeed they were) at aerodromes such as Luton and that it is essential for the users to have a thorough knowledge of such apparatus – which they did not.

It must be concluded that the Authority's Aerodromes Inspectorate did not properly implement one of the duties which was required of it at its annual inspections of Luton Airport since 1978, that is, 'to see evidence that the licensee has made a full assessment of the operational requirements and that the necessary procedures and practices have been *introduced'.* *

It is certainly a sorry state of affairs that air travellers passing through a major airport such as Luton should have been put at unnecessary risk over a considerable period because of a dispute such as this. On safety grounds alone, the proper course of action should have been to downgrade the airport to Category 4, until the apparatus was operationally available. Following representations by the AIB after the accident, the CAA took corrective action requiring the operational introduction of breathing apparatus at Luton at the earliest possible opportunity.

While the airport management believed that the reference in CAP 168 to the operational availability of breathing apparatus did not have the effect of making it mandatory, and indeed the purpose of the latest revision to this document appears to have been to relegate the 'requirements' contained in it to the status of 'recommendations' for the benefit of those who were unable, for one reason or another, to comply with it; it should have been apparent that the topographical peculiarities of Luton airport required a full measure of fire and rescue equipment and, most particularly, of breathing apparatus.

The disturbing circumstances disclosed by this investigation highlight the way in which the relaxed wording introduced by the 1978 revision to CAP 168 – when it was downgraded to the status of a guidance document – may be used to allow reductions in aerodrome standards. It is considered that the postulation of 'recommended' criteria is, on its own, insufficient and that, in addition, minimum requirements should be clearly set out in the document, which should be backed by the necessary legislation. This matter was the subject of a safety recommendation in AIB Aircraft Accident Report No. 1/81 (HS 748 G–BEKF at Sumburgh Airport) which has not been implemented. Accordingly, it is again recommended that the content of CAP 168 be reviewed, in order specifically to upgrade the 'recommended criteria' contained therein to 'mandatory standards'.

* *AIB* italics

3. Conclusions

(a) Findings

(i) The commander was properly licensed and sufficiently experienced for the flight. The co-pilot was not suitably licensed, although he was well experienced. Both pilots were fit for the flight.

(ii) The aircraft had been properly maintained and a valid Certificate of Airworthiness was in force.

(iii) Examination of the aircraft revealed no evidence of a malfunction or unserviceability that would have contributed to this accident.

(iv) The relevant navigational aids, both ground based and in the aircraft, were serviceable.

(v) At the completion of a surveillance radar approach to runway 08 the commander descended below his self-determined decision height without having adequate visual contact with the runway or runway lighting.

(vi) In the circumstances the commander should have executed a missed approach procedure.

(vii) By the time that the commander had orientated himself with respect to the runway lighting and re-aligned the aircraft, the latter was in a position such that a landing could not be safely completed, and the aircraft overran the far end of the runway.

(viii) The fire and rescue services acted promptly and with initiative.

(ix) Because of an industrial dispute, breathing apparatus was not worn by the airport firemen with the result that their entry into the cabin was delayed and the search for survivors undertaken with difficulty.

(x) The CAA Aerodromes Inspectorate did not take the required action to downgrade the operational status of Luton Airport as a consequence of a deficiency in the ability to deploy safety equipment.

(b) Cause

The accident was caused by the commander's action in attempting a landing from a non-precision approach without sufficient visual reference.

4. Safety Recommendations

It is recommended that

4.1 The CAA introduce an approach ban applicable to private flights and similar to those which apply to public transport flights under certain conditions of adverse weather.

4.2 The CAA introduce recommended aerodrome operating minima for those categories of private aircraft to which they do not already apply.

4.3 The content of CAP 168, Licensing of Aerodromes, be reviewed with the purpose of upgrading the recommended criteria contained therein to the status of mandatory standards.

4.4 The feasibility of establishing an adequate RESA at the eastern end of runway 08 be re-examined by the licensing and airport authorities.

4.5 The research now being undertaken into the problems associated with aircraft interior fires be prosecuted with the utmost urgency, including that associated with the improvement of survival prospects in aircraft manufactured to earlier standards.

C C ALLEN
Inspector of Accidents
Accidents Investigation Branch
Department of Trade

October 1982

Produced in England by Her Majesty's Stationery Office, Reprographic Centre, Basildon
Bas 93849/R151 750 11/82 TP