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ADDENDA and CORRECTIONS

(ALL TIMES IN THIS BULLETIN ARE UTC)

SERIOUS INCIDENT

Aircraft Type and Registration:	BN2B-26 Islander, G-BPCA
No & Type of Engines:	2 Lycoming O-540-E4C5 piston engines
Year of Manufacture:	1986
Date & Time (UTC):	18 December 2010 at 1134 hrs
Location:	Kirkwall Airport, Orkney Islands, Scotland
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 1 Passengers - 3
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	52 years
Commander's Flying Experience:	7,711 hours (of which 4,860 were on type) Last 90 days - 109 hours Last 28 days - 28 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, the operator's incident report, and subsequent AAIB enquiries

Synopsis

The aircraft landed 20 m to the side of the runway pavement edge when, as the commander was about to flare the aircraft for landing, it was suddenly enveloped in a snow shower.

History of the flight

Kirkwall Aerodrome was closed for snow clearing operations. An agreement between the aircraft operator and the aerodrome authority provided for the aerodrome to be opened for their inter-island operations to land during snow-clearing periods. Although the agreement did not specify which runway should be used, it was common for the operator's Islander aircraft (which are suited to operations on short runways) to use the shorter runway, Runway 14/32, in these conditions, as this minimised the disruption to snow clearing on the main Runway 09/27. There were no instrument approaches to Runway 14/32, which had blue markers, 300 mm high, marking its edges. Runway 09/27 had ILS approaches, was lit, and had a lesser covering of snow than Runway 14/32.

The aircraft departed Papa Westray and flew at 700 ft amsl under visual flight rules towards its destination. En route, the commander assessed the visibility to be 10 km or more with isolated snow

showers either side of the aircraft's track, and a cloud base of around 1,800 ft. As the aircraft approached Kirkwall, ATC reported that the wind was light and easterly and visibility was 1,600 m in snow showers with cumulonimbus clouds. The commander enquired about the condition of Runway 14, and was informed that it was contaminated with between 7 and 10 mm of snow. This was within the operator's limits, and the commander continued a visual approach towards Runway 14. When the aircraft was on base leg, ATC reported that the IRVR[1] was now 900 m. The commander continued his approach towards the runway, which he could see delineated by snow banks on either side.

On final approach, about 350 m from the runway threshold, the commander observed a heavy snow shower on the southern aerodrome boundary, developing northwards towards him. He judged that he would land before it affected the runway, and continued the approach. When the aircraft was over the runway threshold, it was suddenly enveloped in another snow shower, with visibility assessed by the commander as less than 100 m.

Before the commander was able to react and initiate a go-around, the visibility improved again and he was able to see the aerodrome, albeit covered in a fresh fall of snow. The commander held the aircraft in the landing flare while he considered his options. Ahead of him was a "very black cloud, down to ground level". He was also aware of another aircraft holding above the aerodrome at 2,600 ft, the altitude to which he would climb if a go-around was necessary.

He considered that the risks inherent in going around included flying through snow and ice associated with the cumulonimbus cloud (the aircraft was not equipped with weather radar), the aircraft in the hold overhead, and diverting towards his alternate, where he would have to make an approach in similar weather conditions, but with minimum reserve fuel. Although he was aware that he had lost sight of the runway, he considered the only risk associated with landing on the aerodrome would be encountering deep snow; he was aware that the aerodrome surface was flat grass and he was very familiar with landing on rough grass runways.

The commander then saw tyre tracks in front of him, and concluded that these had been made by a vehicle carrying out a runway inspection on Runway 14. There were no hazards on the ground in front of the aircraft, and the commander completed the landing without incident. The aerodrome controller observed the landing, which was north-east of the runway and appeared "very controlled"; he called the aircraft and informed the commander that he had not, in fact, landed on the runway. The aircraft taxied normally to its parking position and was inspected by engineers who found nothing amiss. There was no damage to the aerodrome surface or facilities. An aerodrome inspection found that the aircraft had touched down approximately 20 m from the side of the runway pavement.

The pilot considered that it was possible that the wind had veered and gusted with the snow shower, and this had had the effect of drifting his aircraft from its track towards the runway, and over the grass. He remarked that the blue runway edge markers had been rendered invisible as their sides were covered with snow.

Analysis

The flight proceeded normally until the final moments of the approach when, as indicated by the commander's

Footnote

[1] Instrumented runway visual range. This IRVR was obtained from transmissometers on Runway 09/27 and is not strictly applicable to an aircraft making an approach to Runway 14.

statement, an isolated snow shower, which substancially reduced the visibility, suddenly began over the threshold and affected the aircraft. The commander assessed his options and their relative merits, and saw tracks that gave the impression the aircraft was over the runway.

The incident might have been avoided had the approach not been flown to the smaller of the aerodrome's two runways. The arrangement to land on the shorter runway provided an opportunity to minimise disruption to snow clearing operations, but could present pilots with the task of landing on a runway less clear of snow than the main runway, and which did not have the benefit of its ILS approaches or comprehensive lighting.

Following the incident, the operator suspended this arrangement, and agreed that the aerodrome would not be temporarily opened during snow clearance operations for the operator's aircraft to land. Instead, the parties would seek better co-ordination to enable operations to run to schedule without being affected by snow clearing operations. The operator also clarified its instructions to pilots regarding in-flight visibility requirements, requiring pilots inbound to Kirkwall to conduct instrument approaches if the reported visibility is less than 3,000 m.

INCIDENT

Aircraft Type and Registration:	Boeing 757-28A, G-TCBA
No & Type of Engines:	2 Rolls-Royce RB211-535E4-37 turbofan engines
Year of Manufacture:	1998
Date & Time (UTC):	12 June 2010 at 0045 hrs
Location:	Near London Gatwick Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 8 Passengers - 226
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	59 years
Commander's Flying Experience:	16,875 hours (of which 8,134 were on type) Last 90 days - 139 hours Last 28 days - 76 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft began to leak fuel from the left engine while it was cruising at FL360. The flight crew diagnosed the fuel leak and cross-fed fuel to the left wing to correct the imbalance but the fuel leak continued. The commander made a PAN call and the aircraft was cleared to make an approach to Runway 26L at Gatwick Airport with no speed or altitude constraints, following which the aircraft landed normally. Subsequent investigation by the operator's maintenance engineers traced the source of the fuel leak to a pipe coupling at the HP fuel pump on the left engine. Further detailed investigation into the fuel leak was not possible as the seals removed from the aircraft were discarded, rather than being retained as is required by the operator's engineering organisation's procedures.

History of the flight

The aircraft was on a flight from Milas-Bodrum Airport, Turkey, to London Gatwick Airport and was established in the cruise at FL360. Approximately 2 hours and 20 minutes into the flight and shortly after entering French airspace a FUEL CONFIG warning appeared on the EICAS display. The commander consulted the Quick Reference Handbook (QRH) and a lateral fuel imbalance of 800 kg was detected 'right wing heavy'. He then carried out the QRH drill to correct the imbalance, during which it was noted that when the 'fuel consumed' figure from FMC Progress Page 2 was added to the fuel remaining figure, a discrepancy of 800 kg was evident, leading the crew to conclude that fuel was leaking from the aircraft. Fuel flow indications remained equal for both engines.

The commander contacted Maintrol using the aircraft's high frequency link and the symptoms were described to the duty engineer, who considered it possible that they could be caused by water contamination in the fuel uplifted from Milas-Bodrum. Fuel balancing continued, but the discrepancy between fuel used and fuel on board continued to increase to 1,200 kg, confirming a probable fuel leak.

The commander considered diverting to Paris Charles de Gaulle Airport which at this point was approximately 40 nm west of the aircraft, but Runway 09 was in use which would have necessitated additional track miles. As the aircraft was nearing the top of descent for arrival into London Gatwick, where the arrival runway in use was Runway 26L, the commander elected to continue to London Gatwick. He made a PAN call to London ATC who cleared the aircraft for an immediate approach to Runway 26L with no speed or altitude constraints, following which the aircraft landed normally.

Approaching the end of the landing roll the commander shut down the left engine as a fire precaution and parked the aircraft on Runway 08L, to allow the Airfield Fire and Rescue Services (AFRS) to conduct an inspection of the aircraft, and the airfield was closed to all movements. The AFRS fire chief advised, via the commander, that the aircraft be prepared for passenger evacuation using the right-hand slides only, due to the considerable amount of fuel spilled on the runway, taxiway, left engine and brakes.

The commander shut down the right engine and the AFRS hosed the fuel spillage away. Total useable fuel on board at the time the right engine was shutdown was approximately 3,800 kg, which was approximately 478 kg less than the flight planned arrival fuel of 4,278 kg. The commander estimated that approximately 1,300 kg of fuel had leaked from left engine and that the smaller 478 kg discrepancy in the actual-versus-planned arrival fuel quantity was due to the expeditious routeing received resulting from the PAN call.

The aircraft was towed to a remote stand where the passengers were disembarked normally. Following passenger disembarkation the operator's maintenance engineer opened the left engine cowl, resulting in a further fuel spill and it was apparent that the left engine and cowling interior were saturated with fuel.

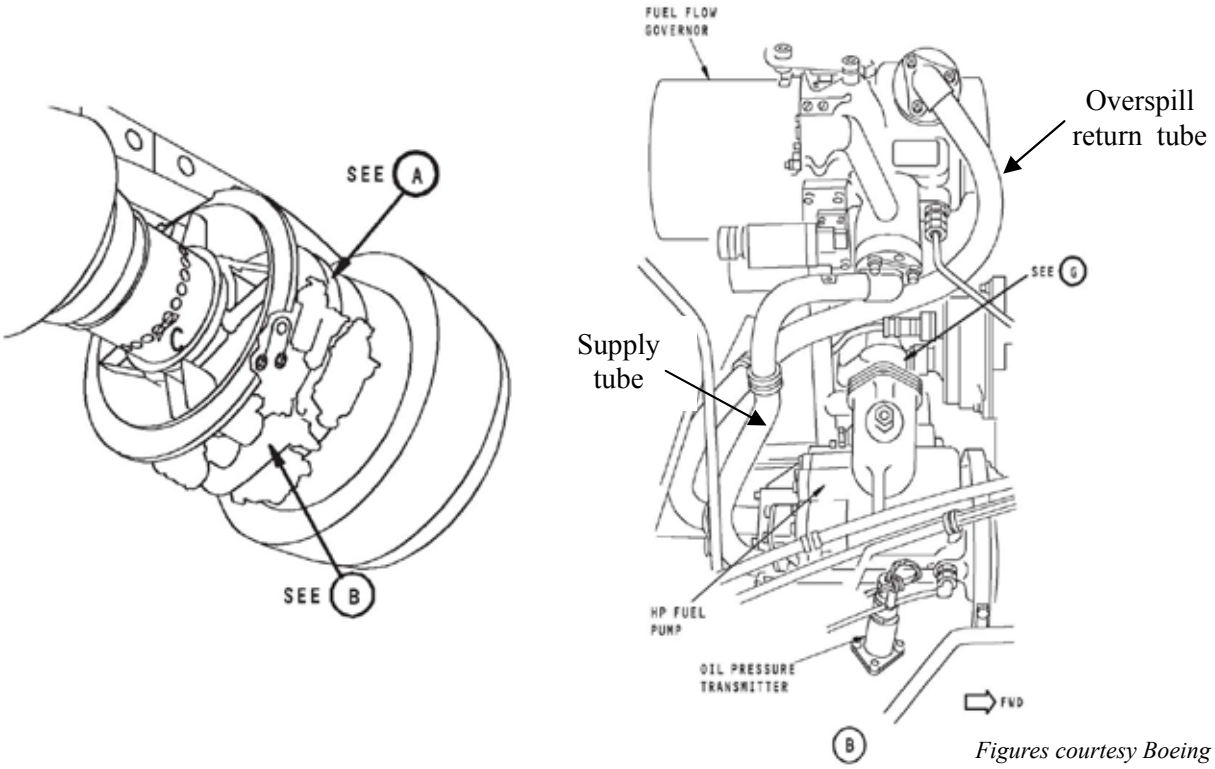
Source of the fuel leak

The operator's maintenance engineer traced the fuel leak to the seal ring between the HP fuel pump and the fuel flow governor (FFG) to HP fuel pump overspill return tube on the left-hand engine (shown in Figures 1 and 2). He therefore replaced this seal ring on both engines in accordance with the aircraft maintenance manual and a second maintenance engineer conducted a duplicate inspection, following which both engines were ground run at maximum static EPR to check for leaks. No fuel leaks were observed during this test and the aircraft was released to service.

The aircraft's maintenance records were reviewed and no record of maintenance activity on the fuel supply tube had been recorded or scheduled since the left engine had been installed, following overhaul, eight months previously in August 2009. Following installation the left engine had accumulated 2,839 flight hours and 812 flight cycles.

Retention of parts involved in occurrences

Following replacement of the HP fuel pump seal ring, the seal ring removed from the aircraft was discarded, preventing further investigation of this item's condition. The operator's engineering organisation is approved



Figures courtesy Boeing

Figure 1

Location of the HP fuel pump and FFG on the RB211-535E4 engine

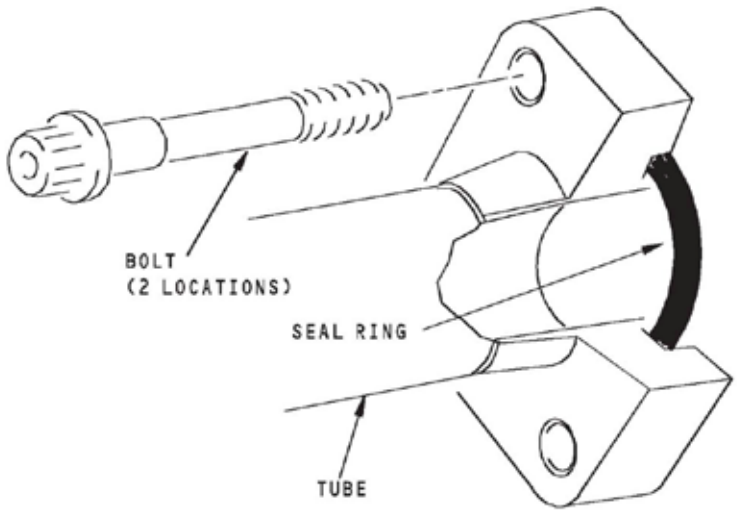


Figure courtesy Boeing

Figure 2

FFG fuel overspill return tube coupling at the HP fuel pump (post SB RB.211-73-B047)

by EASA under EASA Part 145 '*Maintenance Organisation Approval'* procedures. EASA regulation Part 145.A.60(a) states:

> *'The organisation shall report to the competent authority, the state of registry and the organisation responsible for the design of the aircraft or component any condition of the aircraft or component identified by the organisation that has resulted or may result in an unsafe condition that hazards seriously the flight safety.'*

In order to comply with this requirement the engineering organisation's Company Manual contains procedure 02-02-18 *'Reporting of Defects to the NAA/Operator/ Manufacturer'* which provides the following requirement to retain parts involved in occurrences that generate a Mandatory Occurrence Report (MOR) as required by Civil Aviation Publication (CAP) 382 – *'The Mandatory Occurrence Reporting Scheme'*:

> *'3.8 Retention of Parts Involved in Occurrences*
>
> *Any part that is the subject of an occurrence report or involved in or the cause of an incident is to be removed from the aircraft and prominently identified as the subject of an investigation. The part must then be returned to Stores and brought to the attention of Quality Assurance for decisions on further action on the part as the nature of the occurrence dictates.'*

Similar incidents

The CAA's MOR database was searched to identify any previous similar incidents involving leaks from the couplings between the HP fuel pump and the FFG supply and overspill fuel tubes on Rolls-Royce RB211-535E4 series engines. Following introduction of Service Bulletin (SB) RB.211-73-B047 in April 1996, which revised the fuel tube end adapters to feature a rigid two-bolt flanged joint and seal ring at the HP fuel pump coupling, only one occurrence of a fuel leak at this location was listed in the MOR database. However, information supplied by the engine manufacturer recorded 23 other events involving fuel loss from the HP fuel pump fuel tube couplings since January 2008. This statistic was gathered from the worldwide fleet of RB211-535E4 engines and included one precautionary diversion; all the other events were detected during ground checks.

Investigation undertaken by the engine manufacturer determined that the width of the seal ring groove in the fuel tube end adapter was insufficient to allow the seal ring to seat properly in the groove when the joint was compressed during torque tightening of the assembly. If the seal ring did not seat correctly, it was possible for it to become pinched at the corners of the groove. The action of vibration and fuel pressure fluctuations caused portions of the pinched seal ring to erode, resulting in a loss of sealing capability.

In response, the engine manufacturer introduced a further SB, RB.211-73-G230, in November 2009 that increased the width of the seal ring groove from 2.60 mm to 4.15 mm. No engines incorporating this SB have subsequently experienced fuel leaks at the HP fuel pump fuel tube couplings. The engine manufacturer comments that compliance guidance contained in this SB currently recommends embodiment of this modification when the engine is disassembled for refurbishment or overhaul. The modification is currently optional on-wing, when the parts require renewal or when the fuel tube connections are disturbed during maintenance.

Analysis

The source of the fuel leak was correctly identified by the operator's maintenance engineer as the coupling between the left engine HP fuel pump and the fuel overspill return tube from the FFG to the HP fuel pump, because following replacement of the seal ring at that location no further fuel leakage occurred.

No maintenance actions, either scheduled or unscheduled, had been performed on the fuel overspill return tube in the eight months preceding the incident. During this period the aircraft had accumulated 2,839 flight hours and 812 flight cycles without experiencing a similar fuel leak. Previous occurrences of fuel leaks at this location have been caused by trapping of the seal ring between the mating faces of the coupling, leading to erosion of the seal ring and eventual loss of sealing capability. The engine manufacturer introduced SB RB.211-73-G230 to address this problem, but this SB had not yet been embodied on this aircraft when the incident occurred.

As the seal ring removed from the aircraft was discarded following the incident, contrary to the operator's maintenance organisation's procedures, it has not been possible to identify positively the cause of the fuel leak. However, given the recorded history of fuel leaks due to trapping and subsequent erosion of the seal ring on engines without SB RB.211-73-G230 embodied, it is considered that this is the most likely mechanism that caused the fuel leak in this incident.

Safety action

Recent human factors analysis by the engine manufacturer indicates acceptable reliability when tubes are replaced during planned on-wing maintenance. Hence a revision to the Service Bulletin is planned, to recommend on-wing replacement during planned maintenance and during unplanned overhaul shop visits. Hence, it is expected that this modification will be fully implemented into the fleet by the end of 2013 and progress against this target will be monitored.

INCIDENT

Aircraft Type and Registration:	Fokker 100, D-AFKC
No & Type of Engines:	2 Rolls Royce Tay 650-15 turbofan engines
Year of Manufacture:	1996
Date & Time (UTC):	18 November 2010 at 1445 hrs
Location:	London Heathrow Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 4 Passengers - 35
Injuries:	Crew - None Passengers - None
Nature of Damage:	Small perforation of nosecone
Commander's Licence:	Not known
Commander's Age:	Not known
Commander's Flying Experience:	Not known
Information Source:	Ground handling company report

Synopsis

During pushback, the pushback tractor came into contact with the nosecone of the Fokker 100 (F100) aircraft, causing minor damage. The towbar used during the manoeuvre was not compatible with the aircraft type. The ground handling company investigated the incident and implemented measures to prevent recurrence, which included making three internal safety recommendations.

History of the flight

D-AFKC, a Fokker 100 (F100) aircraft, was due to embark on a commercial passenger flight from London Heathrow Terminal 1 to Stuttgart, Germany. The aircraft was on Stand 141 at Terminal 1. Due to the configuration of stands and the taxiway in the Kilo cul-de-sac, pushback from Stand 141 requires a pushback and then a pull forward onto a curved taxiway centre line to abeam Stand 233 prior to release.

Ground handling for the flight was contracted to a ground handling company. The pushback for the aircraft was allocated to a tractor driver and a headset operator. The driver reported that he selected for the manoeuvre what he believed was a F100 type towbar. He connected the towbar to the aircraft and the headset operator assisted connection of the opposite end of the towbar to the tractor. The tractor faced the aircraft so that driving the tractor forward reversed the aircraft. The tractor was operating in "4-wheel steer".

The driver manoeuvred the aircraft back into the taxiway, at a shallow angle and without incident, where

he halted the aircraft. He then towed the aircraft forward towards its release position, looking over his shoulder in the direction of travel during this manoeuvre. The ground handling company reported that this action is normal procedure.

The tow forward required a sharper angle of turn than the pushback and as the angle of turn increased, the separation between the right front corner of the tractor and the left side of the aircraft nose decreased. The headset operator reported that he noticed the closing proximity of the tractor and the aircraft and called to the driver to halt. The driver reported that he halted as quickly as he could. The tractor contacted the aircraft nosecone causing a 12 inch L-shaped indentation, which pierced the skin.

The aircraft was unloaded and passengers disembarked through the normal exits. The weather radar, which is housed in the nosecone, suffered a 1 cm dent to the radar disc. After electrical testing the radar was cleared. The nosecone was replaced and the aircraft flew the following day.

Ground handling company report

The Safety Training & Standards Manager of the ground handling company conducted an investigation into the incident. This safety investigation reported that contact between the tractor and the aircraft was caused by use of an Avro RJ-compatible towbar, which is 55 cm shorter than the F100 towbar. This accounted for the lack of clearance during the ground manoeuvre.

Figure 1

F100 towbar clearly marked
(photograph courtesy of ground handling company)

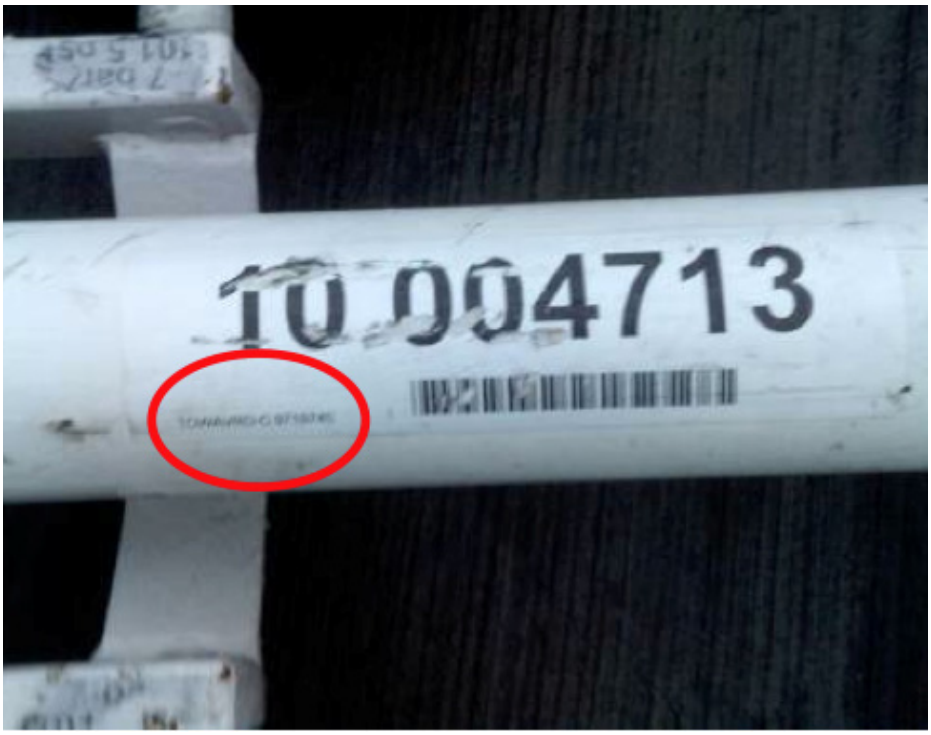


Figure 2

Avro RJ towbar markings circled
(photograph courtesy of ground handling company)

The safety investigation further reported that the F100 variant towbars were clearly marked (Figure 1) and that Avro RJ towbars:

> *'only had markings that were in very small letters on the side plate that formed part of the asset registration labelling'* (Figure 2).

The safety investigation reported that the size of the labelling on the Avro RJ towbar was a contributory factor in this incident and that the similarity in design of both towbars, together with the driver's recognition of the type of towbar he had previously used on Fokker 100 aircraft, was a further contributory factor.

Safety action

The ground handling company subsequently issued a Safety Alert to all staff. All unmarked towbars were taken out of service until they are clearly marked with the aircraft types with which they are compatible. This included all of the Avro RJ towbars.

The internal investigation report recommended that all future types of towbar are:

> *'clearly marked in bold letters showing the certified aircraft type.'*

For all in-service towbars it recommended monitoring and periodic checking for clear markings, and that the service check by the towbar maintenance provider be revised to include a check for clear markings.

ACCIDENT

Aircraft Type and Registration:	PA 31 Navajo, N80HF
No & Type of Engines:	2 Lycoming TIO-540-A2C piston engines
Year of Manufacture:	1971
Date & Time (UTC):	25 July 2010 at 1521 hrs
Location:	North Weald Aerodrome, Essex
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 4
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to propeller tips and severe damage to fuselage skin and frames
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	36 years
Commander's Flying Experience:	2,920 hours (of which 4 were on type) Last 90 days - 55 hours Last 28 days - 27 hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft was nearing its destination when both engines lost power as a result of fuel exhaustion. No fuel leak was found and it is considered that a combination of factors led to a higher fuel consumption than had been planned by the pilot.

History of the flight

The pilot arrived at Antwerp Airport at about 1300 hrs with the four passengers who had accompanied him on a one hour flight from North Weald the previous day. After completing the necessary customs and administrative requirements, he conducted a pre-flight check of the aircraft. This did not reveal any faults.

The pilot started the aircraft's engines at 1405 hrs and took off at 1415 hrs for the return flight to North Weald. The aircraft climbed, initially, to FL50 before descending to an altitude of 4,000 ft amsl for the transit across the English Channel. The aircraft then descended further, as it continued towards North Weald, reaching 2,500 ft amsl approximately 10 nm south-west of the airfield. The pilot contacted North Weald Radio and descended to 1,500 ft amsl.

The pilot stated that, with the aircraft at a range of about 5 nm from the airfield and the landing runway (Runway 20) in sight, he heard what he described as a "surging" noise. He looked at the engine instruments

and saw that the right propeller rpm and right engine manifold pressure indications were fluctuating. He quickly switched both the electric fuel pumps to ON and set both engine mixtures to FULL RICH. The indications kept fluctuating, so the pilot switched the right fuel selector to the outboard tank. The engine stabilised for a few seconds but then cut out. The pilot increased power on the left engine and feathered the right propeller before making a PAN call to North Weald, requesting a priority landing.

Shortly after the PAN call was made, the left engine began making a similar "surging" noise and the left propeller rpm and engine manifold pressure indications began fluctuating. The pilot kept the left inboard fuel tank selected and, after several seconds, the left engine ran down. The pilot feathered the left propeller, trimmed the aircraft for a glide speed of 120 kt and continued towards the runway. At this point the aircraft was at a range of between 1.5 and 2 nm from the airfield and at an altitude of about 1,000 ft amsl.

When the pilot considered that the aircraft would reach the runway, he tried lowering the landing gear using the normal gear lever but, as he expected, nothing happened. He stated that he did not try lowering the gear manually as he wanted to concentrate on flying the aircraft and reaching the airfield. The pilot decided to land on the asphalt surface of the runway, rather than the grass area alongside, and deliberately left the flaps up in order to achieve a level attitude for the touchdown. He positioned the aircraft over Runway 20 at a height of approximately 10 ft and a speed of about 90 kt, and set the mixture on both engines to FUEL CUT OFF. He then maintained the aircraft in a level attitude, allowing the speed to decrease and the aircraft to descend on to the runway surface. The aircraft decelerated rapidly and stopped in the middle of the 1,920 m long paved surface.

No one was injured, and the pilot and passengers were able to disembark, unaided, using the rear cabin door. The time that the aircraft touched down was recorded by the airfield as 1521 hrs.

Weather

The weather for both flights was good and there was no requirement to use the de-icing boots or pitot heat. The aircraft did not encounter any rain, either en route or overnight whilst parked. The pilot stated that he experienced about a 10 kt tailwind on his flight to Antwerp and about a 10kt headwind on the return flight.

Aircraft examination

Following the accident the aircraft was raised on jacks, the landing gear was extended and the aircraft was moved to a parking area to facilitate further examination. The fuselage belly exhibited extensive skin and fuselage frame damage, consistent with a landing on a hard runway with the landing gear retracted. Both propellers were in the feathered position and exhibited blade tip damage with no evidence of rotation during impact.

The fuel selectors were positioned to draw fuel from the left inboard fuel tank and the right outboard fuel tank. Both firewall emergency shutoff valves were open and the cross-feed valve was closed. The fuel tanks were individually drained in order to establish accurately the fuel remaining onboard the aircraft - see Table 1.

The aircraft fuel gauges registered empty for the left inboard fuel tank and ⅜ full for the left outboard fuel tank. The right wing gauge appeared to be inoperative as it did not move when the aircraft master switch was turned on, remaining in a position well below the E (empty) marking.

Fuel tank	Left wing, outboard	Left wing, inboard	Right wing, inboard	Right wing, outboard
Fuel recovered (USG)	4.8	0.1	0.9	0.1

Table 1

Fuel drained from the aircraft following the accident

No external evidence of fuel leakage was found on the aircraft skin or on the runway. The wing mounted fuel filters were dismantled and no contamination was observed on the filter screen elements.

The Hobbs meter reading when the aircraft was inspected after the accident was 1177.6. Paperwork provided by the pilot indicated that the Hobbs meter reading prior to the flight from North Weald was 1175.1. The Hobbs meter recorded engine running time on the right engine, regardless of the engine power set. The readings indicated that the right engine had run for a total of 2.5 hours since the aircraft was last refuelled. This was consistent with the combined flight times of 2.1 hours and 0.4 hours of ground running. The pilot reported that there had been no significant delay between starting and stopping both engines at the beginning and end of each flight. Therefore, the left engine had run for a similar length of time as the right engine.

Fuel onboard

The pilot refuelled the aircraft prior to its departure from North Weald. He had no means of determining the amount of fuel onboard, since there was no means of dipping the tanks and he believed that the gauges were not accurate[1]. Also, there was no aircraft technical log or other documented fuel record available to him. Therefore, the pilot considered that the only way he could be sure of the quantity of fuel onboard was to refuel the tanks until they were full. The pilot reported that, after refuelling, the fuel gauges indicated that each inboard tank was only between ⅔ and ¾ full, despite both he and the bowser operator confirming that the inboard tanks had been filled completely. The refuelling docket recorded 273 litres (72 USG) being delivered and fuel checks conducted by the pilot and the bowser operator did not reveal any fuel quality issues.

Although the pilot did not visually check the outboard fuel tanks, he stated that the fuel gauges indicated that both tanks were empty. He also stated that there were no indications of any fuel leaks during his external checks.

Prior to its departure from Antwerp the aircraft's fuel gauges indicated that each inboard fuel tank was approximately ⅓ to ½ full.

It was normal practice for pilots operating the aircraft to pay directly for fuel uplifted, with no procedure in place to receive compensation for fuel uplifted but not used.

Footnote

[1] The pilot stated that both fuel gauges appeared to be serviceable prior to each flight.

Engine management

The pilot stated that in the cruise on each of the two flights he had adjusted the mixture on both engines to achieve a peak EGT before then enriching each engine slightly. He reported setting 30 inches of manifold pressure and the propellers at 2,400 rpm, consistent with a power setting of approximately 70%, as determined from the Aircraft Flight Manual. He stated that this gave him an indicated fuel flow on each engine of 16-17 USG per hour, which is also consistent with a power setting of approximately 70%, as specified in the Aircraft Flight Manual.

The pilot reported achieving a cruise speed of about 170 kt, confirmed by radar recordings, which the Aircraft Flight Manual equates to a power setting of approximately 75%.

Documentation

The pilot completed a weight and balance chart for each flight. For the flight from North Weald he recorded the fuel on board as 670 lbs (112 USG). For the return flight from Antwerp he recorded 420 lbs (70 USG).

For his fuel calculations, the pilot relied on an Information Manual produced by the aircraft's manufacturer. This gave total cruise fuel consumption figures of 35.6 USG per hour at 75% power and 27.8 USG per hour at 65% power. The Information Manual also stated a climb power total fuel consumption figure of 56 USG per hour, with 39.5 inches of manifold pressure set and the propellers at 2,400 rpm. These fuel consumption figures assume that the engines are 'leaned' in accordance with the operating instructions contained in the Flight Manual. For cruising conditions, these instructions require the mixture to be leaned to peak EGT followed by further leaning of the mixture until a drop of at least 25°F EGT is observed.

No other fuel consumption figures were provided in either the Information Manual or the approved Flight Manual. However, both of these documents stated that:

> *'Performance for a specific airplane may vary from published figures depending on the equipment installed, the condition of engines, airplane and equipment, atmospheric conditions and piloting technique.'*

The Flight Manual contained no information regarding fuel consumption when the engines are running at idle. However, subsequent inquiries with the engine manufacturer indicate that this figure is approximately 1.5 USG per engine per hour.

The pilot's navigation log showed a planned flight time from North Weald to Antwerp of one hour, equivalent to a fuel consumption of 35.6 USG at 75% power. However, his weight and balance charts indicated that he calculated a fuel consumption for the first flight of 42 USG, taking into account additional fuel consumption for taxiing and higher power settings whilst climbing.

The return navigation log again showed a planned flight time of one hour. The planned fuel consumption was the same as for the outbound leg, giving a total fuel consumption for the two flights of 71.2 USG, at 75% power, or 84 USG using the pilot's figures, in which the additional factors for taxiing and climbing were included. The inboard fuel tanks held a total of 108 USG useable fuel, giving, for the greater rate of consumption, 24 USG of reserve fuel (equivalent to approximately 40 minutes flight time) for holding and diverting.

Pilots operating the aircraft were requested by the owner to complete a 'Flight Record Sheet' and to return this to him following each flight. This document recorded departure and destination aerodromes, flight times, oil consumed and technical defects. On receipt of a completed Flight Record Sheet the owner updated the airframe, engine and propeller logbooks. The Flight Record Sheet was then discarded. Copies of completed Flight Record Sheets were not kept in the aircraft and therefore no information relating to fuel consumption or technical defects from previous flights was available to pilots operating the aircraft.

CAA Safety Sense Leaflet 1e - *Good Airmanship*

Section 13 of this leaflet provides the following guidance on fuel planning:

> *'13 FUEL PLANNING*
>
> *a) Always plan to land by the time the tanks are down to the greater of ¼ tank or 45 minutes' cruise flight, but don't rely solely on gauge(s) which may be unreliable. Remember, headwinds may be stronger than forecast and frequent use of carb heat will reduce range.*
>
> *b) Understand the operation and limitations of the fuel system, gauges, pumps, mixture control, unusable fuel etc. and remember to lean the mixture if it is permitted.*
>
> *c) Don't assume you can achieve the Handbook/Manual fuel consumption. As a rule of thumb, due to service and wear, expect to use 20% more fuel than the 'book' figures.'*

Aircraft information

The Piper PA-31-310 Navajo is powered by two Textron Lycoming TIO-540-A2C piston engines, each rated at 310 hp. There are two pilot seats and cabin seating for five passengers. The airframe has retractable landing gear and electrically-driven trailing edge flaps. The flight controls are conventional and manually operated.

Aircraft fuel system

Fuel is stored in four flexible fuel cells (tanks), two in each wing. A diagram of the fuel system is shown in Figure 1. The two inboard tanks each have a capacity of 56 USG, of which 54 USG is useable. The outboard tanks each hold 40 USG, of which 39 USG is useable. Each fuel tank has a drain valve and a filler cap. The capacity of the inboard fuel tanks was checked after the accident and found to conform to the stated capacity.

The fuel system consists of two independent systems that allow each engine to be fed by its own fuel supply. During normal operation each engine should be supplied with fuel from its respective fuel system. However, fuel can be cross-fed, when necessary, via a cross-feed valve to feed both engines from one set of fuel tanks.

Fuel is drawn from each tank, through a screen located in the tank outlet fitting and on to the fuel tank selector valve. From the fuel tank selector valve it passes through the fuel filter, the electrically driven fuel pump and the firewall emergency shutoff valve to the engine-driven pump.

The fuel valves are operated through controls located on a panel between the pilots' seats. Included on this panel are the controls for the fuel tank selector valves,

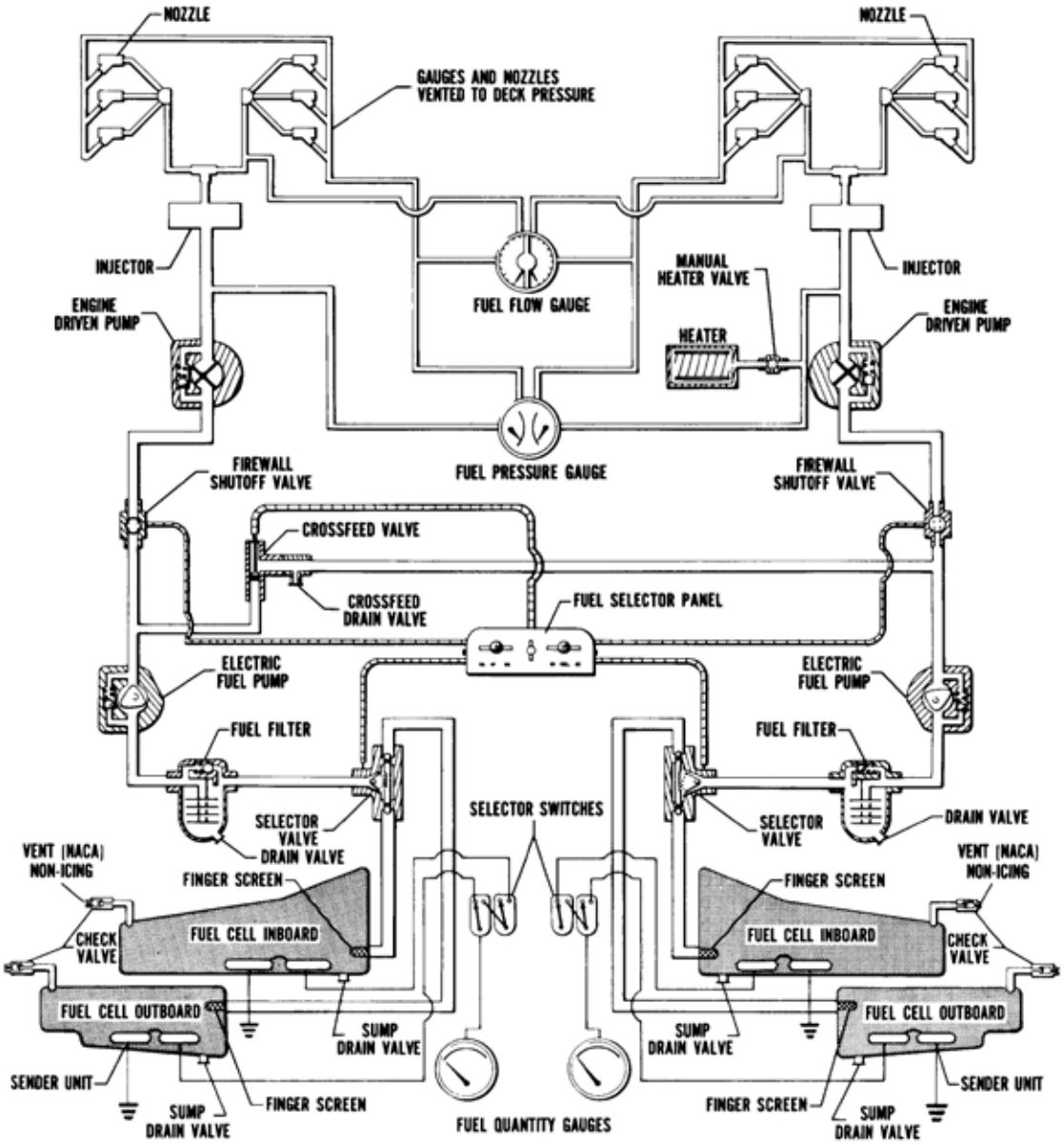


Figure 1

PA-31-310 Fuel System Schematic

the firewall shutoff valves and the cross-feed valve. Fuel boost pump controls are located on the right side of the overhead panel next to the fuel gauges.

The outboard fuel tanks should only be used in level flight. Takeoff, climb, descent and landing should be carried out using fuel from the inboard fuel tanks.

Fuel gauging

Two fuel gauges are mounted on the cockpit overhead panel, one each for the left and right fuel tanks respectively. Each gauge has markings for E (empty), ¼, ½, ¾ and F (full). The gauges indicate the contents of the respective inboard or outboard tank, depending on which is in use.

Aircraft maintenance

An annual inspection had been performed on 3 November 2009, by an FAA approved aircraft maintenance technician, when the aircraft had flown 2,850.9 hours. No fuel system-related defects had been reported to the maintenance technician since this annual inspection and, at the time of the accident, the aircraft had flown 2,866.5 hours.

Analysis

The pilot based his fuel calculations on the information available to him. He believed that the aircraft would consume 42 USG on each of the two flights, in still air, and that the fuel tanks contained 108 USG of usable fuel. This would have left a figure of about 24 USG unaccounted for, equivalent to about 40 minutes flight time. Under the prevailing conditions this should still have proved adequate. However, the aircraft ran out of fuel after a combined flight time, since refuelling, of about 2 hours 6 minutes. In the absence of any known fuel leaks it must therefore be considered that either the aircraft had less fuel on board than was thought or that the fuel consumption rate was higher than calculated.

Fuel on board

Both the pilot and refueller stated independently that both main tanks had been filled completely, which, as confirmed by testing, would have given about 112 USG fuel in the inboard fuel tanks.

The arrangement put in place by the owners of the aircraft did not allow members of the club to be compensated for fuel that they had uplifted and paid for, but not used. Therefore, it would be in a pilot's interest to uplift only the amount of fuel required, although there is no evidence of this having occurred in this case.

Whilst the exact fuel load could not be determined, the refuelling receipt indicates that at least 72 USG was onboard.

As with many light aircraft of an older design, the fuel gauges appeared to be of little benefit to the pilot in accurately monitoring the amount of fuel onboard. In addition, it is unclear at what point the right wing gauge became inoperative. Without the ability to dip the tanks, filling the tanks completely was the only method available to the pilot to be sure of the amount of fuel being carried.

Fuel consumption

Information provided by the aircraft manufacturer on fuel consumption in the Flight Manual was limited to three power settings; 65% and 75% rated power, and climb power. The fuel consumption figures stated assume that the engines are leaned in accordance with the operating instructions contained in the Flight Manual. The pilot's stated engine-leaning technique of leaning to peak EGT followed by enriching each engine slightly would have caused the fuel consumption to be greater than the Flight Manual figures, but to what extent is unknown.

Fuel consumption can also be affected by:

> *'the equipment installed, the condition of engines, airplane and equipment, atmospheric conditions and piloting technique'*

as stated in the aircraft Flight Manual. Whilst the investigation did not extend to estimating the performance degradation due to the aircraft's age (39 years) and the condition of its engines, it is likely that the fuel consumption figures for the aircraft were in excess of the Flight Manual figures.

The CAA suggested figure of 20% would have allowed for such degradation, but was not applied. Whilst this would have increased the planned fuel consumption rate at 75% power from 35.6 USG/hr to 42.7 USG/hr the stated fuel flow indicated during the flight was consistent with the actual planned figure used.

Summary

It was not possible to determine a single cause for the fuel exhaustion. It is considered that it resulted from a combination of factors which increased fuel consumption in excess of the Flight Manual figures. The possibility that the aircraft departed without the assumed fuel quantity of 112 USG onboard could not be discounted.

ACCIDENT

Aircraft Type and Registration:	Jabiru J160, G-CFGH
No & Type of Engines:	1 Jabiru Aircraft PTY 2200A piston engine
Year of Manufacture:	2008
Date & Time (UTC):	30 September 2010 at 1535 hrs
Location:	Ludham Airfield, Catfield, Norfolk
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Minor) Passengers - 1 (Minor)
Nature of Damage:	Wing strut, nosewheel, nose leg
Commander's Licence:	Private Pilot's Licence
Commander's Age:	52 years
Commander's Flying Experience:	1,056 hours (of which 43 were on type) Last 90 days - 56 hours Last 28 days - 13 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional AAIB inquiries

Synopsis

Following an uneventful flight, the aircraft touched down and veered to the left; the pilot was unable to correct this as it was apparent that the rudder had jammed. The aircraft departed the runway and flipped over onto its back; both occupants suffered minor injuries The rudder jam was subsequently confirmed and was similar to other incidents involving Jabiru aircraft.

Circumstances of the accident

The aircraft was on its second flight of the day, with no earlier problems having been experienced. After a normal touchdown on the main landing gear on Runway 27 at Ludham, the speed decayed, allowing the nosewheel to contact the runway surface. The aircraft then veered to the left, which the pilot attempted to correct by applying right rudder. However, the rudder pedals, which on this type of aircraft are connected to the nosewheel, had become jammed so the pilot was unable to prevent the aircraft from departing the left side of the runway. The nosewheel encountered soft ground, with the result that it dug in, causing the aircraft to flip over onto its back. Both occupants, who had sustained cuts and bruises, exited the aircraft via the doors.

Subsequent examination of the aircraft

This aircraft, in common with all UK 'homebuilt' Jabiru aircraft, falls under the auspices of the Light Aircraft Association (LAA). Following the accident the pilot concluded that a rudder jam had been responsible for his inability to move the pedals. This view was confirmed by LAA engineers who subsequently inspected the aircraft. It was apparent that the jam had occurred as a result of insufficient clearance between the leading edge of the rudder and the trailing edge of the fin. This was the same cause that has been responsible for a number of previous incidents involving Jabiru control surfaces becoming jammed, resulting in the LAA conducting an extensive investigation. The first of these occurred early in 2008 and involved a jammed aileron that nearly resulted in the loss of the aircraft. Summaries of these incidents can be found in the '*Safety Spot*' section of the LAA magazine '*Light Aviation*', specifically in the March 2008, August 2010 and November 2010 issues. The last mentioned contains details of the accident to G-CFGH.

Figure 1 shows a generic control surface and how hinge deflection can result in a jammed condition. In this example it can be seen that a lack of clearance will result in rubbing, with a jam occurring when the surface moves to the point where there is no longer any overlap.

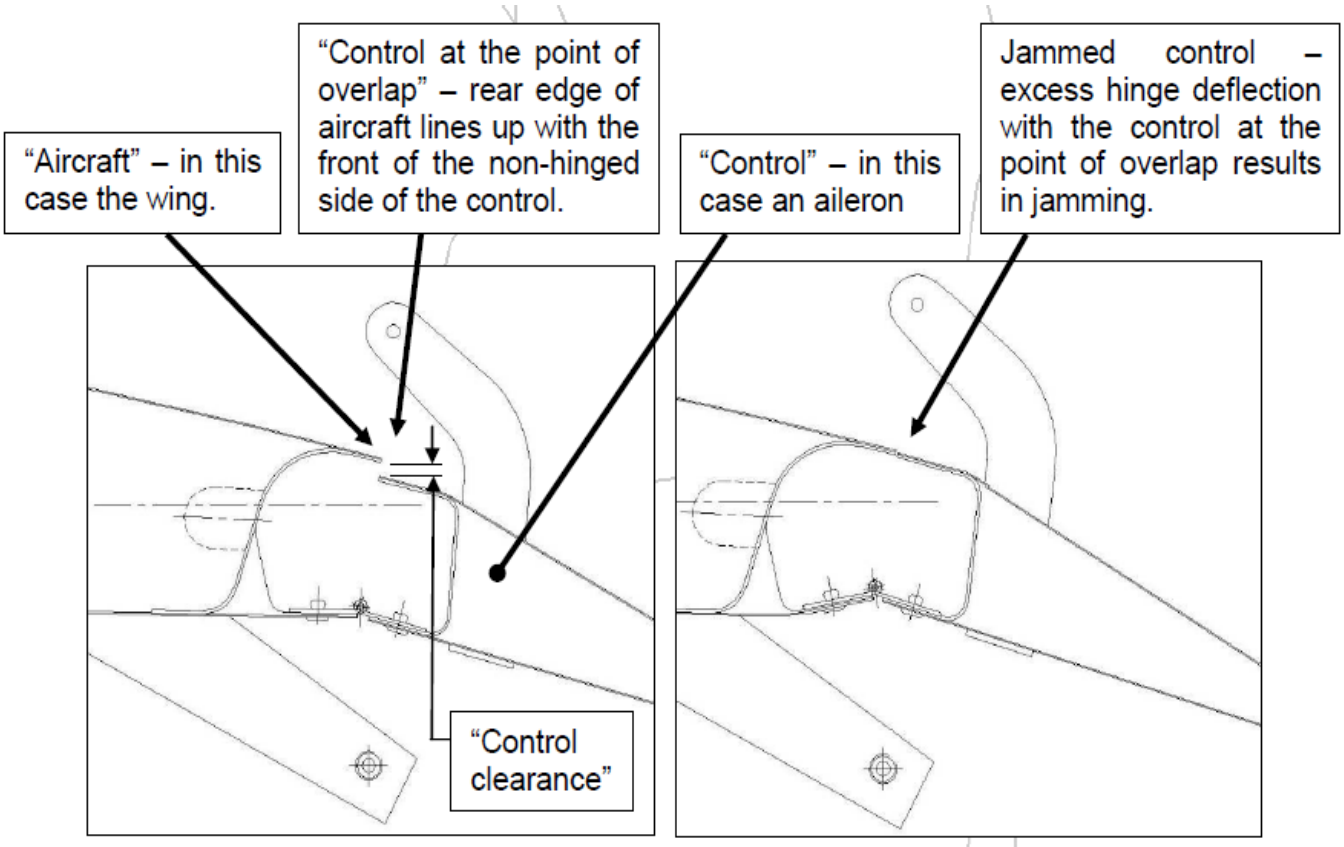


Figure 1

Illustration of a normal and jammed control, taken from JSB 019-2

As a result of the first incident, the LAA issued an Airworthiness Information Leaflet (AIL) MOD/346/001, requiring checks against a Service Letter STSL-004, and applicable to all Jabiru J-Series models, issued on 13 February 2008 by the then UK agents. This was followed, on 29 February 2008, by a manufacturer's Service Bulletin, JSB 019-1, which called for a one-time inspection to check for adequate control surface clearances. The information contained in this SB was considerably more detailed than in STSL-004.

Following the next incident, in July 2010, in which the rudder jammed in flight, the LAA reviewed their advice and re-issued the AILs, this time recommending that checks be conducted against JSB 019-1.

G-CFGH had been checked against JSB 019-1 and was deemed to be compliant. However, the LAA's post-accident examination of the aircraft revealed that the clearance between rudder leading edge and the fin trailing edge was less than the 3 mm specified in the SB. Furthermore, it was apparent that any structural distortions arising from inertial and aerodynamic loads could act to close the gap (refer to Figure 1). Additional vulnerability could arise from there being a number of different control surface designs across the Jabiru range, and differences can occur between aircraft of the same type. There are two basic design configurations; one is where the shrouds of the moving control surface overlap throughout the full range of movement, whilst the other involves less overlap so that, after a small amount of deflection, the control surface emerges from the trailing edge slot. Also, the fact that most of these are home-built aircraft means that no two examples are likely to be exactly alike.

The LAA wrote a letter, dated 10 November, to all Jabiru owners, re-explaining the reasons for the SB checks. It was additionally asked by the manufacturer to contribute suggestions to the content of a revised SB. These were all accommodated, with the result that the manufacturer subsequently issued JSB 019-2 on 24 November 2010, noting to the LAA that the revision was in response to problems that had occurred only in the United Kingdom. A significant addition in the revised version is a check in which each control is moved through its range of travel whilst pushing against the hinge, with a force of 5-7 kg, in a direction that reduces the control clearance. Any evidence of rubbing would require rectification work before the next flight.

The Australian Civil Aviation Safety Authority issued an Airworthiness Directive on 29 November 2010, which mandated JSB 019-2. The mandate was promulgated in the UK by an Emergency Mandatory Permit Directive issued by the Civil Aviation Authority on 23 December 2010; along with the SBs, it is applicable to all Jabiru aircraft, including factory-built machines. Finally, the LAA stated that they will re-issue their AIL in order to accommodate the changed requirements of JSB 019-2.

ACCIDENT

Aircraft Type and Registration:	Piper PA-28-140 Cherokee, G-BXPL
No & Type of Engines:	1 Lycoming O-320-E2A piston engine
Year of Manufacture:	1968
Date & Time (UTC):	10 December 2010 at 1520 hrs
Location:	1.5 miles south-east of Wellesbourne Mountford Airfield, Warwickshire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Extensive
Commander's Licence:	Student Pilot
Commander's Age:	50 years
Commander's Flying Experience:	12 hours (of which 12 were on type) Last 90 days - 7 hours Last 28 days - 1 hour
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

Whilst practising solo circuits, a student pilot experienced a loss in engine power. He attempted a forced landing, but the aircraft touched down at the far end of the field and collided with a boundary hedge, before coming to rest on a road.

History of the flight

The student pilot had flown a number of practice solo circuits without incident. The weather was fine, with a 10 kt breeze from the west, an air temperature of 7°C and a cloud base of 2,500 ft. During climb-out on the final circuit, the pilot noted that the engine noise changed subtly as the aircraft passed through 500 ft agl. The pilot continued the circuit, climbing to 1,000 ft agl and turning onto the crosswind leg, before levelling the aircraft and throttling back the engine. Immediately the engine lost power and the rpm dropped to 1,200. The pilot applied carburettor heat and switched fuel tanks. Although the engine responded to throttle position, the changes were small and no significant increase in power was evident. The pilot selected a field to the north-east of his position (Figure 1) and attempted a forced landing. However, the aircraft touched down at the far end of the field, hitting the boundary hedge at over 20 kt and came to rest on the road behind. The landing caused extensive damage to the aircraft and the hedge, but the pilot was uninjured and exited the aircraft without assistance through the door. Traffic using the road was brought safely to a halt without collision.

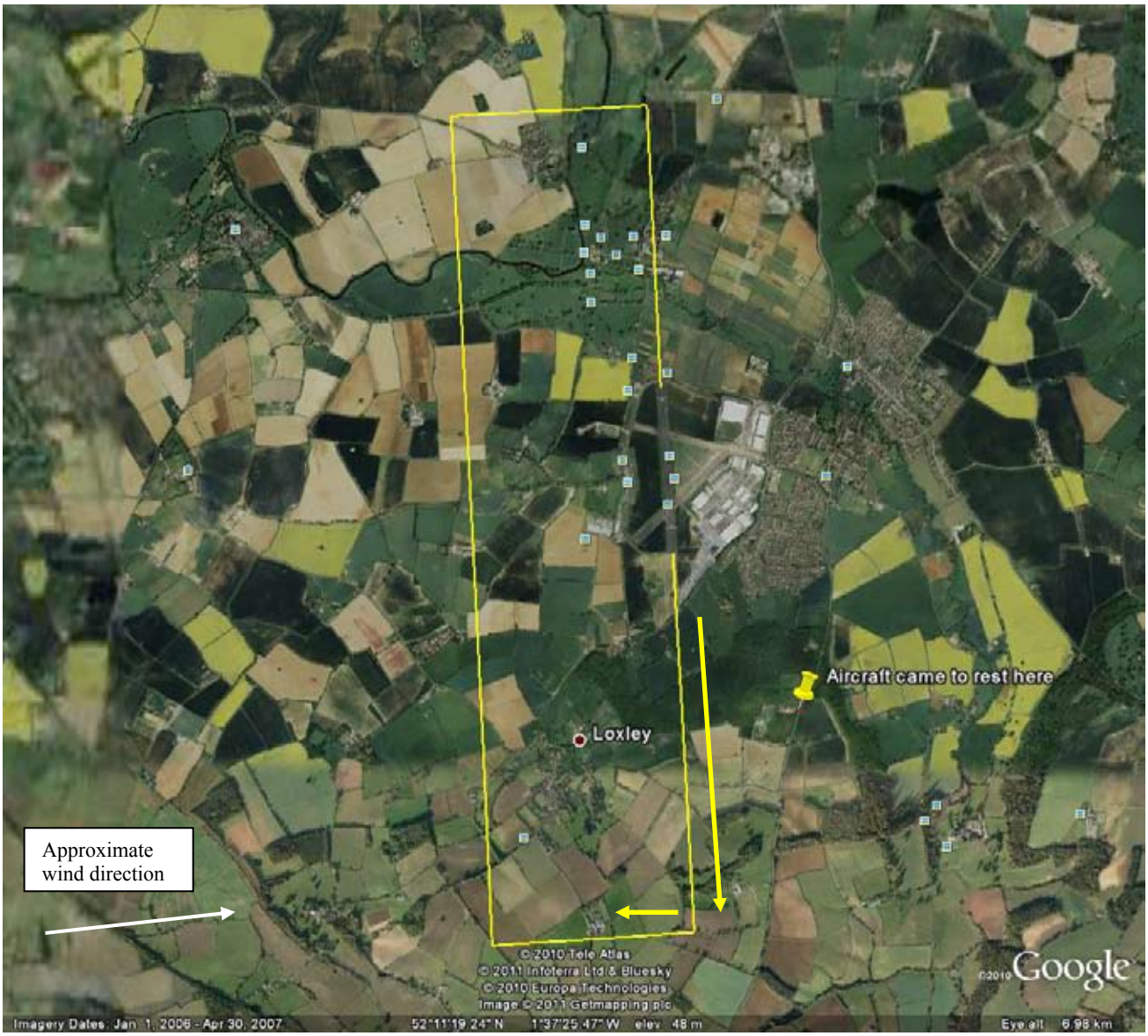


Figure 1

Circuit plan and accident site

Evidence

The flying school's maintenance provider briefly inspected the aircraft following recovery. They confirmed that the engine controls were still connected and that there was no obvious pre-impact damage to the engine. However, no further investigation work was completed on the aircraft prior to its disposal. The pilot submitted a receipt for fuel purchased immediately prior to the flight, the quantity of which should have been sufficient for the length of the flight undertaken. He also confirmed switching the tank in use following the drop in rpm. The rescue services reported significant fuel leaks following the accident indicating that fuel was still present.

Analysis

The source of the engine problem could not be confirmed given the limited examination of the aircraft.

However, the pilot reported that the engine was still running at low power and had some limited response to throttle movement. A partial restriction in either the air intake, fuel system or the carburettor could result in these symptoms. The air temperature was conducive to serious carburettor icing at any engine power. The length of the flight with normal engine response and the possible early indications during the climb-out, also support carburettor icing as a possible cause.

The UK CAA provides guidance in the form of General Aviation Safety Information Leaflets (GASIL) and Safety Sense Leaflets on the subjects of piston engine icing and forced landings. A recent AAIB investigation report (AAIB Bulletin 2/2011, G-ARHN EW/C2010/09/02) also highlights information issued by the New Zealand CAA on the subject of planning for and conducting forced landings.

ACCIDENT

Aircraft Type and Registration:	Piper PA-28-181 Cherokee Archer II, G-BTAM
No & Type of Engines:	1 Lycoming O-360-A4M piston engine
Year of Manufacture:	1988
Date & Time (UTC):	24 August 2010 at 0615 hrs
Location:	Isle of Man (Ronaldsway) Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Aileron control rod failure
Commander's Licence:	Private Pilot's Licence
Commander's Age:	50 years
Commander's Flying Experience:	3,538 hours (of which 2,500 were on type) Last 90 days - 101 hours Last 28 days - 34 hours
Information Source:	AAIB Field Investigation

Synopsis

Shortly after departure the pilot noticed a loss of aileron control and made an uneventful diversion and landing using the rudder to control bank and heading. The eye end on the right aileron control rod had failed at the aileron due to reverse bending fatigue. This was caused by the bearing in the eye end having seized, due to corrosion and an absence of lubrication.

History of the flight

Shortly after departing from a private strip near Douglas on the Isle of Man, the pilot noticed a loss of aileron control. He was heading towards Isle of Man (Ronaldsway) Airport at the time so he made contact via radio and requested an emergency diversion. The pilot controlled the aircraft's bank angle and heading using the rudder and made an uneventful landing on Runway 26.

Aileron control rod examination

Each aileron on the Piper PA-28-181 is operated by the control wheels through a series of cables and pulleys which connect to a bellcrank in the outer wing. A control rod connects this bellcrank to the aileron, with an eye end at the bellcrank and one at the aileron attachment (Figure 1). After G-BTAM landed it was discovered that the right aileron control rod had failed at the threaded shank of the eye end at the connection to the aileron (Figures 1 and 2). Metallurgical examination revealed that the threaded shank of the eye end had failed in bending due to fatigue and that the ball inside the

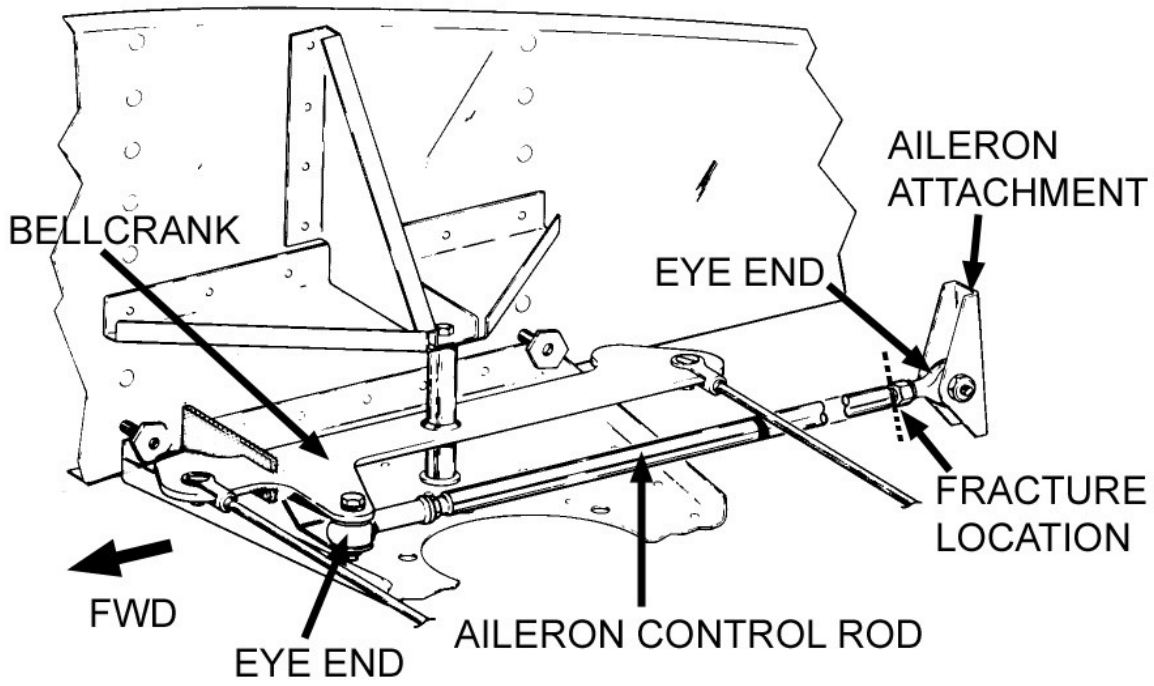


Figure 1

Location of aileron control rod and fractured eye end

Figure 2

G-BTAM right aileron control rod eye end with fractured threaded shank

plain bearing of the eye end was seized. There was no evidence of lubricating oil inside the bearing and there was evidence of corrosion build-up between the ball and the race of the bearing. There was also evidence of corrosion and corrosion pitting on the external surfaces of the eye end.

Maintenance history

The aircraft maintenance manual requires that the aileron control rod eye end bearing is lubricated every 100 hours with a MIL-L-7870 standard oil, which lubricates and provides protection against corrosion. The aircraft's last annual inspection was completed on 18 February 2010 at 3,488 airframe hours, when the rod end was reportedly lubricated. The pilot had subsequently carried out a 50-hour maintenance check on 11 June 2010, at 3,536 airframe hours, but had not lubricated the aileron control rod eye ends. The airframe hours at the time of the eye end failure were 3,586 hours – 2 hours short of when the next 50-hour check and the 100-hour lubricating check would have been required.

The aircraft was based at a private strip near Mount Rule Field, Douglas, on the Isle of Man, about 3 miles from the sea. The aircraft was not hangared, so it would have been regularly exposed to wind containing salt particles from the sea. The Federal Aviation Administration's (FAA's) Advisory Circular (AC 43 4A) entitled '*Corrosion Control for Aircraft*' includes maps of the world showing the degree of corrosion severity by area, ranging from '*mild'* and '*moderate'* to '*severe'*. These maps show that in the UK the corrosion severity is '*severe'* in all locations that are about 50 miles or less from the sea. The Advisory Circular recommends:

> *'thorough cleaning, inspection, lubrication, and preservation at prescribed intervals'*

and in this document the suggested interval for aircraft based in '*severe'* corrosion zones is 15 days.

Unrelated to this incident, the aircraft manufacturer is planning an amendment to Chapter 5-30-00 of the PA-28-181 aircraft maintenance manual, which will introduce specific maintenance requirements for aircraft operating in high salt or high humidity environments.

Research on previous aileron control rod failures

The AAIB's accident database was searched for previous occurrences of Piper PA28 aileron control rod failures and none was found. The aircraft manufacturer's safety department was contacted and they were not aware of any previous occurrences of aileron control rod failures on PA28s. The manufacturer's search of the FAA's 'Service Difficulty Reports' database revealed that since 1995 there have been 79 reports of problems relating to ailerons on PA28s but none of these involved seized or separated control rod end bearings.

Analysis

The aileron control rod end had failed as a result of reverse bending fatigue and this fatigue failure was probably a consequence of the bearing seizure in the eye end. Once the ball in the eye end had seized, any further movement of the aileron would only have been possible due to slippage of the bolt relative to the eye end. However, the eye end would not have rotated freely around the bolt so this would have introduced bending loads on the threaded shank. It was these repetitive bending loads which probably resulted in the rod end failing. Thus, the bearing had seized due to corrosion and an absence of lubricating oil and this corrosion was probably exacerbated by the aircraft being parked outside in an environment close to the sea with a '*severe'* corrosion risk. The pilot/owner candidly admitted that he should have inspected and lubricated the rod end bearing more frequently, given its operating environment.

ACCIDENT

Aircraft Type and Registration:	Pitts S-1S Special, G-REAP
No & Type of Engines:	1 Lycoming O-360-A4A piston engine
Year of Manufacture:	1991
Date & Time (UTC):	13 November 2010 at 1510 hrs
Location:	Netherthorpe Airfield, Nottinghamshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Propeller, left landing gear, tailplane, wing, fuselage
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	74 years
Commander's Flying Experience:	598 hours (of which 271 were on type) Last 90 days - 5 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot was on a local non-aerobatic flight to maintain currency. The weather conditions were fine and, having flown for a longer time than originally planned, the sun was setting as he began his approach to Runway 24. To the south of Runway 24 there is a barbed wire fence which separates the airfield from a narrow road. On the far side of the road there is another fence bordering fields.

Having assessed that he was too high, the pilot reduced power and commenced a sideslip to the left to increase the rate of descent. He stated that, during the final stages of the approach he became temporarily blinded by the low sun which was directly over the end of the runway. Despite wearing sunglasses he was unable to read his ASI and he also lost external visual references. The pilot stated that he maintained the sideslip approach.

The aircraft touched down short of the runway, the tail striking the top of the fence adjacent to the fields. The nose impacted the barbed wire boundary fence and the aircraft came to rest. The pilot was wearing a full harness and helmet and escaped uninjured.

ACCIDENT

Aircraft Type and Registration:	Reims Cessna FRA150L Aerobat, G-BCKV
No & Type of Engines:	1 Continental Motors Corp O-240-A piston engine
Year of Manufacture:	1974
Date & Time (UTC):	20 January 2011 at 1555 hrs
Location:	Netherthorpe Airfield, Yorkshire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to propeller, nose landing gear, cowling and leading edge of one wing
Commander's Licence:	Student
Commander's Age:	50 years
Commander's Flying Experience:	34 hours (of which 34 were on type) Last 90 days - 17 hours Last 28 days - 7 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The student pilot had previously completed eight hours of solo flying, including circuits. He had been flying in the local area for 30 minutes, before returning to Netherthorpe where the weather conditions were good, with light winds and CAVOK. After turning on to final approach, at a height of about 500 ft, the student realised that the sun was ahead of him and low on the horizon. This created a blinding effect for the student, who was not wearing sunglasses, and the aircraft sun-visor was not effective in reducing the glare. He elected to continue the approach with impaired visibility and thought he would land about half way along the 553 m grass Runway 24. However, his touchdown point was towards the end of the runway and, despite the application of maximum braking, the aircraft overran the runway and struck a hedge. The student was uninjured and there was no fire.

The student's instructor commented that the student had been trained to go-around in such circumstances and that additional training and confidence building in going around had been conducted following the accident.

ACCIDENT

Aircraft Type and Registration:	Robinson R44 Raven II, G-ODHB
No & Type of Engines:	1 Lycoming IO-540-AE1A5 piston engine
Year of Manufacture:	2005
Date & Time (UTC):	5 December 2010 at 1230 hrs
Location:	Staverton Airfield, Gloucestershire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to tailskid tube and left aft landing gear fairing
Commander's Licence:	Student
Commander's Age:	63 years
Commander's Flying Experience:	78 hours (of which 78 were on type) Last 90 days - 11 hours Last 28 days - 6 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The student pilot reported that whilst hover taxiing, the right hand forward entry door opened. He instinctively looked towards the door and tried to grab it by momentarily removing his hand from the cyclic control. By the time he had replaced his hand on the controls and looked forward again, the helicopter was in an unusual attitude and he was unable to prevent it from contacting the ground heavily. The helicopter operator later inspected the door latch mechanism and was unable to fault its operation.

ACCIDENT

Aircraft Type and Registration:	EV-97 TeamEurostar UK, G-CDOA
No & Type of Engines:	1 Rotax 912-UL piston engine
Year of Manufacture:	2005
Date & Time (UTC):	12 December 2010 at 0939 hrs
Location:	City Airport (Manchester Barton), Manchester
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to fuselage, both wings, engine frame and propeller, hangar door and a parked, empty microlight
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	49 years
Commander's Flying Experience:	170 hours (of which 1 was on type) Last 90 days - 40 hours Last 28 days - 9 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot was using the checklist to start an aircraft, with which he was not familiar and that was parked outside open hangar doors. When the checklist required the throttle to be fully closed the pilot moved it fully forward, in the mistaken belief that this was the throttle closed position. At the appropriate point in the checklist the pilot pressed the starter-button, the engine started and immediately went to full power. The aircraft lurched forward, the pilot depressed the toe brakes and it turned sharply to the left. The pilot looked for the magnetos, to switch off the engine, but before he could get to them the aircraft's right wing struck one of the hangar doors. The aircraft rotated around the door, the left wing struck another aircraft parked inside the hangar and the engine stopped. The pilot, who was shaken but unhurt, switched off the magnetos and battery and vacated the aircraft normally. There was no fire.

The pilot concluded that the accident resulted from his rush to start the engine in cold weather conditions. He considered he should have taken more time to familiarise himself with the controls before he started the engine.

ACCIDENT

Aircraft Type and Registration:	Pegasus XL-Q, G-MTYS
No & Type of Engines:	1 Rotax 462 piston engine
Year of Manufacture:	1988
Date & Time (UTC):	4 October 2010 at 1530 hrs
Location:	Park Farm strip, Caerleon, near Newport, Wales
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Serious) Passengers - N/A
Nature of Damage:	Wing, propeller and trike extensively damaged
Commander's Licence:	None
Commander's Age:	68 years
Commander's Flying Experience:	22 hours (of which 22 were on type) Last 90 days - 0 hours Last 28 days - 0 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

The unlicensed pilot was seriously injured when the aircraft landed heavily in a crosswind. He had been conducting full throttle taxi tests and allowed the aircraft to become airborne to avoid departing the edge of the farm strip and entering a ploughed field.

History of the flight

At the time of the accident the pilot had completed a limited amount of flying training in a flex-wing microlight but did not possess a pilot's licence. His most recent instructional flight was in August 2000.

The pilot stated that he planned to conduct "full throttle" taxi tests to check that the engine was delivering "smooth and full power" in preparation for renewal of the aircraft's permit to fly. The airstrip at Park Farm has one grass runway orientated approximately south-west to north-east and is surrounded by a ploughed field. While rigging the aircraft he estimated the wind to be southerly to south-easterly at approximately 5 kt.

During the first run, which commenced at the beginning of the north-easterly runway, the pilot used "part throttle" with the control bar fully back, inducing a nose-down input to avoid taking off. On the return run, along the south-westerly runway, the pilot applied full power. Approximately halfway along the runway the aircraft began to drift uncontrollably to the left edge of the strip beside the ploughed field. At a speed of approximately 40-45 mph the pilot considered that the aircraft was

travelling too quickly to correct the situation and elected to push the control bar, in an attempt to take off and avoid entering the ploughed field. The aircraft became airborne immediately. The pilot climbed the aircraft to "a safe altitude" and then familiarised himself with the controls for about 10 min before starting an approach to land. By this time the wind had increased to between 7 and 12 kt.

The pilot stated that he had "no problem with the approach" but that, in the landing flare, the aircraft yawed left and landed heavily on its right wheel before coming to rest with extensive damage. The pilot, who had suffered a broken arm, called emergency services on his mobile telephone and was later airlifted to hospital.

The pilot judged that the accident was caused by his "lack of experience in attempting to handle a flex-wing microlight in what turned out to be significant and variable crosswind conditions".

ACCIDENT

Aircraft Type and Registration:	Rotorsport UK MTOSport, G-CGIX
No & Type of Engines:	1 Rotax 914-UL piston engine
Year of Manufacture:	2010
Date & Time (UTC):	8 February 2011 at 1530 hrs
Location:	Leicester Airfield, Leicestershire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Rotor, tail fin, propeller and rudder connecting rod
Commander's Licence:	Private Pilot's Licence
Commander's Age:	78 years
Commander's Flying Experience:	633 hours (of which 82 were on type) Last 90 days - 6 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot was intending to fly back to his farm strip at West Hinckley, Leicestershire. The weather was good, with a surface wind of 220°/6-8 kt. The pilot taxied the gyroplane to the holding point for Runway 28 with the rotor blades stationary. On completion of the pre-takeoff checks, he engaged the pre-rotator and accelerated the main rotor to 200 rpm. Due to other traffic in the circuit, and the aircraft behind him being ready to depart, the pilot elected to carry out a rolling takeoff. As he made a left turn to enter the runway, he again engaged the pre-rotator and opened the throttle. At that point, the rotor blades struck the tail fin. The pilot concluded that the combination of low rotor rpm, a crosswind and possibly an aft stick position caused the rotor to flap back and the retreating blade to strike the tail. In future, he would line up on the runway and stabilise the correct rpm before commencing the takeoff.

BULLETIN CORRECTION

Aircraft Type and Registration:	Robinson R22 Beta, G-HRBS
Date & Time (UTC):	28 September 2010 at 1256 hrs
Location:	Goodwood Aerodrome, West Sussex
Information Source:	Aircraft Accident Report Form

AAIB Bulletin No 2/2011, page 65 refers

In the fourth sentence of the '**History of the flight**' section the word exasperated was inadvertedly used instead of **exacerbated**. The sentence should have read:

He reported that the right skid was digging into the soft ground and that the situation was **exacerbated** by his being the sole occupant and seated in the right seat.

BULLETIN ADDENDUM

Aircraft Type and Registration:	Schweizer 269C-1, G-LINX
Date & Time (UTC):	22 September 2009 at 1103 hrs
Location:	East bank of River Wyre, near Stalmine, Lancashire
Information Source:	AAIB Field Investigation

AAIB Bulletin No 12/2010, page 77 refers

In the section of the bulletin entitled '**Adjustment of engine idle rpm and idle mixture**', reference is made to maintenance requirements contained within the generic Light Aircraft Maintenance Programme (LAMP), which was applicable to G-LINX, and the fact that the LAMP does not contain specific requirements to check the engine idle rpm and idle mixture.

The CAA has stated to the AAIB that it wishes to emphasise that the requirements of **Regulation EC 2042/2003** require a generic programme such as the LAMP to take into consideration the manufacturer's continuing airworthiness information and 'customise' the LAMP to the specific aircraft. This would include specific checks specified in the aircraft maintenance manual, service information and, in certain circumstances, the Aircraft Flight Manual.

The CAA also provides continued reminders to owners/operators of the need to 'customise' the LAMP via the publication of AIRCOMs. **AIRCOM 2008/03** and **2009/18** are examples of the more recent publications addressing this issue.

FORMAL AIRCRAFT ACCIDENT REPORTS ISSUED BY THE AIR ACCIDENTS INVESTIGATION BRANCH

2009

3/2009 Boeing 737-3Q8, G-THOF
on approach to Runway 26
Bournemouth Airport, Hampshire
on 23 September 2007.

Published May 2009.

4/2009 Airbus A319-111, G-EZAC
near Nantes, France
on 15 September 2006.

Published August 2009.

5/2009 BAe 146-200, EI-CZO
at London City Airport
on 20 February 2007.

Published September 2009.

6/2009 Hawker Hurricane Mk XII (IIB), G-HURR
1nm north-west of Shoreham Airport,
West Sussex
on 15 September 2007.

Published October 2009.

2010

1/2010 Boeing 777-236ER, G-YMMM
at London Heathrow Airport
on 28 January 2008.

Published February 2010.

2/2010 Beech 200C Super King Air, VQ-TIU
at 1 nm south-east of North Caicos
Airport, Turks and Caicos Islands,
British West Indies
on 6 February 2007.

Published May 2010.

3/2010 Cessna Citation 500, VP-BGE
2 nm NNE of Biggin Hill Airport
on 30 March 2008.

Published May 2010.

4/2010 Boeing 777-236, G-VIIR
at Robert L Bradshaw Int Airport
St Kitts, West Indies
on 26 September 2009.

Published September 2010.

5/2010 Grob G115E (Tutor), G-BYXR
and Standard Cirrus Glider, G-CKHT
Drayton, Oxfordshire
on 14 June 2009.

Published September 2010.

6/2010 Grob G115E Tutor, G-BYUT
and Grob G115E Tutor, G-BYVN
near Porthcawl, South Wales
on 11 February 2009.

Published November 2010.

7/2010 Aerospatiale (Eurocopter) AS 332L
Super Puma, G-PUMI
at Aberdeen Airport, Scotland
on 13 October 2006.

Published November 2010.

8/2010 Cessna 402C, G-EYES and
Rand KR-2, G-BOLZ
near Coventry Airport
on 17 August 2008.

Published December 2010.

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http://www.aaib.gov.uk