




AAIB

Air Accidents Investigation Branch

AAIB Bulletin

11/2015

A photograph showing the wing of an aircraft in flight, viewed from above. The wing is dark and extends across the frame. Below the wing, a vast expanse of white, fluffy clouds stretches to the horizon under a clear blue sky.

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CONTENTS**SPECIAL BULLETINS / INTERIM REPORTS**

None

SUMMARIES OF AIRCRAFT ACCIDENT ('FORMAL') REPORTS

None

AAIB FIELD INVESTIGATIONS**COMMERCIAL AIR TRANSPORT****FIXED WING**

Dassault Falcon 20D	G-FRAK	25-Apr-15	3
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ROTORCRAFT

None

GENERAL AVIATION**FIXED WING**

None

ROTORCRAFT

None

SPORT AVIATION / BALLOONS

None

AAIB CORRESPONDENCE INVESTIGATIONS**COMMERCIAL AIR TRANSPORT**

None

GENERAL AVIATION

Cessna 182P Skylane	G-BAHD	18-Jul-15	15
Escapade	G-CGNV	24-Jun-15	16
Piel CP301 (Modified) Emeraude	G-BCCR	30-Jun-15	17
Pulsar	G-MCMS	26-May-15	19
Rans S7 Courier	G-CBNF	16-Aug-15	21
Reims Cessna FRA150L Aerobat	G-PHOR	11-Aug-15	22

SPORT AVIATION / BALLOONS

Ikarus C42 FB80	G-JSKY	13-Aug-15	23
Pegasus Quik	G-CBZT	07-Aug-15	24
Quik R	G-CGHH	15-Jul-15	26

CONTENTS Cont

MISCELLANEOUS

ADDENDA and CORRECTIONS

None

List of recent aircraft accident reports issued by the AAIB 29
(ALL TIMES IN THIS BULLETIN ARE UTC)

AAIB Field Investigation Reports

A field investigation is an independent investigation in which AAIB investigators collect, record and analyse evidence.

The process may include, attending the scene of the accident or serious incident; interviewing witnesses; reviewing documents, procedures and practices; examining aircraft wreckage or components; and analysing recorded data.

The investigation, which can take a number of months to complete, will conclude with a published report.

ACCIDENT

Aircraft Type and Registration:	Dassault Falcon 20D, G-FRAK	
No & Type of Engines:	2 x General Electric CO CF700-2D-2	
Year of Manufacture:	1969	
Date & Time (UTC):	25 April 2015 at 1650 hrs	
Location:	English Channel, approximately 20 nm south of Portland Bill	
Type of Flight:	Special operations, target towing	
Persons on Board:	Crew - 3	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Wing leading edge torn and dented, winch carrier damaged, target lost at sea	
Commander's Licence:	Air Transport Pilot's Licence	
Commander's Age:	64	
Commander's Flying Experience:	12,700 hours (of which 9,000 were on type) Last 90 day - 121 hours Last 28 days - 32 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft was undertaking target towing operations for a military exercise and was recovering the target whilst flying in an assigned danger area over the English Channel. With the target approximately 40 m from the aircraft, the target winch accelerated rapidly and the target struck the leading edge of the wing before detaching and travelling over the wing. Although, the launcher and the droop leading edge on the wing were damaged, the aircraft landed safely. The target winch is powered by a turbine, and the speed of the turbine is controlled by vent doors. The target winch had oversped due to a fault with the closed limit switch on the vent doors which prevented the doors from closing. The operator and manufacturer have carried out several safety actions as a result of the investigations and one Safety Recommendation is made.

History of the flight

The aircraft departed Bournemouth Airport at 1518 hrs, following a detailed crew briefing, to tow a target over the English Channel for a military exercise in a designated danger area. The target, 2.9 m long and weighing 53 kg, was attached to a winch housed on the pylon under the left wing, at around mid-span. A launcher for the target was attached to the outboard side of the winch (Figure 1).



Figure 1

Image of an aircraft similar to G-FRAK with a RM30/ASL winch on its left wing and a target attached to the launcher on the outboard side of the winch

There were three crew members on board at the time of the accident: the commander who was pilot flying (PF), the co-pilot, and the Target Tow Officer (TTO), who occupied a rear-facing seat at the front, left-side of the cabin. The TTO had his own winch control panel located on the TTO console (Figure 2) which included various controls and monitors associated with the target-towing operation.



Figure 2

TTO winch control panel

The target was being towed 4,145 m (13,600 ft) behind and about 1,000 ft below the aircraft, whilst at around 4,250 ft. The target had not been fired at during the exercise and recovery of the target commenced at 1640 hrs, with the aircraft climbing to 4,800 ft, to avoid cloud, while it was turned onto a steady north-easterly heading for the last stages of the recovery. The intention was to depart the Danger Area once the target was recovered and then return to Bournemouth. The minimum total air temperature (TAT) recorded during the recovery was 10.75°C, whilst the airspeed ranged from 222 to 238 KIAS.

Initially, the target was reeled in at a nominal winch speed of 10 metres per second (m/s), until the last 340 m of cable was reached. At this point, the winch speed automatically reduced to 3 m/s. The TTO monitored this on a digital display (Figure 2) of cable length remaining and by looking out at the vent doors on the front of the winch as they moved from fully open to approximately two thirds open. The slowing of the counter display, along with observed vent door movement and lessening of the airframe vibration caused by the winch, indicated that the wind-in speed had slowed. The TTO switched on a video recorder that received inputs from two underwing cameras and from the aircraft's intercom and radio system. Only the image from the camera selected by the TTO was recorded.

The commander recalled that the wind-in checklist had been completed and that the aircraft was straight and level at 230 KIAS. The TTO verified these parameters using his own monitors and over the intercom he counted down the indicated, remaining cable length at 200 m, 100 m and 60 m. At 60 m the TTO was aware that the winch vibration reduced and he watched the vent doors close further. He checked that the rate of the change of the cable length readout was reducing to approximately 1 m/s. This assured him that, with the winch control switch, set to *AUTO*, it was now reeling in at its slowest rate (0.76 m/s). In accordance with standard procedures, the TTO selected the control switch to *SLOW*, as a backup to the automatic mode, and announced this on the intercom. The commander observed that the TTO's cadence was normal and he told the crew that he expected the target to be recovered in one minute and 20 seconds time.

The TTO recalled looking at his monitor of the image from the camera that was directed inboard from the underside of the left wingtip. He saw the winch and approximately 10 m of the cable behind it and he checked that the cable appeared to be stable. He called out "50 TO GO" and "40" as these were shown on the cable length indicator and was about to switch his monitor to the camera beneath the starboard wingtip, which would give him first sight of the target as it approached 35 m to go. The commander prepared to hand over control of the aircraft to the co-pilot, thus allowing the commander to look out on the left side and monitor the final stage of target recovery to the launcher. Before he could do this the TTO declared "STOPPING, STOPPING" and immediately after this all three crew members felt something impact the aircraft.

The TTO noticed that the numbers on the cable length display were reducing quickly and he sensed that the speed the cable was winding in had increased. As he said "STOPPING" his hand moved towards the *STOP* switch but, before he could move it, the target appeared on the camera monitor, closing rapidly towards the aircraft. He saw and felt it strike the launcher before it disappeared from the camera's view. The co-pilot recalled that the

autopilot remained engaged and that the aircraft rocked. The TTO informed the pilots that "IT JUST CAME AT US" and that the target detached after hitting the wing. The aircraft's position was noted and the TTO told the commander that he could see damage to the leading edge of the wing.

The aircraft was receiving a Traffic Service from Plymouth Military ATC and the commander informed the controller about the incident. He passed the last known position of the target, which was within the notified danger area, and over the sea in an area that was clear of shipping. After discussion with ATC, the commander declared a PAN and the transponder was set to 7700.

The damage to the leading edge of the left wing appeared to be confined to a portion of the leading edge which drooped when the flaps were moved. The commander elected to continue the flight without extending the flaps as, based on his previous flight test experience of the Falcon 20, he felt this might provide greater stability given the damage.

A low speed handling check was conducted, with the co-pilot reading out the required checklist from the operations manual. The aircraft weighed a little less than 24,000 lb and the reference cards indicated that the V_{REF} for this weight was 142 KIAS. The commander assessed the aircraft's handling qualities at this speed, in a 1,000 ft/min descent, while the TTO observed airbrake deployment and used the underwing cameras to check for normal operation of the landing gear.

The aircraft's handling characteristics appeared normal and all systems indicated correctly. A radar-vectorised ILS approach was flown to Runway 26 at Bournemouth, followed by a flapless landing. The aircraft was brought to a halt on the runway at 1708 hrs and the RFFS conducted an external inspection. After establishing that no further signs of damage could be seen, the crew taxied the aircraft to the operator's parking area.

Aircraft information

The Falcon 20 is a business jet with a fin-mounted tail, aft-mounted engines and swept wings. The aircraft had been modified with the installation of pylons for targets to be towed behind the aircraft for military exercises. The winch system was originally designed in the 1980s and is fitted to several different aircraft types, including the Falcon 20. G-FRAK's modifications were originally approved through an FAA Supplementary Type Certificate, which were validated by the UK CAA through an Additional Airworthiness Note (AAN). The system was modified in 1992 to the current standard by FRA modification FD304 and recorded as an addendum to the AAN. These approvals were subsequently passed to the EASA.

When installed, the target winches are mounted on out-board pylons and are hence located away from the engines and tail-plane.

The aircraft has droop leading edges (ie there is no slot formed when the leading edges are drooped) and trailing edge flaps; the control for these devices is such that they deploy together. Under both wing tips there is a video camera facing inboard which capture images of the winch and the area behind and below.

Target winch information

The aircraft was fitted with a Meggitt RM30/ASL target winch, sometimes referred to as a reeling machine, which was mounted on a pylon under the left wing, at around mid-semi-span, Figure 3. There is a carrier, sometimes called a launcher, attached to the outboard side of the winch by a series of struts, under which the target is stowed.



Figure 3

Images of winch, target, launcher and pylon

At the front of the winch is a turbine and air vent system. The turbine rotates in both directions to provide mechanical power for reeling-in and can dissipate power during reel-out. The air vent system consists of seven radial, servo-activated doors; the greater the opening of the doors the greater the torque delivered to the winch. There are two limit switches: one for doors closed and one for doors fully open. The maintenance for these switches is on-condition.

A tachometer is mounted next to the vent system as part of the system that controls the speed of the turbine by varying the size of the opening of the vent door and hence the speed of the spool.

The centre body contains the spool which can accommodate cable lengths of up to 8,000 m. The torque from the turbine is transmitted to the spool by a series of chains and sprockets.

The afterbody contains a series of pulleys, the brakes system, the shock absorption system and the logic control module. There are several sensors that input the control system. Of note is that if an overspeed is detected by either the tachometer or by a Hall effect sensor, then the winch stops. The overspeed threshold is based on spool rpm, hence when the target is near to the aircraft the spool is full and the overspeed threshold is around 15 m/s..

Inside the body of the launcher is a line cutter; the cable can be cut from either the cockpit or the TTO's control panel.

Target towing

The CAA issued the operator with a valid certificate of Exemption from Articles 128(1) and 128(4)¹ of the Air Navigation Order 2009. This Exemption permits the operator to carry out deployment and retrieval of target equipment in furtherance of Ministry of Defence contracts, in accord with a CAA-approved Flight Manual Supplement.

This Supplement includes the operation of Falcon 20 aircraft with external pylons and provides details of acceptable stores such as the winch and target carried on the accident flight. Crews for target-tow missions have to be suitably qualified and undergo a structured ground training syllabus followed by a series of target-tow missions under supervision before they fly on routine target-tow sorties.

The commander and TTO on G-FRAK were both experienced in this role. The co-pilot was recently qualified, but this was taken into account when the crew was constituted and during the pre-flight briefing.

The CAA Exemption allows the operator to tow targets up to 10,000 m behind the Falcon 20 but, in UK airspace, the target can only be streamed when inside a notified danger area. The operation can take place in IFR provided the aircraft is in receipt of a Traffic Service, with a proviso that target recovery is not allowed in cloud thick enough to prevent the wingtip cameras from being used to assess target stability within 30 m of the aircraft. The Supplement requires towing operations to be conducted only when the TAT is 5°C or greater.

The operator presented a safety case to the CAA during the renewal process for target towing exemptions in November 2014. The safety case listed 21 incidents that occurred during target towing operations between 1 January 2012 and 4 November 2014. These incidents included several lightning strikes, occasions where the cable had failed and four events when the target was lost during recovery. In one of the recovery events, the cable was deliberately cut by the crew because of observed target instability. On two other occasions the circuit breaker supplying power to the winch tripped and the cable was then cut. The affected circuit breaker was subsequently upgraded. There were no recorded events during this period when the winch unexpectedly accelerated.

Procedures

A towing aircraft can climb into clear air during the initial phase of target recovery and it may turn with an angle of bank of up to 30°, observing a speed restriction of 200 to 250 KIAS. Once the cable reaches 300 m, the TTO must check that the leader marker lamp is illuminated and that the winch speed slows to around 3 m/s. The video recorder is turned on at this stage.

The TTO counts down the length of cable that remains from his digital display and the PF verifies that the aircraft is straight and level and is being flown between 230 and 250 KIAS.

Footnote

¹ Article 128(1) relates to the towing of articles other than gliders by aircraft and 128(4) stipulates a 150 m maximum tow length for any article that is towed by an aircraft.

During target streaming, the TTO notes the precise range at which he loses sight of the target, using the furthest camera, so that during recovery he knows what the optimum cable distance is to look through this camera to see the target. Prior to this he uses the nearside camera to monitor the cable for stability. The target can then be wound all the way onto its cradle without stopping but, if there are any signs of instability, the TTO suspends the recovery. If the target cannot be stabilised the cable is cut.

The procedures in place when the accident occurred were for the TTO to watch the vents on the winch when the cable remaining was 60 m and to check that they moved to an almost closed position. At the same time he would sense decreasing vibration level from the winch and he would check the speed of wind-in using the cable length display to ensure that digits then reduced at a rate of approximately 1 m/s. Once this happened, he changed the control switch from AUTO to SLOW. From then on he used the cameras to monitor first the cable and then the target, while he also kept watch on the digits showing cable length remaining. For the final stages of the recovery the pilots changed control if necessary, so that the Pilot Monitoring could look out and watch the target once it came into his line of sight under the wing.

Damage to the aircraft

There was damage to the droop leading edge on the left wing and the struts between the target winch and the launcher. There was also deformation to the pylon where it attached to the wing spar, Figure 4.



Figure 4

Image showing damage to leading edge

On-board video

There was a recording from the TTO's monitor, which included information from one or other of the two underwing, tip-mounted cameras (as selected by the TTO), plus the crew's dialogue. Using the recording the following timeline of events was generated:

Time on recording (min:sec)	Event
8:25	"60" (metres to go) called by TTO
8:39	TTO switches to camera under the left wing
8:40	"onboard in 1 minute 20 seconds" call
8:42	"50 metres to go" call
8:43	Video evidence that the vent doors start to partially open
8:46 to 8:47	Slight indication of the cable angle, and hence speed, changing faster than normal
8:49	Target comes into view of camera
8:50	The target strikes the wing leading edge, and is propelled over the wing leading edge, and detaches

The target was visible on the camera for only about 1 second. Simple estimates of the speed of the target range from 6 m/s (50 m in 8 seconds) to around 13 m/s (approximately 40 m in 3 seconds), and these are below the overspeed detection speed of around 15 m/s.

Engineering investigation

The video evidence clearly showed a significant increase in cable speed with approximately 40 m of cable left to recover, and the vent doors could be seen approximately half-open.

Functional and wiring continuity checks were made on the target winch system and nothing significant was found.

The limit switches for the vent doors OPEN and doors CLOSED were tested. The CLOSED switch was found to have a variable, high impedance and failed open circuit once during testing. An open circuit prevents the servo motor from operating in the closed direction. If the servo motor was not at the closed limit then an open circuit on the CLOSED switch would have prevented the vent doors from closing and the spool would speed up.

The change of winch speed to slow, at 60 m, would have required the vent doors to be commanded to closed, and shortly afterwards the vent doors would have been opened and closed to control the winch speed to 0.76 m/s. Analysis of the video suggested that the vent doors closed once, opened, but then failed to close.

It was also determined that the limit switches carried a current of up to 4A, and not merely a signal. Whilst the current was approximately that of the specification of the limit switch, it was unclear if this was a factor in the failure of the CLOSED limit switch.

It was also found that disconnecting the tachometer, simulating an open circuit, would cause the vent doors to open fully and cause an overspeed condition. The manufacturer confirmed that this would occur, but advised that this would cause an overspeed condition and the winch would stop shortly afterwards.

Analysis

The target accelerated during the latter stages of its recovery, causing it to strike the aircraft. The acceleration was probably due to an overspeed of the target winch as a result of the failure of the vent door CLOSED limit switch preventing the vent doors from closing when commanded. The turbine would then have spooled up, increasing the torque and resulting in the winch accelerating.

All the operator's standard procedures appear to have been adhered to prior to the event. The TTO had already ascertained that the winch speed reduced to the minimum and his attention was prioritised towards the camera monitor. He was about to switch to a different view to look for the target and assess its stability but he could not do this at the same time as looking out at the vent doors, the movement of which was difficult to discern on the monitor. He managed to pick up an increased rate of change on the cable remaining indicator while simultaneously dealing with the camera monitor, but the target was already approaching the aircraft quickly. From the video evidence the target was visible on the TTO's monitor for about one second, and therefore it is unreasonable to expect him to have detected this and either to have moved the STOP switch or to have initiated the cable cutter.

Safety action

As a result of this accident the manufacturer of the target system and the operator have carried out several safety actions.

Because the vent door limit switches are on condition items, the winch manufacturer issued a Service Bulletin 094 on 13 May 2015 recommending:

- Replacing the cable harness (which includes the two vent door limit switches) every 10 years.
- Performing a ground test on the winch doors every 20 missions.
- The TTO should check, during recovery, the length display for the 'tens' changing from once per second to the 'units' changing to about once per second, after transition to SLOW.

The operator has carried out the following since the accident:

- Painted markings on the vent doors to enhance visual cues for movement.
- Changed its recovery procedure so that the Pilot Monitoring is seated on the same side as the active winch. His task from 1,000 m of cable remaining, is to observe the vent doors for correct movement.

- Changed its recovery procedure so that the TTO selects slow with 130 m of cable remaining to be reeled in, rather than at 60 m. This gives the crew more time to detect an erroneous speed condition, and the system more time to detect an overspeed condition.
- Tested the vent door limit switches and introduced recurrent testing every 4 hours of winch running.
- Commenced a door limit switch replacement programme.

During the investigation several possible actions that could prevent reoccurrence were discussed including:

- Introducing an audible indication for target recover speed.
- Introducing limit switches with higher current ratings.
- Changing the distance at which the automatic speed reduces from 3 m/s to 0.75 m/s. Currently this is at 60 m; increasing this to 130 m would be in line with their revised recovery procedure.
- Lowering the overspeed threshold at lower speeds. The overspeed threshold is based on spool rpm, hence when the target is near to the aircraft the spool is full and the overspeed threshold is around 15 m/s. An overspeed threshold of around 10 m/s is more appropriate when the target is close to the aircraft.
- Improving the video imagery available to the TTO either by improving the camera or the monitors, or both.

The target towing system and associated winches are operated on a variety of aircraft throughout the world, and whilst the safety actions taken by the manufacturer and operator have reduced the risk of reoccurrence, there remains a possibility of reoccurrence on aircraft fitted with the RM30 and similar target winches. Therefore the following Safety Recommendation is made:

Safety Recommendation 2015-037

It is recommended that the European Aviation Safety Agency, require that Meggitt Defense Systems Inc review the design, maintenance and operation of the RM30 and similar winches to reduce the possibility of an uncommanded target acceleration during recovery.

AAIB Correspondence Reports

These are reports on accidents and incidents which were not subject to a Field Investigation.

They are wholly, or largely, based on information provided by the aircraft commander in an Aircraft Accident Report Form (AARF) and in some cases additional information from other sources.

The accuracy of the information provided cannot be assured.

ACCIDENT

Aircraft Type and Registration:	Cessna 182P Skylane, G-BAHD	
No & Type of Engines:	1 Continental Motors Corp O-470-R piston engine	
Year of Manufacture:	1972 (Serial no: 182-61501)	
Date & Time (UTC):	18 July 2015 at 1000 hrs	
Location:	Jericho Farm, Lambley, Nottinghamshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Nosewheel detached and aircraft extensively damaged	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	47 years	
Commander's Flying Experience:	421 hours (of which 3 were on type) Last 90 days - 5 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

After an uneventful approach to Runway 26 the aircraft bounced on landing and veered to the left during the ground roll. The pilot reported that he over corrected with rudder and then tried to go around. However, the aircraft ran off the right side of the runway and into a crop of rape. The nosewheel collapsed and the aircraft rotated 180° coming to rest facing the threshold of Runway 26. While the pilot and passenger were uninjured, the aircraft was extensively damaged.

ACCIDENT

Aircraft Type and Registration:	Escapade, G-CGNV	
No & Type of Engines:	1 Rotax 912-UL piston engine	
Year of Manufacture:	2011 (Serial no: LAA 345-14901)	
Date & Time (UTC):	24 June 2015 at 1248 hrs	
Location:	Sandown Airport, Isle of Wight	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to propeller, possible engine shock-load, right wing tip and right aileron damage, right landing gear bungee failed	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	64 years	
Commander's Flying Experience:	22,823 hours (of which 64 were on type) Last 90 days - 154 hours Last 28 days - 38 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft had landed normally and was taxiing at about 5 kt when the right wing tip suddenly dropped and hit the ground; the engine stopped. The aircraft was shut down and the pilot and his passenger exited via the left door. The cause of the wing drop was a failure of the right main gear bungee. A friend of the pilot's, who had built his own Escapade, examined the aircraft to provide a repair assessment. He was not able to examine the bungee because it was tangled with rope and was supporting the aircraft. However, he observed that the back-up wire had failed in tension due to the bungee releasing suddenly. He did not note any damage to the other landing gear components, including the bungee strut, the gear leg and the 'V' brace.

ACCIDENT

Aircraft Type and Registration:	Piel CP301 (Modified) Emeraude, G-BCCR	
No & Type of Engines:	1 Continental Motors Corp O-200-A piston engine	
Year of Manufacture:	1975 (Serial no: PFA 712)	
Date & Time (UTC):	30 June 2015 at 1145 hrs	
Location:	Leicester Airport	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to left landing gear, left lower wing and fuselage, wing spar, propeller. Engine shock-loaded	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	56 years	
Commander's Flying Experience:	311 hours (of which 33 were on type) Last 90 days - 8 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

On its second approach to land, the aircraft gained height in the flare and landed heavily, damaging the left main landing gear.

History of the flight

After an uneventful flight from Derby the aircraft joined the Leicester circuit for Runway 10. The wind was southerly and varied between 7 and 10 kt. In the later stages of the approach the pilot encountered thermal activity at a height of around 200 ft. This resulted in the aircraft rising above the normal descent profile, despite power being reduced; accordingly the pilot elected to go around.

During the next circuit the pilot called Leicester radio and enquired about the availability of Runway 15, as he considered that there would be a reduced likelihood of thermal activity. However as one aircraft was on long finals for Runway 10 and others were joining the circuit he decided to remain in the Runway 10 circuit in order to avoid confusion and possible confliction.

The second approach was normal, on the centreline of the runway and with no observed thermal activity. However, as the aircraft entered the flare with the power at idle, it gained

height. As the airspeed rapidly decayed and the aircraft subsequently started to sink, the pilot applied full power but was unable to prevent a hard landing that resulted in the collapse of the left landing gear. The aircraft then swung to the left and departed the runway, coming to rest in the grass adjacent to the paved surface, having turned through almost 180°. The pilot completed the shutdown checks and, together with his passenger, left the aircraft.

The pilot subsequently commented that the cause of the sudden increase in height during the flare may have been an updraught or the application of excessive aft control column movement.

ACCIDENT

Aircraft Type and Registration:	Pulsar, G-MCMS	
No & Type of Engines:	1 Rotax 582 piston engine	
Year of Manufacture:	1993 (Serial no: PFA 202-11982)	
Date & Time (UTC):	26 May 2015 at 1550 hrs	
Location:	Pembrey Airport, Carmarthenshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Propeller, spinner, lower front fuselage, wheels and wheel fairings, leading edge and tip of one wing	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	74 years	
Commander's Flying Experience:	832 hours (of which 3 were on type) Last 90 days - 3 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and enquiries by the AAIB	

Synopsis

The aircraft was low on the approach to Runway 04 such that the main undercarriage clipped the top of the airfield boundary fence, 66 m from the displaced threshold, before coming to rest on the runway strip. The pilot was not injured.

History of the flight

On the approach to Runway 04 at Pembrey, the pilot encountered turbulence over the forested area to the south of the airport and possibly some sink in the final stages of the approach. The main undercarriage wheels clipped the top of the airport's boundary chain link fence, which was a little under 6 ft high and, at its closest, 66 m from the displaced threshold of Runway 04. The aircraft came to rest on the runway strip short of the threshold and the pilot, who had been using a full harness, exited the aircraft unharmed.

Approach surface

The CAA's UK Aeronautical Information Publication (AIP) states that the Runway 04 at Pembrey has a TODA of 797 m and is therefore classed as a Code 1 runway. The CAA's CAP 168 – *Licensing of Aerodromes* – provides guidance on how to meet aerodrome licensing requirements, which includes guidance on the 'approach surface' – an inclined plane preceding the threshold and runway strip that must be clear of obstacles. For a

Code 1 runway, such as Pembrey, the runway strip is 30 m and the approach surface is 5% (1:20); therefore, at the boundary, 36 m from the start of the runway strip, obstacles should be no higher than 1.8 m or 6 ft. The airfield owner has subsequently measured and confirmed that the fence in question is slightly less than the 6 ft height permitted.

ACCIDENT

Aircraft Type and Registration:	Rans S7 Courier, G-CBNF	
No & Type of Engines:	1 Rotax 912 ULS piston engine	
Year of Manufacture:	2002 (Serial no: PFA 218-13762)	
Date & Time (UTC):	16 August 2015 at 1330 hrs	
Location:	Netherley Strip, Aberdeenshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to left wing, propeller, engine cowlings and right mainwheel	
Commander's Licence:	Light Aircraft Pilot's Licence	
Commander's Age:	N/K	
Commander's Flying Experience:	1,082 hours (of which 50 were on type) Last 90 days - 9 hours Last 28 days - 5 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot was approaching to land on the westerly grass strip at Netherley, which is 500 m long. He deployed full flap but flared too high and, whilst trying to correct this, he decided to go around and applied full power. However, the pilot admits he left it too late and the aircraft landed heavily, causing the right mainwheel to detach. This led to the aircraft nosing over, before coming to rest inverted in long grass just to the north of the strip. The pilot exited the aircraft with no injuries.

ACCIDENT

Aircraft Type and Registration:	Reims Cessna FRA150L Aerobat, G-PHOR	
No & Type of Engines:	1 Continental Motors Corp O-240-A piston engine	
Year of Manufacture:	1972 (Serial no: 0157)	
Date & Time (UTC):	11 August 2015 at 1455 hrs	
Location:	Netherthorpe Airfield, Nottinghamshire	
Type of Flight:	Training	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to nose gear, propeller, engine, engine frame and left wing rear spar	
Commander's Licence:	Student	
Commander's Age:	58 years	
Commander's Flying Experience:	18 hours (of which 18 were on type) Last 90 days - 15 hours Last 28 days - 5 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Following a circuit training flight with his instructor at Netherthorpe Airfield, the student pilot was cleared for his first solo circuit. The weather forecast obtained from Doncaster Sheffield Airport, some 11 nm distant, was for a wind from 280° at 10 kt. The instructor watched the final approach of the aircraft to grass Runway 24 and reported that the approach "looked good and stable". However, on landing the aircraft bounced twice and, following the second bounce, the aircraft was seen to pitch down collapsing the nose landing gear onto the runway surface. The uninjured pilot switched off the fuel and master switch before vacating the aircraft through the left door. The pilot attributed the pitch down to leaning forwards onto the control yoke during the second bounce. The instructor later commented that he had expected the student pilot to have executed a go-around after the first bounce.

ACCIDENT

Aircraft Type and Registration:	Ikarus C42 FB80, G-JSKY	
No & Type of Engines:	1 Rotax 912-UL piston engine	
Year of Manufacture:	2013 (Serial no: 1308-7272)	
Date & Time (UTC):	13 August 2015 at 1115 hrs	
Location:	Plockton Airfield, Ross and Cromarty, Scotland	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to nose and right main landing gears, propeller and wing strut	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	59 years	
Commander's Flying Experience:	664 hours (of which 664 were on type) Last 90 days - 47 hours Last 28 days - 18 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft was engaged on a training flight from Broadford Ashaig Airfield on the Isle of Skye to Plockton. The student pilot had handled the aircraft throughout the flight and during final approach but, as it crossed the threshold of asphalt Runway 20, a gust of wind caused it to drift to the left over the grass. The instructor told the student to regain the runway centreline but he did not respond quickly enough and also flared too early, causing the airspeed to reduce. More turbulence was encountered with the result the aircraft landed heavily on the grass to the left of the runway and bounced.

At this point, the instructor took control and tried to recover but yet more turbulence occurred and he was unable to prevent the aircraft from stalling and striking the ground in a right wing low attitude, breaking the propeller and the nose and right main landing gears. Both occupants were uninjured. The instructor reported that the observed wind at the time was south westerly at about 12 kt and gusting.

ACCIDENT

Aircraft Type and Registration:	Pegasus Quik, G-CBZT	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2003 (Serial no: 7936)	
Date & Time (UTC):	7 August 2015 at 1755 hrs	
Location:	Eshott Airfield, Northumberland	
Type of Flight:	Training	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to wing, propeller and scuffing to pod	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	54 years	
Commander's Flying Experience:	734 hours (of which 685 were on type) Last 90 days - 64 hours Last 28 days - 35 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The instructor was demonstrating a powered approach to his student but this required the student to take control once on the ground, including application of the brakes. After touchdown, the student applied the brakes but felt that the aircraft was not slowing down. The instructor tried to shut down the engine using the magneto switches but because of a broken grounding wire, it continued to run. The student tried to steer the aircraft to avoid the boundary fence, but it was travelling too fast and rolled onto its right side. Neither occupant was injured.

History of the flight

When used for training, the Pegasus Quik is configured such that the instructor, occupying the rear seat, has access to the control bar, the hand throttle and the magneto switches. In addition, only the student in the front seat can operate the footbrake (using the left pedal) and the foot throttle (using his right foot); he can also move the nosewheel steering bar. When operating the foot throttle, the hand throttle remains stationary.

On the practice circuit training session during which the accident occurred, the student had demonstrated to his instructor that he was proficient at landings, go-arounds and taxiing following glide approaches. On the last circuit of the lesson, the instructor took control to demonstrate a powered approach. At a height of about 15 ft, he cut the power using the hand throttle and made a reasonably smooth, if somewhat fast, touchdown. The student then

reports that he commenced braking but, despite “standing on the brakes” the aircraft did not appear to slow down. The instructor said “Take your foot off the throttle” to the student, who replied that he was not applying throttle, but trying to brake. The instructor double-checked that the hand throttle was closed and then reached to switch off both magnetos, but the engine continued to run.

The end of the runway and a fence were now fast approaching, so the student steered the aircraft to the left, but it was travelling too fast and toppled onto its right side. Both occupants climbed out of the trike uninjured.

It was subsequently found, when the aircraft was returned to its manufacturer for repair, that a grounding wire associated with the ignition unit had broken internally such that one magneto was permanently live; this explained why the instructor could not switch off the engine.

ACCIDENT

Aircraft Type and Registration:	Quik R, G-CGHH	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2010 (Serial no: 8496)	
Date & Time (UTC):	15 July 2015 at 1200 hrs	
Location:	North of Hushinish, Isle of Harris	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Wing structure and sail badly damaged. Minor damage to the trike	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	43 years	
Commander's Flying Experience:	318 hours (of which 318 were on type) Last 90 days - 38 hours Last 28 days - 33 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft departed Sollas, on North Uist, and flew north at a height of 500 to 700 ft along the west coast of the Isle of Harris. After passing Hushinish, the pilot elected to fly along the centre of the channel between the Isle of Scarp and Harris in order to remain clear of the birds along the cliffs. However, a bird struck the windscreen causing part of it to detach from the aircraft. Due to the risk of the remaining part of the windscreen breaking away and striking the propeller, the pilot elected to carry out a precautionary landing on the beach. While the sand appeared to be firm, on landing the wheels sunk into the sand and the aircraft tipped over onto its sail. While both occupants were uninjured, the wing structure and fabric were badly damaged. There was also some damage to the pod.

Miscellaneous

This section contains Addenda, Corrections and a list of the ten most recent Aircraft Accident ('Formal') Reports published by the AAIB.

The complete reports can be downloaded from the AAIB website (www.aaib.gov.uk).

**TEN MOST RECENTLY PUBLISHED
FORMAL REPORTS
ISSUED BY THE AIR ACCIDENTS INVESTIGATION BRANCH**

- | | |
|--|---|
| 7/2010 Aerospatiale (Eurocopter) AS 332L Super Puma, G-PUMI at Aberdeen Airport, Scotland on 13 October 2006.
Published November 2010. | 2/2014 Eurocopter EC225 LP Super Puma G-REDW, 34 nm east of Aberdeen, Scotland on 10 May 2012 and G-CHCN, 32 nm south-west of Sumburgh, Shetland Islands on 22 October 2012
Published June 2014. |
| 8/2010 Cessna 402C, G-EYES and Rand KR-2, G-BOLZ near Coventry Airport on 17 August 2008.
Published December 2010. | 3/2014 Agusta A109E, G-CRST Near Vauxhall Bridge, Central London on 16 January 2013.
Published September 2014. |
| 1/2011 Eurocopter EC225 LP Super Puma, G-REDU near the Eastern Trough Area Project Central Production Facility Platform in the North Sea on 18 February 2009.
Published September 2011. | 1/2015 Airbus A319-131, G-EUOE London Heathrow Airport on 24 May 2013.
Published July 2015. |
| 2/2011 Aerospatiale (Eurocopter) AS332 L2 Super Puma, G-REDL 11 nm NE of Peterhead, Scotland on 1 April 2009.
Published November 2011. | 2/2015 Boeing B787-8, ET-AOP London Heathrow Airport on 12 July 2013.
Published August 2015. |
| 1/2014 Airbus A330-343, G-VSXY at London Gatwick Airport on 16 April 2012.
Published February 2014. | 3/2015 Eurocopter (Deutschland) EC135 T2+, G-SPAO Glasgow City Centre, Scotland on 29 November 2013.
Published October 2015. |

Unabridged versions of all AAIB Formal Reports, published back to and including 1971, are available in full on the AAIB Website

<http://www.aaib.gov.uk>

GLOSSARY OF ABBREVIATIONS

aal	above airfield level	lb	pound(s)
ACAS	Airborne Collision Avoidance System	LP	low pressure
ACARS	Automatic Communications And Reporting System	LAA	Light Aircraft Association
ADF	Automatic Direction Finding equipment	LDA	Landing Distance Available
AFIS(O)	Aerodrome Flight Information Service (Officer)	LPC	Licence Proficiency Check
agl	above ground level	m	metre(s)
AIC	Aeronautical Information Circular	mb	millibar(s)
amsl	above mean sea level	MDA	Minimum Descent Altitude
AOM	Aerodrome Operating Minima	METAR	a timed aerodrome meteorological report
APU	Auxiliary Power Unit	min	minutes
ASI	airspeed indicator	mm	millimetre(s)
ATC(C)(O)	Air Traffic Control (Centre)(Officer)	mph	miles per hour
ATIS	Automatic Terminal Information System	MTWA	Maximum Total Weight Authorised
ATPL	Airline Transport Pilot's Licence	N	Newtons
BMAA	British Microlight Aircraft Association	N_R	Main rotor rotation speed (rotorcraft)
BGA	British Gliding Association	N_g	Gas generator rotation speed (rotorcraft)
BBAC	British Balloon and Airship Club	N_i	engine fan or LP compressor speed
BHPA	British Hang Gliding & Paragliding Association	NDB	Non-Directional radio Beacon
CAA	Civil Aviation Authority	nm	nautical mile(s)
CAVOK	Ceiling And Visibility OK (for VFR flight)	NOTAM	Notice to Airmen
CAS	calibrated airspeed	OAT	Outside Air Temperature
cc	cubic centimetres	OPC	Operator Proficiency Check
CG	Centre of Gravity	PAPI	Precision Approach Path Indicator
cm	centimetre(s)	PF	Pilot Flying
CPL	Commercial Pilot's Licence	PIC	Pilot in Command
°C,F,M,T	Celsius, Fahrenheit, magnetic, true	PNF	Pilot Not Flying
CVR	Cockpit Voice Recorder	POH	Pilot's Operating Handbook
DFDR	Digital Flight Data Recorder	PPL	Private Pilot's Licence
DME	Distance Measuring Equipment	psi	pounds per square inch
EAS	equivalent airspeed	QFE	altimeter pressure setting to indicate height above aerodrome
EASA	European Aviation Safety Agency	QNH	altimeter pressure setting to indicate elevation amsl
ECAM	Electronic Centralised Aircraft Monitoring	RA	Resolution Advisory
EGPWS	Enhanced GPWS	RFFS	Rescue and Fire Fighting Service
EGT	Exhaust Gas Temperature	rpm	revolutions per minute
EICAS	Engine Indication and Crew Alerting System	RTF	radiotelephony
EPR	Engine Pressure Ratio	RVR	Runway Visual Range
ETA	Estimated Time of Arrival	SAR	Search and Rescue
ETD	Estimated Time of Departure	SB	Service Bulletin
FAA	Federal Aviation Administration (USA)	SSR	Secondary Surveillance Radar
FIR	Flight Information Region	TA	Traffic Advisory
FL	Flight Level	TAF	Terminal Aerodrome Forecast
ft	feet	TAS	true airspeed
ft/min	feet per minute	TAWS	Terrain Awareness and Warning System
g	acceleration due to Earth's gravity	TCAS	Traffic Collision Avoidance System
GPS	Global Positioning System	TGT	Turbine Gas Temperature
GPWS	Ground Proximity Warning System	TODA	Takeoff Distance Available
hrs	hours (clock time as in 1200 hrs)	UHF	Ultra High Frequency
HP	high pressure	USG	US gallons
hPa	hectopascal (equivalent unit to mb)	UTC	Co-ordinated Universal Time (GMT)
IAS	indicated airspeed	V	Volt(s)
IFR	Instrument Flight Rules	V_1	Takeoff decision speed
ILS	Instrument Landing System	V_2	Takeoff safety speed
IMC	Instrument Meteorological Conditions	V_R	Rotation speed
IP	Intermediate Pressure	V_{REF}	Reference airspeed (approach)
IR	Instrument Rating	V_{NE}	Never Exceed airspeed
ISA	International Standard Atmosphere	VASI	Visual Approach Slope Indicator
kg	kilogram(s)	VFR	Visual Flight Rules
KCAS	knots calibrated airspeed	VHF	Very High Frequency
KIAS	knots indicated airspeed	VMC	Visual Meteorological Conditions
KTAS	knots true airspeed	VOR	VHF Omnidirectional radio Range
km	kilometre(s)		
kt	knot(s)		
