

SERIOUS INCIDENT

Aircraft Type and Registration:	Dassault Falcon 20D, G-FRAR	
No & Type of Engines:	2 General Electric Co CF700-2D-2 turbofan engines	
Year of Manufacture:	1969 (Serial no: 209)	
Date & Time (UTC):	21 September 2015 at 1500 hrs	
Location:	Lyme Bay, South of Dorset	
Type of Flight:	Aerial work	
Persons on Board:	Crew - 3	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Minor damage to upper surface of horizontal tailplane	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	51 years	
Commander's Flying Experience:	8,737 hours (of which 4,423 were on type) Last 90 days - 127 hours Last 28 days - 68 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The aircraft was on a live-firing target towing mission in Lyme Bay. The target was struck and appeared to become unstable, and the crew elected to cut the cable. Approximately 10 m of cable remained attached to the aircraft. One end became looped around the winch, which is mounted under the wing, and the other end became lodged in the horizontal tailplane. The aircraft landed without further incident.

History of the flight

The aircraft was on a target towing mission for a warship in a notified danger area in Lyme Bay. The aircraft was flying at 1,700 ft amsl and 300 KIAS, with the target trailed 23,000 ft behind and 40 ft above the sea surface.

During a live-firing exercise the crew recognised the target had sustained a hit because the aircraft yawed to the left; this is normal. Immediately afterwards the aircraft lurched to the left, possibly as a result of the target striking the water. The crew detected that the target was unstable and the Target Tow Operator (TTO), who was monitoring the target, cut the cable by activating the primary cable cutter switch on his control panel. The pilot flying felt a light vibration through the airframe and rudder pedals, and the TTO observed on his camera monitor that a length of cable remained, and that it appeared to be "corkscrewing"

behind the aircraft. He believed that the cable was probably striking the tailplane area. The pilot monitoring attempted to cut the cable by activating the secondary cable cutter switch in the cockpit, but this had no effect.

The crew declared an emergency and, after a discussion with ATC, they decided to land on Runway 08 at Bournemouth, as this offered an approach over the least populated area. The aircraft was configured to land with the flaps up, to minimise the risk of the cable fouling the control surfaces on the wing. Shortly after the landing gear was lowered the cable ceased banging against the airframe and the TTO reported: "It's hooked up on something...I think it's the tail." The aircraft landed without further incident.

After the flight the TTO discovered that one end of the 10 m length of cable was lodged between the elevator and the horizontal tailplane, and that there was a loop in the cable that had snagged on the winch (Figures 1 to 4). The cable was removed from the gap between the elevator and the horizontal tailplane; this was a simple task and there was no evidence to suggest that the elevator had not been operating effectively during the incident.



Figure 1

Image of aircraft showing winch and tail plane



Figure 2

Image showing one end of the cable looped around the winch



Figure 3

Image showing damage to the tailplane leading edge



Figure 4

Image showing cable lodged in the gap between the horizontal tailplane and the elevator

Aircraft information

The Falcon 20 is a business jet with a fin-mounted horizontal tailplane, aft mounted engines and swept wings. The elevator is a hydraulically-powered flying control.

The aircraft was fitted with a target towing winch, which was mounted on a pylon under the left wing, at around mid-semi-span. Inside the winch outrigger is a cable cutter; this can be activated from either the cockpit or the TTO's control panel. The target was 2.9 m long and weighed 53 kg.

The TTO sits on the left side of the cabin ahead of the wing leading edge in a rear-facing seat, next to a window. In front of the TTO there is a monitor, which can be selected to view video images from the left or right underwing cameras, and a control panel.

G-FRAK, a similar aircraft to G-FRAR, was the subject of an AAIB Field investigation as a result of a target-towing accident in April 2015. A detailed description of the aircraft, the target towing system and its operation can be found at: <https://www.gov.uk/aaib-reports/aaib-investigation-to-dassault-falcon-20d-g-frak>

Discussion

It is likely that, after being hit, the damaged target struck the water and its subsequent motion was complex, with a high degree of variation in cable tension. The 10 m section of cable that remained attached had separated at both ends, but had become snagged on the winch because of a loop that had formed after the target detached. There was a cut at the winch end which was likely to have been the result of activating the cable cutter. The break

at the trailing end may have been a result of a failure of the cable in overload, after the target was hit and before the cable cutter was activated.

Although the cable became lodged between the elevator and the horizontal tailplane, there was no evidence that it had restricted the operation of the elevator.

The operator is considering a modification to introduce a 'weak-link' in the cable and a modification to the winch to reduce the likelihood of snagging.