

N230BW Accident Report

Introduction

On 12/24/2019 an F1 Rocket with a MK I empennage, manned by a crew of 2, sustained a structural failure to the horizontal stabilizer while maneuvering. The failure resulted in the majority of the starboard stabilizer departing the aircraft. The starboard elevator remained attached to heavily damaged rear spar and to the port elevator through the hinge points and the control horns. The starboard HS that departed the aircraft has not been recovered.

The port stabilizer remained attached, but was severely compromised and was bent downward approximately 30 degrees. Elevator movement was restricted to approximately 1.25 inches, as measured at the top of the rear control stick, allowing a moderate amount of pitch control. The pilot was able to regain control of the aircraft, return to base, and after one aborted landing attempt, was able to land the damaged aircraft successfully.

Background Summary

The pilot/owner had recently purchased the aircraft, and had approximately three hours' time in type. His previous two flights were an acceptance flight at purchase, and a short ferry flight to his home field. The incident occurred when the passenger, a rated pilot, was performing a barrel roll. The estimated weight at the time of the accident was 1830 lbs. The following narrative is derived from the data logging device, a Dynon D180. A more detailed discussion is presented later in this report.

The roll was initiated at 3400 ft (181 KIAS), and reached an altitude of 4000 ft (147 KIAS)

In the descent phase, the aircraft reached 3700 ft, with a pitch low angle of -47 degrees, and an instantaneous rate of descent of -13,000 ft/min at 170 KIAS. It was at this point that the pilot flying initiated pitch recovery, but the aircraft continued to descend and build speed. The aircraft continued to descend to 2000 ft with a pitch angle of -18 deg, and vertical descent rate of -4680 ft/min. Three seconds later the horizontal stabilizer departed and there was a -2.6 G event. At this point the pilot/owner took control and initiated a recovery, but the aircraft continued to descend to 455 ft (approximately 400 AGL) before stabilizing. Peak speeds of 244 KIAS occurred after the failure.

Interviews with the pilot substantiated the data logged data. The pilot stated that he believed he was flying well within the aerobatic specifications of the aircraft, which he believed were +6/-3 G at 2000 lbs., as found in this aircraft's pilot's operating handbook (POH). He believed that they had not pulled more than 2 Gs in the sequence, and the data supports this statement.

Note: The G data from the Dynon was not deemed to be reliable while maneuvering, but an estimate was made from the vertical descent data of the Gs experienced. This vector was not aligned with the maneuvering aircraft, but is nonetheless consistent with a low G event.

Aircraft Inspection

The aircraft was inspected on 1/25/2020 by three individuals. All three have built Rocket variants and are familiar with the aircraft construction. Two of the three are A&Ps with a background in experimental aviation. The third has an engineering background with extensive industry experience.

Approximately 75 pictures were taken both before and during the disassembly of the empennage. The starboard HS had departed the aircraft, but the associated elevator remained attached to the aircraft through the elevator horn and a single bolt. The port HS and elevator were bent down approximately 30 degrees. Control travel was limited to about 1.25 inches at

the rear control stick.

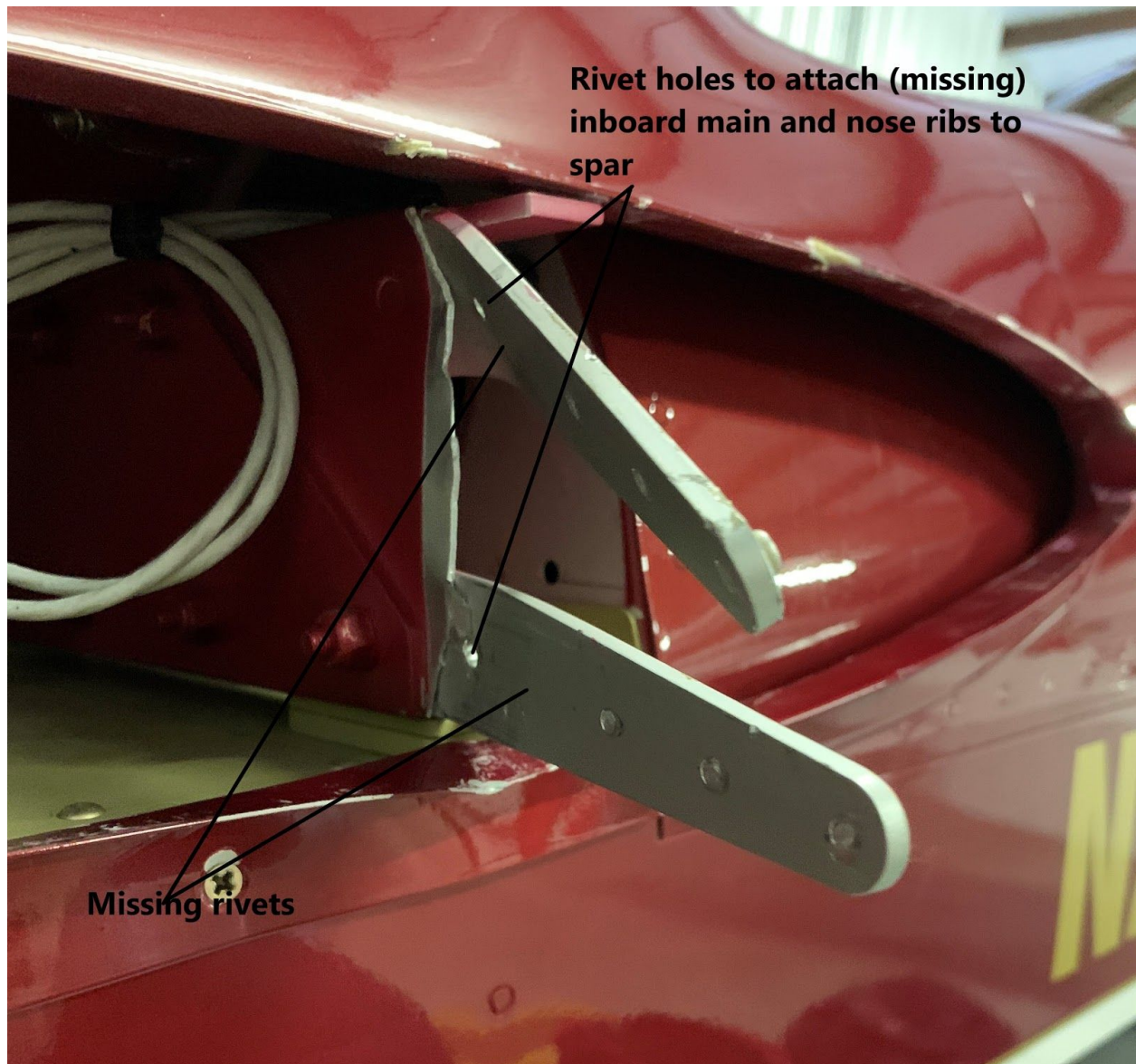


Figure 1

Figure 1 shows the failure of the HS 002 front spar, and the bent legs of the HS 014 spar caps. The failure occurred at the HS 002 bend area as the tapering HS 002 front spar merges with the fuselage.

There was minor damage to the rudder, and no visible damage to the vertical stabilizer. On close examination of the remainder of the aircraft, there was no other visible damage. A story pole was erected to determine if there was any twist in the fuselage front to rear and none was visible.