

No. 24

Skyways Ltd., Hermes 4, G-ALDV, accident at Manor Farm,  
Meesden Green, Herts., on 1 April 1958. Civil Accident Report No. C. 677  
released by the Ministry of Transport and Civil Aviation (U.K.)

Circumstances

The aircraft took off on a test flight from Stansted Airport at 1059 hours and climbed steeply towards the northwest. A few minutes later it was observed approaching the airport from the west at a height of approximately 1 500 ft. At 1113 hours the Air Traffic Control Tower received a radio call from the aircraft in which the captain declared an emergency and said that the controls were jammed. At about the same time the aircraft was seen some 6 miles northeast of the airfield descending in a series of dives and climbs. It crashed in a field shortly thereafter killing the crew of three. The greater part of the wreckage was destroyed by fire.

Investigation and Evidence

Inspection at the scene of the accident showed that the aircraft had struck the ground on a heading of 040°M while descending at an angle of approximately 14°. The wreckage trail extended over a distance of about 200 yards. The fuselage had broken at the centre section and that part containing the flight deck had turned through nearly 180°. The port wing had torn off, all four engines had broken away and apart from the empennage the wreckage had been severely burned. An examination of the control runs in the fuselage and on the flight deck for signs of jamming was without result.

The wreckage was removed to a site with workshop facilities where the control mechanism in the stern frame bay was dismantled. Deep bright score marks were found on the face of the port side elevator datum lever (Figures 18 and 19) adjacent

to the locking latch housing which are movable and fixed parts of the elevator control system. The appearance of these marks under microscopic examination indicated that a hard object such as a small split pin had fouled and jammed the mechanism. Judging by the depth and width of the score marks it was clear that considerable force had been applied to operate the elevator controls. The object referred to above, in spite of an exhaustive search, was not found and it is presumed that it was displaced when the aircraft struck the ground. Several small extraneous objects were, however, recovered from the stern frame bay (Figure 20). Thereupon an inspection of the stern frame bay of another Skyways Hermes aircraft was carried out and a similar assortment of extraneous objects was found. The attention of the Skyways' Inspection Department and the Air Registration Board Resident Surveyor was drawn to the matter at once. Experiments were carried out on a Hermes aircraft in which a piece of 14 swg\* brass wire was introduced into the appropriate part of the control mechanism and an attempt was made to operate the elevator controls from the cockpit. It was found that they could be moved only with the greatest difficulty.

Laboratory examination of the elevator datum lever taken from the crashed aircraft showed differences in the colour of the oxide film among the score marks on one side of the locking slot indicating that some of these marks were of a greater age. The marks of more recent origin were superimposed on the others. The appearance of the superimposed score marks indicated that they were made on the same

\* standard wire gauge

occasion as those on the other side of the locking slot where there is no evidence of previous scoring. There is, however, no record of any previous stiffness or jamming of controls.

Similar but shallower and less extensive marks were reproduced on the starboard side elevator datum lever of the same elevator control unit in a laboratory experiment.

A test rig was constructed so that the unit was rigidly supported and the datum lever operated by a tensile load applied to the control linkage attachment point. This point could be measured against a scale. A new 3/32" split pin was introduced between the datum lever and the latch housing. It was found that the split pin could be forced between the two components by the application of a load of between 110 and 115 lb and that considerable force was necessary to return the datum lever to its neutral position. This force could not be measured because the testing machine was not reversible but it is considered that it was in the order of, or possibly more than, 110 lb. The reversal of the jamming when the mechanism was forced back could well have distorted the split pin further and progressively increased the force necessary to move the datum lever. The datum lever was removed from the unit and an examination of the scores produced showed them to be shallower but very similar to those on the port side datum lever.

#### Observations

1. A force of between 110 and 115 lb at the control linkage attachment point is equivalent to a force of 55 to 60 lb at the spectacle of the pilot's control column. As the marks found on the datum lever after the accident are deeper and more extensive it must be supposed that they

were formed by the application of a greater force than that produced in the laboratory.

It is reasonable to suppose that it was within the capabilities of the pilots to apply enough effort to force the object which caused the score marks on the datum lever between the relevant components and to move the controls to some extent. The resistance of the jammed components to movement would cease suddenly when the controls approached the neutral position and the locking slots in the datum lever and the locking latch housing came into alignment. It is unlikely that the pilots would be able to anticipate this and avoid over-movement and jamming on the other side of the slots.

It is evident from the appearance of the score marks that several such movements did take place. The heaviest scoring undoubtedly resulted from the progressive distortion of the object causing the jamming and it is reasonable to deduce that the force required to move the jammed controls became more than the pilots could exert.

2. The difficulty of keeping aircraft free from extraneous objects is something that constructors and operators have always been aware of as the structure of aircraft is such that small objects can find their way into crevices and inaccessible places. The importance of guarding against this happening and the necessity for absolute cleanliness cannot be emphasized too strongly.

#### Probable Cause

The accident was caused by the elevator mechanism becoming jammed - loss of control resulted. The jamming was due to the presence of a small extraneous object which entered the control mechanism.

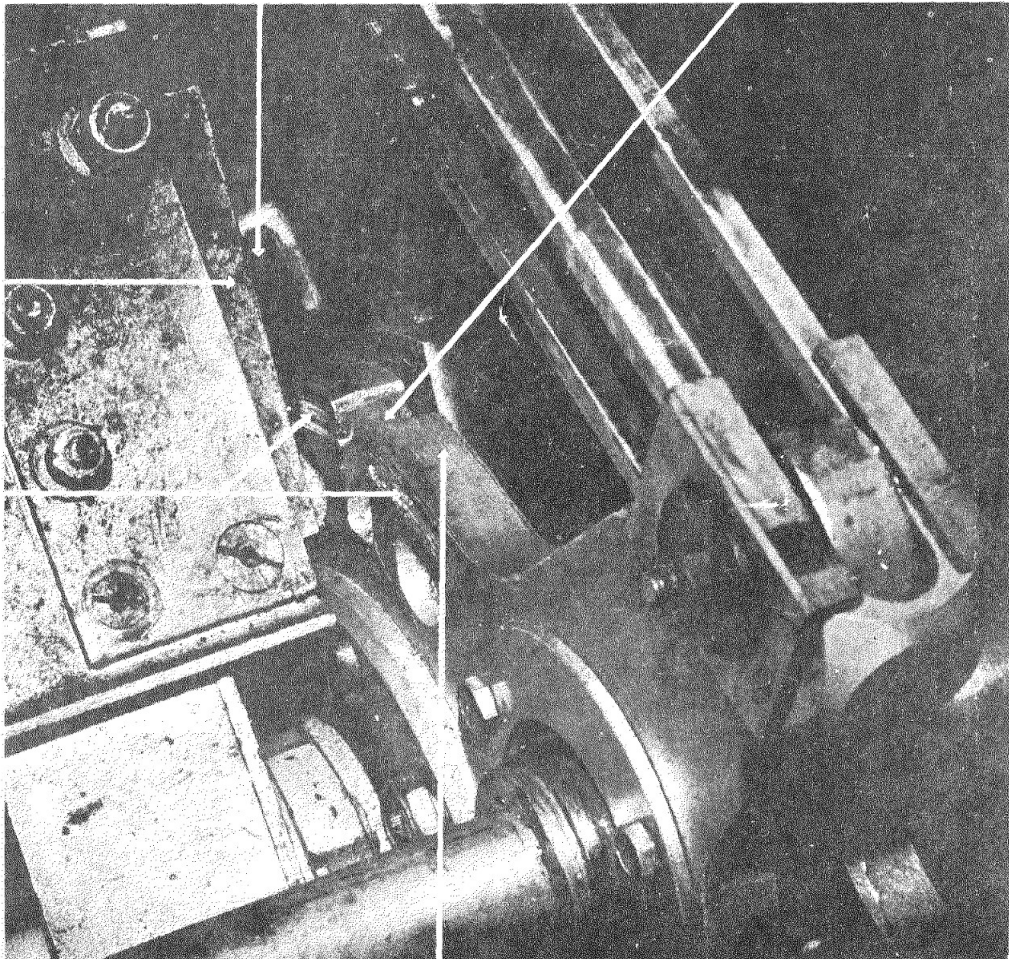
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ELEVATOR LOCKING LEVER  
(For locking elevators  
on the ground only)

ELEVATOR LOCKING  
LEVER SLOT

HEAVY SCORE  
MARKS

LOCKING LEVER  
HOUSING (FIXED PART)



ELEVATOR DATUM  
LEVER (MOVING PART)

FIGURE 18

SHOWING SECTION OF ELEVATOR CONTROL  
ASSEMBLY WHERE JAMMING OCCURRED

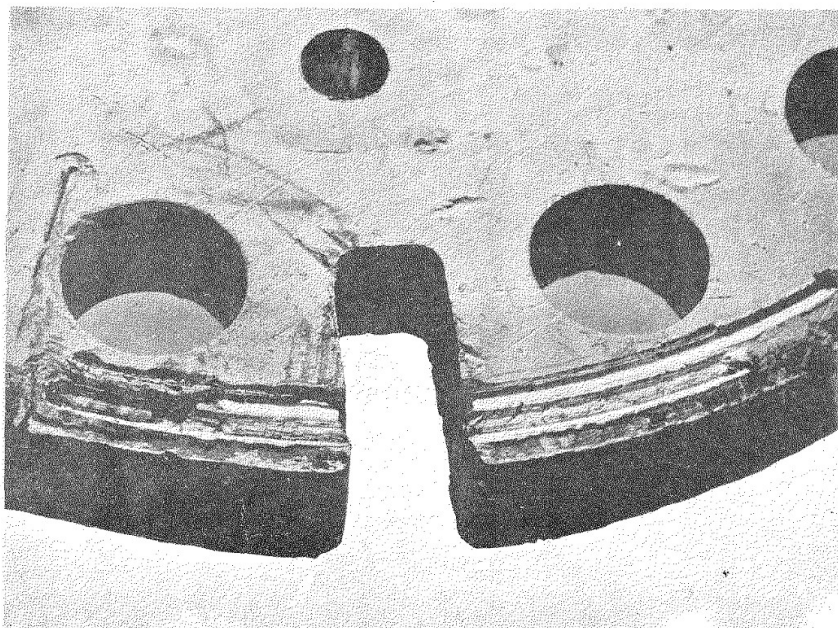


FIGURE 19  
SHOWING SCORE MARKS ON BOTH SIDES OF  
LOCKING SLOT OF ELEVATOR DATUM LEVER

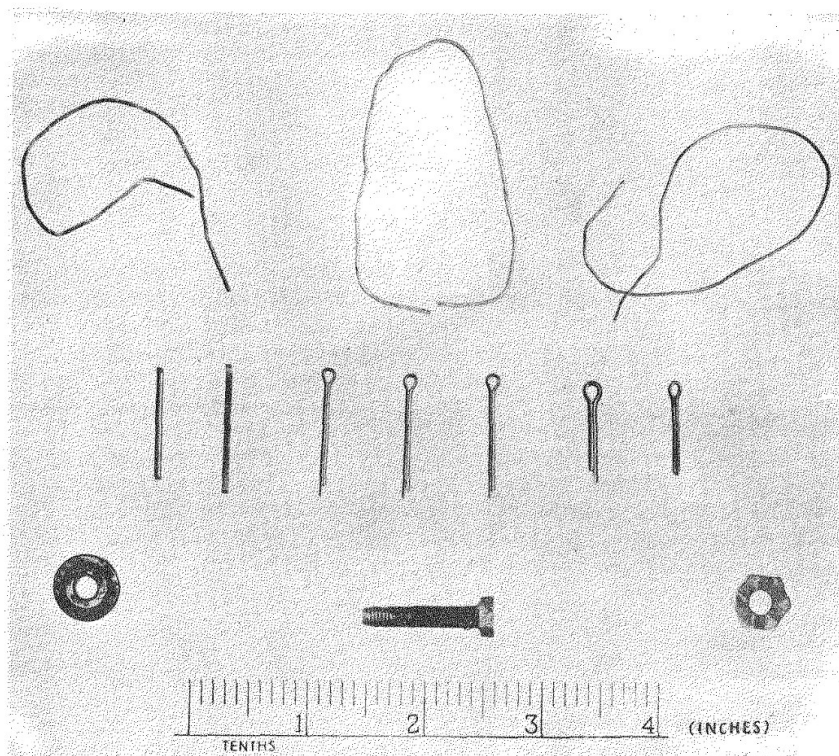


FIGURE 20  
EXTRANEOUS LOOSE ARTICLES FOUND IN THE  
STERN FRAME BAY OF THE CRASHED AIRCRAFT

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