

Elevator Failure, 1972 Grumman Traveler

As many of you are aware, a 1972 AA5's elevator attachment system failed in flight. While there is significant damage to the aircraft, neither occupant is known to have suffered any injury. I would consider elevator detachment a "fail fatal" failure mode, so the two individuals are very lucky.



Photo: Close up.jpg



Photo: Distant image on runway.jpg

The left and right horizontal stabilizers and elevators of the AA5 Traveler are considerably smaller than those of an AA5A Cheetah or AA5B Tiger. Each side, left or right, of any of the models, is the same mirror image of the other.

Both the Traveler and the Cheetah/Tiger utilize a torque tube bonded into the leading edge of the elevator. These left and right torque tubes are inserted into a central bellcrank. Each elevator's torque tube (L & R) is pinned to the bellcrank with a single bolt & nut. The bellcrank is rotated by cables connected to the control yoke in the cabin.



Photo: AA5 Torque Tube Bolts.jpeg

Photo caption: AA5 Elevator Torque Tubes & Bellcrank Assy.



Photo: AA5A Torque Tube Bellcrank.jpg

Photo caption: AA5A Elevator Torque Tube & Bellcrank Assy.

There are also differences in the method of attaching the elevators to the horizontal stabilizers. Each of the Traveler's elevators is secured by and pivots in a single outboard hinge. This hinge is attached on the outside rear of the outboard rib of the horizontal stabilizer, by two screws (AA-5, Fig. 401, items 17, 16 & 18.)

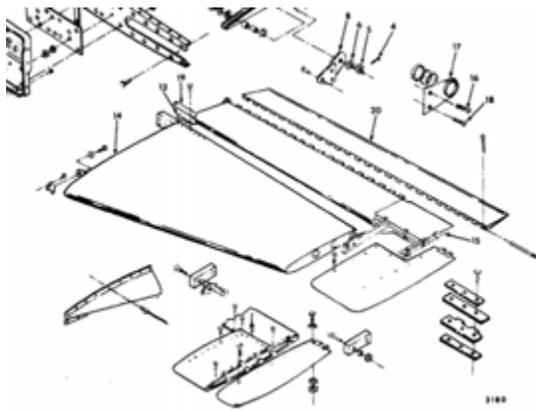


Photo: AA5 Fig 401.png

Photo Caption: AA5 IPC Fig 401 Elevator Assy



Photo: AA5 Outboard Hinge.jpeg

Photo caption: "Looking forward & outward. Blanket is laying on left horizontal stabilizer.

The Cheetah and Tiger's elevators each rotate on two bolts in two hinges, one located mid-span and one located at the outboard end. The mid-span and outboard hinges (item 24 in Fig. 402) are secured to the trailing edge of the horizontal stabilizer by four bolts. Illustration Fig. 402 only shows one of the hinges, in the detail view at the bottom of this illustration.

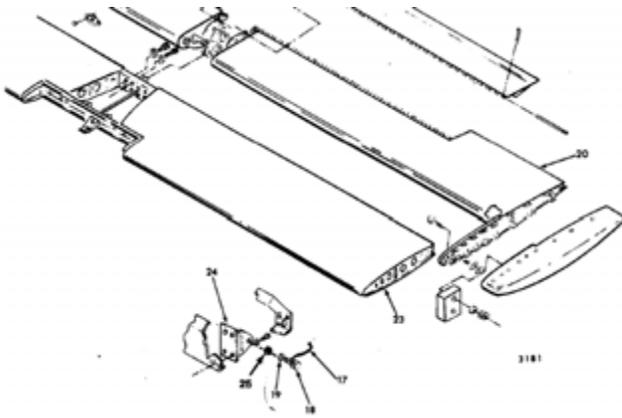


Photo: AA5A Fig 402.png

Photo Caption: AA5A IPC Fig 402 Elevator Assy

While a detailed inspection of all of these elevator bearings and hinges is part of a quality annual inspection, it is possible to include visual inspection of many of these items during a preflight inspection. You may want to use a bungee cord on the yoke to hold the elevator in the full up position during inspection, as needed.

On both the Traveler and Cheetah/Tiger, the hinge and elevator attachment can be viewed with a flashlight from above and below with a flashlight and mirror. Check screws for security & check structure for cracks and/or corrosion.



Photo: Traveler hinge.jpg

Photo caption: AA5 Elevator Outboard Hinge



Photo: Traveler nutplate.jpg

Photo caption: AA5 Nutplate Inspection with Mirror

Also check for delamination of the top and bottom skin from the rib, above and below the hinge attachment.



Photo: Check for delamination.jpg

Photo caption: Check for delamination above & below rib.

This Traveler's hinge nutplates have minor corrosion presenting on the rib, forward of the hinge, around the nutplate rivets.



Photo: AA5 Nutplate Corrosion.jpeg

Photo caption: AA5 Nutplate beginning corrosion.

The hinges of the Cheetah and Tiger are best inspected with a mirror and flashlight from below. Use a soft rag to hold the elevator in the full up position, or pull back & secure the yoke to the seats.



Photo: AA5A Hinge.jpeg

Photo caption: AA5A Elevator Hinge

A narrow flashlight and mirror allow inspection of the attaching bolts and nutplates, and the interior of the trailing edge of the Cheetah and Tiger's outer hinge. The mid-span interior can only be inspected with a long flexible shaft borescope.



Photo: AA5A Mirror.jpeg

Photo caption: AA5A Inspecting Bolts & Nutplates with Mirror.



Photo: AA5A Nutplates.jpg

Photo caption: AA5A Outboard Hinge Inside Rib View of Nutplates in Mirror

Removing the upper half of the tail cone will allow inspection of the torque tubes, bellcrank, bolts, and elevator trim system. It takes about 10 minutes to remove the fairing and 10 minutes to reinstall it. It requires a Phillips screwdriver. Steps: Trim control full aft (nose up.) Remove screws. Trim control full forward (nose down.) Remove upper fairing, being careful to not scratch the paint. Inspect. Reinstall upper fairing. Reinstall all screws loosely. All installed? Lightly torque all screws. Trim control back to neutral.

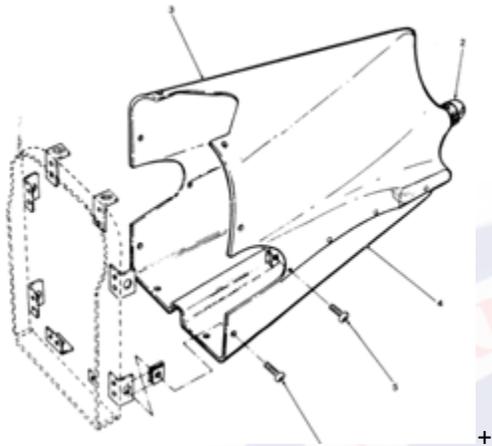


Photo: Tailcone IPC.jpg

Photo caption: AA5, AA5A & B Tailcone.

Hopefully we will learn what caused the elevator attachment failure of N5880L. Stay safe: add a more detailed visual inspection to your preflight!

Thanks to Roger Rowlett for photos and Gary Vogt for photos and discussions about the AA5 aircraft elevator control system.

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Other stuff:

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