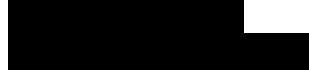




Aug 4, 2023

Ref. T-2307 (19 pgs)
(Addendum A , 24 pgs)

Mr. Josh Gray
Chief Inspector
Winner Aviation



Vienna, OH 44473

Subject: No Technical Objection to Ferry Flight of N515AM with Temporary Repair.

References

- 1) Addendum A, N515AM Damage photos. 24 pages.(attached)
- 2) Document M690003-4, IPC for the 695 Model, Section 2 – NLG, dated 15 Sept 1986.
- 3) Twin Commander Custom Kit CK 159 Revision C, Dated Oct 9, 2013.

Twin Commander, LLC has No Technical Objection (NTO) to permitting a Ferry Flight of aircraft FAA Reg # N515AM, Model 695, Serial Number 95008, from Philadelphia PA (PHL) to Youngstown OH (YNG) to enable proper repairs to be undertaken, provided the limitations stated below are complied with;

- 1) This NTO is based on the assessment of the damaged components and the localized type and scale of the damage, as defined/described by the enclosed photos and those in Addendum A.
- 2) The damage addressed by this NTO, as presented/described by page 3 and Addendum A, are accurate and complete at the date of this NTO.
- 3) Any other damage present on the aircraft and beyond allowable limits, and not listed/depicted within page 3 and Addendum A, is not covered by this NTO letter and must be resolved by the operator prior to flight.
- 4) The temporary repairs, have been installed per AC43.13-2A methods, on the aircraft as presented/described by pages 3-19, using CR3213-4 cherrymax rivets.
- 5) There is no damage to the pressure vessel.
- 6) The Aileron flight control cable drum support hat channel has been reinforced, and the Aileron surface travel/operation has been verified per the 695 AMM.
- 7) The Nose Landing Gear Strut has been detail visually inspected and a dye penetrant inspection of the drag brace attachment bore performed.
- 8) Twin Commander Kits CK159-1 and CK159-2 have been fully installed. Kit CK159-3 was previously installed prior to the incident.
- 9) The four nose landing gear doors, and their linkage mechanism have been removed from the aircraft for Ferry flight. There are no components of the remaining mechanism that may cause interference with the gear, as the landing gear will be left fully extended/fixed for the duration of the flight.
- 10) Ferry flight to be performed with gear down.

- 11) Max aircraft airspeed is no more than 200 KCAS (198 KIAS), per the POH for gear down operations.
- 12) The flight crew consists of a single pilot. No others are permitted for the Ferry flight.
- 13) The aircraft shall carry no payload for this Ferry Flight, except the pilot's travel items.
- 14) Flight into moderate turbulence is to be avoided.
- 15) The Ferry flight consists of a single leg of approx 1-2 hrs (+/-0.5hrs), of approx. 300-330 miles.
- 16) The pilot shall be informed of the significant noise present due to the gear down and doors removed for this flight.

Any restrictions stated in this NTO must be followed to ensure continued safe ground and flight operations. Restriction may include, but are not limited to, periodic inspections, operational limitations, total operating time prior to repair, etc.

Based on an evaluation of the damage noted by the Twin Commander LLC Engineering group, and the temporary repairs installed, the evaluation/inspections of the gear unit, and the installation of the CK159 kits, the noted condition of the aircraft does not pose a safety of flight issue within the limitations stated on the previous page, it is determined the aircraft is safe for Ferry Flight.

This letter of no technical objection is not an FAA approval, and in addition, the operator should seek the required approval from their Civil Airworthiness Authorities.

Yours Faithfully,

[REDACTED]

Conan Fox
Technical Director, Type Certificates

[REDACTED]

Encl.

The Following pages outlined the noted damage and temporary repairs to the 695 Aircraft and are the basis for this NTO.

Incident.

Aircraft flew from Florida to Philadelphia. Gear was extended approx. 4 miles out from landing, and 3 green lights shown. The main gear wheels touched down and the aircraft rotated gently onto the nose gear, upon the nose wheel contacting the runway, the gear collapsed inside the wheel well, causing the aircraft to rotate further downward to cause the belly to contact and scrape along the runway during landing.

Upon inspection, the belly skin and mating structure were found damaged as shown in the photos in Addendum A.

This damage included two antennae, the hat channel supporting the Aileron flight control cable drum, and the lower angle of the frame, which acts as the fwd pressure bulkhead, the fwd fuselage skin and a number of supporting flanges/angles attaching the skin. The pressure vessel was not impacted from the incident per the report.

The complete cause of the gear collapse is not fully understood at this stage, except that the upper drag brace pivot support structure gave way, cause the drag brace to rotate, which initiated the retraction.

The pilot/owner noted some discussion with ground crew in Florida and the aircraft was relocated on the tarmac. There is some speculation by the Winner Chief Mechanic that improper towing may have contributed to the failure.

The Nose landing gear strut assembly and drag brace assy were removed from the aircraft.

The upper drag brace link was found bent. The upper and lower drag brace parts are matched sets and hence they were replaced. The drag brace bore on the nose gear strut was dye penetrant inspected. No damage was reported.

The rest of the gear was detail visual inspected. No damage found.

The normal operation of the gear consists of; the doors open, the gear extends, and then the aft doors close again after the gear is fully extended. The Collapse caused the doors and linkage mechanism to be damaged. These are removed for Ferry Flight.

The wheel well support structure supporting the upper drag brace was damaged.

This aircraft has previously complied with CK159-3, which installs additional structure around the retract actuator aircraft fitting. An inspection of this structure showed no signs of damage using detail visual inspection.

The NLG door bellcrank which is also runs to the steering bypass valve has a broken lug.

Repairs.

The fwd lateral angle supporting the Aileron Drum support hat channel was reinforced as the original angle flange was worn away. The lateral angle at FS12.5 was also damaged. Replacement parts were fabricated from formed sheet alclad 2024-T3, 0.040" thick. The original angles were 0.020" thick of the same material. They are attached using the same number of rivets at the same locations. The skin at FS5.5 was just trimmed out as it was mostly gone from chafing. The skin doubler will restore the skin material.

The damaged skin was roughly trimmed away in areas needed to permit the attachment of a large belly skin doubler. This is designed to replace the skin.

The repair doubler is fabricated from 0.032" thick alclad 2024-T3 material, which is the same as or thicker than the mating skins (0.025" or 0.032").

Where the fwd/aft intercostals, acting as lower keelson web beams were worn away, replacement angles of 2024-T3511 extrusion per AND10135-1005 were used, picking up on the same number of fasteners, attaching to the large skin doubler, and the keelson web. This AND section is a little thicker and has longer flanges than the original B/P angles. In the keelson web, the original BJ4 rivets were drilled out, and new rivets were installed a little higher ensuring enough material into the keelson web, restoring the shear connection.

Twin Commander kits CK159-1 and CK159-2 have been completely installed. The CK159-1 kit removes all of the cracked and damaged structure at the aft upper drag brace attachment.

The lower angle of the frame, which also acts as the fwd pressure bulkhead, was worn thru, and this was re-fabricated with formed sheet of one gage thicker 2024-T3 material. The pressure vessel is actually at the floor height, which is above this angle. Replacement of this angle has no impact on the pressure vessel.

The web of the hat channel which supports the pivot bolt for the Aileron drum was not replaced. It did suffer some chafing damage. Instead, the skin doubler seats over this, and picks up on some of the rivets thru this hat section, all of the rivets to the adjacent fore/aft stringers are picked up and this effectively creates a stiff closeout box. The stiffness of the aileron drum was examined, and a simulated air load was applied to the aileron control surface, and all aileron operation was deemed smooth and full travel limits were obtained.

The skin doubler picks up on all frames, stringers and keelson intercostal structure effectively restoring the longitudinal and lateral load paths. A review of the 680T SRM (as there is no SRM for this model), shows typical external doublers in non pressurized areas, only requiring a single peripheral row of fasteners to the original skin. Over the various Twin Commander models this design element has not changed in the area of the forward fuselage unpressurized section.

The aircraft will be ferried to the repair station in Youngstown for a full repair.

See photos over the following pages for repairs undertaken.



Figure 1: View looking up, FS5.5 and 12.5 (pressure bulkhead) Damaged flanges with skin removed



Figure 2: View looking up/aft, Repair angle at FS23.5 (fwd end of aileron drum hat channel) being worked.



Figure 3 Chafed skin been trimmed out LH Side aft of FS23.5



Figure 4 Chafed skin been trimmed out LH Side just fwd of FS23.5



Figure 5 Repair angle at FS23.5, and chafed skin RH Side



Figure 6 View looking up at FS37.0 – chafed skin cut out.

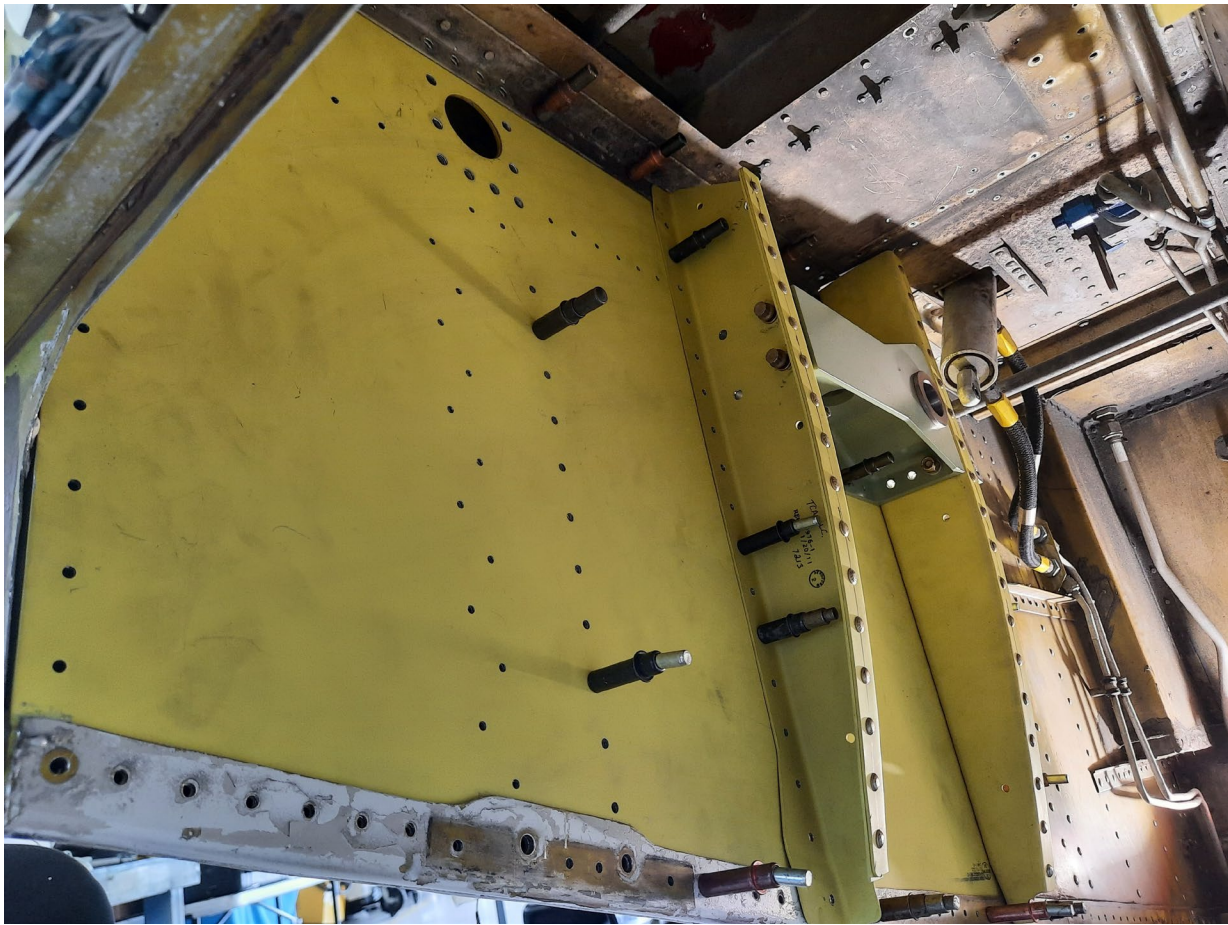


Figure 7 RH CK 159-1 being installed in Keelson web.

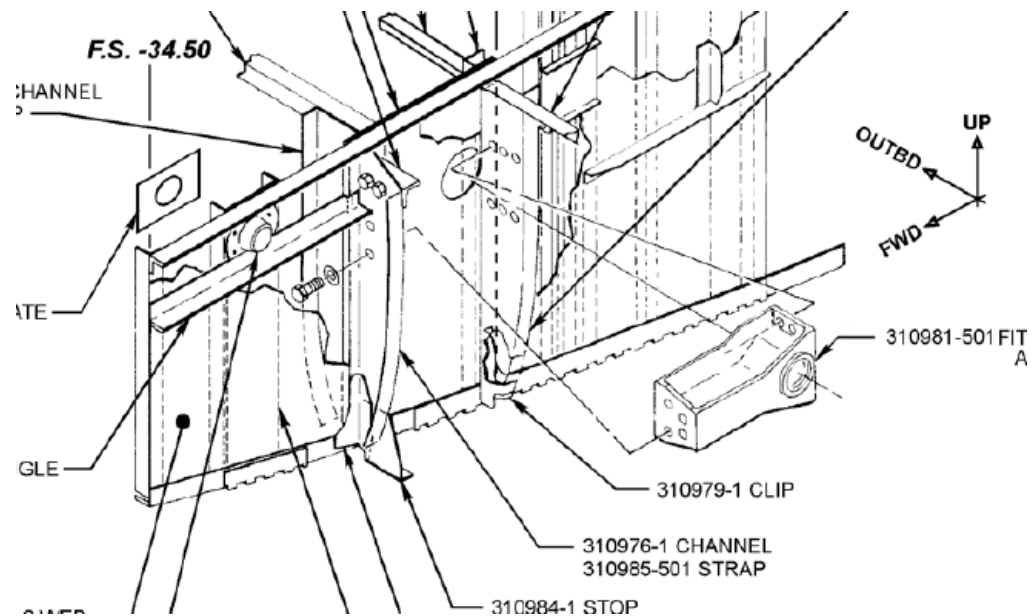


Figure 8: Figure from CK 159-1 showing instln.

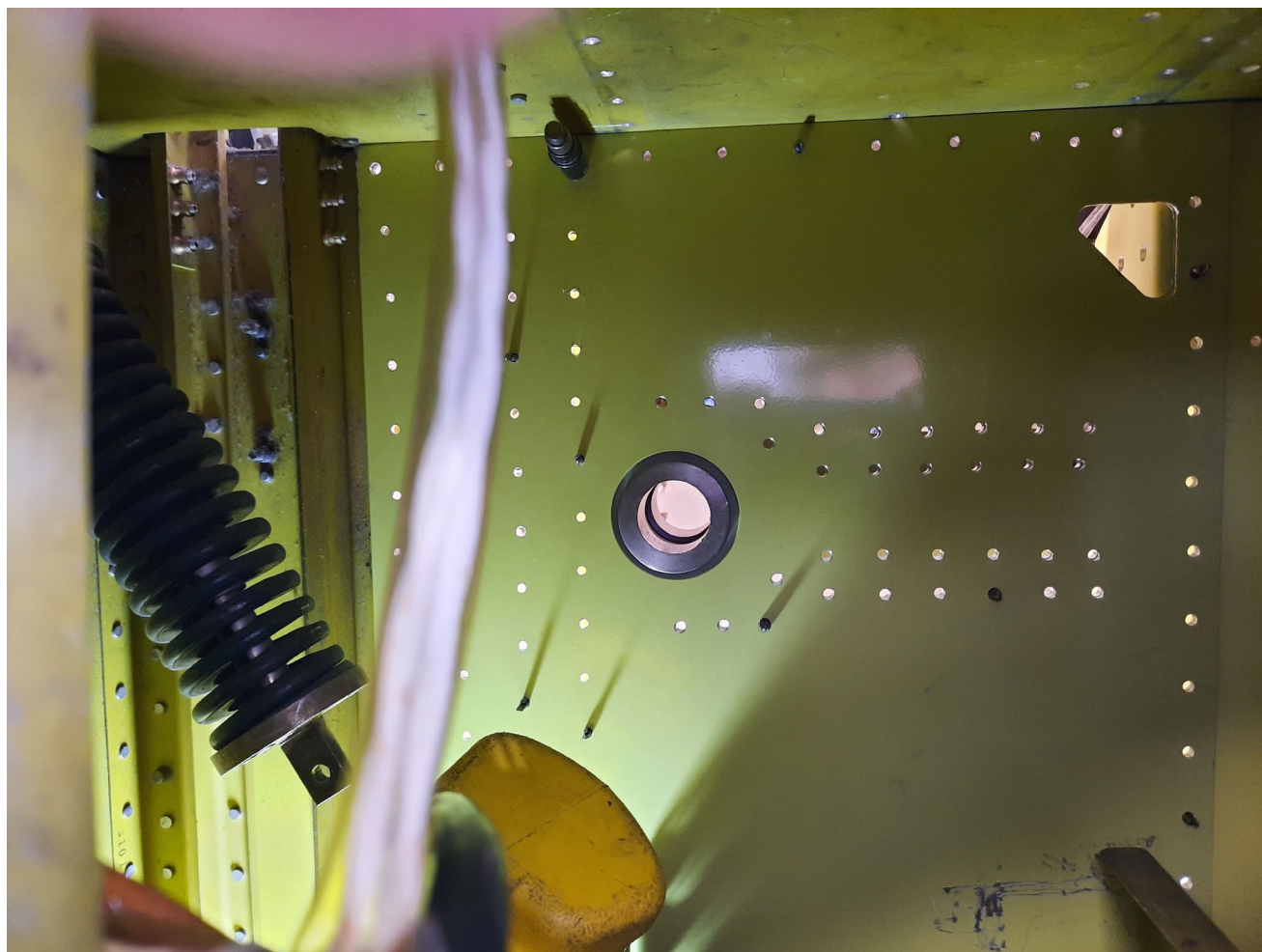


Figure 9 RH CK 159-1 being installed in Keelson web.



Figure 10 LH CK 159-2 being installed to keelson



Figure 11 LH CK 159-2 being installed to keelson



Figure 12 keelson web lower intercostals being repaired



Figure 13 keelson web lower intercostals being repaired



Figure 14 View looking up/aft Mylar being used to transfer holes to skin doubler.

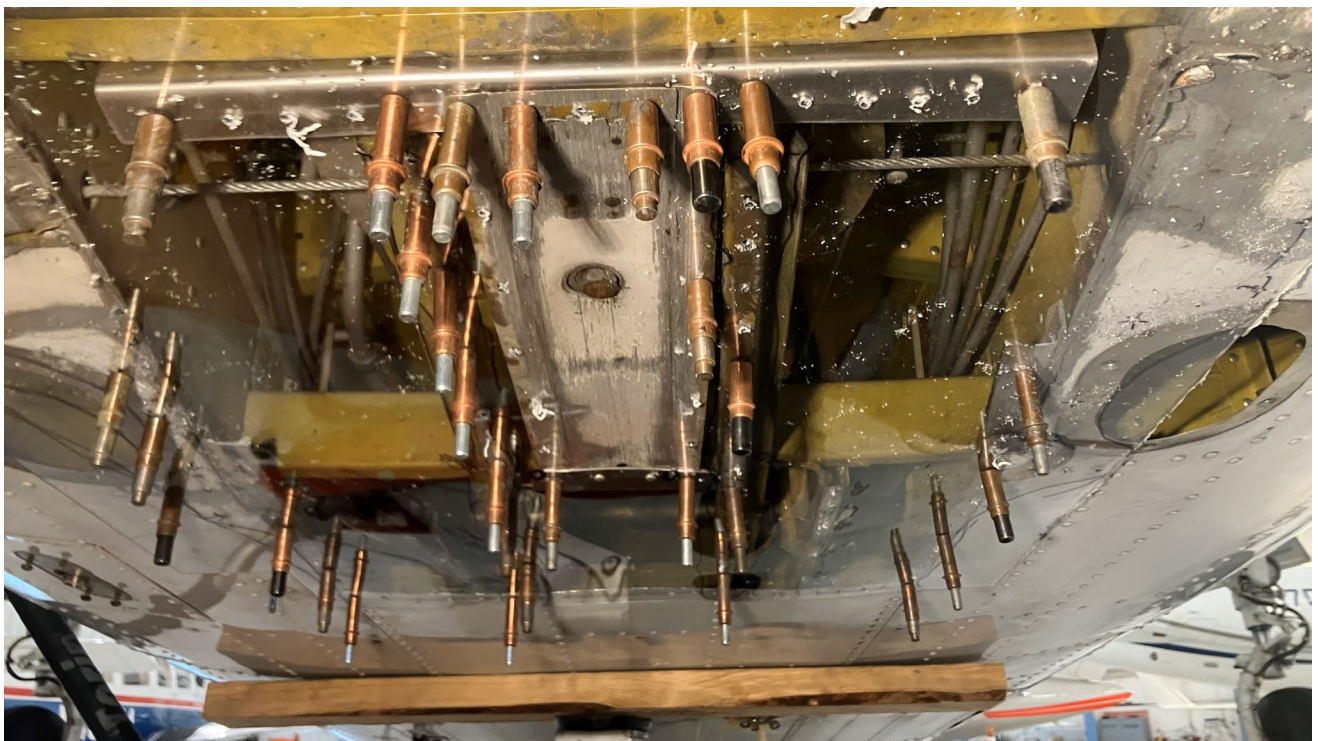


Figure 15 View looking up/aft, fasteners holes being drilled in mylar to transfer to skin doubler.

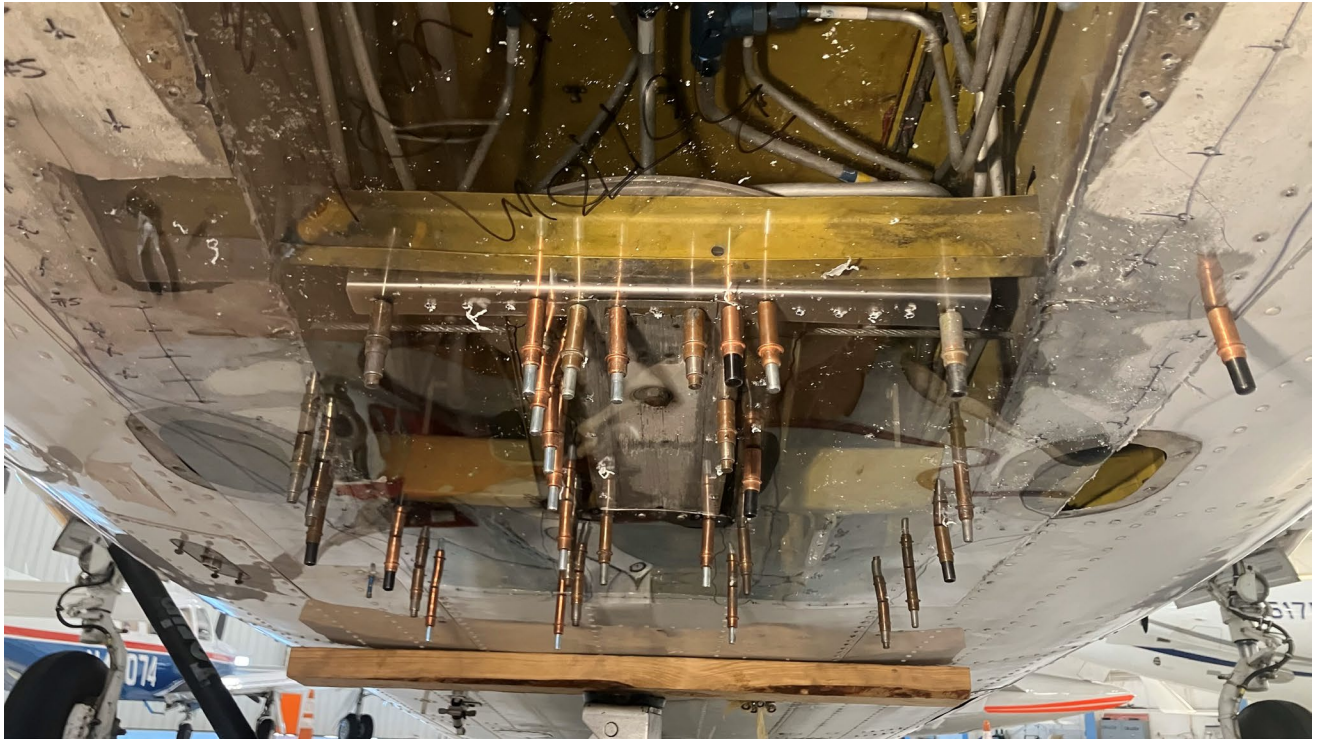


Figure 16 View looking up/aft, fasteners holes being drilled in mylar to transfer to skin doubler.



Figure 17 Skin doubler taking shape.



Figure 18 Skin doubler attach holes being located and picked up.

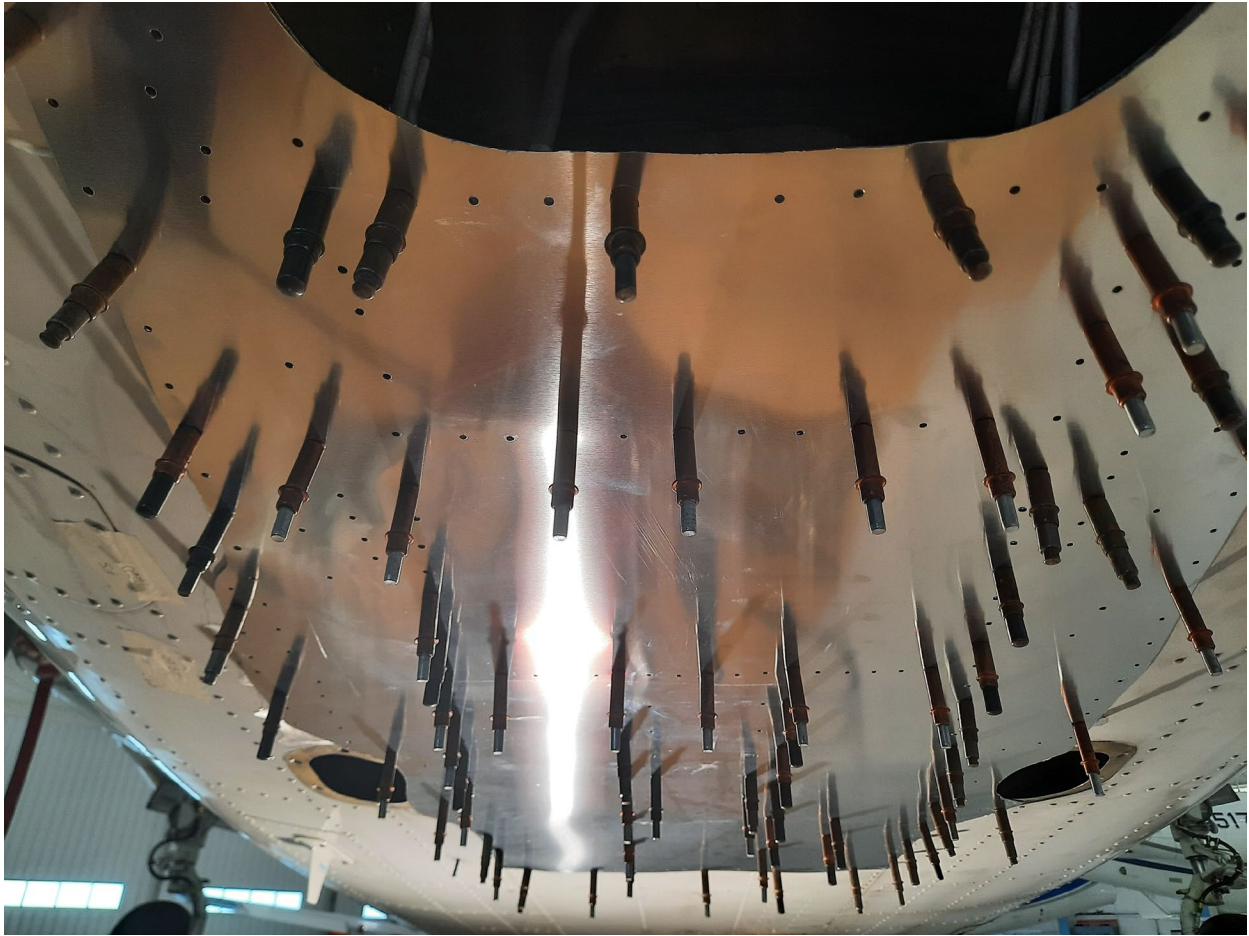


Figure 19 Skin doubler attach holes being located and picked up.

End.