



AIRWORTHINESS BULLETIN

AWB 53-011 Issue 1 – 12 Jul 2019

Cessna 210 and 177 Wing Carry-through Spar

An Airworthiness Bulletin is an advisory document that alerts, educates and makes recommendations about airworthiness matters. Recommendations in this bulletin are not mandatory.

1. Effectivity

All Cessna 210 and Cessna 177 models with cantilevered (un-strutted) wings.

2. Purpose

To provide additional information to assist in managing the airworthiness of Cessna 177 and 210 Wing Carry-through spar forgings.

3. Background

A recent fatal accident on an Australian registered Cessna T210M aircraft may have been caused by a fatigue fracture of the spar where cracking had initiated from a corrosion pit on the lower surface of the wing carry-through spar. The spar failed inboard of the right-hand wing attachment lugs where the lower cap transitions into a carry-through tension tie that connects to the left-hand wing attach lugs (Figure 1).

While the accident investigation is currently being carried out by the ATSB, a preliminary ATSB report shows that the spar had experienced very minor surface corrosion pitting on the lower cap lower surface and that no other mechanical damage was found at the fracture surface. The corrosion pit was 1.82mm long and 0.3mm deep. Figures 2 through 4 refer to the fractured spar, and Figures 5 and 6 show pitting corrosion evident on the lower surface of the lower spar cap.

A review of Defect Reports (DRs) and industry feedback regarding corrosion to carry-through spars fitted to Cessna 210 G through M models show that the design is prone to moisture ingress at the upper wing skin joint. The upper wing skin joint is where the fuselage cabin roof skins are attached by solid rivets to the carry-through spar upper cap forward and aft flanges. If this area is not sealed correctly moisture could seep into the joint and run down the spar to soak the upholstery pads adhered to the spar lower cap, or soak the electrical wiring over-braid. Wet pads or wet over-braids in contact with spars that have not been primed and/or corrosion inhibited may be especially susceptible to corrosion damage.

Later Cessna 210 models (N through R) were redesigned so that the fuselage cabin roof skin is not attached to the carry-through spar but is continuous. This redesign has minimised the moisture seepage issues through the skin joint experienced by the early models. However, some incidents of corrosion have still been reported despite the carry-through spar being coated with primer.

Cessna advise that the Cessna 177 models have the same design and potential for similar corrosion on the carry-through structure as in the Cessna 210. This is supported by industry submitted DRs.



Furthermore, both early and later Cessna 210 and Cessna 177 models can also experience moisture ingress from the wing root rib panel cut-outs located adjacent to the carry-through spar wing attachment lugs.

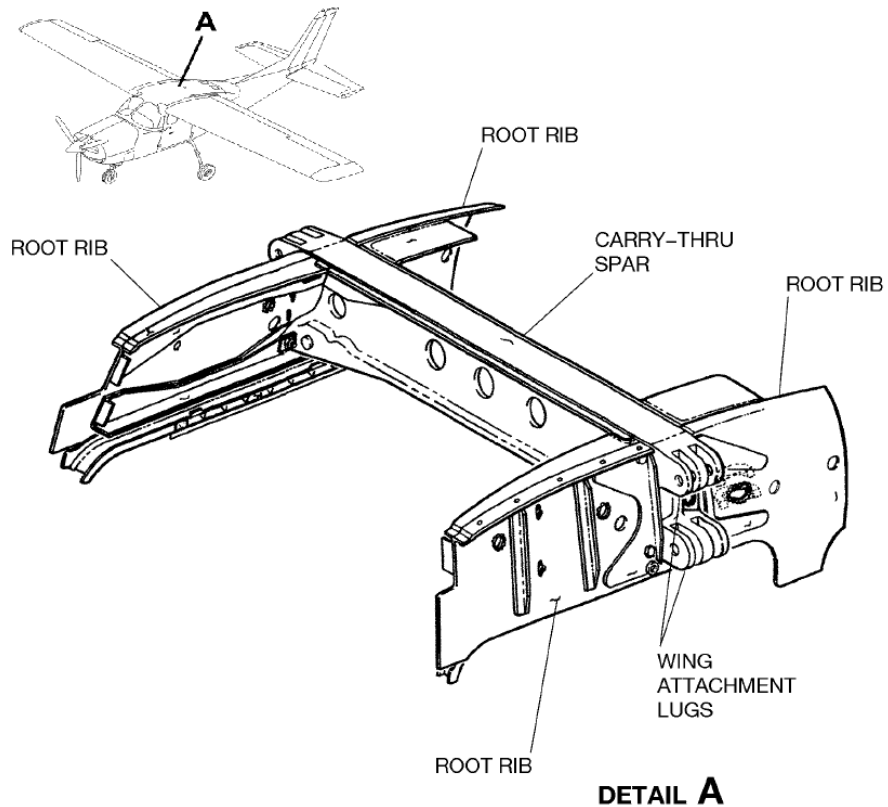


Figure 1: CESSNA Aircraft Company Model 210 Series (1970-1976) Service Manual Carry-Thru Spar Corrosion Inspection Figure 1 (Sheet 1) D2002-5-13 Temporary Revision Number 11 Aug 1/2011



Figure 2: Photograph of Cessna T210M Fractured Carry-Thru Spar. View looking AFT at lower chord surface. Photo: ATSB AO-2019-026 Preliminary Report



Note: Preliminary investigation of the failed carry-through structure showed that a crack quickly grew to a critical size from a very small corrosion pit. Detection of any crack is likely to be very difficult, even with eddy current methods on the forging lower cap lower surface, as it will be in compression on the ground. It is recommended to mark out small zones on the lower surface and overlap the ECI probe path to ensure no areas are missed. The crack on the failed carry-thru spar propagated in the fore/aft direction across the lower cap lower surface.

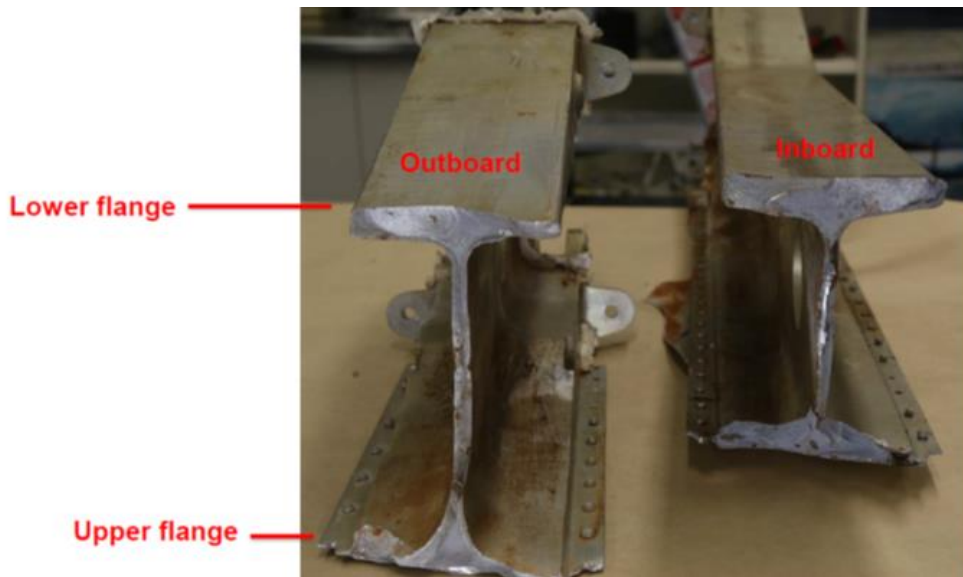


Figure 3: Photograph of Cessna T210M Fractured Carry -Thru Spar Fracture Surfaces
Photo: ATSB AO-2019-026 Preliminary Report

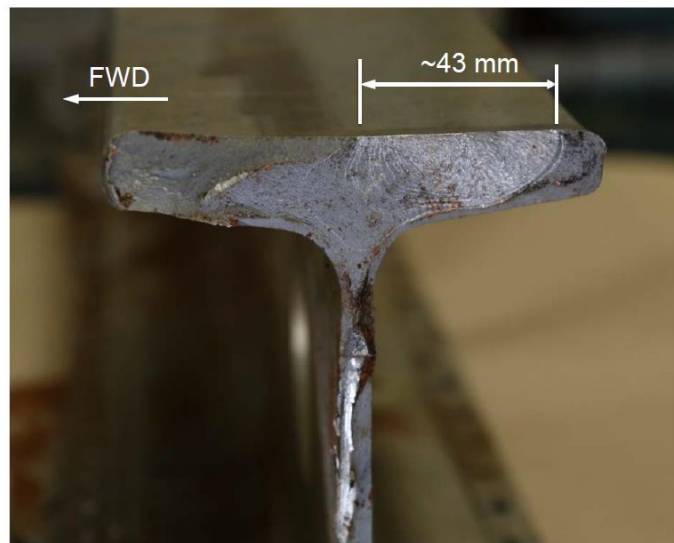


Figure 4: Photograph of Cessna T210M Fractured Carry -Through Spar INBD Fracture Surface.
Photo: ATSB AO-2019-026 Preliminary Report

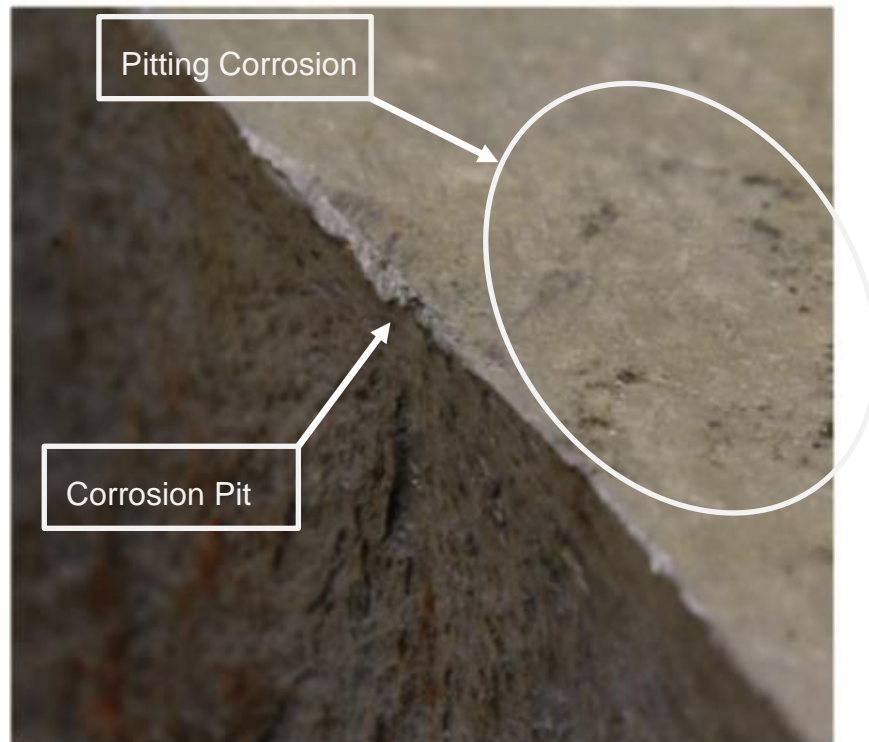


Figure 5: Photograph of Cessna T210M Fractured Carry -Through Spar INBD Fracture Surface.
Pitting Corrosion Pits evident.
Photo: ATSB AO-2019-026 Preliminary Report

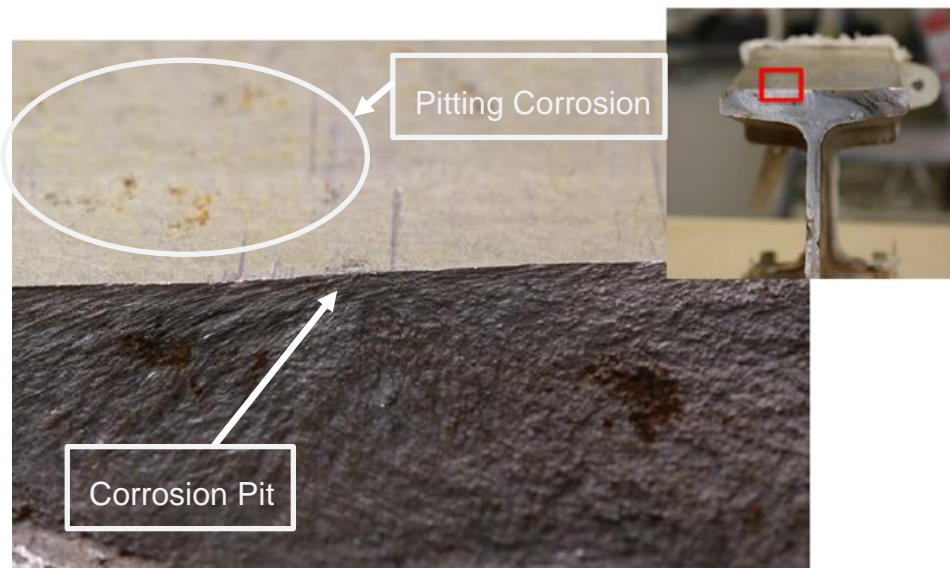


Figure 6: Photograph of Cessna T210M Fractured Carry-Through Spar OUTBD Fracture Surface
with Corrosion Pit evident.
Photo: ATSB AO-2019-026 Preliminary Report



4. Recommendations

CASA recommends that all operators and maintainers of Australian registered Cessna 177 and 210 aircraft with cantilevered (unstrutted) wings carry-out the following:

- Cessna 210 Service Letter SEL-57-06 and Cessna 177 Service Letter SEL-57-07 or later revisions as appropriate which relate to one-time inspections of the lower surface of the carry-through lower cap. It is prudent to extend the enhanced inspection (10 x magnification and bright light source) to the upper surface of the lower cap and the carry through web where visible with the aid of a mirror and/or borescope.

Note: CASA recognises that some maintenance programs already require compliance with these Cessna Service Letters.

- CASA advise that whilst the cabin interior and head-liner is removed for this inspection that it may be an opportune time to carry out other appropriate repeat inspections at the same time.
- The Cessna Service Letter requires determination of usage criteria in accordance with section 2A-10-00 of the service and maintenance manual. CASA advise that section 2A-10-00 involves an assessment of utilisation and environment to determine the correct usage criteria. CASA recommends following the severe usage instructions in most cases.
- For Cessna Models with skin attaching to the carry-through (Cessna 210 G-M models), the following is recommended in addition to carrying out the Cessna Service Letter procedure:
 - a. Visually inspect the serviceability of the fuselage cabin skin to carry-through forward and aft joints for the condition of the sealant, any signs of bulging of the skin and for any loose or missing solid rivets. If corrosion is suspected, disassemble the joint to allow for a detailed visual inspection for corrosion or cracking.
 - b. If the joint is opened, it is recommended that fay surface sealant is applied IAW Cessna Service Manual 2A-30-01.
 - c. If the joint edge sealant is found deteriorated, clean up and reapply the edge seal IAW Cessna Service Manual 2A-30-01.



- Some aircraft have modifications to ensure the cabin headliner is securely attached to the forging which may promote retention of water and chaffing against the carry-thru structure thereby exacerbating the potential corrosion problem (Figure 7).



Figure 7: Photograph of strap configuration on some aircraft.

- Visually inspect the gap sealant applied between the wing root rib panel cut-outs and the carry-through spar for condition or evidence of watermarks or water streaking. If the joint edge sealant is found deteriorated clean up and reapply the gap seal IAW Cessna Aircraft Company Service Manual 2A-30-01.
- Contact Cessna Customer service for evaluation of any corrosion damage detected and for damage limits on the carry-through forging structure.
- Notify CASA via the Defect Reporting System of any corrosion or cracking found.

These recommendations are based on the information available. Further actions may be recommended and/or mandated, depending on the outcome of current enquiries and available information.



5. Supporting Documentation

ATSB AO-2019-026 Preliminary Report

CESSNA 210 SERVICE LETTER SEL-57-06

CESSNA 177 SERVICE LETTER SEL-57-07

Cessna Aircraft Company Service Manual 2A-30-01 Corrosion Prevention and Control program

6. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link email address:

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