



# UNIVAIR AIRCRAFT CORPORATION

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## UNIVAIR®

January 11, 2006

Dear Ercoupe Owner,

The following information is a new Service Bulletin 32. We are supplying some revisions of existing Ercoupe Service Memoranda, Memo 19 and 35. The new Service Bulletin 32 is being issued as a result of a fatal accident. An Ercoupe was severely over-stressed during a non-approved aerobatic maneuver resulting in a center section failure. In the course of the accident investigation, the National Transportation Safety Board (NTSB) discovered that among the rivets that fasten the spar web to the upper and lower spar caps, there was evidence of several pre-existing corroded rivets. These rivets had their heads or buck tails popped off revealing evidence of corrosion or leaving the corroded shank of the rivet. On all of these rivets there was no evidence of any corrosion visible on either side of the spar cap. A very knowledgeable conscientious mechanic would not have noticed any problems with these rivets upon a visual inspection.

The NTSB's findings were that the over-stressing of the aircraft was the cause of the accident. The failure of the rivets was a secondary result of the front beam structure being torn apart. The NTSB brought it to our attention that there needed to be some way to inspect for hidden corrosion. Their suggestion was to use ultrasonic testing. We settled on the following; the center section inspection must be performed by a qualified Level II or III Non Destructive testing technician using a portable ultrasonic flaw detector with digital thickness using 15 MHz 0.25 inch diameter transducer with a 0.75-inch delay line.

Univair's Sales staff can assist owners and operators with replacement parts issues and they can answer general questions about S.B. 32 or the other attached Service Memos. However, questions regarding ultrasonic flaw detectors, 0.75-inch delay lines and the finer points of the actual inspection will need to be directed to a qualified non-destructive testing technician.

Ercoupe Service Memorandum 35 addresses Rigging. This Memo has been revised to emphasize that the rudder cables need to be *crossed* at mid tailcone for proper rigging of the aircraft. There has been some revisions made to Sketch A.

Ercoupe Service Memorandum 19 addresses Discussion of Longitudinal Trim Devise and is referenced in Service Memo 35. There have been some text changes to update this Service Memo.

If you no longer own your aircraft, please forward this information along to the current owner.

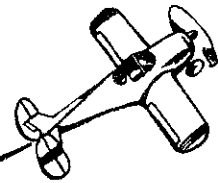
Sincerely yours,

Michael D. Sellers  
Marketing and Sales Manager

ERCOUPE  
SERVICE  
BULLETIN  
No. 32

# Ercoupe BULLETIN

**SUBJECT:** Mandatory Wing Center Section  
Inspection



October 18, 2005

## MANDATORY SERVICE BULLETIN NO. 32 WING CENTER SECTION INSPECTION

**DATE:** October 18, 2005

**SUBJECT:** Mandatory ultrasonic examination of all the upper and lower spar cap 5/32-inch, 1/4-inch and 5/16-inch fasteners (rivets) in the Main Spar Center Section carry through structure. See Figure 1.

**MODELS AFFECTED:** All Ercoupe 415-C, 415-CD, 415-D, 415-E and 415-G aircraft.  
All Forney F-1 and F-1A aircraft.  
All Alon A-2 and A-2A aircraft.  
All Mooney M10 aircraft.

### STATEMENT OF DIFFICULTY:

Based upon inspections in accordance with Service Bulletin 31, there have been reports of light to severe corrosion and/or damage, (broken rivets attaching center section shear web to the upper and lower spar caps), in the wing center section structures of several aircraft. If corrosion has been detected anywhere in the wing center section additional hidden corrosion may be present in the main center section spar cap rivets. This corrosion cannot be seen by the visual inspection methods outlined in Service Bulletin 31. If the aircraft has experienced hard landings the main spar rivets may be damaged. Internal corrosion or internal damage of the rivets in the spar caps, if severe enough, could lead to structural failure of the wing center section, which could result in loss of control of the airplane. Consequently, this Service Bulletin provides for the ultrasonic inspection of the wing front spar carry through beam assembly rivets to establish the airworthiness of the center section structure.

**COMPLIANCE:** Initial inspection required within the next 12 calendar months or within the next 100 hours time in service or annual inspection,

whichever occurs first. Continued inspections every six years or whenever additional corrosion or an extraordinarily hard landing is suspected, whichever comes first. It is suggested to adjust the repetitive inspection to coincide with every other 3 year inspection required for Ercoupe Service Bulletin 31.

**PERSONNEL:** **IMPORTANT:** Personnel performing ultrasonic examinations shall be qualified and certified in accordance with the requirements of National Aerospace Standard NAS 410 (*Additional information is available on the web. Search Google.com for NAS 410*). Only certified Level II and III personnel shall interpret examination results to determine acceptability.

Additional work and inspections required by this Service Bulletin are to be performed by a properly rated and equipped certified mechanic or repair station with experience in the work, use of equipment, inspections, and repairs listed.

**TOOLS REQUIRED:** The following equipment has been shown to adequately perform the inspections required by this Service Bulletin. Independent laboratories that have nondestructive testing capability using ultrasonic portable flaw detectors and transducers made by other company brands may be used provided satisfactory results are obtained.

Panametrics Epoch 4 flaw detector with digital thickness using 15 MHz 0.25 inch diameter transducer with a 0.75-inch delay line.

Aluminum blocks with thicknesses of .080", .125", .250", .375", .500", .750", 1.00" and 1.25" that are commercially available.

Sonotec (or other suitable brand) ultrasonic couplant

**PROCEDURE:**

Prepare aircraft for ultrasonic inspection by providing access to the main spar center section carry through beam.

Remove the forward floorboard, seat cushion(s), seat bucket(s), and any other interior items necessary to gain clear access to the wing center section where it passes through the fuselage. See Figure 1.

On aircraft so equipped, remove the left and right window slide guide on the side of the fuselage to allow access into the wing center section walkway behind the spar.

If the aircraft was inspected per Ercoupe Service Bulletin 31 using Method No. 1, the installation of 8 inspection openings in the bottom of the wing center section, remove these covers to provide access for the ultrasonic transducer to the bucked end of the 5/32-inch, 1/4-inch and 5/16-inch diameter rivets on the rear of the center section spar carry through structure.

If the aircraft was inspected per Ercoupe Service Bulletin 31 using Method No. 2 or 3, then the outer wing panel must be removed to accommodate access for the ultrasonic transducer to the bucked end of the 5/32-inch, 1/4-inch and 5/16-inch diameter rivets on the rear of the center section spar carry through structure.

**Remove outer wing panels using following procedure for each wing.**

(This procedure is best accomplished by two or more people)

- Remove self-tapping sheet metal screws attaching fairing strip at the gap between the center section and the outer wing panel. Remove the fairing.
- Remove the aileron push-pull tube at the aileron inboard end.
- Disconnect electrical wires leading to the wing tip navigation light, landing light(s) (if installed) and strobe light(s) (if installed).
- Disconnect the pitot and static line (left outer panel only).
- Place a padded support under the wing tip, or have someone support the wing at its tip.
- Remove the two 5/16-inch bolts from the rear spar attachment fitting, and the two 5/8-inch bolts from the wing hinge fitting at the main spar. Take great care to not damage the wing attach fitting on the outer panel or on the center section by either twisting the panel or moving the tip fore or aft. Remove the outer wing panel by pulling straight out.

The following procedures are based upon the use of the Panametrics Epoch 4 flaw detector with digital thickness with 15 MHz 0.25 inch diameter transducer with a 0.75 -inch delay line. Slight modifications to the procedures may be required if other ultrasonic flaw detection equipment is used. The initial inspection is done to provide a base line of no corrosion and no failed rivets.

**1. Preparation -**

- 1.1 Clean all areas on and around the aft sides of rivets connecting top and bottom spar caps to the front center section spar carry through structure. The inspection surfaces shall be smooth and flat and free from pitting, roughness, scale, loose paint, and foreign material that would interfere with inspection results.

| <b>Table 1 - Critical Fastener Dimensions</b> |                              |      |                 |                                                                     |                                                                                      |                                                                                          |                |
|-----------------------------------------------|------------------------------|------|-----------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------|
| Area                                          | Size                         | Qty. | Fastener Length | Bucked Tail Length<br>(Critical Area)<br>See Example Fig. 1, Dim. 1 | Bucked tail to aft side of spar web<br>(Critical Area)<br>See Example Fig. 1, Dim. 2 | Bucked tail to forward side of spar web<br>(Critical Area)<br>See Example Fig. 1, Dim. 3 | Head Thickness |
| A                                             | 5/32" (.156")                | 160  | .290" to .370"  | .060" to .110"                                                      | .215" to .275"                                                                       | .245" to .310"                                                                           | .065" to .070" |
| B                                             | 1/4" (.250")                 | 32   | .525" to .580"  | .135" to .155"                                                      | .275" $\pm$ 10%                                                                      | .370" $\pm$ 10%                                                                          | .185" to .190" |
| C                                             | 5/16" (.312")                | 12   | 1.00" to 1.03"  | .150" to .215"                                                      | .450" to .515"                                                                       | .594" $\pm$ 10%                                                                          | .230"          |
| D                                             | 5/16" (.312")                | 12   | 1.18" to 1.25"  | .150" to .215"                                                      | .545" to .610"                                                                       | .670" $\pm$ 10%                                                                          | .230"          |
| E                                             | 5/16" (.312")<br>Countersink | 2    | .990" to 1.01"  | .150" to .215"                                                      | .575" to .640"                                                                       | .700" $\pm$ 10%                                                                          | Countersink    |
| F                                             | 5/16" (.312")                | 12   | 1.232" $\pm$    | .150" to .215"                                                      | .575" to .640"                                                                       | .700" $\pm$ 10%                                                                          | .230"          |

## 2. Instrument Set-Up -

2.1 With the thickness gate enabled, place the transducer on the blocks that represent the different critical areas along the length as indicated in Table 1 and adjust the instrument so that three distances match that of the fastener to be inspected.

2.1.1 At least a three point calibration shall be used for each of the different fastener lengths.

2.1.1.1 The three points of calibration shall be made on the block nearest the following distances:

- (a) Buck tail length (shop deformed end to aircraft structure)
- (b) Buck tail end to fastener head face
- (c) Full fastener length

2.2 The reflections from all three steps must fall between the first and second reflections of the delay line and the range setting should be at maximum screen width of the fastener to be inspected.

2.3 Adjust the gain from the farthest distance of the fastener to be inspected to approximately 100% FSH (Full Screen Height).

2.4 Add 6db and place the transducer on an assumed good fastener. The back surface reflection from the full length of the fastener should be approximately 80% to 100% FSH. This will be the corrected scanning gain.

2.5 The bucked tail portion of the fastener length may be verified by moving the transducer away from center towards the edge of the bucked tail.

- 2.6 Carefully monitor the back reflection and evaluate any indications that may be encountered.

NOTE: *Bucked fastener lengths may vary by as much as 10%.*

### 3. Inspection Process –

- 3.1 The critical area of inspection for each fastener is where the fastener shank meets the bucked tail, where the fastener shank meets the head of the fastener and the shear plane between the spar web and the spar cap. These dimensions can be found in Table 1.
- 3.2 The inspection shall be performed from the bucked (flat) end of the fastener accessed from the aft side of the forward main spar web.
- 3.2.1 With the transducer diameter (.250") being larger than the fastener shank on the 5/32" (.156") fasteners, there will be an indication at .080" from the flattened sides of the bucked fastener. These indications are normal, but should be observed for consistency.
- 3.3 Inspect all fasteners, upper and lower, of the forward main spar center section to the outboard panel.
- 3.4 Care must be exercised in maintaining good coupling between transducer and fastener for consistent results.
- 3.5 Marking and inspecting groups of approximately 20 to 30 fasteners at a time is recommended. An additional technician to manipulate the transducer may be helpful due to limited access.

### 4. Acceptance Criteria –

Any of the following shall be cause for rejection:

- 4.1 Any fastener found to be defective or cracked shall be cause for rejection.
- 4.2 All rejected fasteners shall be replaced by a properly rated mechanic or an authorized repair station per paragraph 6.

### 5. Reports –

Ultrasonic examinations shall be documented and the results maintained in the permanent aircraft logs.

Any inspection report indicating the discovery of failed rivets and or significant corrosion shall be reported to Univair Aircraft Corp and the FAA. Use Malfunction or Defect Report form 8010-4 for FAA notification.

Information on the inspection report shall include the following:

Date

Aircraft Owner and Registration Number

Aircraft Make, Model, and Serial Number

Total time on aircraft at time of inspection

Inspector Job Number

Inspection equipment manufacturer and model

Instrument settings

Transducer size, frequency range

Reference standard and standardization technique

Reference gain and scanning gain

Location of significant discontinuities and other relevant characteristics of the indication

An interpretation of the results and a description of any special circumstances

## 6. Additional Inspection and Repair –

Carefully drill out each rivet that shows signs of corrosion or damage, **NOTE:** *Caution following this section.* Inspect the holes where the rivets have been drilled out. If there are no signs of corrosion or damage in the holes, the rivets may be replaced with the same size and type of rivets after corrosion prevention measures are taken (see instructions below). If there are signs of corrosion or damage in the holes, carefully inspect the holes to determine if the corrosion or damage extends to the interfaces between the spar caps, spacers, and web.

For all drilled out 5/32 inch diameter rivets only: If corrosion and/or damage does extend beyond the rivet holes, drill the holes to the next size rivet to remove the corrosion or damage unless the rivet is already the next size larger. If corrosion or damage is still evident, the center section spar must be replaced.

For all drilled out rivets 3/16 inch diameter and larger: If there are no signs of corrosion or damage in the holes, the rivets may be replaced with the same size and type of rivets after corrosion prevention measures are taken (see instructions below). If Corrosion or damage is evident, the center section spar must be replaced with a new or serviceable part.

**CAUTION:** Some of the rivets used in the wing center section spar assembly are very large. Most shops and mechanics do not have the equipment to set such large rivets. Do not drill out rivets if you do not have the proper tools and skills to set the replacement rivets. Do not substitute bolts for the rivets. Rivets are hole-filling fasteners and, therefore, provide better fit in the holes than bolts.

Remove all light corrosion about areas where rivets were drilled out in accordance with the procedures outlined in Chapter 6, Section 5 of AC 43-4A. Clean and apply chemical conversion coating to the corrosion rework areas as outlined in Chapter 4 of AC 43-4A. For further corrosion resistance, a zinc chromate, zinc oxide, or two-part epoxy listed on the following chart may be applied by spraying or brushing after the chemical conversion coated surfaces have thoroughly dried. Comply with safety procedures of AC 43-4A, as well as paint manufacturer's safety, preparation, and application procedures, during all phases of treating the corroded areas. Be sure primer coating is applied evenly and smoothly so it won't be mistaken for corrosion on subsequent inspections.

| Zinc Chromate primer coatings                                                                      |                  | Zinc Oxide primer coatings |               | 2 Part Epoxy Primer                                                                                |                    |
|----------------------------------------------------------------------------------------------------|------------------|----------------------------|---------------|----------------------------------------------------------------------------------------------------|--------------------|
| Manufacturer                                                                                       | Part Number      | Manufacturer               | Part Number   | Manufacturer                                                                                       | Part Number        |
| Randolph                                                                                           | 800 (green)      | Tempo                      | A801 (yellow) | Randolph (Epibond)                                                                                 | W-2248 (off white) |
| Randolph                                                                                           | 656 (yellow)     | Tempo                      | A802 (green)  | Randolph (Rand-O-Plate)                                                                            | B6433 (dark green) |
| Tempo                                                                                              | A7-6889 (yellow) |                            |               | Dupont                                                                                             | Corlar             |
| Tempo                                                                                              | A7-6889A (green) |                            |               |                                                                                                    |                    |
| Any other zinc chromate primer meeting TT-P-1757 or MIL-P-6889 or MIL-P-8585, Type I specification |                  |                            |               | Any other epoxy primer system meeting MIL-P-23377, Class I, Type 1 (yellow) or Type 2 (dark green) |                    |

## 7. Replacement –

Replacement rivets should be installed “wet” (dip rivets in primer, install rivets, and set rivets before primer dries). Paint rivet heads of larger size than original with red paint. Any rivets that are painted red may not be replaced with larger diameter rivets upon subsequent inspections.

## 8. Reinstall items removed for inspection.

## 9. Required documentation -

Make log book entry stating compliance with Univair Service Bulletin No. 32. State equipment used for inspection, where faulty rivets were found, size of replacement rivets, and corrosion prevention measures employed. Notify Univair Aircraft Corp. and the FAA of any failed rivet fasteners found and/or severe corrosion discovered by sending a copy of the inspection report per paragraph 5.

10. Continued inspections -

Assuming that all corrosion and/or damage has been detected, repaired, and protected from further corrosion or damage, then the inspection procedures of this Service Bulletin must be repeated every six years. If additional corrosion is suspected prior to the end of the six-year inspection period, repeat the inspections and repairs of this Bulletin prior to further flight. These inspection procedures also apply to aircraft that have experienced an extremely hard landing resulting in suspected center section damage.

INFORMATION AND PARTS AVAILABILITY:

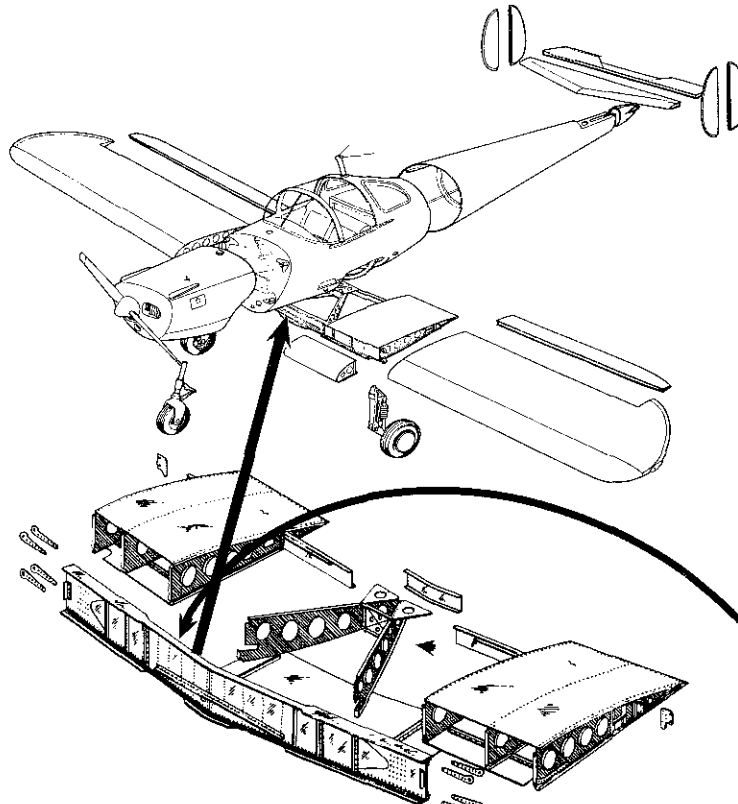
Copies of Ercoupe, Forney, Alon, and Mooney M-10 Service Manuals are available from Univair Aircraft Corporation.

Copies of Ercoupe Service Bulletin 31 are available from Univair Aircraft Corporation.

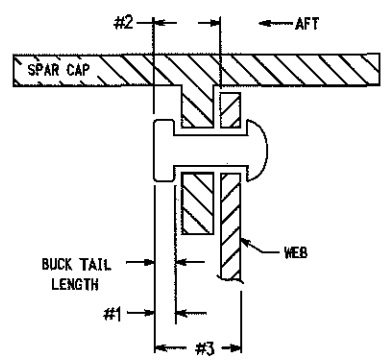
Contact Univair Aircraft Corporation for availability and pricing of wing center section replacement parts and parts for complying with Service Memorandums and Bulletins.

The Non-Destructive Testing technical assistance for this Service Bulletin was provided by Terry J. Taylor, president of NDE Services, Inc. of Greenwood Village, CO. He may be contacted to perform inspections and other non-destructive testing services at:

|                       |                      |                             |
|-----------------------|----------------------|-----------------------------|
| Terry J. Taylor       | Office: 303-741-0518 | FAX: 303-741-0519           |
| NDE Services, Inc.    | Cell: 303-591-5620   | email: terry@ndeservice.com |
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| Suite 809             |                      |                             |
| Greenwood Village, CO | 80111                |                             |



EXAMPLE FOR AREA "A"  
TABLE 1: CRITICAL FASTENER DIMENSIONS



## Main Spar Carrythrough (Beam) Location Rear Face Shown (Looking Forward)

