Custom Kit No. CK-AG- 29

December 23, 1997

WING FATIGUE LIFE EXTENSION

Models Affected:

Group 1 Airplanes

Model	Serial Numbers
S2R	5000 through 5099R
S2R-R1340	R1340-011,R1340-012,R1340-019,R1340-020, R1340-024, R1340- 025, and R1340-027
S2R-R1820	R1820-001 through 1820-035
S2R-T34	6000R through 6049R, T34-001 through T34-143, T34-145, T34-147 through T34-167, T34-171, T34-180, and T34-181*
S2R-T15	T15-001 through T15-033**
S2R-T11	T11-001 through T11-005
S2R-G1	G1-101 through G1-108

* The serial numbers of the Model S2R-T34 airplanes could incorporate T34-xxx, T36-xxx, or T41-xxx or T42-xxx. This Service Bulletin applies to all of these serial number designations, as they are Model S2R-T34 airplanes.

** The serial numbers of the Model S2R-T15 airplanes could incorporate T15-xx and T27-xx. This Service Bulletin applies to both of these serial number designations as they both Model S2R-T15 airplanes.

Group 2 Airplanes

Model	Serial Numbers
S2R-R1340	R1340-0028 through R1340-035
S2R-R1820	R1820-036
S2R-T65	T65-001 through T65-017
S2RHG-T65	T65-002 through T65-017
S2R-T34	T34-144, T34-146, T34-168, T34-169,T34-172 through T34- 179, and T34-189 through T34-232, T34-234, & T34-236*
S2R-T45	T45-001 through T45-014
S2R-G6	G6-101 through G6-147
S2R-G10	G10-101 through G10-141
S2R-G5	G5-101 through G5-105

* The serial numbers of the Model S2R-T34 airplanes could incorporate T35-xxx, T36-xxx, T41-xxx, or

T42-xxx. This Service Bulletin applies to all of these serial number designations as they are all Model S2R-T34 airplanes.

Group 3 Airplanes*

Model	Serial Numbers
600 S2D	All serial numbers beginning with 600-1311D
S2R	1380 and 1416R through 4999R
S2R-R1340	R1340-001 through 1340-010, R1340-013 through R1340-018, R1340-021 through R1340-023, and R1340-026
S2R-R3S	R3S-001 through R3S-011

* Any Group # airplane that has been modified with a hopper over 400 gallons, a piston engine greater than 600 horsepower, or any gas turbine engine makes the airplane a Group 1 airplane for the purpose of this Service Bulletin. The owner/ operator must inspect the airplane at the group 1 compliance time specified in the Compliance section of this Service Bulletin.

Part II:

BY WHOM WORK WILL BE ACCOMPLISHED:	Part I:	**Inspection.** FAA approved repair station with NDT certification employing a technician certified to conduct non-destructive testing per MIL-STD-410E, ISO9712, or SNT-TC-1A.
		Rework. A & P mechanic or equivalent approved by Ayres Corporation. Owner/operators are to contact Ayres Corporation for a list of approved facilities.
	A & P Mechanic or equivalent.	
APPROVAL:		FAA approved
WEIGHT & BALANCE:		Not applicable.
ESTIMATED MAN HOURS:		Part I: 4 hours Part II: 70 hours

If any problems are encountered while installing this custom kit, contact Ayres Customer Service at (912) 883-1440.

REASON FOR PUBLICATION:	Part I:	To provide a possible alternative to spar cap removal for aircraft found to have a small reworkable spar cap crack in the ¼" hole.
	Part II:	The purpose of this kit is to accomplish the removal and replacement of the butterfly (P/N 20211-3) center splice plate from the aft surface of the wing spar join area.

SPECIAL TOOLS:	Part I:	NDT inspection equipment. Calibrated torque wrench.
		FTI-AG-039-1 cold expansion kit and instructions. ESK 556-1 fixture. Reamers Calibrated torque wrench. Micrometer. Ball gauges.
	Part II:	None

ACCOMPLISHMENT INSTRUCTIONS:

PART I (To provide a possible alternative to spar cap removal for aircraft found to have a small re-workable spar cap crack in the ¼" hole)

1. Results of the Part I inspection determines the appropriate rework.
   a) If the inspection reveals no cracks or an extremely small crack or flaw, it is possible that it could be removed by oversizing the holes. Refer to the attached copy of SB-AG-39 page 5 through 11 for instructions on reaming up and cold expanding the ¼" & 5/16" spar cap holes to ¼ X" & 5/16 X" diameter.

      When the rework has been successfully accomplished, and subsequent magnetic particle inspection reveals no evidence of crack, record the appropriate log book entry as instructed in operation 22 of this procedure.
   b) If the inspection reveals a small crack in the ¼" spar cap hole(s), and it appears that the crack can be removed by reaming up and cold expanding the hole to a 5/16 X" diameter, proceed to operation 6.
   c) If the inspection reveals a crack in the ¼" hole that can not be removed by enlarging and cold expansion to 5/16 X", then contact Ayres Customer Service at (912)883-1440 extension 242.
2. Reassemble the spar cap & splice fitting assembly, using new nuts, bolts and washers. Do not install the ¼", 5/16" and ½" bolts (first, second and fourth bolt hole from the ends of the splice fittings) at this time.
3. Remove the paint from the spot faces of the ½" holes in the splice fitting.
4. With 250 grit or finer sand paper, clean the ½" bolt holes so that they easily accept the ½" bolts of the ESK 556-1 fixture assembly.
5. Install the ESK 556-1 fixture.

* WARNING *

Do not, under any circumstances, attempt to ream a hole without the use of the ESK 556-1 fixture and bushings.

6. The following instructions describe the process required for enlarging and cold expanding the ¼" spar cap hole(s) to 5/16 X", and cold expanding the original 5/16" hole to a 5/16 X" diameter.
   a) Enlarge the ¼" spar cap fitting attach hole(s) to a 5/16" diameter using the following process:
      1. *With the ESK 556-1 fixture installed cold expand cracked ¼" hole up to ¼ or 1/64" oversize using method found in rework section SB-AG-39.*
      2. *Using the following reamers in the order listed ream up to a nominal 5/16" hole.*
         a.) I. Reamer .272
         b.) J. Reamer .277
         c.) K. Reamer .281
         d.) L. Reamer .290
         e.) M. Reamer .295
         f.) 5/16" Reamer .312
      3. Finally, cold expand hole to 5/16" or 1/64" oversize using method found in re-work section of SB-AG-39.

         b) To prepare the 5/16" spar cap fitting attach hole: * Lubricate the 0.3110 reamer and with the reamer bushing installed in the fixture, ream the 5/16" holes.
7. Remove the ESK 556-1 fixture.
8. Using the attached Fatigue Technology, Inc. procedure described in F.T.I. Document No. 52373, cold

expand the two 5/16" holes.

9. Install the ESK 556-1 fixture.
10. Lubricate the 0.3268 reamer (smaller of the two 5/16" final reamers) and with the reamer bushing installed in the fixture, ream the 5/16" holes.

* NOTE *

The oversize 5/16" repair bolts are manufactured to a tolerance of 0.3266 - 0.3276. The diameter of a reamed hole depends on reamer quality, operator technique, lubricant, RPM and other factors. Because of these variations in bolt diameter and hole size, bolt-in-hole fit will vary. Use caution when installing the bolts so as not to remove the bolt cadmium plating on installation.

11. Insert an "X" oversize 5/16" bolt into one of the holes. If resistance is encountered, encourage the installation with moderate taps of a 6 ounce plastic mallet. If further resistance is encountered or it appears that installation will remove the cadmium plate from the bolt, remove the bolt and ream the hole with the 0.3276 final reamer (larger of the two final reamers).

* NOTE *

If the bolt is still excessively tight after using the larger final reamer, use a micrometer to check the mandrel for wear, the reamer for wear, and the bolt diameter, it may be required to select a bolt with a small diameter.

12. Mark the bolt to ensure that it is used in the appropriate hole during reassembly.
13. Repeat operation 9 and 10 on the other 5/16" hole and bolt.
14. Remove the remaining spar splice bolts and the spar splice fittings per the SB-AG- 39 instructions (beginning on page 8).
15. Remove all corrosion from all of the bolt holes by mechanical and/or chemical means. If chemicals are used, rinse thoroughly to ensure no chemical residue remains on the surface or becomes entrapped in a crevice.
16. Thoroughly clean the area in and around the 5/16" bolt holes and remove the paint from an area extending one inch from the center of each of the two holes.
17. If rust or corrosion is found anywhere on the spar cap or spar web, perform SB-AG-29 in conjunction with this bulletin.
18. Using the magnetic particle or equivalent flaw detection equipment, inspect the walls of the 5/16" bolt holes in the spar cap.
    a) If no cracks are found, proceed to operation 20.
    b) If any portion of the crack if found, the spar cap must be removed and replaced. Contact Ayres Corporation at (912)883-1440 extension 242.
19. Drill or ream the MS20002C5 washer to 0.332.
20. Reassemble the splice fittings per the instructions provided in SB-AG-39 page 9. Use all **new** nuts, bolts and washers.
21. Install the pump mount and brackets.
22. Upon completion of the rework, make the appropriate log book entry.

ACCOMPLISHMENT INSTRUCTIONS: PART II (The purpose of this kit is to accomplish the removal and replacement of the butterfly (P/N 20211-3) center splice plate from the aft surface of the wing spar splice area.)

1. The aircraft must be de-fueled and the wings removed.

* WARNING *

Due to the presence of flammable vapors, the danger of fire is greatly increased. Use extreme care and follow local fire safety procedures regarding specific open areas for de-fueling operations, fire extinguishers, personnel, etc.

2. Once the wings have been removed from the aircraft, remove the butterfly center splice plate (P/N 20211-3). Care must be taken not to damage the original butterfly plate, it will be used as a drill template for the replacement (P/N 20211-9 & -11) butterfly plates.

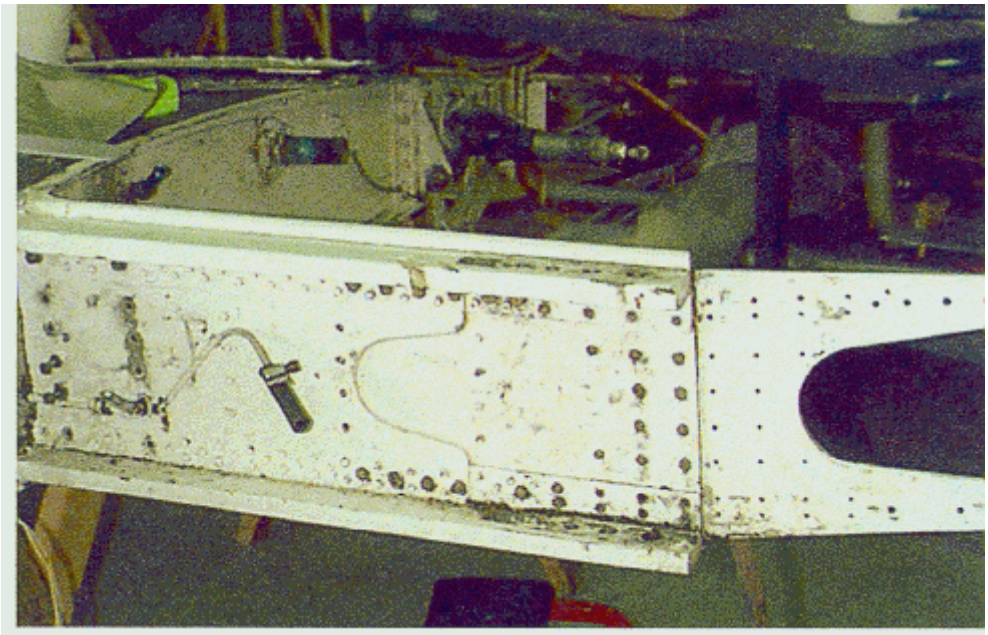

Figure 1. Front view of the main spar Custom Kit #29 work area.

3. If removal of the butterfly plate reveals corrosion, use a mechanical means such as sanding or Scotchbright to remove all evidence of oxides and moisture. Do not use phosphate conversion chemical cleaning agents which will migrate into and become entrapped in critical join areas.
4. The new replacement butterfly plates have longer lower extension. Additional fasteners must be removed and the holes prepared to accommodate the additional butterfly length.

   The steel Huck fastener collars will be difficult to remove without the aid of a Huck cutter and/or chisel. Care must be taken not to damage and elongate the holes during fastener removal.

   The outboard edge of the lower arm of the new butterfly plate (P/N 20211-9) is located at wing station 19.43. Because the butterfly plate edge is so close to the two adjacent MS24694 screws, the screws must be countersunk to assure clearance. In addition, the eight each MS24694 screws inboard of wing station 19.43 must be countersunk to allow the butterfly plate (P/N 20211-9) to set flush against the aft face of the main spar web.

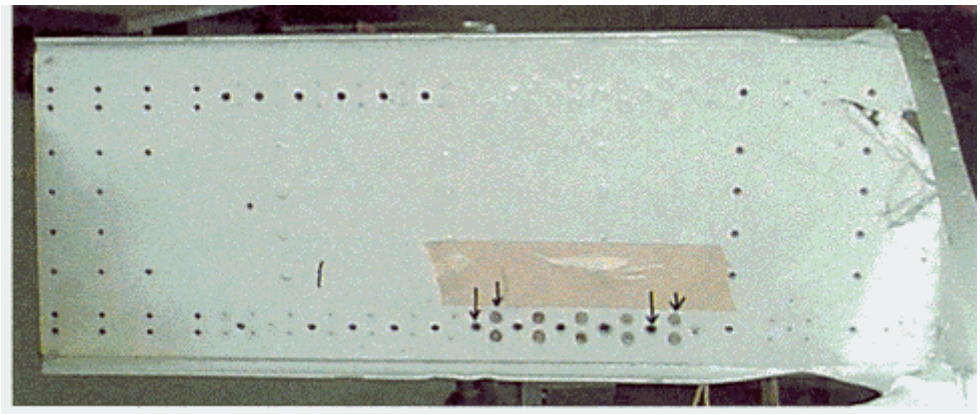

Figure 2. Rear view of the main spar, wing station 00 to 28. A piece of tape has been placed above the operation (4) work area. The two shorter arrows point to the first and last holes in the set of 10 newly countersunk MS24694 screw holes.

5. The original butterfly plate will be the drill template for the new butterfly plates. The upper portion of the new butterfly plate (P/N 20211-9) has the same configuration as the original (P/N 20211-3). Align the top edge of (P/N 20211-3) and the new butterfly plate (P/N 20211-9) and clamp together.
   a) To ensure precision, transfer the hole pattern and drill on a drill press. Use a number #14 drill bit.
   b) Remove the clamps from the P/N's 20211-3 & 9. Clamp together the lower butterfly reinforcement plate (P/N 20211-11) and the original butterfly plate (P/N 20211-3). Transfer the lower hole pattern onto the new butterfly plate using a number #14 drill bit. When the drilling is complete, remove the clamps.
6. Place the new butterfly splice plates into position onto the aft surface of the main spar. With a number #13 drill bit, drill up the holes. Line ream to 3/16". All but five (5) of the required hole locations transferred from the original butterfly plate (P/N 20211-3) to the new butterfly plate (P/N 20211-9). Transfer the five (5) each NAS1104 bolt locations from the spar web to the lower arm of the butterfly plate (P/N 20211-9).

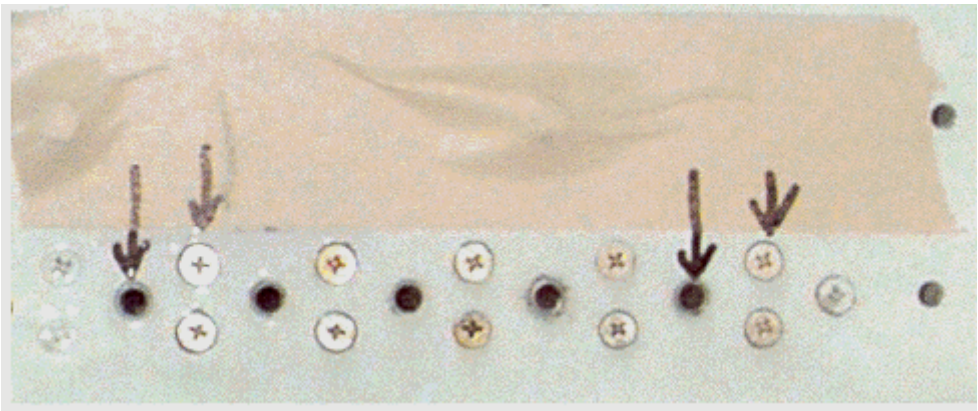

Figure 3. Close-up view of the figure (2) work area, rear view of the main spar. The 10 each MS24694 countersunk screws have been installed. In contrast are the 5 each NAS1104 bolt locations (situated between the two larger arrows).

7. Remove the butterfly plates from the spar web. On a drill press, drill out the five (5) hole locations on the new butterfly plate (P/N 20211-9). Use a 15/64" or an #A drill bit.
8. Temporarily reinstall the butterfly plates (P/N 20211-9 & -11) onto the aft face of the main spar web. Ream the five (5) lower arm butterfly plate holes to ¼".
9. The other half of the new butterfly plates (P/N 20211-9 & -11) must be fit to the opposite wing spar. Repeat instructions (4) through (8) on the other wing.
10. Nicks and/or scratches through the paint down to the metal surface shall be touched up.

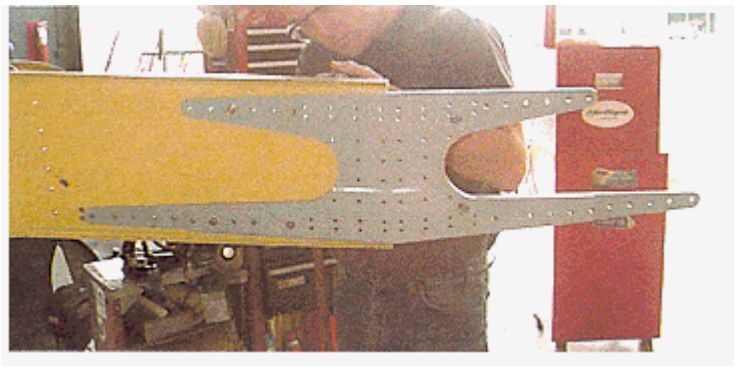

Figure 4. Rear view of the main spar, center butterfly splice plates (P/N 20211-9 & -11) temporarily installed. Transfer drilling operations on the butterfly plates is complete. The mechanic is line reaming the holes to size.

11. Upon completion of the reaming operation, install the butterfly plate/spar web fasteners. The opposite wing fasteners will be installed at the time the wings are joined.
12. Fill out and return the enclosed compliance card indicating ...
13. After five (5) hours of flight, recheck the torque on the wing spar cap fitting (12 each bolts) and on the wing attach angles.

Publications affected:SB-AG-39
AIRCRAFT RECORDS

a) CK-AG-29, dated December 23, 1997, entitled *Wing Fatigue Life Extension Inspection,* accomplished Part I. _____ date.

b) CK-AG-29, 1997, dated December 23, 1997 entitled *Wing Fatigue Life Extension Inspection,* accomplished Part II. _____ date.

Complete the CK-AG-29 Revision 1 compliance card and mail to Ayres Corporation. Make the appropriate airframe logbook entry.