



# service bulletin

Service Bulletin Number : **SB-AG-39**

September 17, 1996

---

## WING SPAR INSPECTION AND FATIGUE LIFE EXTENSION

---

### MODELS AFFECTED:

All S2R models and serial numbers manufactured and listed here, including any others converted, which have:

- a) Wing assemblies with aluminum spar webs with 4500 hours or more time in service.
- b) A gas turbine engine of any type
- c) A piston engine rated at more than 600 horsepower

Model	Serial Numbers
S2R	5000 through 5099R
S2R-R1340	R1340-011, R1340-012, R1340-019, R1340-020, R1340-024, R1340-025, R1340-027
S2R-R1820	R1820-001 through R1820-035
S2R-T34	6000R through 6049R, T34-001 through T34-143, T34-145, T34-147 through T34-167, T34-171, T34-180, T34-181
S2R-T15	T15-001 thru T15/27-029 thru -033
S2R-T11	T11-001 through T11-005
S2R-G1	G1-101 thru -108
S2R-T15	T15/27-001 thru T15/27-029 thru -033

All T34 models whose serial numbers have the prefix T36, T41 or T42 applies if the number is listed.

All models with or without the DC suffix apply, if listed.

---

### MODELS EXEMPTED:

- a) All 600 horsepower radial engine models, regardless of wing spar web material or total flight time.
- b) All S2R models, manufactured or converted which have all-steel wing spar assemblies.
- c) All S2R models whose wing assemblies have less than 4500 hours time in service.

**Specific models and serial numbers as manufactured are:**

<b>Model</b>	<b>Serial Number</b>
S2R	1380R, 1416R and subs
S2R-R1340	R1340-001 through R1340-010, R1340-013 through R1340-018, R1340-021 through R1340-023, R1340-026 through S2R-R1340-028 and subs
S2R-R3S	S2R-R3S-001 through S2R-R3S-011
S2R-R1820	S2R-R1820-036 and subs
S2R-T34	S2R-T34-144, S2R-T34-146, S2R-T34-168, S2R-T34-169, S2R-T34-172 through S2R-T34-179, S2R-T34-182 and subs
S2R-T45	S2R-T45-001 and subs
S2R-T65	S2R-T65-001, S2R-T65-010 and subs
S2R-HG-T65	S2R-HG-002 through S2R-HG-009 and subs
S2R-G5	S2R-G5-101 and subs
S2R-G6	S2R-G6-101 and subs
S2R-G10	S2R-G10-101 and subs

**All T34 models whose serial numbers have the prefix T34, T41 or T42 applies if the number is listed.**

**All models with or without the DC suffix apply if listed.**

**REASON FOR PUBLICATION:**

**To detect, before failure, cracks in the lower wing spar of wing assemblies with aluminum spar webs and to extend indefinitely the fatigue life of these spars.**

**COMPLIANCE:**

**\*NOTE\***

Although inspection without rework is an option for compliance of this service bulletin, Ayres Corporation **recommends** that the cold expansion procedure be accomplished prior to disassembly of the wing splice joint and prior to the inspection procedure for the following reasons:

1. Finding a crack in the spar cap is unlikely

2. The cold expansion procedure may remove a small existing crack
3. The cold expansion procedure is simple and easy to implement
4. The mechanical aspects of the cold expansion process require the splice fittings to be firmly bolted in place and preferably in a "well-settled" configuration.
5. The cold expansion procedure eliminates further action per this bulletin.

**Inspection only:**

1. Inspect the spar cap for cracks within the next 100 hours of flight or the next 100 hour/annual inspection, whichever comes first.
2. If a crack is found, replace the spar cap or wing prior to the next flight. Consult Ayres Corporation if a ferry flight to a suitable repair station is required.
3. If no cracks are found, return the aircraft to service and repeat the inspection at 500 hour or annual intervals, whichever occurs first.

**Rework:**

**1. Rework by cold expansion of the 1/4 and 5/16 inch bolt holes per this bulletin will end the requirement for the crack inspection.**

---

**BY WHOM WORK MAY BE ACCOMPLISHED:**

**Inspection:**

**An FAA approved repair station with NDT certification employing a technician certified to conduct non-destructive testing per MIL- STD-410E, ISO 9712, 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.

**APPROVAL:**

The FAA and Ayres Corporation.

---

**ESTIMATED MAN HOURS FOR COMPLIANCE:**

**Inspection:** 8 hours.

**Rework:** 3 hours.

**PARTS DATA:**

**Inspection:**

- Full complement of lower splice fitting bolts, nuts and washers. 2 upper spar tube-nuts. Paint.

**Rework:**

- Full complement of lower splice fitting bolts, nuts and washers.
- 2 upper spar tube nuts.
- 2 each "x" oversize 1/4 inch bolts.
- 2 each "x" oversize 5/16 inch bolts.
- Paint.

**SPECIAL TOOLS:**

**Inspection:**

- NDT inspection equipment.
- Calibrated torque wrench.

**Rework:**

- ESK 556-1 fixture.
- FTI Document No. 52373
- Cold expansion equipment.
- 0.2490, 0.2646, 0.2651, 0.3110, 0.3268 and 0.3276 reamers.
- Calibrated torque wrench.
- Micrometer.
- Ball gauges.

---

**\*NOTE\***

If there is any doubt concerning spar material, remove an inspection plate outboard of the fuel tank and use an ordinary magnet on the spar web face. The magnet will not stick to aluminum.

**ACCOMPLISHMENT**

**INSTRUCTIONS:**

**Inspection:**

1. Gain access to the wing main spar splice fittings. Remove spray pump and spray pump mounting brackets.
2. Remove the lower spar splice fitting bolts and splice fittings per attached removal procedure.
3. Thoroughly clean the area in and around the 1/4 and 5/16 bolt holes and remove the paint from an area extending one inch from the center of each of these holes.
4. If rust or corrosion are found anywhere on the spar cap or spar web, perform SB-AG-29 in conjunction with this bulletin.
5. Remove all corrosion from all of the bolt holes by mechanical and/or chemical means.
6. Inspect the walls of the 1/4 and 5/16 inch bolt holes in the lower spar cap for cracks or flaws using magnetic particle or equivalent flaw detection equipment.

- 7.If no cracks or flaws are found, prime and repaint all areas where the paint was removed.
- 8.Reassemble the splice fittings per the attached installation procedure using **new** nuts, bolts and washers.
- 9.Return the aircraft to its airworthy configuration, make appropriate log book entries and return the aircraft to service

**\*WARNING\***

If cracks or flaws are found, either replace the spar cap or wing prior to the next flight or reassemble the splice fittings and proceed with the rework if there is a possibility that oversizing the holes will remove the crack or flaw. Contact Ayres Corporation if a ferry flight to a suitable repair station is required.

**Rework:**

- 1.Gain access to the main spar splice fittings. Remove the spray pump and spray pump mounting brackets.
- 2.Remove the 1/4, 5/16 and 1/2 inch bolts (first, second and fourth from the ends of the splice fittings).
- 3.Thoroughly clean in and around the splice fittings and bolt holes.
- 4.Remove the paint from the spot faces of the 1/2 inch holes in the splice fitting.
- 5.With 250 grit or finer sand paper, clean the 1/2 inch bolt holes so that they easily accept the 1/2 bolts of the ESK 556-1 fixture assembly.
- 6.Install the ESK 556-1 fixture.

**\*WARNING\***

Under no circumstances attempt to ream a hole without the use of the ESK 556-1 fixture and bushings.

- 7.Lubricate the 0.2490 reamer and with the reamer bushing installed in the fixture, ream the 1/4 inch holes.
- 8.Lubricate the 0.3110 reamer and with the reamer bushing installed in the fixture, ream the 5/16 inch holes.
- 9.Remove the ESK 556-1 fixture.
- 10.Using the attached Fatigue Technology, Inc. procedure described in F.T.I. Document No. 52373, cold expand the 1/4 and 5/16 inch holes.
- 11.Install the ESK 556-1 fixture.
- 12.Lubricate the 0.2646 reamer (smaller of the two 1/4 inch final reamers) and with the reamer bushing installed in the fixture, ream the 1/4 inch holes.
- 13.Lubricate the 0.3268 reamer (smaller of the two 5/16 inch final reamers) and with the reamer bushing installed in the fixture, ream the 5/16 inch holes.

**\*NOTE\***

The oversize repair bolts are manufactured to a tolerance of 0.2641 - 0.2651 for the "x" oversize 1/4 inch bolt and 0.3266 - 0.3276 for the "x" oversize 5/16

inch bolt. 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.

- 14. Insert an "x" oversize 1/4 inch bolt into one of the 1/4 inch 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 0.2651 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.

- 15. In a similar manner, prepare the other 1/4 inch hole.
- 16. Using similar technique and precautions, prepare the 5/16 inch holes for "x" oversize 5/16 inch bolts using the 0.3110 and 0.3276 inch reamers.
- 17. Mark these 1/4 and 5/16 inch "x" oversize bolts and be sure to install them in their respective holes during reassembly.
- 18. Remove the remaining spar splice bolts and the spar splice fittings per the attached removal procedure.
- 19. Remove all corrosion from all of the bolt holes by mechanical and/or chemical means.
- 20. Thoroughly clean the area in and around the 1/4 and 5/16 bolt holes and remove the paint from an area extending one inch from the center of each of these holes.
- 21. If rust or corrosion is found anywhere on the spar cap or spar web, perform SB-AG-29 in conjunction with this bulletin.
- 22. Inspect the walls of the 1/4 and 5/16 inch bolt holes in the lower spar cap for cracks or flaws using magnetic particle or equivalent flaw detection equipment.
- 23. If no cracks or flaws are found, prime and repaint areas where the paint was removed.

**\*WARNING\***

If cracks or flaws are found, replace the spar cap or wing prior to the next flight. Contact Ayres Corporation if a ferry flight to a suitable repair station is required.

- 24. Drill or ream the MS20002C4 washers to 0.2720. Drill or ream the MS20002C5 to 0.332.
  - 25. Reassemble the splice fittings per the attached installation procedure. Use all **new** nuts, bolts and washers.
  - 26. Install the pump mount and brackets.
  - 27. Return the aircraft to its airworthy configuration, make appropriate log book entries and return the aircraft to service.
-

**WEIGHT AND BALANCE:**No change.

**PUBLICATIONS AFFECTED:**None.

**RECORD OF COMPLIANCE:**Make appropriate airframe logbook entry. Complete the SB-AG-39 compliance card and mail to Ayres Corporation.

**LOWER SPLICE FITTING REMOVAL**(Reference Figure 1)

- 1.Park the aircraft in a closed door hangar and secure the aircraft for maintenance.
- 2.Disconnect the battery and external power sources.
- 3.Gain access to the wing splice area by removing the wing root fairings and the necessary aircraft side and belly panels.
- 4.Support the wings at the jack points located approximately 6 feet from the wing tips and under various wing ribs to prevent wing movement when the attach bolts are removed.
- 5.Back the locknuts off of the NAS bolts in the splice fittings far enough to conceal the end of the bolt threads. Spray the bolt shanks with WD-40 or an equivalent lubricant.
- 6.Remove the AN5 bolts securing the tubes to the tube nuts and loosen the lower splice fitting tube nuts. As the nuts are loosened, the bolts will back out of the holes. Once the tube nuts are off of the lower bolts, loosen the upper tube nuts to back them out of the holes. If one of the bolts does not move, rethread the tube nut onto this bolt and place a spacer between the opposite end of the tube and the spar cap (or NAS bolt). Proceed, once again, to loosen the tube nut and back the bolt out of the hole. Remove the tubes and tube nuts once sufficient clearance has been obtained.

**\*CAUTION\***

Extreme care must be taken to avoid damaging the spar cap and the surface finish of the holes through the spar cap.

**\*NOTE\***

Adjusting the angle of the wings with the wing jacks may assist in wing bolt removal.

- 7.Place an aluminum block on the smallest nut and with a 4X rivet gun, drive the nut flush to the splice fitting. Proceed in a similar manner with the remainder of the bolts working from the smallest to the largest.
- 8.Remove all of the nuts and tube nuts from the NAS bolts. Place the aluminum block on the threaded end of the smallest bolt and with the 4X rivet gun, drive it flush with the splice fitting. Proceed in a similar manner with the remainder of the bolts working from the smallest to the largest.
- 9.Pry the lower splice fitting (top half) off of the NAS bolts by tapping aluminum wedges between the lower splice fitting (top half) and the lower spar cap. Remove the top half of the lower splice fitting.
- 10.Place the aluminum block on the threaded end of the smallest bolt in the lower splice fitting and with a 2X rivet gun, drive it flush with the spar cap. Proceed in a similar manner with the remainder of the bolts working from the smallest to the largest.

**\*WARNING\***

Under no circumstances should the bolts be turned while the threads are in the spar cap. This could damage the hole surface finish which could result in a stress concentration.

- 11. Pry the lower splice fitting (bottom half) off of the lower spar cap by tapping aluminum wedges between the two. Remove the bottom half of the lower splice fitting along with the NAS bolts.
  - 12. Discard all used nuts, bolts and washers.
  - 13. Clean and remove corrosion from the splice fittings.
- 

**LOWER SPLICE FITTING INSTALLATION** (Reference Figure 1)

- 1. Install the upper tube nuts and torque to specification in accordance with the Figure 2 torque chart.
- 2. Grease the the 12 NAS wing splice attach bolts and the holes in the lower splice fittings (top and bottom halves) with Moly-Disulfide grease. Insert the two large NAS bolts with MS20002C countersunk washers installed into the lower splice fitting (bottom half). Be sure to mate the countersunk portion of the washer with the head of the bolt. Insert the remaining 10 NAS bolts with their respective, properly orientated, MS20002C washers into their respective holes and position all 12 bolts flush with the top face of the lower fitting (bottom half).

**\*CAUTION\***

Use extreme care to avoid damaging the spar cap or the surface finish of the holes through the spar cap.

- 3. Apply Moly-Disulfide grease to the matching holes in the lower spar cap and place the top splice fitting into position. Press the bolts through the holes in the lower spar cap.
- 4. Place the lower splice fitting (top-half) into position and press the fitting downward over the bolts. Install MS20002 (no countersink) washers (12 places). Slip the 20240-1 tubes over the upper splice tube nuts and install the lower splice tube nuts. Bring the 20239-4 tube nuts (2 places) and the AN365 nuts (10 places) up snug.
- 5. Torque the tube nuts and the AN365 locknuts on the NAS bolts through the lower splice fittings per Figure 2, 4 places and 20 places, respectively.
- 6. Position the tubes equidistant between the upper and lower tube nuts. Drill 5/16 inch diameter holes (+0.003, -0.001), 2 places per tube, parallel to the spar web through the pilot holes in the tubes and through the tube nut shanks, 4 places total. Install AN5 bolts through these holes and secure with AN960 washers and AN365 locknuts. Torque locknuts per Figure 2.
- 7. Remove the wing jacks.







-8	6,500	8,000	4,000	5,000								
----	-------	-------	-------	-------	--	--	--	--	--	--	--	--



# service bulletin

Service Bulletin Number : **SB-AG-39 Rev. 1**

December 12, 1997

---

## SB-AG-39 Revised Compliance Options and Inspection Intervals

---

### 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.

**Perform initial inspection at 2000 hours time in service (TIS).**

---

#### 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.

**Perform initial inspection at 2200 hours time in service (TIS).**

### 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.

**Perform initial inspection at 6400 hours time in service (TIS).**

<b>Reason for publication:</b>	Ayres Service Bulletin No.SB-AG-39 was published to detect before failure, cracks in the wing spar assemblies of Ayres Thrush Agricultural Airplanes.
	The revision to the Service Bulletin defines the re-inspection interval for certain models after rework and redefines model effectivity and grouping.

<b>Compliance:</b>	<b>Options</b>
	1) Perform SB-AG-39 as originally written.
	2) Perform Ayres CK-AG-29 Part 1 if necessary.
	3) Add the "big butterfly" P/N 20211-09 and -11 in accordance with CK-AG-29 Part 2.
<b>By whom work may be performed:</b>	A & P Mechanic or Equivalent

**Approval:** \_\_\_\_\_ || The FAA and Ayres Corporation

Revised inspection requirements:

Based on findings from accomplishment of SB-AG-39 and damage tolerance analysis, the following Inspections are acceptable for all Groups of airplanes:

<b>Work performed/Technique</b>	<b>Mag. Particle</b>	<b>Ultrasonic</b>	<b>EddyCurrent</b>
Inspect only	500 hours	400 hours	450 hours
Inspect, no cracks, cold work	1500 hours	1200 hours	1300 hours
Inspect, no cracks, cold work, install big butterfly	2500 hours	1950 hours	2150 hours
Inspect, small crack, cold work, to remove crack, re-inspect	950 hours	750 hours	825 hours
Inspect, small crack, cold work, to remove crack, re-inspect, install big butterfly	1550 hours	1200 hours	1350 hours

<b>Weight and Balance:</b>	N/A
<b>Publications affected:</b>	SB-AG-39
<b>Record of Compliance:</b>	Make appropriate airframe logbook entry.

**Aircraft records:**

SB-AG-39A, dated December 12, 1997  
Entitled SB-AG-39 INSPECTION INTERVALS,  
Accomplished \_\_\_\_\_ (date).