

Service Bulletin No. SB-AG-39
17 September 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.

S2R-R1340-011, -012, -019, -020, -024, -025, -027

S2R-R1820-001 thru -035

S2R-5000R thru -5099R

S2R-T11-001 thru T11-005

S2R-T15 - T15/27-001 thru T15/27-029 thru -033

S2R-T34-6000R thru 6049R

S2R-T34-001 thru -143, -145, -147 thru -167, -171

S2R-T34-180, -181

S2R-G1 - G1-101 thru -108

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:

S2R-1380R, 1416R and subs

S2R-R1340-001 thru -010, -013 thru -018, -021 thru -023, -026

S2R-R1340-028 and subs

S2R-R3S-001 thru -011

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:**

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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.

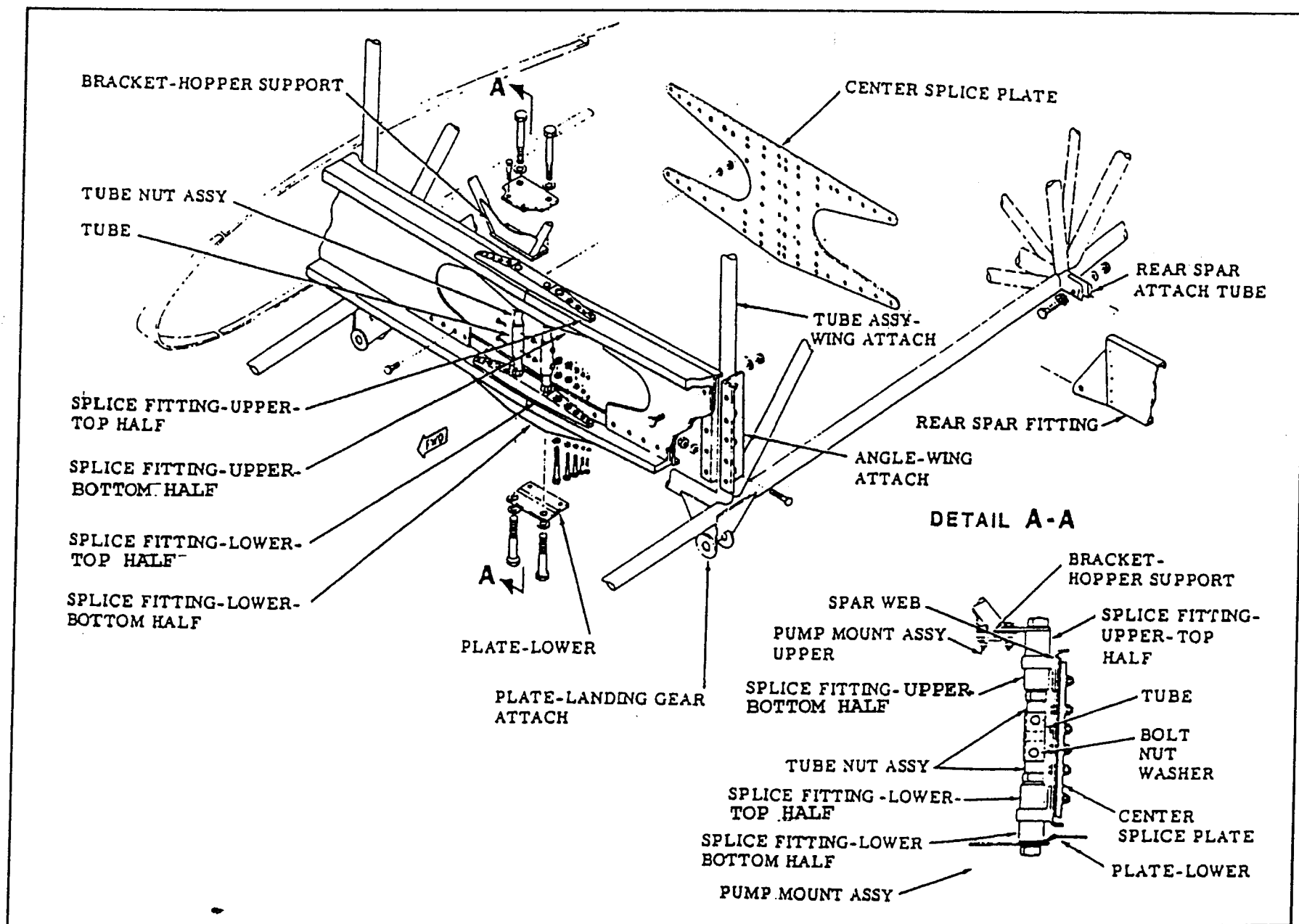


Figure 1 - SPLICE FITTING

BOLTS Steel Tension		BOLTS Steel Tension		BOLTS Aluminum	
AN 3 thru AN 20 AN 42 thru AN 49 AN 73 thru AN 81 AN 173 thru AN 186 MS 20033 thru MS 20046 MS 20073 MS 20074 AN 509 NK9 MS 24694 AN 525 NK525 MS 27030		MS 20004 thru MS 20024 NAS 144 thru NAS 158 NAS 333 thru NAS 340 NAS 583 thru NAS 590 NAS 624 thru NAS 644 NAS 1303 thru NAS 1320 NAS 172 NAS 174 NAS 517		AN 3DD thru AN 20DD AN 173DD thru AN 186DD AN 509DD AN 525D MS 27039D MS 24694DD	
NUTS		NUTS		NUTS	
Steel Tension	Steel Shear	Steel Tension	Steel Shear	Aluminum Tension	Aluminum Shear
AN 310 AN 315 AN 363 AN 365 NAS 1021 MS 17825 MS 21045 MS 20365 MS 20500 NAS 679	AN 320 AN 364 NAS 1022 MS 17826 MS 20364	AN 310 AN 315 AN 363 AN 365 MS 17825 MS 20365 MS 21045 NAS 1021 NAS 679 NAS 1291	AN 320 AN 364 NAS 1022 MS 17826 MS 20364	AN 365D AN 310D NAS 1021D	AN 320D AN 364D NAS 1022D

FINE THREAD SERIES

Nut-bolt size	Torque Limits in.-lbs.		Torque Limits in.-lbs.		Torque Limits in.-lbs.		Torque Limits in.-lbs.		Torque Limits in.-lbs.		Torque Limits in.-lbs.	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
8 -26	12	15	7	9					5	10	3	6
10 -32	20	25	12	15	25	30	15	20	10	15	5	10
1/4 -28	50	70	30	40	80	100	50	60	30	45	15	30
5/16 -24	100	140	60	85	120	145	70	90	40	65	25	40
3/8 -24	160	190	95	110	200	250	120	150	75	110	45	70
7/16 -20	450	500	270	300	520	630	300	400	180	280	110	170
1/2 -20	480	690	290	410	770	950	450	550	280	410	160	260
5/8 -18	800	1,000	480	600	1,100	1,300	650	800	380	580	230	360
3/4 -18	1,100	1,300	660	780	1,250	1,550	750	950	550	670	270	420
1 -16	2,300	2,500	1,300	1,500	2,650	3,200	1,600	1,900	950	1,250	560	880
1 1/4 -14	2,500	3,000	1,500	1,800	3,550	4,350	2,100	2,600	1,250	1,900	750	1,200
1 1/2 -14	3,700	4,500	2,200	3,300	4,500	5,500	2,700	3,300	1,600	2,400	950	1,500
1 3/4 -12	5,000	7,000	3,000	4,200	6,000	7,300	3,600	4,400	2,100	3,200	1,250	2,000
2 -12	9,000	11,000	5,400	6,600	11,000	13,400	6,600	8,000	3,900	5,600	2,300	3,650

COARSE THREAD SERIES

8 -32	12	15	7	9								
10 -24	20	25	12	15								
1/4 -20	40	50	25	30								
5/16 -18	80	90	48	55								
3/8 -16	160	185	95	110								
1/2 -14	235	255	140	165								
5/8 -13	400	480	240	290								
3/4 -12	500	700	300	420								
1 -11	700	900	420	540								
1 1/4 -10	1,150	1,600	700	950								
1 1/2 -9	2,200	3,000	1,300	1,800								
1 3/4 -8	3,700	5,000	2,200	3,000								
2 -8	5,500	6,500	3,300	4,000								
2 1/4 -8	6,500	8,000	4,000	5,000								

Recommended torque values for nut-bolt combinations (without lubrication)

Figure 2

Ayres service bulletin

corporation No. SB-AG-39 REV 1

P.O. Box 3090 One Ayres Way Albany, Georgia 31706-3090 Phone:912/883-1440 Fax:912/439-9790

Service Bulletin NO. SB-AG-39 Rev. 1
December 12, 1997

SB-AG-39 Revised Compliance Options and Inspection Intervals

Models Affected:

Group 1 Airplanes

Model
S-2R

Serial Numbers
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, T38-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**

S2R-R1340

S2R-R1820

S2R-T65

S2RHG-T65

S2R-T34

S2R-T45

S2R-G6

S2R-G10

S2R-G5

Serial Numbers

R1340-0028 through R1340-035

R1820-036

T65-001 through T65-017

T65-002 through T65-017

T34-144, T34-146, T34-168, T34-169, T34-172 through T34-179, and T34-189 through T34-232, T34-234, & T34-236*

T45-001 through T45-014

G6-101 through G6-147

G10-101 through G10-141

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**

600 S2D

S2R

S2R-R1340

S2R-R3S

Serial Numbers

All serial numbers beginning with 600-1311D

1380 and 1416R through 4999R

R1340-001 through 1340-010, R1340-013 through R1340-018, R1340-021 through R1340-023, and R1340-026

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).

Reason for publication:

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.

Compliance:**Options**

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.

By whom work may be performed: 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:

Work performed/Technique	Mag. Particle	Ultrasonic	EddyCurrent
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

Weight and Balance: N/A

Publications affected: SB-AG-39

Record of Compliance: Make appropriate airframe logbook entry.

Aircraft records:

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