# SERVICE BULLETIN

**Beech**

**TITLE**: **WINGS - INSPECTION OF WING SPAR STRUCTURE**

## 1. Planning Information

### A. Effectivity

(1) Airplanes conforming to Type Certificate No. 5A3.

Beech Mentor 45 (Military YT-34), Serials G-3 through G-6;

A45 (Military T-34A), Serials G-7 and After;

B45, Serials CG-1 and After;

D45 (Military T-34B), Serials BG-1 and After;

B45 (T-34 Manufactured by Canadian Car and Foundry), Serials 34-1 through 34-125.

Beech Bonanza Model 35 through Model G35, all serials which have installed T-34 wings per STC or field approval.

If the airplane has been modified by any Supplemental Type Certificate (STC), the airplane owner will have to contact the owner of the STC to determine whether this Service Bulletin applies.

If you are no longer in possession of the airplane, please forward this information to the present owner.

(2) Spares

All spare forward (main) spar assemblies and spare aft (rear) spar assemblies which conform to Type Certificate No. 5A3 for the airplanes listed in step (1) above.

### B. Reason

This Service Bulletin is being issued because fatigue cracks have been found at specific locations in the wing spars of an airplane involved in a fatal accident where the wing separated from the aircraft. Fatigue cracks have also been found at specific locations in the wing spars of other in-service airplanes. The YT-34, T-34A, and T-34B airplanes were designed as military trainers. Less than 1400 were built between 1953 and 1958. At that time, there was no requirement for the establishment of a fatigue life for these three

(3) models of military trainer. More important, the accumulated operational service history - the magnitude and number of g-loads - of an individual airplane is unknown. Given the intermingling of spare and salvaged parts installed on airplanes in military service, it is usually impossible to determine accurately the overall history of the airplane. Fatigue cracks at any location in the forward or aft spar will reduce the wing's ability to carry limit load and may result in an in-flight separation of a wing.

This Service Bulletin provides inspection procedures for the forward (main) and aft (rear) wing spars of the airplanes listed in EFFECTIVITY conforming with Type Certificate No. 5A3 to detect fatigue cracks in specified areas only. The specified areas are those where fatigue cracks have been found during investigation of the aforementioned accident and during preparation of this Service Bulletin. While inspecting individual airplanes, inspectors must carefully examine other accessible areas and structure. During preparation of this Service Bulletin, corrosion was found on one wing that was severe enough that the operator elected to replace the wing.

This Service Bulletin does not provide relief from the requirements of Airworthiness Directive 62-24-01 (inspection of both horizontal stabilizer front and rear spars), which remains in effect. The inspection and recurring inspection schedule mandated by this Service Bulletin are to be accomplished in addition to any other inspections and inspection schedules.

Reference Airworthiness Directive 99-12-02 and Safety Communique 162 Rev. 2 (or subsequent revision) for additional information.

**C. Description**

**Part I** of this Service Bulletin provides instructions for the modification and inspection of the forward wing spar structure and aft wing spar structure for fatigue cracks and corrosion at suspected locations.

**Part II** of this Service Bulletin provides a recurring inspection interval at 80 hour intervals. An Accomplishment Instructions Index and Index of Illustrations is located on pages 61 through 63.

**D. Compliance**

Raytheon Aircraft Company considers this to be a mandatory inspection. **Part I** must be accomplished before further flight.

**Part II** is a recurring mandatory inspection and must be accomplished every 80 flight hours thereafter.

An inspector must be certified in the Eddy Current Method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410) for the initial and recurring NDI inspections in this Service Bulletin.

An amendment to AD 99-12-02 has been requested.

**E. Approval**

The engineering data contained in this Service Bulletin is FAA approved.

**F. Manpower**

The following information is for planning purposes only:

**Part I - Initial Inspection**

Estimated man-hours for preparation and reassembly: 235 hours**.**

Suggested number of men for preparation: 2 men.

Estimated man-hours for NDI inspection: 6 hours**.**

Suggested number of men for NDI inspection: 1 man.

**Part II - Recurring Inspection**

Estimated man-hours for preparation and reassembly: 25 hours.

Suggested number of men for preparation and reassembly: 1 man.

Estimated man-hours for NDI inspection: 6 hours**.**

Suggested number of men for NDI inspection: 1 man.

The above is an estimate based on experienced, properly equipped personnel complying with this Service Bulletin. Occasionally, after work has started, conditions may be found which could result in additional man-hours.

**G. Weight and Balance**

Negligible.

**H. Electrical Load Data**

Not changed.

**I. Software Accomplishment Summary**

Not applicable.

**J. References**

Airworthiness Directive No. 99-12-02;

Safety Communique No. 162, Rev. 2 or subsequent revision;

Mandatory Service Bulletin 2538, Rev. I or subsequent revision.

**K. Publications Affected**

It is recommended that a note "See Service Bulletin No. 57-3329" be made in the following:

The appropriate chapter of the applicable parts catalog.

**L. Interchangeability of Parts**

Not applicable.

**M. Warranty Credit**

None.

## 2. Material Information

### A. Materials - Price and Availability

Obtain locally.

### B. Industry Support

Not applicable.

### C. Airplanes

The following parts required for this modification may be ordered from RAPID or obtained locally:

| Part Number | Description | Quantity Per Airplane |
|---|---|---|
| MS21069L3 or MS21075L3 | Nutplate | 8 |
| MS21071L3 | Nutplate | 10 |
| MS20426AD3 | Rivet (to fill in aft spar capstrip, see Figure 26) | 6 |
| MS20470AD4 | Rivet (to install doubler plate) | 40 |
| MS20426AD6 | Rivet ("AD 6" in aft spar capstrip) | 12 |
| MS20470AD3 | Rivet | 12 |
| MS21042L06 | Nut (box section hinge angle and trunnion fastener) | 10 |
| NAS1097AD3 | Rivet (to install nutplates to mounting plates) | 36 |
| NAS 1121-X * | Screw (aft MLG trunnion fastener) | 4 |
| NAS1151-XP * | Screw (forward MLG trunnion fastener)* | 2 |
| NAS1121-X * | Screw (box section hinge angle fasteners) | 4 |
| NAS1703-X * | Bolt (forward spar lower hinge extrusion - spar cap) | 8 |
| NAS1603-X * | Bolt (alternative oversize to NAS1703-X) | As Required |
| NAS2903-X * | Bolt (forward spar lower structure) | 10 |
| NAS3003-X * | Bolt (alternative oversize to NAS2903-X) | As Required |
| AN960-6 | Washer (trunnion and box section hinge angle fasteners) | 10 |
| NAS9310M-4 or NAS1738B-4 | Blind Fastener | Where Specified, As Required |
| * Grip length of Screws and Bolts to be determined upon installation. X = Grip Length, P= Cad Plate | | |

| Part Number | Description | Quantity Per Airplane |
|---|---|---|
| 35-921502 | Gasket, Wing Fuel Cell Filler Neck | 2 |
| 35-921503 | Gasket, Fuel Quantity Transmitter | 2 |
| 45-921523 | Gasket, Wing Fuel Cell Outlet | 2 |
| 35-921502 | Gasket, Submerged Fuel Boost Pump | 2 |

The following materials may be obtained locally:

| Part Number | Description | Quantity Per Airplane |
|---|---|---|
| 8544 (33396) | Tape, Fuel Resistant, Black (Minnesota Mining & Manufacturing Co.) | As Required |
| 2024-T3 ALCLAD .020 | Plate .020 inch thick (for mounting nutplates) | 2 - approx. 3" x 6" |
| 2024-T3 ALCLAD .040 | Plate .040 inch thick (doubler plate for lower skin) | 2 - approx. 5" x 5" |
| 2024-T3 ALCLAD .125 | Strip .125 inch thick (radius block - trunnion) | As Required 1"x1" |
| EA9309NA | Structural Adhesive | As Required |
| 6061-T4 bare .032 | Fuel bladder protecting angle - fabricate locally, smooth corners and edges | 2 - size as required |
| MIL-C-5541, CLASS 1A | Alodine 1200, 1200S or 1201 (chemical film treatment) | As Required |
| G322L | Silicone Grease (General Electric) | As Required |
| MIL-C-16173, Grade 2 | Corrosion Preventive Compound | As Required |
| MIL-P-23377 | Epoxy Polyamide Primer | As Required |
| MIL-L-6082A | Light Engine Oil | As Required |

Raytheon Aircraft Company expressly reserves the right to supersede, cancel and/or declare obsolete, without prior notice, any parts or publications that may be referenced in this Service Bulletin.

**D. Spares**

WARNING

**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

**Any replacement leading edge or box section hinge angle assemblies which are to be installed as replacement parts must be Eddy Current Inspected in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

**E. Reidentified Parts**

None.

**F. Tooling - Price and Availability**

- Hand Reamers, tapered tip with spiral flute and straight shank, LH spiral/RH cut, such as Lavallee & Ide No. 503 Series Spiral Flute hand reamers in sizes (9/64, 13/64 and 7/32) which yield hole dimensions specified in this Service Bulletin. (Lavallee & Ide, 110 West Canal St./P.O. BOX 0068, Winooski, Vermont 05404, tele. 802-655-1870, FAX 802-655-3881) or (Claude Mann & Associates 1720 E. Morris, Suite 113, Wichita, KS 62211, tele. 316-267-2272, FAX 316-267-8124) or (The Wiedemann Company, 705 Bowser St., Suite #101, Richardson, TX 75081, tele. 800-392-5123)
- Nortec Staveley 19e Impedance plane Eddy Current instrument or equivalent with a frequency range of 500 Hz to 3 Mhz minimum. The instrument must be capable of connecting to the rotating probe listed below. (Staveley Instruments, Kennewick, WA. tele. 509-735-7550)
- Nortec (Staveley Inst.) RA-19 Rotating Eddy Current probe or equivalent with a rotational speed of not less than 200 rpm., and reflection differential coil bolt hole probes to fit, 300 kHz minimum. (Staveley Instruments, Kennewick, WA. tele. 509-735-7550)
- Shielded Eddy Current bolt hole probes, sizes to fit, 300 kHz minimum, absolute or differential coil.
- Shielded Eddy Current pencil probe, minimum 100 kHz, absolute coil.
- Eddy Current 90° pencil probe, maximum 1/2" drop, minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 8.
- Hi-Torque drivers (MS33750) for removal/installation of NAS1703 bolts, available from tool supply companies such as Brown Aviation Tool Supply Co. 700 N. Rockwell, Bldg. Two, Suite E, Bethany, OK 73008, tele. 800-587-3883.
- Torq-Set drivers (MS33781) for removal/installation of NAS1121 and NAS1151 screws, available from tool supply companies such as Brown Aviation Tool Supply Co. 700 N. Rockwell, Bldg. Two, Suite E, Bethany, OK 73008, tele. 800-587-3883.

## 3. Accomplishment Instructions

This Service Bulletin shall be accomplished as follows:

**NOTE**

Should any difficulty be encountered in accomplishing this Service Bulletin, contact Raytheon Aircraft Company at 1-800-429-5372 or 316-676-3140. Reference the Accomplishment Instructions Index located on pages 61 and 62 for indexes to the Accomplishment Instructions in Part I and Part II.

**A. Airplane**

WARNING

**Observe all Warnings and Cautions contained in the aircraft manuals referred to in this Service Bulletin.**

WARNING

**Whenever any part of this system is dismantled, adjusted, repaired or renewed, detailed investigation must be made on completion to make sure that distortion, tools, rags or any other loose articles or foreign matter that could impede the free movement and safe operation of the system are not present, and that the systems and installations in the work area are clean.**

**NOTE**

Accomplish all maintenance in accordance with the appropriate manual and best shop practices.

**NOTE**

Maintenance procedures are the same for both left and right sides. Only the maintenance procedures for the left side are described. Reference the Accomplishment Instructions Index located on page 61 for an index of the Accomplishment Instructions in Part I.

**Part I**

(1) To determine whether this Service Bulletin applies, inspect the airplane to ensure it conforms to the Type Certificate as follows:

(a) Review all logbooks and FAA forms 337 and inspect the airplane to ensure it conforms to Type Certificate No. 5A3 by confirming it is in original condition. If the airplane has been modified, altered or repaired, received parts produced by an owner/operator or been modified by Supplemental Type Certificate(s) (STC)(s), contact a FAA Designated Engineering Representative (DER) and the owner(s) of the STC(s) to determine whether those are all compatible with each other and the original condition/Type Certificate.

(b) Based on the findings from step (a), remove/replace all parts that are not compatible with the original condition (Type Certificate) and with all other changes since original manufacture.

WARNING

**Do not defuel near an open flame or within 100 feet of any energized electrical equipment capable of producing sparks.**

(2) Defuel and drain all fuel into a suitable container.

(3) Place the airplane on jacks and raise until the wheels are clear.

(4) Remove the flaps as follows:

(a) Lower the flaps and pull out the flap circuit breaker.

CAUTION

*If power is left on when the left flap is disconnected from the actuator, the actuator switch tab will release the limit switch, closing the circuit. The flap motor will start, pushing the flap actuator through the flap.*

(b) Remove all electrical power from the airplane and disconnect the battery. Display warning notices prohibiting reconnection of airplane electrical power.

(c) Disconnect the flap actuator from the flap.

(d) Remove the inboard and outboard upper flap bolts.

(e) Pull flap down from top flap track and remove the lower inboard and lower outboard flap bolts.

(f) Remove the flap bonding cable.

(g) Remove the flap.

(5) Manually raise the landing gear using the hand crank until the inboard landing gear doors are fully open.

(6) Disconnect the inboard MLG door actuating rod at the bracket on the inboard door.

(7) Gain access to the forward side of the forward spar (main spar) as follows:

(a) Remove the fuel cell access panel from the inboard side of the leading edge (lower surface).

CAUTION

*Lubricate the fuel cell with light engine oil MIL-L-6082A. The fuel cell should not be moved until 24 hours after the oil has been applied. The lighter viscosities of oil are preferable because they leave a thinner film on the walls of the cells. Do Not permit excessive amounts of oil to remain in the cells in pools or puddles.*

CAUTION

*A thin coating of light engine oil should be applied to the inside of all serviceable fuel cells, which have contained gasoline, if the cells are to remain unfilled for 10 days or more. When working inside cell, do not allow hot light bulbs to contact the cell.*

(b) Remove the small panel from the upper surface of the leading edge which is located on the fuel tank filler opening.

(c) Remove the fuel cell (fuel bladder) from the leading edge of the wing.

CAUTION

*Do not damage the structure beneath the fuel cell liner.*

(d) Trim the aft edge of the fuel cell (fuel bladder) metal liner adjacent to the forward spar assembly, and remove material from inside the leading edge fuel cavity to gain access to the lower forward spar area as follows:

**NOTE**

An additional vertical stiffener and a vertical row of rivets is installed on T-34B wing spars (not installed on T-34A spars). This stiffener is located on the forward spar web approximately 4 inches inboard of the vertical stiffener located at Wing Station (WS) 33.0. On T-34B airplanes it will be necessary to locate the third vertical row of rivets (as opposed to the second row on T-34A's) in step (7) (d) (i).

(i) Look through the fuel filler opening at the forward spar (inside the leading edge fuel cell cavity) and locate the first vertical row of rivets in the forward spar web located closest to the fuselage. Reference Figure 1. Moving outboard along the spar web, find the next (second) vertical row of rivets in the spar web. The second vertical row of rivets is located near WS 33.0 (reference the 3rd vertical row of rivets on T-34Bs).

(ii) Mark an area approximately 2" by 7" on the liner as shown in Figure 1 [VIEW OF FORWARD SPAR INSIDE LEADING EDGE FUEL CAVITY THROUGH FUEL FILLER]. Start the mark at the inboard side of the second vertical row of rivets in the spar web (near WS 33.0 identified in step (7) (d) (i)). Extend the line 2" forward from the spar, 7" outboard along the spar and 2" aft to the spar. Reference Figure 1.

(iii) Remove the fastener heads (located inside the marked area) from the liner. These two (2) fasteners attach the liner to an "L" shaped bracket mounted to the aft inside structure of the leading edge. The "L" shaped bracket will not be visible until the liner is cut away.

CAUTION

*Maintain a 1/4" to 1/2" radius on all cutting operations in this Service Bulletin.*

(iv) Cut away the fuel cell liner along the marked line with compact sheet metal snips. Remove the cut away section of liner from the leading edge fuel cell cavity.

(v) Remove the five (5) rivets (not shown) which attach the small "L" shaped bracket to the leading edge hinge angle, located under the liner area removed in step (iii). Remove the bracket from the leading edge structure.

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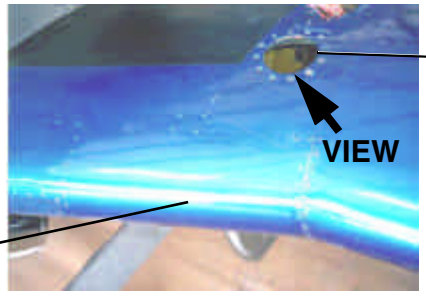
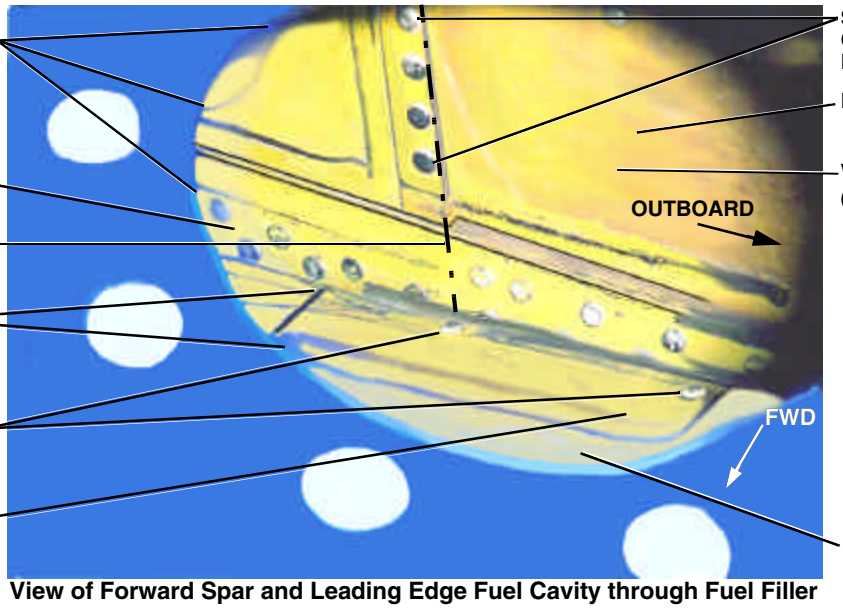
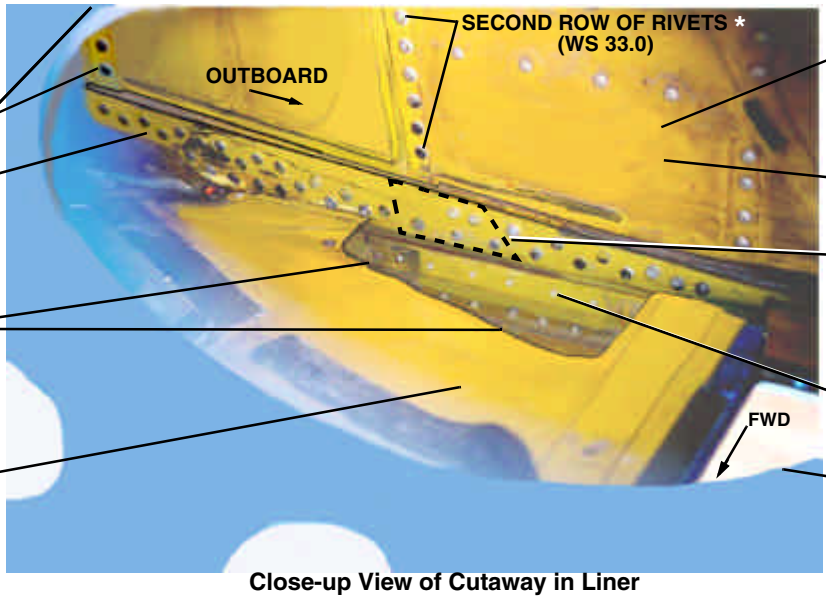



*Note:
T-34A Shown
T-34B is similar except an additional row of rivets is installed between the "first vertical row" and the "second vertical row" of rivets




View of Forward Spar and Leading Edge Fuel Cavity through Fuel Filler




Close-up View of Cutaway in Liner

**Fuel Cell Liner Modification**
**Figure 1**

The lower inboard section of the forward (main) spar is constructed of several layers of sheet metal and metal extrusions which are formed, fitted and attached to the lower wing fitting. As viewed from the inboard side looking outboard, the cross section of the lower forward spar is shaped similar to an upside down "**T**" (reference Figure 2) with multiple layers reinforcing the upside-down "**T**".

- The spar web is oriented vertically and attaches the upper spar structure (not shown) to the lower spar hinge extrusion (spar cap).
- The aft reinforcement is attached to the aft side of the spar web.
- A tapered spacer is attached to the forward side of the spar web.
- The aft "J" channel is attached to the forward side of the tapered shim. The aft "J" channel extends below the lower edge of the web and curves aft below the tapered shim, spar web and aft reinforcement. The aft "J" channel curves up on the aft side of the aft reinforcement.
- The forward "J" channel is attached to the forward side of the aft "J" channel. The forward "J" channel curves down and forward, and the curves back up past the forward side of the forward reinforcement.The forward reinforcement is attached to the forward side of the forward "J" channel.
- The forward reinforcement is attached to the forward side of the forward "J" channel.
- A filler strip is attached to the lower side of both "J" channels.
- The lower spar hinge extrusion (spar cap) is attached to the lower side of the filler strip.

(8) Inspect the inboard section of forward spar as follows:

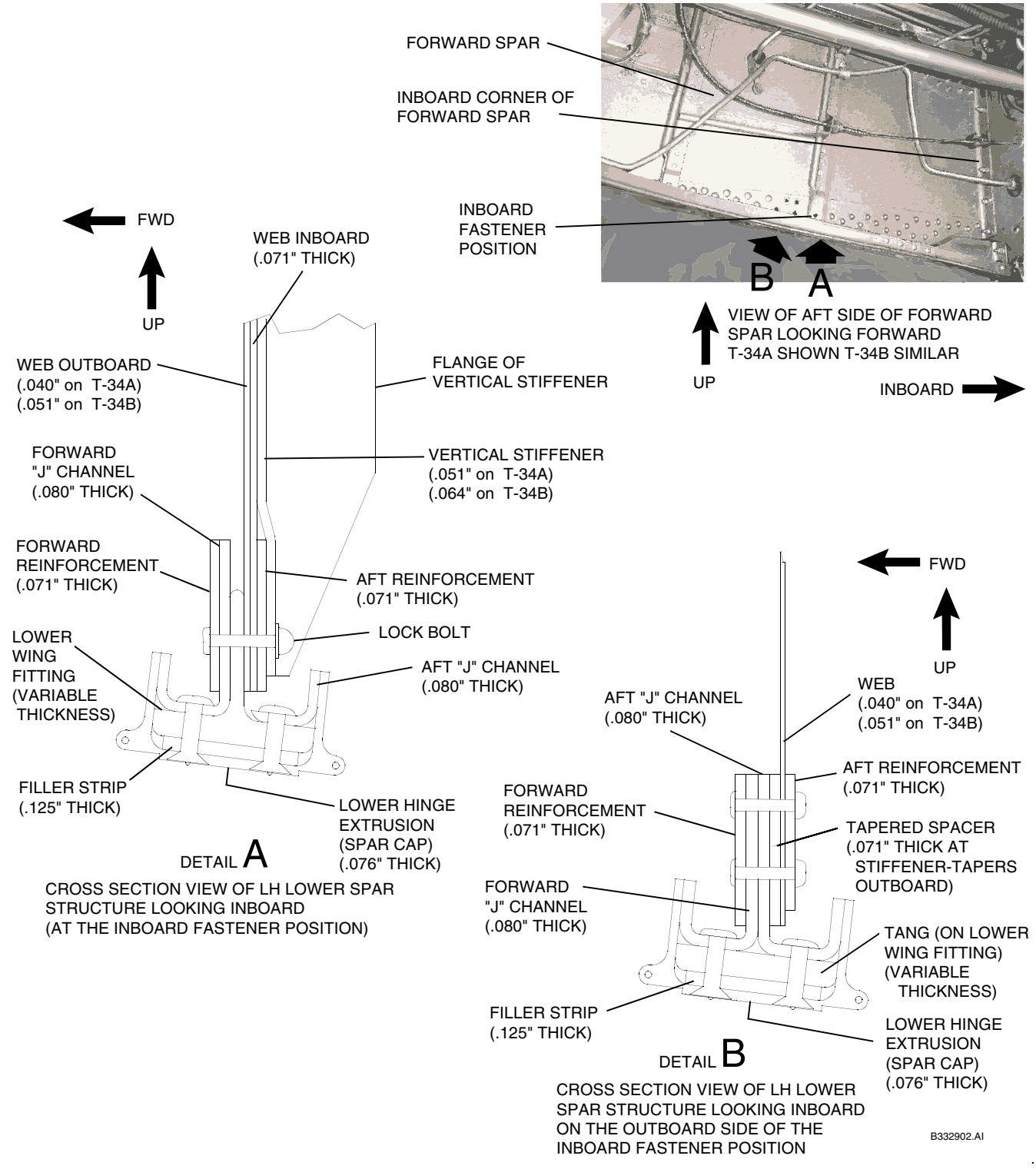
(a) Locate the inboard forward (main) spar inspection area near W.S. 34.0 as shown in Figures 3, 4 5 and 6. This area consists of nine (9) fasteners in the lower forward spar.

Five (5) of the nine (9) fasteners are installed through the lower area (edge) of the spar web (reference Figure 4), from the forward side to the aft side (the rivet shanks are oriented horizontally, longitudinally with respect to the airplane axis). These fasteners are located in reinforcements on the spar web in the forward (main) spar structure near the outboard end of the lower forward wing fitting.

- Of the five (5) fasteners, the inboard fastener (reference the inboard fastener position in Figure 4) is installed in the vertical stiffener, aft reinforcement, spar web (both forward and aft elements), vertical spline of the lower forward wing fitting, forward "J" channel and forward reinforcement. Reference Detail A in Figure 2.

- The other fasteners in the group of five (5) are installed in the aft reinforcement, spar web, tapered spacer, aft "J" channel, forward "J" channel and forward reinforcement. Reference Figure 4 and Detail B in Figure 2.

The other four (4) fasteners within the group of nine (9) fasteners (reference Figures 5 and 6) are installed through the lower forward spar hinge extrusion (spar cap), filler strip, tang on the outboard end of the wing fitting and horizontal flange of their respective forward "J" channel or aft "J" channel near W.S. 34.0. The fastener shanks are oriented vertically (2 are located on the forward side of the spar web, the other 2 are aft of the spar web) and are installed at the outboard end of the lower forward wing fitting. Reference Detail B in Figure 2.




**Typical Spar Cross Section**
**Figure 2**

CAUTION

*Be very careful when removing fasteners. Ensure the heads of the fasteners are drilled off and the fastener shanks are* ***pushed*** *out with a punch with same diameter as the fastener shank. Do not attempt to drill out the shanks.* ***Drill the rivet head only, do not drill the shank****. If the fasteners are not removed correctly and the fastener hole wall is damaged, the Eddy Current Inspection may produce inconsistent results.*

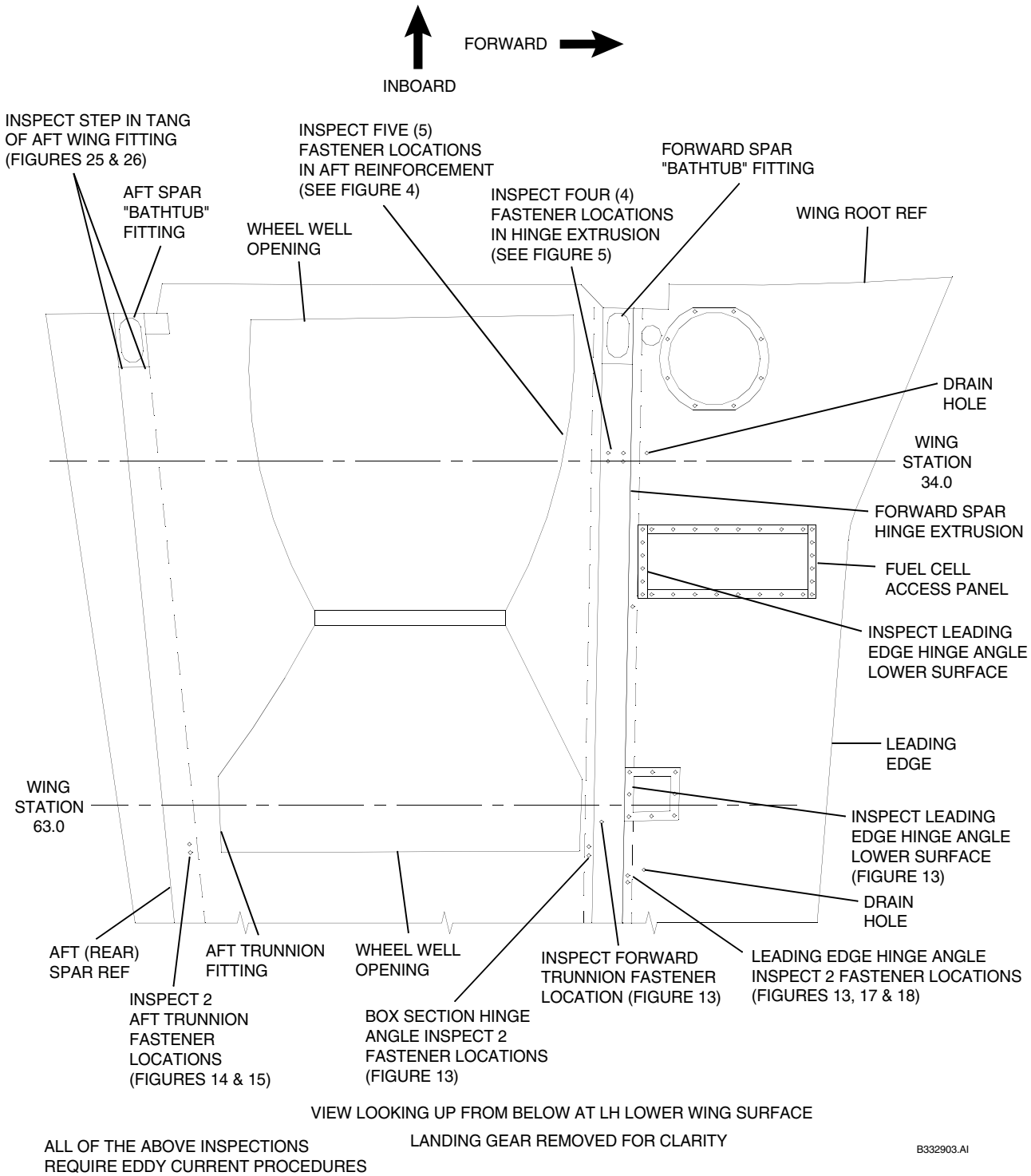
(b) Remove the nine (9) fasteners described in step (a).

(i) Access five (5) of the fasteners from the Main Landing Gear (MLG) wheel well area on the aft side of the forward (main) spar. These fasteners are installed through the vertical members of the lower spar structure. When looking forward at the spar structure from inside the MLG wheel well compartment, these fasteners can be viewed by locating the vertical stiffener on the aft spar web which is closest to the forward inboard corner of the MLG wheel well. Reference Figure 4. These fasteners include the fastener in the vertical stiffener plus the four fasteners located immediately outboard of the vertical stiffener.
Note that T-34B airplanes had an additional vertical stiffener (not shown in Figure 4) installed between the inboard corner of the wheel well and the vertical stiffener shown in Figure 4. On T-34B airplanes the fastener is located in the second vertical stiffener from the inboard corner of the wheel well.

Also note that the fastener (in the group of five (5)) located closest to the inboard corner is installed in a vertical stiffener on the aft reinforcement. This inboard fastener (installed through the vertical stiffener - see Figure 4) is a lock bolt and is slightly larger than the other fasteners, constructed of a harder material. It will be necessary to carefully cut the aluminum collar from the lock bolt (on the wheel well side) and drive the shank forward. It may also be necessary to cut the shank of the lock bolt into two pieces (cut it on the forward side of the spar with a cut off tool) to provide clearance as it is removed from the forward side of the forward spar.

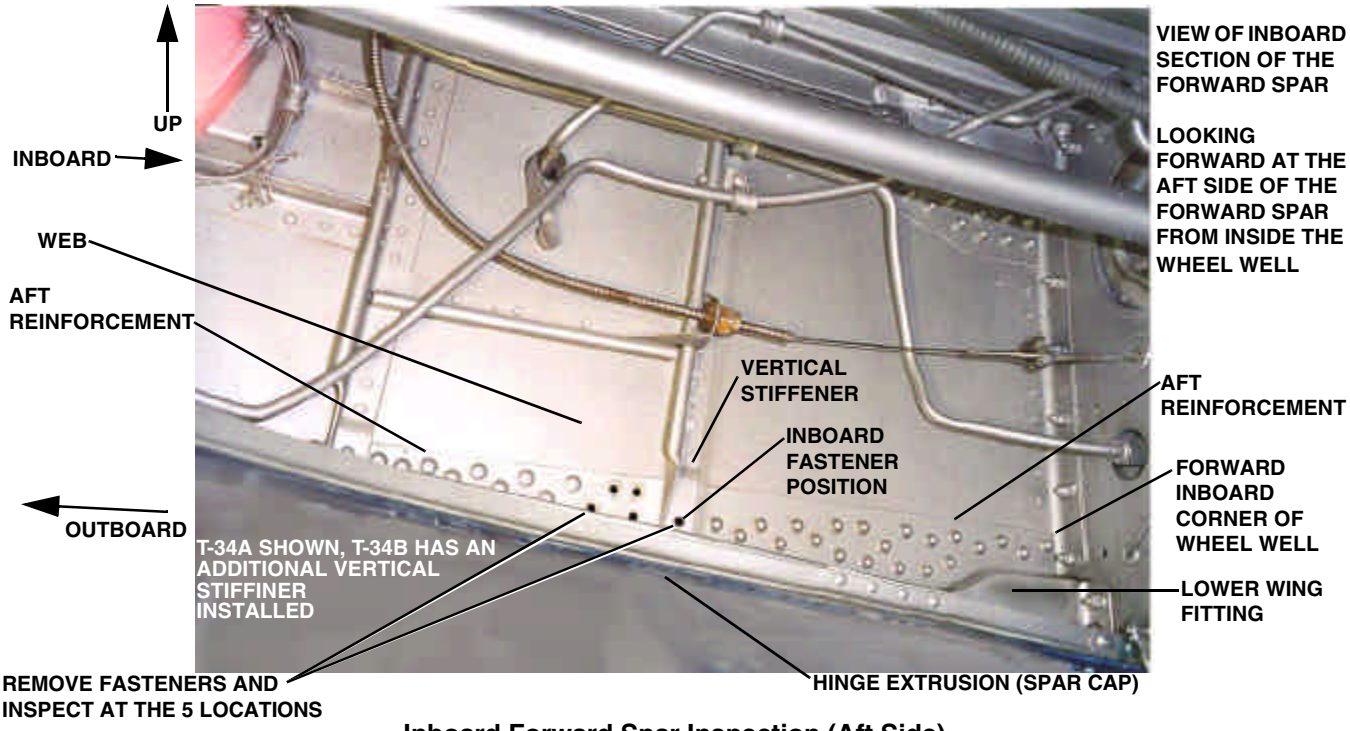
Drill out the heads and push out the shanks of the four (4) fasteners (of the group of 5) that remain.

(ii) Access the other four (4) fasteners from below the wing surface. Locate the forward (main) lower spar hinge extrusion (spar cap) on the lower side of the wing. The lower spar hinge extrusion has a series of fastener rows with 2 fasteners installed in each row. The four (4) fasteners to be removed are located in the lower spar hinge extrusion and are in the 11th and 12th fastener rows in the hinge extrusion as counted from the inboard edge of the lower spar hinge extrusion (reference Figure 5 and Figure 6). The fastener shanks are oriented vertically and are installed immediately aft of a drain hole in the lower side of the leading edge. These fasteners are installed through the lower spar hinge extrusion (spar cap), filler strip, lower forward wing fitting tang and respective forward or aft "J" channel. Remove the fastener heads and push the shanks up through the lower spar structure.

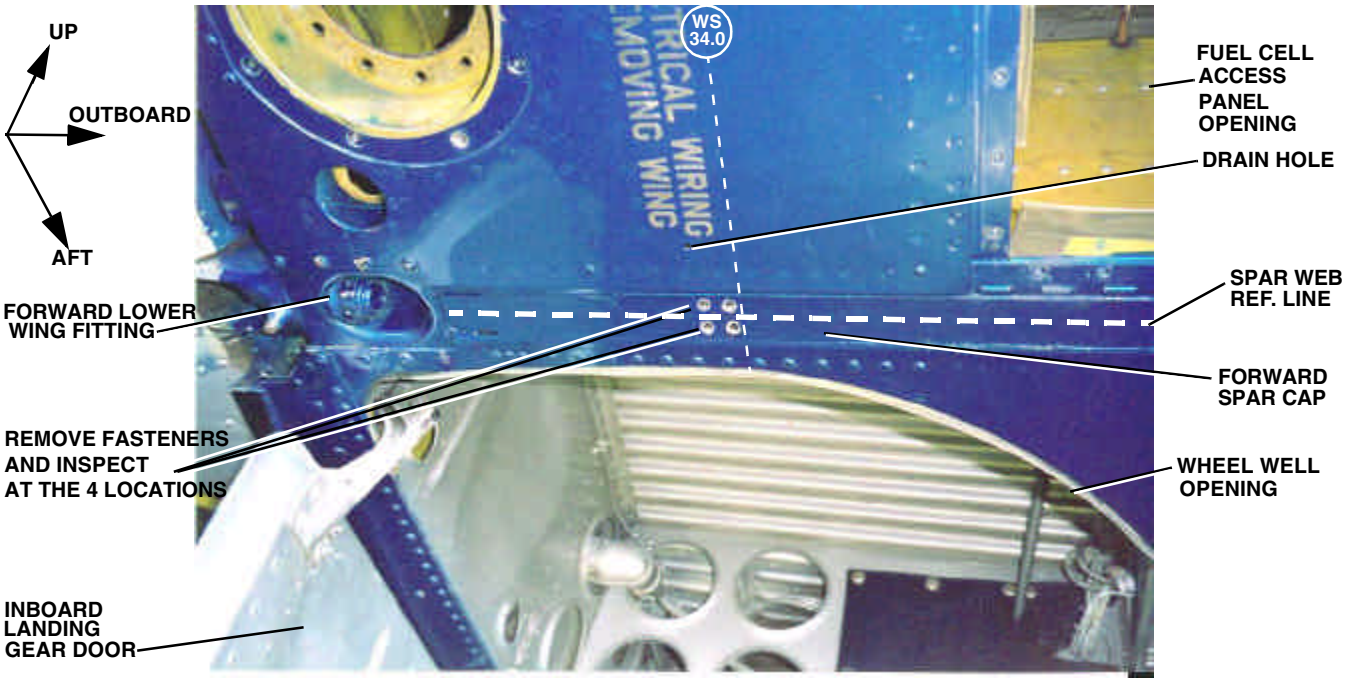



**Inspection Locations (LH Wing Shown)**

**Figure 3**




**Inboard Forward Spar Inspection (Aft Side)**
**Figure 4**




VIEW LOOKING UP AND AFT AT THE LH FORWARD LOWER SPAR CAP

**Inboard Forward Spar Inspection (Lower Side)**
**Figure 5**

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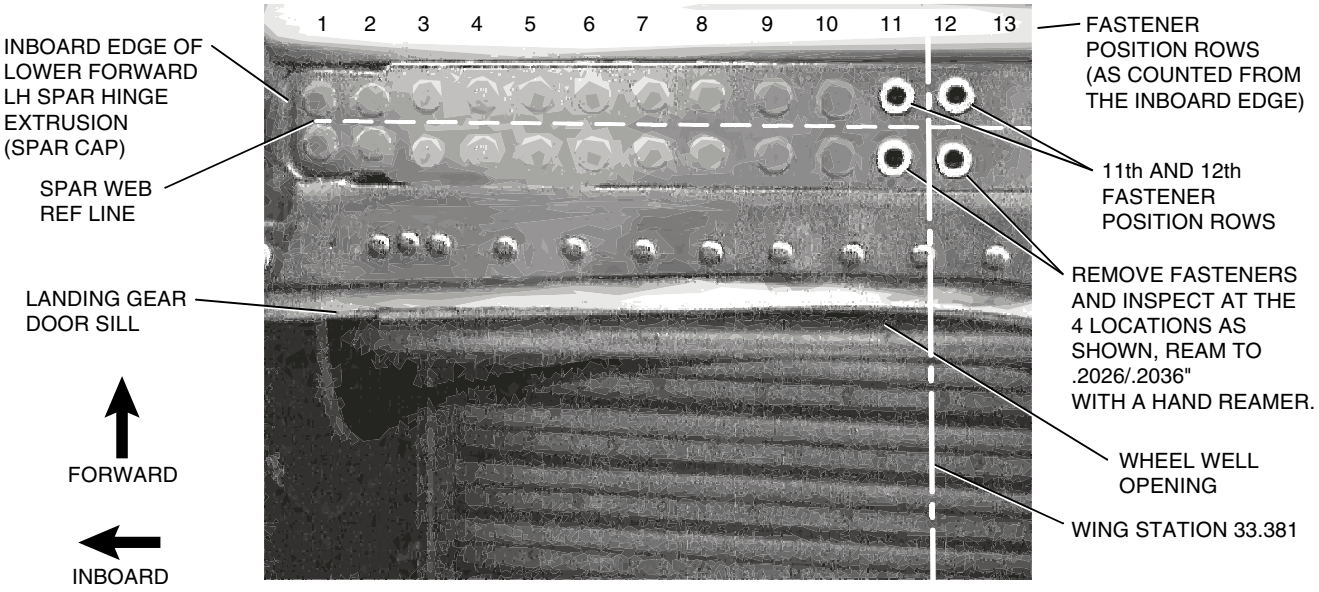


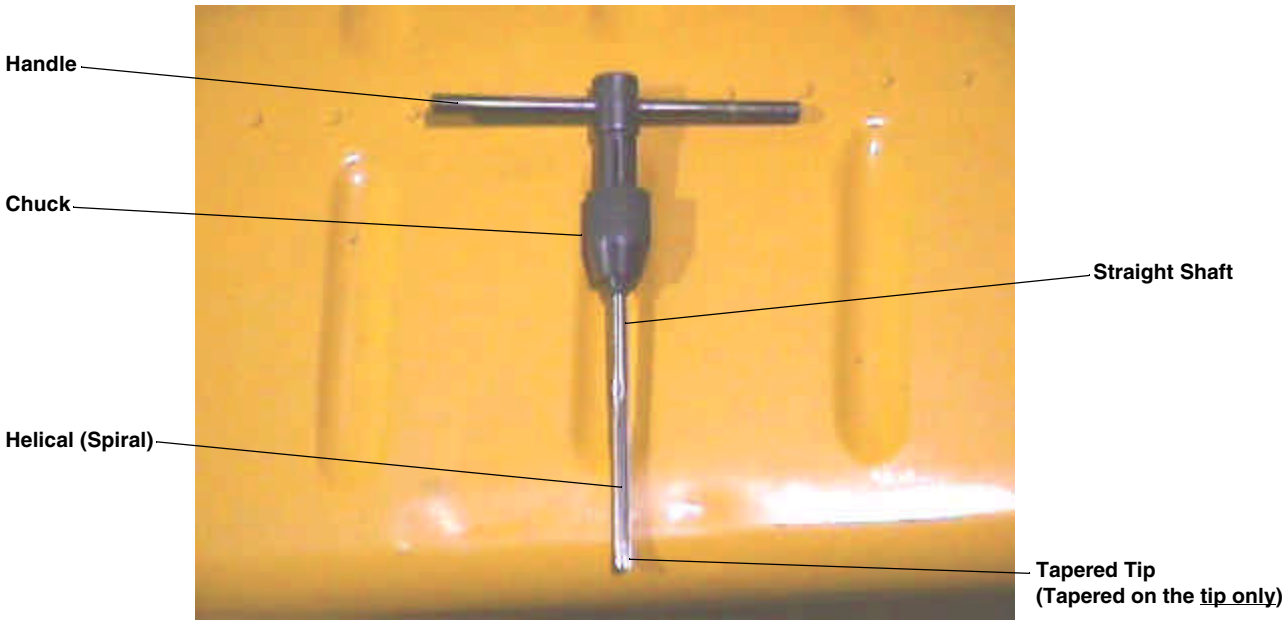

CLOSE-UP VIEW OF THE LOWER FORWARD LH SPAR HINGE EXTRUSION LOOKING UP FROM BELOW

**Inboard Forward Spar Close-Up**
**Figure 6**

**CAUTION**

*Use a **hand reamer** (reference Figure 7) for all reaming operations in this Service Bulletin. Hand reamers are made with both straight and helical flutes. Use a hand reamer with helical flutes. Helical flutes usually produce less binding and chattering. **Hand reamers** are tapered slightly on the end, as opposed to **machine reamers** which have the same diameter throughout the length of the flutes. The taper end on a hand reamer facilitates proper alignment and starting of the reamer in the hole.*

***Do not over-insert the hand reamer into any of the fastener holes.** Conduct the reaming operation with two men to ensure the reamer does not contact components on the opposite side of the fastener hole. Protect these areas with brass or stainless steel shim stock sheet (.010 or .005 inch thick) before reaming. When reaming from below lower surface of the wing do not allow the hand reamer to nick metal on the forward reinforcement or aft reinforcement. When reaming from inside the wheel well do not allow the hand reamer to nick metal on the forward "J" channel or the aft flange on the leading edge. Place the brass or stainless steel shim stock sheet against these surfaces **before** reaming.*




**Hand Reamer**
**Figure 7**

(c) Using a hand reamer, enlarge the nine (9) fastener holes which were exposed in step (8) (b) as follows:

**NOTE**

It is very desirable to ream a **smooth hole** (which can be Eddy Current inspected) at the first oversize of .2026/.2036 inch diameter as opposed to re-reaming to the next oversize of .2183/.2193 inch diameter.

(i) Ream the group of 5 fastener holes in the aft reinforcement (reference Figure 4) removed in step (8) (b) (i), to the first oversize of .2026/.2036 inch diameter for NAS2903 bolts. Start at the aft reinforcement and ream through the spar structure detailed in step (8) (a). If larger fasteners are required, use a second standard oversize of .2183/.2193 inch diameter for NAS3003 bolts.

**CAUTION**

*Do not allow the hand reamer to nick metal on the forward reinforcement or aft reinforcement on the forward spar (see Figure 2). Protect the spar structure by placing brass or stainless steel shim stock sheet (.005 or .010 inch thick) against the forward reinforcement and aft reinforcement before reaming the four (4) fastener holes in the forward spar lower hinge extrusion (spar cap).*

(ii) Ream the group of four (4) fastener holes in the forward spar lower hinge extrusion (spar cap) (reference Figures 5 and 6) that were removed in step (8) (b) (ii), to the first oversize of .2026/.2036 inch diameter for NAS1703 bolts. Protect both the forward and aft side of the forward spar by placing (.005" or .010" thick) brass or stainless steel shim stock sheet against the forward and aft reinforcements before reaming. If a smoother hole is required, it is permissible ream to the second standard oversize of .2183/.2193 inch diameter for NAS1603 bolts.

(d) Perform an Eddy Current NDI inspection of the each of the 9 fastener holes in the inboard area of the forward spar that were removed in step (8) (b) as follows:

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

Equipment:

- Nortec Staveley 19e Impedance plane Eddy Current instrument or equivalent with a frequency range of 500 Hz to 3 Mhz minimum. Reference Figure 8. The instrument must be capable of connecting to the rotating probe listed below. (Staveley Instruments, Kennewick, WA. tele. 509-735-7550)
- Nortec (Staveley Inst.) RA-19 Rotating Eddy Current probe or equivalent with a rotational speed of not less than 200 rpm., and reflection differential coil bolt hole probes to fit, 300 kHz minimum. (Staveley Instruments, Kennewick, WA. tele. 509-735-7550)
- Shielded Eddy Current bolt hole probes, sizes to fit, 300 kHz minimum, absolute or differential coil.
- Shielded Eddy Current pencil probe, minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(i) Set up the instrument in accordance with the manufacturer's instructions to obtain a minimum 30% screen deflection on the corner .030" notch of the standard. When using amplitude/time mode, the indication from the notch should look like a tight sine wave (reference Figure 11). A series of loose sine waves which are spread across the screen are indicative of a hole which requires further clean up (caution, do not ream to a larger size).

(ii) Inspect each of the noted fastener holes by inserting the rotating probe at a very slow transverse rate. Note that this is a multi-layered structure. A spinning Eddy Current probe will show this effect clearly. Scan all of the noted holes.

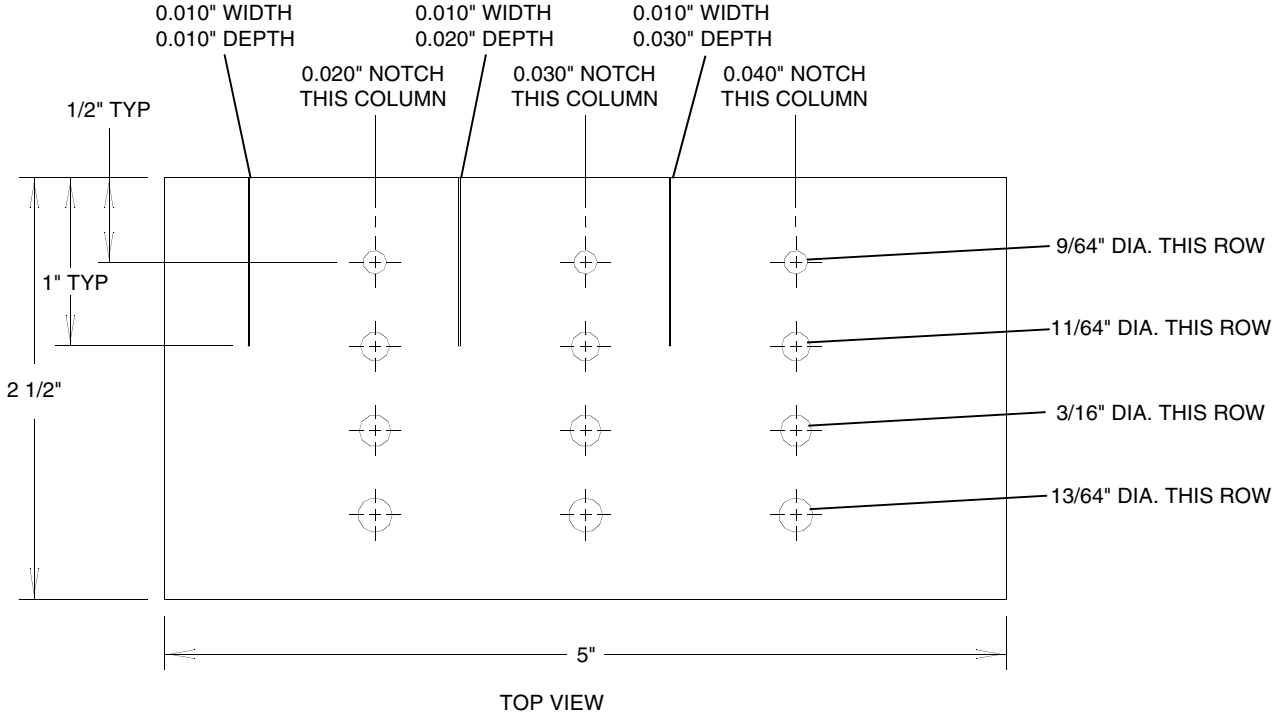

**Impedance Plane Eddy Current Instrument - Nortec Staveley 19e**
**Figure 8**

(iii) A means of clearly determining the depth of the probe coil is essential, in that the acceptance criteria varies at the second layer in some locations.

(iv) If an indication appears, note the location and verify with a manual probe set with a depth stop to the noted location. Note the direction of the crack indication and the part the crack indication was discovered in.

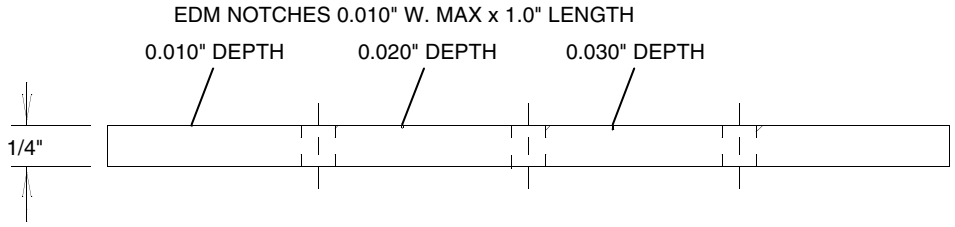
**WARNING**

**A crack indication in the filler strip may be allowed, but only if the direction of the crack indication is toward the outside edge of the filler strip. If the direction of the crack indication is toward the inside of the filler strip, the spar assembly must be replaced. Reference Figure 10.**

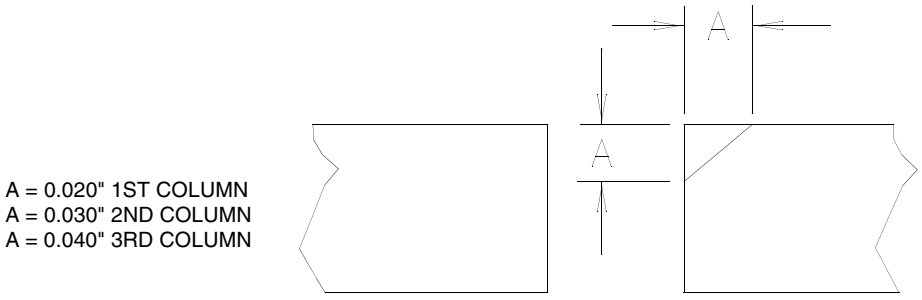



TOP VIEW

MATERIAL 2024-T3 OR 2024-T4 ALUMINUM




SIDE VIEW

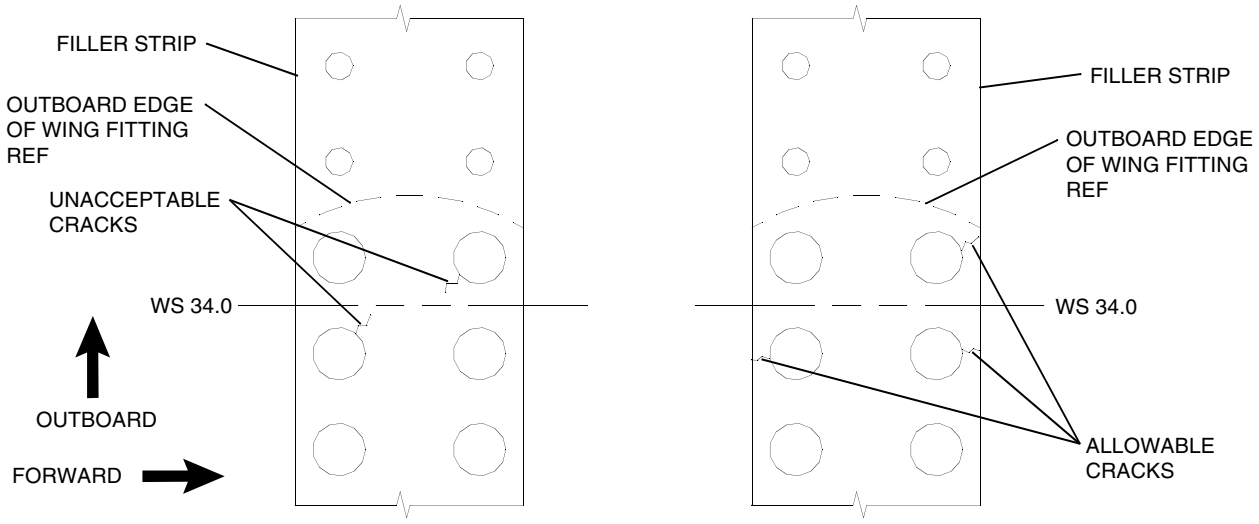



HOLE EDM NOTCH DETAIL .010" W. MAX.

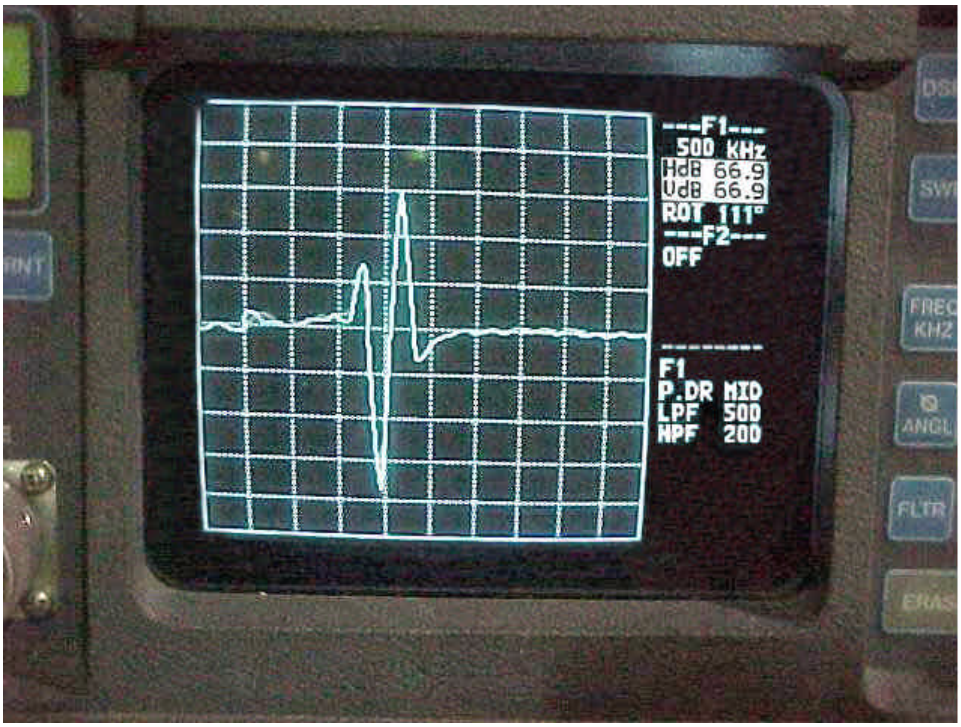
B332908.AI

**Standard Calibration Block**

**Figure 9**




**Filler Strip Cracks**
**Figure 10**




**Calibration / Crack Indication Display on Nortec Staveley 19e**
**Figure 11**

WARNING

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

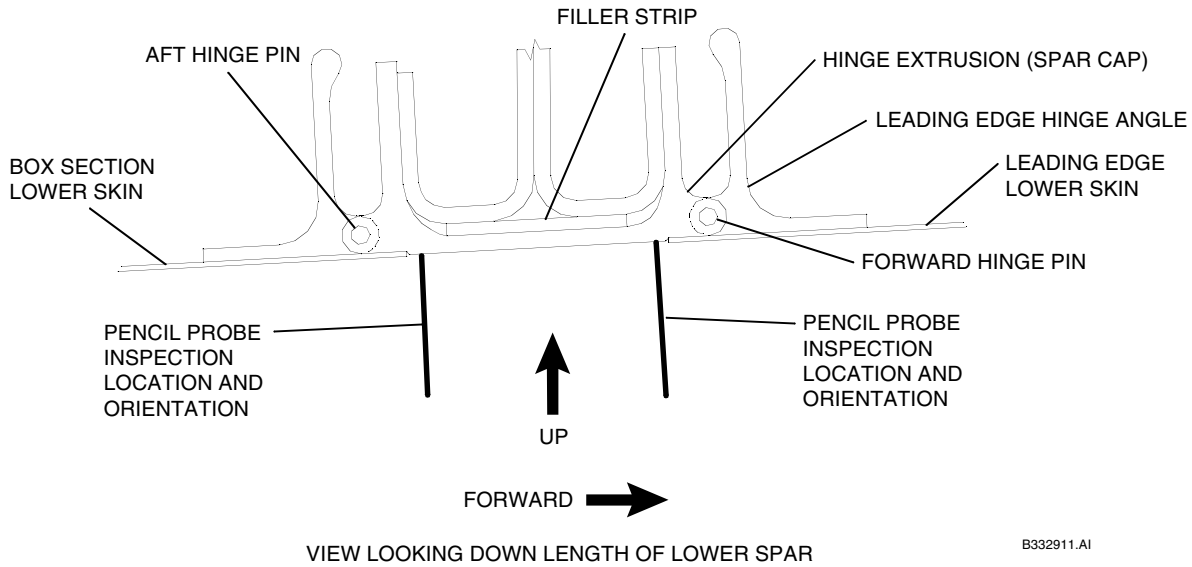
(e) Eddy Current inspect the lower surface of the forward (main) spar hinge extrusion for the length of the spar. Reference Figure 3, Figure 6, Figure 12, Figure 14, and Figure 17 as follows:

Equipment:

- Instrument: Same as used to inspect the inboard area of the forward wing spar in step (8) (d).
- Shielded Eddy Current pencil probe, minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(i) Adjust the instrument using the .030" EDM notch on the flat of the standard. Obtain a minimum 50% screen deflection.

(ii) On the lower surface of the forward spar from the attach fitting outboard to the end of the exposed spar (wingtip), scan the exposed surface of the forward and aft edges of the hinge extrusion adjacent to the hinge attach point with the pencil probe as shown in Figure 12.




**Eddy Current Inspection of Forward Spar (Lower Surface)**
**Figure 12**

WARNING

**Do Not use a metal ruler or metallic guide, as the metal will affect the coil in the Eddy Current probe. Ensure that the spar hinge extrusion is scanned, not the lower skin which overlaps the hinge extrusion.**

(iii) A one scan pass on the forward side of the spar lower hinge extrusion adjacent to the forward lower leading edge skin is required, and one scan pass on the aft edge of the spar lower hinge extrusion adjacent to the box section lower wing skin as shown in Figure 12 is required. Use a plastic ruler or other nonmetallic guide to assist in the scan.

(iv) Ensure the scan is continued from the lower wing attach fitting to the end of the exposed spar (wingtip) along the forward and aft surface of the spar hinge extrusion as shown in Figure 12.

WARNING

**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(f) If a crack is found during the Eddy Current Inspection of the forward spar as outlined in step (d) and step (e), the entire forward (main) spar assembly must be replaced **BEFORE FURTHER FLIGHT.**

(9) Inspect three (3) MLG trunnion fitting fastener locations as follows:

(a) Locate the MLG trunnion fittings in the wheel well area, reference Figures 3, 13, 14 and 15. The forward trunnion fitting is attached to the aft side of the forward (main) spar and the aft trunnion fitting is attached to the forward side of the aft (rear) spar near W.S. 63.0.

Identify the single (1) outboard fastener located in the lower flange of the forward MLG trunnion fitting. The forward trunnion fastener is installed in the forward spar hinge extrusion, aft "J" channel horizontal flange ("J" angle on the forward spar) and lower flange of the forward MLG trunnion fitting. This fastener is located in the fastener position closest to the outboard end of the lower flange on the forward MLG trunnion fitting. Reference Figure 14.

Identify the two (2) outboard fasteners in the lower flange of the aft MLG trunnion fitting. The two aft trunnion fasteners are installed in the aft spar lower element (capstrip), forward "L" angle horizontal flange ("L" angle of the aft spar) and lower flange of the MLG trunnion fitting. These two (2) fasteners are located in the fastener positions which are closest to the outboard end of the lower flange on the aft MLG trunnion fitting. Reference Figure 15 and Figure 16.

(b) Remove the three (3) fasteners identified in step (9) (a). Drill the head of each trunnion fastener from the underside of the wing and push out the shanks.

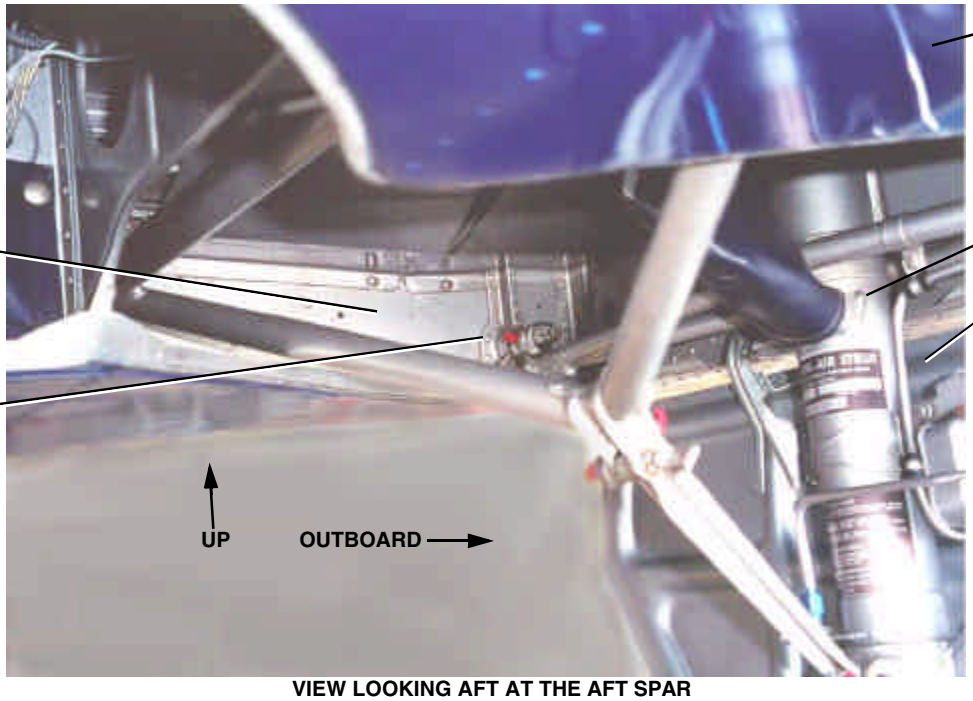
(c) Ream the three (3) fastener holes which were exposed in step (9) (b) to .1400/.1410 inch diameter with a hand reamer. Clean the enlarged holes with Naphtha.

(d) Eddy Current Inspect the trunnion fitting fastener hole in the forward (main) spar lower hinge extrusion (spar cap) and aft "J" channel ("J" angle). Eddy Current Inspect the trunnion fitting fastener holes in the aft (rear) spar capstrip and "L" angle on the forward side of the aft spar. Conduct the Eddy Current Inspections in accordance with step (8) (d).

**WARNING**

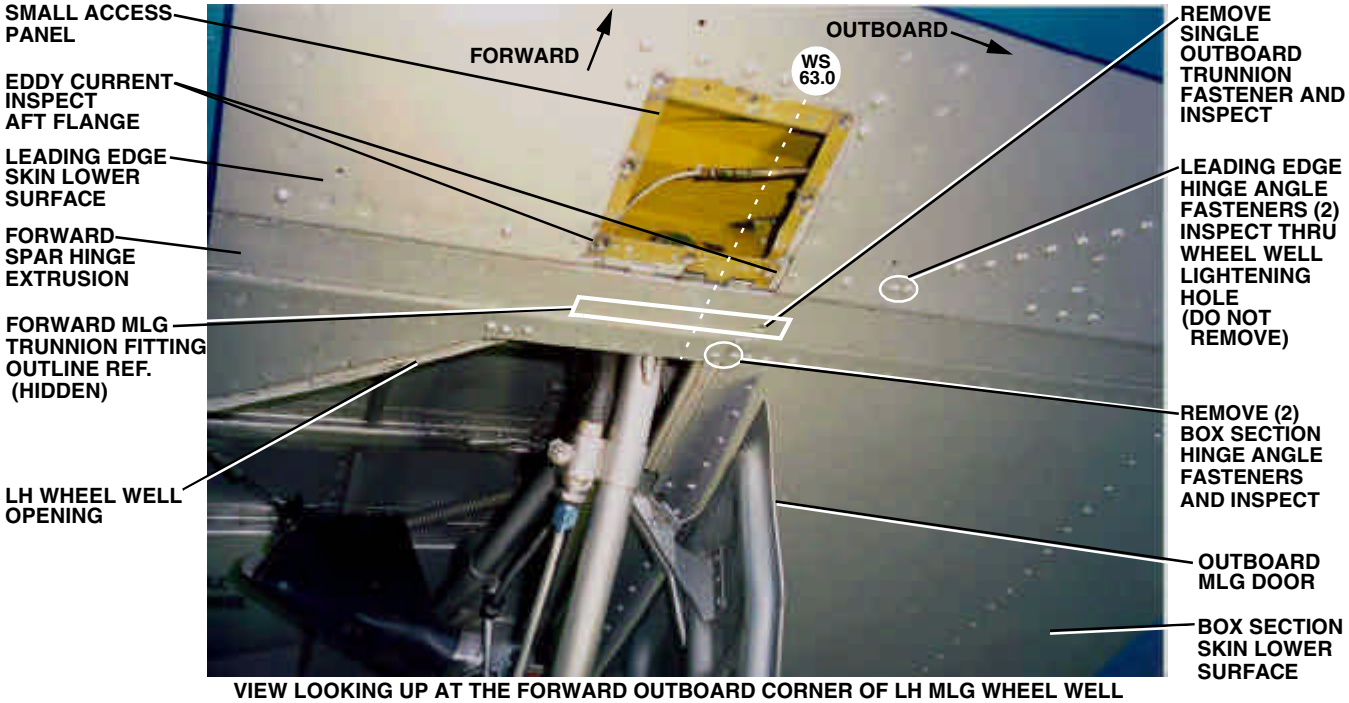
**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(e) If a crack is found during the Eddy Current Inspection as outlined in step (9) (d), the entire corresponding forward (main) spar assembly or aft (rear) spar assembly must be replaced **BEFORE FURTHER FLIGHT**.



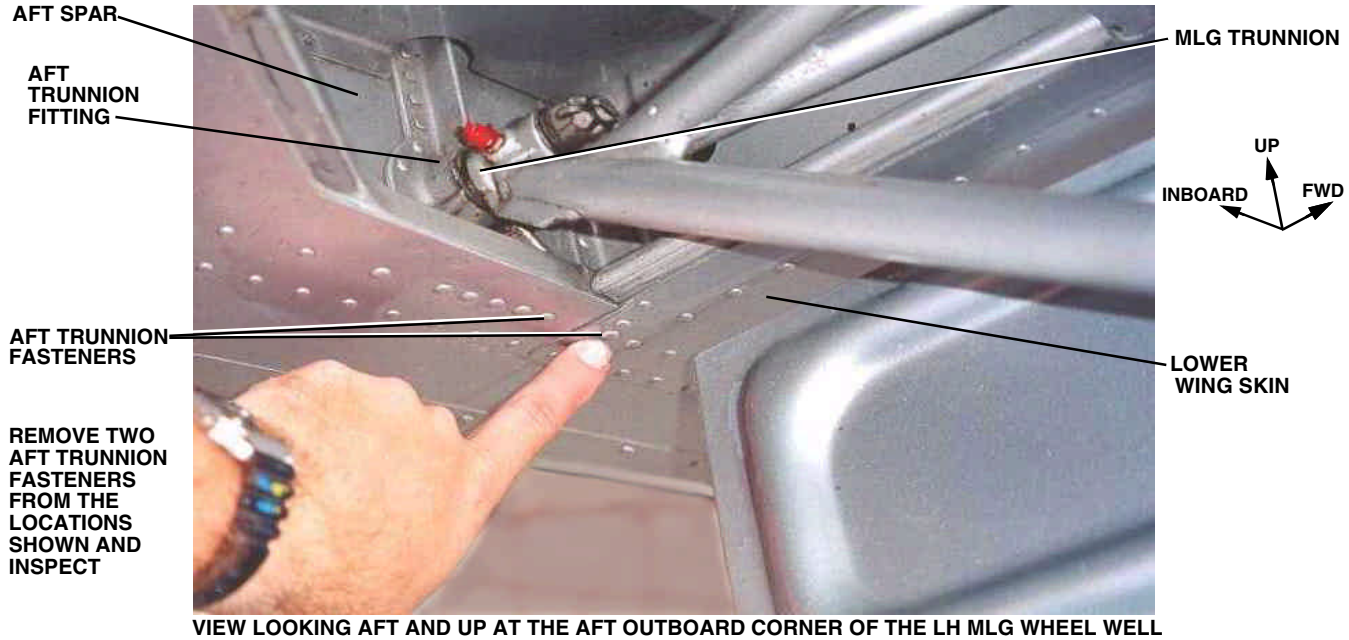

VIEW LOOKING AFT AT THE AFT SPAR

**Aft MLG Trunnion Location (LH Side Shown)**
**Figure 13**



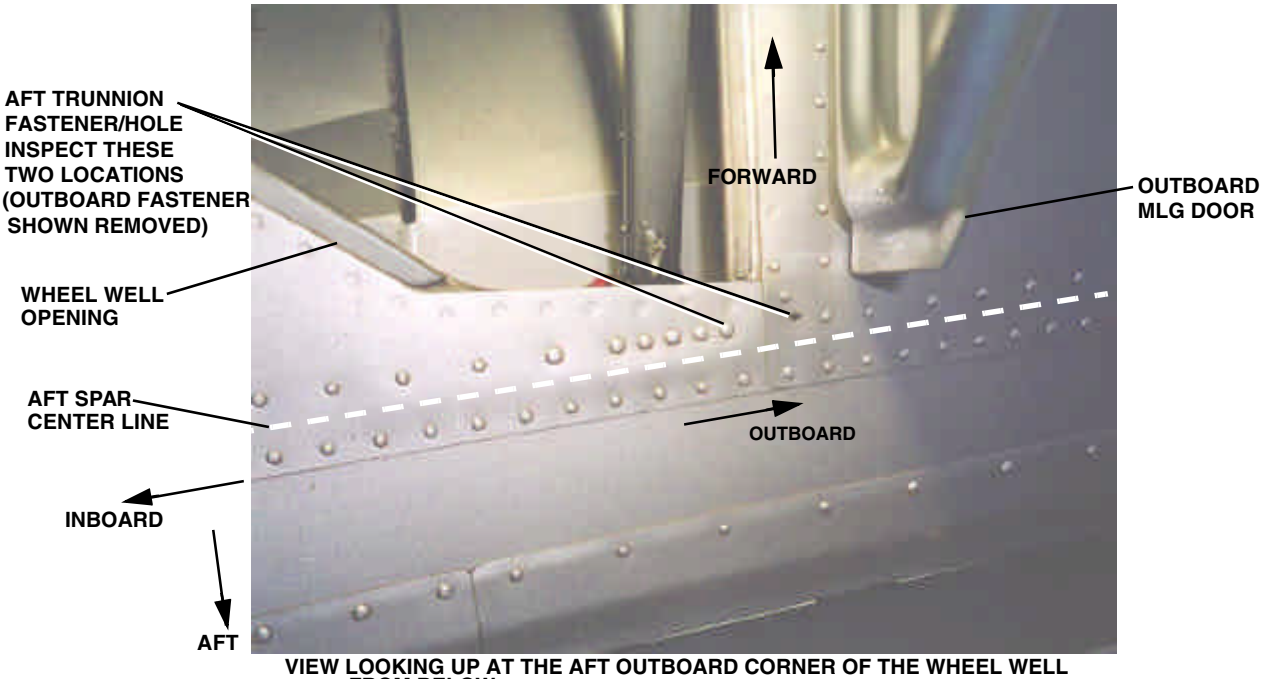

VIEW LOOKING UP AT THE FORWARD OUTBOARD CORNER OF LH MLG WHEEL WELL

**Forward Trunnion and Hinge Angle Fastener Locations (LH side shown)**
**Figure 14**

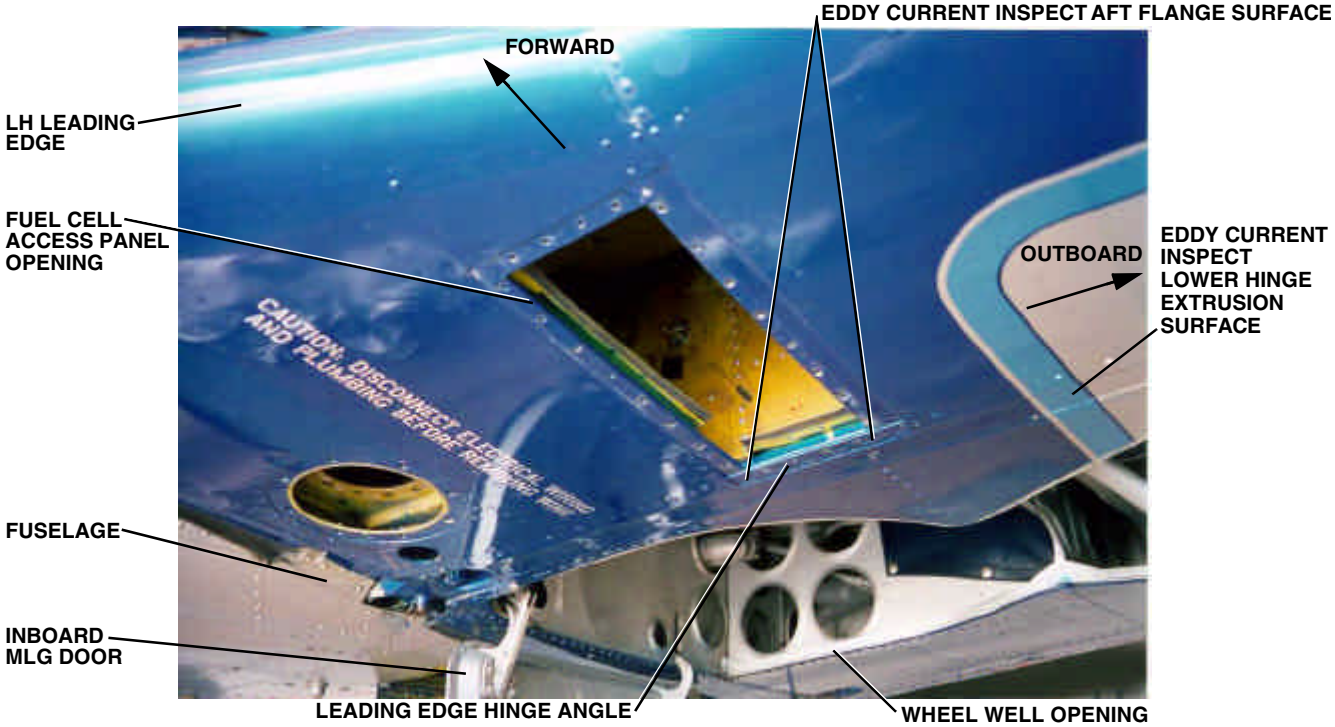



VIEW LOOKING AFT AND UP AT THE AFT OUTBOARD CORNER OF THE LH MLG WHEEL WELL

**Aft Trunnion Fastener Location (LH Side Shown Before Removal)**
**Figure 15**




**Aft Trunnion Fastener Location (LH Side Shown During Removal)**
**Figure 16**




**Leading Edge Hinge Angle and Fuel Cell Access Panel**
**Figure 17**

(10) Inspect the leading edge lower hinge angle and the box section lower forward hinge angle as follows:

(a) Locate two (2) fasteners in the box section lower forward hinge angle.

The fasteners are installed in the box section lower forward hinge angle. They are located adjacent to the forward outboard corner of the MLG wheel well opening. They are the first and second fasteners as counted from the corner, immediately outboard of the corner on the aft side of the lower forward spar hinge extrusion (spar cap). Reference Figure 14.

(b) Remove the two (2) fasteners identified in step (10) (a). The fastener shanks are oriented vertically and attach the wing skin to the box section hinge angle. Drill the heads and push out the shanks.

(c) Using a hand reamer, enlarge the fastener holes identified in (10) (a) and (10) (b) as follows:

(i) Ream the two (2) box section hinge angle fastener holes (reference Figure 14) with a hand reamer to .1400/.1410 inch diameter.

(ii) Clean the enlarged holes with Naphtha.

(d) Perform an Eddy Current NDI inspection of the fastener holes reamed in step (10) (c).

(i) Conduct the Eddy Current Inspections in accordance with the instructions in step (8) (d).

(ii) Scan the holes and note any crack indications. Verify all indications with a standard bolt hole probe set to the precise depth of the hinge angle.

(e) Perform an Eddy Current NDI inspection of a section of the leading edge lower hinge angle (on the outboard side of the small access panel). Locate the two (2) leading edge hinge angle fasteners which attach the leading edge lower hinge angle to the skin on the leading edge. These fasteners are located on the outboard side of the small access panel which is used to service the MLG trunnion. The two (2) fasteners can be accessed through a wheel well lightening hole. Reference Figure 14.

These two (2) fasteners **will not be removed**. The upper surface of the area adjacent to the fasteners will be inspected from inside the leading edge. Eddy Current Inspect the leading edge lower hinge angle near upper side of the two (2) fasteners as follows:

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

Equipment:

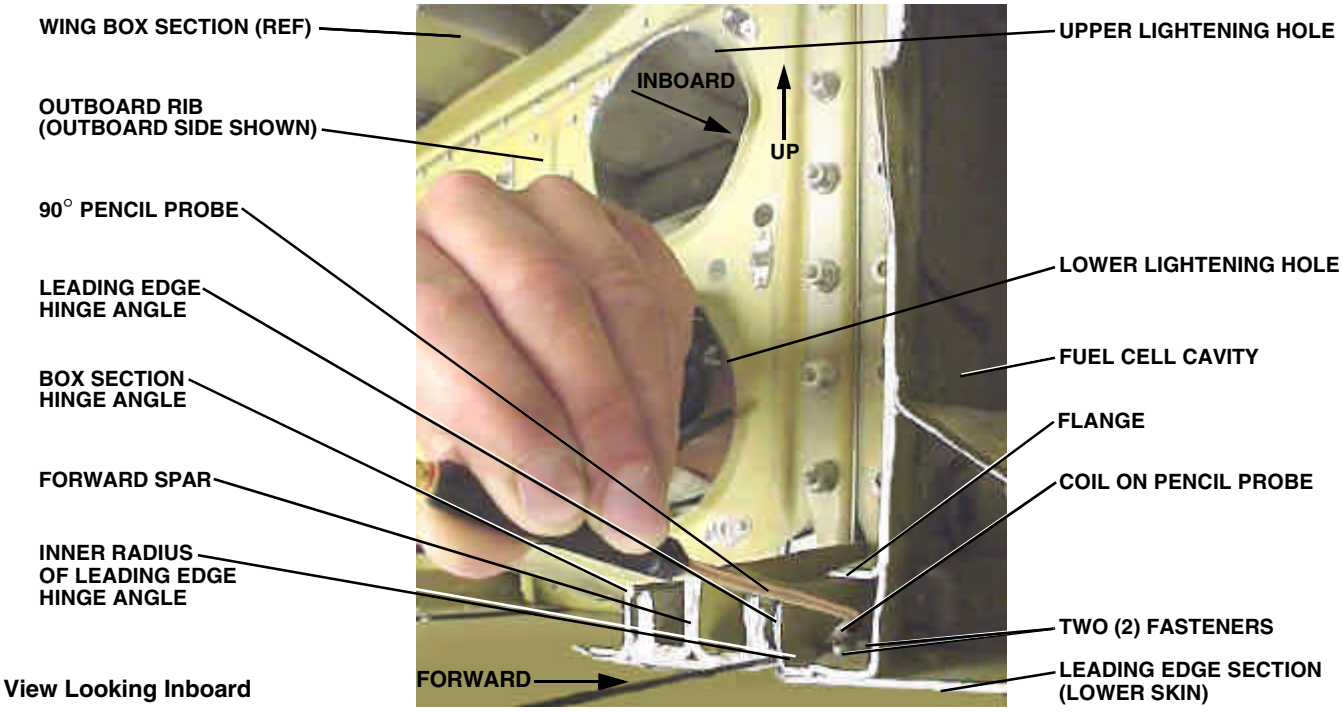
- Instrument: Same as used in the inboard forward wing spar and trunnion fitting inspections.
- Eddy Current pencil probe, straight or 90°, maximum 1/2" drop (on 90° only), minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(i) Gain access to the two (2) fasteners through the lower forward lightening hole in the outboard rib of the MLG wheel well compartment. Remove the six (6) screws that retain the oval access panel to the outboard side of the wheel well and remove the oval access panel to expose the upper and lower lightening holes. Reference Figure 18 and reach forward until the aft side of the fuel cell cavity is felt. Find the flange that is attached to the aft side of the fuel cell cavity. Feel below the flange to locate the two (2) fasteners directly below the flange at the bottom of the opening.

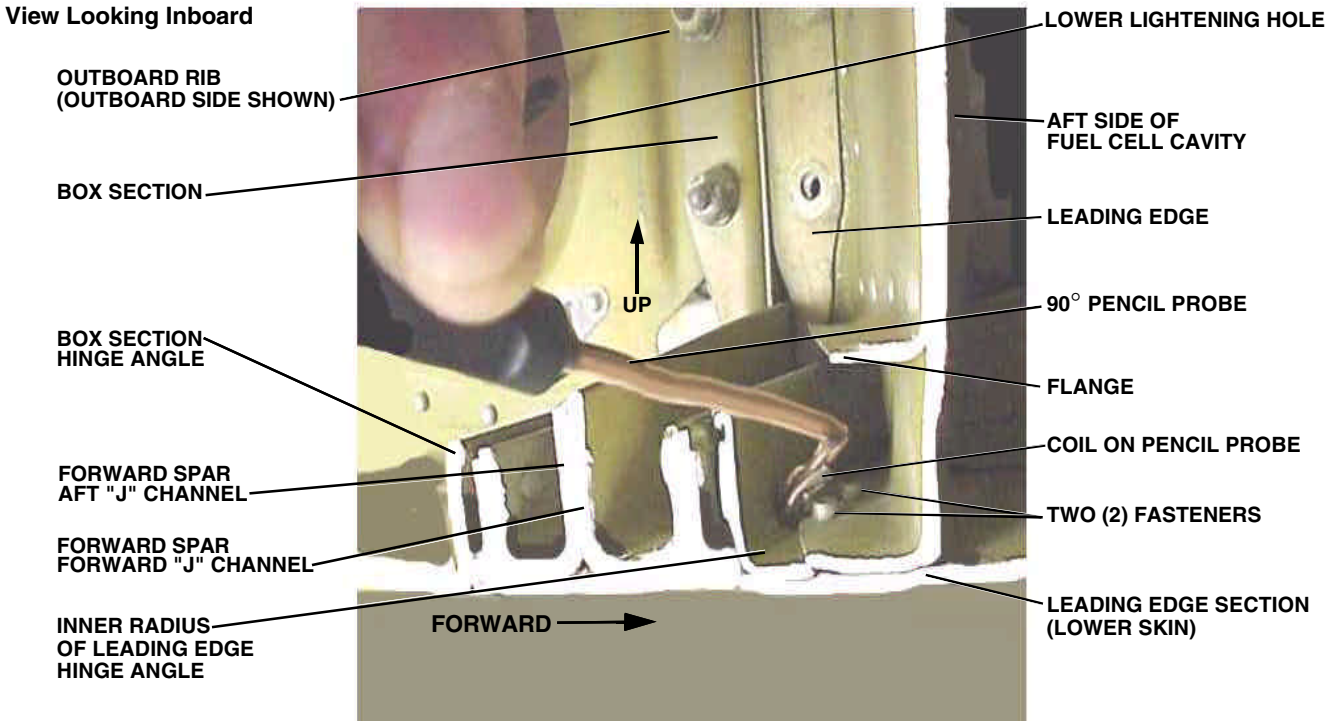
(ii) Locate the leading edge lower hinge angle which is immediately aft of the two (2) fasteners. Reference the cut away T-34 spar and leading edge structure shown in Figure 18 and Figure 19.

**NOTE**

The following Figures 18 through 26 show sections of the right hand wing (as opposed to all other figures which show the left hand wing). All other figures in this Service Bulletin depict the left hand wing.




**Cutaway View of Lower Forward Spar and Leading Edge Structure (RH Wing Shown)**
**Figure 18**




**Scanning the Leading Edge Lower Hinge Angle (RH Wing Shown)**

**Figure 19**

(iii) Adjust the instrument using the 0.030" EDM notch on the flat of the standard. Obtain a minimum 50% screen deflection.

(iv) Scan the inside radius of the leading edge hinge angle with the pencil probe. Reach in the lightening hole with the pencil probe and turn the probe back towards the inboard side. Place the coil of the probe on the inner radius of the hinge angle (on the forward side of the hinge angle, reference step (ii) and Figure 19) and scan the hinge angle. Scan along the hinge angle starting 1/2" inboard from the inboard side of the inboard fastener continuing to 1/2" outboard from the outboard side of the outboard fastener.

(v) Note any crack indications.

(f) Perform an Eddy Current NDI inspection of two (2) of the leading edge hinge angle surfaces. The first area to be scanned is located on the leading edge lower hinge angle adjacent to the small square access panel opening (fuel vent access door/trunnion access door) near the MLG trunnion, reference the aft flange in Figure 14. The second area to be scanned is adjacent to the aft side of the fuel cell access panel opening (reference aft flange surface in Figure 17).

WARNING

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

(i) Remove the small access panel (square) shown in Figure 14. The small access panel is located 38" to 42" outboard of lower wing fitting, adjacent to the forward spar hinge extrusion (spar cap).

(ii) Use the same instrument and equipment as used in the inboard forward wing spar and trunnion fitting inspections. Adjust the instrument using the 0.030" EDM notch on the flat of the standard. Obtain a minimum 50% screen deflection.

(iii) Using a straight or 90° pencil probe, scan the entire length of the exposed face of the leading edge lower hinge angle along the aft side of the small access panel opening. The small access panel is located 38" to 42" outboard of the lower wing fitting, adjacent to the forward spar hinge extrusion (spar cap). Reference Figure 14.

(iv) Using a straight or 90° pencil probe, scan the entire length of the exposed face of the hinge angle along the aft side of the fuel cell access panel opening. The fuel cell access panel is located 17" to 25" outboard of the lower wing fitting, adjacent to the lower hinge extrusion on the forward spar (spar cap). Reference Figure 17.

(v) Visually inspect the lower wing skin adjacent to the area Eddy Current Inspected in step (10) (f) (iv). Look closely at the area next to the fuel cell access panel aft flange surface for cracks or distortions in the paint. Reference Figure 17. If distortions are found, remove the paint for a closer inspection. Visually check for cracks in the lower wing skin and leading edge lower hinge angle.

WARNING

**Any replacement leading edge or box section hinge angle assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(g) If a crack is found during the Eddy Current Inspection in any of the fastener holes inspected in either step (10) (d), the hinge radius inspected in step (10) (e) or the lower skin and hinge angle surface inspections in step (10) (f) the corresponding hinge angle assembly(ies) must be replaced **BEFORE FURTHER FLIGHT**.

(11) Inspect the lower surface of the lower aft outboard wing fitting near the outboard end of the bathtub area of the fitting as follows:

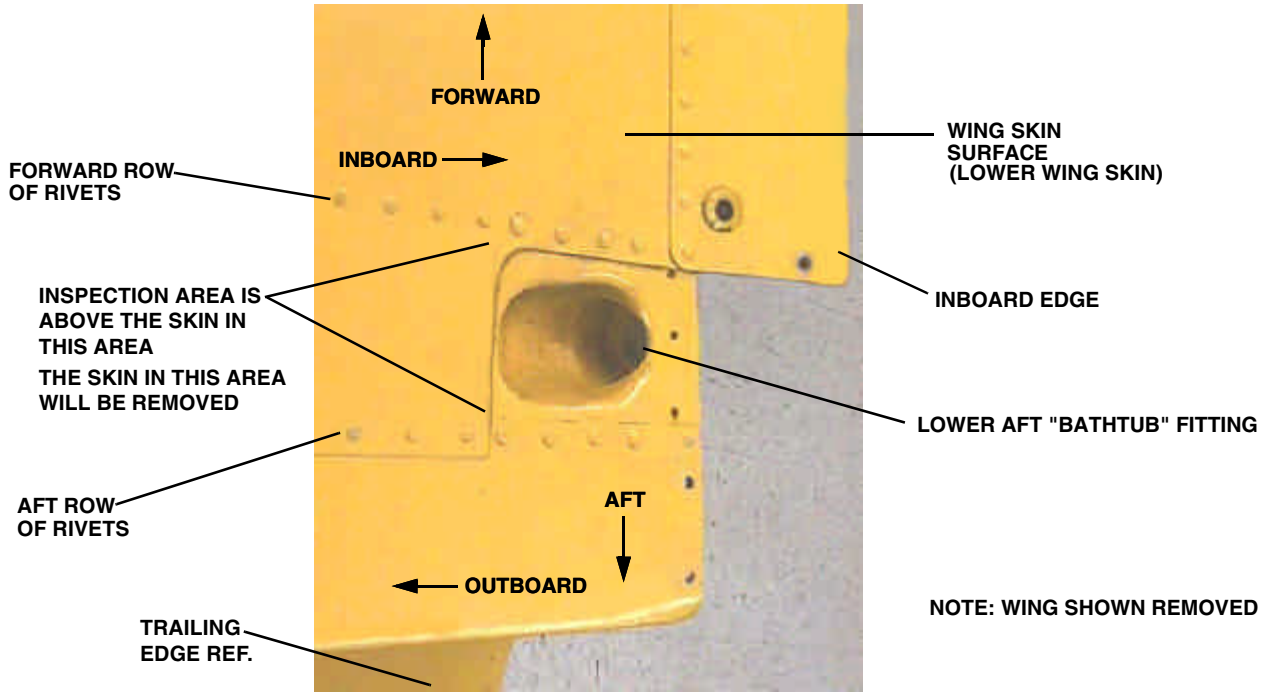
(a) Locate the lower wing spar "bathtub" fitting near the wing root and aft (rear) spar as shown in Figure 20. Gain access to the area by removing the lower aft attach fitting access panel from the lower wing surface (by removing the three attaching screws) as follows:

(i) Remove rivets from the lower wing skin area adjacent to and outboard of the bathtub fitting. Remove the row on the forward side of the bathtub fitting and also the row on the aft side of the fitting (remove 9 rivets in the aft row, and 10 rivets in the forward row starting from the inboard edge of the wing skin working outboard). These rows are roughly parallel to the trailing edge of the wing. Reference Figure 21. Drill the heads from the lower side of the wing and push out the shanks.

(ii) Mark and remove a 2 7/8" wide by 2 5/16 - 2 3/4" long section (approximately) of lower wing skin located immediately outboard of the bathtub fitting. Pull the skin away from the fitting and insert a suitable wedge and a thin section of stainless steel sheet between the lower wing skin and the flap cove fairing skin to protect the bathtub fitting (stainless steel sheet shown in Figure 25). Cut the lower wing skin away using best shop practice. Reference Figure 22.

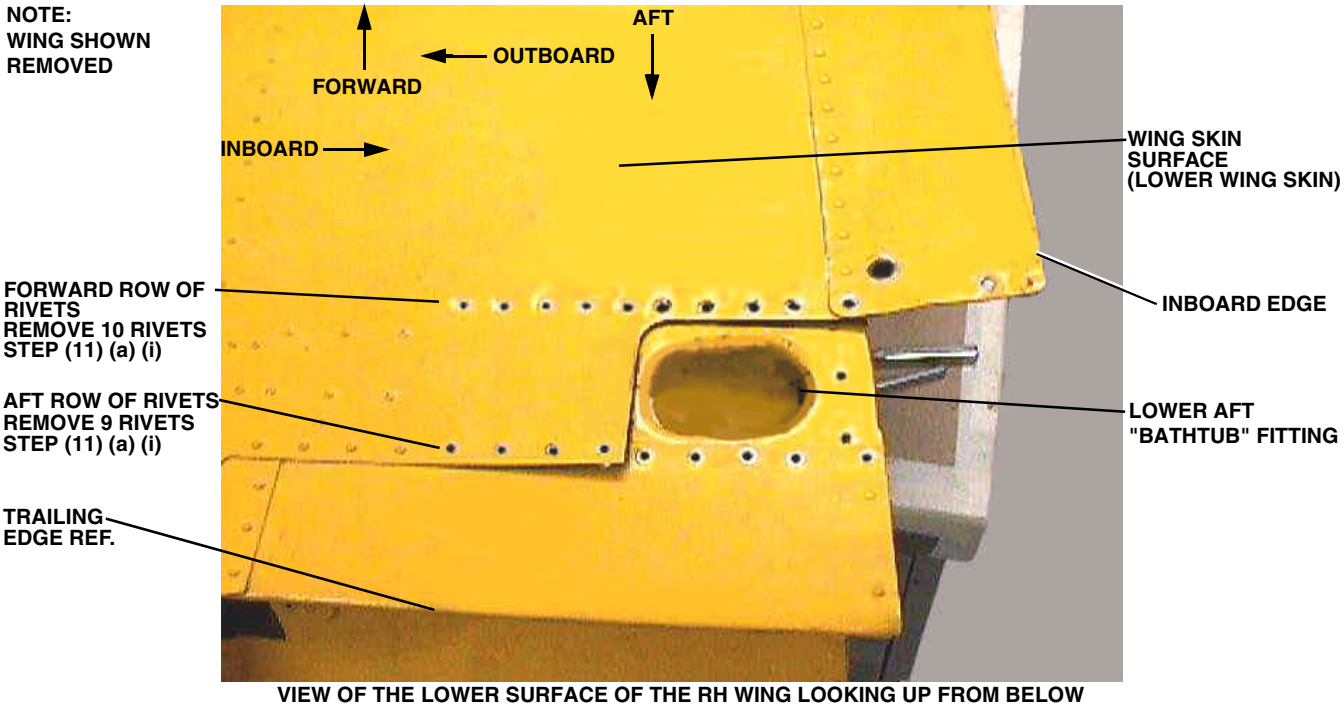
**NOTE**

The following sequence (which includes Figure 20 through Figure 26) shows sections of the right hand wing as opposed to most of the other Figures which depict sections of the left hand wing.




VIEW OF THE LOWER SURFACE OF THE RH WING LOOKING UP FROM BELOW

**Lower Aft "Bathtub" Wing Fitting**
**Figure 20**




VIEW OF THE LOWER SURFACE OF THE RH WING LOOKING UP FROM BELOW

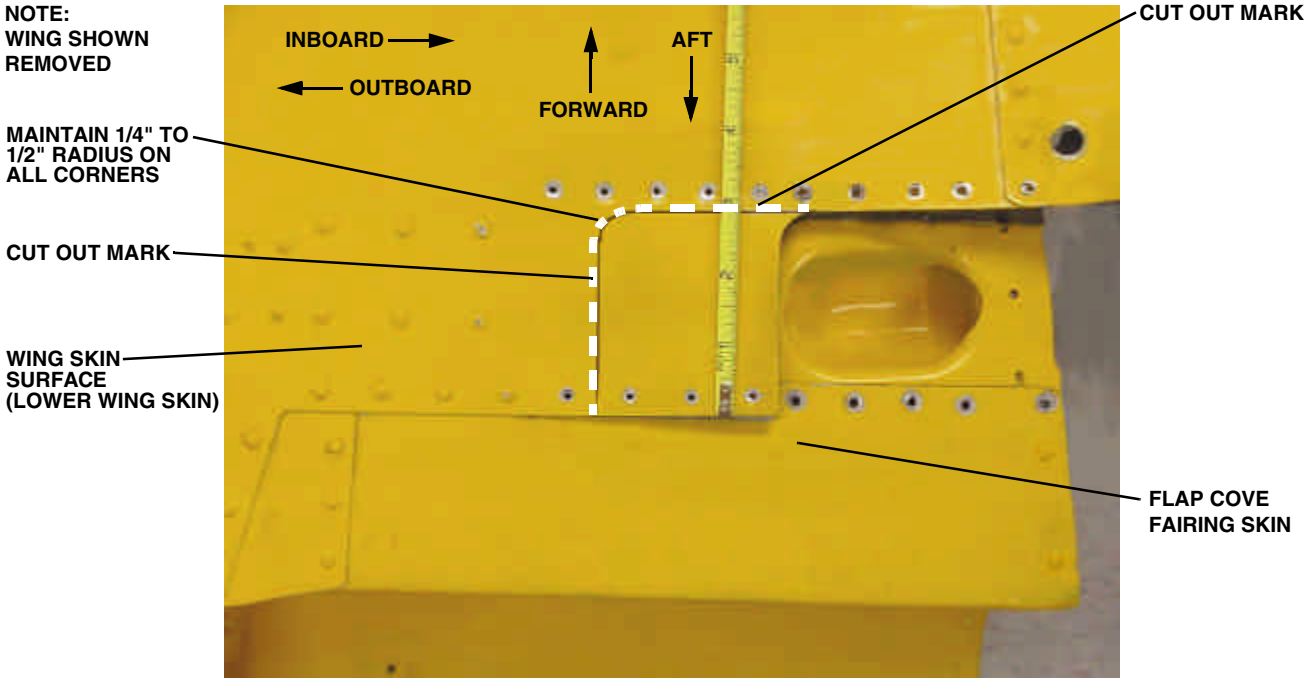
**Lower Wing Skin Fastener Removal**
**Figure 21**

(iii) Mark and remove a rectangular section of flap cove fairing skin. The section of flap cove fairing skin is located next to the outboard side of the bathtub fitting as shown in Figure 23. Note that part of the section of flap cove fairing skin to be removed is not visible because it is installed between the lower wing skin and the lower spar structure.

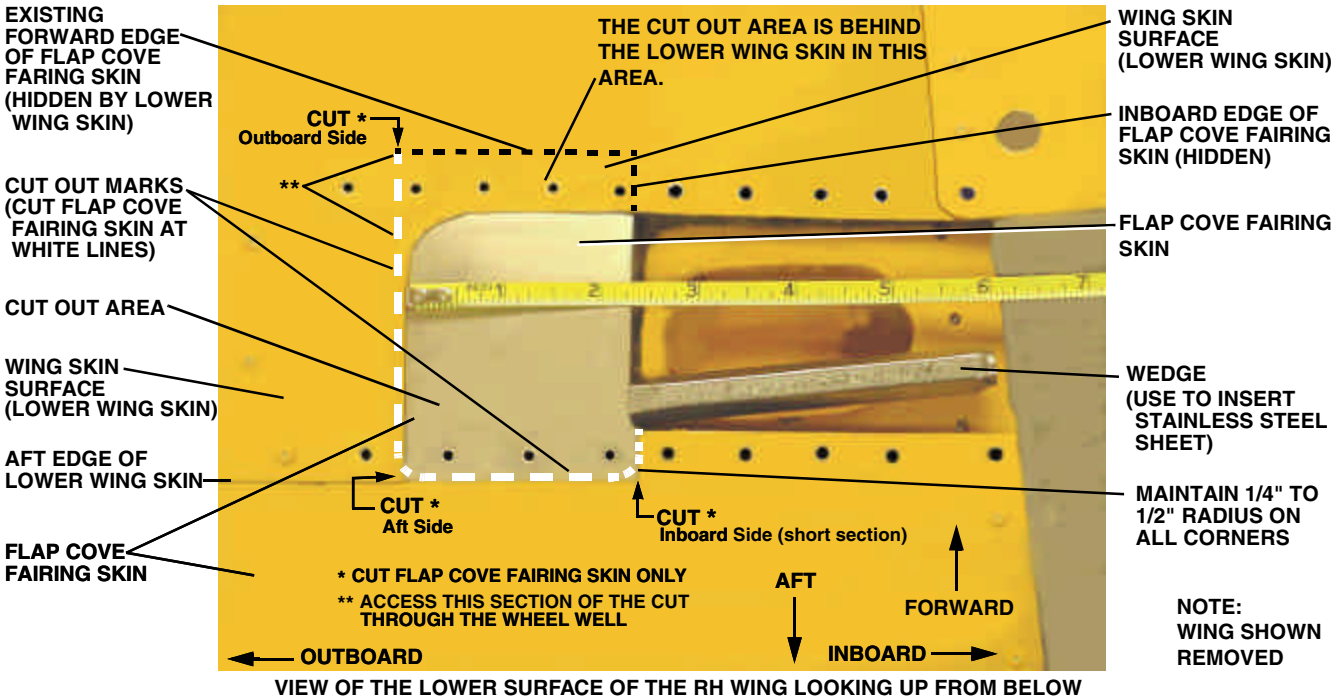
- Mark the area to be removed, reference the dashed white cut-out marks shown in Figure 23. Three sides will be marked; the aft side, the outboard side and a short section of the inboard side. Note that the removal area extends forward to the forward edge of the flap cove fairing skin.
- Before cutting, pull the flap cove fairing skin away from the spar structure and place a protective stainless steel sheet between the flap cove fairing skin and the aft spar structure lower element (capstrip) (stainless steel sheet not shown in Figure 23).
- Pull the lower wing skin away from flap cove fairing skin and cut the flap cove skin using best shop practice.
  - Cut the aft side of the of the flap cove fairing skin along the dashed white cut-out line shown in Figure 23.
  - Cut the short section of the flap cove fairing skin on the inboard side along the dashed white cut-out line shown in Figure 23.
  - Cut the outboard side along the dashed white line shown in Figure 23. It may be necessary to cut the forward portion of the outboard side from an opening in the wheel well.
- Remove the rectangular section of flap cove fairing skin. The removed section should measure approximately 2 1/4" wide by 3 1/4" long. The aft spar structure will be exposed after the flap cove skin section is removed (reference Figure 24).

(iv) Mark and remove a 1/8" section from the inboard end of the aft spar structure lower element (capstrip). The aft spar structure lower element (capstrip) is installed in a "notch" or "step" in the bathtub fitting. Remove six (6) AD6 fasteners from the inboard side of the aft spar structure lower element (capstrip) which retain the aft spar structure lower element (capstrip) to the bathtub fitting. Drill the heads from lower side of the wing and carefully push out the shanks. Pull the aft spar lower element (capstrip) away from the fitting and reposition the wedge and protective stainless steel sheet between the aft spar lower element (capstrip) and the fitting. Remove 1/8" (.125 inch) of material from the inboard edge of the lower aft spar lower element (capstrip) per best shop practice. Reference Figure 25 and Figure 26. Radius the inboard edge of the spar structure lower element (capstrip) as shown in Figure 27 so the Eddy Current pencil probe can be held at 45° to the fitting. Remove the stainless steel sheet and wedge.

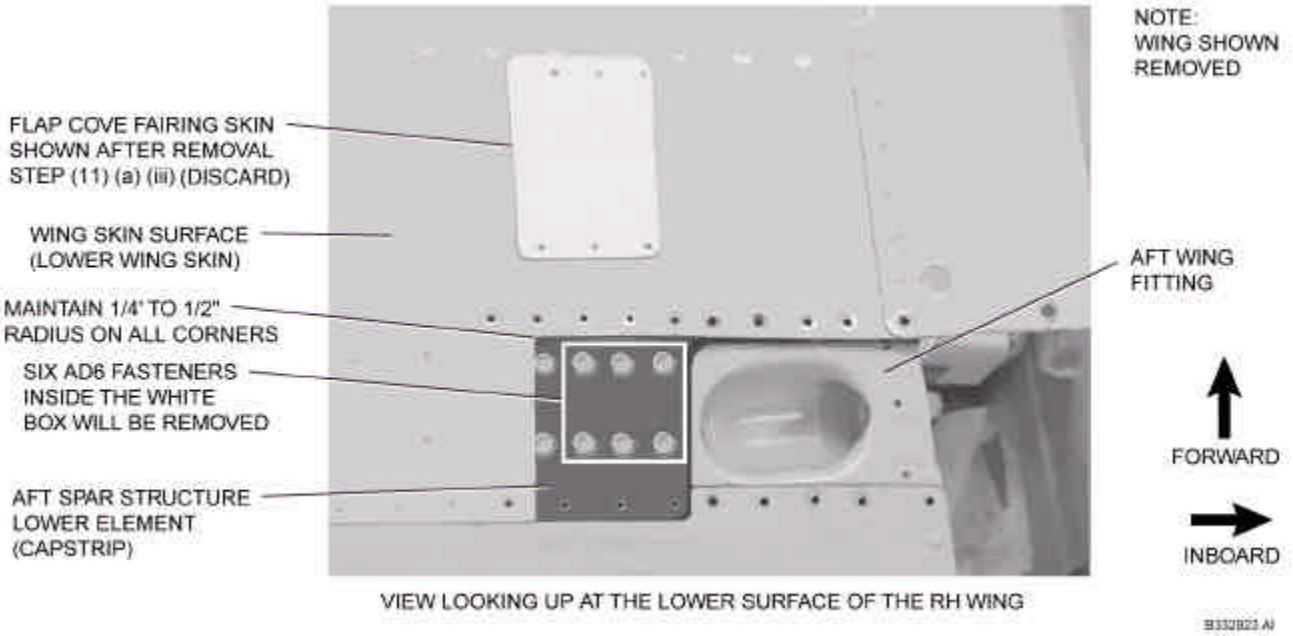
# SERVICE BULLETIN



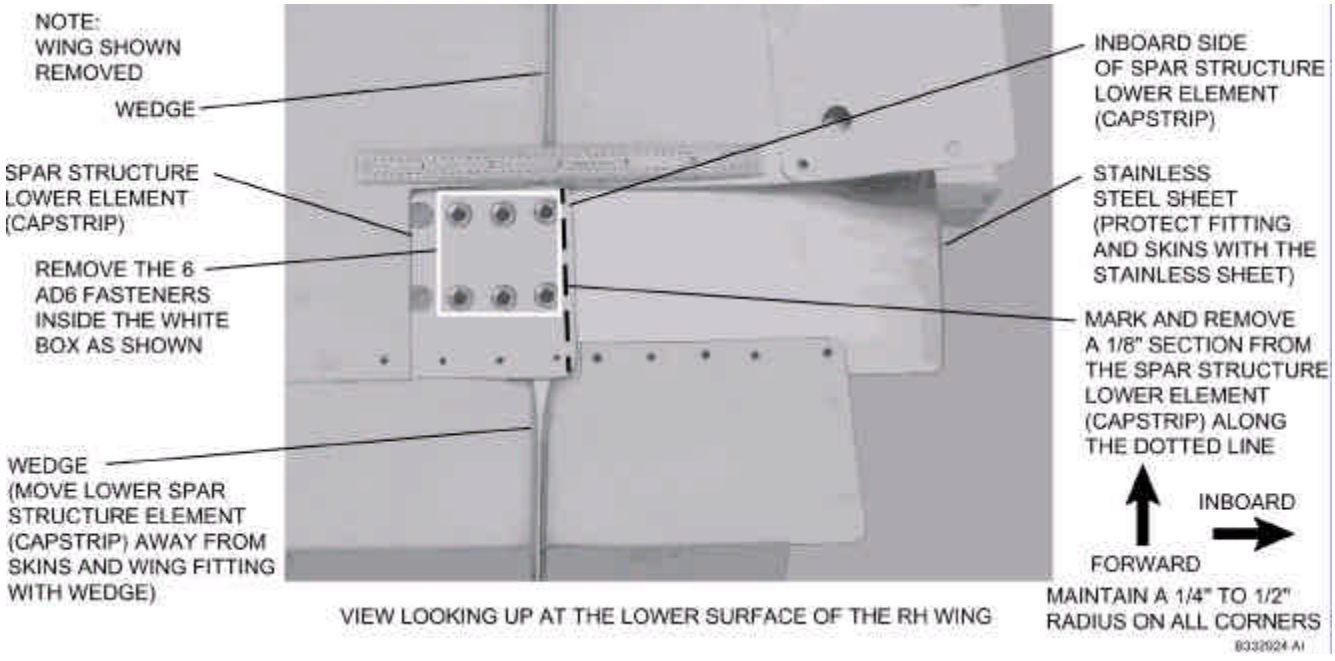

**Lower Wing Skin Marking and Removal**
**Figure 22**




**Flap Cove Skin Marking and Removal**
**Figure 23**




**Flap Cove Skin Shown Removed**
**Figure 24**




**Aft Spar Structure Lower Element (Capstrip) Modification**
**Figure 25**

(b) Conduct an Eddy Current Inspection of the lower surface of the bathtub fitting. Locate and gain access to the area by removing the wing lower aft attach fitting access cover from the lower wing surface (by removing the three attaching screws) located near the wing root and aft (rear) spar. The inspection area is along the visible outboard edge of the fitting (clean the fitting with Naphtha before inspecting). Conduct the inspection as shown in Figure 26 and Figure 27 as follows:

WARNING

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

Equipment:

- Instrument: Same as used in the inboard forward wing spar and trunnion fitting inspections.
- Shielded Eddy Current pencil probe, minimum 100 kHz, absolute coil.
- Eddy Current 90° pencil probe, maximum 1/2" drop, minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(i) Adjust the instrument using the .030 EDM notch by moving the probe from the solid area onto the notched area from the end (i.e. parallel to the notch). This will simulate the signal expected for a crack in the fitting. The signal will not give a distinctive bump on the screen, rather it should move from one area to another and stay there while the probe is moved along the top of the notch.

(ii) Adjust for a minimum 50% screen deflection. This scanning motion is necessary due to the configuration of the part.

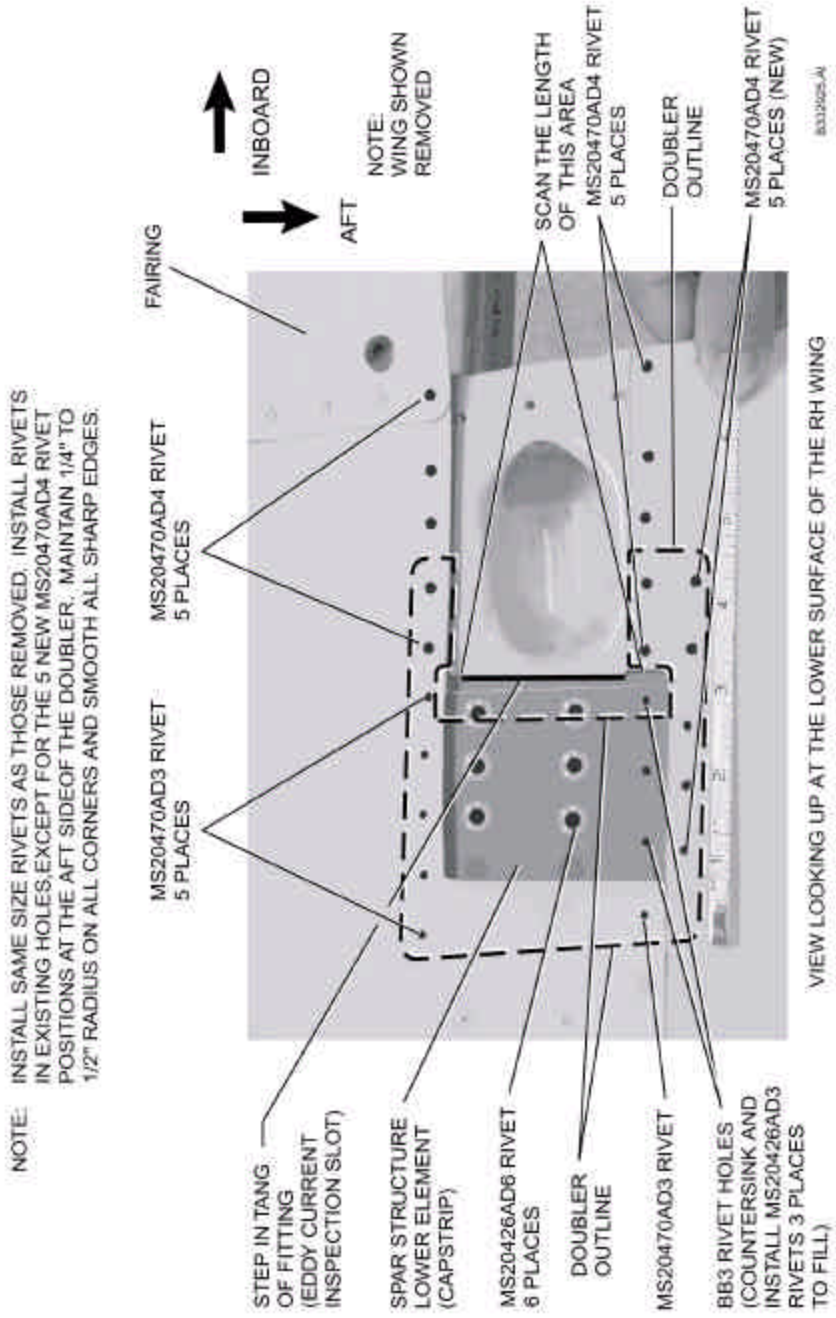
(iii) The scan will be parallel to the expected crack direction, so care should be taken while performing the inspection. Scan along the entire length of the step in the fitting.

(iv) Scan the fitting along the edge of the depression. Scan several times with the probe at approximately 45° from the surface of the fitting. Reference Figure 27.

WARNING

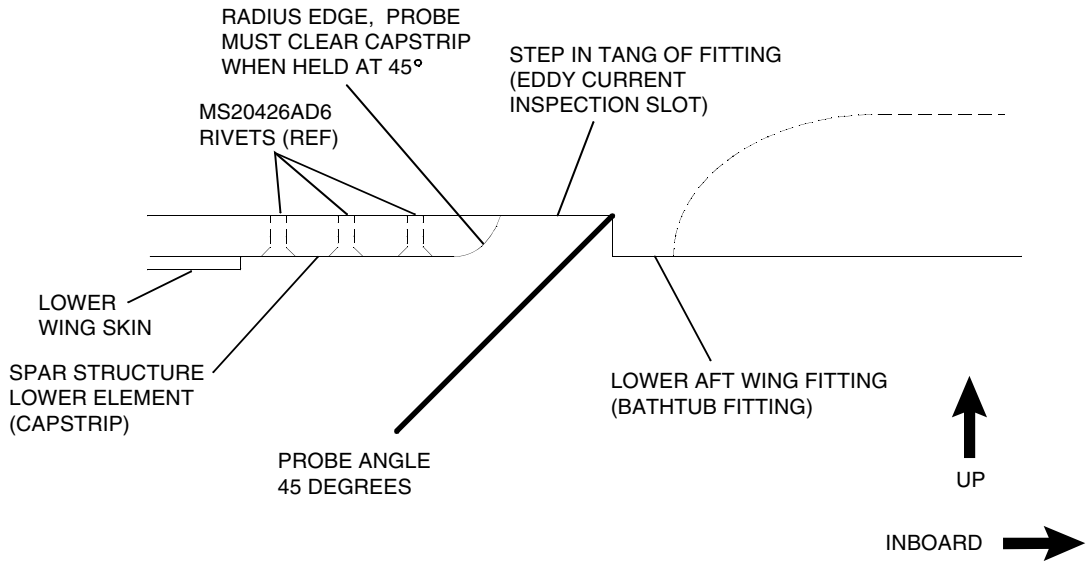
**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(c) If crack is found during the Eddy Current Inspection of the lower surface of the bathtub fitting near the outboard edge as outlined in step (b), the entire aft (rear) spar assembly must be replaced **BEFORE FURTHER FLIGHT**.




**Aft Spar Structure Lower Element (Capstrip) - After Modification**

**Figure 26**




**Eddy Current Pencil Probe Angles**

**Figure 27**

(12) Accomplish an Eddy Current NDT inspection of the aft reinforcement (located in the forward spar lower structure) as follows:

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

(a) Conduct the Eddy Current Inspection with the same equipment utilized to inspect the hinge angle surfaces in step (10) (f).

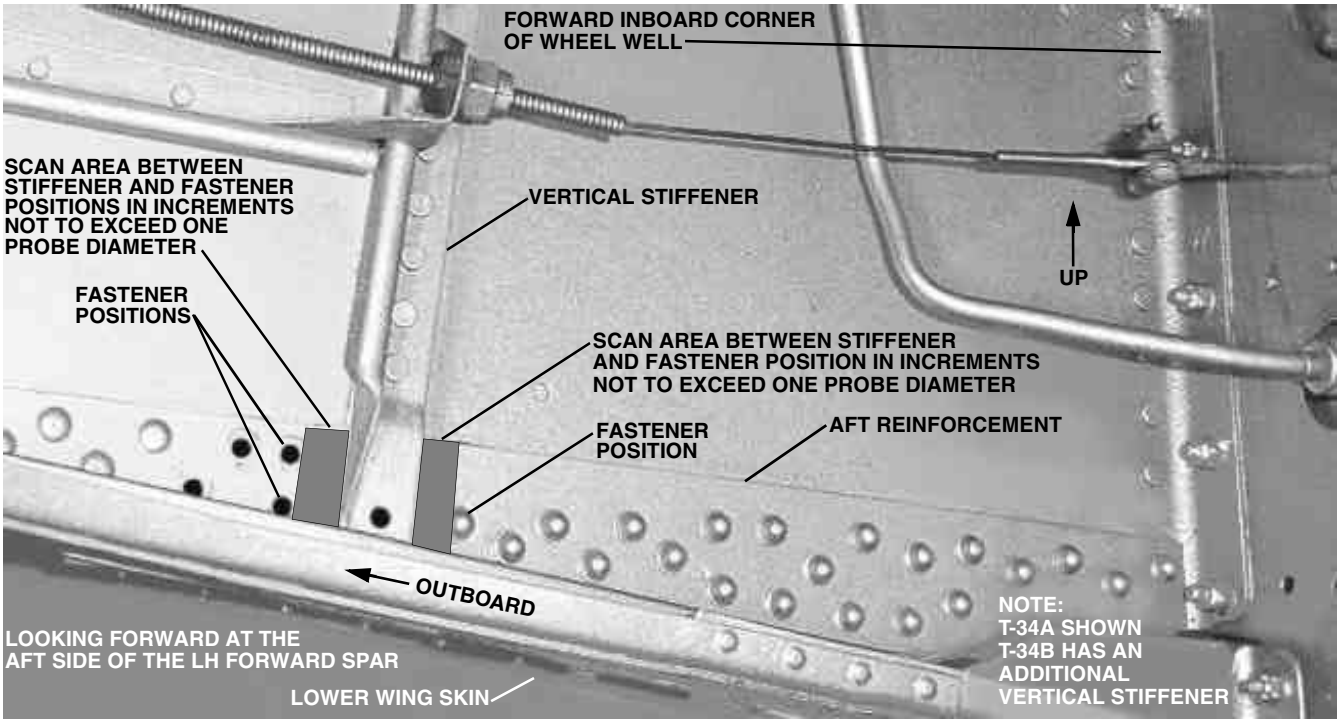
(b) Adjust the instrument using the .030" EDM notch on the flat of the standard shown in Figure 9. Obtain a minimum 50% screen deflection.

(c) Locate the aft reinforcement and vertical stiffener, on the aft side of the forward spar. Gain access to the area from the wheel well opening. Reference Figure 28.

(d) Using a pencil probe or 90° pencil probe, scan the exposed surface of the aft reinforcement on both the inboard and outboard sides of the vertical stiffener.

(e) Move the probe in a back and forth (inboard to outboard motion) pattern between the vertical stiffener and adjacent fastener position(s) as shown in Figure 28. Start at the upper edge of the aft reinforcement, slowly adjusting the scan pattern downward in increments not to exceed one probe diameter toward the lower edge. A plastic ruler may be used as a guide.

(f) Note any crack indications.




**Aft Reinforcement Surface Inspection**

**Figure 28**

(g) If a crack is found during Eddy Current Inspection of the aft reinforcement, the entire forward (main) spar assembly must be replaced **BEFORE FURTHER FLIGHT.**

(13) Inspect the upper and lower spar caps and adjacent hinge angles for corrosion in accordance with the steps outlined in Mandatory Service Bulletin No. 2538, Rev. I., attached to this Service Bulletin. Also inspect for corrosion on the forward side of the forward spar from inside the leading edge fuel cell cavity, and on the aft side of the forward spar from inside the wheel well. Inspect the forward side of the aft spar from inside the wheel well.

**WARNING**

**Any forward (main) spar assemblies, aft (rear) spar assemblies or hinge angle assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the steps outlined in Mandatory Service Bulletin No. 2538, Rev. I, prior to installation.**

(14) If corrosion is found in the forward (main) wing spar assembly or adjacent hinge angle assembly, contact Raytheon Aircraft Customer Support at (800) 429-5372 for consultation.

(15) If no cracks or corrosion exist, reassemble the lower inboard wing skin as follows:

(a) Locate the three (3) BB3 rivet holes (.098/.101") and six (6) AD6 (MS20426AD6) rivet holes which are visible in the aft spar structure lower element (capstrip) and install rivets in the holes in accordance with Figure 26 as follows:

(i) Countersink the three (3) BB3 rivet holes (.098/.101") located near the aft end of the aft spar structure lower element (capstrip).

CAUTION

*Clean any bare aluminum surfaces with Naphtha and coat with Alodine 1200, 1200S or 1201 (MIL-C-5541, CLASS 1A). Allow the coating to dwell for approximately five minutes. After the time has elapsed, wash the coated areas with water and blow dry (do not wipe). Paint the coated areas with epoxy polyamide primer and allow sufficient time for drying. Apply finish paint to match the airplane paint scheme, as desired.*

(ii) Install an MS20426AD3 rivet in each of the three (3) rivet holes. Refer to Figure 26.

(iii) Install an MS20426AD6 rivet in each of the six (6) rivet holes to replace those removed in step (11) (a) (iv). Refer to Figure 26.

(b) Fabricate a doubler plate from .040 inch thick alclad 2024-T3 aluminum sheet as follows. Refer to Figure 26:

**NOTE**

Ensure the template follows the contour of the dotted line at the inboard end of the spar structure lower element (capstrip) as shown in Figure 26. The contour of the doubler in this area will permit access to the wing bolt and the Eddy Current Inspection area.

(i) Construct a paper template to match the doubler template outline shown in Figure 26.

(ii) Cut out the doubler plate using the paper template as an outline.

**NOTE**

The doubler will cover the six (6) MS20426AD6 rivets and three (3) MS20426AD3 rivets which attach the lower element to the wing fitting.

WARNING

**Do not drill any holes through the spar structure.**

(iii) Using best shop practice (use a holefinder or comparable method) mark and drill the doubler plate to match the location of all corresponding fasteners which were removed in step (11) (a), with the exception of the three BB3 rivet locations and six (6) MS20426AD6 rivet locations referenced in step (15) (a). Maintain a minimum .25 inch edge distance around all fastener holes. Reference Figure 26.

(iv) Mark and drill the aft side of doubler plate and flap cove fairing skin for MS20470AD4 rivets at the five (5) new locations shown in Figure 26. Maintain a .25 inch edge distance and .75 - 1.00 pitch on the new MS20470AD4 rivet locations.

(c) Deburr all holes and smooth all edges on the doubler plate. Finish all bare surfaces in accordance with the CAUTION which precedes step (15) (a) (ii).

(d) Install the doubler plate on the lower wing skin and flap cove fairing skin. Install the same size rivets as removed. Install Cherry Lock or Monel Cherry Max fasteners wet with primer only if conventional rivets can not be installed.

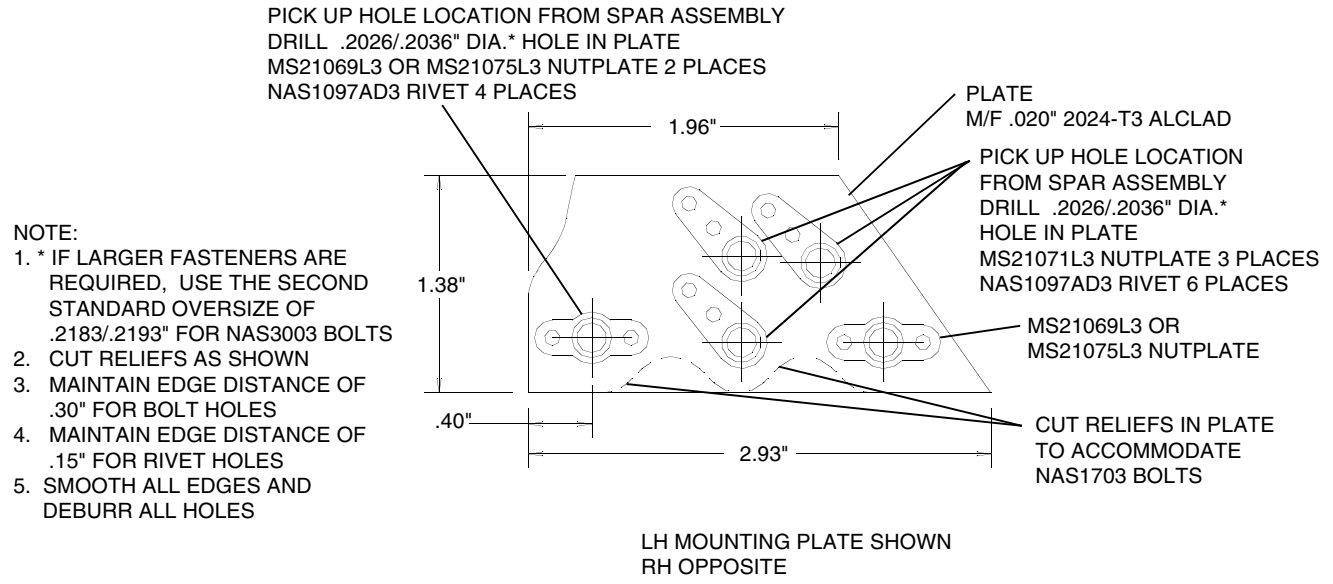
(16) Fabricate nutplate mounting plates for the forward (main) spar as follows:

(a) Fabricate an aluminum nutplate mounting plate for the forward side of the forward reinforcement on the front spar (main spar) from .020 inch thick ALCLAD 2024-T3 aluminum sheet in accordance with Figure 29 as follows:

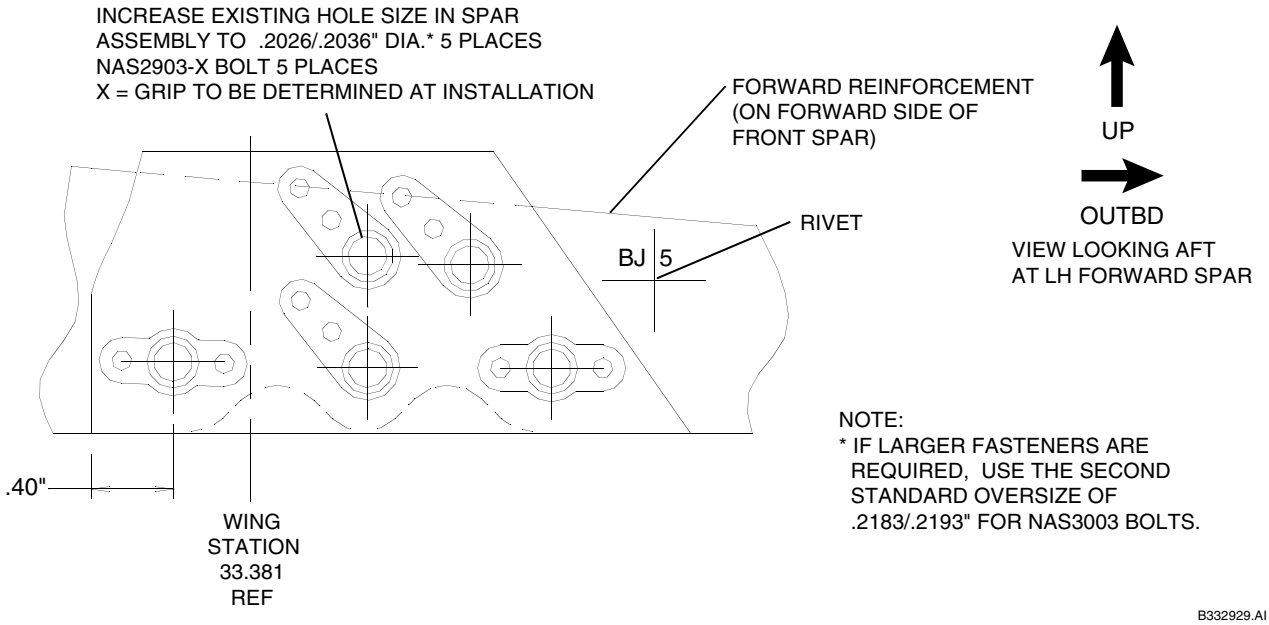
(i) Cut out a mounting plate with the approximate shape and dimensions shown in Figure 29. It may be necessary to cut reliefs in the lower side of the mounting plate to allow clearance for the NAS2903 bolts which will be installed in step (17) (f). It may also be necessary to cut reliefs in the inboard side of the mounting plate to provide clearance for existing fasteners. Ensure that an edge distance of .30 inch is maintained for the NAS2903 bolt holes and an edge distance of .15 inch is maintained for the NAS1097AD3 rivet holes.

(ii) Place the mounting plate on the forward side of the forward reinforcement on the front spar at the location where 5 fasteners were removed in step (8) (b) (i). Ensure the mounting plate fits flush against the forward reinforcement on the spar. Reference Figure 30.

(iii) Center the mounting plate over the 5 fastener holes and mark the fastener hole locations on the mounting plate.




**Nutplate Mounting Plate Fabrication (forward reinforcement)**
**Figure 29**




**Nutplate Mounting Plate Location**
**Figure 30**

**CAUTION**

*Move mounting plate away from the spar. Do not drill the spar. Do not use the holes in the spar as a drill guide.*

(iv) Move the mounting plate away from the spar. Drill .2026/.2036 inch diameter holes in the mounting plate at the fastener positions marked in step (16) (a) (iii). If larger fasteners are required, use the second standard oversize of .2183/.2193 inch for NAS3003 bolts.

(v) Prepare the surfaces of the nutplate mounting plate by coating them with alodine and epoxy polyamide primer in accordance with the CAUTION which precedes step (15) (a) (ii). Apply the alodine and epoxy polyamide primer (before installing the nutplates) after drilling and countersinking the holes used to install the NAS1097AD3 rivets in steps (16) (a) (vi), (vii) and (viii).

(vi) Install MS21071L3 nutplates on the mounting plate to match the 2 upper holes in the mounting plate as shown in Figure 29. Countersink the rivet holes in the mounting plate on the side opposite the nutplates. Secure the nutplates with NAS1097AD3 rivets, install the flush head of the rivets on the side opposite the nutplates.

(vii) Install a MS21071L3 nutplate on the mounting plate to match the middle hole in the lower row of holes as shown in Figure 29. Countersink the rivet holes in the mounting plate on the side opposite the nutplates. Secure the nutplates with NAS1097AD3 rivets, install the flush head of the rivets on the side opposite the nutplates.

(viii) Install MS 21069L3 or MS21075L3 nutplates in the mounting plate to match the 2 remaining lower holes in the mounting plate as shown in Figure 29. Countersink the rivet holes in the mounting plate on the side opposite the nutplates. Secure the nutplates with NAS1097AD3 rivets, install the flush head of the rivets on the side opposite the nutplates.

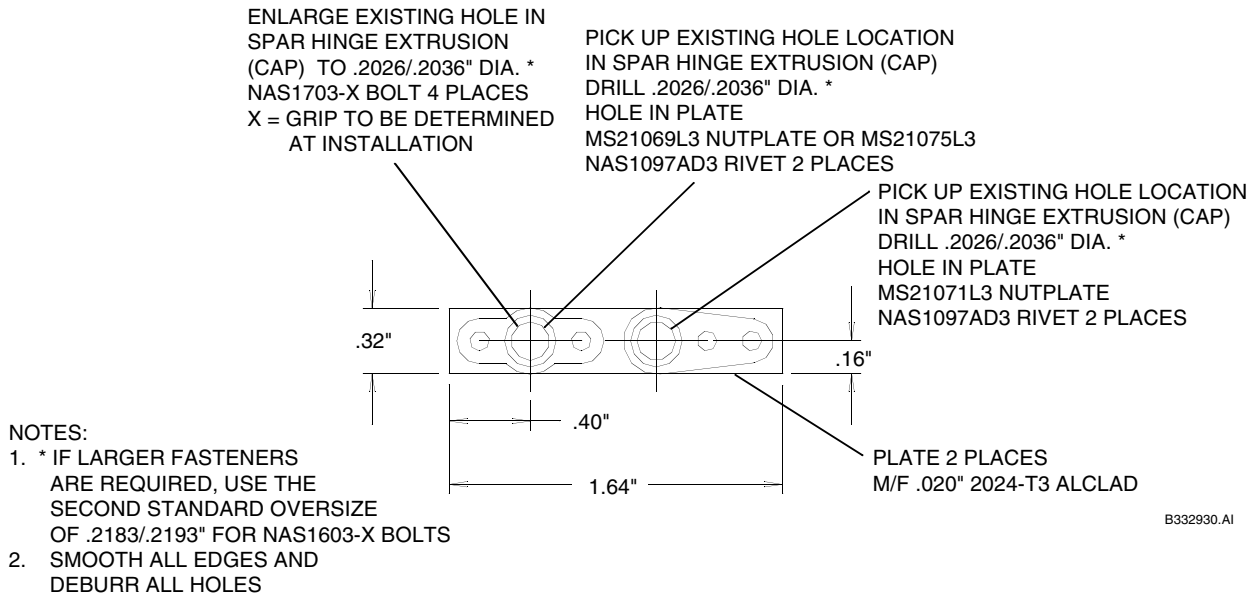
(b) Fabricate two aluminum nutplate mounting plates for the 4 fasteners removed from the forward (main) spar lower hinge extrusion (spar cap) identified in step (8) (b) (ii) in accordance with Figure 31 as follows:

(i) Cut out two rectangular sections (mounting plates) of .020 inch thick ALCLAD 2024-T3 aluminum sheet that measure approximately .32 inch x 1.64 inch.

**NOTE**

One of the mounting plates will be installed on the upper surface of the horizontal flange of the forward "J" channel, on the forward side of the forward spar web. The other mounting plate will be installed on the upper surface of the horizontal flange of the aft "J" channel, on the aft side of the spar web.

(ii) Place one of the mounting plates on the horizontal flange of the forward "J" channel at the location that 2 of the 4 fasteners were removed from the forward flange in step (8) (b) (ii). These two fastener holes are located on the forward side of the forward (main spar web). Center the plate on the two fastener holes and mark the two fastener hole locations on the plate. Drill two .2026/.2036 inch diameter holes in the plate. If larger fasteners are required, use the second standard oversize of .2183/.2193 inch.




**Nutplate Mounting Plates**
**(Install in Forward Spar Lower Structure on "J" Channel Flanges)**
**Figure 31**

(iii) Place the second mounting plate on the horizontal flange of the aft "J" channel (wheel well side) at the location from which 2 of the 4 fasteners (the 2 on the aft side of the spar web) were removed in step (8) (b) (ii). These two fastener holes are located on the aft side of the forward (main) spar web. Center the plate on the two aft fastener holes and mark the two fastener hole locations on the plate. Drill two .2026/.2036 inch diameter holes in the plate. If larger fasteners are required, use the second standard oversize of .2183/.2193 inch.

(iv) Smooth all edges and deburr all holes on the nutplate mounting plates. Prepare the surfaces of each nutplate mounting plate by coating them with alodine and epoxy polyamide primer in accordance with the CAUTION which precedes step (15) (a) (ii).

(v) Install a P/N MS21069L3 nutplate and a P/N MS21071L3 nutplate on each of the mounting plates as shown in Figure 31. Align the holes in the nutplate with the .2026/.2036 inch or .2183/.2193 inch (if the second oversize is used) diameter holes in the mounting plate. Secure the nutplates with NAS1097AD3 rivets.

CAUTION

*To prevent moisture from entering the fastener holes and causing corrosion, lubricate each bolt or screw and fill each fastener hole with G322L silicone grease or Mil-C-16173 Grade 2 corrosion preventive compound before installing each bolt or screw.*

(17) Install the nutplates and removable fasteners as follows:

(a) Position the mounting plate (fabricated in step (16) (a)) against the forward reinforcement on the forward side of the forward spar. Ensure the five (5) holes in the nutplate mounting plate are aligned with the five (5) fastener holes in the spar. Reference Figure 1 and Figure 30.

(b) Install a P/N NAS2903 bolt in the forward (main) spar web inboard fastener hole. If a larger fastener is required, install a P/N NAS3003 bolt. Determine grip length of the bolt upon installation. Tighten the bolt to 15 - 21 inch-pounds.

(c) Install four (4) P/N NAS2903 bolts in the remaining fastener holes in the forward spar web. If larger fasteners are required, install P/N NAS3003 bolts. Determine grip length of the bolts upon installation. Tighten the bolts to 15 - 21 inch-pounds.

(d) Position the nutplate mounting plate (fabricated in step (16) (b) (ii)) against the horizontal flange on the forward "J" channel (on the forward side of the forward spar web). Access the "J" channel from the leading edge. Ensure the two (2) holes in the nutplate mounting plate are aligned with the two (2) fastener holes in the horizontal flange on the forward "J" channel. Reference Figure 2.

(e) Position the nutplate mounting plate (fabricated in step (16) (b) (iii)) against the horizontal flange on the aft "J" channel (on the aft side of the forward spar). Access the aft "J" channel from the wheel well. Ensure the two (2) holes in the nutplate mounting plate are aligned with the two (2) fastener holes in the horizontal flange on the aft "J" channel. Reference Figure 2.

(f) Install a P/N NAS1703 bolt in each of the four (4) fastener hole locations in the forward spar lower hinge extrusion (spar cap). If larger fasteners are required, install P/N NAS1603 bolts. Reference Figure 5 and Figure 6. Determine the grip length of the bolts upon installation and tighten the bolts to 15 - 21 inch-pounds.

(g) Install a P/N NAS1121 screw in each of the two fastener holes common to the aft trunnion fitting and aft (rear) spar lower forward angle and capstrip as follows:

(i) Install the two (2) screws from below the lower surface of the wing (outside in). Reference Figure 15 and Figure 16. Determine the grip length of the screws upon installation.

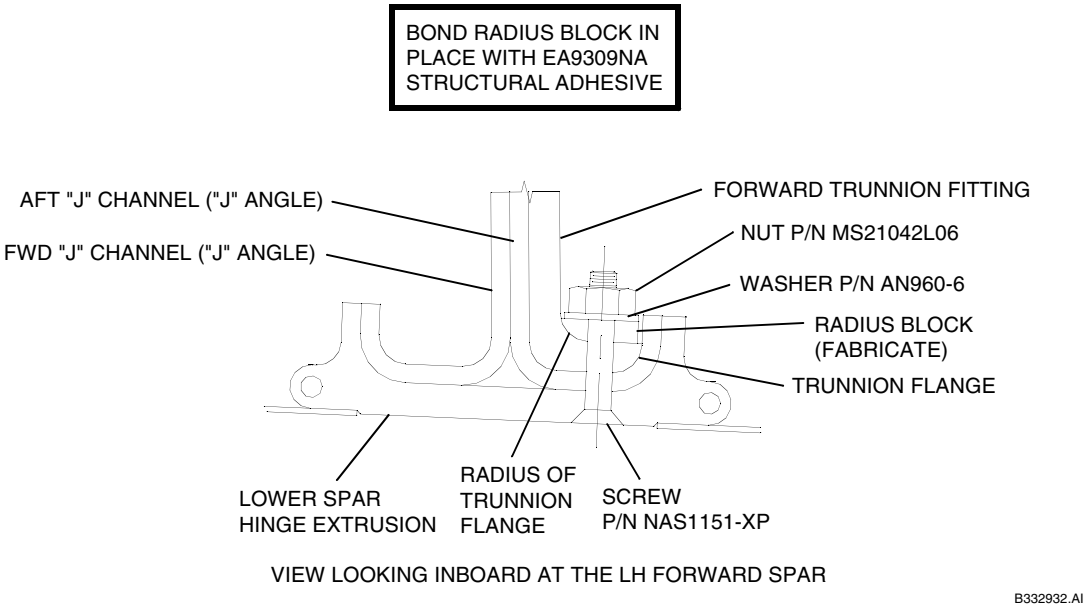
(ii) Secure each of the two (2) screws with a P/N AN960-6 washer and a P/N MS21042L06 nut. Install the washers and nuts on the upper side of the trunnion fitting. Tighten the nuts to 8 - 12 inch-pounds.

(iii) Inspect the P/N AN960-6 washer and a P/N MS21042L06 nut to ensure they seat properly on the aft trunnion flange and do not ride in the radius of the aft trunnion flange. If the washer and nut do not seat properly it will be necessary to install a radius block as described in step (17) (h) (ii).

(h) Install a P/N NAS1151-XP screw (X = grip, P = cad plate) in the fastener hole common to the forward trunnion fitting and forward (main) spar lower hinge extrusion (spar cap) reference Figure 14 and Figure 32 as follows:

(i) Install a P/N NAS1151-XP screw, P/N AN960-6 washer and P/N MS21042L06 nut in the forward trunnion fastener hole (outside in) as installed in step (17) (g) (i) and (17) (g) (ii). This will allow the nut and washer to be installed on the **upper side** of the trunnion fitting. Inspect the nut and washer for clearance in the radius of the trunnion fitting. It is permissible to trim the washer even with the perimeter of the nut as required to prevent it from riding in the radius of the trunnion. Ensure the nut and washer seat properly on the trunnion flange and do not ride in the radius on the trunnion flange. If the nut and washer seat properly on the trunnion flange proceed to step (17) (h) (iii).

(ii) If clearance at the radius in forward trunnion flange is not sufficient to allow the P/N MS21042L06 nut and P/N AN960-6 washer to seat properly, fabricate a one (1) inch long radius block from .125 inch thick 2024-T3 ALCLAD (.125 inch thick 6061-T6 or 7075 aluminum may also be used). Shape the forward edge radius and width as required to nest the radius block in the radius on the upper surface of the horizontal flange of the forward trunnion fitting. Reference Figure 32. The nut should seat flat. Bond the radius block in place with Hysol EA9309NA structural adhesive. Clean the trunnion flange and radius block before bonding in accordance with the manufacturer's directions.




**Forward MLG Trunnion and Radius Block**
**Figure 32**

(iii) Secure the P/N NAS1151-XP screw with the P/N AN960-6 washer and a P/N MS21042L06 nut. Install the screw from the **lower surface** of the hinge extrusion (spar cap). Reference Figure 32 and tighten to 8 - 12 inch-pounds.

(i) Install a P/N NAS 1121 screw in each of the two (2) fastener holes in the box section hinge angle which were reamed in step (10) (c) (ii). Insert each screw from the lower surface of the wing and secure with a P/N AN960-6 washer and a P/N MS21042L06 nut. Reference Figure 14 and tighten the nut to 8 -12 inch-pounds.

(18) Smooth and prepare the fuel cell liner area which was trimmed in step (7) (d) as follows:

(a) Sand the modified edges on the fuel cell liner (modified in step (7) (d)) smooth with 240 grit sandpaper.

(b) Coat all unfinished surfaces in the fuel cell/forward spar area by coating them with alodine and epoxy polyamide primer in accordance with the CAUTION which precedes step (15) (a) (ii).

(c) Tape all modified edges of the fuel cell liner with P/N 8544 black fuel resistant tape.

(d) Form a fuel bladder protective angle from 6061-T4 .032 inch thick aluminum sheet. Cut the sheet and bend to a size (approximately 8" to 9") which will cover the nutplate mounting plate which was installed against the spar in steps (16) (a) through (16) (c). The protective angle should overlap the cut away section of the fuel cell liner by approximately 1" on each side. Smooth all edges and coat the protective angle with alodine and epoxy polyamide primer in accordance with the CAUTION which precedes step (15) (a) (ii). Tape the angle in position in front of the nutplate mounting plates with P/N 8544 black fuel resistant tape. Reference Figure 1.

CAUTION

*Care should be taken to avoid damage to the fuel cells. The fuel cell cavities MUST be clean of any debris before installing the fuel cell.*

*If the fuel cell is not thoroughly clean, it should be cleaned with a lint-free cloth moistened in water, alcohol or kerosene. No other solvent should be used to clean the fuel cell. Inspect the fuel cell for leaks.*

(19) Install the fuel cell (lubricate with light engine oil MIL-L-6082A before installation), fuel filler and fuel filler panel which were removed in steps (7) (b) and (7) (c).

(a) Install the fuel boost pump.

(b) Ensure the fuel level transmitter and transmitter wiring are reconnected properly.

(c) Ensure new gaskets are installed on the fuel filler neck, boost pump, fuel level transmitter and fuel cell outlet.

(20) Install the fuel cell access panel and the small square access panel located on the lower surface of the leading edge.

(21) Install the oval access panel at the outboard side of the wheel well and secure with the six (6) screws.

(22) Install the wing lower aft attach fitting access cover on the lower wing surface (removed in step (11)(a)) and secure with the three (3) screws.

(23) Repeat steps (7) through (22) for the opposite wing.

(24) Connect the MLG doors.

(25) Lower the landing gear.

(26) Install the flaps as follows:

(a) Place the flap in position for installation.

(b) Install the flap bonding cable.

(c) Push the flap up into the top flap track and install the lower inboard and lower outboard flap bolts.

(d) Install the inboard and outboard upper flap bolts.

(e) Connect the flap to the flap actuator.

CAUTION

*Ensure the flaps are connected before reconnecting electrical power. If power is left on when the left flap is disconnected from the actuator, the actuator switch tab will release the limit switch, closing the circuit. The flap motor will start, pushing the flap actuator through the flap.*

(f) Reconnect the airplane battery, remove warning notices and restore electrical power.

(g) Engage the flap circuit breaker and raise the flaps.

(27) Remove the airplane from the jacks.

(28) Ensure all work areas are clean and clear of tools and miscellaneous items of equipment.

**WARNING**

**After defueling or fuel cell replacement, operate the engine on each fuel tank with the airplane on the ground to ensure that all air has been purged from the fuel cells and the fuel lines to the engine upon refueling.**

(29) Fuel the airplane and prepare the airplane for service. Ensure the fuel level indicators and fuel boost pumps are operating properly.

(30) Accomplish a flight test before returning the airplane to service.

(31) Return airplane to service.

**Part II - Wing Spar Structure Recurring Inspection - accomplish at every 80 hour interval.**

**NOTE**

Reference the Accomplishment Instructions Index located on page 62 for an index of the Accomplishment Instructions in Part II.

(1) Place the airplane on jacks and raise until the wheels are clear.

(2) Raise the landing gear until the inboard landing gear doors are fully open.

(3) Remove all power from the airplane and disconnect the battery. Display warning notices prohibiting reconnection of airplane electrical power.

**NOTE**

All step number references listed in **Part II** pertain to the steps in **Part II**.
All figure references pertain to the figures shown in **Part I** of this Service Bulletin.

When removing the bolts in steps (4), (5), (10) and (11) always leave at least one (1) of the bolts in each mounting plate attached to the spar while inspecting the fastener holes. This will keep the mounting plates in alignment with the open fastener holes. After Eddy Current Inspecting the open fastener holes, first reinstall the bolts and then remove the remaining bolts to Eddy Current Inspect the remaining fastener holes.

(4) Remove two (2) of the P/N NAS1703 bolts from the forward lower hinge extrusion (spar cap) on the lower inboard surface of the wing. These two (2) bolts are located closer to the wing root than the other two (2) P/N NAS1703 bolts. Reference Figure 5 and Figure 6.

(5) Remove three (3) of P/N NAS2903 bolts from the aft reinforcement, located in the lower row of fasteners in the aft reinforcement as shown in Figure 4. Access the bolts from wheel well opening on the aft side of the forward spar. Do not remove the two (2) P/N NAS2903 bolts located in the upper row at this time.

(6) Remove the P/N NAS1151-XP screw, P/N AN960-6 washer and P/N MS21042L06 nut from the fastener hole common to the forward trunnion fitting and forward (main) lower hinge extrusion (spar cap). Reference Figure 14. Access the washer and nut from the upper side of the trunnion fitting through the wheel well. Remove the screw from the lower surface of the wing.

(7) Remove the two P/N NAS1121 screws, P/N AN960-6 washers and P/N MS21042L06 nuts from the aft MLG trunnion fitting/aft spar lower structure. Reference Figure 15 and Figure 16. Access the washers and nuts from the upper side of the trunnion fitting through the wheel well. Remove the screws from the lower surface of the wing.

(8) Perform an Eddy Current NDI inspection of the each of the eight (8) open fastener holes that were exposed in steps (4) through (7) as follows:

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

Equipment:

- Nortec Staveley 19e Impedance plane Eddy Current instrument or equivalent with a frequency range of 500 Hz to 3 Mhz minimum. The instrument must be capable of connecting to the rotating probe listed below. (Staveley Instruments, Kennewick, WA. tele. 509-735-7550).
- Nortec (Staveley Inst.) RA-19 Rotating Eddy Current probe or equivalent with a rotational speed of not less than 200 rpm., and reflection differential coil bolt hole probes to fit, 300 kHz minimum. (Staveley Instruments, Kennewick, WA. tele. 509-735-7550)
- Shielded Eddy Current bolt hole probes, sizes to fit, 300 kHz minimum, absolute or differential coil.
- Shielded Eddy Current pencil probe, minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(a) Clean the eight (8) open fastener holes with Naphtha (four (4) open fastener holes when accomplishing step (12)).

(b) Set up the instrument in accordance with the manufacturer's instructions to obtain a minimum 30% screen deflection on the corner .030" notch of the standard. When using an amplitude/time mode, the indication from the notch should look like a tight sine wave. A series of loose sine waves which are spread across the screen are indicative of a hole which requires further clean up (caution, do not ream to a larger size).

(c) Inspect the noted fastener holes by inserting the rotating probe at a very slow transverse rate. Note that this is a multi-layered structure. A spinning Eddy Current probe will show this effect clearly. Scan all of the noted holes.

(d) A means of clearly determining the depth of the probe coil is essential, in that the acceptance criteria varies at the second layer in some locations.

(e) If an indication appears, note the location and verify with a manual probe set with a depth stop to the noted location. Note the direction of the crack indication and the part the crack indication was discovered in.

WARNING

**A crack indication in the filler strip may be allowed, but only if the direction of the crack indication is toward the outside edge of the filler strip. If the direction of the crack indication is toward the inside of the filler strip, the spar assembly must be replaced. Reference Figure 10.**

CAUTION

*To prevent moisture from entering the fastener holes and causing corrosion, lubricate each bolt or screw and fill each fastener hole with G322L silicone grease or MIL-C-16173 Grade 2 corrosion preventive compound before installing each bolt or screw.*

(9) Install the fasteners (screws, bolts and attaching hardware) which were removed in steps (4) through (7) as follows:

(a) Install the two (2) P/N NAS1703 bolts in the forward lower hinge extrusion (spar cap) which were removed in step (4). Reference Figure 5 and tighten the bolts to 15 - 21 inch-pounds.

(b) Install the three (3) P/N NAS2903 bolts in aft reinforcement which were removed in step (5). Reference Figure 4 and tighten the bolts to 15 - 21 inch-pounds.

(c) Install a P/N NAS1151-XP screw in the fastener hole common to the forward trunnion fitting and forward (main) spar hinge extrusion (spar cap) (removed in step (6)). Reference Figure 14 and secure the screw with a new P/N AN960-6 washer and a new P/N MS21042L06 nut. Tighten the nut to 8 - 12 inch-pounds.

(d) Install two P/N MS1121 screws in the aft spar lower structure/aft MLG trunnion fitting (the screws were removed in step (7)). Insert the screws from the lower side of the wing. Secure the screws with P/N AN960-6 washers and P/N MS21042L06 nuts on the upper side of the aft MLG trunnion. Tighten the nuts to 8 - 12 inch-pounds. Reference Figure 15 and Figure 16.

(10) Remove the two (2) P/N NAS2903 bolts from the forward (main) spar aft reinforcement. These bolts are installed in the upper row of fasteners in the aft reinforcement. Access the bolts from the wheel well area on the aft side of the forward spar. Reference Figure 4.

(11) Remove two (2) P/N NAS1703 bolts from the forward lower spar hinge extrusion (spar cap) on the lower inboard surface of the wing. These two (2) bolts are located closer to the wing tip than the other two (2) P/N NAS1703 bolts (in the hinge extrusion). Reference Figure 5 and Figure 6.

(12) Eddy Current Inspect the four (4) fastener holes which were exposed in steps (10) and (11) in accordance with the Eddy Current Inspection procedures in step (8). Ensure the open fastener holes are cleaned with Naphtha before inspecting.

WARNING

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

(13) Eddy Current Inspect the lower surface of the forward (main) spar hinge extrusion for the length of the spar. Reference Figure 6 and Figure 12 as follows:

(a) On the lower surface of the forward spar from the attach fitting outboard to the end of the exposed spar (wingtip), scan the exposed surface of the forward and aft edges of the hinge extrusion adjacent to the hinge attach point with the pencil probe as shown in Figure 12.

**NOTE**

Do Not use a metal ruler or metallic guide, as the metal will affect the coil in the Eddy Current probe. Ensure that the spar hinge extrusion is scanned, not the lower skin which overlaps the hinge extrusion.

(b) A one scan pass on the forward side of the hinge extrusion adjacent to the forward hinge pin is required, and one scan pass on the aft edge of the hinge extrusion adjacent to the aft hinge pin is required. Use a plastic ruler or other nonmetallic guide to assist in the scan.

WARNING

**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(14) If a crack is found in the wing spar structure during the Eddy Current Inspection of any fastener holes or structure in the forward (main) spar as outlined in steps (8), (12) and (13) the entire forward (main) spar assembly must be replaced **BEFORE FURTHER FLIGHT**.

If a crack is found in the wing spar structure during the Eddy Current Inspection of the fastener holes common to the aft spar and MLG trunnion in step (8), the entire aft (rear) spar assembly must be replaced **BEFORE FURTHER FLIGHT**.

(15) Conduct an Eddy Current Inspection of the lower surface of the bathtub fitting. Locate and gain access to the area by removing the lower aft attach fitting access cover from the lower wing surface (by removing the three attaching screws) located near the wing root and aft (rear) spar. The inspection area is along the visible outboard edge of the fitting (clean the fitting with Naphtha before inspecting). Conduct the inspection as shown in Figure 26 and Figure 27 as follows:

WARNING

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

Equipment:

- Instrument: Same as used in the inboard forward wing spar and trunnion fitting inspections in step (8).
- Shielded Eddy Current pencil probe, minimum 100 kHz, absolute coil.
- Eddy Current 90° pencil probe, maximum 1/2" drop, minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(a) Adjust the instrument using the .030 EDM notch by moving the probe from the solid area onto the notched area from the end (i.e. parallel to the notch). This will simulate the signal expected for a crack in the fitting. The signal will not give a distinctive bump on the screen, rather it should move from one area to another and stay there while the probe is moved along the top of the notch.

(b) Adjust for a minimum 50% screen deflection. This scanning motion is necessary due to the configuration of the part.

(c) The scan will be parallel to the expected crack direction, so care should be taken while performing the inspection. Scan along the entire length of the step in the fitting.

(d) Scan the fitting along the edge of the depression. Scan several times with the probe at approximately 45° from the surface of the fitting. Reference Figure 27.

WARNING

**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(e) If crack is found during the Eddy Current Inspection of the lower surface of the bathtub fitting near the outboard edge as outlined in steps (15) (a) through (15) (e), the entire aft (rear) spar assembly must be replaced **BEFORE FURTHER FLIGHT**.

(16) Remove the fuel cell access panel and the small square access panel located on the lower surface of the leading edge.

(17) Remove the two (2) P/N NAS1121 screws, P/N AN960-6 washers and P/N MS21042L06 nuts from the box section hinge angle. These screws are located immediately outboard of the forward outboard corner of the MLG wheel well opening. Reference Figure 14.

(18) Perform an Eddy Current NDI inspection of the two (2) box section hinge angle fastener holes exposed in step (17) as follows:

(a) Conduct the Eddy Current Inspections in accordance with the instructions in step (8). Ensure the open fastener holes are cleaned with Naphtha before inspecting.

(b) Scan the holes and note any crack indications. Verify all indications with a standard bolt hole probe set to the precise depth of the box section hinge angle.

(19) Perform an Eddy Current NDI inspection of a section of the leading edge lower hinge angle. Locate the two (2) fasteners which attach the leading edge lower hinge angle to the skin on the leading edge. These fasteners are located on the outboard side of the small access panel which is used to service the MLG trunnion. Reference Figure 14.

These two (2) fasteners **will not be removed**. The upper surface of the area adjacent to the fasteners will be inspected from inside the leading edge. Eddy Current Inspect the leading edge lower hinge angle near upper side of the two (2) fasteners as follows:

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

Equipment:

- Instrument: Same as used in the inboard forward wing spar and trunnion fitting inspections.
- Eddy Current straight or 90° pencil probe, maximum 1/2" drop (90° only), minimum 100 kHz, absolute coil.
- Aluminum Electron Discharge Machining (EDM) notch standard as shown in Figure 9.

(a) Gain access to the two (2) fasteners through the lower forward lightening hole in the outboard rib of the MLG wheel well compartment. Remove the six (6) screws that retain the oval access panel to the outboard side of the wheel well and remove the oval access panel to expose the upper and lower lightening holes. Reference Figure 18 and reach forward until the aft side of the fuel cell cavity is felt. Find the flange that is attached to the aft side of the fuel cell cavity. Feel below the flange to locate the two (2) fasteners directly below the flange at the bottom of the opening.

(b) Locate the leading edge lower hinge angle which is immediately aft of the two (2) fasteners. Reference the cut away T-34 spar and leading edge structure shown in Figure 18 and Figure 19.

(c) Adjust the instrument using the 0.030" EDM notch on the flat of the standard. Obtain a minimum 50% screen deflection.

(d) Scan the inside radius of the leading edge hinge angle with the pencil probe. Reach in the lightening hole with the pencil probe and turn the probe back towards the inboard side. Place the coil of the probe on the inner radius of the hinge angle (on the forward side of the hinge angle, reference step (ii) and Figure 19) and scan the hinge angle. Scan along the hinge angle starting 1/2" inboard from the inboard side of the inboard fastener continuing to 1/2" outboard from the outboard side of the outboard fastener.

(e) Note any crack indications.

(20) Perform an Eddy Current NDI inspection of the leading edge hinge angle surfaces. The areas to be scanned are on the leading edge lower hinge angle located adjacent to the fuel cell access panel and adjacent to the small square access panel (fuel vent access door) near the MLG trunnion. Reference Figure 14 and Figure 17.

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

(a) Remove the small access panel (square) shown in Figure 14. The small access panel is located 38" to 42" outboard of lower wing fitting, adjacent to the forward spar hinge extrusion (cap).

(b) Use the same instrument and equipment as used in the inboard forward wing spar and trunnion fitting inspections. Adjust the instrument using the 0.030" EDM notch on the flat of the standard. Obtain a minimum 50% screen deflection.

(c) Using a straight or 90° pencil probe, scan the entire length of the exposed face of the leading edge lower hinge angle along the aft side of the small access panel opening. The small access panel is located 38" to 42" outboard of the lower wing fitting, adjacent to the forward spar hinge extrusion (spar cap). Reference Figure 14.

(d) Using a straight or 90° pencil probe, scan the entire length of the exposed face of the hinge angle along the aft side of the fuel cell access panel opening. The fuel cell access panel is located 17" to 25" outboard of the lower wing fitting, adjacent to the lower hinge extrusion on the forward spar (spar cap). Reference Figure 17.

(e) Visually inspect the lower wing skin adjacent to the area Eddy Current Inspected in step (20) (d). Look closely at the area next to the fuel cell access panel aft flange surface for cracks or distortions in the paint. Reference Figure 17. If distortions are found, remove the paint for a closer inspection. Check for cracks in the lower wing skin and leading edge lower hinge angle.

(21) Accomplish an Eddy Current NDT inspection of the aft reinforcement (located in the forward spar lower structure - reference Figure 28) as follows:

**WARNING**

**All personnel performing inspections to this procedure must be certified in the Eddy Current method of inspection to a Level II or Level III in accordance with AIA Specification NAS-410 (MIL-STD-410).**

(a) Conduct the Eddy Current Inspection with the same equipment utilized to inspect the hinge angle surfaces in step (20).

(b) Adjust the instrument using the .030" EDM notch on the flat of the standard shown in Figure 9. Obtain a minimum 50% screen deflection.

(c) Locate the aft reinforcement and vertical stiffener, on the aft side of the forward spar. Gain access to the area from the wheel well opening. Reference Figure 28.

(d) Using a pencil probe or 90° pencil probe, scan the exposed surface of the aft reinforcement on both the inboard and outboard sides of the vertical stiffener.

(e) Move the probe in a back and forth (inboard to outboard motion) pattern between the vertical stiffener and adjacent fastener position(s) as shown in Figure 28. Start at the upper edge of the aft reinforcement, slowly adjusting the scan pattern downward in increments not to exceed one probe diameter toward the lower edge. A plastic ruler may be used as a guide.

(f) Note any crack indications.

(g) If a crack is found during Eddy Current Inspection of the aft reinforcement, the entire forward (main) spar assembly must be replaced **BEFORE FURTHER FLIGHT.**

**WARNING**

**Any replacement leading edge or box section hinge angle assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

(22) If a crack is found during the Eddy Current Inspection in any of the fastener holes or surfaces inspected in step (18), step (19), step (20) or step (21) the corresponding hinge angle assembly(ies) must be replaced **BEFORE FURTHER FLIGHT**.

**WARNING**

**Any forward (main) spar assemblies, aft (rear) spar assemblies or hinge angle assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the steps outlined in Mandatory Service Bulletin No. 2538, Rev. I., prior to installation.**

(23) If no cracks are found, continue with step (24).

**CAUTION**

*To prevent moisture from entering the fastener holes and causing corrosion, lubricate each bolt or screw and fill each fastener hole with G322L silicone grease or MIL-C-16173 Grade 2 corrosion preventive compound before installing each bolt or screw.*

(24) Install the fasteners (screws, bolts and attaching hardware) which were removed in steps (10) through (17) as follows:

(a) Install the two (2) P/N NAS2903 bolts (removed in step (10)) in the forward (main) spar aft reinforcement. These fasteners are installed in the upper row of fasteners in the forward reinforcement. Insert the bolts from the wheel well area on the aft side of the forward spar and tighten to 15 - 21 inch-pounds. Reference Figure 4.

(b) Install two (2) P/N NAS1703 bolts (removed in step (11)) in the forward lower spar hinge extrusion (spar cap) on the lower inboard surface of the wing. These two (2) bolts are located closer to the wing tip than the other two (2) P/N NAS1703 bolts (reference step (4)). Insert the bolts from below the wing surface and tighten to 15 - 21 inch-pounds. Reference Figure 5 and Figure 6.

(c) Install two (2) P/N NAS1121 screws (removed in step (17)) in the box section hinge angle fastener holes. Insert the screws from the lower surface of the wing and secure with a P/N AN960-6 washers and P/N MS21042L06 nuts. These screws are located immediately outboard of the forward outboard corner of the MLG wheel well opening. Reference Figure 14 and tighten the nuts to 8 - 12 inch-pounds.

(25) Install the fuel cell access panel and the small square access panel located on the lower surface of the leading edge.

(26) Install the oval access panel at the outboard side of the wheel well and secure with the six (6) screws.

(27) Install the wing lower aft attach fitting access cover on the lower wing surface (located near the wing root and aft (rear) spar) and secure with the three (3) screws which were removed in step (15).

(28) Reconnect the battery and restore electrical power. Remove warning notices prohibiting reconnection of airplane electrical power.

(29) Lower the landing gear.

(30) Remove the airplane from the jacks.

(31) Ensure all work areas are clean and clear of tools and miscellaneous items of equipment.

(32) Accomplish a flight test before returning the airplane to service

(33) Return airplane to service.

**B. Spares**

WARNING

**Any forward (main) spar assemblies or aft (rear) spar assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

WARNING

**Any replacement leading edge or box section hinge angle assemblies which are to be installed as replacement parts must be Eddy Current Inspected and inspected for corrosion in accordance with the instructions in Part I of this Service Bulletin, prior to installation.**

**C. Record of Compliance**

Upon completion of **Part I** of this Service Bulletin, make an appropriate maintenance record entry. Make two copies of the Inspection Survey Chart which is printed on the following three (3) pages. Fill the survey charts out for both the R and L wings and return them to Raytheon Aircraft Company, Dept. 52, 9709 E. Central, PO Box 85, Wichita Ks. 67201-8500 or FAX them to (316) 676-8027.

Make an appropriate maintenance record entry and fill out and return the Inspection Surveys each time **Part II** of this Service Bulletin is accomplished.

**D. Survey**

It is very important these survey charts are filled out and returned. Currently, the only method of extending the 80 hour inspection interval is by increasing the amount of data we have on T-34 wing structures in the field. A larger sample size may enable us to increase the time interval between inspections. Please copy these charts, fill in the information and return them to RAC at the address or FAX listed above.

If any parts are replaced as result of this Service Bulletin contact RAC Customer Support at (800) 429-5372 or (316) 676-3140 to arrange delivery of the parts to RAC.

**INSPECTION SURVEY CHART** - Airplane S/N _____ L Wing ___ R Wing ___ Total Airplane Flight Hours _____
**(SHEET 1 of 3)**
Airplane Home Address _____ Contact Name/Tele._____

Report in the chart below any crack indications that were found during this inspection, and the length and direction of the cracks. Make a copy of the applicable figure and sketch an outline of each crack if possible.

| **FASTENER LOCATIONS** | **PART I** step (#) page # | **PART II** step (#) page # | **LAYER OF STRUCTURE** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **5 IN FWD SPAR AFT REINFORCEMENT** SEE FIGURE 4, PG. 15 | | | FORWARD REINFORCEMENT | FWD J CHANNEL | WING FITTING | AFT "J" CHANNEL | TAPERED SPACER | WEB inbd / outbd | AFT REINFORCEMENT (AND VERTICAL STIFFENER INBD. ONLY) |
| Inboard Fastener (at vertical stiffener) | step (8) page 11 | step (5) page 48 | | | | | | | |
| Upper Inboard fastener | step (8) page 11 | step (10) page 50 | | | | | | | |
| Lower Inboard fastener | step (8) page 11 | step (5) page 48 | | | | | | | |
| Upper Outboard fastener | step (8) page 11 | step (10) page 50 | | | | | | | |
| Lower Outboard fastener | step (8) page 11 | step (5) page 48 | | | | | | | |
| **4 IN FWD SPAR CAP** SEE FIGURE 5, PG. 15 | | | SPAR CAP | FILLER STRIP | WING FITTING | "J" CHANNEL | | | |
| Inboard, Fwd | step (8) page 11 | step (4) page 48 | | | | | | | |
| Inboard, Aft | step (8) page 11 | step (4) page 48 | | | | | | | |
| Outboard, Fwd | step (8) page 11 | step (11) page 50 | | | | | | | |
| Outboard, Aft | step (8) page 11 | step (11) page 50 | | | | | | | |

**INSPECTION SURVEY CHART CONTINUED** - Airplane S/N _____ L Wing ___ R Wing ___ Total Airplane Flight Hours _____
**(SHEET 2 of 3)**
Airplane Home Address _____ Contact Name/Tele._____

Report in the chart below any crack indications that were found during this inspection, and the length and direction of the cracks. Make a copy of the applicable figure and sketch an outline of each crack if possible.

| **FASTENER LOCATIONS** | **PART I** step (#) page # | **PART II** step (#) page # | **LAYER OF STRUCTURE** | | |
|---|---|---|---|---|---|
| **3 TRUNNION FASTENERS Figures 14, 15 & 16** | | | SPAR CAP | "J" ANGLE ("L" ANGLE ON AFT SPAR) | TRUNNION FITTING |
| Forward Trunnion, Outboard Fastener Reference Figure 14 on Pg. 25 | step (9) page 23 | step (6) page 49 | | | |
| Aft Trunnion, Inboard Fastener Reference Figure 15 on Pg. 25 | step (9) page 23 | step (7) page 49 | | | |
| Aft Trunnion, Outboard Fastener Reference Figure 15 on Pg. 25 and Figure 16 on Pg. 26 | step (9) page 23 | step (7) page 49 | | | |
| **SURFACE SCANS - REPORT LOCATION, LENGTH AND LAYER OR DEPTH OF THE CRACK INDICATION. REFERENCE FIGURES 5, 12 AND 26** | | | | | |
| Forward Spar - Full length of Spar Cap & Spar Lower Structure. See Fig. 5 on Pg. 15 and Fig. 12 on Pg. 22 | step (8)(e) page 22 | step (13) page 51 | | | |
| Forward Spar - Aft Reinforcement Reference Fig. 28 on Pg. 39 | step (12) page 38 | step (21) page 54 | | | |
| Aft (Bathtub) Fitting Reference Fig. 26 on Pg. 37 and Fig. 27 on Pg. 38 | step (11) page 31 | step (15) page 51 | | | |
| **LEADING EDGE LOWER HINGE ANGLE SURFACES - REPORT LOCATION, DIRECTION AND LENGTH OF CRACK INDICATION.** | | | | | |
| Fuel Cell Access Panel Opening - Aft Flange Surface Reference Fig. 17 on Pg. 26 | step (10)(f) page 29 | step (20) page 54 | | | |
| Small Access Panel Opening - Aft Flange Surface Reference Fig. 14 on Pg. 25 | step (10)(f) page 29 | step (20) page 54 | | | |
| Leading Edge Lower Hinge Angle Fasteners and Inner Radius Reference Fig. 14 on Pg. 25, Fig. 18 on Pg. 28 and Fig. 19 on Pg. 29 | step (10)(e) page 27 | step (19) page 53 | | | |

**INSPECTION SURVEY CHART CONTINUED** - Airplane S/N _____ L Wing ___ R Wing ___ Total Airplane Flight Hours _____
**(SHEET 3 of 3)**
Airplane Home Address _____ Contact Name/Tele._____

Report in the chart below any crack indications that were found during this inspection, and the length and direction of the cracks. Make a copy of the applicable figure and sketch an outline of each crack if possible.

| FASTENER LOCATIONS | PART I step (#) page # | PART II step (#) page # | LAYER OF STRUCTURE |
|---|---|---|---|
| **BOX SECTION LOWER HINGE ANGLE FASTENER HOLES - REPORT LOCATION DIRECTION AND LENGTH OF CRACK INDICATION.** | | | |
| Box Section Hinge Angle - Inboard Fastener Hole Reference Fig. 14 on Pg. 25 | step (10)(a) page 27 | step (18) page 53 | |
| Box Section Hinge Angle - Outboard Fastener Hole Reference Fig. 14 on Pg. 25 | step (10)(a) page 27 | step (18) page 53 | |
| **CORROSION INSPECTION - REPORT TYPE, LOCATION AND SIZE OF AREA (REQUIRED ON INITIAL INSPECTION ONLY, NOT REQUIRED FOR PART II RECURRING INSPECTIONS). AFTER INITIAL INSPECTION, RESUME ANNUAL INSPECTIONS IN ACCORDANCE WITH MANDATORY SB 2538 REVISION I OR SUBSEQUENT REVISION.** | | | |
| Upper Spar Cap and Adjacent Upper Hinge Angles Reference SB 2538 Rev. I or subsequent | step (13) page 39 | does not apply | |
| Lower Spar Cap - and Adjacent Lower Hinge Angles Reference SB 2538 Rev. I or subsequent | step (13) page 39 | does not apply | |
| Forward Spar - Forward Side (visible inside fuel cell cavity) Reference Fig. 1 on Pg. 10 | step (13) page 39 | does not apply | |
| Forward Spar - Aft Side (visible from inside wheel well) Reference Fig. 4 on Pg. 15 | step (13) page 39 | does not apply | |
| Forward Side of Aft Spar (visible from inside wheel well) Reference Fig. 13 on Pg. 24 | step (13) page 39 | does not apply | |

# SERVICE BULLETIN

## ACCOMPLISHMENT INSTRUCTIONS INDEX

### Part I - Initial Inspection

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## ACCOMPLISHMENT INSTRUCTIONS INDEX

### Part II - Recurring Inspections

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