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# **SERVICE BULLETIN**

## **No. SB-AG-45 Rev. C**

**February 16, 2018**

### **FIN SPAR & ATTACH FITTINGS INSPECTION AND UPGRADE**

**THIS BULLETIN AFFECTS THOSE AIRPLANES THAT HAVE BEEN EQUIPPED WITH THE METAL EMPENNAGE (Installation P/N 40220 or 95400) AT THE FACTORY OR THROUGH FIELD INSTALLATION OF CUSTOM KIT 407, REGARDLESS OF COMPLIANCE WITH SB-AG-45. Compliance with SB-AG-45A, B satisfies SB-AG-45C.**

**AIRPLANES AFFECTED:**

<b><u>MODEL</u></b>	<b><u>SERIAL NUMBERS*</u></b>
S2R	1416R thru 5100*
S2R-R1340	R1340-001 thru R1340-035*
S2R-1820	R1820-001 thru R1820-036*
S2R-T11	T11-001 thru T11-005*
S2R-T15	T15(or T27)-001 thru T15(or T27)-044*
S2R-T34 or T41	6000-6049, T34-001 thru -279DC, T41-090DC thru -225DC*, T42-209DC*
S2RHG-T34	T34HG-101DC thru -107*
S2R-T45	T45-001DC thru 014DC, T45-008 thru T45-015*
S2R-T65	T65-001DC, T65-011DC thru T65-018DC*
S2RHG-T65	T65-002DC thru T65-010DC, T65HG-011 thru -019*
S2R-G1	G1-101 thru G1-115*
S2R-G5	G5-101 thru G5-105*
S2R-G6	G6-101 thru G6-155*
S2R-G10	G10-101 thru G10-168*
S2R-T660	T660-101 thru -120DC*

**\* with or without DC suffix**

## Log of Revisions

Note: Reformatting and correction of typographical errors is not considered revision. True revisions are indicated by a dark vertical line at the right margin of the lines revised.

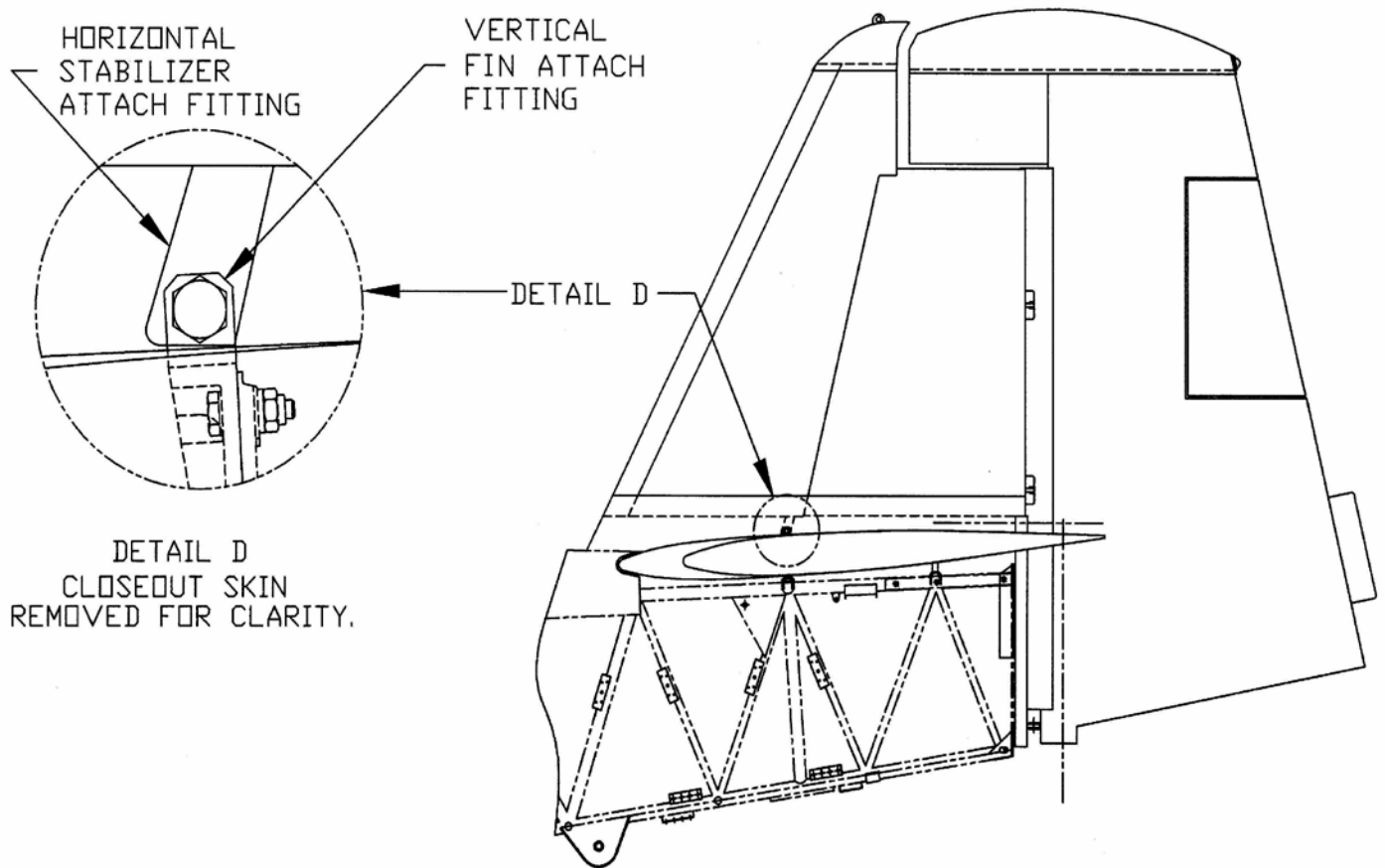
Rev.	Page	Description of Revision	By:
IR	All	New Document Initial Release	P. Nichols 11/08/2003
A	All	Completely Revised Document	P. Nichols 09/06/2005
B	Pg. 3	Add inspection with 10x Magnifier Corrects confusing terminology	G. Moreland 06/01/2007
C	Cover Page Pg. 9	Incorporated new company logo Part Number 95266-3 is now 95266-11	K. Sheppard 02/16/2018

**REASON FOR PUBLICATION:**

A report was received from the field that a 5/16" vertical fin forward attach bolt, P/N NAS1105-68, was found broken in two places. The failure of this bolt caused the rear spar of the vertical fin to crack, but not fail, between the fuselage upper attach point and the center rudder hinge bearing support. A separate incident found the attach fitting on the stabilizer itself cracked in both lugs from stress corrosion. This bulletin was revised (Rev. A) to require inspection of the attach bolt and fittings on the horizontal stabilizer and vertical fin, and the rear vertical fin spar, for cracks every 100 flight hours. It also gives the option to upgrade the vertical fin forward attach bolt to a 7/16" close tolerance bolt and replace the attach fittings on the horizontal stabilizer and vertical fin with ones of a more stress corrosion resistant material, and thereby eliminate the 100 hour inspection requirement. Revision B adds inspecting with a 10X magnifier and corrects some confusing terminology. Revision C replaces P/N 95266-7 vertical fin attach fitting with P/N 95266-11 vertical fin attach fitting.

**COMPLIANCE:**

Inspection of the 40301-7 vertical stabilizer attach fitting, 40303-1, 4 or 7 horizontal stabilizer attach fitting (95267-1 on the T660) and bolt must be accomplished immediately upon receipt or downloading of this service bulletin. It must be re-inspected every 100 hours thereafter until they are replaced with the 95266-11 vertical fin attach fitting, 95267-5 horizontal stabilizer attach fitting, and larger bolt per SB-AG-45 Rev. C. See Figure 45-1 for the location of these fittings and bolt.



**Figure 45-1: Location of Attach Fittings**

**BY WHOM WORK WILL BE ACCOMPLISHED:**

FAA licensed A&P mechanic or equivalent:

**APPROVAL:**

This Service Bulletin is FAA approved

**MAN HOURS:**

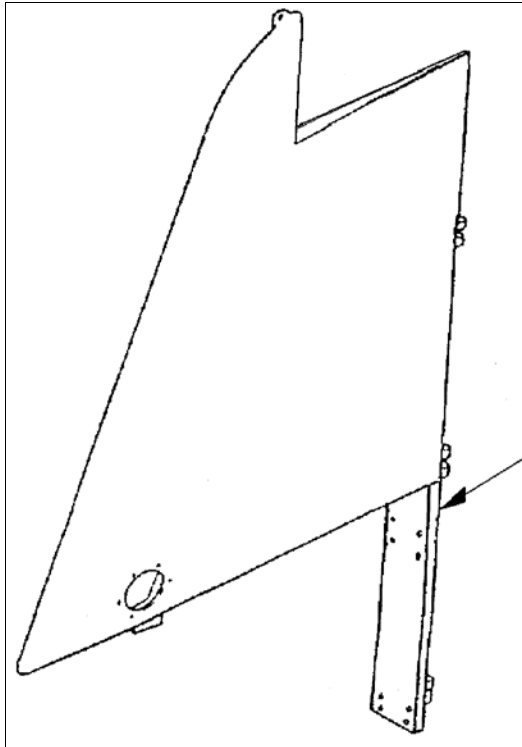
4 to 6 hours for inspection, 15 to 20 hours for part replacement, depending on model.

**SPECIAL TOOLS:**

- ESK 708-12/13 Holding Fixture
- ESK 708-14/15 Holding Fixture
- ESK 708-17 Bushing
- ESK 708-18 Bushings, (2 ea.)
- NAS 1203-2 Bolts, (4 ea.)

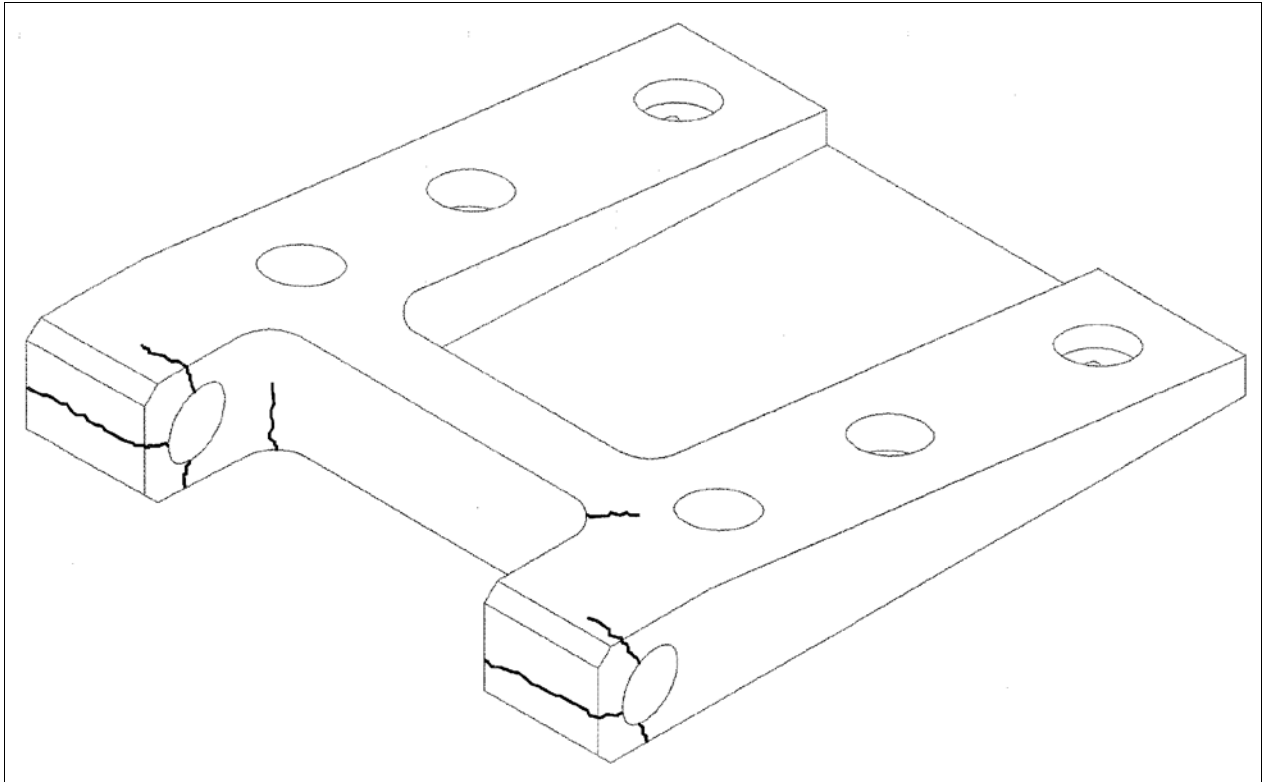
**INSPECTION:**

Remove the rudder from the aircraft. Remove vertical fin fairings, dorsal fin if installed, and the top four bolts attaching the aft vertical stabilizer spar to the fuselage frame. Loosen the bottom four bolts attaching the aft vertical stabilizer spar to the fuselage. While in this area, carefully inspect the vertical fin aft spar for cracks, using a 10X magnifier, especially in the area between the top attach bolts and the center rudder hinge (Ref. Fig. 45-2). Repair, replace and/or refinish the aft spar as necessary.



**Figure 45-2: Inspect Vertical Fin Spar Assy., Using a 10X magnifier at the Upper Attach Bolts**

Remove the bolt holding the horizontal stabilizer attach fitting, 40301-7 (95266-1 for the T660), to the vertical fin\_attach fitting on the horizontal stabilizer. **(This terminology may be confusing. The vertical fin attach fitting is on the horizontal stabilizer, and the horizontal stabilizer attach fitting is on the vertical fin.)** Tilt the vertical fin aft until the inner faces of the horizontal stabilizer attach fitting lugs are easily visible. Block the vertical fin in this position with wood blocks. Using a 10X magnifier, visually inspect both lugs of the vertical fin attach fitting on the horizontal stabilizer and the rest of its exposed surfaces for cracks. If the paint is cracked, discolored or bubbled, remove loose paint prior to inspection, as this can hide cracks or corrosion. Also inspect the inside of the holes as much as possible. See Figure 45-3 for areas most suspect for cracks.



**Figure 45-3: Areas of vertical fin attach fitting to be inspected for cracks**

While there have been no reported cracks in the lug of the horizontal stabilizer attach fitting on the vertical fin, 40303-7 or -11 (95267-1 for T660), it too must be thoroughly visually inspected with a 10X magnifier at this time, while it is easily accessible and visible. Cracked, discolored or bubbled paint may indicate hidden corrosion or cracks, and should be removed for further inspection.

Corrosion, as indicated by white powder or scale on the aluminum surface, if found on either fitting, requires the following repair **prior to further flight**. If there is corrosion, there will be stress corrosion, which will eventually lead to failure. The new fittings are much more stress corrosion resistant.

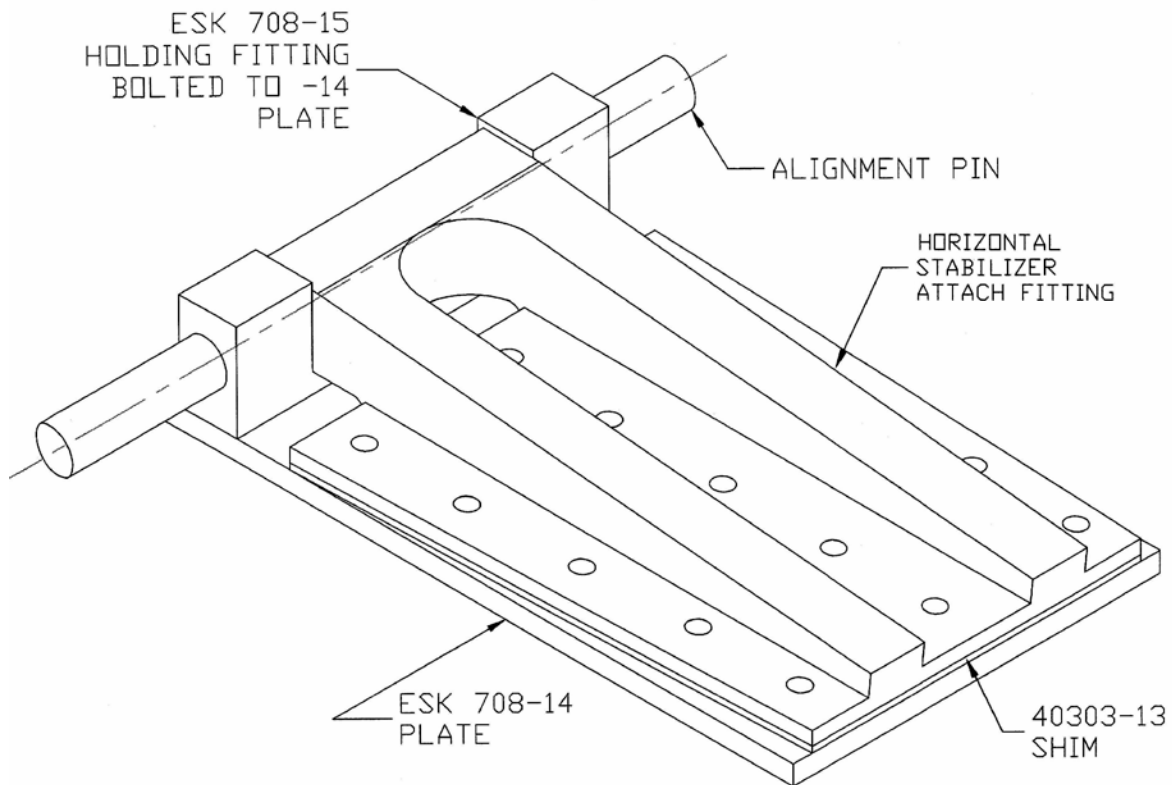
If both fittings are found to be in a satisfactory condition, repaint or touch up with polyurethane primer. Inspect the removed bolt, washers and nut. If bolt is in satisfactory condition, reinstall it with new NAS 1291-5 nut, torqued to 70 – 90-inch pounds (NAS 1291-7; torque to 300 – 400 inch pounds if SB-AG-45 was complied with). Reinstall fin aft spar, fairings and dorsal fin as applicable.

If fittings and bolt are in satisfactory condition, repeat the above inspection at 100 hour intervals until the following repair is accomplished. If bolt, fittings or aft spar is found cracked or deformed, accomplish the following repair **prior to further flight**.

**REPAIR:**

1. Remove the rudder from aircraft.

2. Remove vertical fin fairings from aircraft.
3. Remove the vertical fin and horizontal stabilizer from aircraft. Remove the horizontal stabilizer attach fitting from the vertical fin as follows. Drill off the P/N 40276-3 #1 fin rib and P/N 40281-1 #6 fin rib at the fin bottom to gain access to the horizontal stabilizer attach fitting. Carefully drill out the rivets holding the vertical fin attach fitting to the fin front spar, from the forward side. Inspect the fin front spar for corrosion or damage and repair and/or refinish as necessary. Note any holes that need to be enlarged for clean-up. Corresponding holes in the new fitting must be enlarged after the holes have been drilled per step 6. Retain the old fitting for use as a drill template, to ensure your new fitting fits properly.
4. Attach the ESK 708-15 holding fitting to ESK 708-14 plate using 2 ea. NAS 1203-2 bolts. Install 2 ea. ESK 708-18 bushings in the ESK 708-15 holding fitting. These bushings will not be necessary if SB-AG-45, increasing the bolt size to 7/16", has been previously complied with.



**Figure 45-4: Use of Hole Transfer Fixture ESK 708-14/15 for Stabilizer Attach Fitting**

5. Install old horizontal stabilizer attach fitting, removed from the vertical fin, on the -14/15 holding fixture using a 6" 5/16" (7/16" if SB-AG-45 has been complied with) pin or drill shank for alignment (see Fig. 45-4). Using a suitable "C" clamp, clamp the fitting to the plate. If the old fitting is a steel weldment, drill #30 through the 15 holes (3 rows of 5 ea.) nearest to the tube at the top of the steel fitting, using the old steel fitting as a drill jig. Do not drill the large holes in the steel attach fitting. Remove the old steel fitting and discard it.

If the old fitting is aluminum, a .10" shim must be between the fitting and the -14 plate before clamping. If the old shim is used for this, ensure the holes are either aligned with the fitting or totally out of line, so as not to cause the drill to wander. Drill all of the aluminum fitting's holes #30 into the ESK 708-14 plate. Remove the old aluminum fitting and shim and discard them. Deburr the ESK708-14 plate and remove the ESK 708-18 bushings from the -15 holding fitting (if used).

6. Install the new P/N 95267-5 horizontal stabilizer attach fitting onto the -14/15 holding fixture just drilled using a 7/16" alignment pin or 6" 7/16" drill shank (see Fig. 45-4). The new 40303-13 shim installs between the fitting and the plate. Using "C" clamps, clamp the new aluminum horizontal stabilizer attach fitting and shim to the -14 plate.

Invert this assembly and back drill the #30 holes through the new aluminum fitting and shim, using the -14 plate as a drill template. Remove the aluminum fitting and shim from the fixture and discard the -14 plate. Deburr new aluminum fitting and shim. Note that the -15 holding fitting may be used to do another airplane by locally fabricating a new -14 plate (see Fig. 45-6).

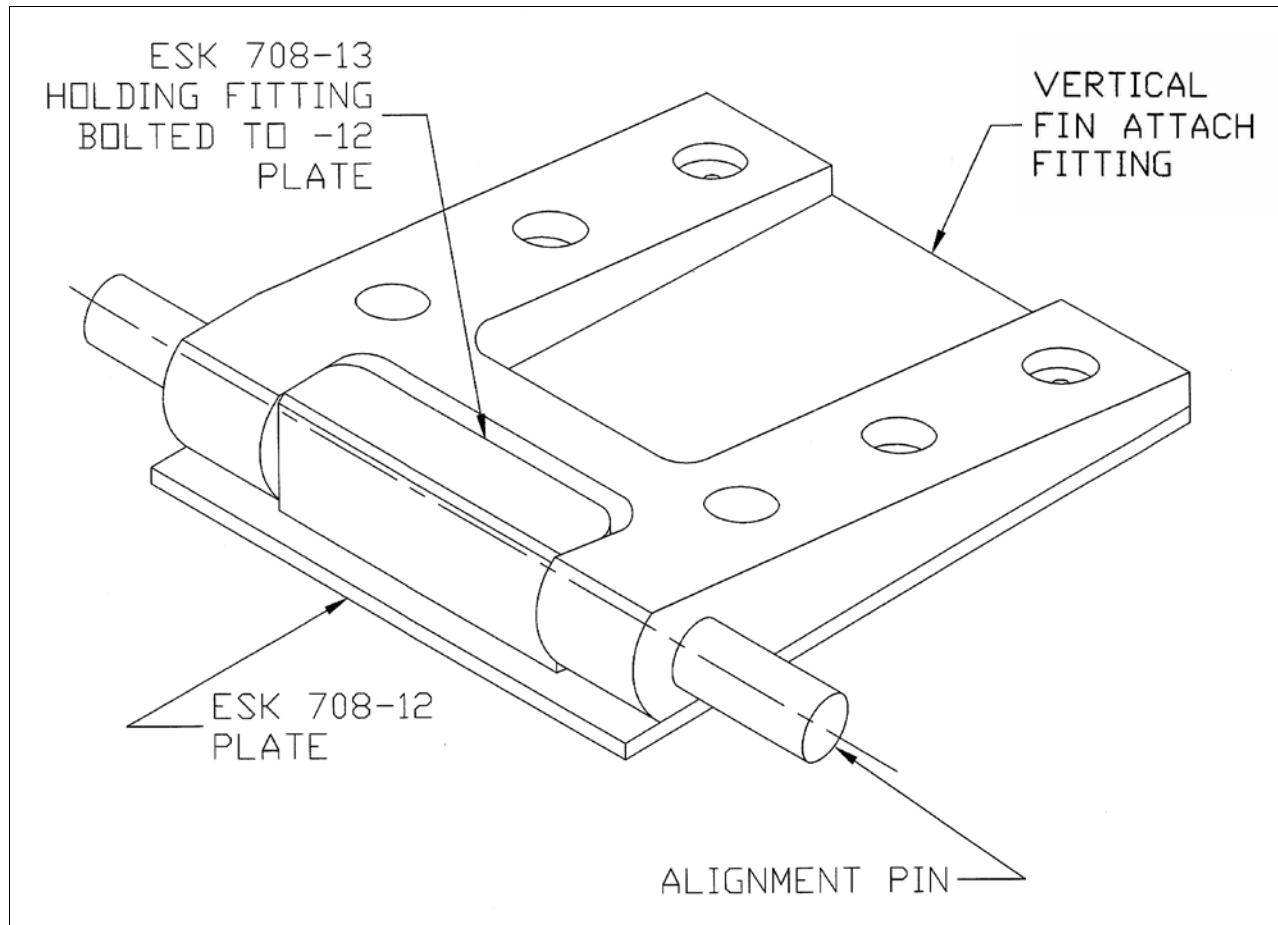
7. Through the bottom access holes in the horizontal stabilizer, remove the existing vertical fin attach fitting. Inspect the horizontal stabilizer forward spar for condition and corrosion and repair and/or refinish as necessary. Note any holes that need to be enlarged for clean-up. Corresponding holes in the new fitting must be enlarged after the holes have been drilled per step 8.
8. The hole pattern of the old vertical fin attach fitting must be transferred to the new 95266-11 vertical fin attach fitting. The #11 holes have been left out of the 95266-11 for this purpose. Tool ESK708-12/13 serves to ensure that the hole pattern in 95266-11 matches the hole pattern in the horizontal stabilizer spar. See Figure 45-5 for use of this tool.

The ESK 708-13 holding fitting is attached to the ESK 708-12 plate with two NAS 1203-2 bolts. Install an ESK 708-17 bushing in the -13 holding fitting if SB-AG-45, installing a 7/16" bolt, has not been complied with. The vertical fin attach fitting previously removed is attached to the ESK 708-13 fitting with a 5/16" pin or drill shank. Once installed on the -13 fitting, clamp the old vertical fin attach fitting to the -12 plate. Drill six #11 holes in the -12 plate using the old vertical fin attach fitting as a drill template. Remove the old vertical fin attach fitting and discard it. Deburr the -12 plate and remove the ESK 708-17 bushings. Install the new 95266-11 fitting on the -12/13 holding fixture using a 7/16" pin or drill bit shank and C-clamps. Turn this assembly over and back-drill the 95266-11 fitting #11 six places using the -12 plate as a drill template. Remove the 95266-11 fitting and deburr the holes. Discard the ESK 708-12 plate. The ESK 708-13 holding fitting may be used for another airplane by locally fabricating a new ESK 708-12 plate (see Fig. 45-6).

9. Install the drilled 95266-11 vertical fin attach fitting on the forward side of the horizontal stabilizer front spar by reversing the removal process. Use new fasteners and oversize fasteners of the same type where necessary. Seal all joints and seams with P/N CS3204-B2 sealer or equivalent to prevent chemical entry. Touch up paint or refinish as necessary.
10. Reinstall horizontal stabilizer per the maintenance manual.



11. If the vertical fin requires repair or parts replacement, do so at this time.



**Figure 45-5: Use of Hole Transfer Fixture for Vertical Fin Fitting**

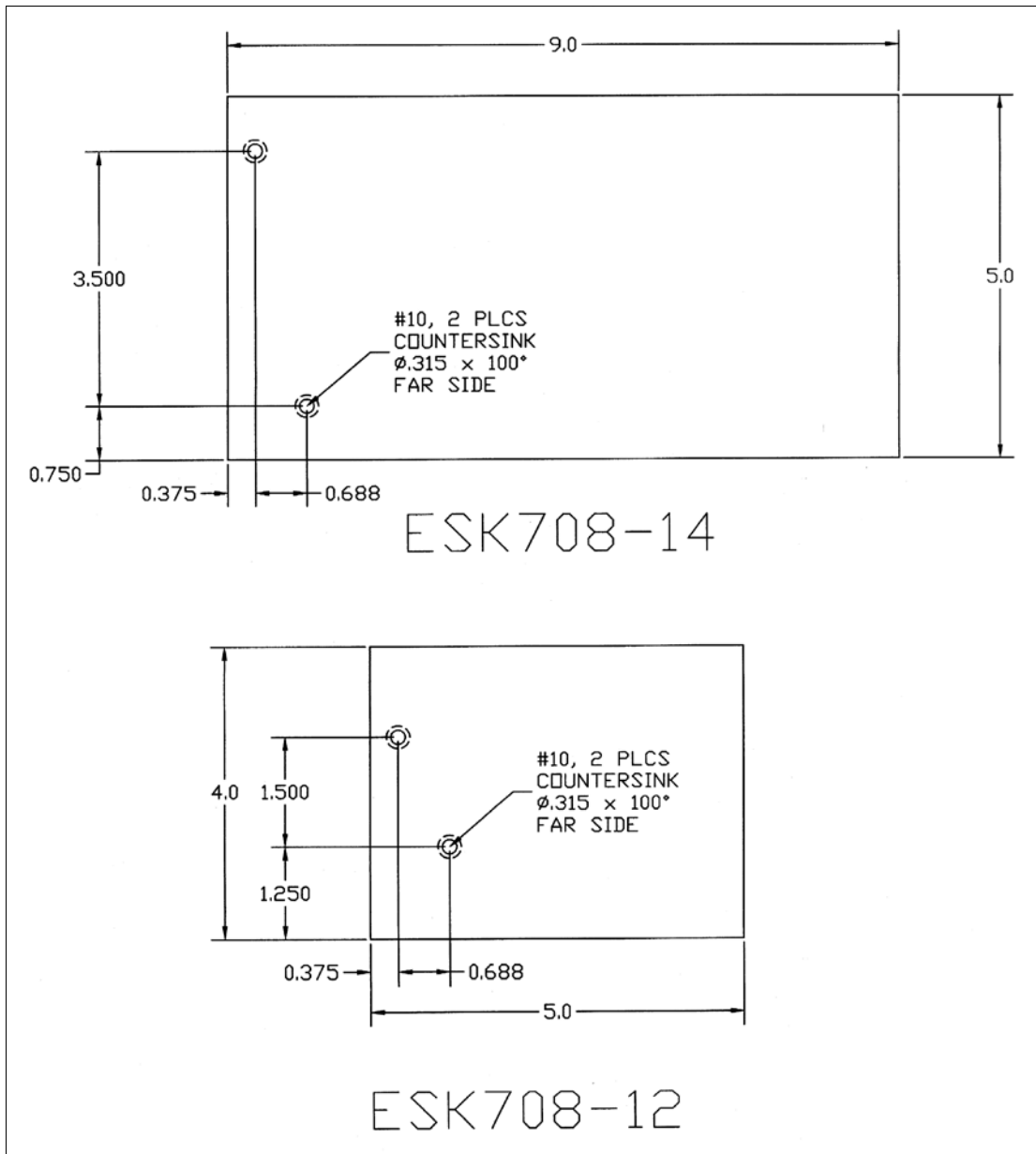
12. Using 1/8" "Cleco" fasteners, fasten the 95267-5 horizontal stabilizer attach fitting and 40303-13 spacer to the vertical fin's front spar. It is recommended to do a trial fit of the fin to the horizontal stabilizer prior to installing the fasteners. Any fore and aft misalignment of the fittings can thus be corrected by changing the thickness of the 40303-13 shim as necessary.

Install the horizontal stabilizer attach fitting to spar by riveting with MS20470AD4-\_\_ rivets or by enlarging all 15 holes to #12 drill size (.1890") and using AN3-\_\_A bolts, AN960-3 washers (1 to 3ea.), and AN365-1032 nuts, or equivalent. The new aluminum fitting is shorter than the welded steel fitting, if you had one, and the extra 5 ea. 1/8" holes in the vertical fin forward spar may be left open or filled with MS20470AD4-\_\_ rivets. Notch the existing nose root rib to clear the new aluminum attach fitting or replace it with a new 40276-3 #1 fin rib. Reinstall the #1 fin rib and #6 fin rib (40281-1) using standard universal and countersunk AD rivets. Seal all joints and seams with P/N CS3204-B2 sealer or equivalent to prevent chemical entry. Touch up paint or refinish as necessary.

13. Install the vertical fin. The new 7/16" bolt is installed as follows. Install the NAS6207-68 bolt with MS20002C7 washer's chamfer towards the bolt's hexagonal head. The bolt should

tap through one lug and enter the other holes with no misalignment or binding; a thumb push-through fit is ideal. Install the standard AN960-716 washer under the nut. Torque NAS1291-7 shear nut to 300-400-inch pounds. Reinstall vertical fin rear spar bolts to fuselage per the maintenance manual.

14. Reinstall the rudder and attach rudder cables per the maintenance manual.
15. Reinstall vertical fin fairings and dorsal fin, as applicable.



**Figure 45-6: Hole Pattern Transfer Plates. Material .100-.188 Aluminum**

**PARTS LIST (Parts are available through your local Approved Thrush Repair Center).**

<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
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1 ea.	NAS6207-68	Bolt, close tolerance
1 ea.	MS20002C7	Washer, chamfered
1 ea.	AN960-716	Washer, plain
1 ea.	NAS1291-7	Nut, shear, self-locking
1 ea.	95266-11	Fitting – Vertical Fin Attach
1 ea.	95267-5	Fitting – Horizontal Stabilizer Attach
1 ea.	40303-13	Shim, fitting to vertical Stabilizer
1 ea. (as req.)	40276-3	#1 Fin Rib
1 ea. (as req.)	40281-1	#6 Fin Rib
1 ea. (as req.)	40261-24	Vertical Fin Aft Spar Assy. <u>or</u>
1 ea. (as req.)	95253-1	Vertical Fin Aft Spar Assy. – T660

### **RECORD OF COMPLIANCE**

Make appropriate entry in airplane maintenance records as follows: **“Thrush Service Bulletin SB-AG-45 Rev. C inspection requirement complied with at \_\_\_\_\_ total hours on aircraft.”** This inspection is to be accomplished every 100 hours hereafter until the horizontal stabilizer attach fitting and vertical fin attach fitting is replaced per SB-AG-45 Rev. C.

When the vertical fin attach fitting is replaced with a 95266-11 vertical fin attach fitting and the horizontal stabilizer attach fitting is replaced with a 95267-5 horizontal stabilizer attach fitting, make an appropriate entry in the airplane maintenance records as follows: **“vertical fin attach fitting replaced with 95266-11 vertical fin attach fitting and horizontal stabilizer attach fitting replaced with 95267-5 horizontal fin attach fitting per SB-AG-45 Rev. C. at \_\_\_\_\_ total hours on aircraft.”** Modification accomplished by:

---

name & certificate #

date

### **RESPONSE CARD**

The final step in compliance with this Service Bulletin is to complete and return the compliance card on the next page. It may be mailed, postage free, Faxed, or scanned and e-mailed.

FAX to: Ed Rusk 229-439-9790

E-mail to: Ed Rusk [erusk@thrushaircraft.com](mailto:erusk@thrushaircraft.com)

**Service Bulletin SB-AG-45 Rev. C Compliance Report**

Aircraft S/N:	_____	Aircraft Owner:	_____
Aircraft Registration #	_____	Address of Owner:	_____
Airframe total time:	_____	City & State:	_____
Engine total time:	_____	Physical location:	_____
Date of Compliance	_____		_____
Complied with by:	_____	Certificate #:	_____
Signature:	_____		

**PLEASE RETURN THIS REPORT ONLY WHEN REPAIR IS MADE**

**Vertical Fin Attach  
Fitting and Stabilizer  
Attach Fitting have been  
Replaced to Alleviate  
The 100 hour Inspection  
Requirement,  
Because:**

Corrosion found; but no cracks:

Minor cracks found, but no corrosion:

Corrosion and minor cracks found:

Significant cracks found:

**Note:** Please return fittings with significant cracks to Ed Rusk at the below address for evaluation. Photographs of corrosion or cracks of the fin spar, before repair, would be greatly appreciated.

This response card may be mailed, Faxed to (229) 436-4856, or e-mailed to [erusk@thrushaircraft.com](mailto:erusk@thrushaircraft.com). Digital photos can be sent as attachments to the e-mail.

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fold, tape & mail (Do Not Staple)

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Return Address

Place first class postage here
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Albany, GA 31721