



WIPLINE FLOATS | MODIFICATIONS | AIRCRAFT SALES  
AVIONICS | INTERIORS | MAINTENANCE | PAINT

# **STRUCTURAL REPAIR MANUAL FOR WIPLINE ALUMINUM FLOATS**

**Revision L**

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## LOG OF REVISIONS

Revision	Pages Affected	Description	Date
IR	All	Initial Release	9/18/2014
A	67	Added bulkhead repair.	11/10/2015
B	20-22, 63-65, 73	Added keel repair data, 10000 strut fitting bushing repair and bulkhead buckling and cracking information.	1/15/2016
C	51, 63, 65	Updated instructions on Main and Front Strut Fitting Repair. Removed drawing 1008698 and changed to intentionally blank page. Updated instructions on Complex Extrusion Splice Repair.	5/9/2019
D	All	Updated manual format in new software. Updated Section 2.0 to Corrosion Removal and Materila Loss. Changed Table 2-1to Material Loss Limits. Changed float sealant 892 BR to PR-1422 or equivalent. Updated Figure 5.10-7: 13000 Main Keel Repair with .063 Skin Thickness and added Main Keel part number 13S01387-004 for straight floats. Added part number 13S01387-004 and changed Screw AN507C832-8 to MS24693-C50 and Washer AN960-8 to NAS1149F0832P and Nut AN365-832 to MS20365-832 in section 5.10.2 Main Keel Extrusion Splice Repair. Added 1001073 Keel Extrusion Repair, Aft to multiple sections. Updated drawing and added Splice Main Keel Repair p/n 8A01354-008 (21"), 8A01354-009 (32"), 8A01354-010 (43"), 8A01354-011 (57") to multiple sections. Removed 6000 and 8000 Complex Extrusion Replacement Parts tables and added Typical Cap Splice to Keel repair drawings and instructions. Updated drawing in Figure 5.9-2 for Aft Keel Repair. Updated Figure 5.9-4 Fwd Chine Repair. Updated drawing for Figure 5.9-3 Gunwall Repair. Updated drawing for Figure 5.9-5 Aft Chine Repair. Changed drawings in Figure 5.9-6, 5.9-7, 5.10-6, and 5.10-7 for Main Keel Simple Extrusion Splice Repair for 10000 and 13000 floats. Added 1006762 Keel Splice to Sections 5.9.1 and 5.10.1. Updated drawing for Figure 5.10-2 Aft Keel Repair. Updated drawing for Figure 5.10-3 Gunwall Repair. Updated drawing for Figure 5.10-4 Fwd Chine Repair. Updated drawing for Figure 5.10-5 Aft Chine Repair.	6/19/2020
E	9, 20	Added note in introduction about NDT. Added information about raw materials in Section 5.0.	6/10/2021
F	53-54	Updated section 5.9.3 Main and Front Strut Fitting Repair work instructions and Figure 5.9-8 and Figure 5.9-9 images.	5/13/2022
G	64	Added Sections 7.0 and 7.1 for spreader bar repairs.	3/31/2023
H	12-13, 66-67	Updated section 1.0, 1.1, and 1.2. Added section 7.2.	9/18/2023
J	38-39, 41-42, 53-55	Updated title for Section 5.5. Added note to Section 5.5.2. Added Section 5.5.3. Added Figure 5.5-5. Added Section 5.8.3. Added Figures 5.8-6, 5.8-7, 5.8-8, 5.8-9, 5.8-10.	4/24/2024
K	18, 30, 33, 36, 39, 45, 48, 52, 59	Changed side skin material 6061-T6 / .025" to 2024-T3 / .025" in 2100/2350 float table in Section 4.3. Changed screw AN507C832-8 to MS24693-C50. Changed wear strip 1004039 to 1006214 in section 5.8.2. Changed washer AN960-8 to NAS1149FN832P. Changed nut AN365-832 to MS21044N08.	4/17/2025
L	54-57	Update Figures 5.8-7, 5.8-8, 5.8-9, and 5.8-10.	1/26/2026

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## INTRODUCTION

This manual describes standard repairs for Wipline aluminum floats. Contact Wipaire for repairs not covered by this manual.

**Note:** Nondestructive testing (NDT) is optional for all repairs.

This manual is revised periodically and needs to be kept updated. Updates are available at [www.wipaire.com](http://www.wipaire.com) at no charge.

The service products referred to throughout this manual are described by their trade name and may be purchased from the factory Parts Department.

To contact Wipaire for repair assistance or parts sales, call or write:

Wipaire Customer Service  
Telephone: (651) 451-1205 or 1 (888) 947-2473  
Fax: (651) 306-0666  
Email: [customerservice@wipaire.com](mailto:customerservice@wipaire.com)

# 1.0 HARD LANDING AND GEAR UP RUNWAY LANDING

Hard landings and gear up runway landings can transmit excessive stresses into the float structure. In such an event, a thorough damage investigation is necessary before returning to service. Key areas of concern for each scenario are provided in the following sub-sections.

## 1.1 HARD LANDING DAMAGE INVESTIGATION

After a thorough cleaning of the suspected damaged area, all parts should be carefully examined to determine the extent of the damage. Frequently, the force causing the initial damage is transmitted from one member to the next, causing strains and distortions. Abnormal stresses incurred by shock or impact forces on a rib, bulkhead, or similar structure may be transmitted to the extremity of the structural member. These stresses may result in secondary damage, such as sheared or stretched rivets, elongated bolt holes, or damaged skins or bulkheads. Points of attachment should be examined carefully for distortion, and the security of fasteners in the primary and secondary damaged areas at locations beyond the local damage. Inspect aircraft tubes in the areas of float fitting attachment for signs of bending, cracked welds, or other signs of damage.

## 1.2 GEAR UP RUNWAY LANDING DAMAGE INVESTIGATION

After a gear up landing and aircraft recovery, and in addition to a thorough assessment of external float structure with the considerations described in the "hard landing" section above, focused inspections should be performed on the following areas:

1. Float keels
2. Float bulkhead structure
3. Gear retraction/extension
4. Float attachment struts and fittings
5. Airframe attachment areas

### Float Keels

Inspect keels for damage beyond wear strips (if originally installed). Refer to Section 2.0 for allowable material loss. Inspect for cracks, creases, buckling, sharp gouges, etc. which indicate localized weakness of the keel (stress concentration). Wear/deformation of the main keel may require repair or replacement per applicable float hull extrusion as detailed in Section 5.0. Floats that utilize a bonded keel extrusion may require a riveted repair due to the excessive heat incurred from friction. Perform a water leak check to determine if keels are watertight. Refer to the applicable Wipaire service manual for recommended sealants. Restore finish to keel as needed to prevent corrosion. Continued operation with wear strip removed (if originally installed) is not recommended.

### Float Bulkhead Structure

Inspect float bulkhead structure for buckling and cracking. Refer to Section 6.0 for applicable bulkhead repairs.

### Gear Retraction/Extension Test

With aircraft on jacks, cycle landing gear and observe for any binding which may be caused by deformation of float structure.

### Float Attachment Struts and Fittings

Visually inspect float struts and attachment fittings for indications of damage. Inspect for deformation in strut attachment hardware, fittings that appear to be out of alignment, and strut ends at hardware areas for signs of

damage. Replace damaged struts, fittings, and hardware if required.

#### Airframe Attachment Areas

Visually inspect airframe attachment areas for indications of damage. Inspect for deformed rivets, aircraft skin or frame buckling, and engine mount and firewall condition.

## 2.0 CORROSION REMOVAL AND MATERIAL LOSS

Floats may experience material loss due to chaffing, fretting, or other accidental damage. Refer to Table 2-1 for allowable material loss. If damage exceeds listed limits, replace damaged parts.

To prevent and detect corrosion follow the procedures outlined in the appropriate float service manual. Corrosion appears as a white or pale green powder, discoloration of a metal surface, or bubbles and blisters under the surface of the paint.

If the corrosion does not exceed the corrosion limits listed in Table 2-1, the corrosion can be removed. Thoroughly clean the affected area. Remove light corrosion (discoloration, minimal pitting) with gentle sanding or washing with a chromic acid solution. Remove moderate and severe corrosion (blistering, flaking, pitting) with heavier sanding and grinding.

After removing the corrosion, restore the area to the original finish. Typically, this is either priming and enameling, or coating bare metal with waterproof grease. Apply CorrosionX or an equivalent to the affected area to stop corrosion and repel moisture and contaminants.

If the corrosion exceeds the corrosion limits listed in Table 2-1, refer to section 4.0 of this manual for typical reinforcement or replacement of the affected areas. Contact Wipaire Customer Service with questions.

AREA	ALLOWABLE MATERIAL LOSS
Bottom Skins	30%
Side Skins (forward of step)	30%
Side Skins (aft of step)	20%
Top Skins	30%
Machinings	0.015"
Extrusions	0.015"
Struts and Spreader Bars	0.030"

#### NOTES:

1. Maximum surface area for skin corrosion, up to the maximum depth, shall not exceed one square inch and must be separated by at least 14 inches from any other skin corrosion damage.
2. For machined fittings, struts, spreader bars, and pylons, corrosion limits are provided as maximum pitting depths. Corroded surface area shall not exceed 0.5 square inches and must be separated by at least 5 inches from any other corrosion damage.

**TABLE 2-1: CORROSION LIMITS (MATERIAL LOSS LIMITS)**

## 3.0 RIVET REPLACEMENT

There are instances during float repair where replacement of solid rivets is not practical. For these occasions, Wipaire has composed a list of acceptable fastener substitutions.

Solid rivets may be replaced by the following fasteners with equal or greater diameter than the original rivet:

1. New solid rivet
2. CherryMAX blind rivet
3. HuckLok blind rivet
4. Hi-Lok fastener

### NOTES:

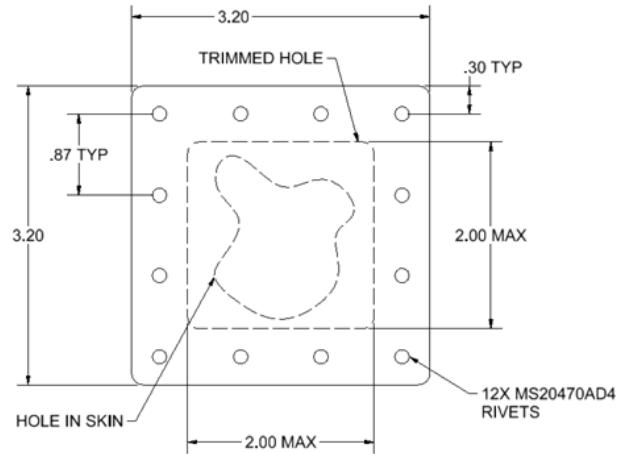
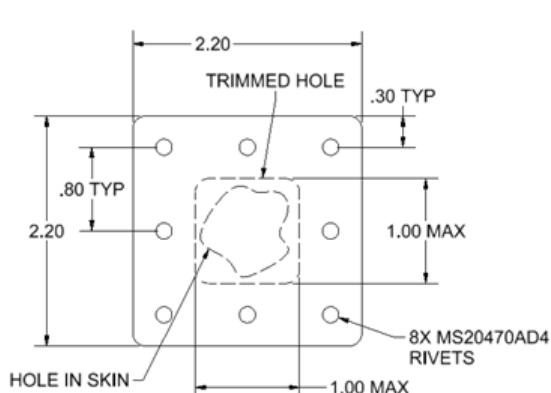
1. When installing any structural fasteners, edge distance and rivet spacing guidelines per AC 43.13-1B should be followed at all times.
2. In areas where solid rivets are smoking or missing, blind rivets are an acceptable short-term solution but should be replaced with solid rivets or Hi-Lok fasteners.
3. Follow fastener manufacturer guidelines for installation.

## 4.0 FLOAT HULL SHEET METAL

Damage to any sheet metal, including but not limited to skins and bulkheads, may be repaired per the figures in this section, or any acceptable repair method listed in FAA Advisory Circular 43.13-1B.

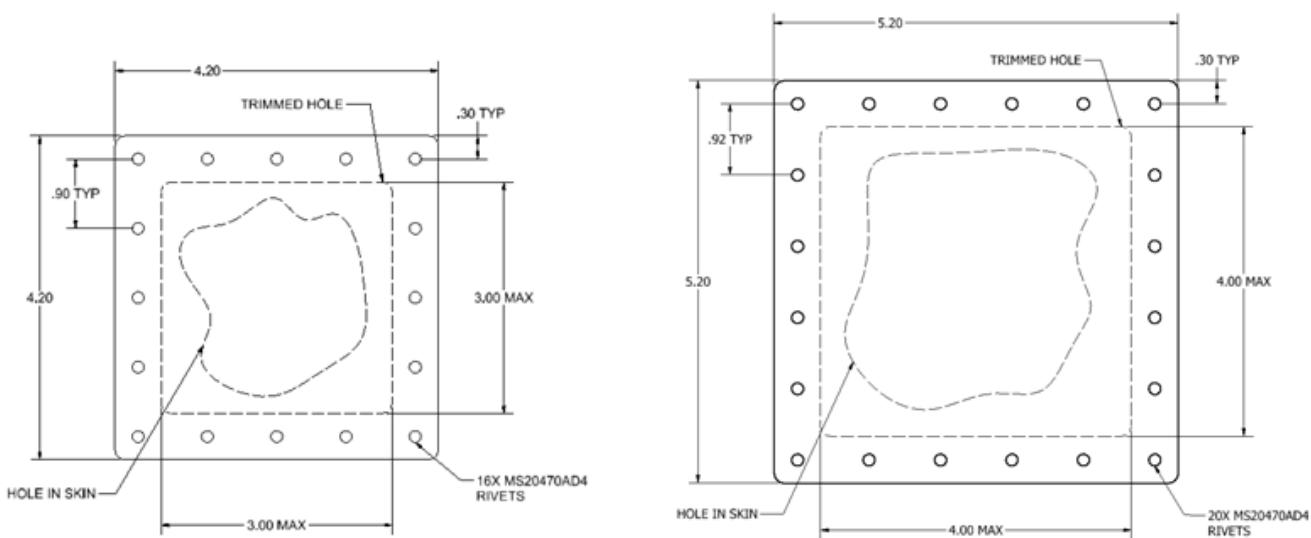
Float hull sheet metal or part thereof can be purchased from Wipaire. To simplify repairs, the sheet metal can be ordered precut and predrilled. Contact Wipaire Customer Service to order parts.

## 4.1 FLOAT SKIN DAMAGE REPAIR (ALL MODELS)



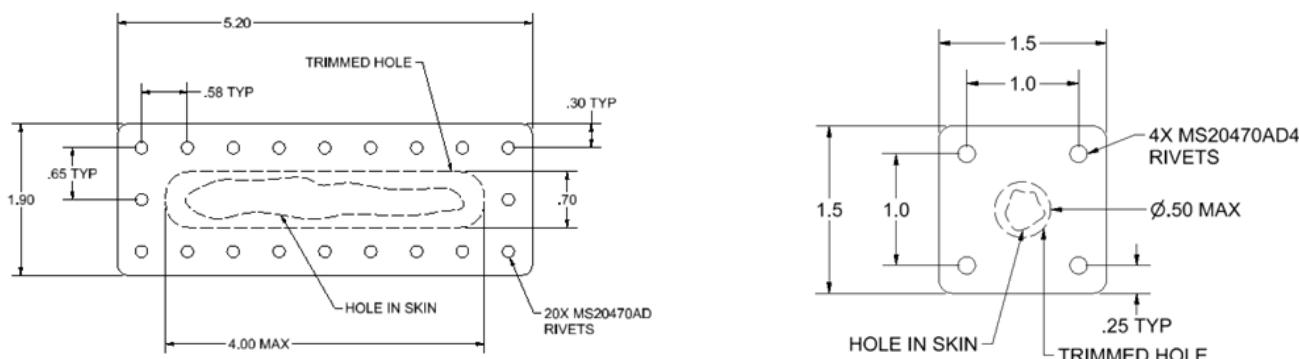
1. Trim hole as shown by dotted line
2. Patch to be same material with equal or greater thickness than original skin (See Table 4-1)
3. Prime all bare surfaces
4. Seal between patch and skin
5. Rivet in place

**FIGURE 4.1-1A: SHEET METAL REPAIR**



1. Trim hole as shown by dotted line
2. Patch to be same material with equal or greater thickness than original skin (See Table 4-1)
3. Prime all bare surfaces
4. Seal between patch and skin
5. Rivet in place

**FIGURE 4.1-1B: SHEET METAL REPAIR**



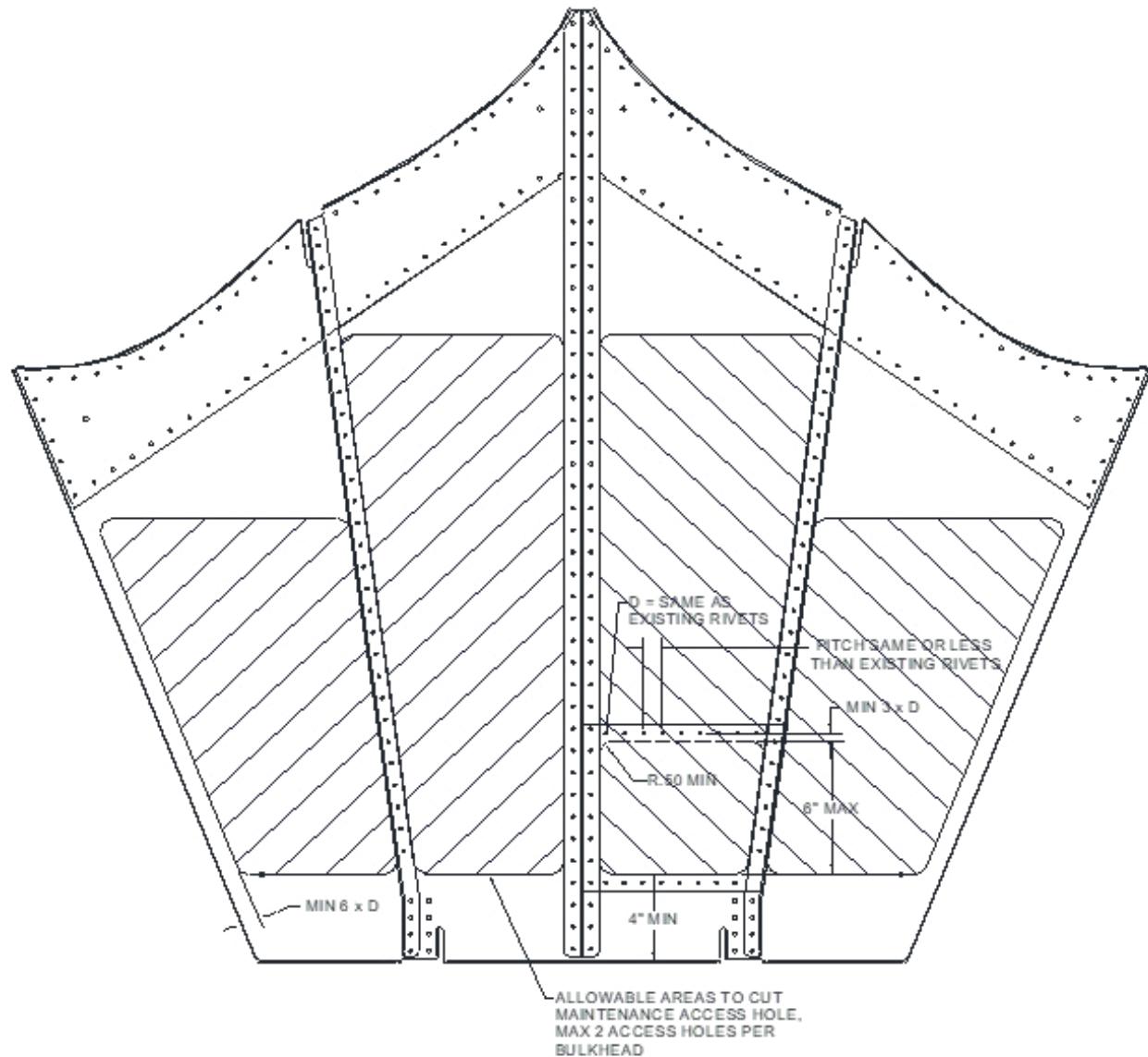
1. Trim hole as shown by dotted line
2. Patch to be same material with equal or greater thickness than original skin (See Table 4.1)
3. Prime all bare surfaces
4. Seal between patch and skin
5. Rivet in place

**FIGURE 4.1-1C: SHEET METAL REPAIR**

## 4.2 WIPLINE MODEL 10000 & 13000 OPTIONAL ACCESS HOLE REPAIR

During extensive float maintenance of 10000 and 13000 floats, it may be desirable to cut an access hole in a solid bulkhead to enable replacement of neighboring float structure. This type of access hole can be cut and then repaired according to Figure 4-2.

**Note that this is only acceptable practice on the 10000 and 13000 floats.**



**NOTE(S):**

1. ACCESS HOLES MAY BE CUT FOR THE PURPOSE OF MAINTENANCE
2. MAX 2 ACCESS HOLES PER BULKHEAD
3. RIVET PATCH OVER ACCESS HOLE ONCE MAINTENANCE IS COMPLETE
4. PATCH MUST BE OF THE SAME, OR STRONGER ALLOY (6061-T6 OR 2024-T3), WITH THE SAME THICKNESS AS THE ORIGINAL PANEL, OR ONE GAGE THICKNESS GREATER
5. USE SOLID RIVETS OF SAME DIAMETER AS EXISTING RIVETS, OR 1 SIZE LARGER; ALTERNATELY USE CHERRY MAX (OR EQUIVALENT) FASTENER OF SAME DIAMETER, OR 1 SIZE LARGER

**KEY:**  
 D = DIAMETER  
 R = RADIUS

**FIGURE 4-2: BULKHEAD ACCESS HOLE REPAIR**

## 4.3 WIPLINE SKIN AND BULKHEAD THICKNESSES

		FLOAT		
		2100/2350	3000/3450	3730/3900
Skins	<b>Top</b>	6061-T6 / .025"	6061-T6 / .025"	2024-T3 / .032"
	<b>Side</b>	2024-T3 / .025"	6061-T6 / .025"	2024-T3 / .032"
	<b>Bottom</b>	2024-T3 / .032"	6061-T6 / .040"	6061-T6 / .040"
	<b>Afterbody</b>	2024-T3 / .025"	6061-T6 / .025"	2024-T3 / .032"
Bulkheads	<b>Nose</b>	6061-T6 / .063"	6061-T6 / .080"	6061-T6 / .100"
	<b>Forward (except nose)</b>	6061-T6 / .032"	6061-T6 / .032"	2024-T3 / .032"
	<b>Aft Wheel Well</b>	6061-T6 / .032"	6061-T6 / .032"	2024-T3 / .050"
	<b>Aft (except aft wheel well)</b>	6061-T6 / .032"	6061-T6 / .032"	2024-T3 / .040"

**Note:** See appropriate parts manual at [www.wipaire.com](http://www.wipaire.com) to identify damaged part(s)

		FLOAT		
		4000	6000/6100	8000
Skins	<b>Top</b>	6061-T6 / .032"	6061-T6 / .032"	6061-T6 / .032"
	<b>Side</b>	2024-T3 / .025"	6061-T6 / .032"	6061-T6 / .032"
	<b>Bottom</b>	6061-T6 / .040"	6061-T6 / .040"	6061-T6 / .040"
	<b>Afterbody</b>	2024-T3 / .025"	6061-T6 / .032"	6061-T6 / .032"
Bulkheads	<b>Nose</b>	6061-T6 / .100"	6061-T6 / .100"	6061-T6 / .100"
	<b>Forward (except nose)</b>	6061-T6 / .032"	6061-T6 / .032"	6061-T6 / .032"
	<b>Aft Wheel Well</b>	6061-T6 / .050"	6061-T6 / .050"	6061-T6 / .050"
	<b>Aft (except aft wheel well)</b>	6061-T6 / .032"	6061-T6 / .040"	6061-T6 / .040"

**Note:** See appropriate parts manual at [www.wipaire.com](http://www.wipaire.com) to identify damaged part(s)

**TABLE 4-1: SHEET METAL ALUMINUM MATERIAL/THICKNESS**

(Continues on the next page)

		7000
<b>Top Skins</b>	All	6061-T6 / .050"
<b>Side Skins</b>	All	6061-T6 / .032"
<b>Bottom Skins</b>	<b>Bulkhead 1-10 (main keel to sister keel)</b>	<del>6061-T6 / .063"</del>
	<b>Bulkhead 1-10 (sister keel to chine)</b>	<del>6061-T6 / .050"</del>
	<b>Bulkhead 10 -16</b>	6061-T6 / .032"
<b>Bulkheads</b>	<b>Bulkhead 1</b>	6061-T6 / .100"
	<b>Bulkheads 2-3</b>	6061-T6 / .040"
	<b>Bulkheads 4-10</b>	6061-T6 / .025"
	<b>Bulkhead 11 (aft wheel well)</b>	<del>6061-T6 / .040"</del>
	<b>Bulkheads 12-16</b>	6061-T6 / .032"

**Note:** See appropriate parts manual at [www.wipaire.com](http://www.wipaire.com) to identify damaged part(s)

		8750
<b>Top Skins</b>	All	6061-T6 / .050"
<b>Side Skins</b>	<b>Forwardmost (inboard and outboard)</b>	<del>6061-T6 / .032"</del>
	<b>Wheel Well (outboard only)</b>	<del>2024-T3 / .050"</del>
	<b>All Remaining</b>	2024-T3 / .032"
<b>Bottom Skins</b>	<b>Bulkhead 1-10 (main keel to sister keel)</b>	<del>6061-T6 / .063"</del>
	<b>Bulkhead 1-10 (sister keel to chine)</b>	<del>6061-T6 / .050"</del>
	<b>Bulkhead 10 -19</b>	6061-T6 / .032"
<b>Bulkheads</b>	<b>Bulkhead 1</b>	6061-T6 / .100"
	<b>Bulkheads 2-3</b>	6061-T6 / .040"
	<b>Bulkheads 4-10</b>	6061-T6 / .025"
	<b>Bulkhead 11 (aft wheel well)</b>	<del>6061-T6 / .040"</del>
	<b>Bulkheads 12-19</b>	6061-T6 / .032"

**Note:** See appropriate parts manual at [www.wipaire.com](http://www.wipaire.com) to identify damaged part(s)

**TABLE 4-1: SHEET METAL ALUMINUM MATERIAL/THICKNESS**

(Continues on the next page)

		10000/13000
<b>Top Skins</b>	<b>Forward and Aft</b>	6061-T6 / .040"
	<b>Center</b>	6061-T6 / .063"
<b>Side Skins</b>	<b>Forward and Aft</b>	6061-T6 / .040"
	<b>Center</b>	6061-T6 / .063"
<b>Bottom Skins</b>	<b>Bow to Wheel Well (main keel to sister keel)</b>	6061-T6 / .063"
	<b>Afterbody</b>	6061-T6 / .032"
	<b>All Remaining</b>	6061-T6 / .050"
<b>Bulkheads</b>	<b>Nose</b>	6061-T6 / .100"
	<b>Aft Wheel Well</b>	6061-T6 / .063"
	<b>All Remaining</b>	6061-T6 / .040"

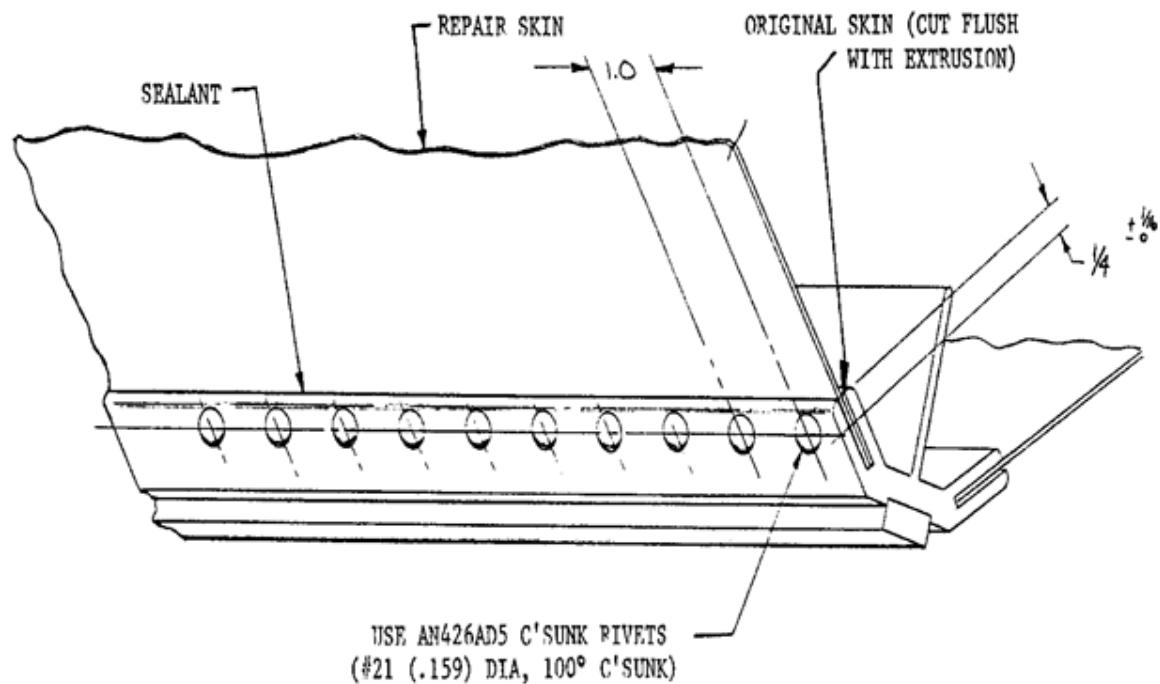
**Note:** See appropriate parts manual at [www.wipaire.com](http://www.wipaire.com) to identify damaged part(s)

**TABLE 4-1: SHEET METAL ALUMINUM MATERIAL/THICKNESS**

## 4.4 WIPLINE MODELS 3730/3900/4000/6000/6100/8000 SKIN TO KEEL REPAIR

All outside hull skins are bonded to the extrusions with a special heat pressure 3M adhesive. This bond adheres skins to the inside of all extrusions.

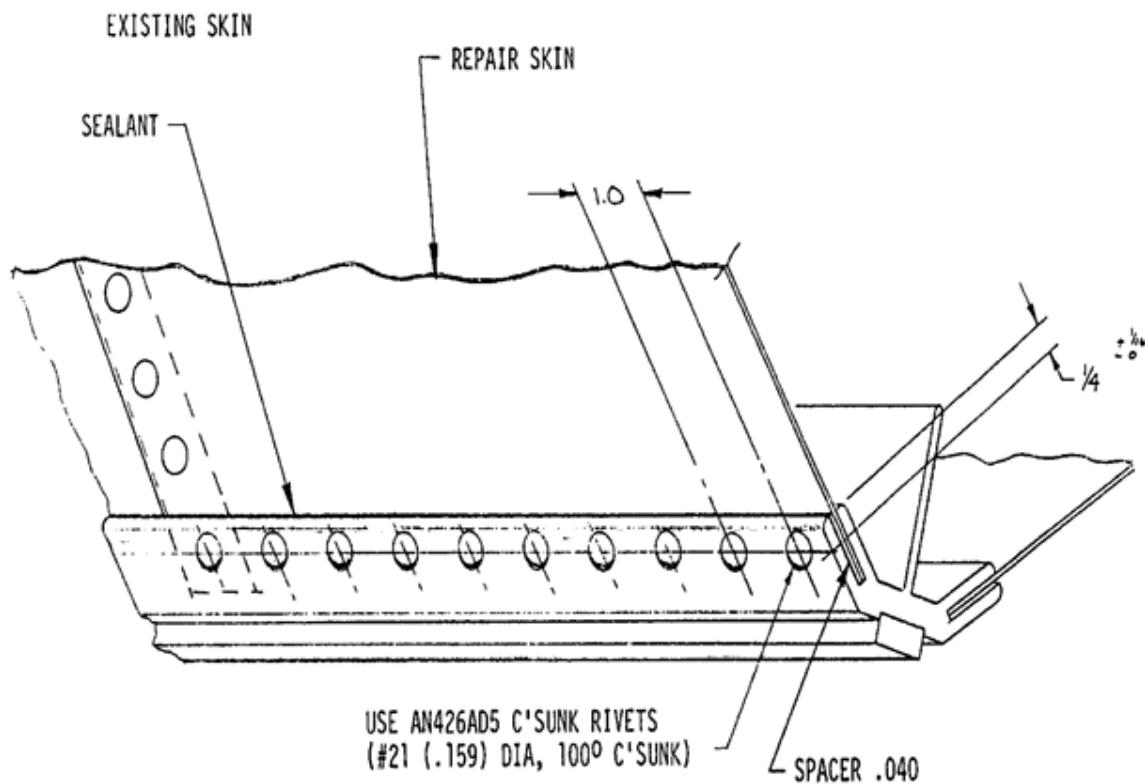
Skins may be reattached to extrusions by methods shown in Figures 4-4A, 4-4B, 4-4C. If the skin bond must be broken from an extrusion for a long distance the caulking material must first be removed from the exterior crack. Then heat the extrusion with a propane torch until the bond starts to loosen. Caution must be taken not to heat and loosen bonds not needing replacement.



**FIGURE 4.4-1A: MODEL 3730/3900/4000/6000/6100/8000 TYPICAL REPAIR BOTTOM SKIN TO KEEL INSTRUCTIONS**

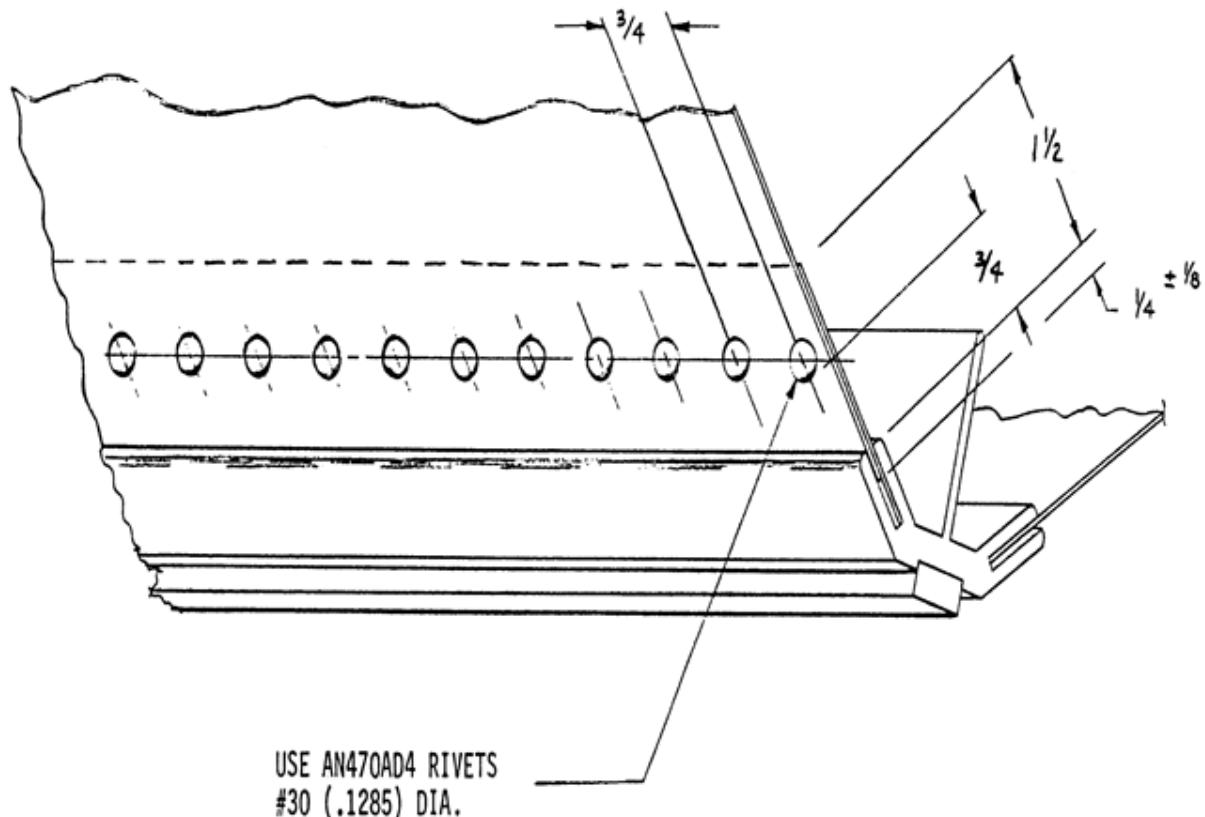
**(PREFERRED METHOD)**

1. REMOVE ORIGINAL DAMAGED SKIN CUT FLUSH WITH EXTRUSION.
2. REMOVE CAULKING FROM GROOVE OF EXTRUSION.
3. APPLY SEALANT IN GROOVE. (BE SURE TO USE PLENTY OF SEALANT!)
4. INSERT REPAIR SKIN INTO EXTRUSION.
5. DRILL AND COUNTERSINK HOLES AND RIVET INTO PLACE.



**FIGURE 4.4-1B: MODEL 3730/3900/4000/6000/6100/8000 TYPICAL REPAIR BOTTOM SKIN TO KEEL INSTRUCTIONS**

1. REMOVE ORIGINAL DAMAGED SKIN FROM EXTRUSION.
2. REMOVE CAULKING FROM GROOVE OF EXTRUSION.
3. APPLY SEALANT IN GROOVE. (BE SURE TO USE PLENTY OF SEALANT!)
4. INSERT REPAIR SKIN INTO EXTRUSION.
5. INSTALL SPACER BETWEEN REPAIR SKIN AND EXTRUSION.
6. DRILL AND COUNTERSINK HOLES AND RIVET INTO PLACE.



**FIGURE 4.4-1C: MODEL 3730/3900/4000/6000/6100/8000 TYPICAL REPAIR BOTTOM SKIN TO KEEL (ALT) INSTRUCTIONS (ALTERNATE METHOD)**

1. REMOVE ORIGINAL DAMAGED SKIN LEAVING APPROXIMATELY 1 1/2" OF SKIN PROTRUDING FROM EXTRUSION.
2. REMOVE CAULKING FROM GROOVE IN EXTRUSION.
3. INSTALL SEALANT IN GROOVE. (BE SURE TO USE PLENTY OF SEALANT!)
4. INSERT REPAIR SKIN IN GROOVE APPROXIMATELY 1/4".
5. LAYOUT HOLE PATTERN, DRILL, DE-CHIP, SEAL AND RIVET.

## 5.0 FLOAT HULL EXTRUSIONS

Extrusions in the float hull are formed from 6061-T6 or 6061-T4 aluminum alloy. Alternative raw materials are subject to Wipaire approval. See individual repair figures in this section (Section 5.0) for materials used in each repair. Pieces of extrusions may be purchased from Wipaire in full or desired lengths. Internal splice pieces for repairs may be purchased from Wipaire or fabricated per the figures in this section.

There are many ways to repair Wipline floats and each method depends on the degree and location of the damage. The following figures are examples of some repairs. Any repair to the hull not shown in this manual to be per FAA Advisory Circular 43.13.1A.

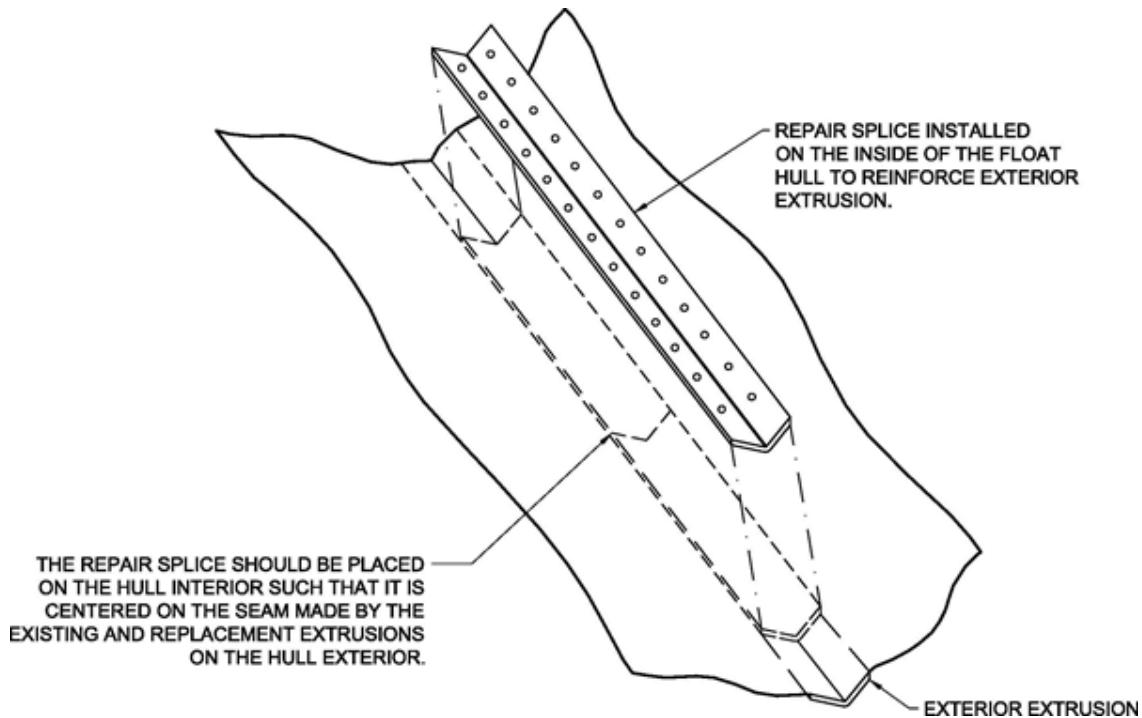
## 5.1 2100/2350 FLOAT EXTRUSION REPAIRS

### 5.1.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.1-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices, making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.1-1: SIMPLE EXTRUSION SPLICE REPAIR**

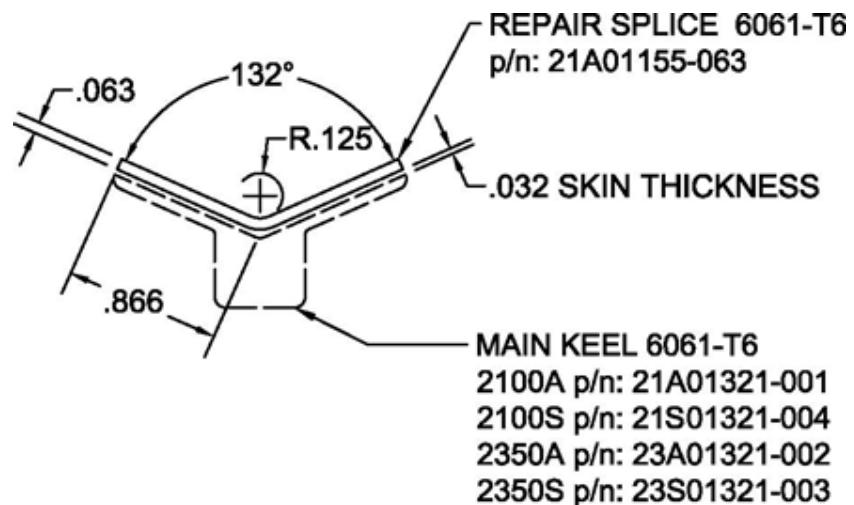


FIGURE 5.1-2: 2100/2350 MAIN KEEL REPAIR

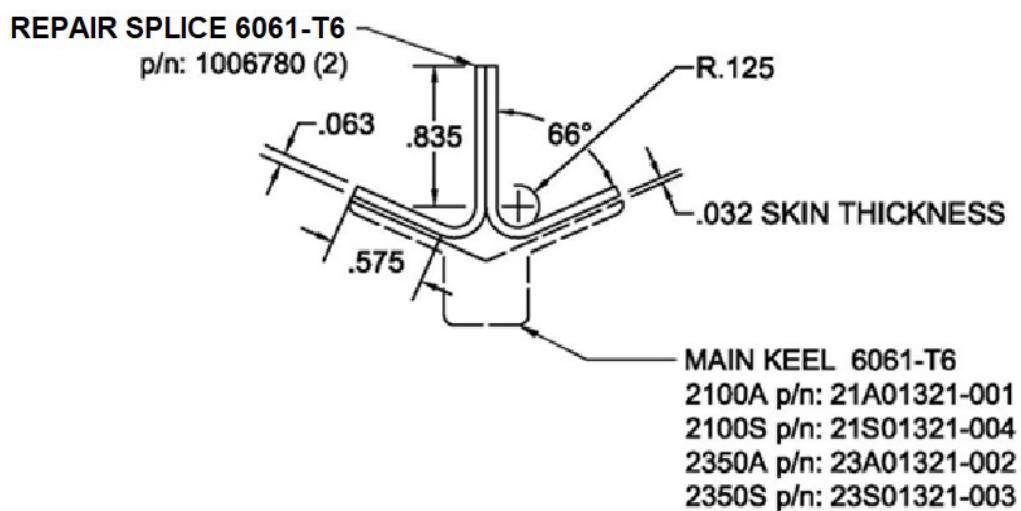


FIGURE 5.1-3: 2100/2350 ALTERNATE MAIN KEEL REPAIR

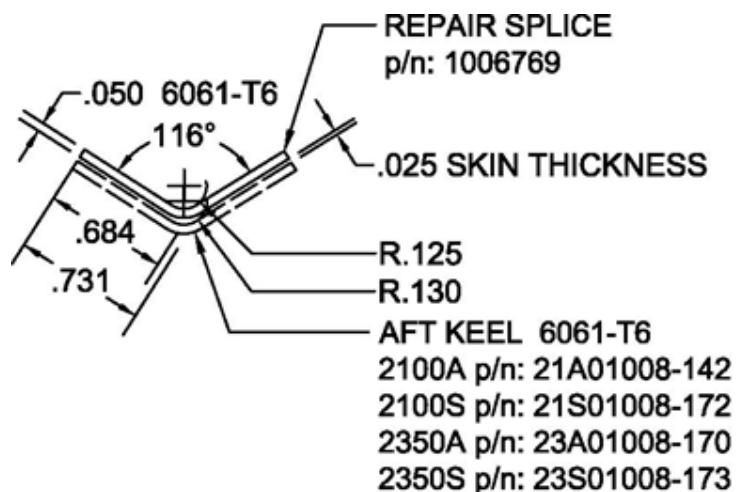


FIGURE 5.1-4: 2100/2350 AFT KEEL REPAIR

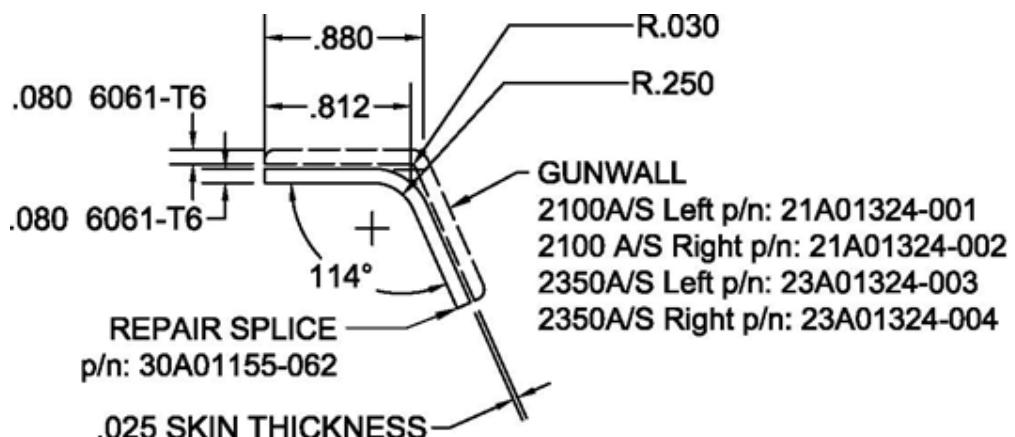


FIGURE 5.1-5: 2100/2350 GUNWALL REPAIR

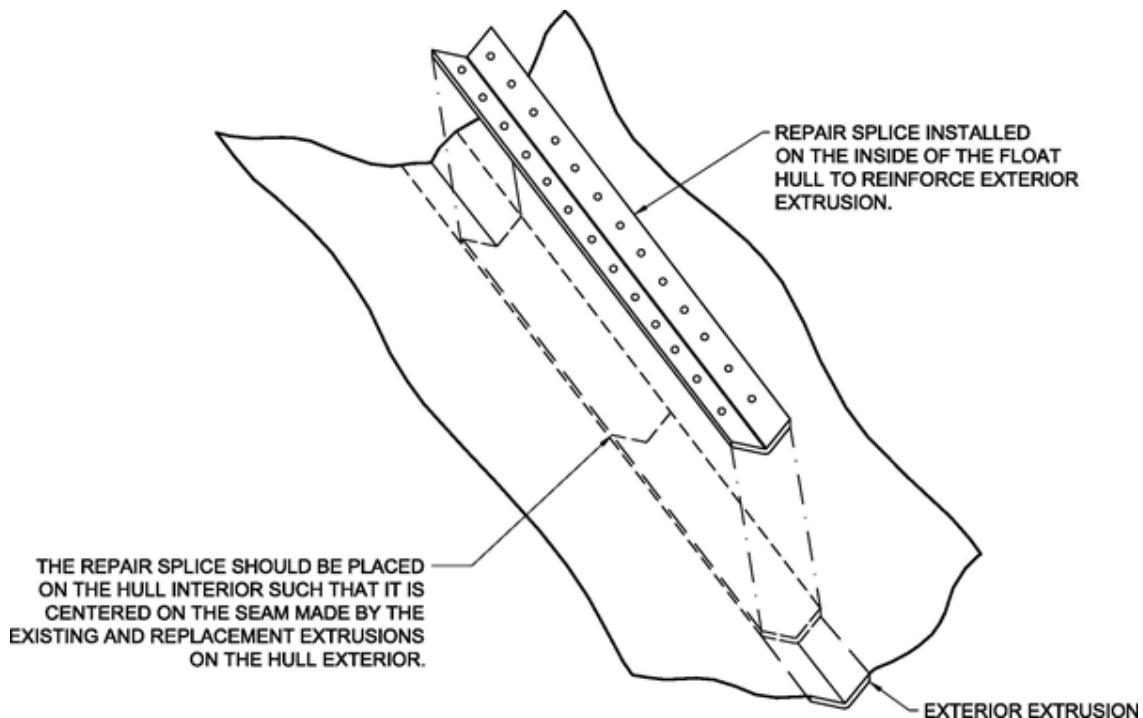
## 5.2 3000/3450 FLOAT EXTRUSION REPAIRS

### 5.2.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.2-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices, making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.2-1: SIMPLE EXTRUSION SPLICE REPAIR**

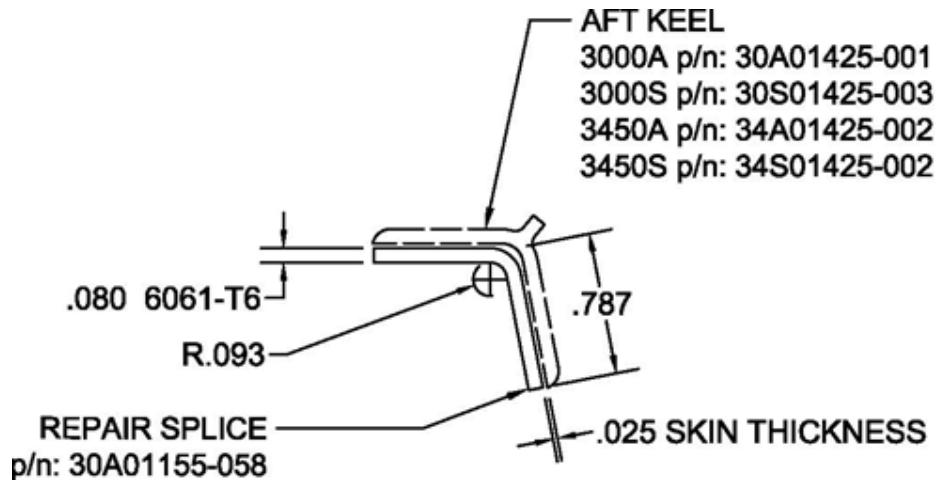


FIGURE 5.2-2: 3000/3450 AFT KEEL REPAIR

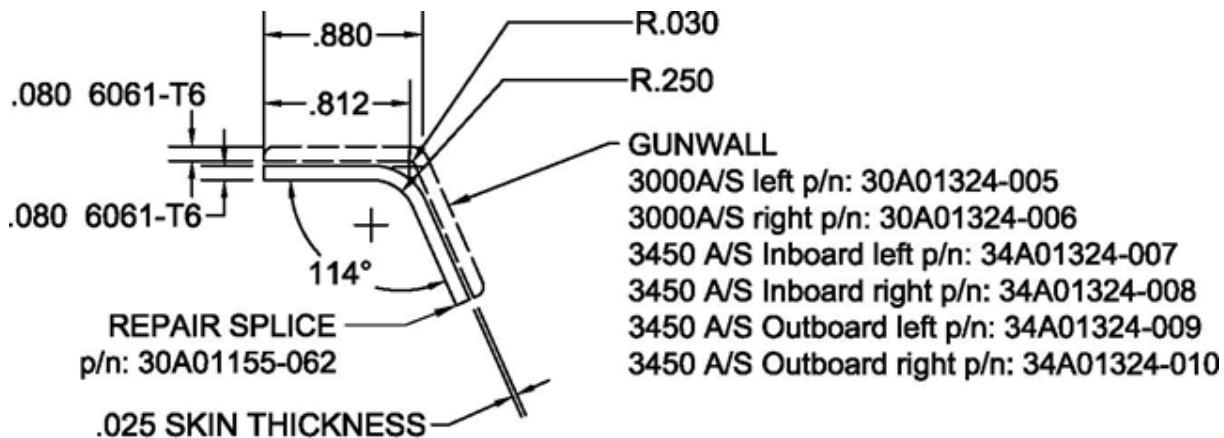


FIGURE 5.2-3: 3000/3450 GUNWALL REPAIR

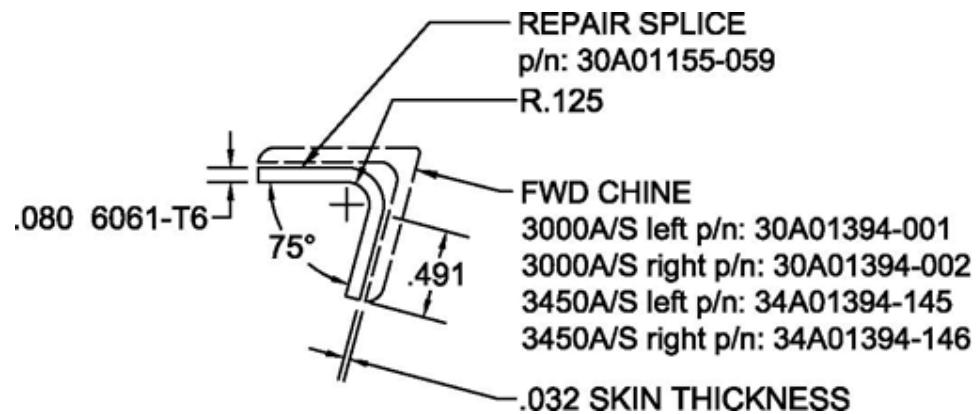


FIGURE 5.2-4: 3000/3450 FWD CHINE REPAIR

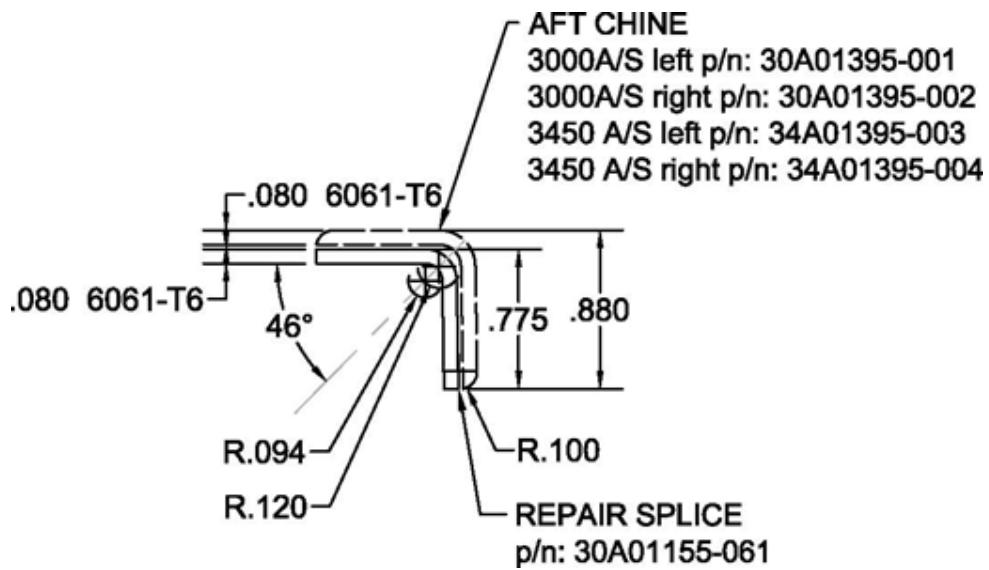


FIGURE 5.2-5: 3000/3450 AFT CHINE REPAIR

## 5.2.2 MAIN KEEL EXTRUSION SPLICE REPAIR

On several float models, the main keel will have a flat bottom with an attached wear strip that must be replaced when repairs are made. Figure 5.2-6 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, and the internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

### Repair Process:

1. Remove entire wear strip. Purchase new Wear Strip from Wipaire (3A01200-001).
2. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
3. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
4. Cut out damaged section being careful NOT to cut into the skins.
5. Obtain new extrusion from Wipaire Parts Department (30A01377-001 or 34A01377-002), and cut out the repair section from the new extrusion in the exact area of the damage.
6. File to remove rough edges.
7. See Section 3.0 of this manual for appropriate fastener options.
8. Add internal splices making sure the repair seam is located in the middle of the splice.
9. Install the new wear strip.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approximate locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia. hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.

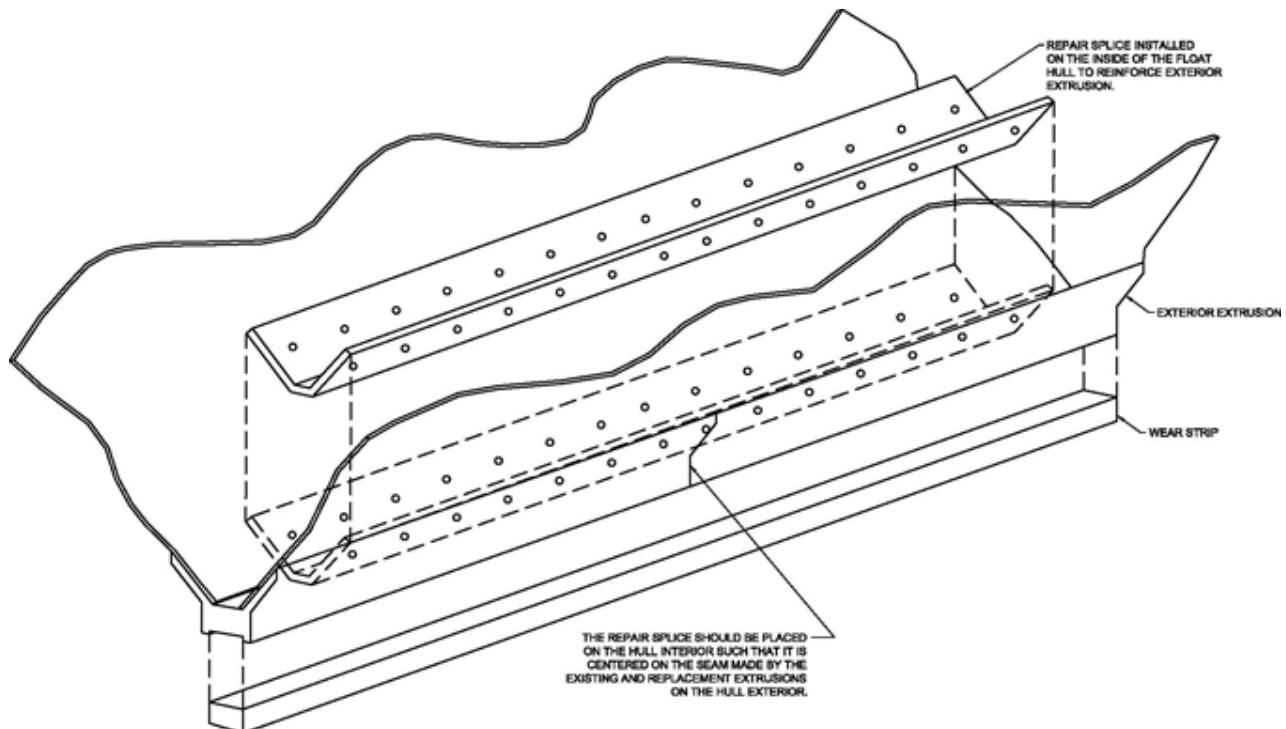


FIGURE 5.2-6: MAIN KEEL SIMPLE EXTRUSION SPLICE REPAIR

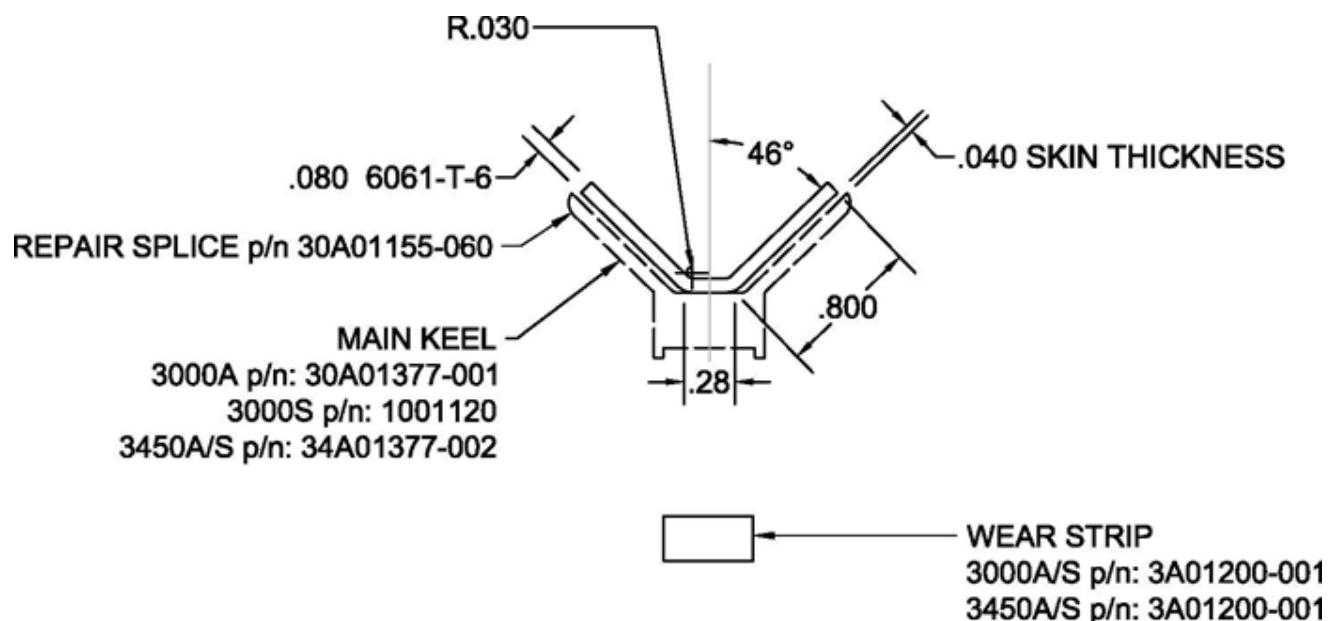


FIGURE 5.2-7: 3000/3450 MAIN KEEL REPAIR

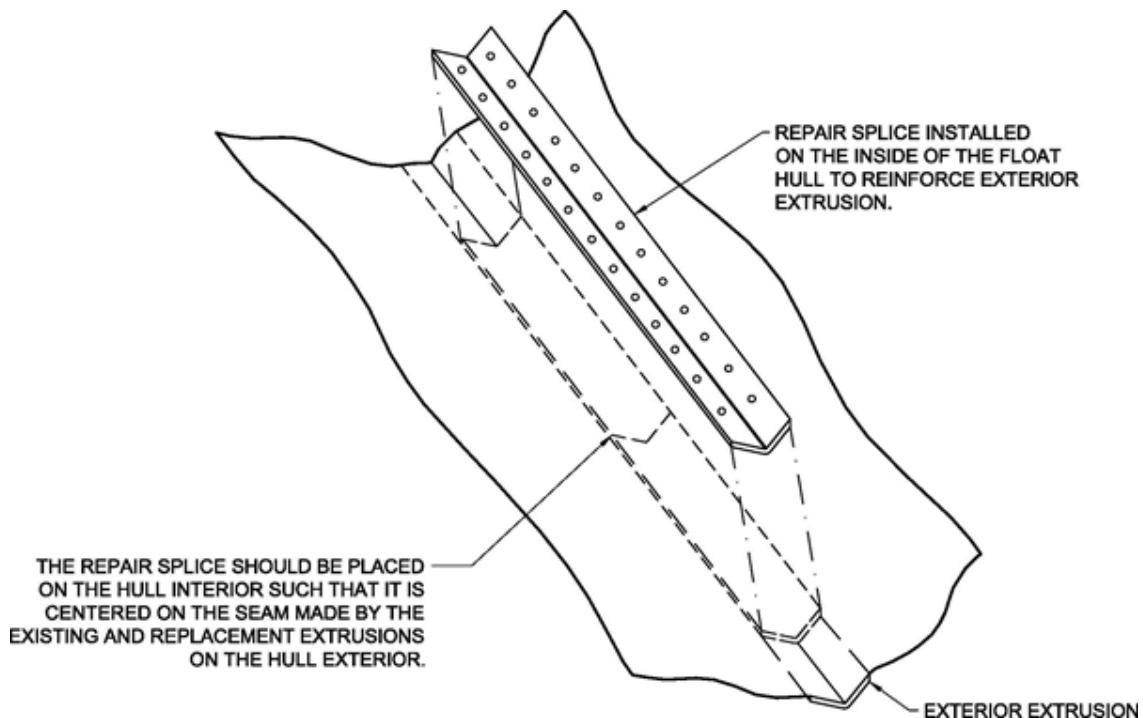
## 5.3 3730/3900 FLOAT EXTRUSION REPAIRS

### 5.3.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.3-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices, making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.3-1: SIMPLE EXTRUSION SPLICE REPAIR**

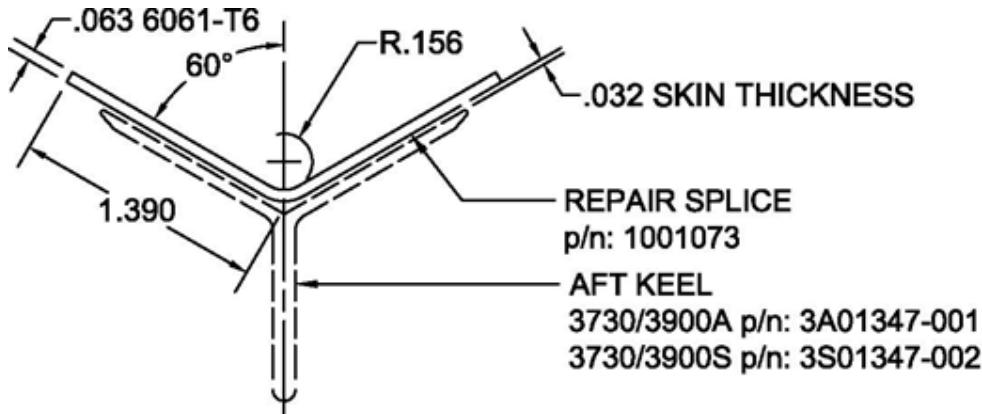


FIGURE 5.3-2: 3730/3900 AFT KEEL REPAIR

### 5.3.2 COMPLEX EXTRUSION SPLICE REPAIR

The 3730/3900, 4000, 6000, and 8000 float models utilize complex extrusions with channels on each flange into which the skins are inserted. Figure 5.3-3 depicts the general method of this splice repair. The replacement extrusions and wear strips can be purchased from the Wipaire Parts Department. Consult Table 5.3-1 below to locate applicable part numbers for your repair.

#### Repair Process:

1. Remove the damaged area. On the remaining extrusion, cut out 3" of the outer layer of the extrusion as shown in Figure 5.3-3 so it can receive the repair piece.
2. Purchase the repair part from Wipaire. The repair part will be pre-cut and machined from the factory so only the outside layer of the extrusion remains for 3" at the end and the repair piece will notch together with the existing keel.
3. Fasten the 2 pieces together in the overlapping area using AN426AD5 c'sunk rivets spaced per Figure 5.3-3.
4. If repairing the Main Keel, finish repair by installing a new Wear Strip which can be purchased from Wipaire.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approx. locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.

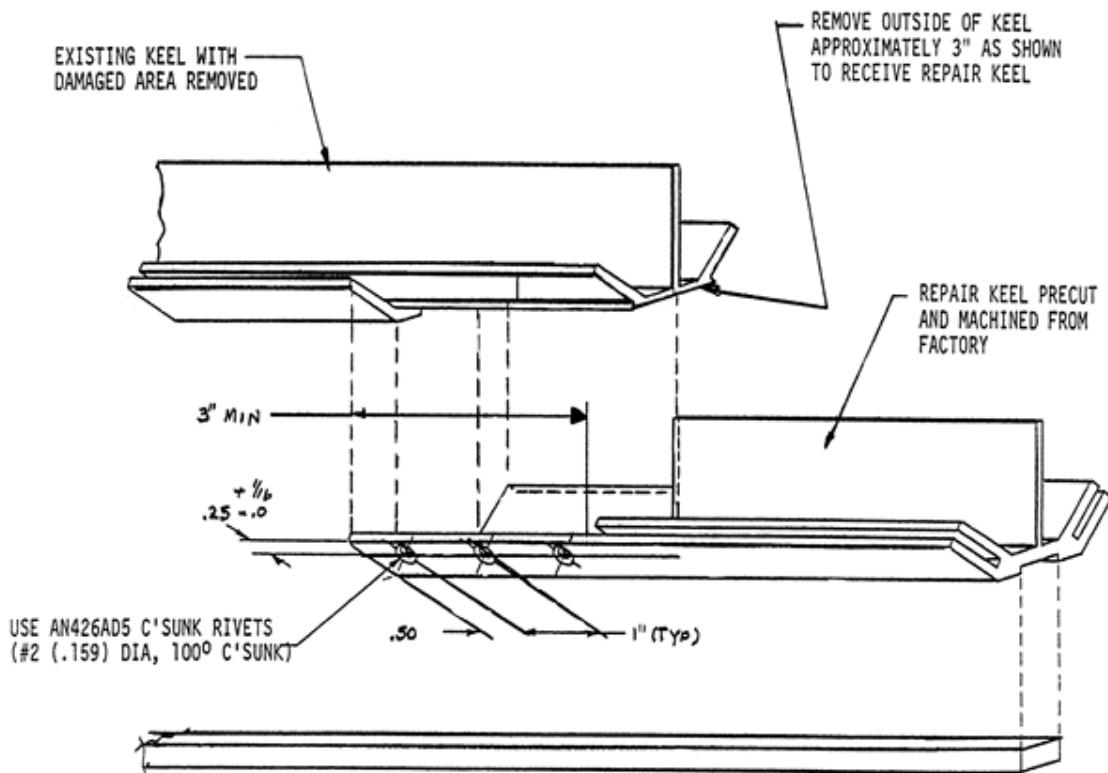


FIGURE 5.3-3: COMPLEX EXTRUSION SPLICE REPAIR

<b>Main Keel</b>	3A01354-001 (A) 34A01354-002 (S)
<b>Wear Strip</b>	3A01200-001
<b>Sister Keel (outer)</b>	3A01342-001 (Left) 3A01342-002 (Right)
<b>Fwd Chine</b>	3A01351-001 (Left) 3A01351-002 (Right)
<b>Aft Chine</b>	3A01363-001 (Left) 3A01363-002 (Right)
<b>Gunwall</b>	3A01366-001 (Left) 3A01366-002 (Right)

TABLE 5.3-1 3730/3900 COMPLEX EXTRUSION REPLACEMENT PARTS

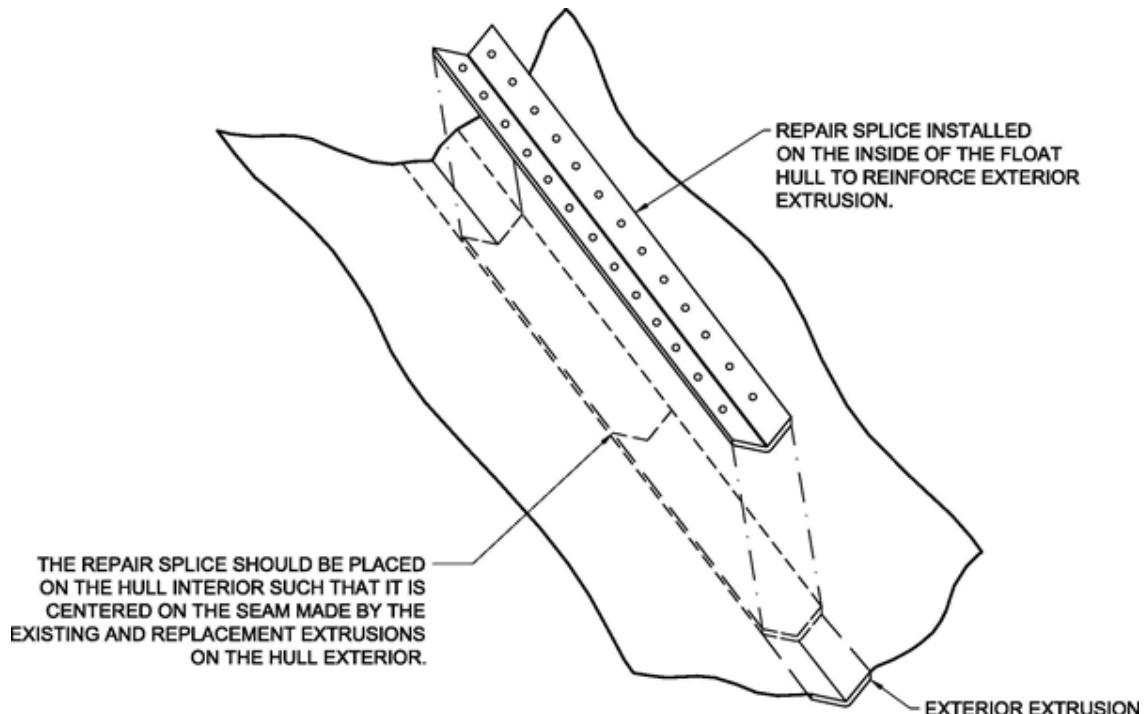
## 5.4 4000 FLOAT EXTRUSION REPAIRS

### 5.4.1 Simple Extrusion Splice Repair

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.4-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices, making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.4-1: SIMPLE EXTRUSION SPLICE REPAIR**

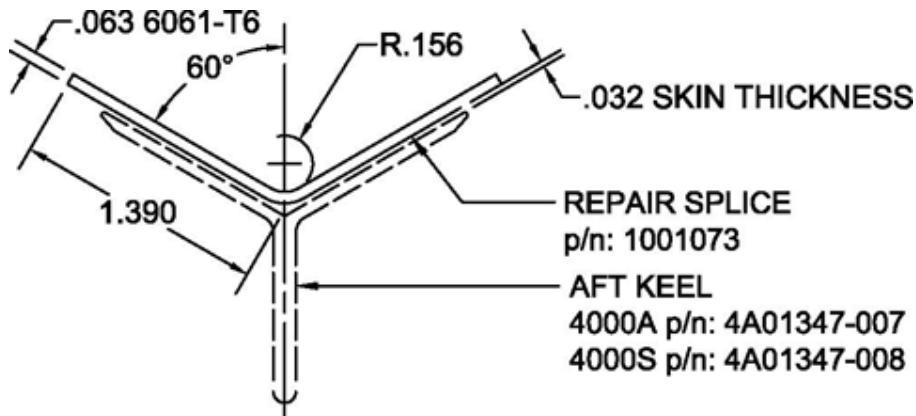


FIGURE 5.4-2: 4000 AFT KEEL REPAIR

#### 5.4.2 COMPLEX EXTRUSION SPLICE REPAIR

The 3730/3900, 4000, 6000, and 8000 float models utilize complex extrusions with channels on each flange into which the skins are inserted. Figure 5.4-3 depicts the general method of this splice repair. The replacement extrusions and wear strips can be purchased from the Wipaire Parts Department. Consult Table 5.4-1 below to locate applicable part numbers for your repair.

##### Repair Process:

1. Remove the damaged area. On the remaining extrusion, cut out 3" of the outer layer of the extrusion as shown in Figure 5.4-3 so it can receive the repair piece.
2. Purchase the repair part from Wipaire. The repair part will be pre-cut and machined from the factory so only the outside layer of the extrusion remains for 3" at the end and the repair piece will notch together with the existing keel.
3. Fasten the 2 pieces together in the overlapping area using AN426AD5 c'sunk rivets spaced per Figure 5.4-3.
4. If repairing the Main Keel, finish repair by installing a new Wear Strip which can be purchased from Wipaire.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approx. locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.

STRUCTURAL REPAIR MANUAL FOR WIPLINE ALUMINUM FLOATS

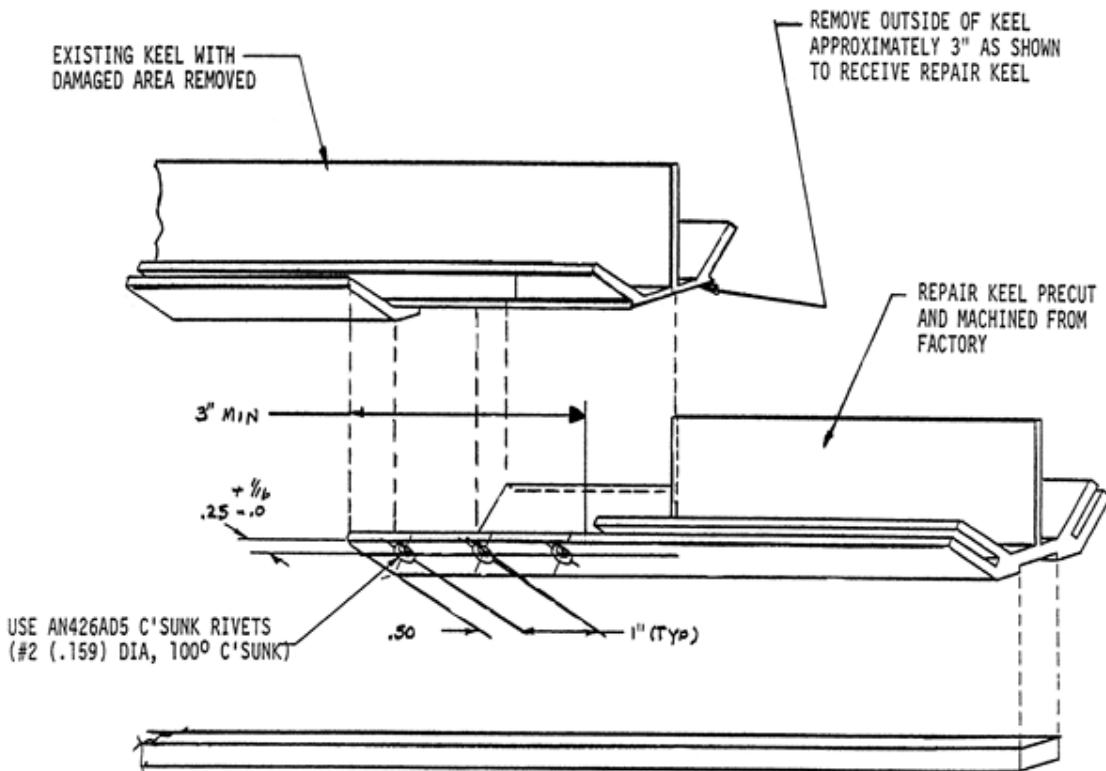


FIGURE 5.4-3: COMPLEX EXTRUSION SPLICE REPAIR

<b>Main Keel</b>	4A01354-007 (A) 4S01354-008 (S)
<b>Wear Strip</b>	3A01200-001 (A) 6S01200-002 (S)
<b>Sister Keel (outer)</b>	4A01342-008 (Left) 4A01342-007 (Right)
<b>Fwd Chine</b>	4A01331-001 (Left) 4A01331-002 (Right)
<b>Aft Chine</b>	4A01332-001 (Left) 4A01332-002 (Right)
<b>Gunwall</b>	4A01330-001 (Left) 4A01330-002 (Right)

TABLE 5.4-1: 4000 COMPLEX EXTRUSION REPLACEMENT PARTS

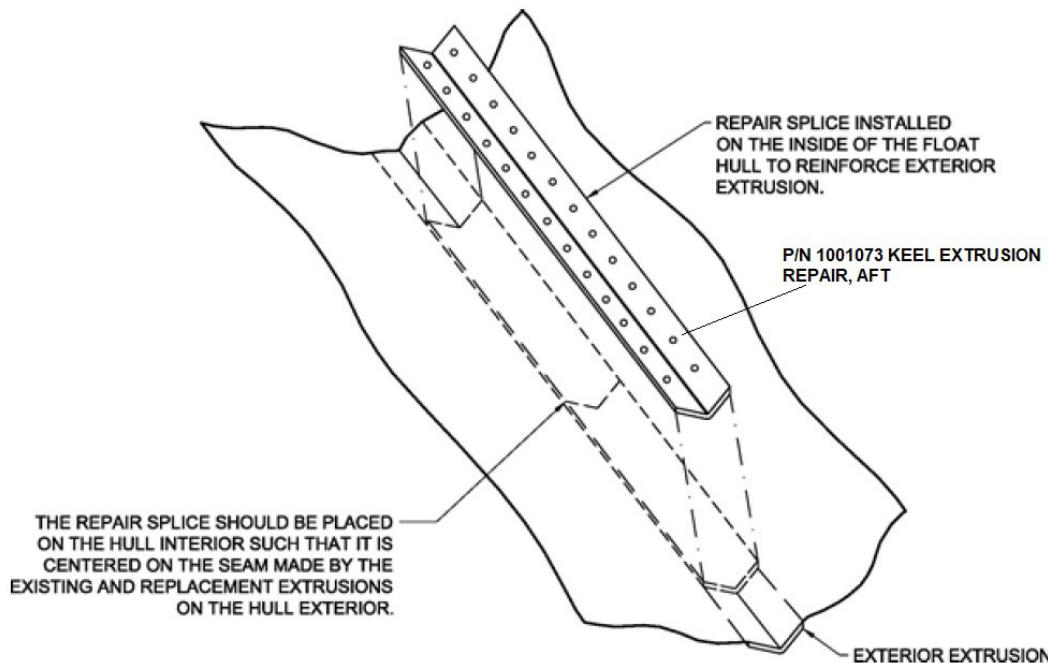
## 5.5 6000/6100 FLOAT EXTRUSION REPAIRS

### 5.5.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.5-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices (1001073), making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.5-1: SIMPLE EXTRUSION SPLICE REPAIR**

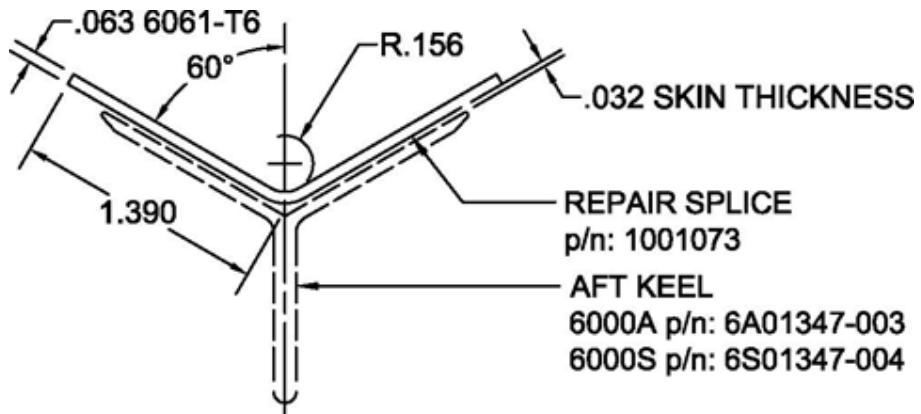


FIGURE 5.5-2: 6000 AFT KEEL REPAIR

### 5.5.2 COMPLEX EXTRUSION SPLICE REPAIR

The 3730/3900, 4000, 6000, and 8000 float models utilize complex extrusions with channels on each flange into which the skins are inserted. Figure 5.5-3 depicts the general method of this splice repair. The replacement extrusions and wear strips can be purchased from the Wipaire Parts Department. Consult Table 5.5-1 below to locate applicable part numbers for your repair.

**Note:** The "riveted" 6100 float utilizes a different style of keel. See Section 5.5.3 for details.

#### Repair Process:

1. Remove the damaged area. On the remaining extrusion, cut out 3" of the outer layer of the extrusion as shown in Figure 5.5-3 so it can receive the repair piece.
2. Purchase the repair part from Wipaire. The repair part will be pre-cut and machined from the factory so only the outside layer of the extrusion remains for 3" at the end and the repair piece will notch together with the existing keel.
3. Fasten the 2 pieces together in the overlapping area using AN426AD5 c'sunk rivets spaced per Figure 5.5-3.
4. If repairing the Main Keel, finish repair by installing a new Wear Strip which can be purchased from Wipaire.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approx. locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.

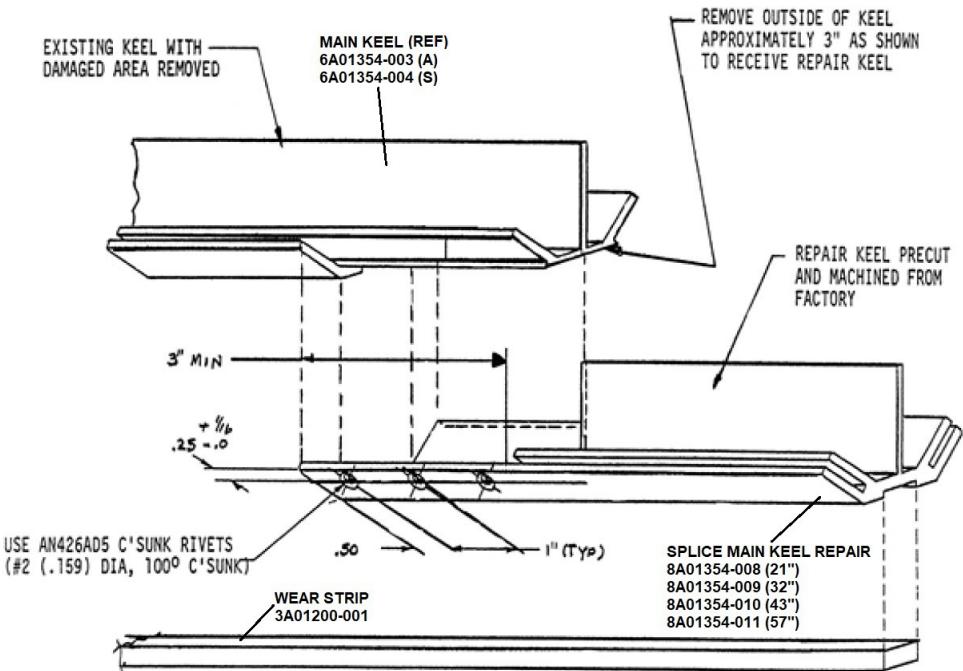
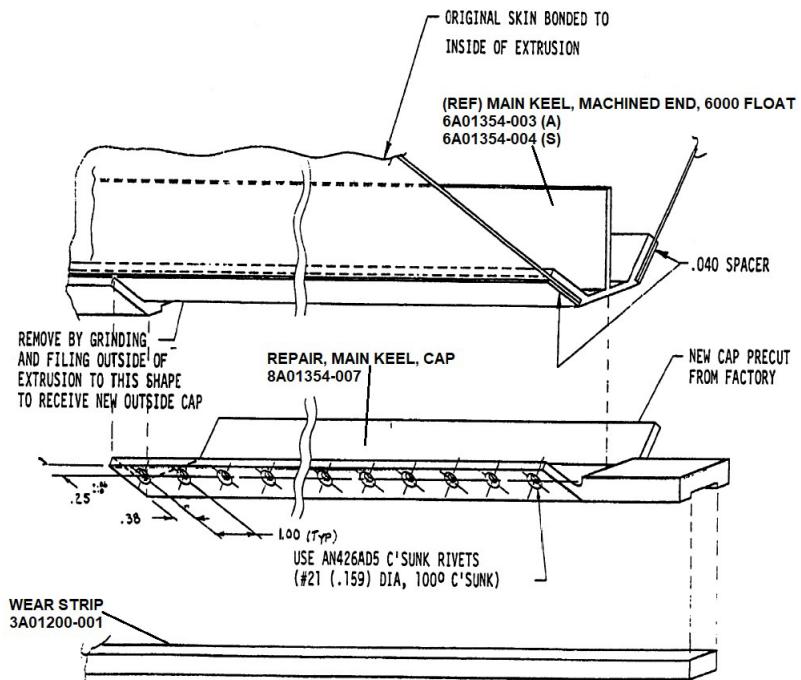


FIGURE 5.5-3: COMPLEX EXTRUSION SPLICE REPAIR



1. Lay out new repair cap on damaged extrusion.
2. Remove outside of damaged extrusion by filing or grinding to inside shape of repair cap.
3. Match drill or lay out and drill hole pattern as shown.
4. Rivet outside cap and spacer to existing inside extrusion.
5. Apply keel wear strip with any good 2-part epoxy.

FIGURE 5.5-4: TYPICAL CAP SPLICE TO KEEL

### 5.5.3 RIVETED MAIN KEEL SPLICE REPAIR (6100 RIVETED FLOAT)

The Wipline 6000/6100 series moved to an all-riveted design at SN 61500. Figure 5.5-5 depicts the parts and general requirements for a splice of the main keel. Physical accessibility will limit the practical locations for this repair, with the baggage area being the most viable. Splice and spacer pieces may be locally fabricated from 0.080" 2024 aluminum, with the formed splice pieces must be heat treated to -T3 after forming. However, given the limited space and need for precise bends, ordering parts from Wipaire is recommended. Refer to Parts Manual for float components.

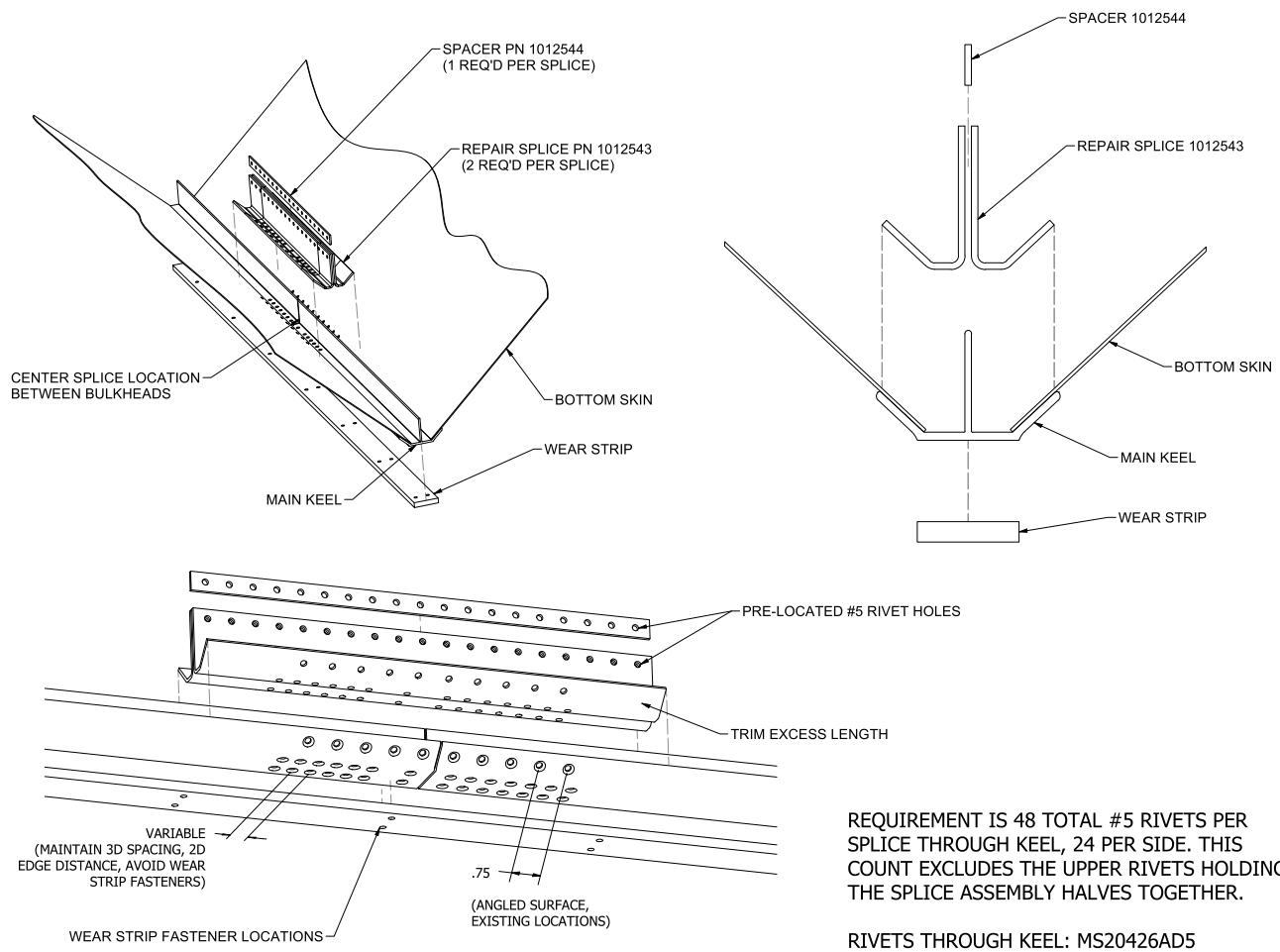
**Repair Process:**

1. Determine splice location with the following considerations. Refer also to figure 5.5-5:
  - a. Centered approximately between two bulkheads
  - b. Avoid wear strip fastener locations. Slightly shifting the full splice assembly to avoid these locations is an option, as is shifting specific rivet locations through the bottom-most surface of the splice/keel, so long as edge distance and spacing minimums are maintained. Details in step 4.
  - c. Splice point shall bisect the 0.750" rivet pattern joining the keel extrusion to the bottom skin (splice to be ~0.375" from each rivet joining the bottom skin to the keel, to either side fwd/aft).
2. Test fit repair splice 1012543 (2 per splice) and spacer 1012544. These parts must fit tightly against the bottom skin and the main keel for a strong repair. A preliminary determination of the rivet patterns described in step 4 may be required at this time in order to trim pieces to the approximate final length to allow fit-up. Use additional aluminum spacers to bridge bulkhead flange bulkheads, stiffeners, etc. as needed.
3. Remove the main keel wear strip (a new wear strip will be fit during the repair, assuming damage).
4. Trim the repair splice to a final length so it satisfies the following criteria:
  - a. Splice picks up at least 10 rivets on each side of the splice location that join the bottom skins to the main keel (angled surface of keel, 0.750" pitch).
  - b. There are at least 14 rivets on each side of the splice location that pass through the bottom of the main keel and the repair splice 1012543. This spacing can vary so long as 3D spacing and 2D edge distance is maintained while avoiding existing wear strip fastener locations.

**Note:** 24 rivets per side of splice (48 total) is the requirement, with the quantities above being the most likely layout (10 through angled surface and 14 through bottom).

5. Assuming the wear strip has been damaged, temporarily Cleco a new main keel wear strip onto the main keel extrusion using existing hole patterns and transfer any holes not present from the wear strip into the new keel section being spliced. Remove the wear strip after transferring holes.
6. Fit the Repair Splice tightly against both the bottom skin and the Main Keel, then match drill both the 0.75" hole pattern from the Main Keel and the hole pattern from the Main Keel where the Wear Strip attaches.
7. Finalize the rivet pattern that passes through the bottom of the main keel and the repair splice. Review the details provided in step 4 and figure 5.5-5. Drill pattern into repair splice and then match drill into keel.
8. After dry fitting, remove and deburr all parts, countersink wear strip and Main Keel holes, and "wet rivet" using polysulfide sealant between all parts.

# STRUCTURAL REPAIR MANUAL FOR WIPLINE ALUMINUM FLOATS



**FIGURE 5.5-5: SPLICE REPAIR FOR RIVETED MAIN KEEL**

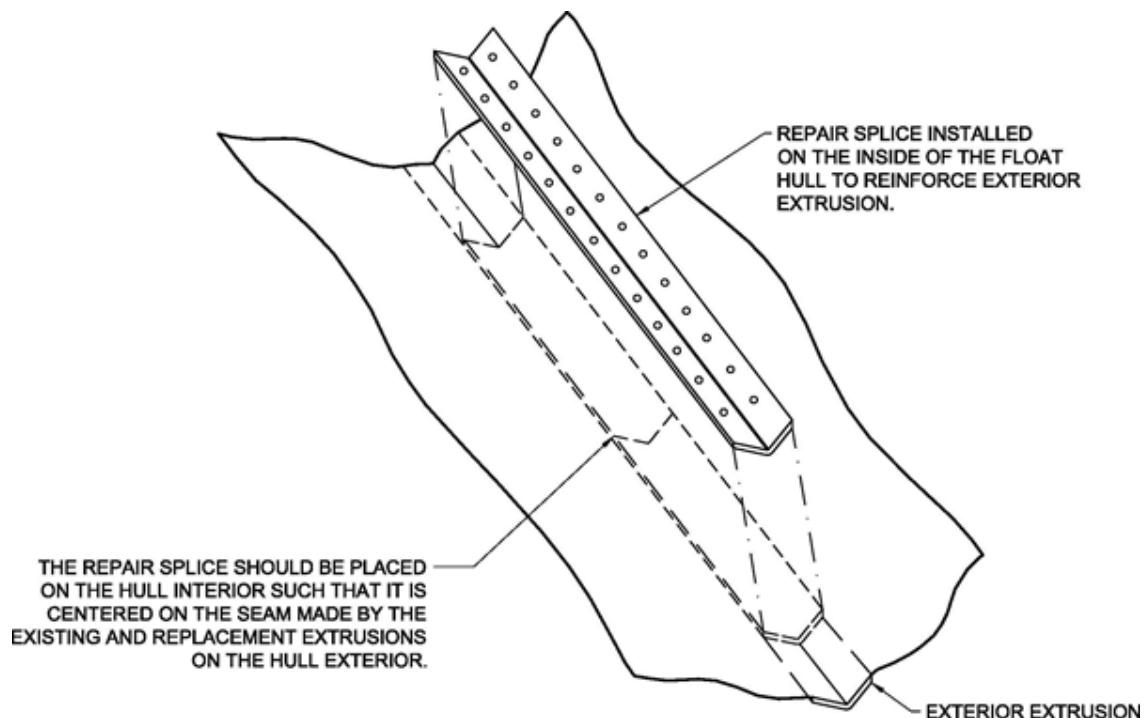
## 5.6 7000 FLOAT EXTRUSION REPAIRS

### 5.6.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.6-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices, making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.6-1: SIMPLE EXTRUSION SPLICE REPAIR**

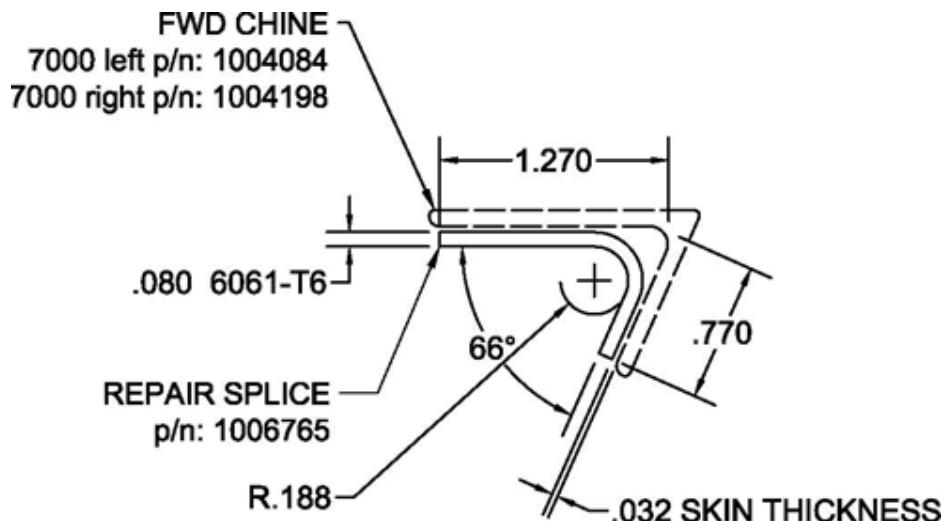


FIGURE 5.6-2: 7000 FWD CHINE REPAIR

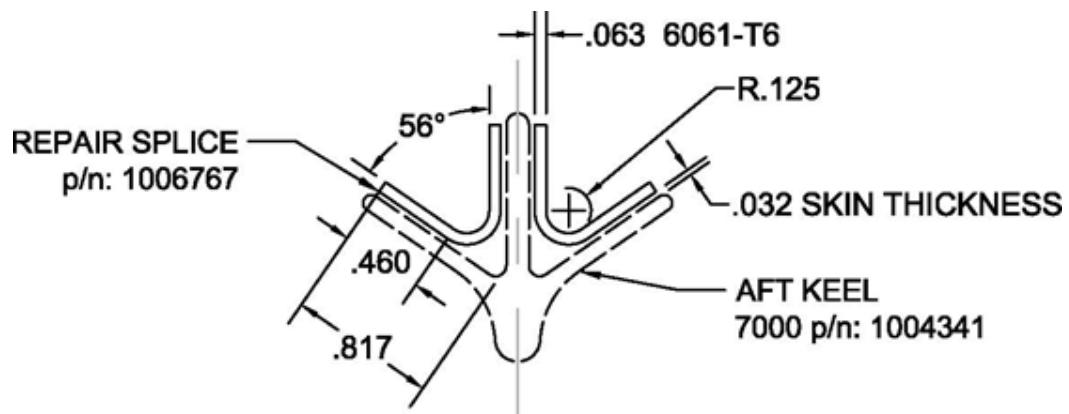


FIGURE 5.6-3: 7000 AFT KEEL REPAIR

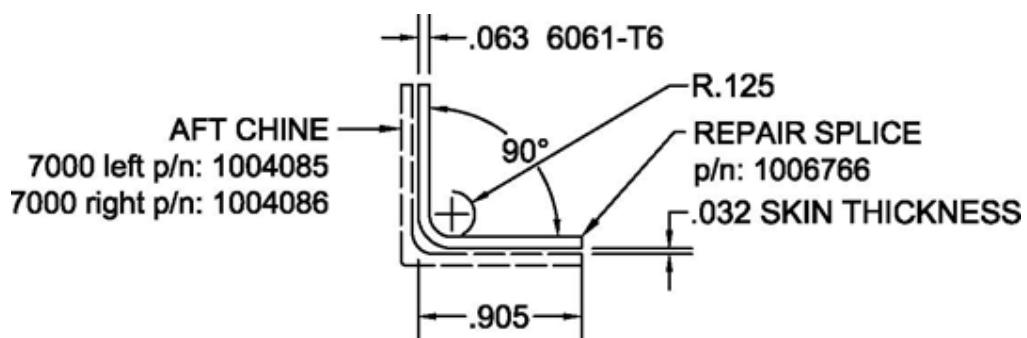


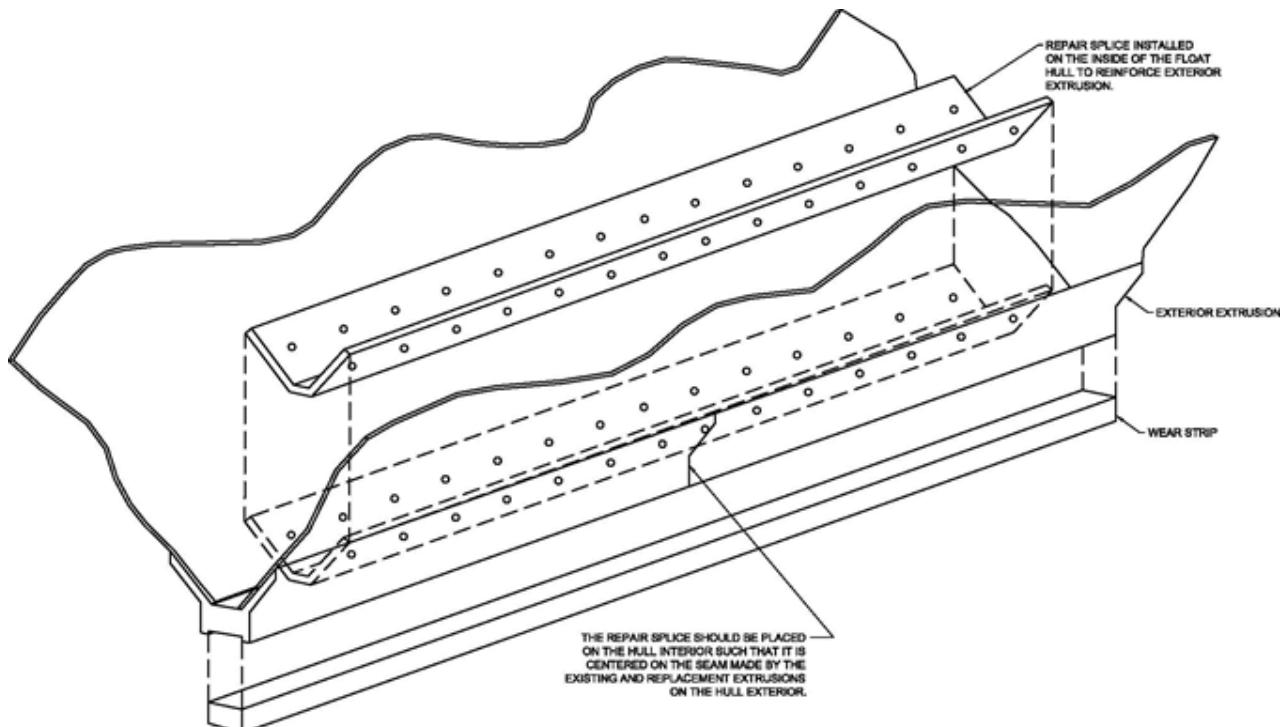
FIGURE 5.6-4: 7000 AFT CHINE REPAIR

## 5.6.2 MAIN KEEL EXTRUSION SPLICE REPAIR

On several float models, the main keel will have a flat bottom with an attached wear strip that must be replaced when repairs are made. Figure 5.6-5 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, and the internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

### Repair Process:

1. Remove entire wear strip. Purchase new Wear Strip from Wipaire (1004039).
2. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
3. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
4. Cut out damaged section being careful NOT to cut into the skins.
5. Obtain new extrusion from Wipaire Parts Department (1004031) and cut out the repair section from the new extrusion in the exact area of the damage.
6. File to remove rough edges.
7. See Section 3.0 of this manual for appropriate fastener options.
8. Add internal splices making sure the repair seam is located in the middle of the splice.
9. Install the new wear strip.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approximate locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia. hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.



**FIGURE 5.6-5: MAIN KEEL SIMPLE EXTRUSION SPLICE REPAIR**

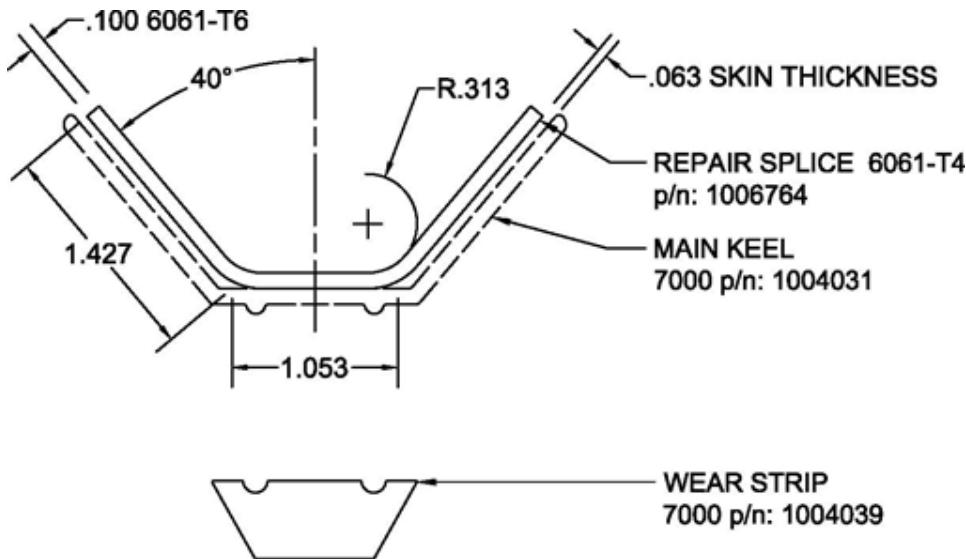


FIGURE 5.6-6: 7000 MAIN KEEL REPAIR

## 5.7 8000 FLOAT EXTRUSION REPAIRS

### 5.7.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.7-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices (1001073), making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.

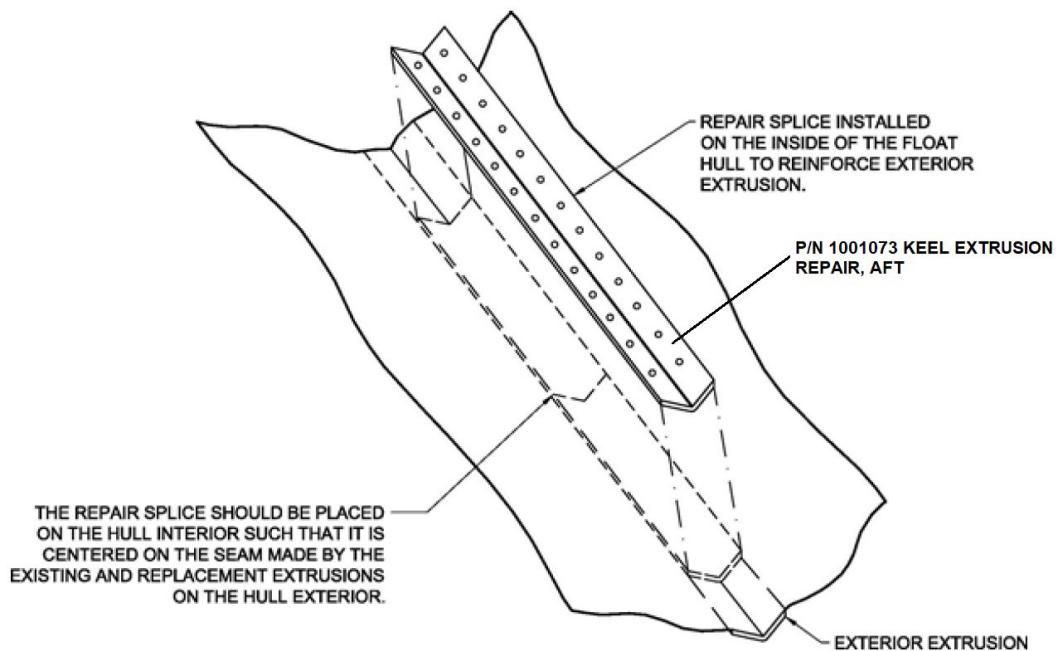


FIGURE 5.7-1: SIMPLE EXTRUSION SPLICE REPAIR

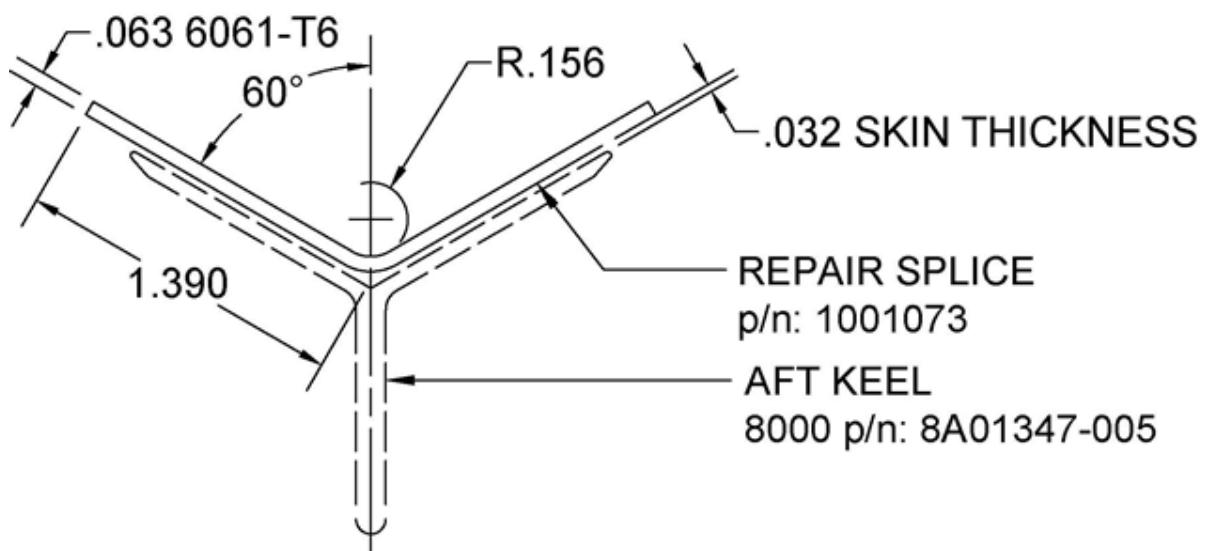


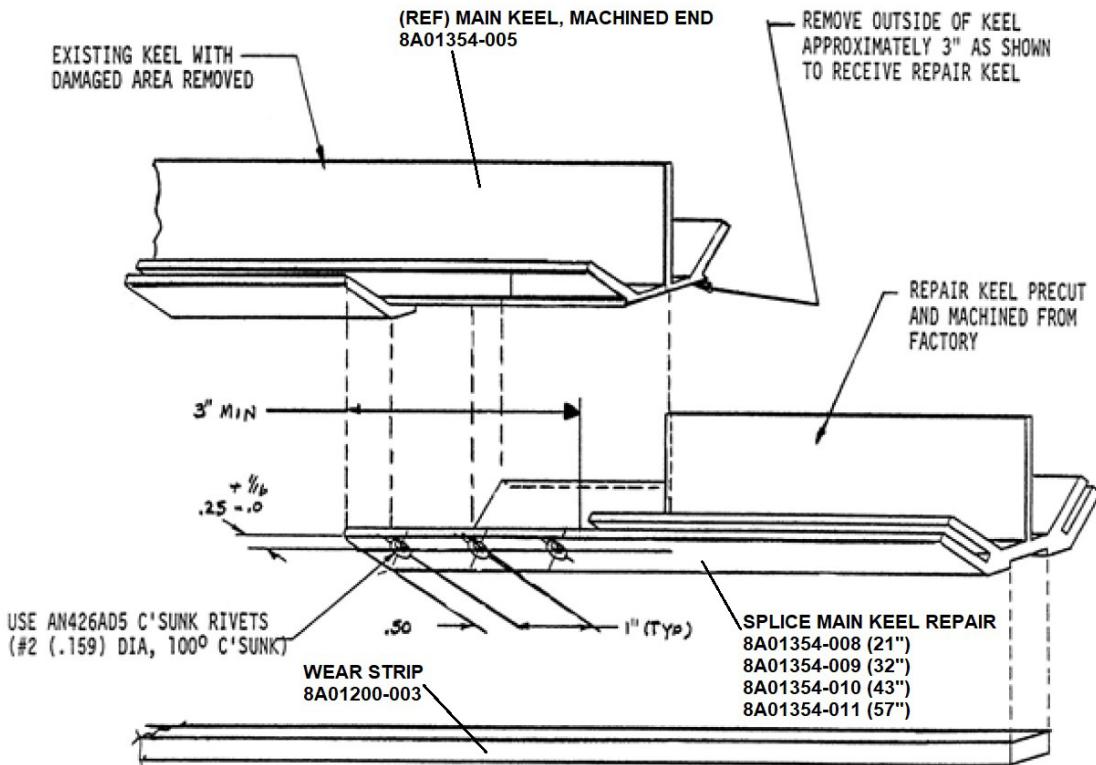
FIGURE 5.7-2: 8000 AFT KEEL REPAIR

## 5.7.2 COMPLEX EXTRUSION SPLICE REPAIR

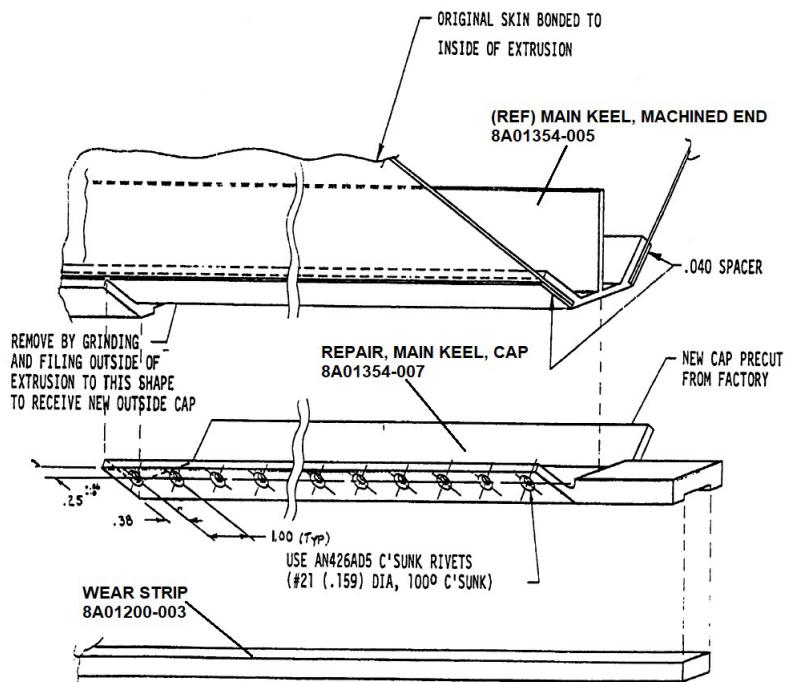
The 3730/3900, 4000, 6000, and 8000 float models utilize complex extrusions with channels on each flange into which the skins are inserted. Figure 5.7-3 depicts the general method of this splice repair. The replacement extrusions and wear strips can be purchased from the Wipaire Parts Department. Consult Table 5.7-1 below to locate applicable part numbers for your repair.

### Repair Process:

1. Remove the damaged area. On the remaining extrusion, cut out 3" of the outer layer of the extrusion as shown in Figure 5.7-3 so it can receive the repair piece.
2. Purchase the repair part from Wipaire. The repair part will be pre-cut and machined from the factory so only the outside layer of the extrusion remains for 3" at the end and the repair piece will notch together with the existing keel.
3. Fasten the 2 pieces together in the overlapping area using AN426AD5 c'sunk rivets spaced per Figure 5.7-3.
4. If repairing the Main Keel, finish repair by installing a new Wear Strip which can be purchased from Wipaire.
  - a. Position wear strip over main keel
  - b. Drill #29 diameter hole no more than 7/16" deep, close to each end and between each bulkhead (use old wear strip for approximate locations).
  - c. Tap main keel with 8-32 bottoming tap
  - d. Drill wear strip to #17 dia hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws.



**FIGURE 5.7-3: COMPLEX EXTRUSION SPLICE REPAIR**



1. Lay out new repair cap on damaged extrusion.
2. Remove outside of damaged extrusion by filing or grinding to inside shape of repair cap.
3. Match drill or lay out and drill hole pattern as shown.
4. Rivet outside cap and spacer to existing inside extrusion.
5. Apply keel wear strip with any good 2-part epoxy.

TABLE 5.7-4: TYPICAL CAP SPLICE TO KEEL

## 5.8 8750 FLOAT EXTRUSION REPAIRS

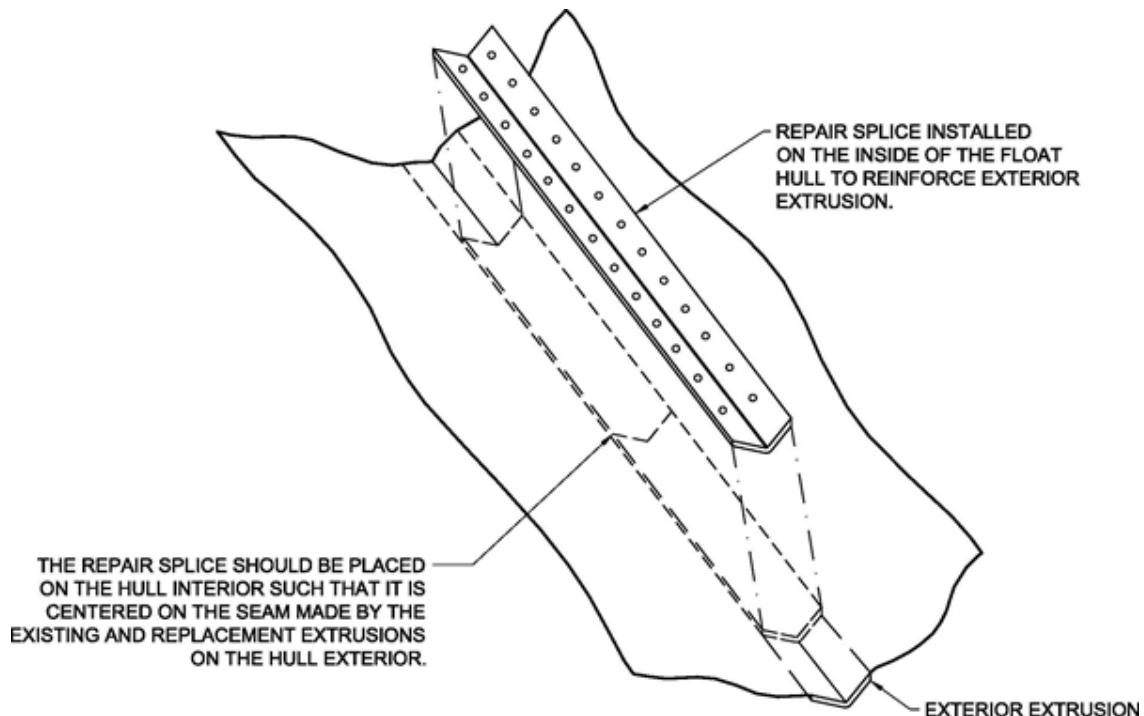
### 5.8.1 SIMPLE EXTRUSION SPLICE REPAIR

The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.8-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

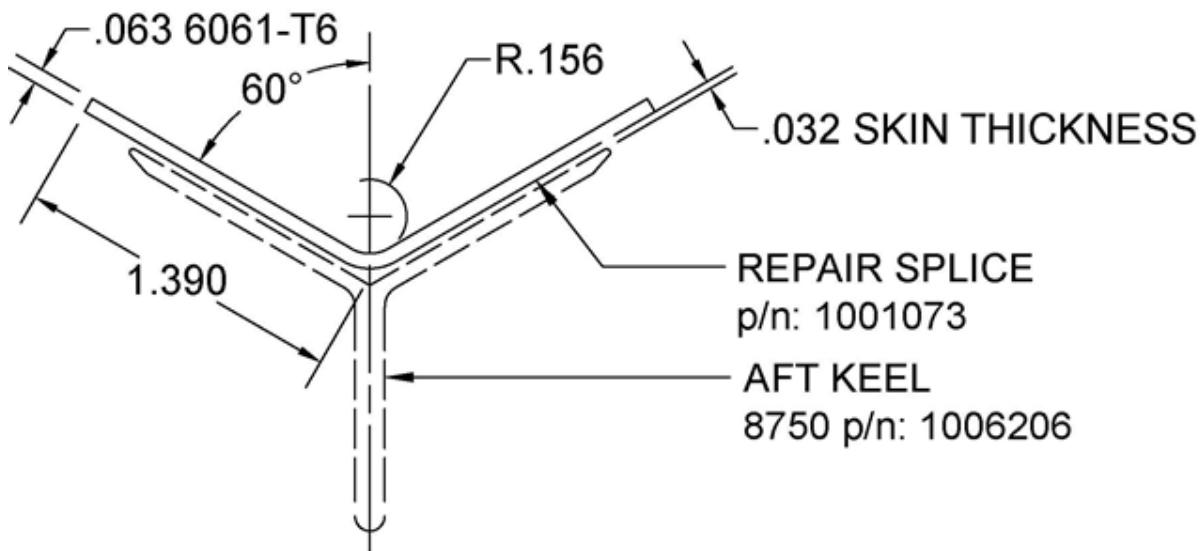
#### Repair Process:

1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.

7. Add internal splices, making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



**FIGURE 5.8-1: SIMPLE EXTRUSION SPLICE REPAIR**



**FIGURE 5.8-2: 8750 AFT KEEL REPAIR**

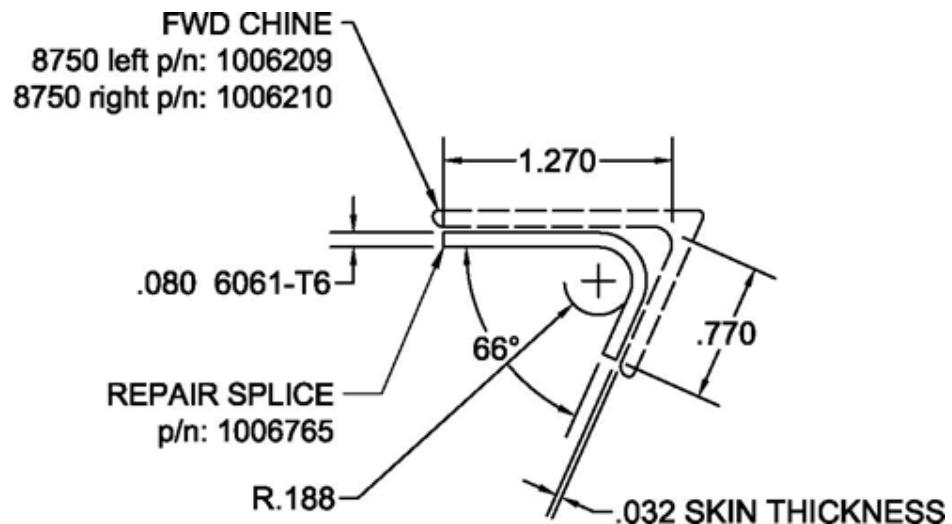


FIGURE 5.8-3: 8750 FWD CHINE REPAIR

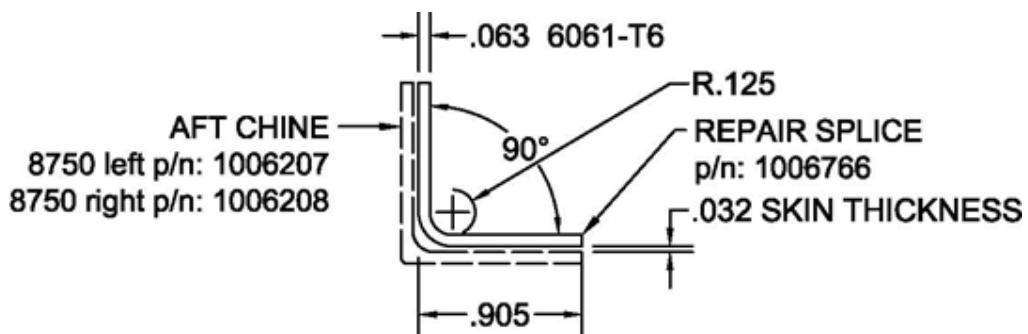


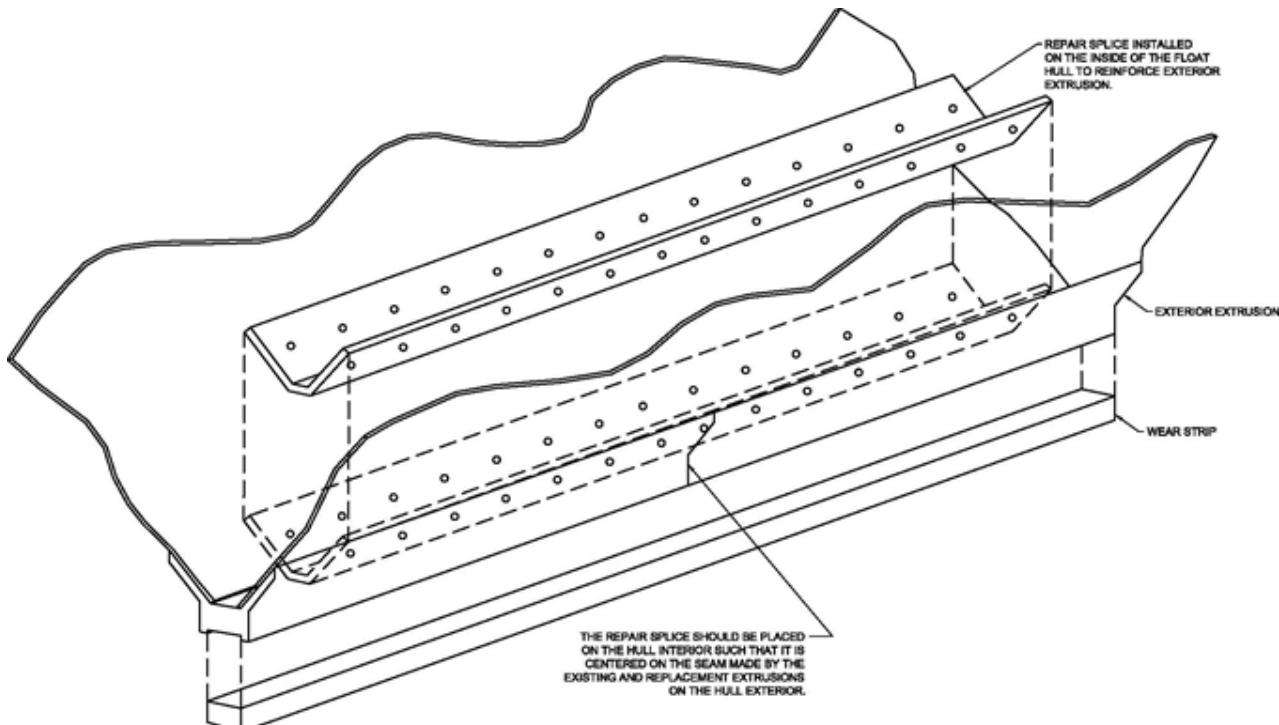
FIGURE 5.8-4: 8750 AFT CHINE REPAIR

## 5.8.2 MAIN KEEL EXTRUSION SPLICE REPAIR

On several float models, the main keel will have a flat bottom with an attached wear strip that must be replaced when repairs are made. Figure 5.8-5 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, and the internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

### Repair Process:

1. Remove entire wear strip. Purchase new Wear Strip from Wipaire (1006214).
2. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
3. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
4. Cut out damaged section being careful NOT to cut into the skins.
5. Obtain new extrusion from Wipaire Parts Department (1006213) and cut out the repair section from the new extrusion in the exact area of the damage.
6. File to remove rough edges.
7. See Section 3.0 of this manual for appropriate fastener options.
8. Add internal splices making sure the repair seam is located in the middle of the splice.
9. Install the new wear strip.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approximate locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia. hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.



**FIGURE 5.8-5: MAIN KEEL SIMPLE EXTRUSION SPLICE REPAIR**

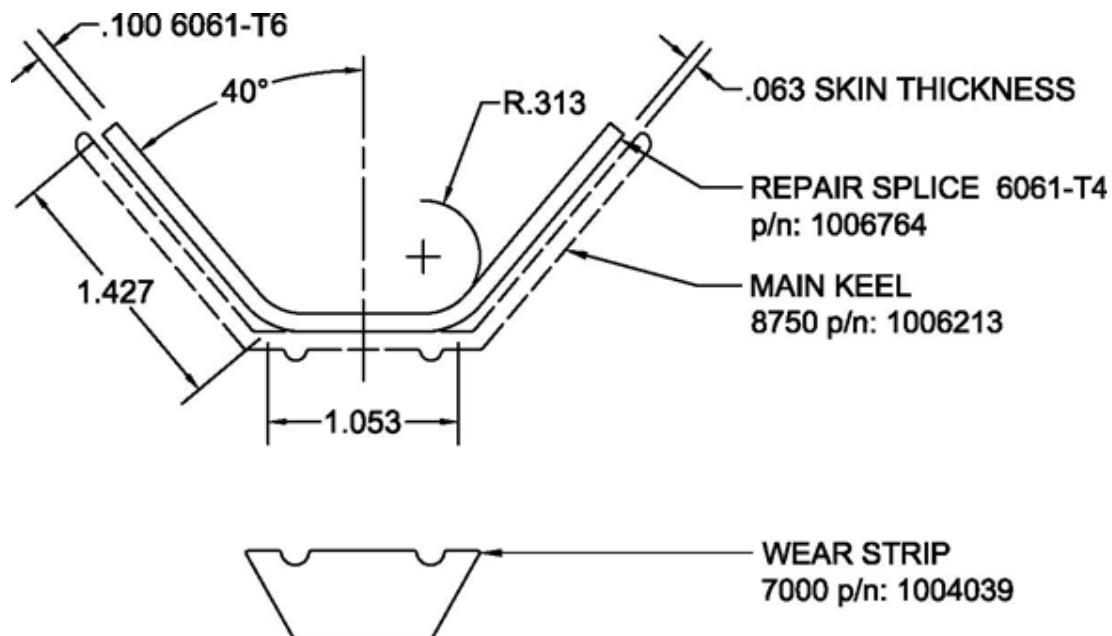


FIGURE 5.8-6: 8750 MAIN KEEL REPAIR

### 5.8.3 GUNWALL REPAIR

A common repair is using a doubler kit to repair the gunwall edges where damaged areas may be removed and filled without replacing the gunwall. The doubler kit can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

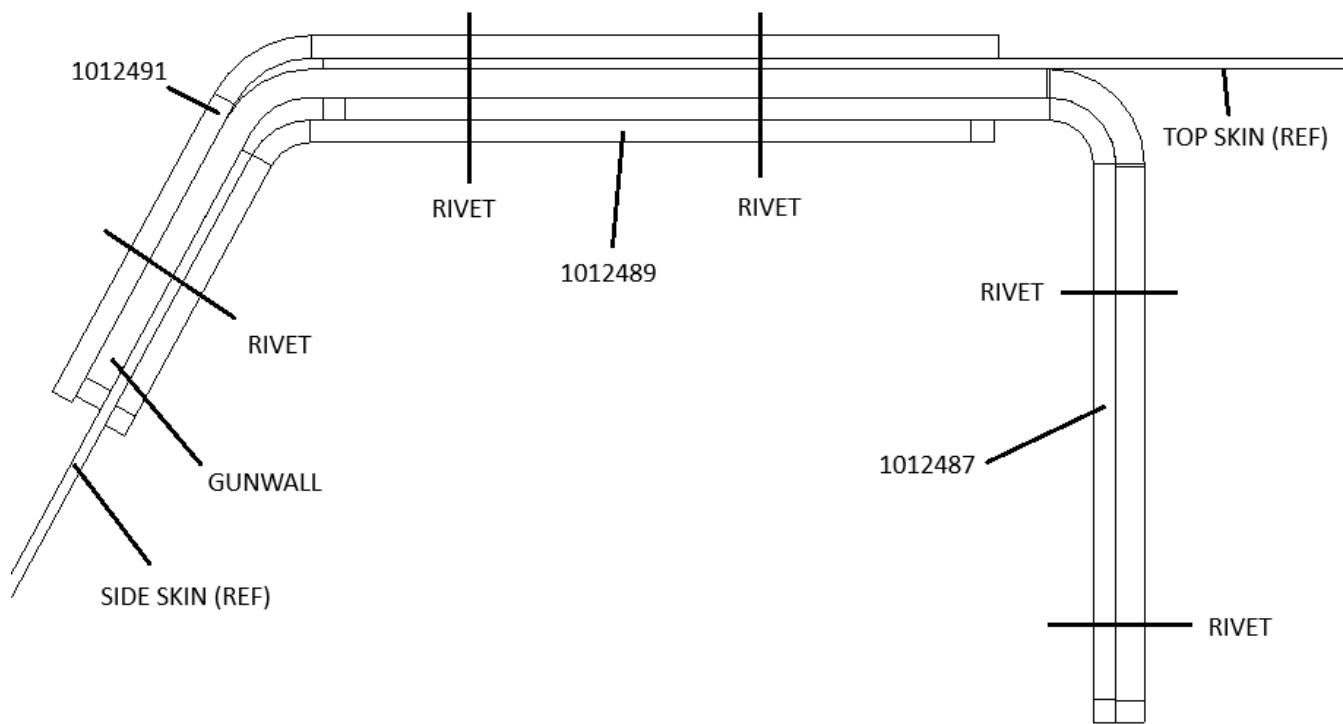
**Note:** this is not a splice repair, the intention is not to remove a whole section and replace it but instead to remove only around the damaged area and to subsequently fill and reinforce the damaged portion.

**Repair Process:**

1. Remove existing rivets from around the damaged area.
  - a. Side skin, top skin, and internal gunwall rivets.
2. Remove damage from the gunwall and top skin as required.
3. Filler spacers may be fabricated as needed to replace the removed material.
4. Cut the inner gunwall doubler (1012488 and 1012489 for a FWD gunwall repair, 1012487 and 1012489 for AFT), and outer doubler (1012491) to fit 6-8 inches (if applicable) on either side of damage.

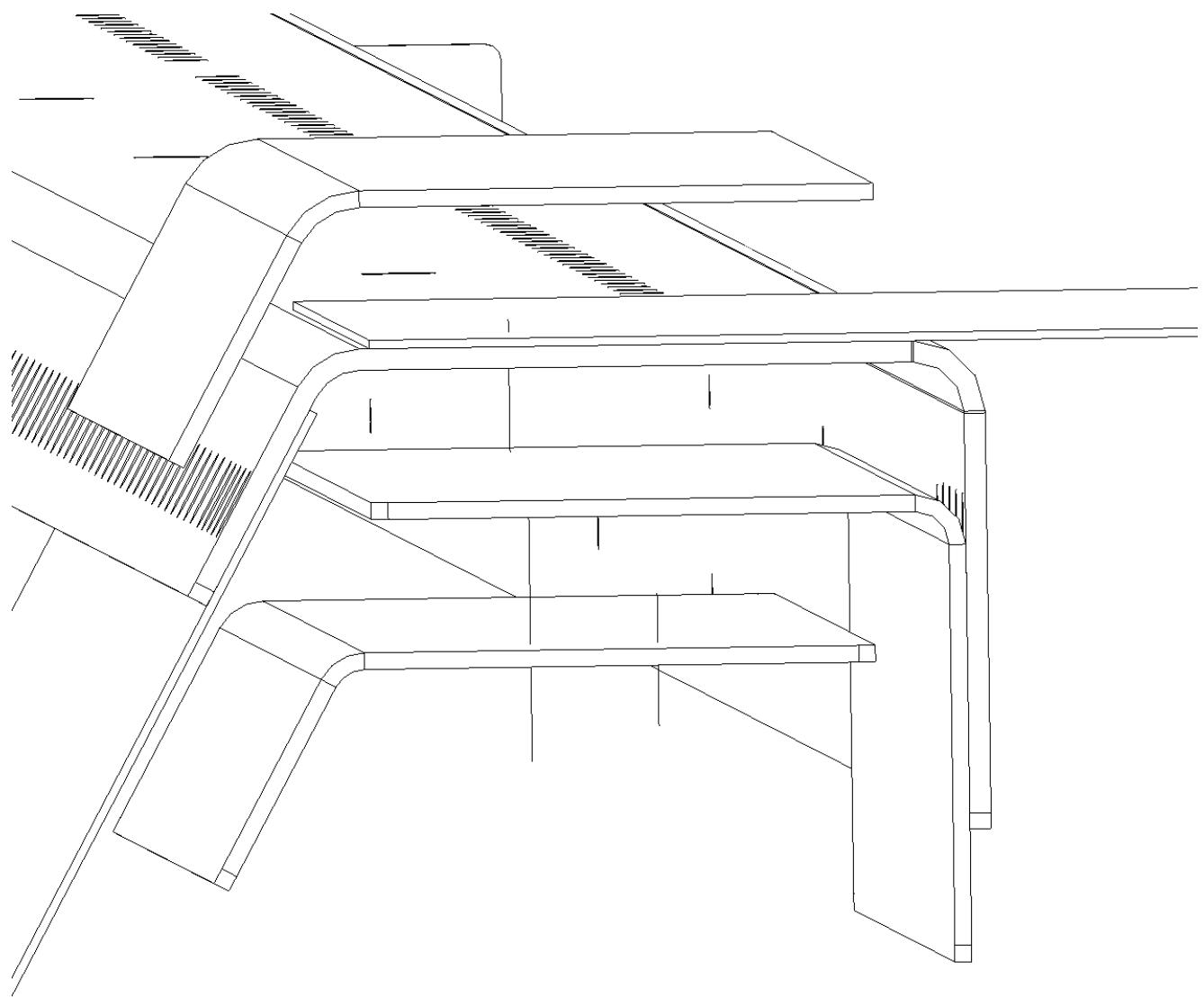
**Note:** If fabricating repair pieces locally, parts are to be formed from 0.063" thick 6061-T6 aluminum.

5. Match drill the inner gunwall doublers and the outer doubler using all existing holes.
6. You will need to add a row of rivets MS20426AD5- to the top side of the outer doubler 1 inch apart interspacing them from the rivets on the side skin per 43.13-1B.
7. All parts should be assembled with PR-1422 or equivalent.
8. During assembly LS5931A72 filler washers should be used in places where the rivets were drilled out, connecting the side skin to the gunwall.

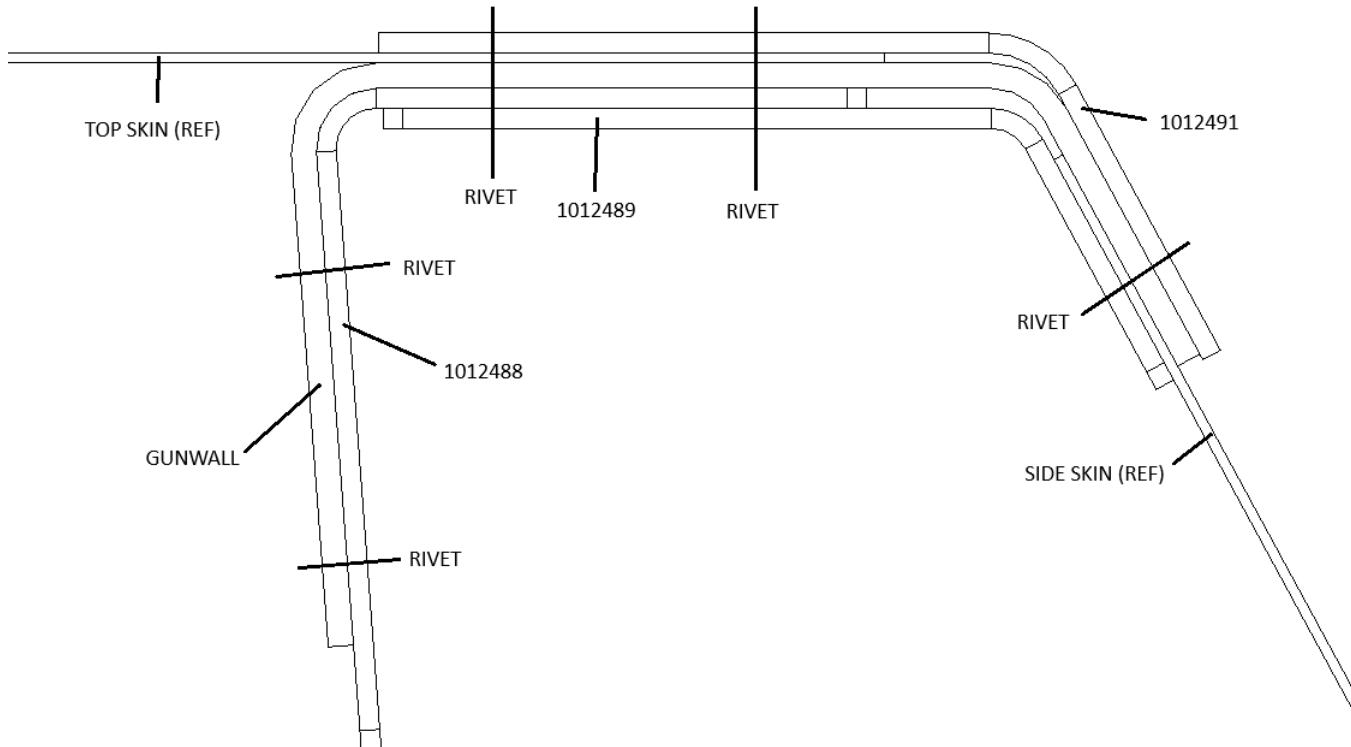


**FIGURE 5.8-7: AFT GUNWALL REPAIR SECTION VIEW**

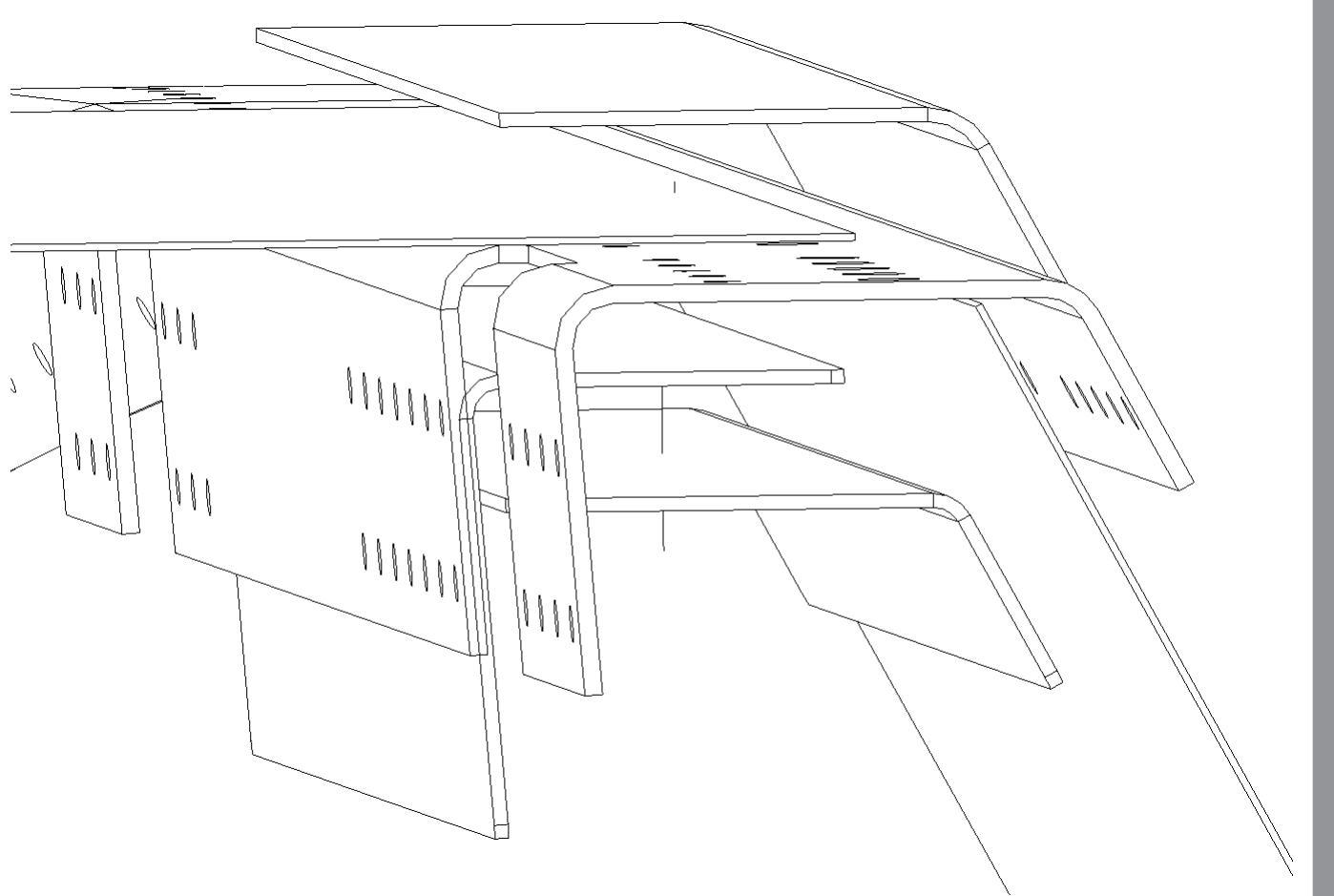
STRUCTURAL REPAIR MANUAL FOR WIPLINE ALUMINUM FLOATS



**FIGURE 5.8-8: AFT GUNWALL ISOMETRIC EXPLODED VIEW**



**FIGURE 5.8-9: FWD GUNWALL REPAIR SECTION VIEW**



**FIGURE 5.8-10: FWD GUNWALL ISOMETRIC EXPLODED VIEW**

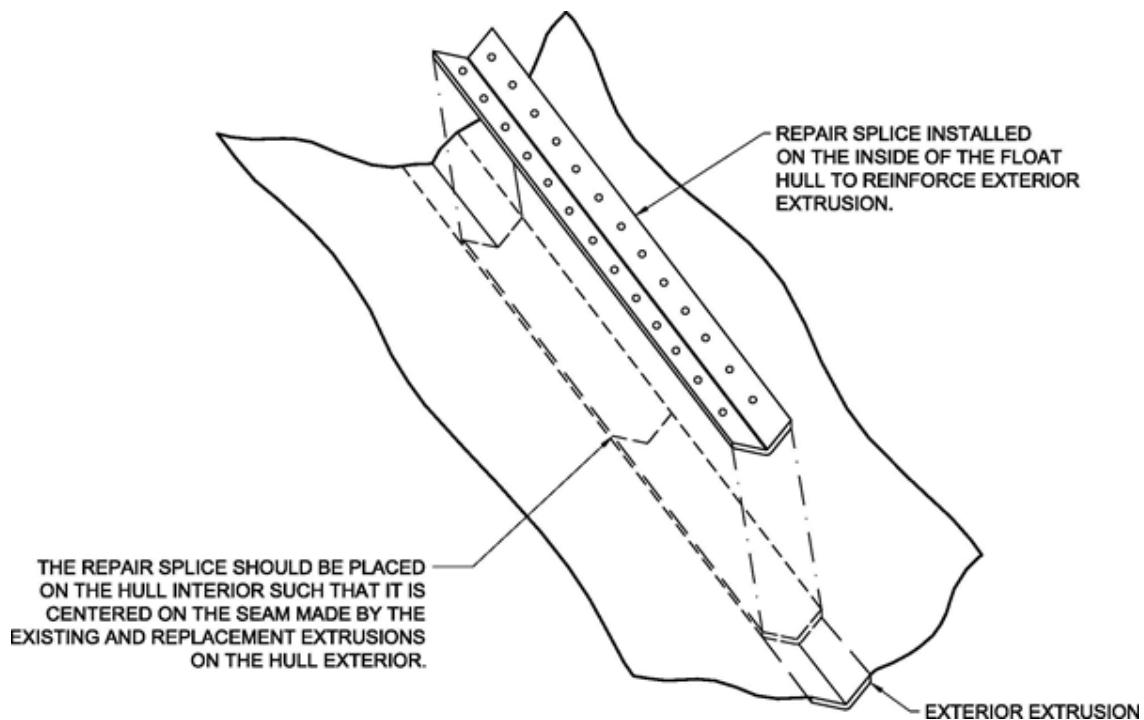
## 5.9 10000 FLOAT EXTRUSION REPAIRS

### 5.9.1 SIMPLE EXTRUSION SPLICE REPAIR

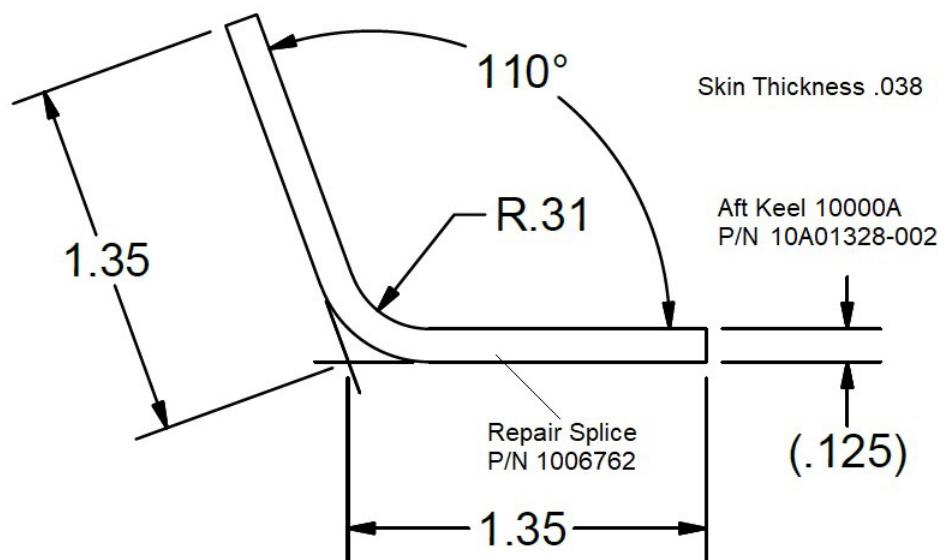
The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.9-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### **Repair Process:**

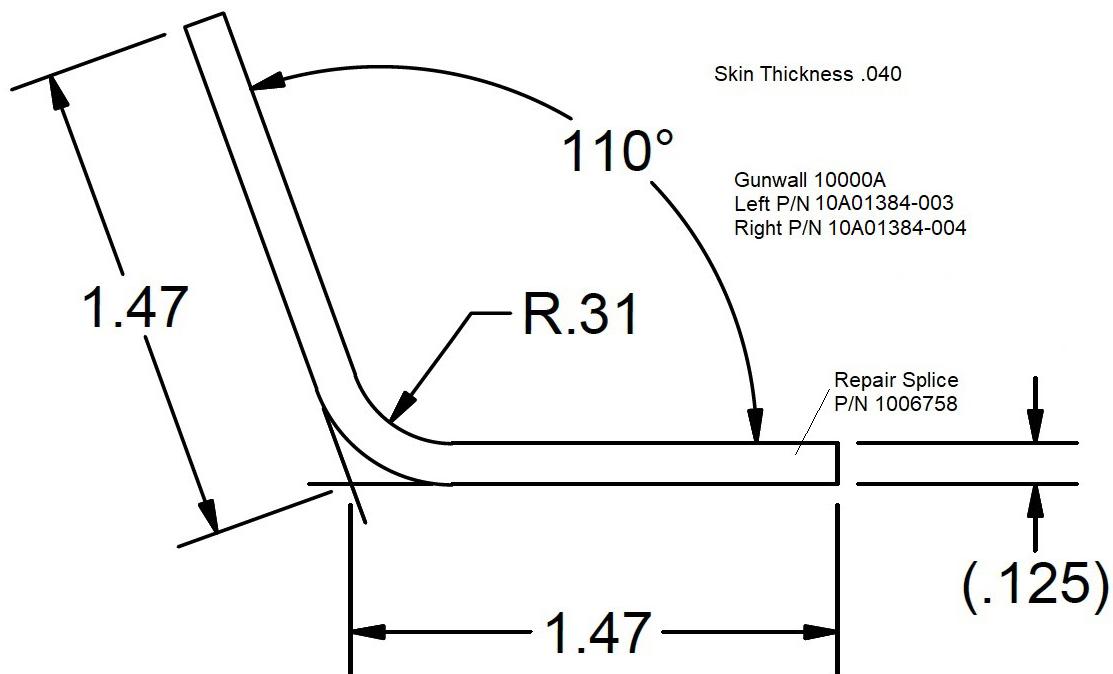
1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices (1006762), making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



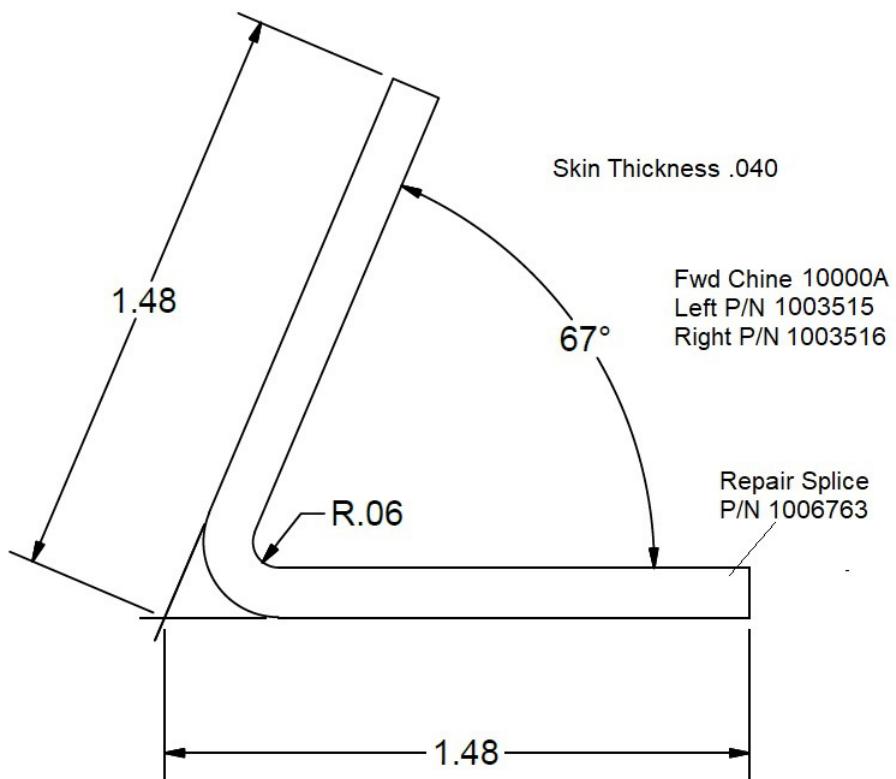
**FIGURE 5.9-1: SIMPLE EXTRUSION SPLICE REPAIR**



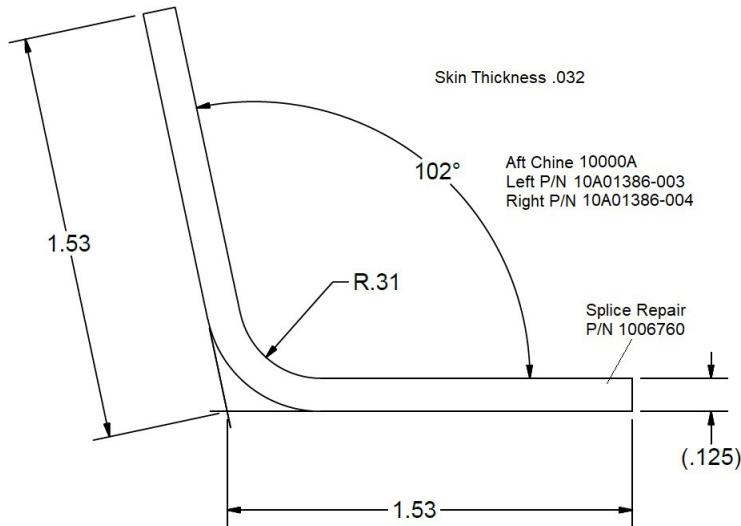
**FIGURE 5.9-2: 10000 AFT KEEL REPAIR**



**FIGURE 5.9-3: 10000 GUNWALL REPAIR**



**FIGURE 5.9-4: 10000 FWD CHINE REPAIR**

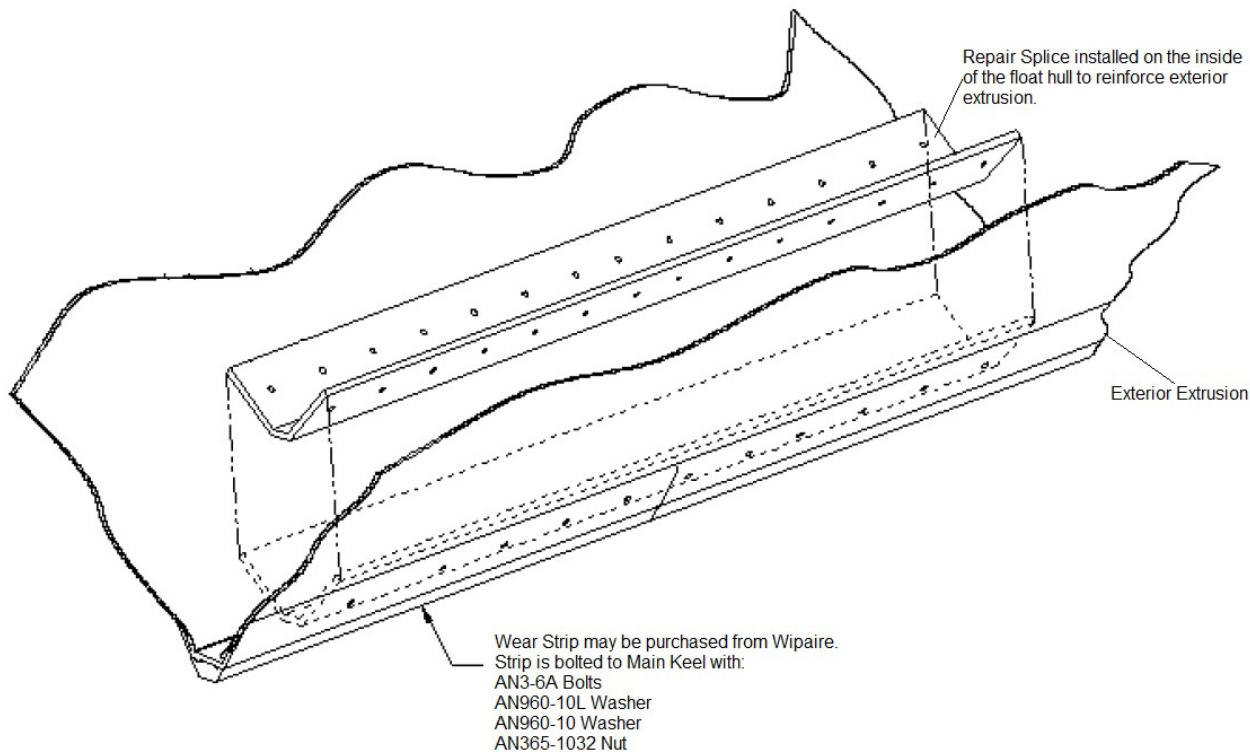
**FIGURE 5.9-5: 10000 AFT CHINE REPAIR**

### 5.9.2 MAIN KEEL EXTRUSION SPLICE REPAIR

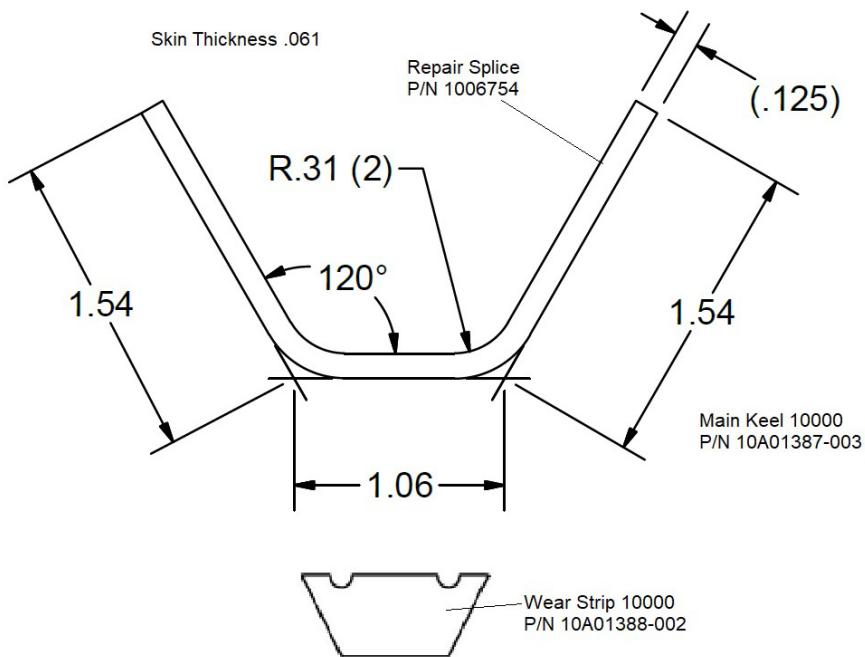
On several float models, the main keel will have a flat bottom with an attached wear strip that must be replaced when repairs are made. Figure 5.9-6 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, and the internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

1. Remove entire wear strip. Purchase new Wear Strip from Wipaire (10A01388-002).
2. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
3. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
4. Cut out damaged section being careful NOT to cut into the skins.
5. Obtain new extrusion from Wipaire Parts Department (10A01387-003), and cut out the repair section from the new extrusion in the exact area of the damage.
6. File to remove rough edges.
7. See Section 3.0 of this manual for appropriate fastener options.
8. Add internal splices making sure the repair seam is located in the middle of the splice.
9. Install the new wear strip.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approximate locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia. hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149FN832P washers, and MS21044N08 nuts.



**FIGURE 5.9-6: MAIN KEEL SIMPLE EXTRUSION SPLICE REPAIR**



**FIGURE 5.9-7: 10000 MAIN KEEL REPAIR**

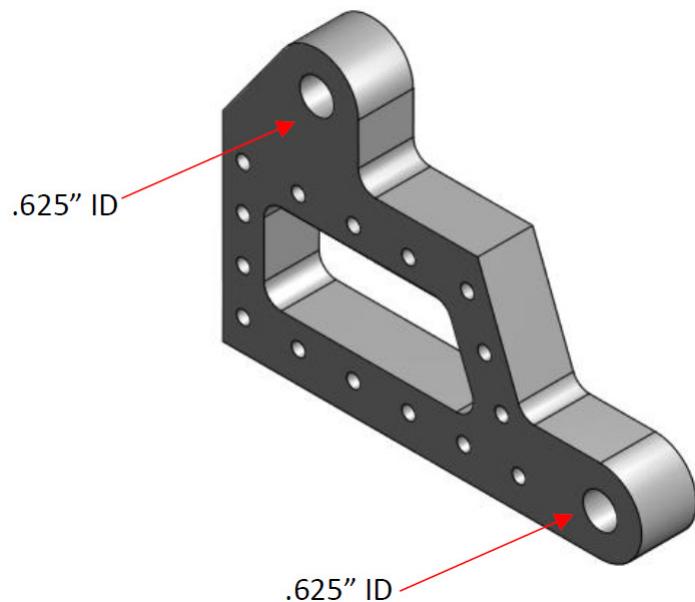
### 5.9.3 MAIN AND FRONT STRUT FITTING REPAIR

A. This repair scheme is to be used to repair the  $\varnothing 0.625$ " bolt holes on the main and front strut fittings when they have become larger than nominal. The fix should be considered optional for holes  $\varnothing 0.628$ "-  $\varnothing 0.645$ " and mandatory for holes over  $\varnothing 0.645$ ." Reference Figure 5.9-8 and Figure 5.9-9 for details.

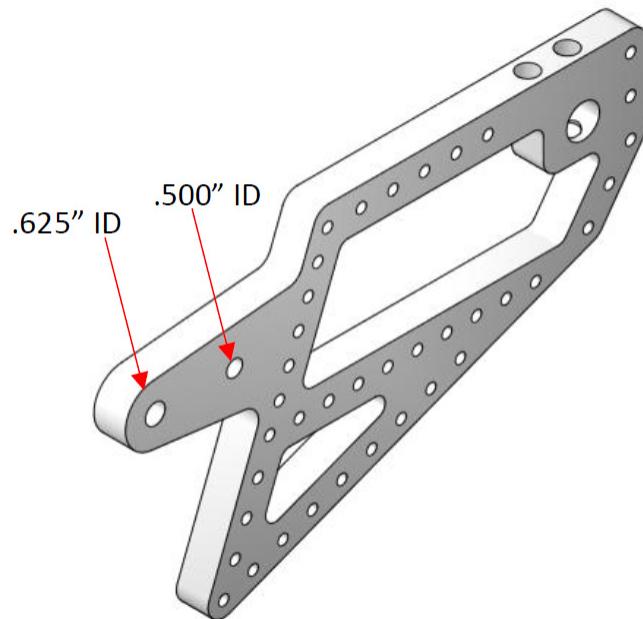
1. Make or purchase bushing (1008698). Measure the outside diameter (OD) of the bushing. If making the bushing, it should be made from 2024-T3 with an OD of  $0.75$ " + .035, - .0005, an ID of  $0.625$ " + .002, -0 and  $.990$ " ± .003 long with a  $.04$ "x $45$ ° chamfer on one end to help align with the hole when pushing it in.
2. Drill out and ream the hole with an adjustable hand reamer until the hole is  $.001$ " smaller than the bushings measured OD. It will be hard to press the bushing into the hole if the difference between the hole and the bushing is greater than  $.001$ . The bushing and hole should have an interference of  $.001$ .
3. Use a hand deburring tool to remove the sharp edges on the hole. Clean out the hole after reaming.
4. All bare aluminum will need to be degreased and alodine conversion coated as soon as possible after the machining operations.
5. Assembly of the bushing into the fitting will be done "wet" with a thin coat of polysulfide sealant or equivalent.
6. The bushing is designed with a chamfer to help start it into the hole. Make sure the bushing is pressed in chamfer first.
7. The bushing will be pressed flush with the surface of the fitting, a clamp or press should be used to squarely press the bushing into the hole.
8. After pressing the bushing in, the bushing may need to be reamed out to an inside diameter of  $.625$ " so the bolt will fit.
9. The bushing should be flush or recessed so that it does not interfere with the strut fitting upon assembly.
10. After installing the bushing, prime the area and apply a corrosion inhibiting compound prior to strut installation.

B. This repair scheme is to be used to repair the  $\varnothing 0.500$ " bolt holes on the main strut fittings P/N 13A01161-002 when they have become larger than nominal. The fix should be considered optional for holes  $\varnothing 0.503$ "-  $\varnothing 0.520$ " and mandatory for holes over  $\varnothing 0.520$ ." Reference Figure 5.9-9 for details.

1. Make or purchase bushing (1012018). Measure the outside diameter (OD) of the bushing. If making the bushing, it should be made from 2024-T3 with an OD of  $0.6245$ " + .0005, - .0000 an ID of  $0.500$ " + .002, -0 and  $.990$ " ± .003 long with a  $.04$ "x $45$ ° chamfer on one end to help align with the hole when pushing it in.
2. Drill out and ream the hole with an adjustable hand reamer until the hole is  $.001$ " smaller than the bushings measured OD. It will be hard to press the bushing into the hole if the difference between the hole and the bushing is greater than  $.001$ . The bushing and hole should have an interference of  $.001$ .
3. Use a hand deburring tool to remove the sharp edges on the hole. Clean out the hole after reaming.
4. All bare aluminum will need to be degreased and alodine conversion coated as soon as possible after the machining operations.
5. Assembly of the bushing into the fitting will be done "wet" with a thin coat of polysulfide sealant or equivalent.
6. The bushing is designed with a chamfer to help start it into the hole. Make sure the bushing is pressed in chamfer first.
7. The bushing will be pressed flush with the surface of the fitting, a clamp or press should be used to squarely press the bushing into the hole.
8. After pressing the bushing in, the bushing may need to be reamed out to an inside diameter of  $.500$ " so the bolt will fit.
9. The bushing should be flush or recessed so that it does not interfere with the strut fitting upon assembly.
10. After installing the bushing, prime the area and apply a corrosion inhibiting compound prior to strut installation.



**FIGURE 5.9-8: 10000 Front Strut Fitting 13A01082-001**



**FIGURE 5.9-9: 10000 Main Strut Fitting 13A01161-002**

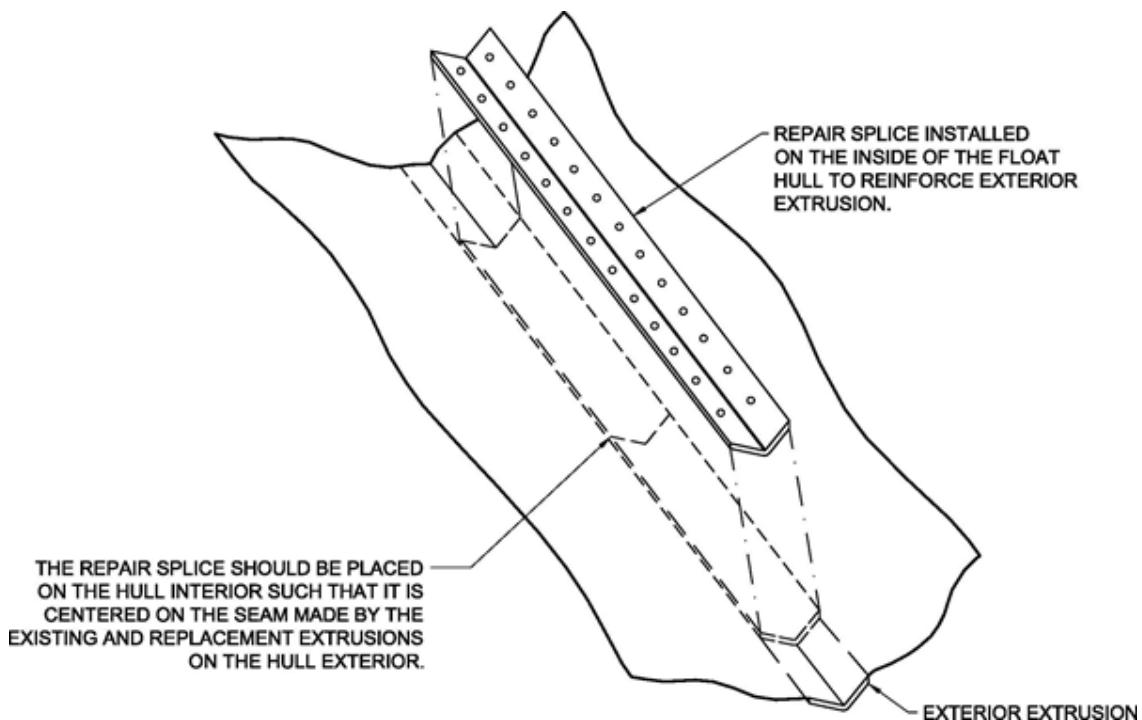
## 5.10 13000 FLOAT EXTRUSION REPAIRS

### 5.10.1 SIMPLE EXTRUSION SPLICE REPAIR

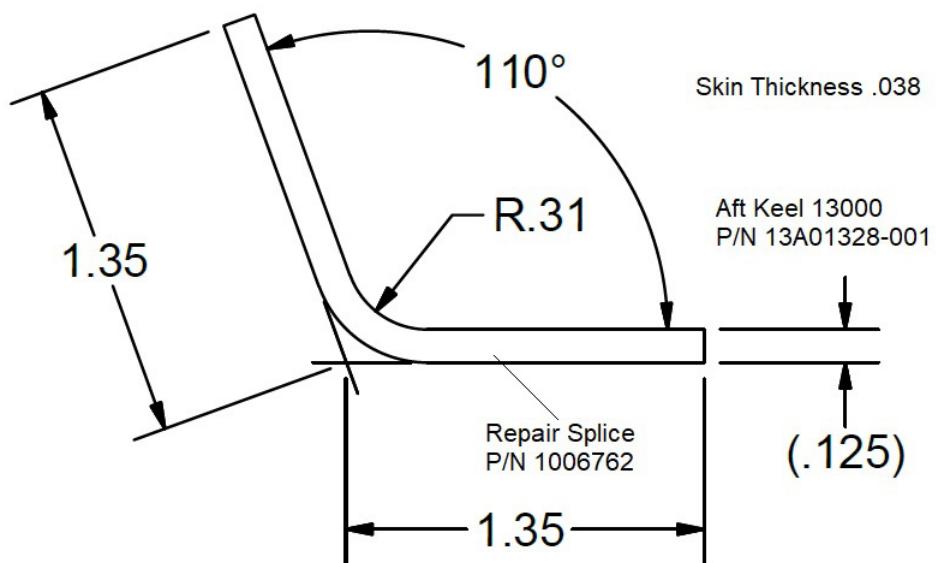
The most used and simplest repair is a splice of an extrusion that is a simple one bend angle where the skins attach to each flange. Figure 5.10-1 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, or in some cases, fabricated per the figures in this section. The internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

#### Repair Process:

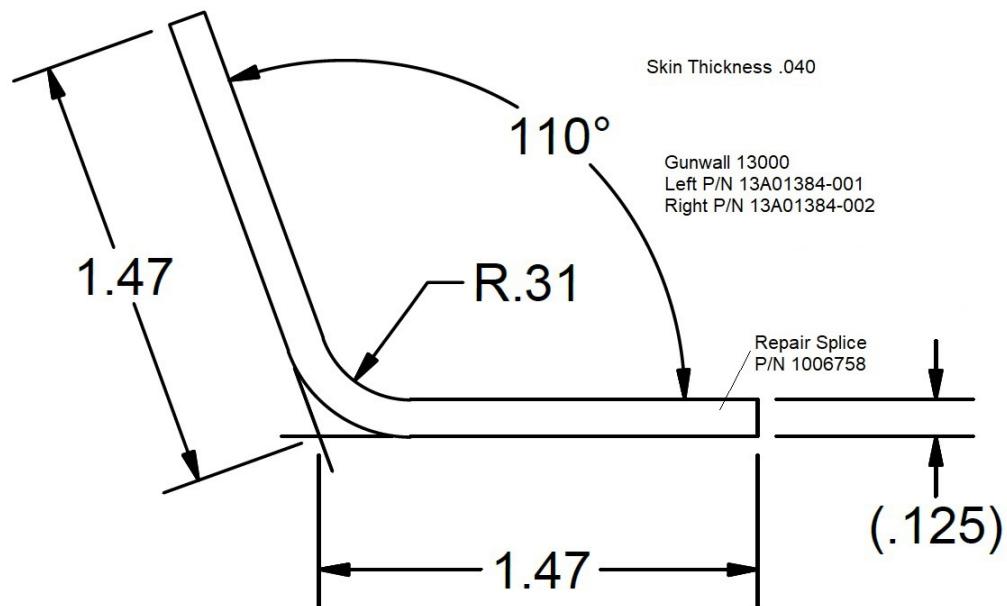
1. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
2. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
3. Cut out damaged section being careful NOT to cut into the skins.
4. Obtain new extrusion from Wipaire Parts Department. Cut the repair section from the new extrusion in the exact area of the damage.
5. File to remove rough edges.
6. See Section 3.0 of this manual for appropriate fastener options.
7. Add internal splices (1006762), making sure the repair seam is located in the middle of the splice, and that the splice is centered between the bulkheads.
8. Use existing piece to back drill holes for attachment making sure the distance from the end of the splice to the center of the first hole is greater than or equal to 2 times the diameter of the rivet used.



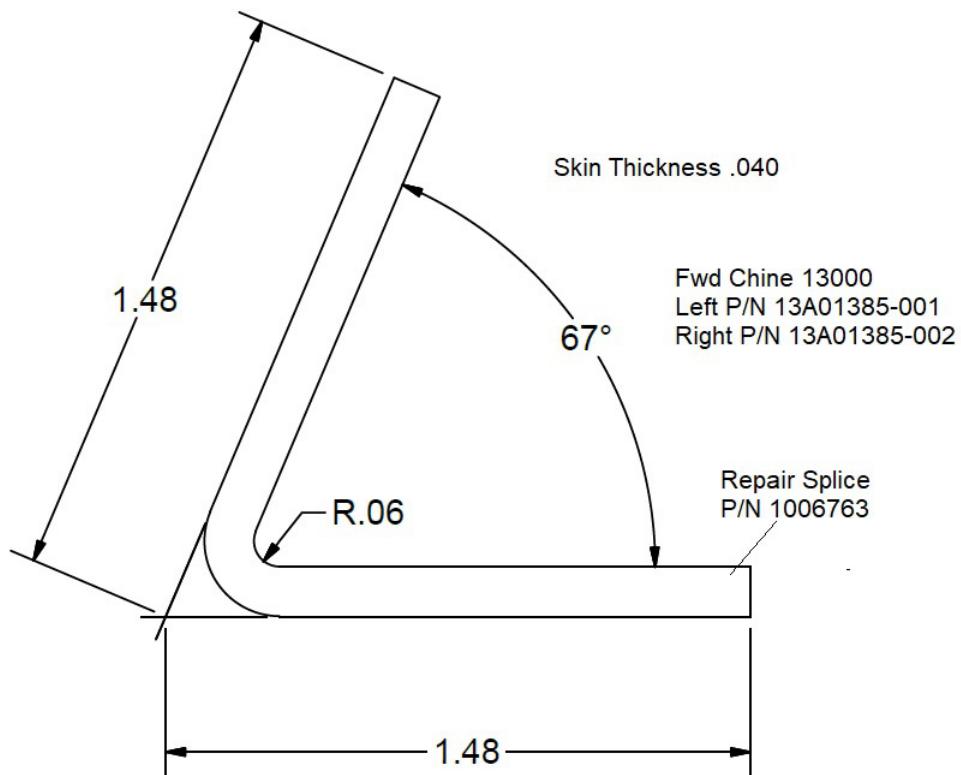
**FIGURE 5.10-1: SIMPLE EXTRUSION SPLICE REPAIR**



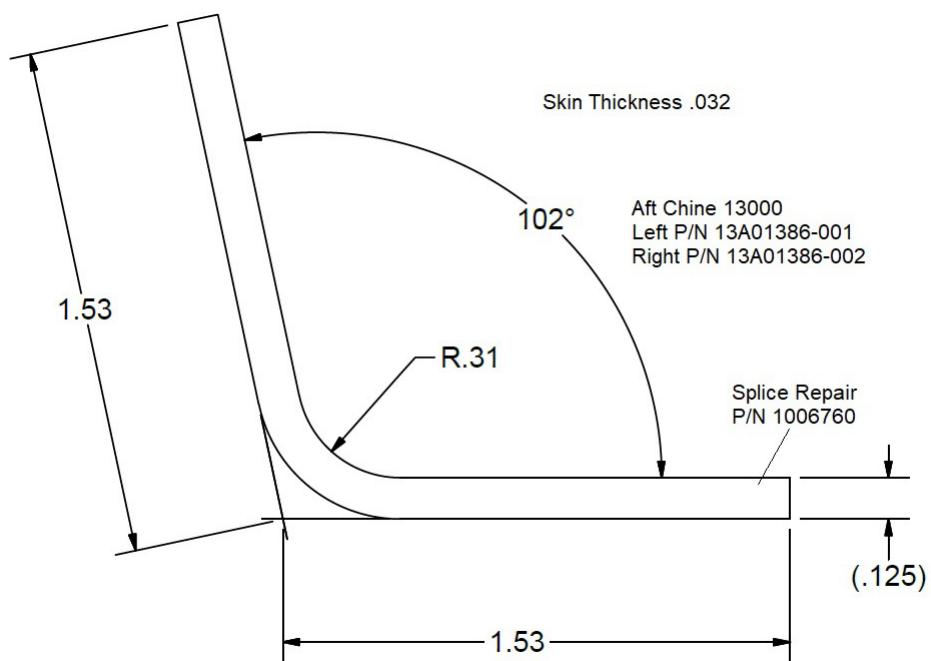
**FIGURE 5.10-2: 13000 AFT KEEL REPAIR**



**FIGURE 5.10-3: 13000 GUNWALL REPAIR**



**FIGURE 5.10-4: 13000 FWD CHINE REPAIR**



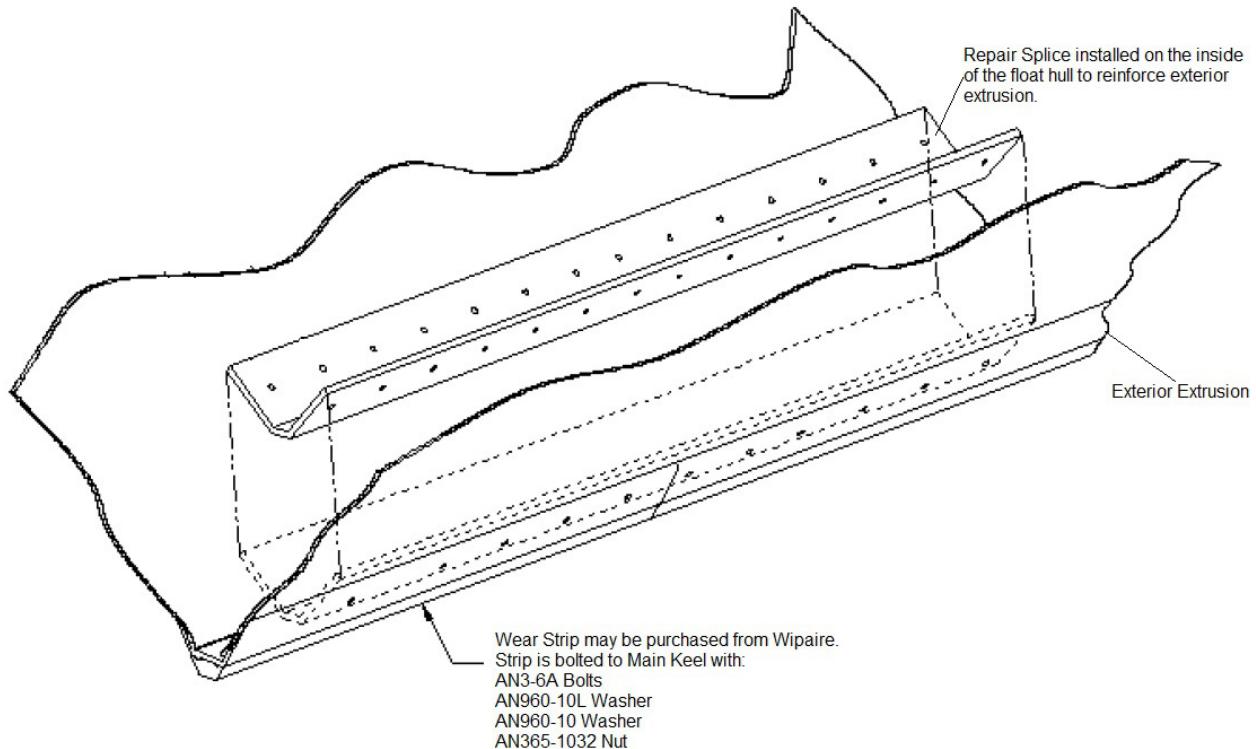
**FIGURE 5.10-5: 13000 AFT CHINE REPAIR**

## 5.10.2 MAIN KEEL EXTRUSION SPLICE REPAIR

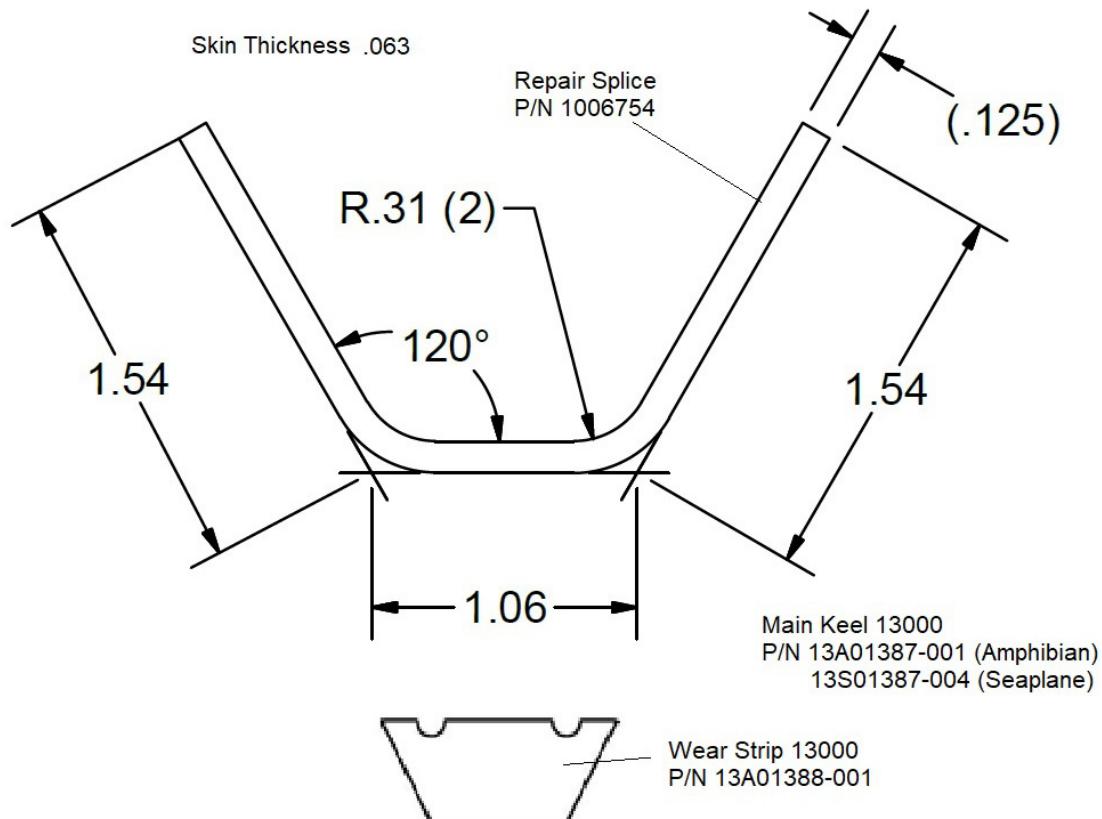
On several float models, the main keel will have a flat bottom with an attached wear strip that must be replaced when repairs are made. Figure 5.10-6 depicts the general method of this splice repair. The replacement extrusion can be purchased from Wipaire, and the internal splices may either be purchased from Wipaire or fabricated per the figures in this section. Consult the Table of Contents at the beginning of this manual to locate applicable figures for your repair.

### Repair Process:

1. Remove entire wear strip. Purchase new Wear Strip from Wipaire (13A01388-001).
2. Remove rivets (if applicable) about 6-8" on either end of the area to be repaired.
3. Mark damaged area to be removed.
  - a. Be sure to start and end spliced area in the centers of the float bays to prevent interference with the bulkheads or bottom stiffeners.
4. Cut out damaged section being careful NOT to cut into the skins.
5. Obtain new extrusion from Wipaire Parts Department (13A01387-001) for amphibian or (13S01387-004) for straight floats and cut out the repair section from the new extrusion in the exact area of the damage.
6. File to remove rough edges.
7. See Section 3.0 of this manual for appropriate fastener options.
8. Add internal splices making sure the repair seam is located in the middle of the splice.
9. Install the new wear strip.
  - a. Position wear strip over main keel
  - b. Drill #29 dia. hole close to each end and between each bulkhead (use old wear strip for approximate locations).
  - c. Tap main keel to 8-32 thru
  - d. Drill wear strip to #17 dia. hole and c'sink 100°
  - e. Apply float sealant PR-1422 or equivalent between strip and keel.
  - f. Secure strip to keel with MS24693-C50 screws, NAS1149F0832P washers, and MS 20365-832 nuts.



**FIGURE 5.10-6: MAIN KEEL SIMPLE EXTRUSION SPLICE REPAIR**



**FIGURE 5.10-7: 13000 MAIN KEEL REPAIR**

## 6.0 FLOAT HULL BULKHEADS

Float hull bulkheads are the vertical structures that internally divide the floats into bays. Bulkheads add strength to the float structure and keep water contained to one bay in the event of a leak. Bulkheads are constructed either of 6061-T6 or 2024-T3 aluminum and are riveted in place. They vary in size and thickness depending on the float model and location within the float. Damage to any float bulkheads may be repaired in accordance with this section, Section 6.0 of this manual, or any acceptable repair method listed in FAA Advisory Circular 43.13-1B. Any float parts, including bulkheads, can be purchased from Wipaire. To simplify repairs, the sheet metal can be ordered precut and predrilled. Contact Wipaire Customer Service to order parts.

During extensive maintenance of 10000 and 13000 series floats, it may be desirable to cut an access hole in a solid bulkhead to enable replacement of neighboring float structure. This type of access hole can be cut and then repaired according to Figure 4-2 in Section 4 of this manual. This is only acceptable practice on the 10000 and 13000 series floats.

Repair of bulkheads of Wipline floats can be categorized into a few general methods based on the type of damage and bulkhead configuration.

### **Complete Bulkhead Replacement**

This method is used when the bulkhead has sustained extensive damage and other repair methods within this manual are not feasible.

### **Partial Bulkhead Replacement**

Partial bulkhead replacement is used when a bulkhead has sustained damage in a local area. Typically, a section of bulkhead is removed when cutting out the damaged area, requiring a new section of bulkhead.

### **Bulkhead Reinforcement**

Bulkhead reinforcement is used when a crack is discovered that can be stop drilled and reinforced to prevent further cracking.

## 6.1 COMPLETE BULKHEAD REPLACEMENT

To replace a complete bulkhead, you must gain access to the bulkhead. This may include removing one side skin if no other access is available.

Gain access to the bulkhead by removing a side skin or opening a baggage compartment door.

Drill out all rivets and remove any fasteners attaching the bulkhead to the float structure.

Carefully examine the area for any additional hidden damage.

Install the new bulkhead using the same fasteners as original wherever possible.

## 6.2 PARTIAL BULKHEAD REPLACEMENT

Partial bulkhead replacements will vary depending on the scope of the repair. A properly repaired bulkhead will be as strong as the original.

Remove damaged area of bulkhead.

Cut partial bulkhead for installation large enough to allow for proper rivet edge distance.

## 6.3 BULKHEAD REINFORCEMENT

Carefully examine the cracked area for additional damage. Stop drill cracks to prevent further cracking. Determine the size of the reinforcement required based on the damaged area. The doubler should at least completely overlap the cracked area. Rivet spacing should match existing rivet spacing or be less.

## 6.4 BULKHEAD REPAIR

Carefully inspect the area that is requiring repair. Determine the original thickness and type of material being repaired. Determine the amount of original material that needs to be removed prior to repair. Use AC43.13-1B or later FAA approved revision for guidelines to determine the required size of the doubler. Rivet spacing should match existing rivet spacing or be less.

## 6.5 BULKHEAD BUCKLING AND CRACKING

### 6.5.1 BULKHEAD BUCKLING

Bulkhead buckling. Small bulkhead buckles are not a structural concern. These buckles occur due to local water impacts. When a bulkhead buckles, it actually makes the structure more able to take local water impact loads due to an increase in the local flexibility. This increased flexibility allows the structure to flex and absorb the water impact without damage to another float structure. For this reason, it is not a structural requirement to fix small bulkhead and flange buckles to maintain the structural integrity of the float.

### 6.5.2 BULKHEAD CRACKING

Cracking. The downside to bulkhead buckles is that they will eventually turn into cracks. Once a crack has started in a bulkhead it isn't going to stop. For this reason, any bulkhead buckles that have developed cracks should be addressed when discovered. Standard repair methodology for cracks should be employed. In the case of many Wipline floats it may be acceptable to cut off the bulkhead flange and rivet a new flange to the bulkhead. In other, more severe, cases it may be necessary to replace an entire bulkhead. This must be evaluated for each case as it is discovered. When repairing any cracks, the integrity of the sealed compartment must be met after the repair is conducted.

## 7.0 MISCELLANEOUS REPAIRS

Repairs not fitting within earlier sections are detailed below.

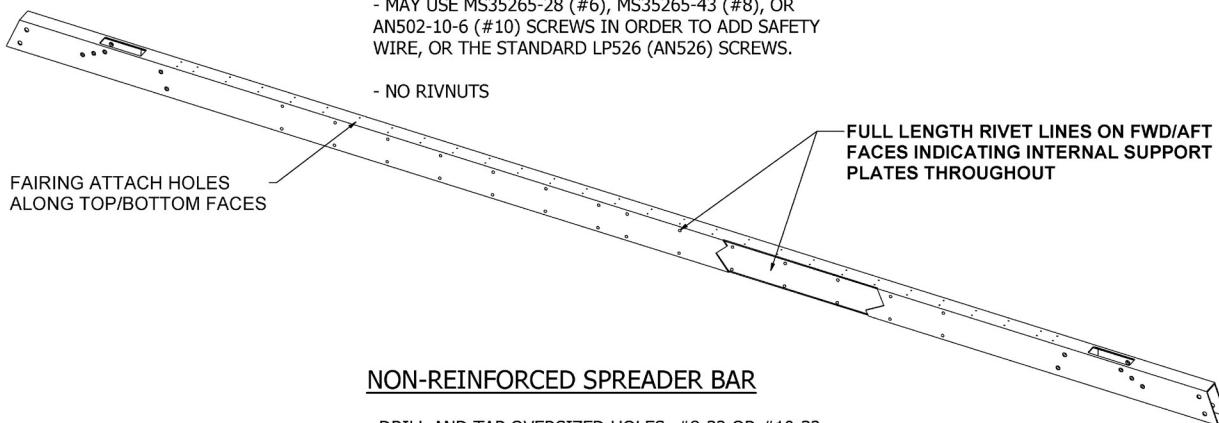
### 7.1 8000 SPREADER BAR THREADED FAIRING HOLE REPAIR

8000 series float spreader bar fairings are secured with #6-32 holes tapped into the underlying aluminum spreader bar tube. These holes have been observed to wear over time. Oversizing the tapped holes, using alternate hardware to accommodate safety wire, and/or installing blind rivet nuts are all options for repair, in accordance with Figure 7.1.

**Note:** A "reinforced" spreader bar to aid ground operations was optionally added to seaplane floats via Service Letter 58, and later became standard. The geometry of this version will not accommodate blind rivet nuts. Figure 7.1 provides representational images to help identify the two varieties.

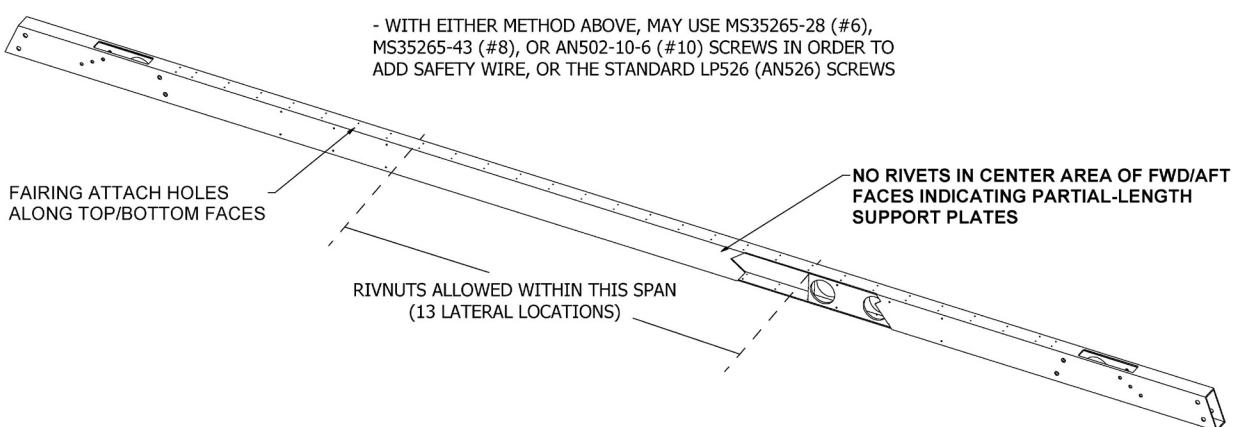
#### "REINFORCED" SPREADER BAR

- DRILL AND TAP OVERRSIZED HOLES: #8-32 OR #10-32
- MAY USE MS35265-28 (#6), MS35265-43 (#8), OR AN502-10-6 (#10) SCREWS IN ORDER TO ADD SAFETY WIRE, OR THE STANDARD LP526 (AN526) SCREWS.
- NO RIVNUTS



#### NON-REINFORCED SPREADER BAR

- DRILL AND TAP OVERRSIZED HOLES: #8-32 OR #10-32
- ALTERNATELY, NAS1329A06K160 (#6) OR NAS1329A08K160 (#8) RIVNUTS MAY BE ADDED AT THE (13) CENTER-MOST LOCATIONS INDICATED BELOW
- WITH EITHER METHOD ABOVE, MAY USE MS35265-28 (#6), MS35265-43 (#8), OR AN502-10-6 (#10) SCREWS IN ORDER TO ADD SAFETY WIRE, OR THE STANDARD LP526 (AN526) SCREWS



**FIGURE 7.1: 8000 SPREADER BAR THREADED FAIRING HOLE REPAIR**

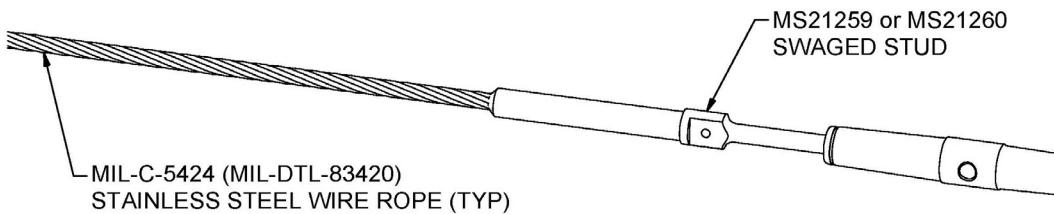
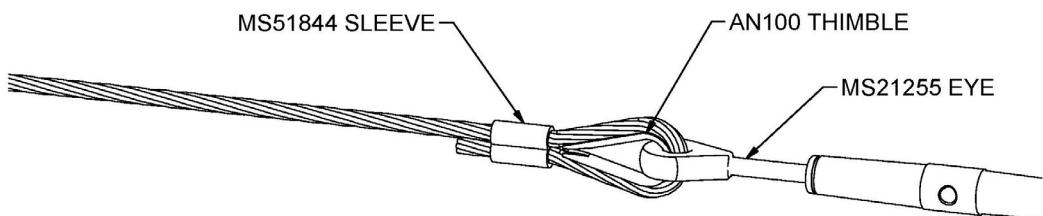
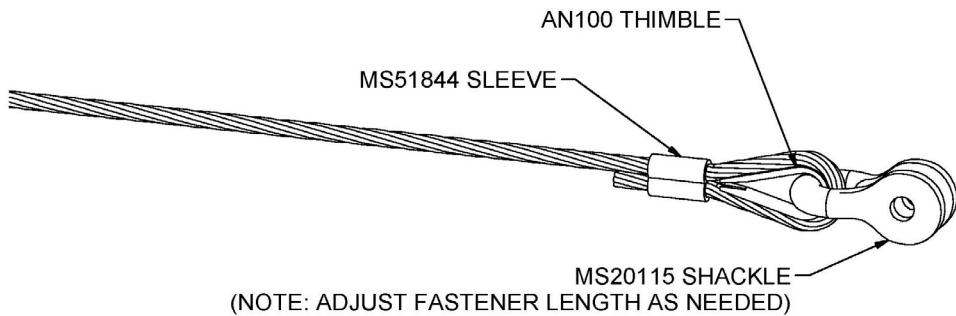
## 7.2 STEERING AND RETRACT CABLE - ALTERNATE REPAIR COMPONENTS

Aviation-style wire rope (cable) assemblies are common to water rudder systems in Wipline floats. The factory-built assemblies often use swaged components which require costly equipment unavailable at most maintenance facilities. This section describes repair options which make use of more readily available tools. These options are meant to be used when replacement of original components or replacement of the entire cable assembly is not feasible, and situations remain where only the original swaged components are appropriate. This section is targeted towards the specific configurations encountered on Wipline floats, while AC43.13-1B may be referenced for generalized guidance on this topic.

Figure 7.2 illustrates common factory configurations along with alternate repair options.

### NOTES:

1. Original specifications of the wire rope itself must be maintained, and components sized accordingly.
2. When material options exist within the noted component specifications, selection must be based on compatibility with stainless steel wire rope.
3. Proper installation of these components in accordance with manufacturer instructions is critical to maintaining the strength of the assembly.
4. Given the altered geometry, nearby structure must be assessed for clearance while keeping in mind that certain conditions can cause momentary slack in the cables.
5. Adjusted pin/fastener lengths may be required where cables terminate.
6. Cables must be re-rigged after repairs are performed.

ORIGINAL: SWAGED STUD TO TURNBUCKLE BARRELREPAIR OPTION: EYE SPLICE TO TURNBUCKLE BARRELORIGINAL: BALL END AND FORK -OR- SWAGED FORKREPAIR OPTION: EYE SPLICE TO SHACKLE**FIGURE 7.2: STEERING AND RETRACT CABLE - ALTERNATE REPAIR COMPONENTS**