

TOTAL PERFORMANCE
VAN'S AIRCRAFT

14401 Keil Road NE, Aurora, Oregon, USA 97002

PHONE 503-678-6545 • FAX 503-678-6560 • www.vansaircraft.com • info@vansaircraft.com

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SERVICE BULLETIN 12-11-09

Date Released: November 9, 2012

Date Effective: November 9, 2012

Subject: Loose U-1202 Attach Bolts, Cracking in F-1204 Center Section Assembly, Damage to side skin structure near landing gear attach.

Affected Models: All RV-12 Models

Required Action: Remove landing gear. Inspect for damage to center section and side skin structure. Repair damage if applicable. Install modifications required by this document.

Time of Compliance:

- For aircraft having been previously inspected in accordance with SB 12-09-26, *and* found to have no evidence of any structural damage, at or before the next annual condition inspection.
- For aircraft not previously inspected in accordance with SB 12-09-26, or aircraft previously inspected and found to have damage, before the next flight.

Supersedes Notice: SB 12-09-26

Synopsis:

The AN5-20A bolts used to attach the U-1202 Outbd Main Gear Attach Bracket may be improperly seated and torqued during initial installation resulting in loose fasteners and possible damage to the landing gear and aircraft structure. Some RV-12 aircraft have exhibited damage to the side skin structure near the landing gear attach point.

Method of Compliance:

Parts Required:

Qty	Item
1	F-1204V
1	F-1204T
1	F-1204U-B
2	F-1270A
2	F-1270D
2	U-1202C-B
2	U-1202D-B
2	U-1203E
5'	VA-204
8	AN365-428
4	AN365-524
2	AN365-624A
4	AN4-24A
4	AN5-22A
4	AN509-416R17
2	AN6-25A
4	HW-00003
8	NAS1149F0463P
4	NAS1149F0563P
2	NAS1149F0663P
182	LP4-3
26	CS4-4
76	CR3213-4-2
8	CR3213-4-5

List of required materials and specialty tools (not included in update kit)

12" #30 Drill
100 Degree countersink cutter (1/2" diam)
Double sided tape
1/8"-1/2" step drill
120 Degree countersink cutter with #30 pilot

Step 1: Remove the top and bottom cowling halves.

Step 2: Remove seat cushions and seat backs for both seats.

Step 3: Remove the wings from the aircraft.

Step 4: Remove the five inspection covers from the belly of the aircraft. See Section 35 of the Construction Manual.

Step 5: Disconnect negative battery cable from battery.

Step 6: Remove 3 screws that mount the F-1205G ELT Bracket to the F-1205 Mid Fuse Brace. Remove the ELT from the ELT Mounting tray (Handle the ELT gently to avoid activation since the battery has not been removed).

Step 7: Drain the fuel tank.

Remove fuel tank.

See "Draining the Fuel System" and "Fuel Tank Removal" in Chapter 13 of the Maintenance Manual.

Step 8: Support the aircraft using sawhorses such that both main landing gear are no longer touching the ground. See "Lifting and Supporting the Fuselage" in the Maintenance Manual. Note an alternative aft sawhorse position is shown in Figure 1.

A height that positions the tires approx. 1 inch off the floor makes it easier to hold the legs in the proper position during removal and re-installation.



FIGURE 1: AIRCRAFT SUPPORT

Step 9: Drain the brake fluid from the L and R side brake systems. Remove the vented cap from the brake fluid reservoir located on the firewall. Place a cup under the L & R wheel calipers. Open the bleeder valve on each brake caliper with a 1/4" wrench, and allow each system to fully drain.

Step 10: Disconnect the F-1289D L & R Caliper Brake Lines from their associated fittings on the outboard side of the U-1302 Inboard Main Gear Attach Brackets. See Construction Manual Section 35.

Step 11: Remove the two outboard most cushion clamps that attach the F-1204Y Wire Run Conduit to the F-1204 Center Section Assembly. See Construction Manual Page 31-03

Step 12: Use a Step-Drill (Uni-bit™) to drill 3/8 dia. [9.5mm] holes in the F-1276 Bottom Skin to allow for insertion of a drift (for seating the bolt hardware) or a socket extension before the socket itself is attached.. See Figure 2. This will permit torque to be applied to the head of the U-1202 attach bolts.

Step 13: Remove the main landing gear and all associated parts shown on Page 35-03 from the aircraft. The U-1203 Inboard Main Gear Attach Brackets should be left laying in the belly of the aircraft, with their plastic brake lines still attached.

Set aside the AN365-524 Nuts, U-1202's, and U-1203B's, but discard the U-1202B Outboard Wear Plate and remaining landing gear attach hardware. It will no longer be used. See Construction Manual Page 35-03

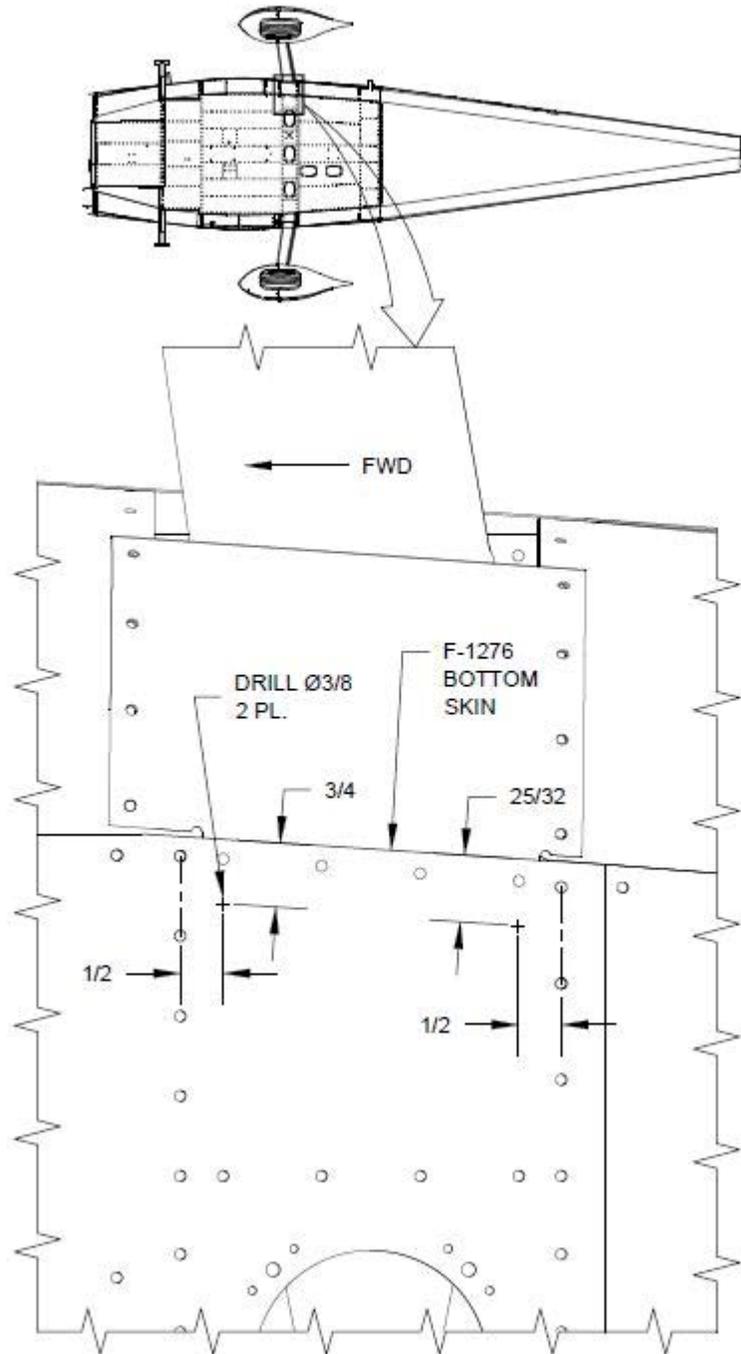


FIGURE 2: DRIFT AND SOCKET ACCESS HOLES (BOTTOM VIEW - LEFT SIDE)

Step 14: Cut the wing root seal with a razor blade at the location shown in Fig 6. Remove the portion of the wing root seal strip aft of the cut point by using a sharpened wood Popsicle type stick to lift the seal away as you pull it with your opposite hand. See Figures 3 and 4.



FIGURE 3: CUTTING SEAL STRIP

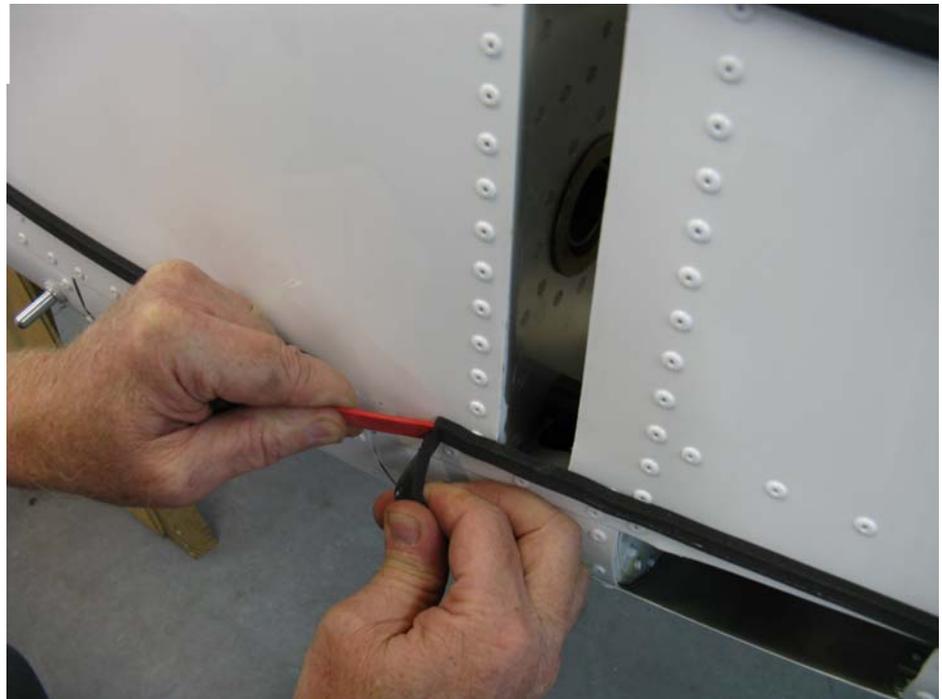


FIGURE 4: REMOVING THE SEAL STRIP

Step 15: Reference Figures 5, 6 and the F-1270A Doubler to mark the zone on the fuselage side for rivet removal. See Figure 5.



FIGURE 5: MARKING RIVET
REMOVAL AREA

Remove all rivets that have rivet callouts depicted in Figure 6

When removing blind rivets

Drive out the center mandrel of the rivet with a hammer and a 1/16" diam. pin punch by inserting the pin punch into the small hole in the manufactured head of the rivet, and then tap the mandrel out through the shop head of the rivet.

Drill through the rivet using an 1/8" drill bit. Use the combination of high rpm and very low pressure on the drill bit to help prevent the rivet from spinning.

If a rivet does spin, hold the shop head of the rivet with a pair of pliers while drilling.

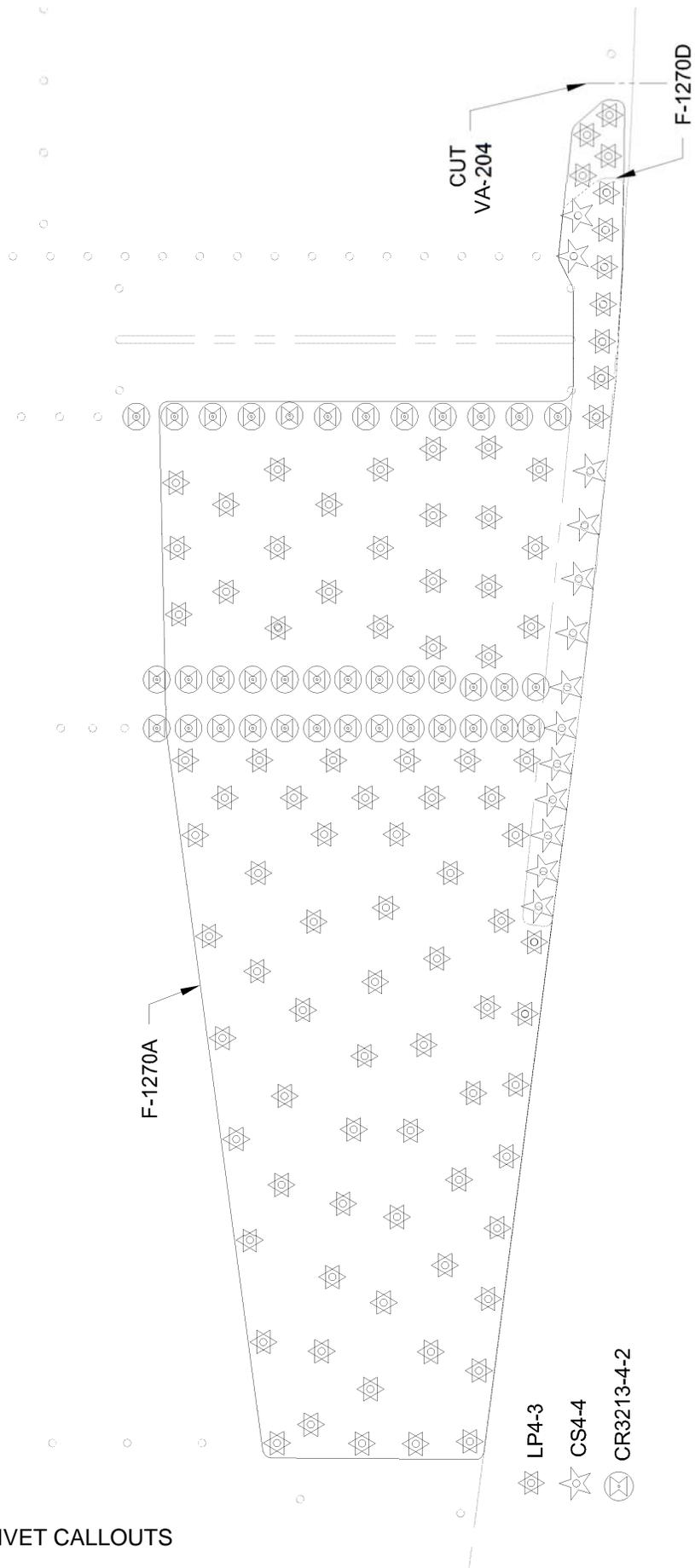


FIGURE 6: RIVET CALLOUTS

Step 16: Depending on the thickness of any paint coating that may be present, the rivet heads may stay in place after drilling. Use an 1/8" diam. pin punch to pop the rivet heads off of the skin surface.

Step 17: Once the rivet heads are all removed, any paint ridge caused by the rivet heads that is present must be removed. This can be done by shaving them flush with a sharp wood chisel, sanding them with a small sanding block, etc.. See Figure 7 and Figure 8.



FIGURE 7: RIVET HEAD
PAINT BUILDUP



FIGURE 8: REMOVED RIVET
HEAD PAINT BUILDUP

Step 18: Carefully remove the rivets holding the F-1204T-L & -R Skin Stiffeners to the F-1204 Center Section Assembly. At these eight rivet locations, it is acceptable to use a 12" long, #30 extension drill to access the rivets from below, through the gear leg opening in the fuselage side. See Construction Manual Page 20-04.

Step 19: Inspect for damage in fuselage structure including skins and internal bulkheads near the gear leg opening. See Figures 9 and 10.

Inspect the F-1289D-L & -R Brake Lines for damage where they exit the gear leg opening in the fuselage. If damage is noted, they must be replaced. Note: material for this has not been supplied with this service bulletin and must be ordered from Van's Aircraft. Each brake line will require approximately four feet of ATO-032X1/4 (.032 Wall Thickness X 1/4 O.D. 3003 Aluminum Tube)

Straighten any buckling in the F-1204F-R Aft Side Bulkhead. This especially may be prevalent just above the upper edge of the F-1204D Center Section Aft Bulkhead. See Construction Manual Page 20-04, Fig. 1.

Flatten any damage in the F-1270 Fuselage Side Skin, F-1253-L & -R Seat Floor Supports, F-1273-L & -R Baggage Corner Skin and F-1275-L & -R Fuselage Corner Skins. See Sections 21,23 and 25.

When flattening creases or ripples in skins, first evaluate the sharpness of the bend. At locations where there is a sharply defined crease apply localized pressure along the raised portion of the crease, forcing it back in the opposite direction. A hardwood (Oak or Maple) block with a 6 inch radius sanded on the end, and the sharp corners radiused slightly (about 1/16" radius) works well as a tool. The large radius on the end of the tool allows you to rock it along the crease. It is more of a massaging process than a one time bending process. Work slowly a little at a time, starting at the worst point, then working your way out from there.

On large radius creases or ripples, a tool with a bigger radius is needed. A general rule to follow for removing large radius creases is find a hard round object of similar radius (hard ball shapes work well) to the damaged area. Once again it is a massaging process... don't try and straighten the damage in just one pass.

Most of all, resist getting out a big hammer and dolly. This process is faster, but localized hammering thins/stretches the metal, causing big oilcans and ripples that can only be resolved by replacing the skin.

If unable to flatten and straighten damaged parts/skins, replace the parts or contact Van's Aircraft for further support. Van's will determine if the damage may be flattened out or if part replacement is necessary. Photos and description of damage can be e-mailed to engineering@vansaircraft.com.



FIGURE 9: SIDE SKIN DAMAGE

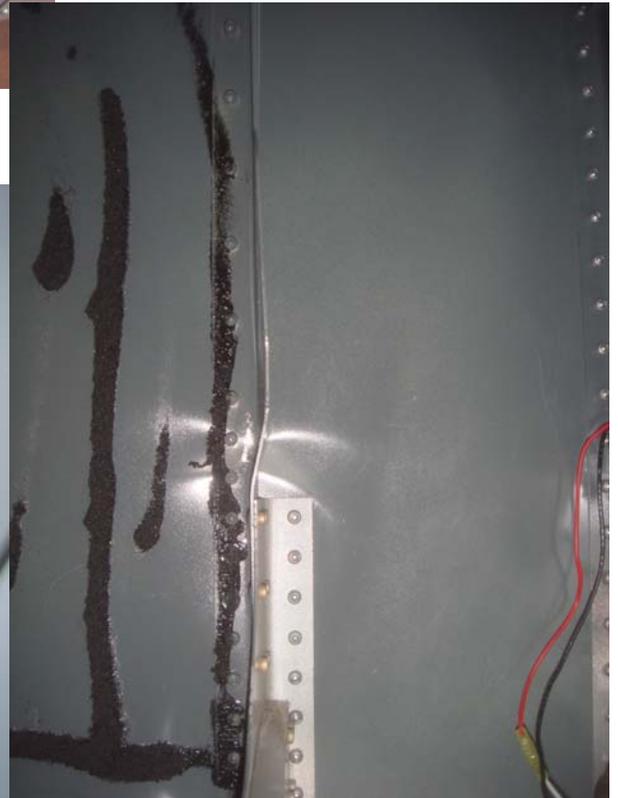


FIGURE 10: BULKHEAD DAMAGE
EXAMPLE

Step 20: Remove the blue vinyl plastic from the F-1270A and F-1270D Side Skin Doublers, and cleco them to the sides of the fuselage. See Figure 11.



FIGURE 11: ADDING SIDE SKIN DOUBLERS

NOTE: Before doing any drilling, confirm that all wiring, carpet, upholstered side panels, etc., is moved away from the fuselage side skins so it doesn't get damaged while drilling.

Step 21: Match-Drill #30, all the holes in the F-1270A and F-1270D Side Skin Doublers into the F-1270 Fuselage Side Skin, F-1253-L & -R Seat Floor Supports, F-1273-L & -R Baggage Corner Skin and F-1275-L & -R Fuselage Corner Skins, at hole locations where a hole in the aircraft structure does not already exist.

When drilling, use the drill bit reflection in the bare aluminum parts as an aid to maintain proper drill alignment. Use a new (sharp) bit, run at high speed and low pressure, to minimize burrs on the aft side (holes below the baggage floor will be inaccessible for deburring on the interior side). See Construction Manual Sections 21,23 and 25.

Step 22: Machine countersink all of the rivet locations in the F-1270A and F-1270D Side Skin Doublers where CS4-4 rivets will be installed. Use a 120 Degree cutter with a #30 pilot and cut just deep enough for a flush fit of the rivet. See Figure 6.

Step 23: Separate the F-1204U-B L & R and F-1204T-2 L & R from each other by cutting as shown in Fig. 12

Step 24: Bend a slight upward angle on the flange extensions on the bottom flange forward and aft edges of the F-1204U-B Angles. A pair of pliers with tape applied to pad the jaws can be used. See Figure 12.

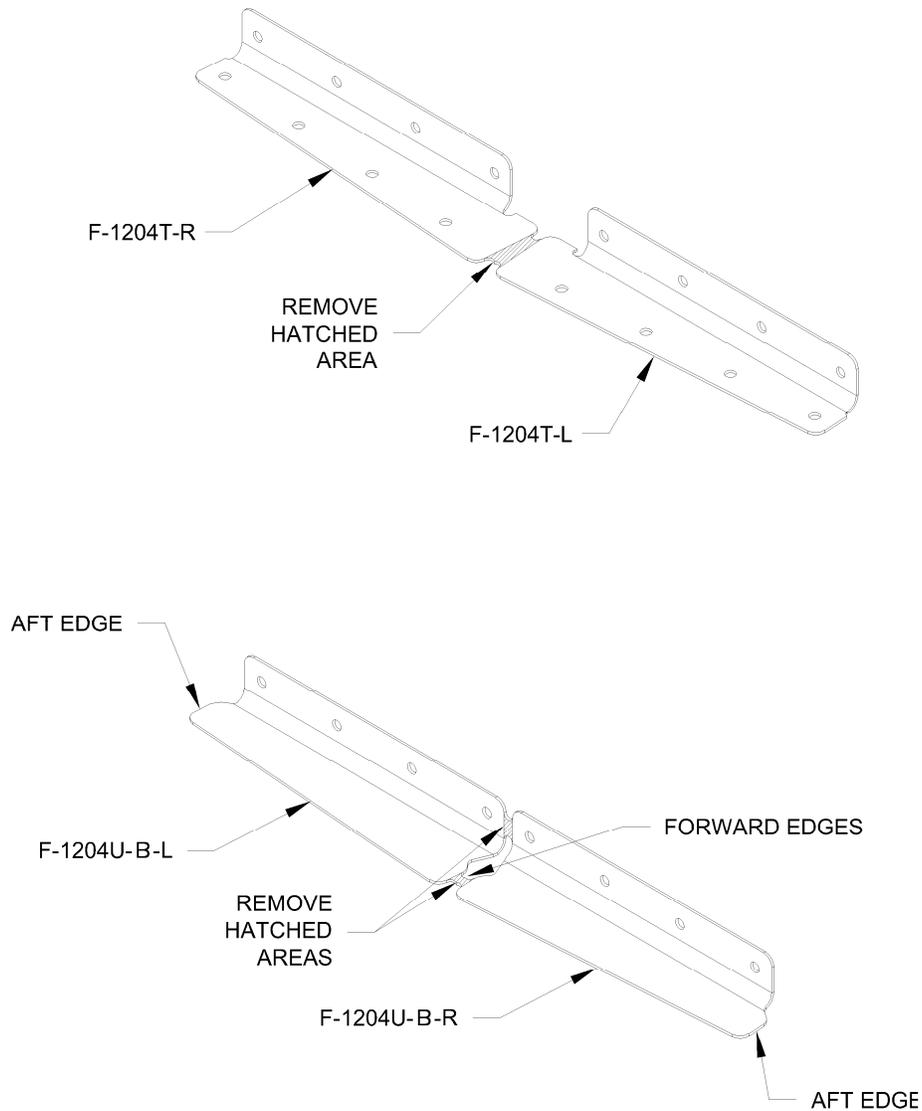


FIGURE 12: SKIN ATTACH FLANGES

Step 25: Cleco the F-1202U-B L & R into position (cleco all holes). Use a 12" #30 drill, and match drill from below up through the four holes in the F-1204 Center Section (cleco each hole as you drill). See Figure 13.

Step 26: Uncleco and remove the F-1204U-B L & R, and deburr the holes match drilled in the previous step.

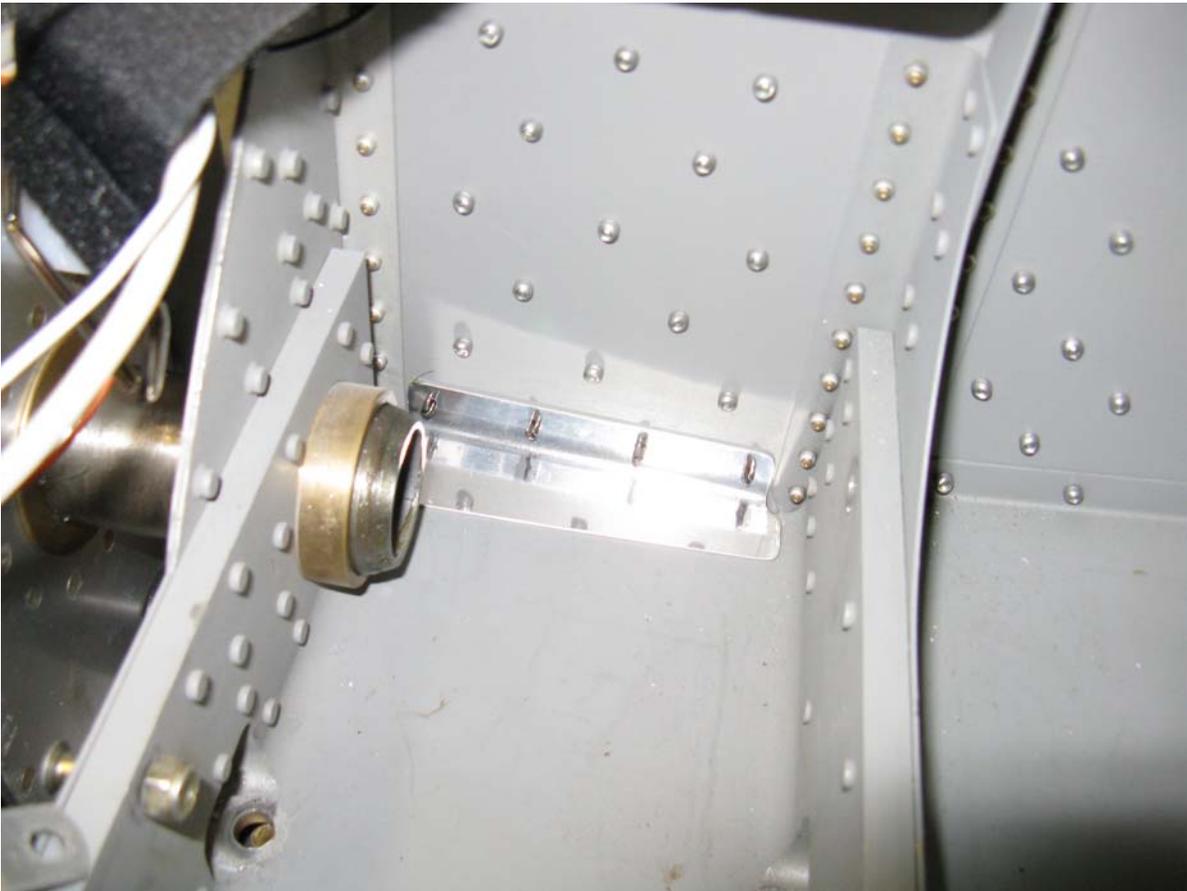


FIGURE 13: CLECOING THE SKIN
ATTACH FLANGES

Step 27: Remove the side skin doublers and deburr all accessible holes in the fuselage side skin that were just match drilled.

Step 28: Deburr the edges of the F-1270A and D Side Skin Doublers. Prime the doublers if/as desired.

Step 29: Use a shop vacuum to remove any rivet tails, drill shavings, etc., from interior areas of the fuselage. Insert an approximately 3/4 inch diameter flexible hose into the open end of the shop vacuum hose and then use tape to hold it in place and seal the rest of the shop vacuum hose end. Insert the flexible hose through the lightening holes in the F-1204 bulkhead members.

GENERAL CHERRYMAX RIVET INSTALLATION

CHERRYMAX CR32XX style blind rivets are high strength aircraft grade fasteners but only if properly installed.

NOTE: To achieve maximum rated strength use only manufacturer recommended method of installation. The source of information for Tables 1 and 2 and Figures 14B and 14D was the *CHERRYMAX Process Manual* which may be viewed and/or downloaded at: <http://www.cherryaerospace.com/files/pdf/catalog/CA-1015.pdf>

KEY POINTS TO REMEMBER:

RIVET SIZE

Rivets must be accurately sized for each application. Proper grip length selection is critical. Use only rivet lengths called out in the construction manual.

RIVET HOLE

Rivets require close tolerance holes in parts where they are being installed. See Table 1.

RIVET DIAMETER	DRILL SIZE	HOLE SIZE	
		MIN.	MAX.
-4 (1/8") [3.2mm]	#30	0.129 [3.3mm]	0.132 [3.4mm]

TABLE 1

TOOLS

CHERRYMAX rivets require a greater pull force than common blind rivets which is why the PRP-26A tool recommended for RV-12 construction does not work in this application. However most common blind rivet installation tools can install CherryMAX rivets so a more expensive Cherry brand tool is not required.

ALIGNMENT

Unlike other blind rivets used in RV construction the CherryMAX stem cannot be pulled at an angle relative to the rivet axis. If stem is not pulled straight / parallel to rivet axis premature stem breakage can occur resulting in a rivet that has not fully formed or locked.

DRIVING ANVIL

This small washer like device located above the manufactured head is a critical component of the installation process and **must not be removed**. It will detach on its own after the stem breaks.

PROPER INSTALLATION

[Step 1]: Verify tool and CherryMAX rivet compatibility by performing a test on an easily removed rivet, in the event that removal becomes necessary. If necessary see **CherryMAX RIVET REMOVAL** below.

[Step 2]: Verify correct rivet part number which is marked on the head of the rivet as shown in left-hand side of Figure 14A.

[Step 3]: Insert rivet in hole and verify manufactured head fits square and flush to material surface. See the left-hand side of Figure 14A.

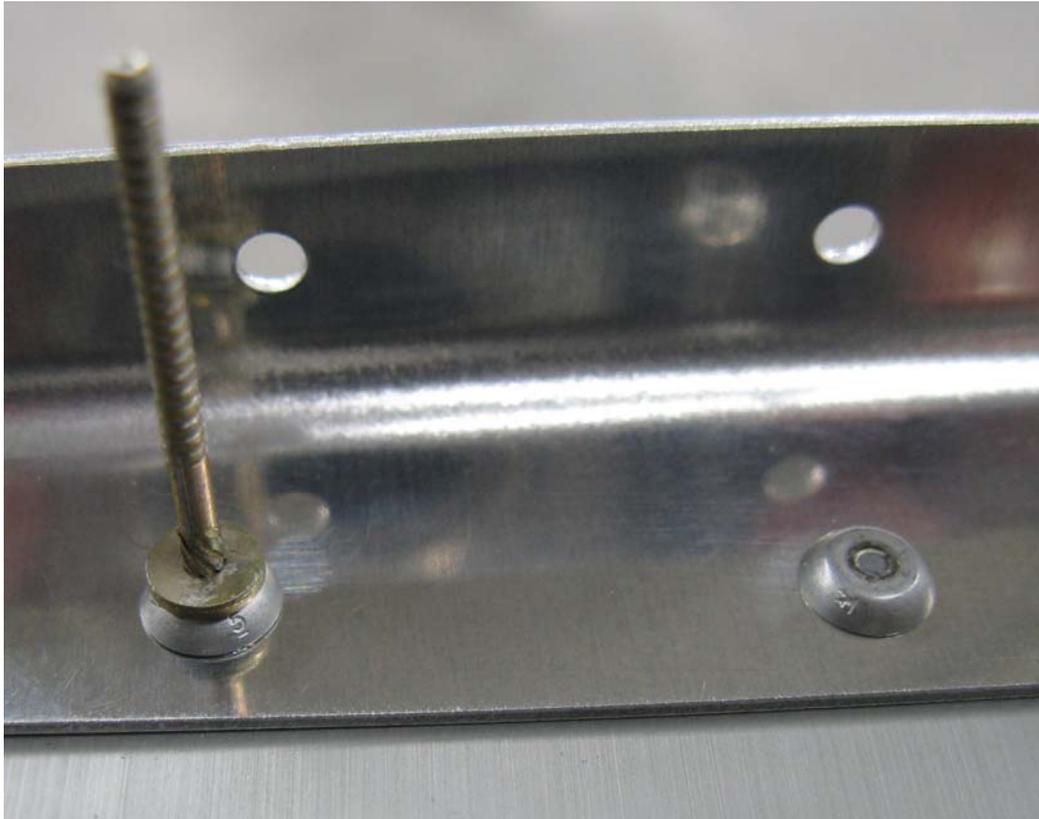


FIGURE 14A: CR32XX MANUFACTURED HEAD EXAMPLE
(before and after installation)

[Step 4]: Slip tool over rivet stem.

[Step 5]: Operate tool while taking care to not lean tool or bend rivet stem while doing so. Continue to pull rivet stem until it snaps free as shown in right-hand side of Figure 14A.

[Step 6]: Inspect rivet to confirm proper installation per the following three criteria:

- i. Nearly flush surface due to stem fracture at top of manufactured head. See right-hand side of Figure 14A.

Typical fastener flushness acceptance criteria is shown in Figure 14B and listed in Table 2 below. Locking collar is to be flush with top surface of rivet head. Collar flash permissible is .020 max. Stem flushness shall be as indicated.

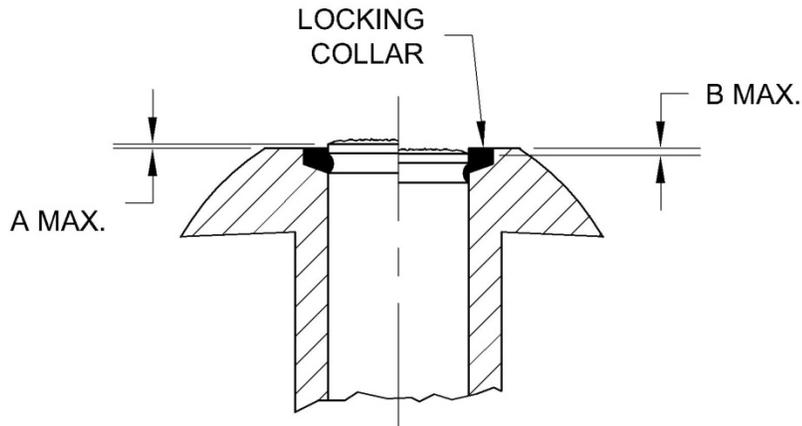


FIGURE 14B: RIVET CROSS SECTION

RIVET DIAMETER	A MAX.	B MAX.
-4 (1/8") [3.2mm]	0.010 [.25mm]	0.015 [.38mm]

TABLE 2

- ii. Base of manufactured head should be tight against surface of material being riveted as shown in right-hand side of Figure 14A.

- iii. Stem will not be pulled fully into rivet body at shop head end, but rivet body should have formed (closed up) around stem as shown in left-hand side of Figure 14C. See Figure 14D for acceptable blind head formations.

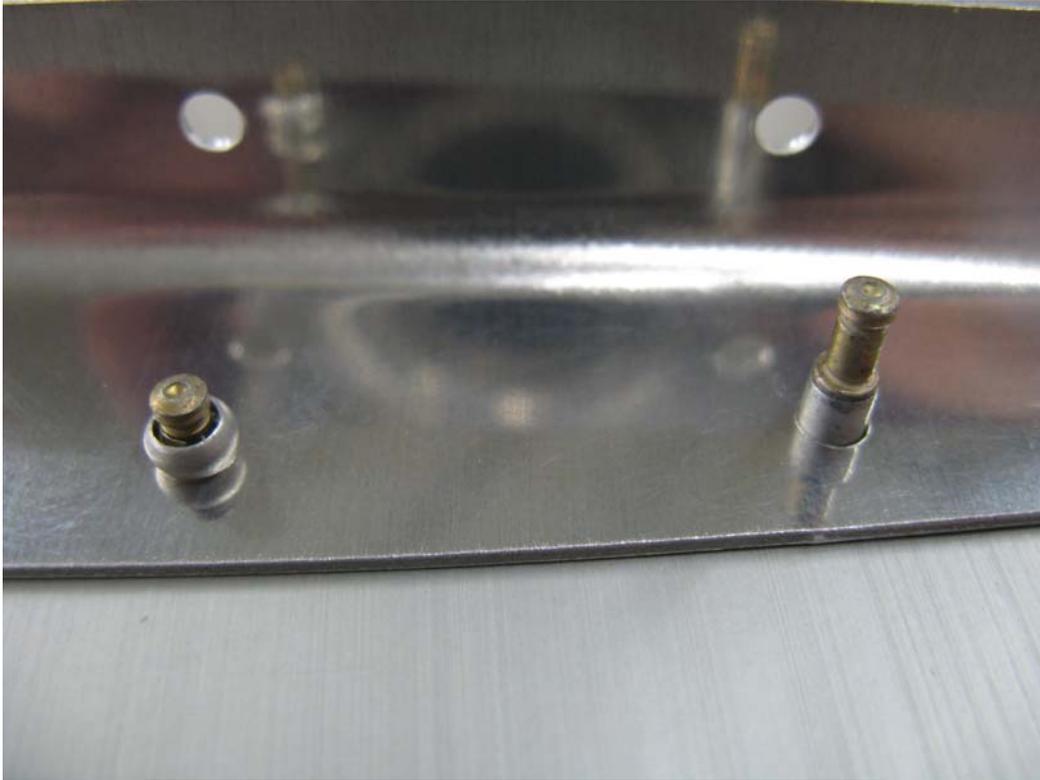


FIGURE 14C: CR32XX
SHOP HEAD EXAMPLE
(after and before installation)



FIGURE 14D: ACCEPTABLE BLIND HEAD FORMATIONS.

CherryMAX RIVET REMOVAL

NOTE: Information taken from *CHERRYMAX Process Manual* which may be viewed and/or downloaded at:

<http://www.cherryaerospace.com/files/pdf/catalog/CA-1015.pdf> This manual contains figures which coincide with the text below.

Should it be necessary to remove an installed **CherryMAX** rivet, the following procedures are recommended.

NOTE: All work is performed from the manufactured head side of the rivet.

[Step 1]: Center punch stem.

[Step 2]: It is recommended that a small center drill be used to provide a guide for a larger drill on top of the rivet stem, and the upper portion of the stem be drilled away to destroy the lock.

[Step 3]: Drive out the rivet stem using a steel pin punch.

[Step 4]: Drill nearly through the head of the rivet using a drill the same size as the rivet shank.

[Step 5]: Break off rivet head using a pin punch as a pry bar.

[Step 6]: Drive out the remaining rivet shank with a pin punch.

Caution: DO NOT drill completely through the rivet sleeve to remove a rivet as this may enlarge the hole.

30: Tap the Spar Pin Bushing in the left and right sides of the F-1204 Center Section fwd slightly to provide access to the fwd most rivet that attaches the F-1204U-B L & R and F-1204T-2 L & R Angles.

NOTE: In Figure 14E rivets are shown installed from the upper side. IT IS NOT PERMISSIBLE FOR THE STEM OF THE RIVET TO BE BENT OVER DURING INSTALLATION. If the side skin in combination with the size of the rivet puller does not permit pulling squarely without bending the rivet stem then you must either locate a different puller or the rivets must be installed from the bottom side which will require removal of the cover plates. See "COVER PLATE REMOVAL & INSTALLATION" below.

Rivet the F-1204U-B L & R and F-1204T-2 L & R to the F-1204 Center Section Assembly using CR3213-4-5 rivets as shown in Figure 14E.

Tap the Spar Pin Bushings back into their original position.

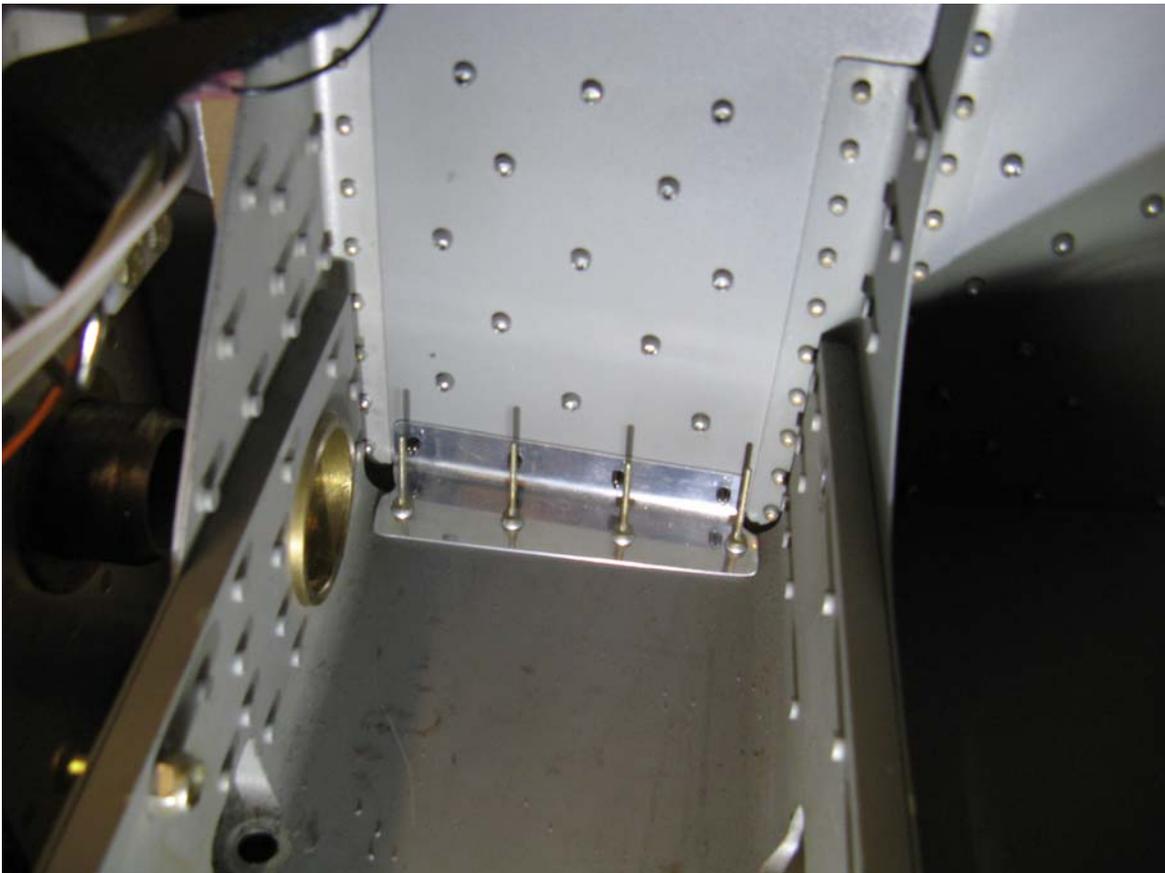


FIGURE 14E: ATTACHING SKIN STIFFENER ANGLES TO CENTER SECTION CHANNEL USING CHERRYMAX CR32XX RIVETS
(NOTE: RIVETS ARE SHOWN INSTALLED FROM THE UPPER SIDE)

COVER PLATE REMOVAL & INSTALLATION

This procedure is only necessary if it's not possible to install the CR32XX rivets from the upper surface of the Center Section, as shown in Figure 14E, and for reasons mentioned in the NOTE above.

[Step 1]: Drill out the existing LP4-3 rivets attaching the F-1275G-L and F-1275G-R (not shown) Cover Plates to the surrounding skins and remove them (cover plates).

[Step 2]: Insert rivets called out in Step 30 through the underside of the Center Section Assembly and F-1204U-B-L Skin Stiffener and rivet them together. Repeat for F-1204U-B-R Skin Stiffener.

[Step 3]: Cleco then rivet the Cover Plates back into place using the rivets called out in Figure 14F.

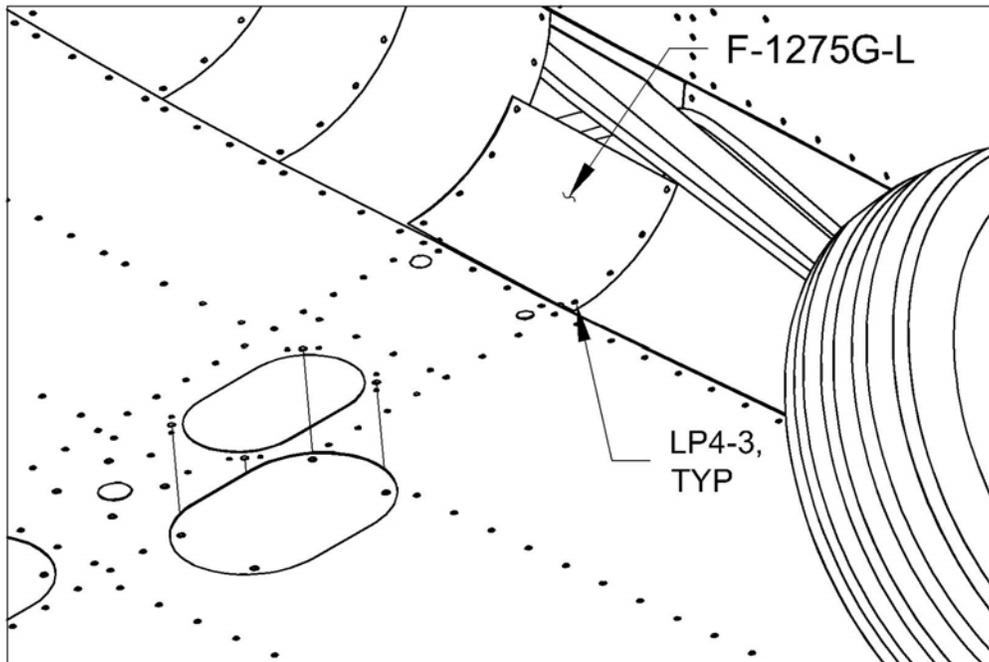


FIGURE 14F: COVER PLATE REMOVAL

Step 31: Rivet the F-1270A and F-1270D Side Skin Doublers to the fuselage structure using the rivet callouts in Figure 6.

Step 32: Add bevels to the four corners of the U-1202 Outboard Main Gear Attach Brackets as shown in Figure 15, and detailed in RV-12 SB 12-09-2.

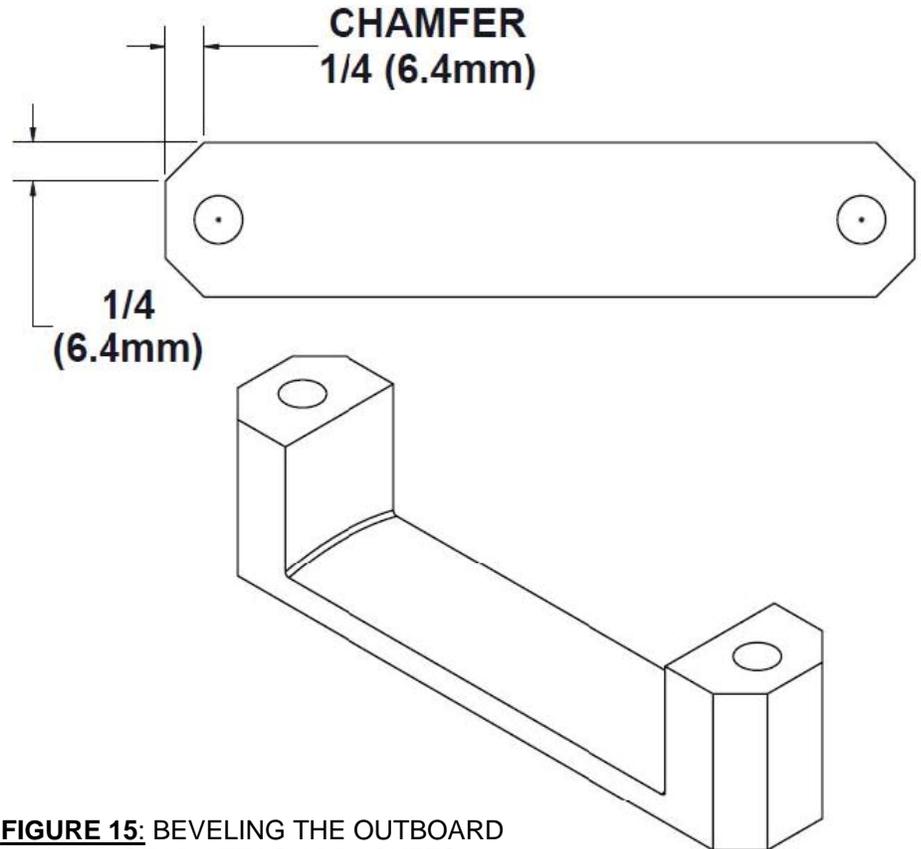


FIGURE 15: BEVELING THE OUTBOARD MAIN GEAR ATTACH BRACKETS

NOTE: The following Steps and figures are for the right side of the aircraft. Repeat the steps for the left side when finished except as noted. The left side is a mirror of the right.

WARNING: Since the parts and the drill template are not symmetrical, be very sure you have them properly oriented (new holes being added are beside the *forward bolt*).

Step 33: Thoroughly clean the area and remove any primer or paint around the cracked region shown in Figure 16. Inspect the areas around the forward U-1202 Outboard Main Gear Attach Bracket hole in the F-1204 Center Section Assembly.

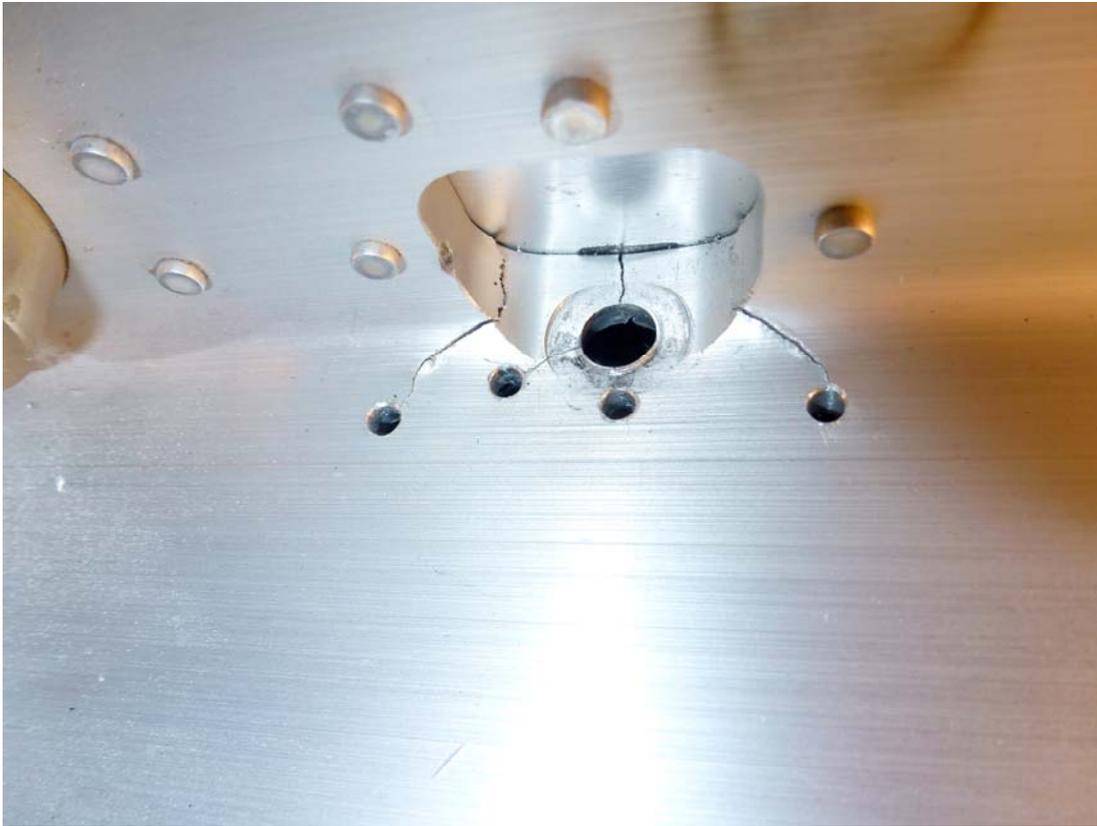


FIGURE 16: CENTER SECTION CRACKING

If cracks are present find the end of the crack then mark the end with a center punch. Stop Drill #30 the end of each crack.

Send pictures to Van's Aircraft engineering department at engineering@vansaircraft.com. A solution will be determined on a case by case basis.

Step 34: Deburr the edges of the U-1202C-B Outboard Doubler Plates and U-1202D-B Outboard Wear Plates (The edges do not have to be perfectly smoothed, just burrs removed that would prevent the parts from laying flush when installed). See Figure 17.

Step 35: Remove the blue vinyl plastic from both sides of the F-1204V Drill Template. Install double sided tape on the two tabbed areas of the template. See Figure 17.

Step 36: Attach the F-1204V Drill Template to the top side of the F-1204 Center Section Assembly with the U-1202 Outboard Main Gear Attach Bracket, U-1202C-B Outboard Doubler Plate and U-1202D-B Outboard Wear Plate to the lower side of the center section assembly at the attachment location for the right main gear leg. Note that the steel wear plate goes below the doubler plate. Use the old AN365-524 Nuts saved when

removing the main gear. Use washers under the head of the bolt as required to pull the assembly up tight. See Figure 17.

Step 37: Match-Drill #30, the two .125 holes called out in Figure 17, through all parts using the template as a drill guide. Use the reflection of the drill bit in the template to check that the drill bit is perpendicular to the surface of the template.

Remove the template leaving the remaining parts still attached to the center section assembly and repeat this step for the left side of the aircraft, except leave the template in place after drilling the holes on the left side. Install new double sided tape if/as necessary.

Step 38: Using the reflection visible in the template to keep the drill bit perpendicular to the surface, drill 1/4" both holes just match-drilled #30. Remove the template and all of the other associated parts, taking note of their orientation they were in when drilled.

Mark the Doubler Plate and Wear Plate in such a way that will allow you to reinstall them positioned the same as when drilled. Example: "Left Top".

Step 39: Relocate the template back to the right side. Re-Tighten the hardware holding the attach bracket, doubler and wear plate, and drill template in place. The template is being reinstalled for it's reflective properties. Repeat the drilling process from the previous step for the two holes on the right side.

Remove the template and all of the other associated parts. Once again take note of the part orientation and mark it on the right side Doubler Plate and Wear Plate as was done for the left side.

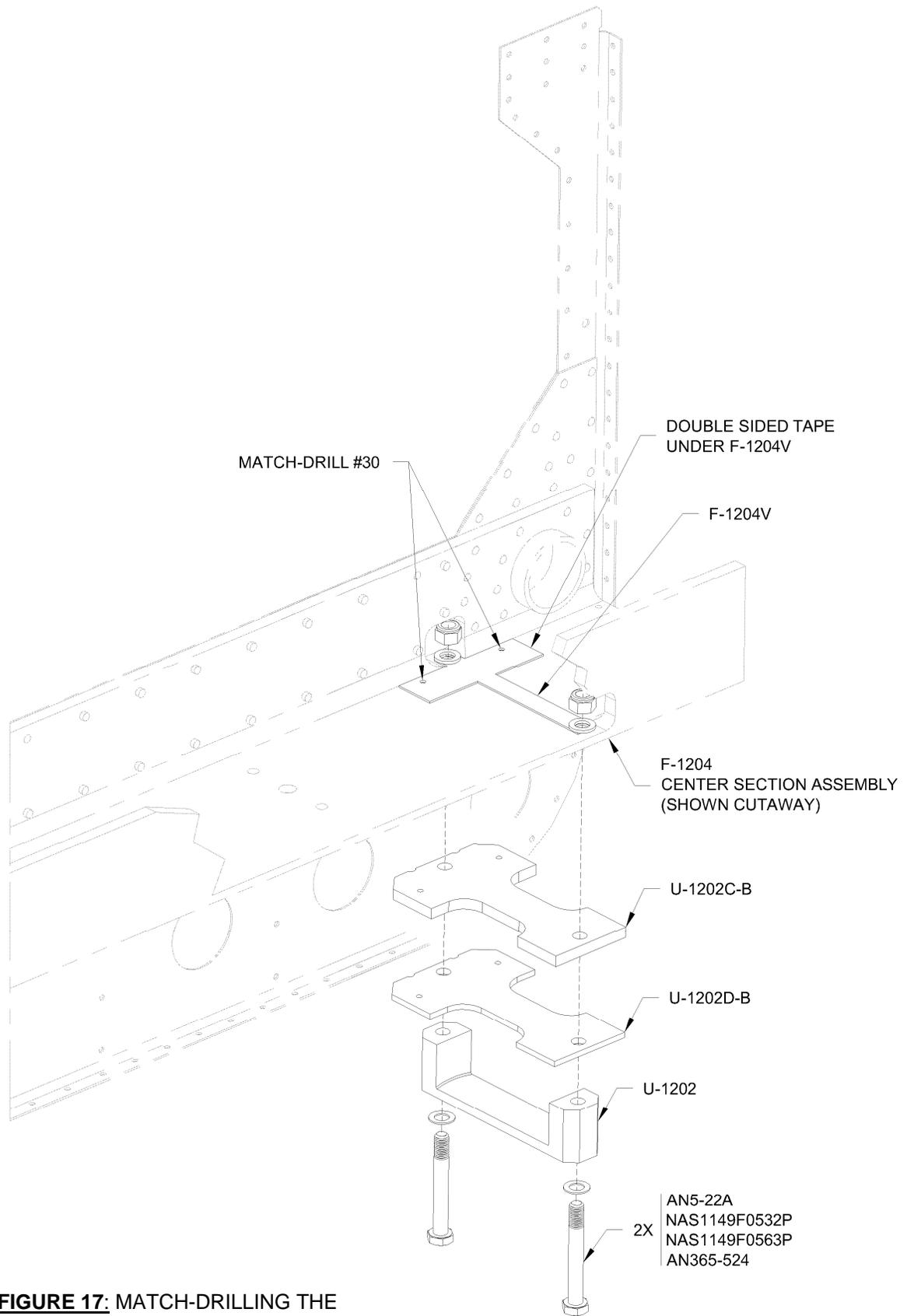


FIGURE 17: MATCH-DRILLING THE CENTER SECTION

Step 34: Deburr the 1/4" holes in F-1204 Center Section, U-1202C-B Outboard Doubler Plates and U-1202D-B Outboard Wear Plates.

Step 41: Clean any drill shavings, etc., from the aircraft.

Step 42: Machine countersink the lower side of the U-1202D-B Outboard Wear Plate at the two locations drilled in the previous step for the head of the AN509-416R17 Screws supplied in the update kit. Be sure to countersink the bottom surface of the Outboard Wear Plate (refer to the orientation marks previously made on the part).

Use a 100 degree machine countersink tool.

NOTE: As long as a drill press is used while countersinking, it is not necessary to use a countersink tool with a 1/4 inch pilot.

Cut the head off of a scrap (but straight) 1/4" bolt. Fit the cut off bolt into the chuck of a drill press and use it as an alignment pin to center the wear plate under the drill chuck. See Figure 18.

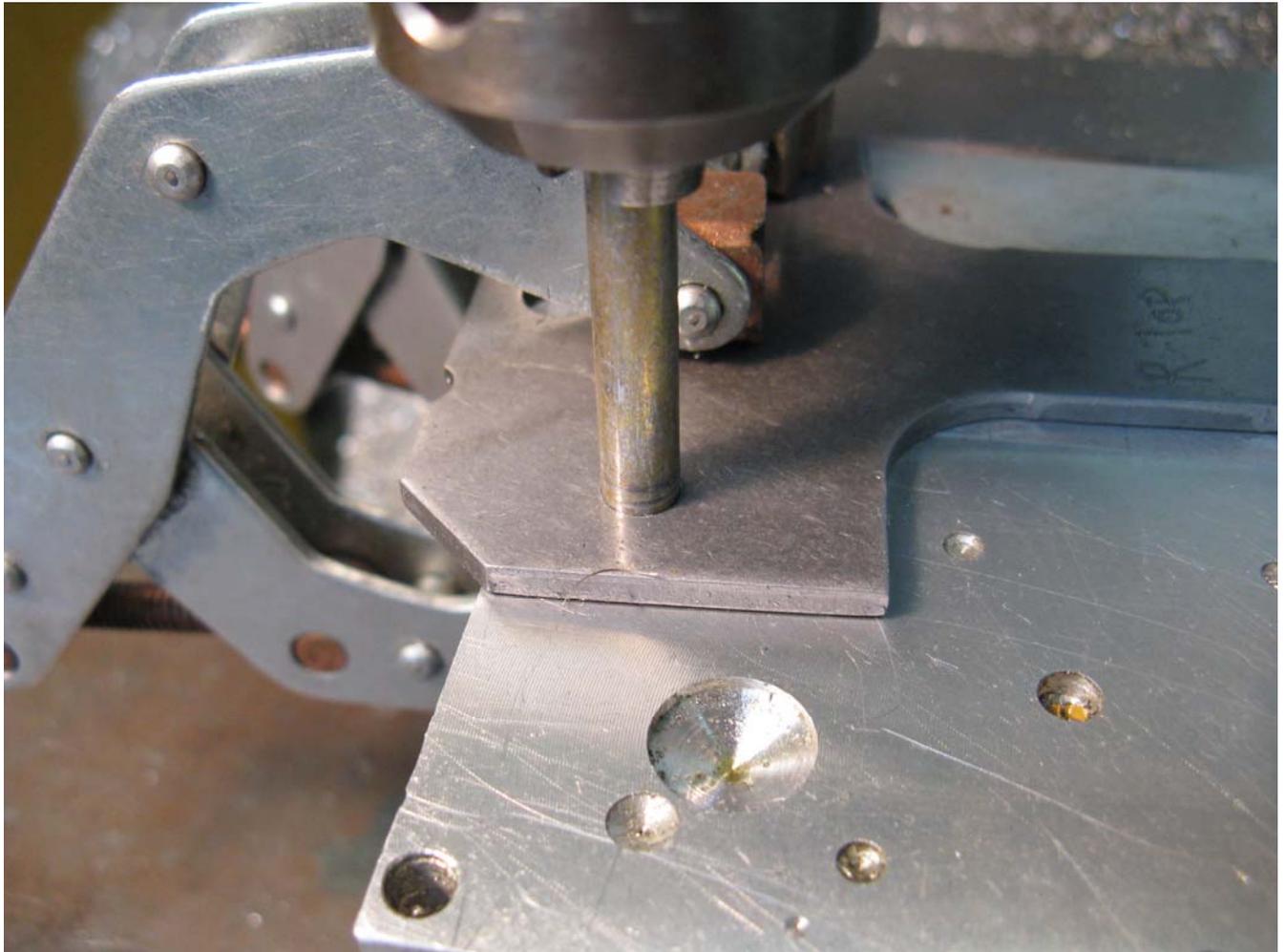


FIGURE 18: DRILL PRESS POSITIONING

With the Wear Plate in position, clamp it to the drill press table. (see photos)
Remove the scrap bolt from the drill press chuck, and install the 100 Deg. countersink.

Use a drill press speed of 500 -650 RPM.

Use cutting fluid or oil while machine countersinking the Wear Plate.

The outside diameter of a proper depth countersink is 1/2". See Figure 19.

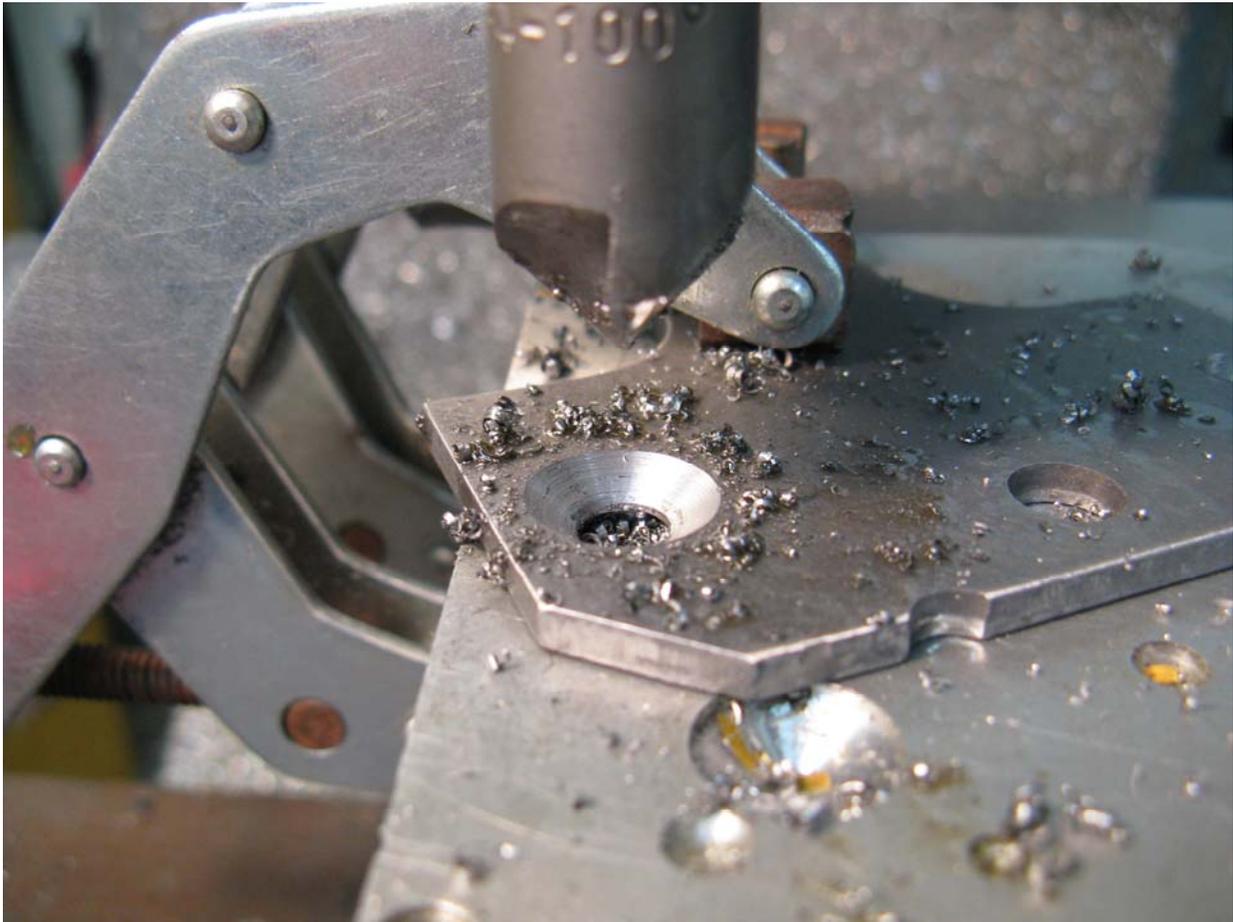


FIGURE 19: MACHINE-COUNTERSINKING
THE WEAR PLATES

Step 43: Lightly prime (keep primer thickness to a minimum) the U-1202C-B Outboard Doubler Plates, U-1202D-B Outboard Wear Plate, U-1203 Inboard Wear Plate and U-1203E Inboard Doubler Plates.

To prevent rust, lightly coat the gear leg contact areas of the U-1202D-B Outboard Wear Plate and U-1203 Inboard Wear Plate, and the bare metal areas of the U-1202 and U-1203 with grease.

Step 44: If applicable, prime and paint the visible portions of the F-1270A and F-1270D Side Skin Doublers. Note: this can be done at any time, but is best if done before reinstalling the removed portion of the VA-204 seal strip.

Step 45: Install the U-1202C-B Outboard Doublor Plate and U-1202D-B Outboard Wear Plate to the F-1204 Center Section Assembly as shown in Figure 20. Use 2 temporary AN5 bolts as alignment pins to assure alignment while torquing the nuts on the screws.

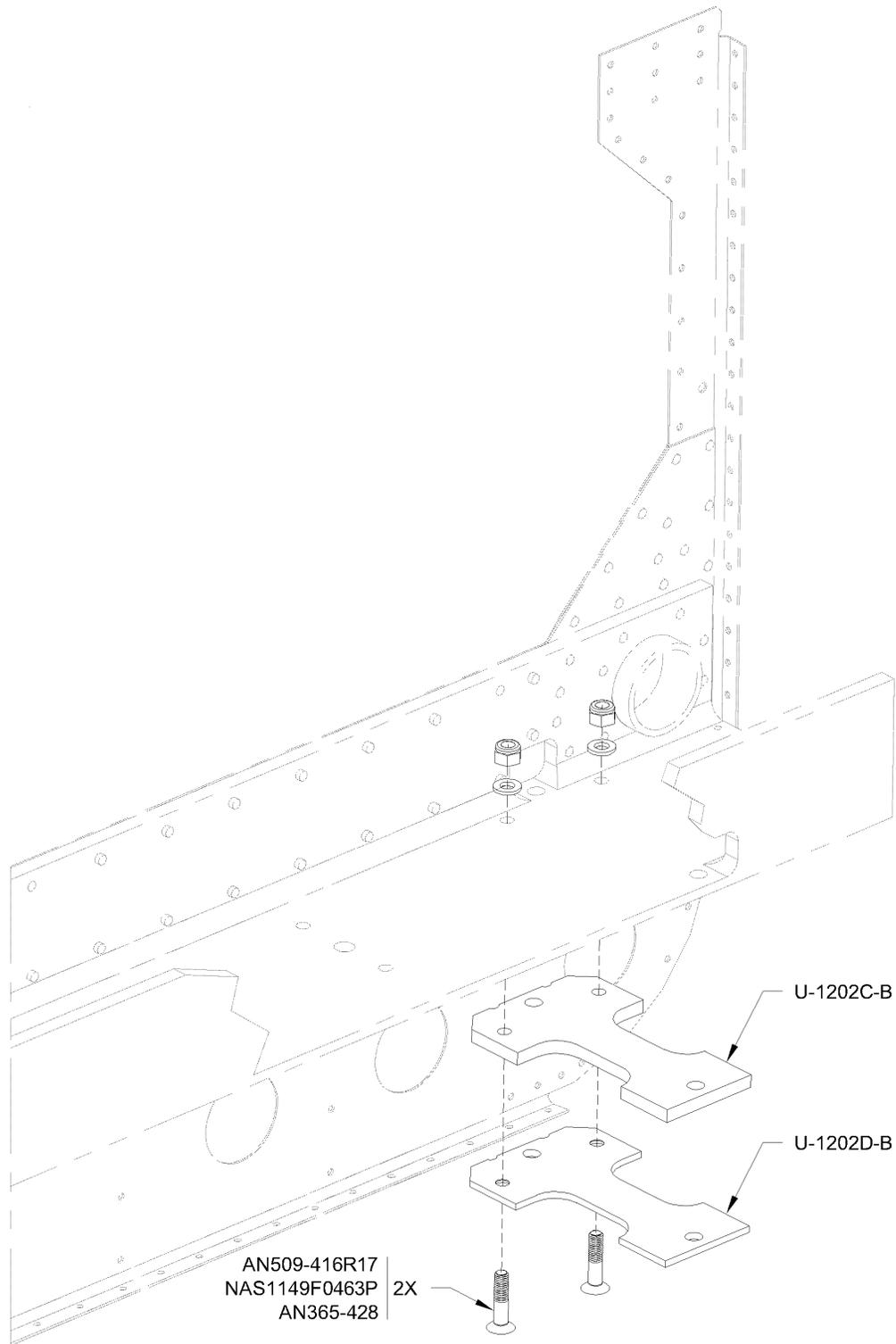


FIGURE 20: INSTALLING THE OUTBOARD DOUBLER AND WEAR PLATES

NOTE: When torquing bolts remember to account for the prevailing torque.

The importance of correct torque application cannot be overemphasized. Under-torque can result in unnecessary wear of nuts and bolts, as well as the parts they secure. Over-torque can cause failure of a bolt or nut from over - stressing the threaded areas. Uneven or additional loads that are applied to the assembly may result in wear or premature failure. The following are a few simple, but important procedures, that should be followed to ensure that correct torque is applied.

NOTE: Be sure that the torque applied is for the size of the bolt shank not the wrench size.

Use the standard torque table provided as a guide for tightening nuts, bolts and screws. These values are for clean and dry threads. Note that on the smaller bolts the torque is quite low and is in inch pounds. Do not try and use a foot pound torque wrench on these bolts. Use a torque wrench calibrated in inch pounds. Apply a smooth even pull when applying torque pressure. When using the 1/4 in. drive snap-over type torque wrench we recommend practicing with it off the aircraft first until you get the feel of the snap-over since it can be rather light depending on the size of the fastener.

Apply the torque to the nut and not the bolt whenever possible. This will reduce rotation of the bolt in the hole and reduce wear. When the bolt is rotated for final torque the chart values must be modified. When applying torque to a bolt be sure to have a washer under the bolt head and lubricate the bolt shank. Add to the overall torque value the torque required to overcome the friction associated with turning the shank of the bolt within the assembly.

When tightening fasteners with self-locking nuts the chart values must be modified. Due to the friction of the locking device noticeable torque is required just to turn the nut onto the threads and does nothing to actually tighten the parts together and stretch the bolt (clamp load). This is called friction drag (or prevailing) torque. The friction drag torque must be determined and then added to the standard torque from the table. Run the nut down to where it nearly contacts the washer or bearing surface and check the friction drag torque required to turn the nut. (At least one thread should protrude from the nut). Add the friction drag torque to the standard torque. This sum is referred to as the final (or total) torque, which should register on the indicator or setting for a snap-over type torque wrench.

As an example illustrating the importance of determining the friction drag torque consider new AN3 bolts and MS21042-3 all metal lock nuts. Testing showed the friction drag torque at 14 in-lbs. The standard torque for this nut/bolt combination is 20-25 in-lbs. Let's say we choose 20 in-lbs. This results in a final torque setting on our wrench of 14 plus 20 or 34 in-lbs. Though we exceeded the 25 in-lb value listed in the table by using a final torque of 34 in-lbs we are still well within the capability of the nut. (Incidentally this nut must meet a maximum torque test value of 60 in-lbs per the military standard spec sheet.) Now what if we completely ignore the friction drag torque and set our wrench to just 20 in-lbs? Recall that it requires about 14 in-lbs (friction drag torque) just to turn the nut. We subtract 14 from 20 and arrive at only 6 in-lbs of torque (torque being the measurement of friction, not tension) applied to induce preload (clamp load) in the bolt. Not a satisfactory result.

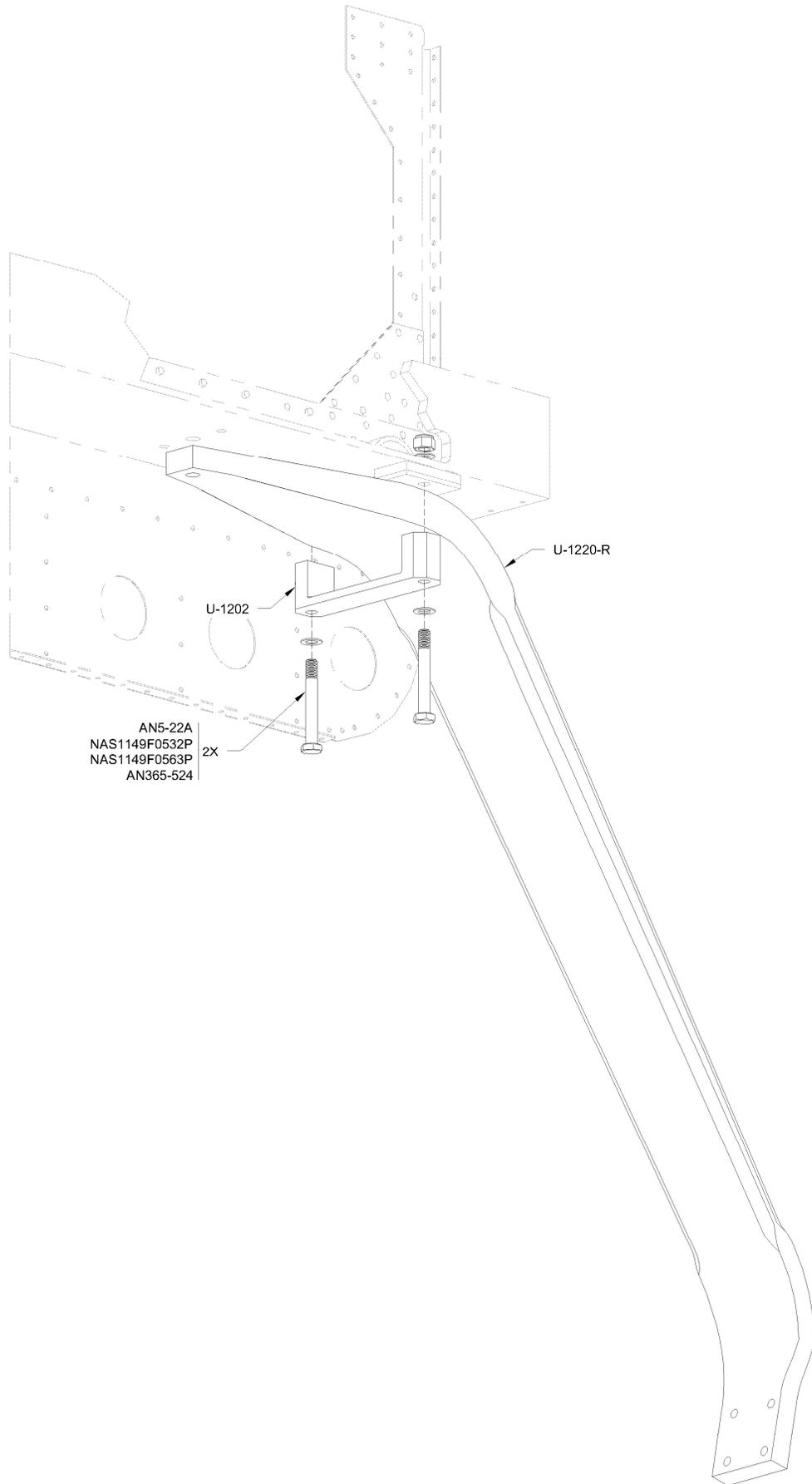
AN Bolt Size	Bolt Size- Threads Per Inch	Standard Nuts AN310, AN315, AN365	
		<i>INCH POUNDS</i>	<i>FOOT POUNDS</i>
AN3	#10-32	20-25	1.6-2.0
AN4	1/4-28	50-70	4.2-5.8
AN5	5/16-24	100-140	8.3-11.6
AN6	3/8-24	160-190	13.3-15.8

NOTE: There may be interference between the U-1202 Outboard Main Gear Attach Brackets and existing rivets in the center section. Confirm that Chamfers have been added to the corners of the outboard main gear attach brackets as described in Step 32 of this service bulletin.

Some early model fuselage kits may have a slight rivet interference on the centerline of the bracket. In this situation the interference should be negligible. Install the bracket as normal.

When installing the gear leg attach bolts, coat them with a light oil or spray lube to reduce the insertion and rotation resistance.

Step 46: Maneuver the U-1202-R Gear Leg and U-1202 Outboard Main Gear Attach Bracket into position at the same time as shown in Figure 21. Insert the two AN5 bolts with washers and nuts but don't fully tighten them yet.



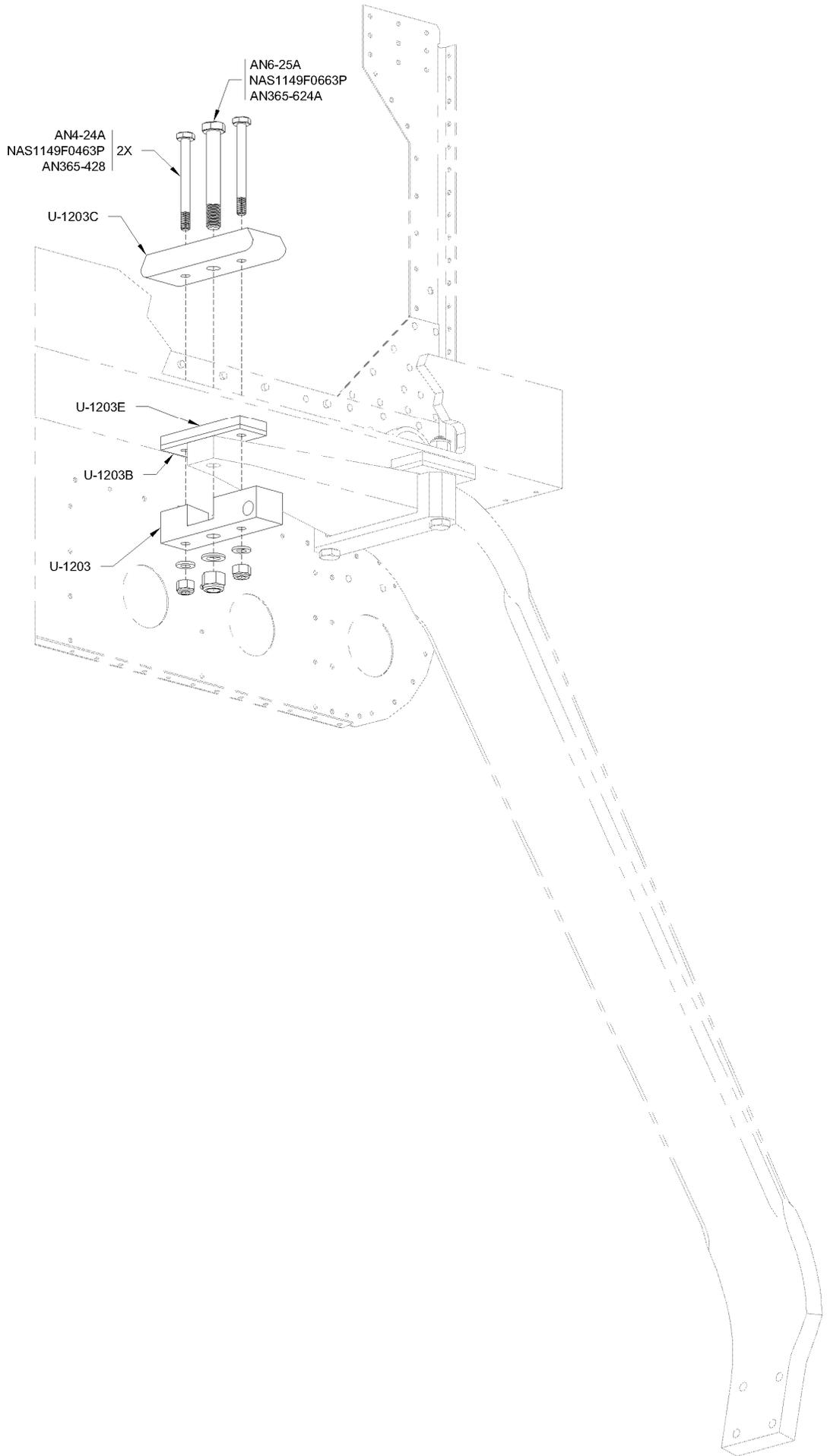
Step 47: Install the U-1203B Inboard Wear Plate, U-1203E Inboard Doubler Plate, U-1203 Inboard Main Gear Attach Bracket, and U-1203C Doubler Plate using the hardware called out in Figure 22 (spacers can be used between the floor and the tire to position the inboard end of the leg away from the center section)

When the leg is properly positioned, tighten and torque the three inboard bolts (start with the center AN6 bolt first).

Use a hammer and brass drift - to protect the head of the bolts - to seat the two outboard bolts fully against the bottom of the outboard main gear attach bracket. Evenly tighten the bolts, moving from one to another, while checking that the outboard main gear attach bracket is pulling up around the gear leg evenly (that the gap between the wear plate and gear attach bracket is the same at each bolt) until the final torque is reached.

Seat the bolts again with hammer and drift then make a final check of the torque.

Fill the four 3/8 diameter holes made in Step 12 with HW-00003 Plugs (plastic snap in plugs supplied in S.B. kit).



Step 48: Remove the supports under the fuselage.

Step 49: Reinstall the two outboard most cushion clamps previously removed from the F-1204 Center Section Assembly. See Construction Manual Page 31- 03, Fig. 1.

Step 50: Reconnect the F-1289D L & R Caliper Brake Lines to their associated fittings on the on the U-1302 Inboard Main Gear Attach Brackets (make new lines if damage was found on the originals during the damage inspection). See Construction Manual Page 35-04, Fig. 3.

Step 51: Re-install brake fluid in the L & R Brake systems. See Maintenance Manual p. 7-5

Step 52: Reinstall the fuel tank. See "Fuel Tank Removal" in Chapter 13 of the Maintenance Manual.

Step 53: Re-install the F-1205G ELT Bracket to the F-1205 Mid Fuse Brace. Reinstall the ELT in the ELT Mounting tray (Handle the ELT gently to avoid activation).

Step 54: Re-connect the negative battery cable to the battery.

Step 55: Add a few gallons of fuel to the fuel tank. Switch the fuel selector valve to on. Switch the master switch to the on position to pressurize the fuel system and verify there are no fuel leaks in the engine compartment or fuselage.

Step 56: Re-install the five inspection covers on the belly of the aircraft. See Section 35 of the Construction Manual.

Step 57: Temporarily install the wings on the aircraft. Mark the fuselage side in the area covered by the newly installed doubler plate, for installing the seal strip. See Construction Manual Section 33-04. Mark the bottom wing skin for the trimming required, to allow for the thickness build-up of the added fuselage side skin doublers. . See Construction Manual Section 30-03

Remove the wings.

Re-apply the VA-204 seal strip in areas that it was previously removed. See Construction Manual Section 33-04.

Trim the lower wing skins to the lines previously marked. Scoring/cutting the paint surface using a razor blade and straight edge, is helpful in preventing cracking/chipping of the paint.

Step 58: Reinstall the Wings

Step 59: Re-install the seat backs and seat cushions for both seats.

Step 60: Verify proper function of the brakes from both seat positions.

Step 61: Install bottom cowl.

Step 62: Test run engine and verify normal operation.

Step 63: Install top cowl

Step 64: Calculate a new weight and balance using the following correction factor

Weight Added : 2.22 lb

Arm: 99.09 inches aft of datum which is 70 inches ahead of the leading edge.

Moment = 2.22 lb X 99.09inches = 219.98 inch - lb

For further information on weight and balance see the weight and balance section in the Production Acceptance Procedures document.

Make an entry on page W&B-2 of the RV-12 Production Acceptance Procedures as follows:

As of this date; ___/___/___ the following values represent current Weight and Balance calculations resulting from the installation of SB 12-11-09.

Revised Empty Weight: _____ lbs

Revised Empty Moment: _____ in-lbs

Revised Empty Arm: _____ in

Signed: _____

Transfer the new weight and balance information to the Pilot Operating Handbook for the aircraft.

Step 65: Complete a log book entry recording compliance with S.B.

Note: Re-torque all landing gear attach bolts after 5 flights hours.