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SERVICE BULLETIN SB-00040

Date Released: August 15, 2022 (general release)
September 13, 2021 (limited release for test installation)

Date Effective: August 15, 2022

Subject: RV-12 Landing Gear Beam Reinforcements

Affected Models: Original RV-12 (does not apply to RV-12iS)

Required Action: Add two Landing Gear Beam Reinforcement Plates, four Landing Gear Beam Plugs, two Reinforcement Angles, and a Fuel Tank Spacer. Replace the Wear Pads with new version. Install enlarged and additional fasteners.

Time of Compliance: Compliance with this Service Bulletin is optional, but is recommended for RV-12 aircraft used in flight training and/or on rough/unpaved runways.

Supersedes Notice: N/A

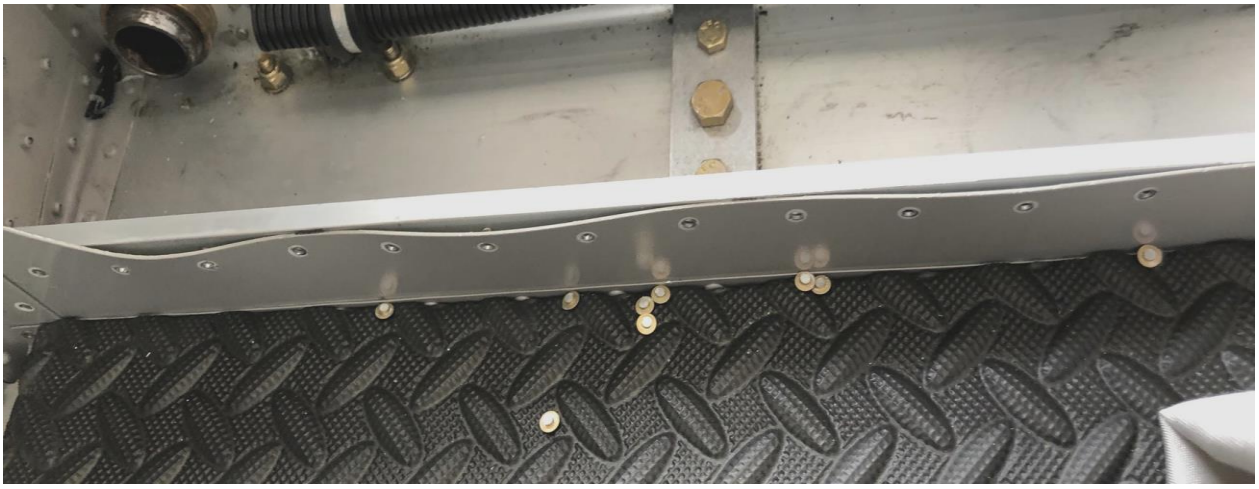
Labor Required / SLSA Warranty Allowance: 14 Hours

Level of Certification: SLSA: LSA Repairman Maintenance or A&P
ELSA: Owner (certification not required)
Check the rules of the local controlling authority/agency and the operating limitations for your aircraft.

Synopsis:

Although the RV-12 landing gear structure meets ASTM requirements for landing loads, data from the field indicates that repeated excessively hard landings may cause failure of rivets between the F-1204E Landing Gear Beam and the F-1204D Center Section Aft Bulkhead, and/or fracture the F-1204U Skin Stiffeners, and/or result in fatigue cracks in the F-1204E Landing Gear Beam. Refer to Figure 1 for illustrative examples.

The modifications described in this document add strength and durability to the original model RV-12 landing gear structure to prevent this type of damage. This service bulletin document does not apply to the RV-12iS.



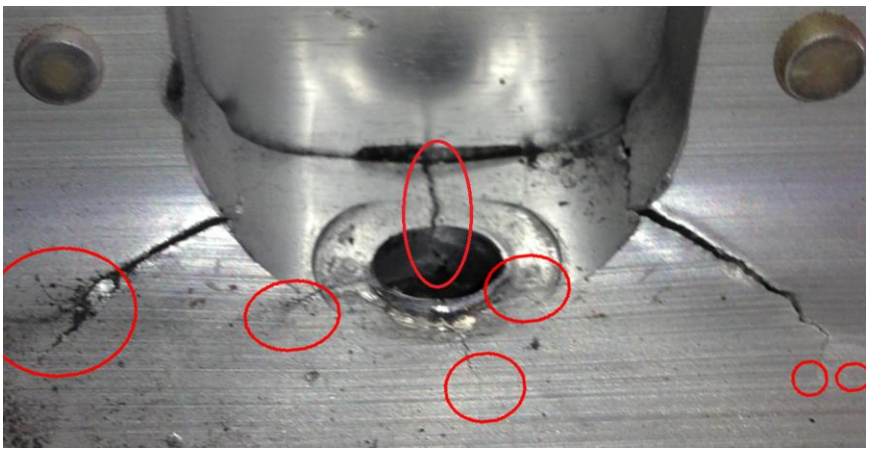


FIGURE 1: DAMAGE IN AND AROUND F-1204E LANDING GEAR BEAM

Materials Required:

The following materials are required to complete the steps necessary to achieve compliance with SB-00040.

Qty.	Item
~½ qt	Brake fluid: Mil Spec 5606A or MIL-PRF-83282 (do not use automotive brake fluid)
1	SB-00040 kit

Special Tools Required:

Qty.	Item
1	Right angle drill
2	Saw horses
1	New, sharp, 5/16 drill bit

Method of Compliance:

Step 1: Clean the inner surface of the F-00228 Drill Bushing with Naphtha, acetone, or lacquer thinner, to remove the anti-corrosion coating. Verify that a 5/16 drill bit fits through the hole.

Step 2: Prime the F-00224 Landing Gear Beam Reinforcement Plates, the F-00225 Landing Gear Beam Plugs, the F-00226 Reinforcement Angles, the F-00231 Fuel Tank Spacer, and the U-01202A Outboard Wear Plates.

Step 3: Remove seat cushions and seat backs for both seats.

Step 4: Remove the wings from the aircraft.

Step 5: Remove the five inspection covers between the main gear legs from the belly of the aircraft. Refer to Kit Assembly Instructions (KAI) Section 35.

Step 6: Remove the top cowl and disconnect the negative battery cable from the battery.

Step 7: Remove 3 screws that mount the F-1205G ELT Bracket to the F-1205 Mid Fuse Brace. Remove the ELT from the ELT Mount Tray (Handle the ELT gently to avoid activation because the battery has not been removed). Remove the ELT Mount Tray. Refer to KAI Section 42E for Artex ELTs or Section 42F for ACK ELTs.

Step 8: Drain the fuel tank. Refer to "Draining the Fuel System" in the RV-12 Maintenance Manual, Chapter 13.

Step 9: Remove the fuel tank from the aircraft. Refer to "Fuel Tank Removal" in the RV-12 Maintenance Manual, Chapter 13.

Step 10: Support the aircraft using sawhorses such that both main landing gear are no longer touching the ground. Refer to "Lifting and Supporting the Fuselage" in the Maintenance Manual. Note an alternative aft sawhorse position is shown in Figure 2.

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 2: AIRCRAFT SUPPORT

Step 11: Drain the brake fluid from the L & R side brake systems. Refer to RV-12 Maintenance Manual, Chapter 7.

Step 12: 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. Refer to RV-12 KAI Section 35.

Step 13: Remove the two outboard-most cushion clamps that attach the F-1204Y Wire Run Conduit to the F-1204 Center Section Assembly. Refer to RV-12 KAI Section 31, Page 31-03.

NOTE: If SB 12-11-09 has been performed, remove the HW-00003 plugs and proceed to Step 15.

Step 14: Use a Step-Drill to drill 3/8 in. [9.5 mm] diameter 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. Refer to Figure 3. This will permit torque to be applied to the head of the U-1202 attach bolts.

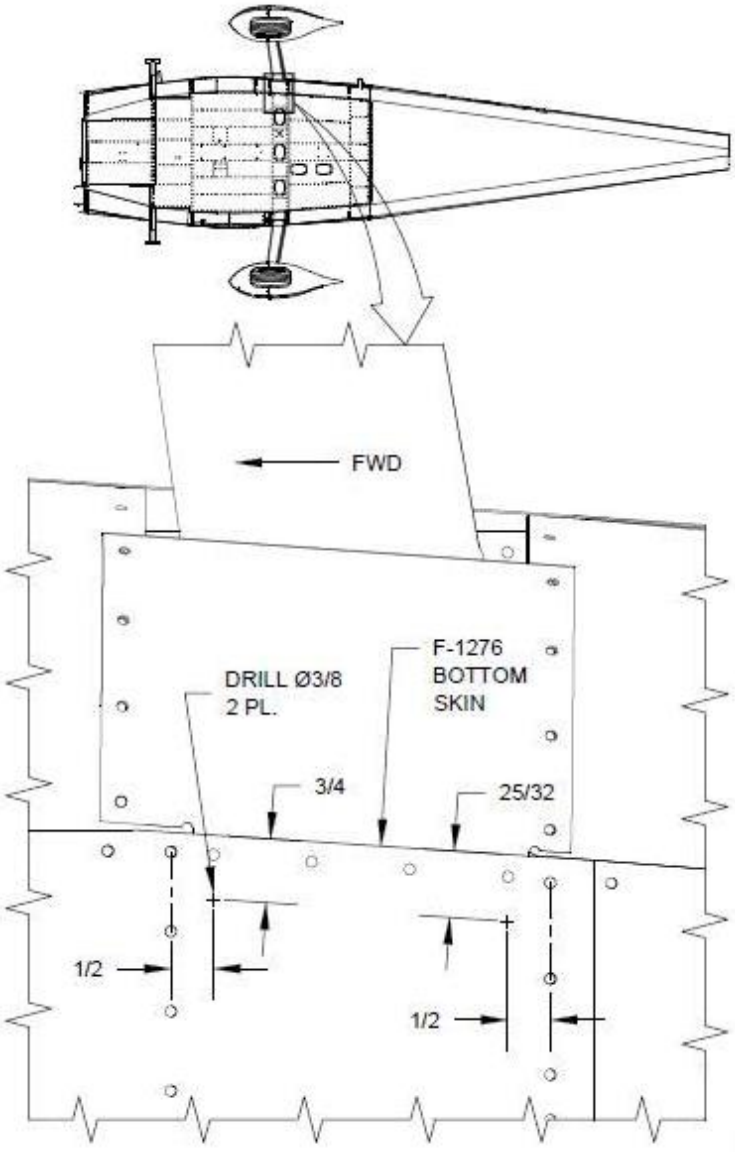


FIGURE 3: DRIFT AND SOCKET ACCESS HOLES
(BOTTOM VIEW - LEFT SIDE)

NOTE: Notification N16-11-02 was sent individually to some RV-12 owners who reported severe damage to their F-1204E Landing Gear Beams. Some RV-12 aircraft have F-00042 repair doublers from this Notification. If this repair has not been performed, simply ignore all mentions of the F-00042 doubler. Refer to Figure 4.

NOTE: If the airplane has F-00042 repair doublers per Notification N16-11-02, then each doubler may remain attached by two AN4-10A bolts, one in the inboard-most hole and one in the outboard-most hole of each F-00042. It should not be necessary to remove the doublers for any of the subsequent steps, but the three centrer bolts should be removed.

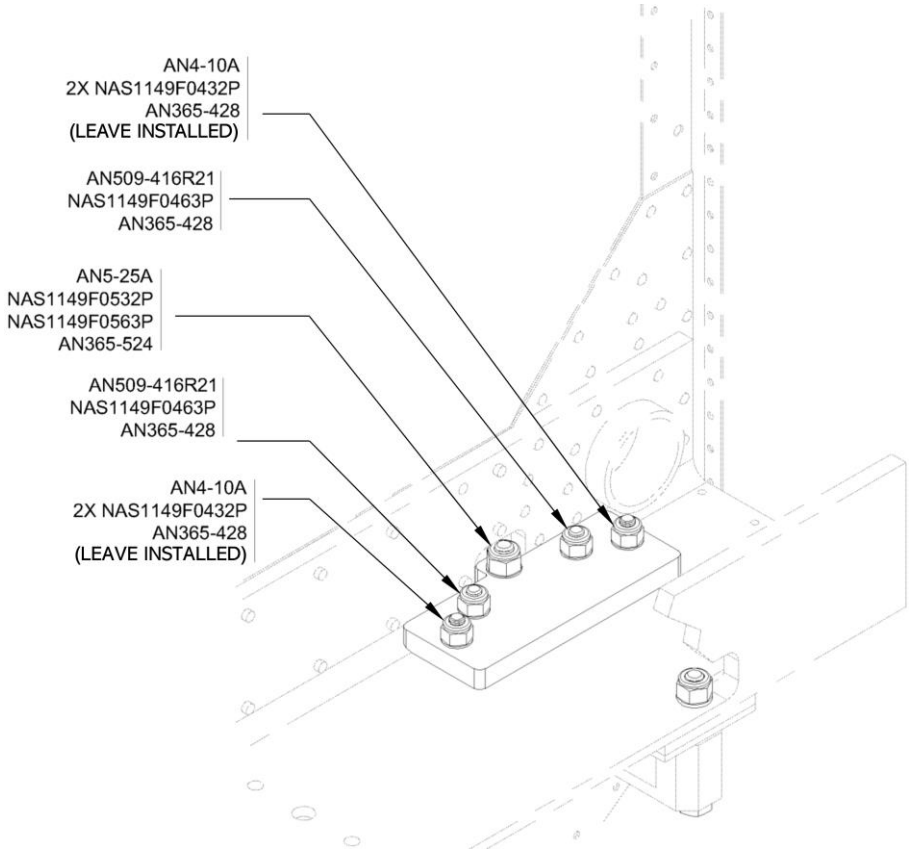


FIGURE 4: F-00042 REPAIR DOUBLER FROM NOTIFICATION N16-11-02

Step 15: Remove the U-1220-L and U-1220-R Gear Legs from the aircraft. The U-1203 Inboard Main Gear Attach Brackets should be left lying in the belly of the aircraft, with their plastic brake lines still attached.

If the airplane has F-00042 repair doublers from Notification N16-11-02, then remove the AN509 screws and associated washers and nuts, but do not remove the two AN4-10A bolts, which are on the inboard-most hole and on the outboard-most hole of each F-00042 repair doubler. Refer to Figure 4.

Set aside the U-1202 Outboard Main Gear Attach Brackets, U-1203B Inboard Wear Plates, and U-1203E Inboard Doubler Plates, as well as all nuts, bolts, and washers. Discard the U-1202C Outboard Doubler Plates and U-1202D Outboard Wear Plates. Refer to KAI Section 35, Page 35-03.

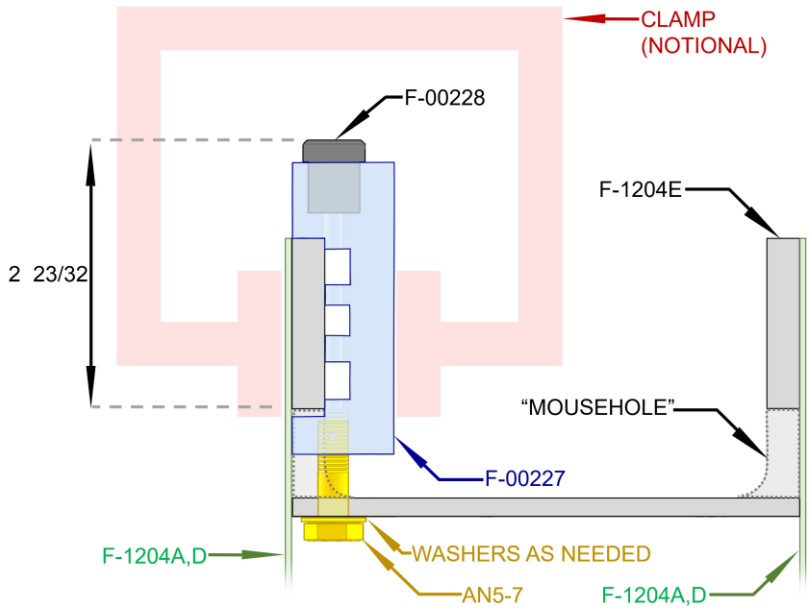


FIGURE 5: CROSS-SECTION SHOWING LOCATION OF F-00227 AND F-00228 RELATIVE TO F-1204E LANDING GEAR BEAM AND TO F-1204A AND F-1204D BULKHEADS

Step 16: Place an F-00227 Drill Guide on the F-1204E Landing Gear Beam as shown in Figure 5. The end with the larger (non-threaded) hole faces upwards. The end with the smaller (threaded) hole faces downwards and fits into one of the four "mouseholes" on the F-1204E. The side with three horizontal grooves contacts the inner vertical surface of the F-1204E.

Step 17: Firmly attach the F-00227 in place by clamping it against the F-1204E and by inserting an AN5-7A bolt through the underside of the F-1204E. Ensure that the sides of the F-00227 are vertical.

Step 18: Insert the F-00228 Drill Bushing into the hole on top of the F-00227 Drill Guide.

NOTE: Per Figure 5, the depth of the hole is 2 23/32 in. [68.6 mm] including the F-00228 bushing. This means that the drill bit must be at least 2 23/32 in. [68.6 mm] long. Mark this distance from the tip of the drill bit using tape or a sharpie so that it is clear when the drill bit is about to reach the top of the "mousehole".

NOTE: Use high speed and low downward drill pressure, in order to prevent the drill from "catching" the bottom of each of the three horizontal channels on the F-00227, and in order to minimize the deflection of the drill away from its intended path.

Step 19: Drill a 5/16 in. [7.9 mm] hole through the Drill Bushing and Drill Guide until the drill bit reaches the "mousehole" at the bottom of the F-1204E inner vertical surface.

Step 20: Remove the drill, the Drill Bushing, and the Drill Guide. Discard the Drill Guide, but keep the Drill Bushing and the AN5-7A bolt for re-use.

This operation will create a vertical channel on the inner vertical surface of the F-1204E Landing Gear Beam.

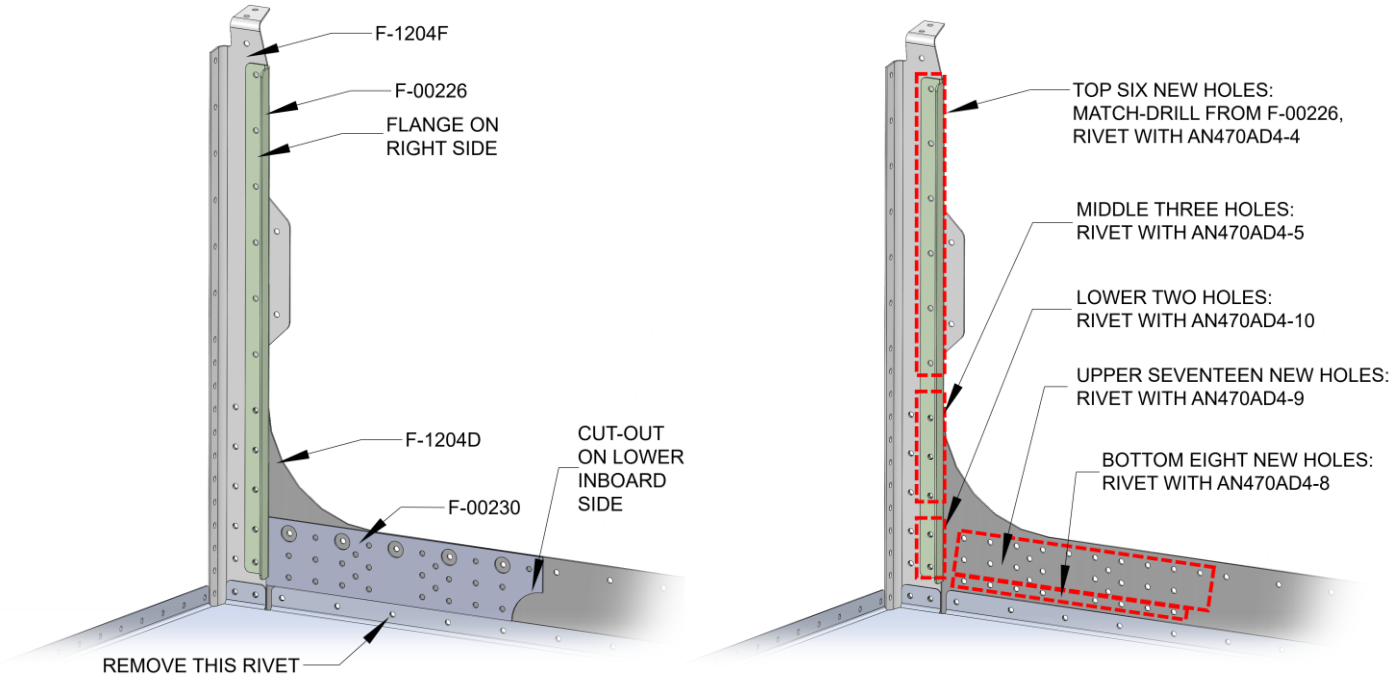
A portion of a rivet – which used to connect the F-1204E Landing Gear Beam to the F-1204A/D Bulkhead – may have been partially removed by the cut. This is acceptable and the rivet should not be replaced. The remains may be removed or may be left in place.

Step 21: Use sandpaper or a rotary tool to smooth the surface of the newly-drilled vertical channel and to deburr its edges.

Check that the AN5-50A bolt can be inserted into the hole at the bottom of the F-1204E while its shank is up against this newly-drilled channel. If this is not possible, then use a rotary tool to make the channel slightly deeper, starting at the top of the mousehole. Remove only the minimum amount of material required to allow the bolt to fit down the channel and into the hole. Enlarge to no more than a few thousandths of an inch of additional channel depth, so that the bolt will still fit after the newly-drilled vertical channel surface is primed.

Step 22: Repeat steps 16 through 21 to create a vertical channel above each of the four "mousehole" locations where AN5-22A bolts were previously attached to the bottom of the F-1204E Landing Gear Beam.

Step 23: Prime the surface of the four vertical channels that have been cut in steps 16 through 22.



Step 24: Drill out the third rivet from the outboard end of the baggage floor flange, as shown in Figure 6. This hole will remain open. Do this on both the left and right sides.

NOTE: MRA 07-15-19-1 / SB-00008 was sent individually to some RV-12 owners who reported significant hard landings, which caused some rivets to fail between the F-1204D and F-1204E. RV-12 aircraft repaired per these documents will already have the additional rivets and stiffeners shown in Figure 6 of this service bulletin SB-00040. For aircraft on which repairs were previously made in compliance with MRA 07-15-19-1 / SB-00008, skip steps 25 through 32, as these steps will have already been performed.

Step 25: Use tape to attach the F-00230 Drill Pattern to the aft side of the F-1204D Center Section Aft Bulkhead near the left end of the airplane. The outboard edge should be up against the F-1204F Aft Side Bulkhead and the lower edge should be resting on top of the F-1224 Baggage Floor flange. The corner with a quarter-circle notch should be the lower inboard corner. Refer to Figure 6.

Step 26: Use the F-00230 Drill Pattern to drill twenty-five (25) additional #30 holes through both the F-1204D Center Section Aft Bulkhead and the F-1204E Landing Gear Beam, as shown in Figure 6. Remove the Drill Pattern.

Step 27: Rivet the holes as shown in Figure 6. Set the rivets such that the rivet heads on the aft side are no more than 0.063 in. [1.6 mm] tall. (For comparison: The F-00230 Drill Pattern is 0.063 in. [1.6 mm] thick, as is the F-00231 Fuel Tank Spacer). For minimum rivet head dimensions, Refer to MIL-R-47196A.

Step 28: Drill out the five rivets on the inboard side of the F-1204F Aft Side Bulkhead just above the F-1224-L Baggage Floor. Cleco the F-00226 Reinforcement Angle into place through its five lower holes, which match the five rivet holes that were just drilled out.

Step 29: Match-Drill #30 the six holes on the upper portion of the reinforcement angle through the F-1204F Aft Side Bulkhead, as shown in Figure 6.

Step 30: Remove the F-00226 Reinforcement Angle and deburr all open holes.

Step 31: Rivet the F-00226 Reinforcement Angle into place per Figure 6. Note that, on the left side of the aircraft, the flange of the F-00226 reinforcement angle is on the inboard (right) side.

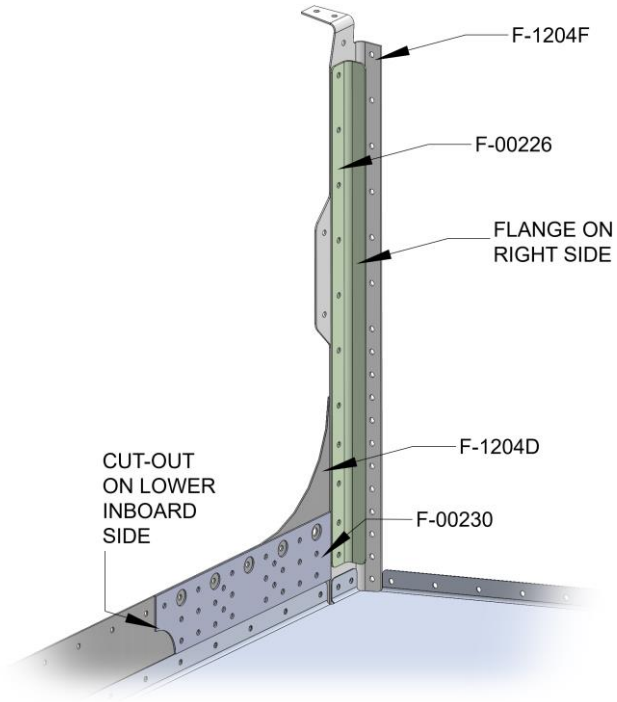


FIGURE 7: F-00226 REINFORCEMENT ANGLE - INSTALLATION, RIGHT SIDE

NOTE: On the right side of the aircraft, the holes drilled with the F-00230 Drill Pattern should be mirrored (i.e. The corner with a notch cut out should be the lower inboard corner).

Step 32: Repeat steps 25 through 31 on the right side of the aircraft. On the right side of the aircraft, the flange of the F-00226 Reinforcement Angle is on the outboard (right) side. Refer to Figure 7.

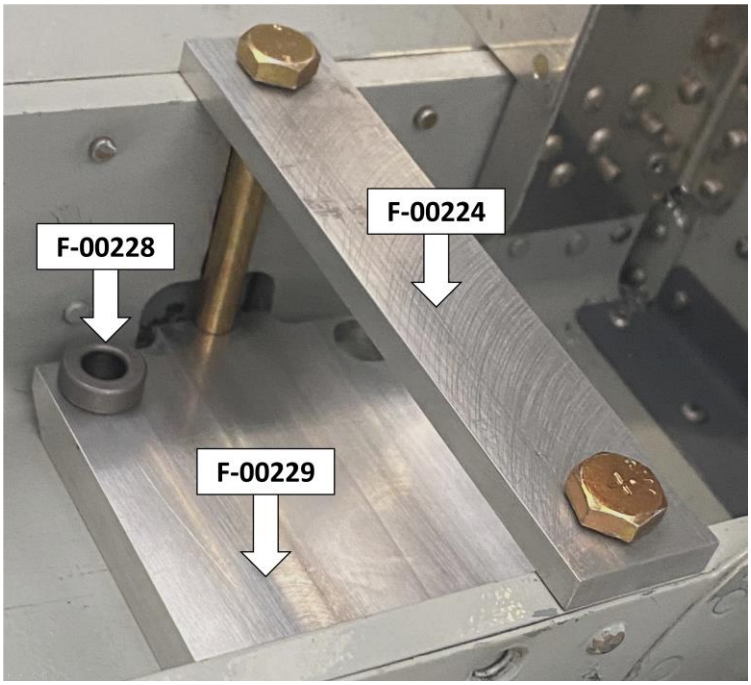


FIGURE 8: INSERTION OF F-00228 DRILL BUSHING, F-00229 DRILL GUIDE, AN5-50A BOLTS, AND F-00224 REINFORCEMENT PLATE

NOTE: At "mouseholes" that include F-00042 Repair Doublers per Notification N 16-11-02, the F-00229 Drill Guide may be placed on top of the F-00042 Doubler. Treat the doubler as part of the F-1204E Landing Gear Beam. If there is only one F-00042 Repair Doubler, then place a 3/8 in. [9.5 mm]-thick block adjacent to it, under the Drill Guide, to be used as a spacer to keep the drill guide horizontal.

Step 33: Place the F-00229 Drill Guide on the bottom of the F-1204E Landing Gear Beam between the two "mouseholes" on the left side of the airplane. The two small partial holes along the edges should line up with the newly-drilled vertical channels. The chamfered edges of the F-00229 should face downwards. Refer to Figure 8.

Step 34: Slide two AN5-50A bolts through the holes of an F-00224 Reinforcement Plate. Slide the bolts down the vertical channels on the left side of the F-1204E Landing Gear Beam and into the holes on the bottom of the F-1204E Landing Gear Beam. Refer to Figure 8.

Insert two AN509-416 screws through the front two holes of the drill guide and through the F-1204E Landing Gear beam. The heads should be on top, in the two forward holes of the F-00229 Drill Guide. Temporarily install nuts on the underside to firmly hold the F-00229 Drill Guide in place.

Step 35: Insert the F-00228 Drill Bushing into one of the half-inch holes on the aft side of the F-00229. Refer to Figure 8.

NOTE: A total of eight 5/16 in. [7.9 mm] holes will be drilled through the F-1204E (including at least four holes being enlarged rather than drilled from scratch).

CAUTION: Be careful to not drill too far below the bottom of the F-1204E due to brake lines and other systems located on the underside.

Step 36: Using the drill bushing, drill a 5/16 in. [7.9 mm] hole through the bottom of the F-1204E Landing Gear Beam.

At locations that include F-00042 Repair Doublers per Notification N 16-11-02, drill through the F-00042 as well, enlarging the hole where the bolt was removed.

Step 37: Insert the F-00228 Drill Bushing into the other free hole of the F-00229 Drill Guide and repeat Step 36.

Step 38: Remove the two AN509-416 screws that were stabilizing the front holes of the F-00229 Drill Guide. Insert two AN509-516 screws into the aft holes of the F-00229 Drill Guide, head end upwards, and through the newly-drilled holes on the F-1204E Landing Gear Beam. Temporarily tighten the nuts on the bottom to firmly hold the F-00229 in place.

Step 39: Repeat steps 35 through 37 on the two front holes of the F-00229.

Step 40: Remove the two AN5-50A bolts, the two AN509-516 screws, and the F-00224 Reinforcement Plate. Remove the F-00229 Drill Guide.

Step 41: Repeat steps 33 through 40 on the right side of the airplane.

Step 42: Cover the upper and lower surfaces of the U-01202A Outboard Wear Plate with grease. (AeroShell 22 works well in this application).

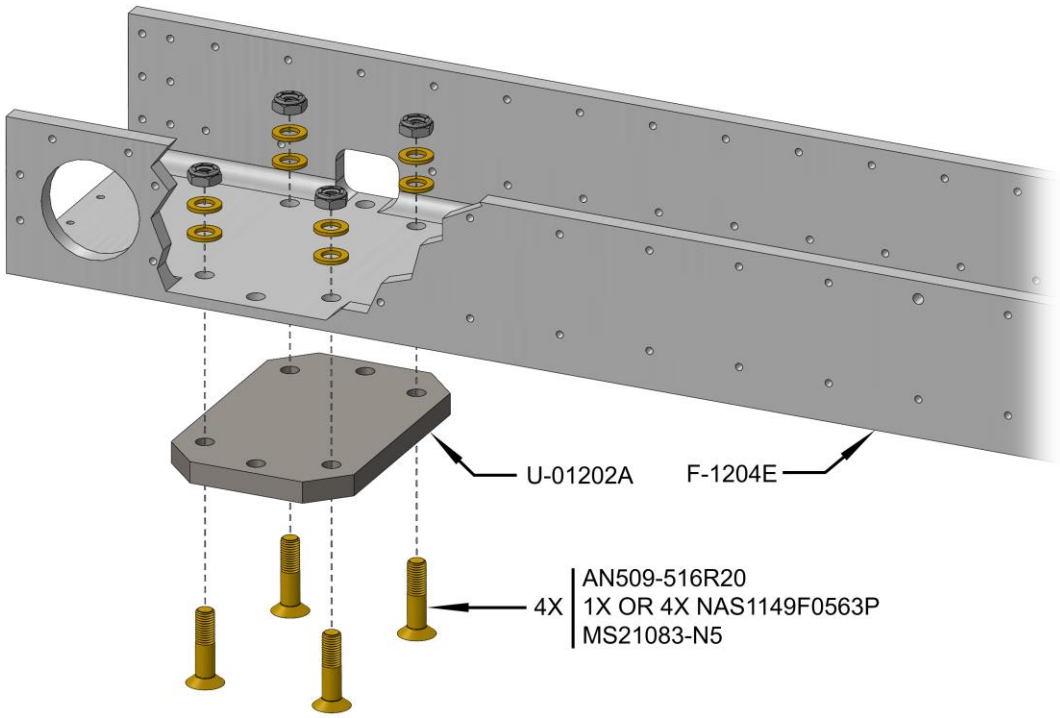


FIGURE 9: U-1202A INSTALLATION

Step 43: Shave or sand the heads of the rivets on the F-1204A and F-1204D bulkheads immediately aft and forward of the location where the U-01202A Outboard Wear Plate will be installed (Refer to Figure 9), immediately underneath the F-1204E Landing Gear Beam.

NOTE: At locations that include F-00042 Repair Doublers per Notification N 16-11-02, use one NAS1149F0563P washer per screw. At locations that do not, use three to four washers per screw.

NOTE: At locations that include F-00042 Repair Doublers per Notification N 16-11-02: If the heads of the AN4-10A bolts interfere with the edges of the U-01202A Outboard Wear Plate, this can be resolved by turning the bolts by 30 degrees (1/12th of a turn) or less, until the bolt head edges that are closest to the Wear Plate are oriented to run forward-aft i.e. parallel to the edge of the Wear Plate. When turning the bolts, ensure that the nuts also turn, so as to not change the torque. Refer to Figure 10.

FIGURE 10: BOLT HEAD EDGES PARALLEL TO PLATE EDGE OF U-01202A TO ELIMINATE INTERFERENCE

Step 44: Attach each U-01202A Outboard Wear Plate to the underside of the F-1204E Landing Gear Beam as shown in Figure 9.

NOTE: At "mouseholes" that include F-00042 Repair Doublers per Notification N 16-11-02, skip steps 45 and 46.

CAUTION: Remove only enough material to fit F-00225 into the mousehole with even contact to the top and bottom surfaces. Ensure that top and bottom faces of F-00225 remain flat and parallel.

Step 45: Remove material from the top and/or bottom of each F-00225 Plug so that it can be snugly inserted into one of the "mouseholes" on the F-1204E Landing Gear Beam.

If the F-00225 Plug can be inserted into a "mousehole" with no friction, then too much material was removed. Apply one or more coats of primer to the upper and lower surfaces of the F-00225 and wait for it to fully set, and/or fabricate a small shim out of thin sheet stock or foil. If this does not achieve a snug fit, discard the F-00225.

The F-00225 Plug should be inserted by hand, not with the help of a hammer. Some trial and error will be required to achieve the appropriate fit in each "mousehole" and in each airplane.

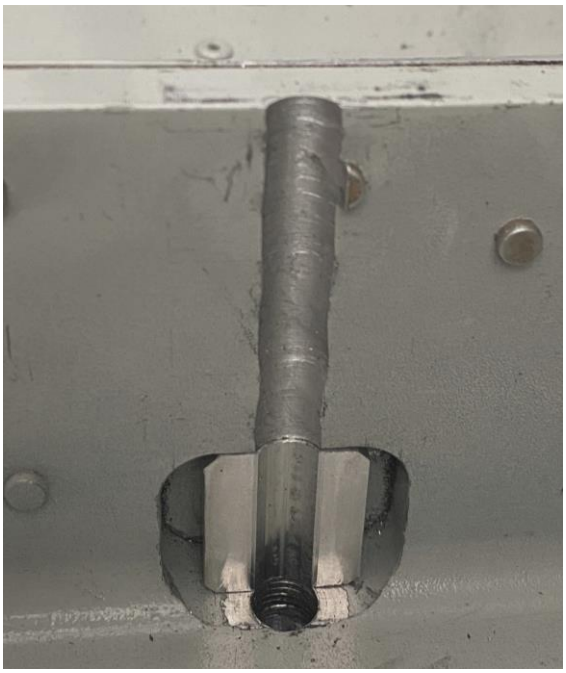


FIGURE 11: LOCATION OF F-00225 PLUGS

Step 46: Insert an F-00225 Plug into each of the four “mouseholes” on the F-1204E Landing Gear Beam, such that the channel on one side of the F-00225 lines up with the newly-drilled vertical channels on the inner wall of the F-1204E and with the 5/16 in. [7.9 mm] bolt holes at the bottom of the F-1204E. Refer to Figure 11.

Step 47: Install the AN5-50A bolts and F-00224 Reinforcement Plate, i.e. repeat step 34, on both sides of the airplane.

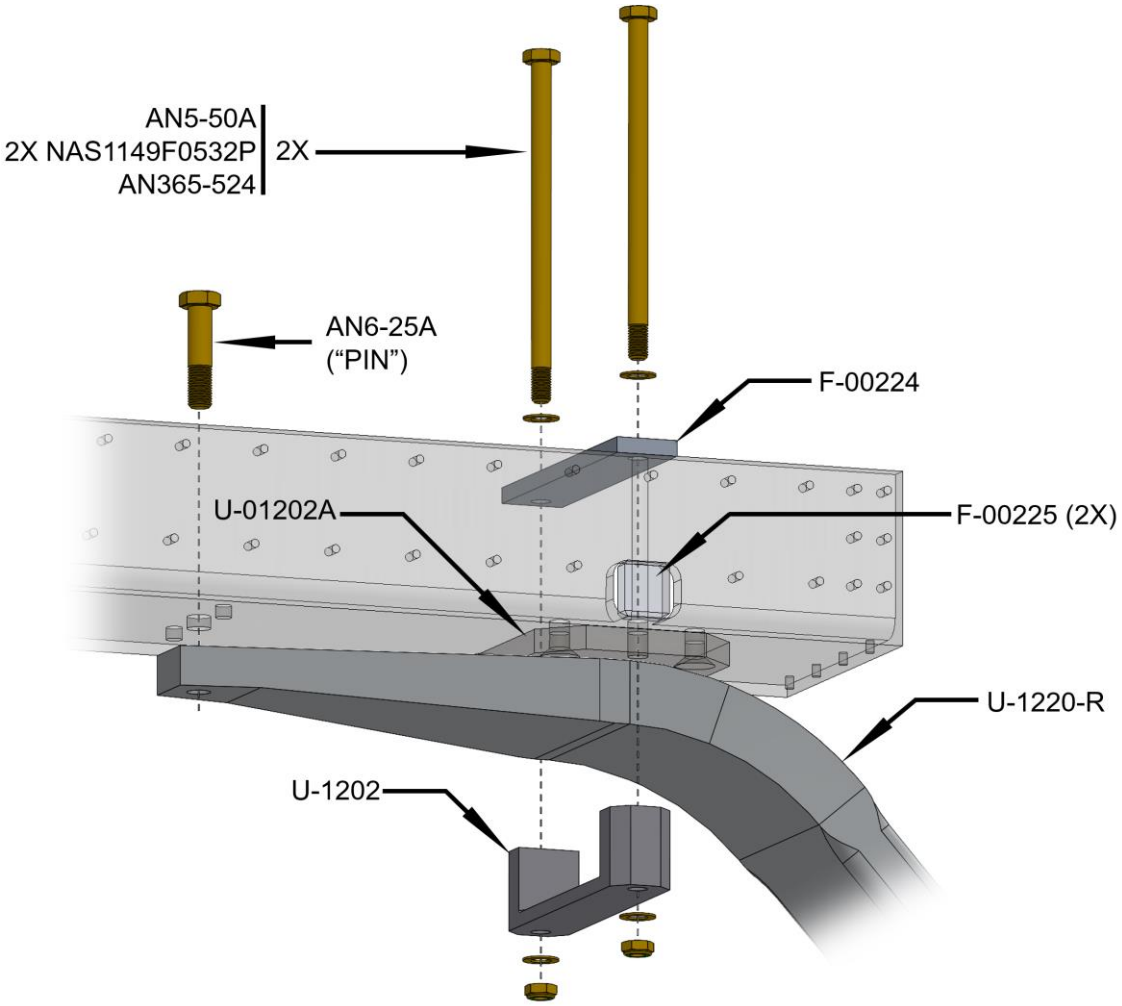


FIGURE 12: INSTALLING THE GEAR LEG
AND OUTBOARD ATTACH BRACKET
(RIGHT SIDE SHOWN)

Step 48: On the right side of the airplane, maneuver the U-1220-R Gear Leg and U-1202 Outboard Main Gear Attach Bracket into position at the same time as shown in Figure 12.

Step 49: Temporarily insert an AN6-25A bolt through the F-1204E Landing Gear Beam and into the U-1220-R Gear Leg to pin the leg in place for easier installation.

Install washers and nuts to the bottom of the two AN5-50A bolts but don't fully tighten them yet.

Remove the AN6-25A bolt.

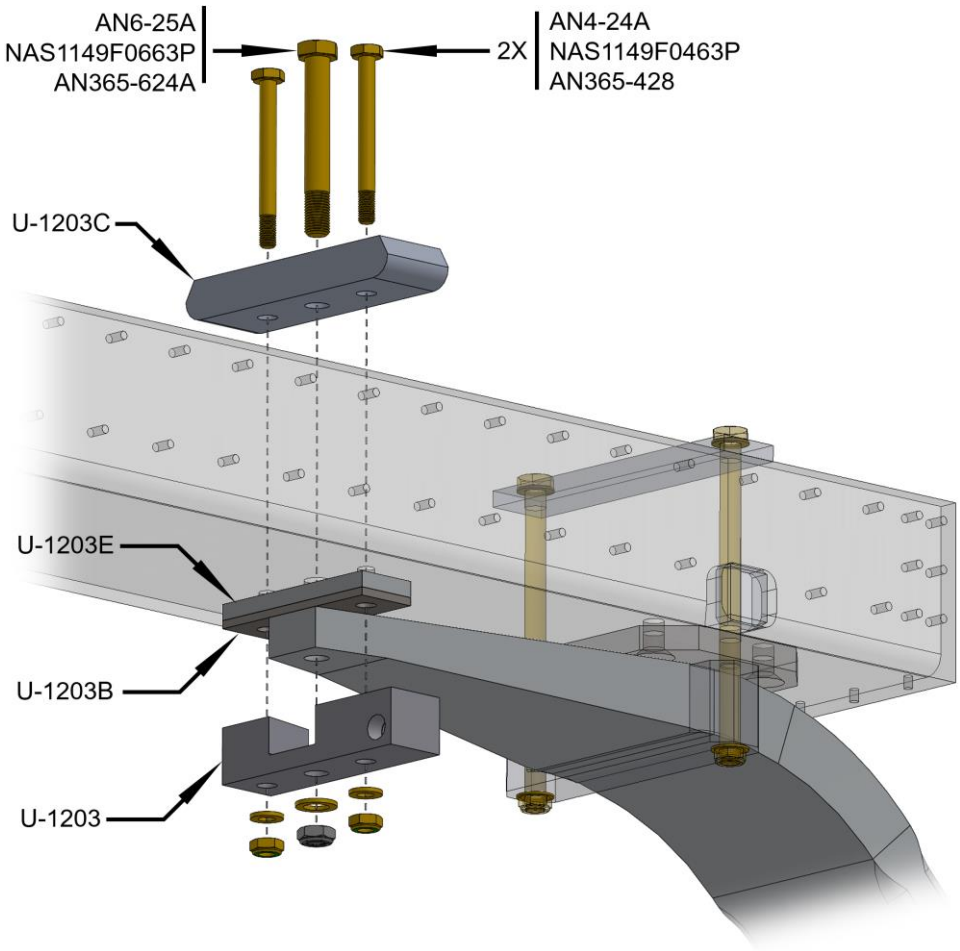


FIGURE 13: INSTALLING THE INBOARD ATTACH BRACKET (RIGHT SIDE SHOWN)

NOTE: The U-1203C Doubler Plate is not symmetric in the up-down direction. The radiused edge should be oriented downwards, onto the F-1204E Landing Gear Beam, and the sloped side should be towards the top. Refer to Figure 13.

Step 50: Install the U-1203B Inboard Wear Plate, U-1203E Inboard Doubler Plate, U-1203 Inboard Main Gear Attach Bracket, and U-1203C Doubler Plate into the right side of the airplane using the hardware called out in Figure 13. Spacers can be used between the floor and the tire to appropriately position the inboard end of the leg.

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

Step 51: Evenly tighten the two AN5-50A bolts, moving from one to another, while checking that the outboard main gear attach bracket is pulling up around the gear leg evenly (i.e. that the gap between the wear plate and gear attach bracket is the same at each bolt) until the final torque is reached.

Step 52: Install HW-00003 plugs in the 3/8 in. diameter holes from step 14.

Step 53: Repeat steps 48 through 52 for the left side of the airplane.

Step 54: Remove the supports under the fuselage.

Step 55: Reinstall the two outboard most cushion clamps that attach the F-1204Y Wire Run Conduit to the F-1204 Center Section Assembly. Refer to Figure 1 on KAI Section 31, Page 31- 03.

Step 56: Reconnect the F-1289D L & R Caliper Brake Lines to their associated fittings on the on the U-1302 Inboard Main Gear Attach Brackets. Refer to KAI Section 35, Page 35-04.

Step 57: Refill the left and right brake systems with clean fluid. Refer to RV-12 Maintenance Manual, Chapter 7.

Step 58: Reinstall the ELT Mount Tray, using three SD-42 BSLF rivets, an AN507C832R8 screw, and an AN365-832A nut. Refer to KAI Section 42, 42E or 42F.

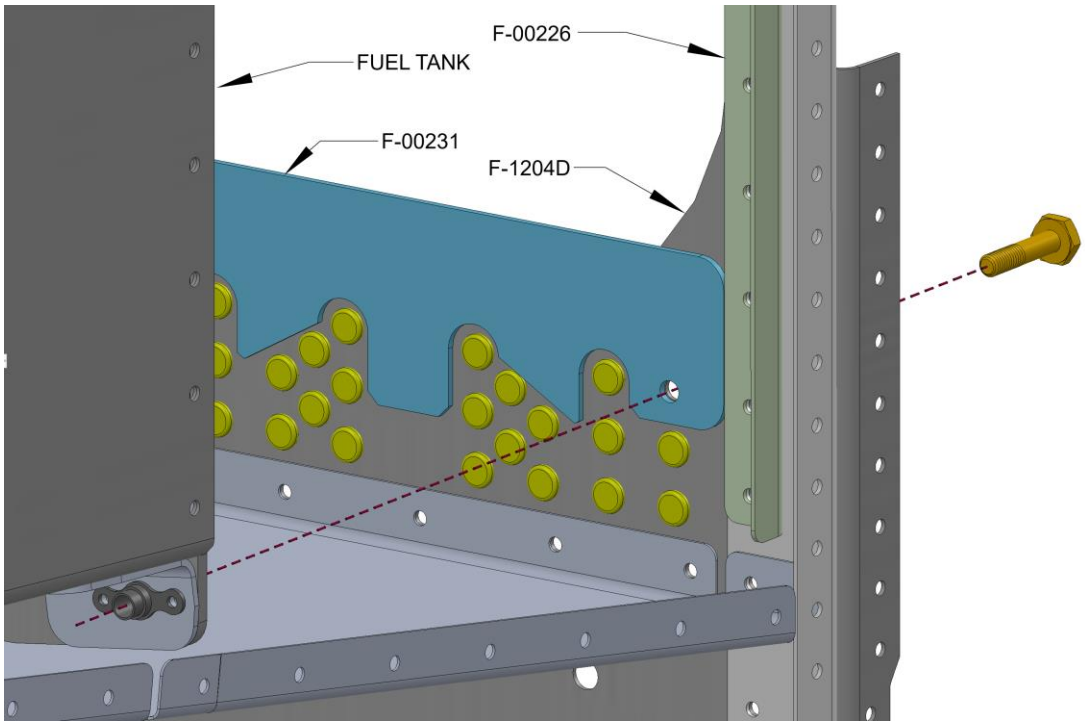


FIGURE 14: INSTALLING THE FUEL TANK SPACER.
FUSELAGE SKIN NOT SHOWN, FOR CLARITY.

Step 59: Place the F-00231 Fuel Tank Spacer between the fuel tank and the F-1204D Center Section Aft Bulkhead, such that the two AN3-7 bolts on the forward side of the fuel tank go through the two holes of the F-00231 as well as through the F-1204D and F-1204E. Refer to Figure 14. The jagged segment of the F-00231 should be on the lower right side, so as to fill the space between the newly-installed rivet heads. Due to this spacer, the fuel tank will be “squeezed” between the spacer and the F-1207 baggage bulkhead. The baggage bulkhead is flexible enough to accommodate the new position of the fuel tank, 0.063 in. [1.6 mm] further aft.

Step 60: Reinstall the fuel tank. Refer to RV-12 Maintenance Manual, Chapter 13.

Step 61: Re-install the F-1205G ELT Bracket to the F-1205 Mid Fuse Brace. Reinstall the ELT in the ELT Mounting tray. Refer to KAI Section 42, 42E or 42F.

Step 62: Re-connect the negative battery cable to the battery.

Step 63: 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 64: Re-install the five inspection covers on the belly of the aircraft. Refer to KAI Section 35.

Step 65: Install the wings on the aircraft.

Step 66: Re-install the seat backs and seat cushions for both seats.

Step 67: Verify proper function of the brakes from both seat positions.

Step 68: Install bottom cowl.

Step 69: Test run engine and verify normal operation.

Step 70: Install top cowl.

Step 71: In the RV-12 Maintenance Manual (MM) "INSTALLED EQUIPMENT LIST" table, add "SB-00040" to the "ITEM" column. On the same line Enter 3.04 lb for Weight", 96.49 in for "Arm", add a checkmark to the "INSTALLED" column, and 293.33 in-lb "Moment".

Step 72: Calculate the change to the empty weight, moment, and arm using the values in the previous step. Make an entry on the WEIGHT AND BALANCE RECORD page of the RV-12 Maintenance Manual as follows:

As of this date: ___/___/___ the following values represent current Weight and Balance calculations resulting from the installation of the EX-00044 Exhaust System.
Revised Empty Weight: _____ lbs
Revised Empty Moment: _____ in-lbs
Revised Empty Arm: _____ in
Signed: _____

Step 73: In the RV-12 Pilot Operating Handbook (POH) "YOUR AIRPLANE" table, enter the new values for the Empty Weight, Empty Moment, and Empty Arm.

Step 74: Make a logbook entry indicating compliance with service document per the requirements of the controlling authority/agency.

Place a copy of this notification in the back of the maintenance manual for your aircraft. Add the name and date of the service information to the Addendum Documents List at the front of the Maintenance Manual.

If you are no longer in possession of this aircraft, please forward this information to the present owner/operator and immediately notify Van's Aircraft, Inc. via email at registrations@vansaircraft.com.

Information regarding establishing/transferring aircraft ownership, registration and licensing is available at: https://www.vansaircraft.com/qr/transfer-of-ownership/