

TOTAL PERFORMANCE VAN'S AIRCRAFT

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REASON FOR REVISION:

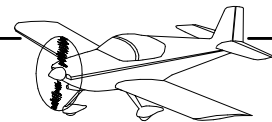
To improve engine sensor performance by improving grounding connections and to remove unnecessary step on Page 45A-05 that modifies grommet.

ASTM compliance testing (see test flight RV-12 10-22-15-1) and general flight of N412RV during 2015 has shown that the cooling shroud is not required. Removing the shroud from the kit not only saves cost but also eliminates the requirement to remove many components from the top of the engine to facilitate installation of the shroud.

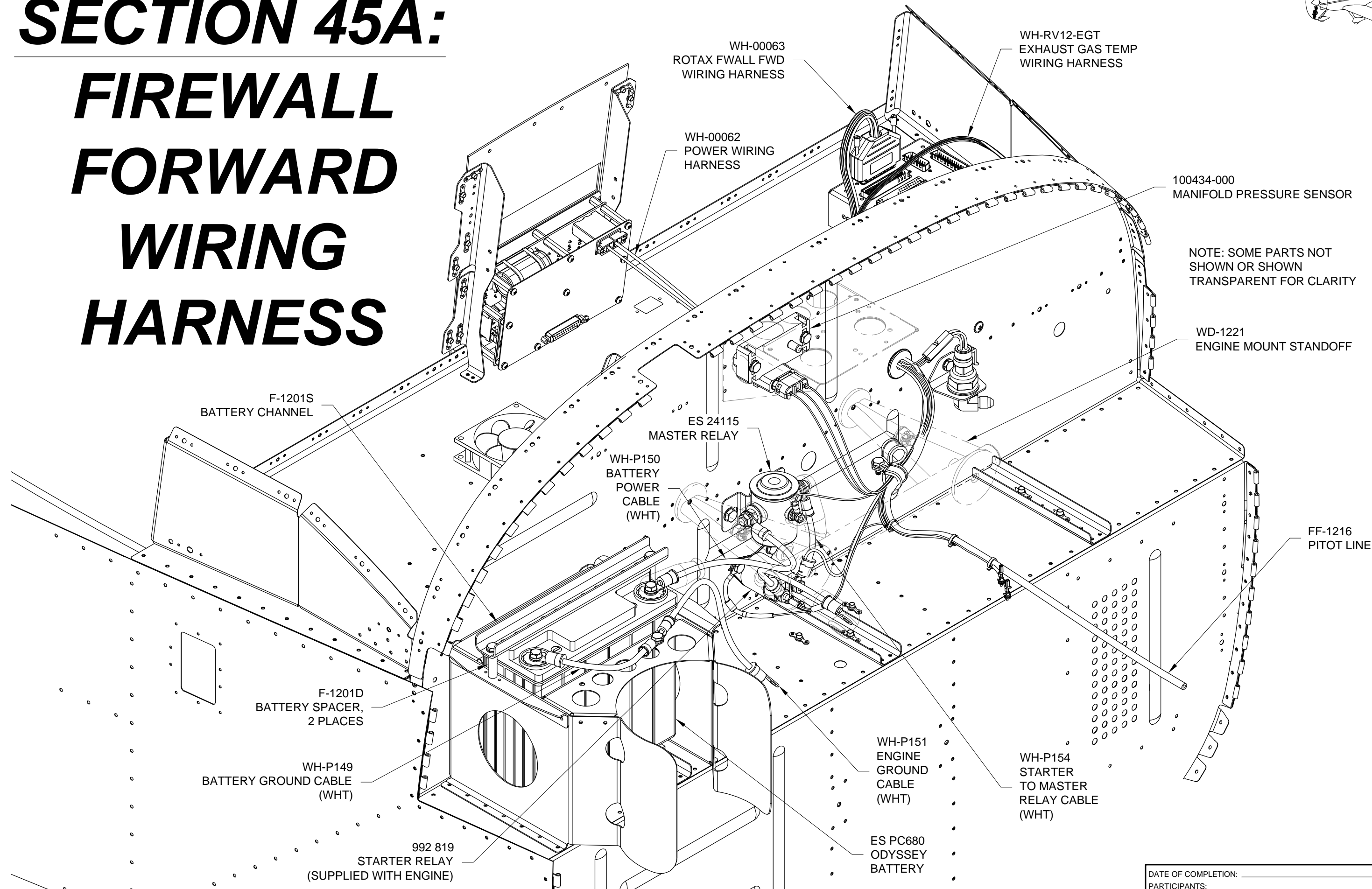
REVISION DESCRIPTION:

Page 45A-03 REV 1: Add to Step 2. "Remove any primer or paint from beneath the ground cable connection to the airframe. A proper ground connection between the airframe and the engine is essential to proper function of sensors mounted to the engine."

Page 45A-05 REV 2: Delete Step 1 and Figure 1 that refer to modifying a grommet for firewall penetration. Change Figure 2 references to Figure 1 and update call-out for grommet to part number from previous Figure 1.



SECTION 45A: FIREWALL FORWARD WIRING HARNESS



NOTE: SOME PARTS NOT SHOWN OR SHOWN TRANSPARENT FOR CLARITY

DATE OF COMPLETION: _____
 PARTICIPANTS: _____
 DATE: 07/03/14 REVISION: 1 RV-12 PAGE 45A-01



Step 1: Make two F-1201D Battery Spacers from .058X5/16 6061-T6 tube per the dimensions in Figure 1.

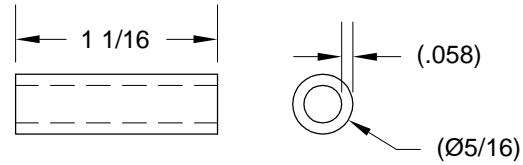


FIGURE 1: MAKING THE BATTERY SPACER

Step 2: Make four F-1257B Battery Anti-Chafe Strips 3 inches long from MS21266-1N Grommet.

Step 3: Place the four F-1257B Battery Anti-Chafe Strips on top of the F-1257 Rudder Pedal Support Channel flanges. Slide the ES PC680 Odyssey Battery into the opening in the firewall assembly. See Figure 2.

Step 4: Secure the ES PC680 Odyssey Battery in place using the F-1201S Battery Channel, F-1201D Battery Spacers and the hardware called out in Figure 2.

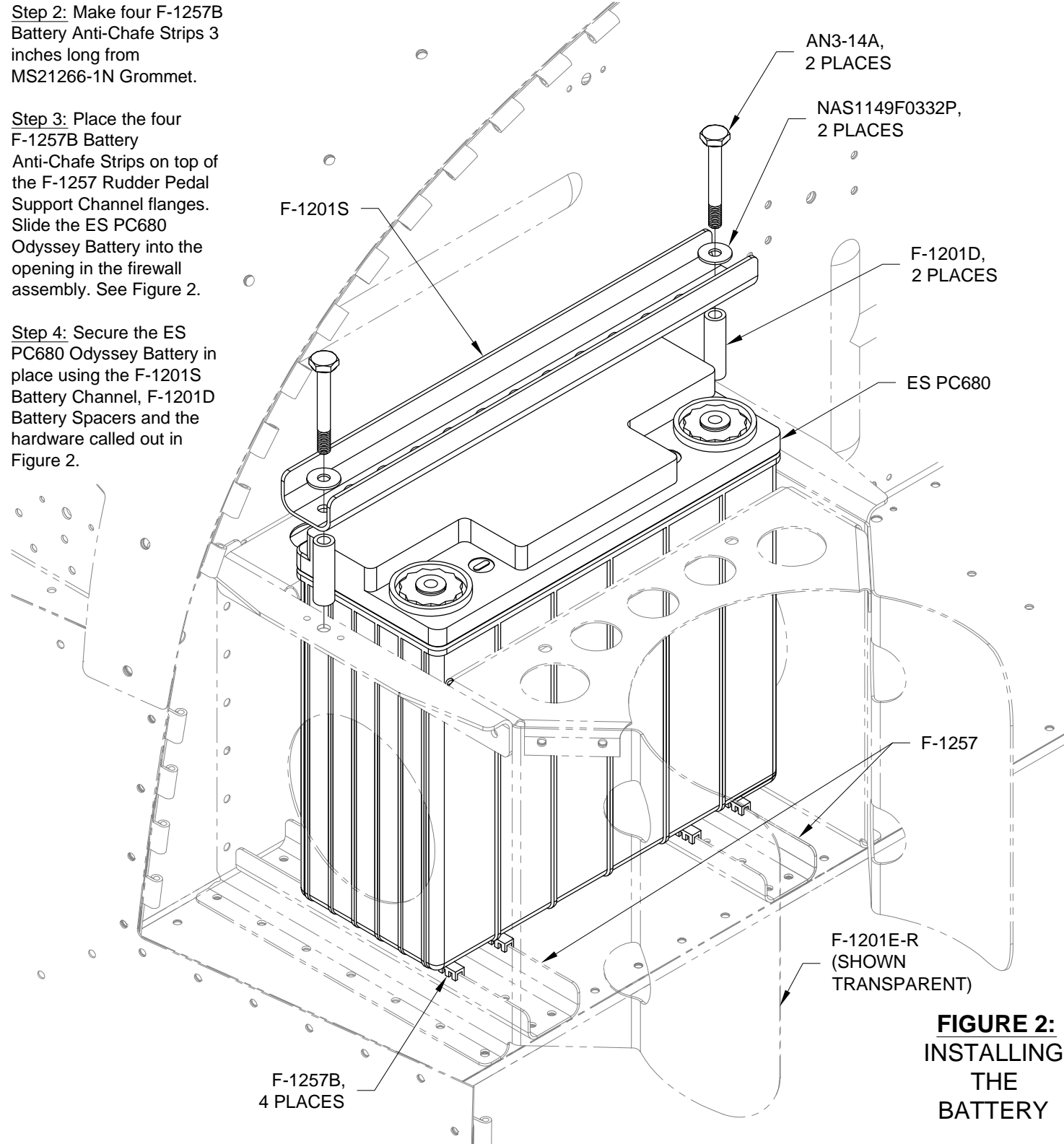


FIGURE 2: INSTALLING THE BATTERY

Step 5: Install the ES 24115 Master Relay, 992 819 Starter Relay and 100434-000 Manifold Pressure Sensor to the F-1201A Firewall Upper using the hardware callouts in Figure 3.

Step 6: Check for attach holes in the F-1202B Firewall Shelf for the 965 349 Rectifier Regulator. If holes are present fill the holes with a bolt and washer as shown in Figure 3. The regulator will be installed in another location, see Sections 46 and 49.

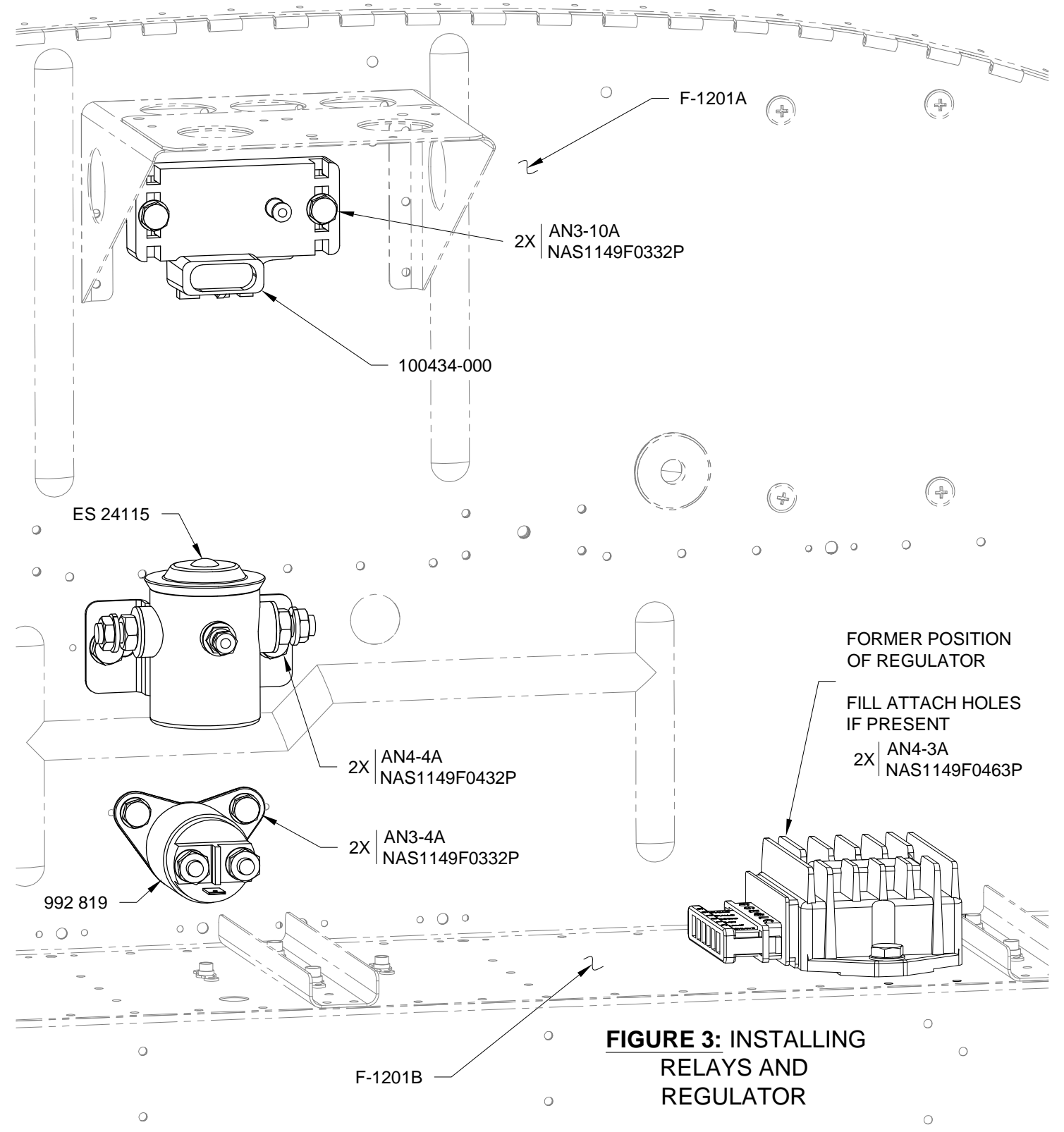
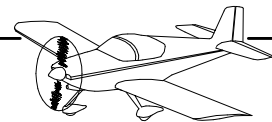


FIGURE 3: INSTALLING RELAYS AND REGULATOR



NOTE: DO NOT CONNECT the WH-P-149 Battery Ground Cable to the negative (ground) battery terminal at this time! Temporarily connect the ground cable only when necessary for testing at the end of this section or permanently before flight testing the aircraft!

Step 1: Slide an insulated boot over the end of the WH-P150 (WHT) Battery Power Cable with the smaller ring terminal. Using the hardware and instructions supplied with the ES PC680 Odyssey Battery attach the WH-P150 (WHT) Battery Power Cable to the positive battery terminal. See Figure 1.

Step 2: Remove any primer from beneath the ground cable connection to the airframe. A proper ground connection between the airframe and the engine is essential to proper function of sensors mounted to the engine.

Using the hardware called out in Figure 1 attach the WH-P149 Battery Ground Cable and the WH-P151 (WHT) Engine Ground Cable to the F-1201G Oil Reservoir Brace.

Step 3: Slide an MS25171-3S Insulated Boot over the unconnected end of the WH-P150 (WHT) Battery Power Cable and tape it in place to isolate the cable from touching the structure of the aircraft.

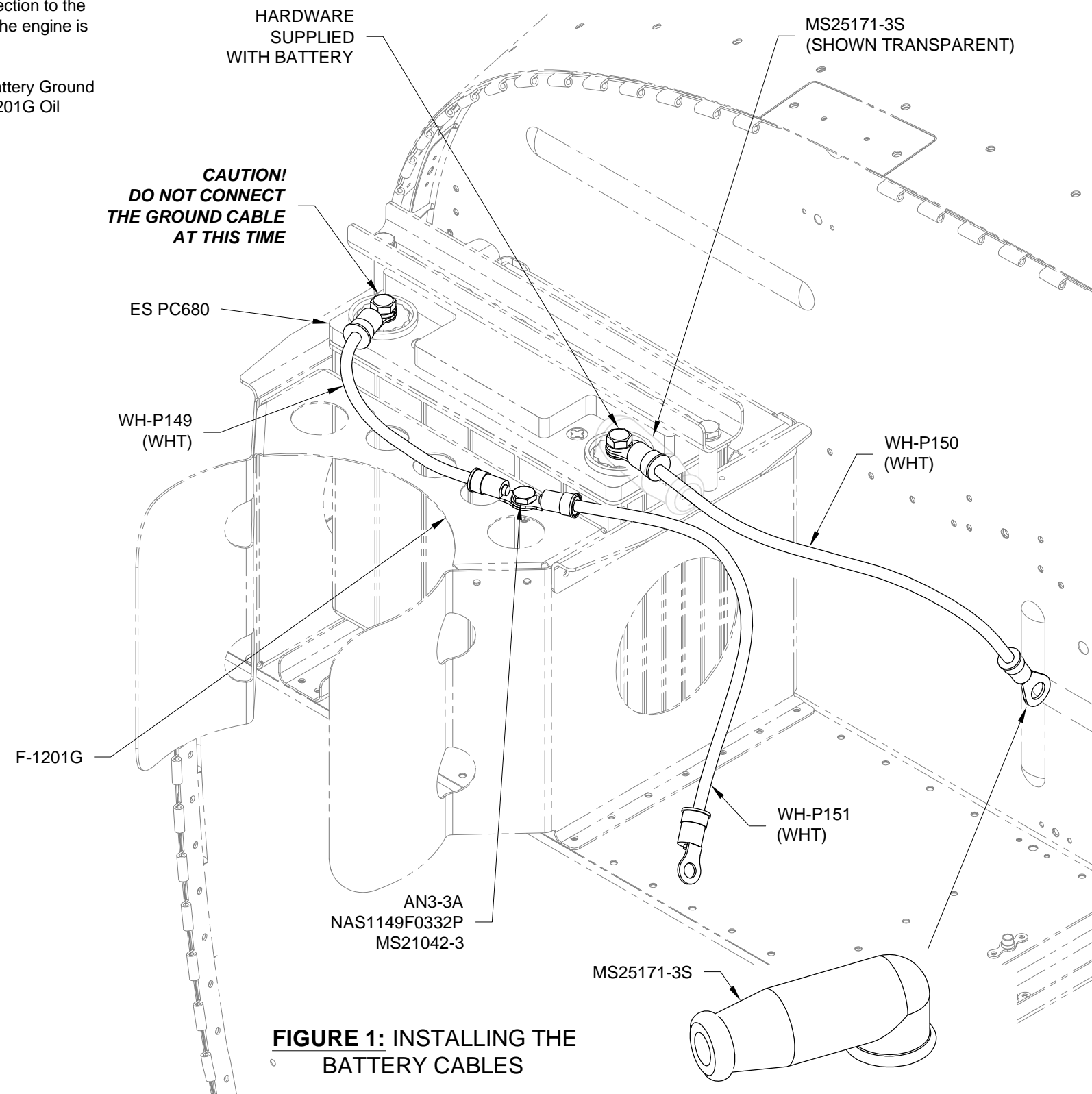


FIGURE 1: INSTALLING THE BATTERY CABLES



Step 1: Remove the F-1240 Top Skin Assembly.

Step 2: Install the WH-00063 Rotax Fwall Fwd Wiring Harness 25-pin d-sub labeled "FWL FWD" to the top of the AV-50000A RV-12 Control Module as shown in Figure 1.

From the harness separate out the WH-P761 (YEL). Route this wire through the cushioned clamp near the left ES CPU FAN, through a snap bushing in the com support bracket then down through the F-1202B Panel Base. See Figure 1.

Route the remaining harness through the cushioned clamp then forward through the firewall penetration grommet.

Step 3: Install the WH-00062 Power Wiring Harness to the back of the AV-50001 Power & Switch Module as shown in Figure 1 and Page 45A-01.

Route the left regulator wire WH-P156 (WHT) down through the F-1202B Panel Base. See Figure 1.

Route the right battery power wire WH-P157 (WHT) through a snap bushing in the com support bracket then forward through the firewall penetration grommet as shown in Figure 1.

Step 4 (SkyView): Install the WH-RV12-EGT Exhaust Gas Temp Wiring Harness to the SV-EMS-220 Engine Monitoring Module as shown in Figure 1.

Route the exhaust gas temp wiring harness through the cushioned clamp near the left ES CPU FAN then forward through the firewall penetration grommet as shown in Figure 1.

Step 5: Cut a length of .030X1/4 104-0250031 TUBE 54.5 inches long to make the FF-1216 Pitot Line.

Step 6: Install the PT 1/4 ID X 3/8 OD X4" Pitot Tube Joiner by inserting two inches of the Aft Pitot Line into one end of the pitot tube joiner.

Insert the FF-1216 Pitot Line into the other end of the pitot tube joiner until the ends of the pitot line and aft pitot line are within 1/4 inch of each other. See Figure 1.

If the pitot tube joiner is difficult to install, warm it in hot water prior to inserting the pitot lines.

Route the pitot line through the firewall penetration grommet as shown in Figure 1.

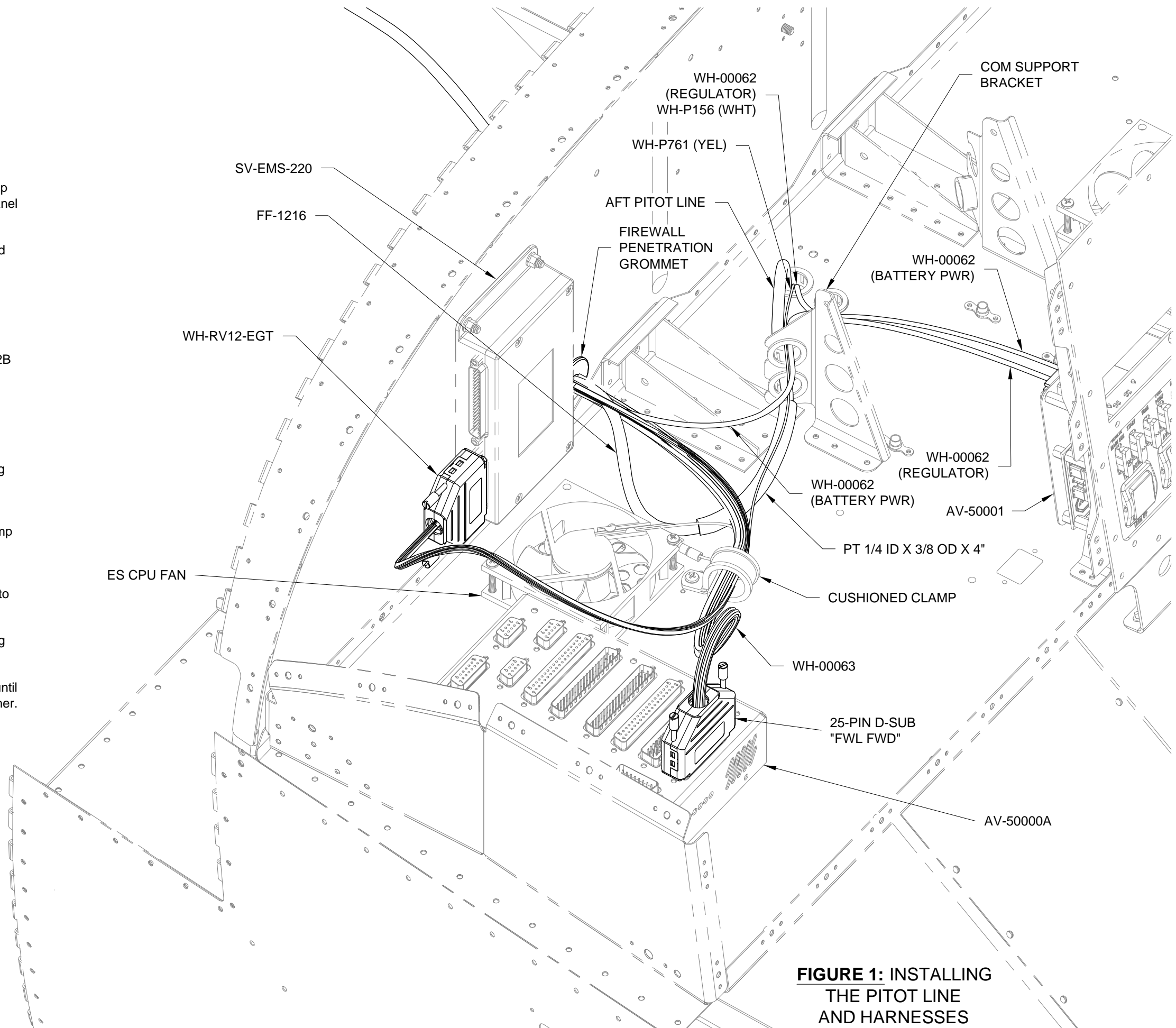


FIGURE 1: INSTALLING THE PITOT LINE AND HARNESSSES



Step 1: Deburr the edges of the F-00036 Fuel Pressure Sensor Bracket.

Insert a grommet into the large hole in the fuel pressure sensor bracket as called out in Figure 1.

Mount the fuel pressure sensor bracket to the F-1201A Firewall Upper using the hardware called out in Figure 1.

Step 2: Insert the F 4 DTX-S Elbow's end with female pipe thread into the grommet from below as shown in Figure 1.

Attach the 101690-000 Fuel Pressure Sensor into the elbow from above using a small amount of pipe thread sealant.

Step 3: Cut the three wires coming from the 101690-000 Fuel Pressure Sensor 1 1/2 inches from where they exit the sensor body.

Step 4: Strip the ends of the three wires twisted together WH-Q741 (RED), WH-Q756 (BLK) and WH-Q755 (GRN) coming from the firewall penetration grommet.

Use splices to attach these wires to the wires of corresponding color coming from the 101690-000 Fuel Pressure Sensor.

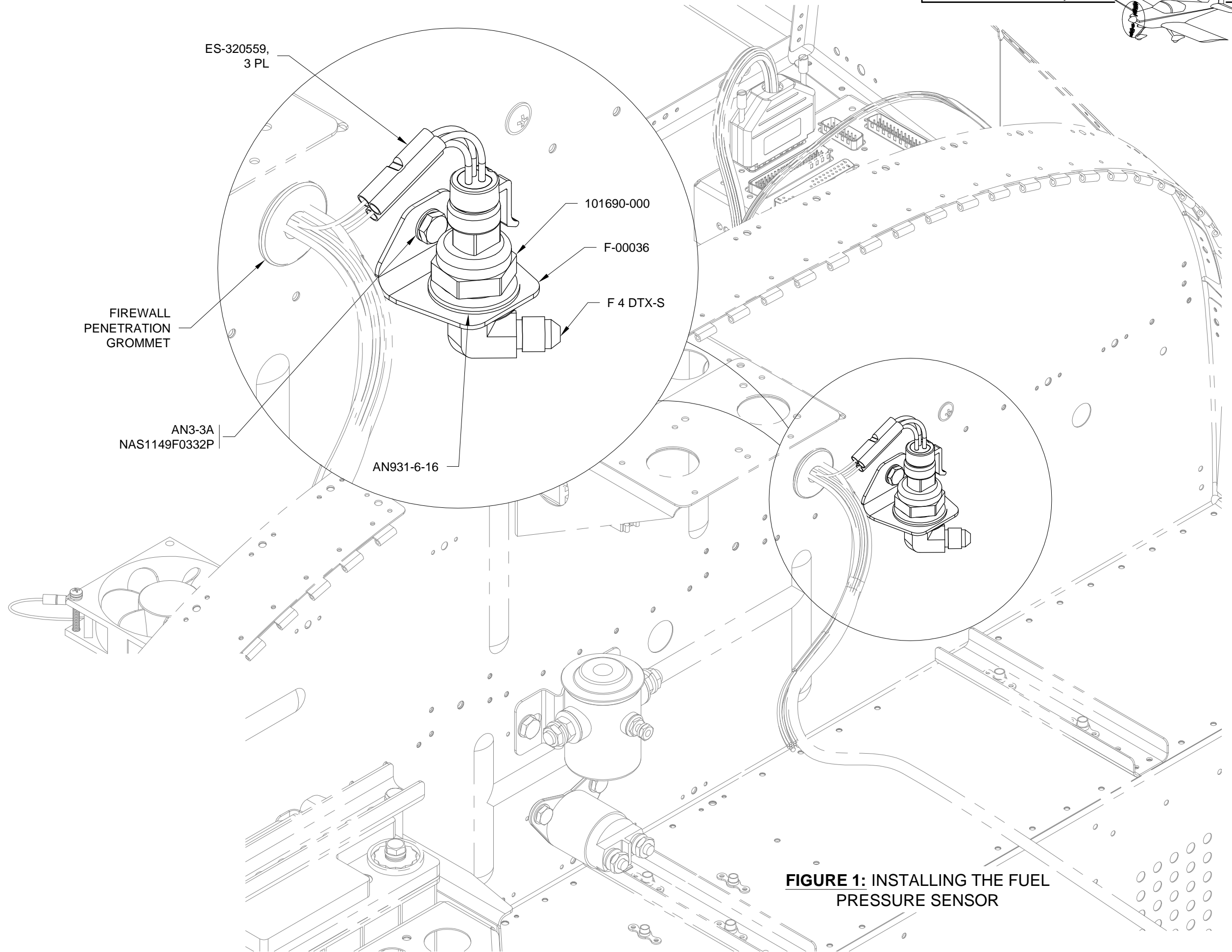
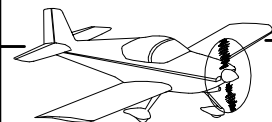


FIGURE 1: INSTALLING THE FUEL PRESSURE SENSOR



Step 1: Route the WH-RV12-EGT Exhaust Gas Temp Wiring Harness, the WH-00062 Power Wiring Harness and WH-00063 Rotax Fwall Fwd Wiring Harness through the cushioned clamp attached to the WD-1221 Engine Mount Standoff. See Figure 1.

Step 2: Separate out and strip the ends of both red and both yellow wires coming from the brown WH-RV12-EGT Exhaust Gas Temp Wiring Harness.

Crimp on ES 421-0107 spade connectors to the end of each wire.

Step 3: Find both 100405-001 EGT Sensors.

Cut off the existing spade terminals leaving as much wire as possible.

Strip the end of the wires then crimp on ES 421-0108 spade connectors to the end of each wire.

Step 4 (Garmin G3X Touch): From the WH-00101 G3X Touch Harness route the WH-P1123 (WHT) and WH-P1122 (RED) wires through the cushioned clamp attached to the engine mount standoff. See Figure 1. These wires are coming from the 15-pin d-sub that connects to the ES BATT TCW 3AH Backup Battery. See Section 42N.

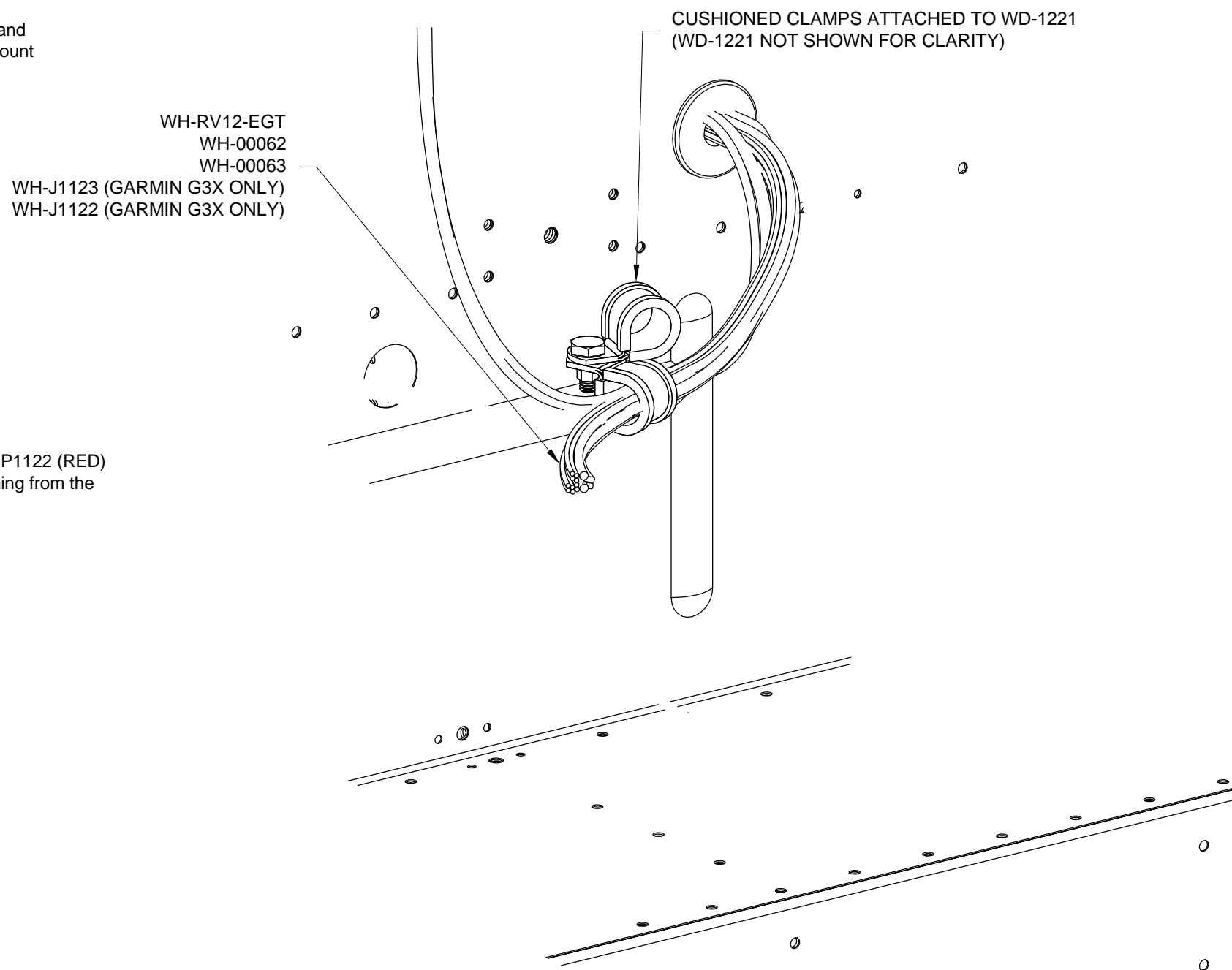
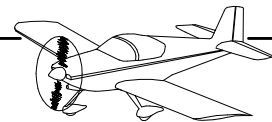


FIGURE 1: ROUTING WIRES THROUGH THE CUSHIONED CLAMPS (GARMIN SPECIFIC WIRES SHOWN)



Step 1: Separate out from the WH-00063 Rotax Fwd Wiring Harness the WH-E752 (BLK) Manifold Pressure A, WH-E751 (GRN/RED) Manifold Pressure B and WH-P750 (WHT/RED) Manifold Pressure C wires.

Step 2: Find the Weatherpak three position connector used with the 100434-000 Manifold Pressure Sensor. Holding the connector right side up as it will be installed in the aircraft (see Figure 1) insert the WH-E752 (BLK) Manifold Pressure A, WH-E751 (GRN/RED) Manifold Pressure B and WH-P750 (WHT/RED) Manifold Pressure C wires into the connector as called out in Figure 1. Check with a gentle tug that all three wires have locked into place. Close the connector housing to retain the wires and seals.

Step 3: Install the three pin connector from Step 2 into the 100434-000 Manifold Pressure Sensor as shown in Figure 2.

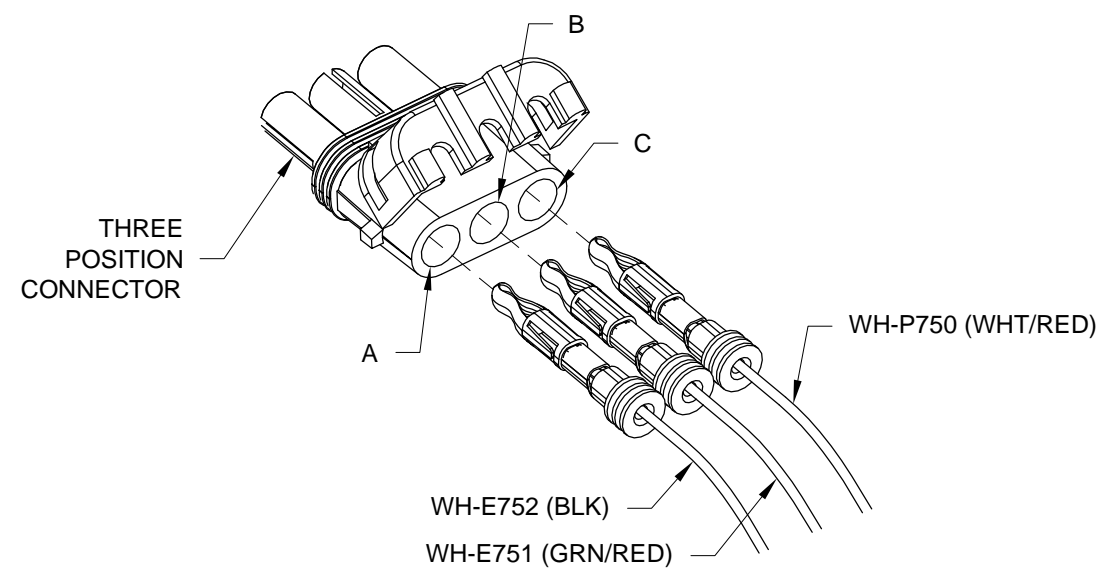


FIGURE 1: INSTALLING WIRES IN THE CONNECTOR HOUSING

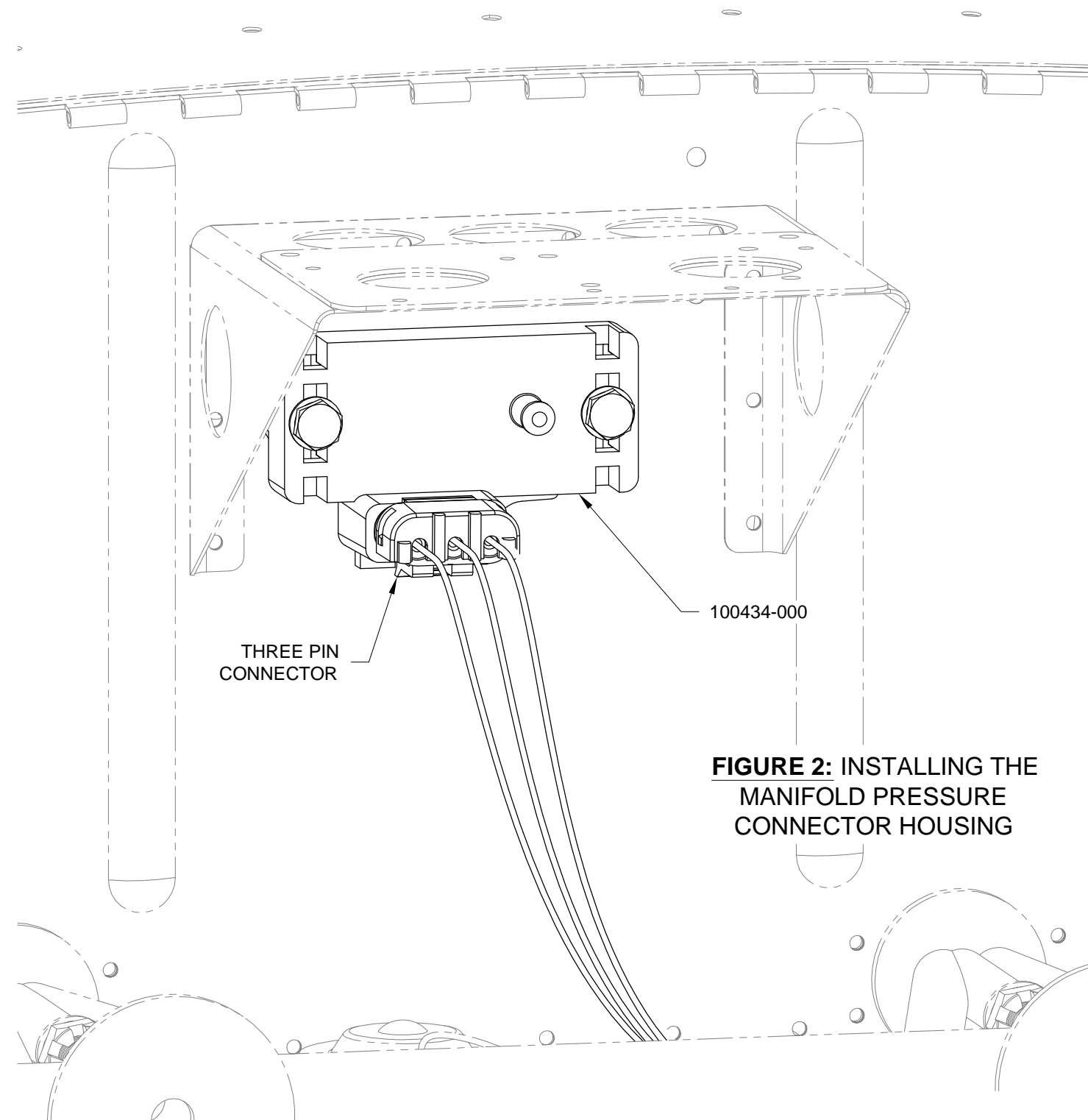
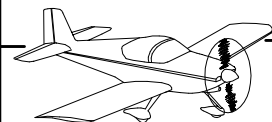


FIGURE 2: INSTALLING THE MANIFOLD PRESSURE CONNECTOR HOUSING



Step 1: Locate the ES 24115 Master Relay. Remove the outer nut and washers from each of the three studs on the relay. Do not remove the nut that lies against the relay body.

Step 2: Locate the ES DIODE MASTER Master Relay Diode. Slip the ring terminal nearest the red band through an insulated boot and onto the stud of the ES 24115 Master Relay, as shown in Figure 1. Through the same insulated boot and over the same stud, slip the larger ring terminal on the WH-P150 (WHT) Battery Power Wire. Use the nut and lock washer provided with the master relay to tighten these terminals down on the stud. See Figure 1.

Step 3 (SkyView): Separate out the WH-P759 (WHT/ORN) Master Relay wire from the WH-00063 Rotax Fwall Fwd Wiring Harness. Strip the end of the wire then crimp a ring terminal on the end per the call-out in Figure 1. Slip the ring terminal on the end of the WH-P759 (WHT/ORN) Master Relay wire through an insulated boot and onto the stud on the front of the ES 24115 Master Relay.

Step 4: Slip the unconnected ring terminal on the ES DIODE MASTER Master Relay Diode through an insulated boot and onto the stud on the front of the ES 24115 Master Relay. Use the nut and lock washer provided with the master relay to tighten these terminals down on the stud. See Figure 1. For Garmin G3X installations leave this nut loose at this time.

Step 5: Slip an insulated boot over the end of the WH-P154 (WHT) Starter to Master Relay Cable then connect the ring terminal to the remaining stud on the ES 24115 Master Relay as shown in Figure 1. Use the nut and lock washer provided with the master relay to tighten this terminal down on the stud. For Garmin G3X installations leave this nut loose at this time.

Step 6: Remove the outer nut and washers from the two studs on the 992 819 Starter Relay.

Step 7: Find the WH-P157 (WHT) Battery Power Wire from the WH-00062 Power Wiring Harness where it was routed through the cushioned clamp attached to the WD-1221 Engine Mount Standoff. Strip the end of the battery power wire and attach a ring terminal per the call-out in Figure 1.

Step 8: Slip the unconnected ring terminal on the WH-P154 (WHT) Starter to Master Relay Cable and the ring terminal on the end of the WH-P157 (WHT) Battery Power Wire through an insulated boot and onto the stud on the 992 819 Starter Relay as shown in Figure 1. Use the nut and lock washer provided with the start relay to tighten these terminals down on the stud. See Figure 1.

Step 9: Slip one end of the WH-P155 (WHT) Starter Power Cable through a insulated boot and onto the remaining stud on the 992 819 Relay. Use the nut and lock washer provided with the start relay to tighten this terminal down on the stud. See Figure 1.

Step 10: Separate the ES 421-0108 spade connector crimped onto ORN and PRP wires coming from the WH-00063 Fwall Fwd Wiring Harness.

Insert the female spade terminal onto to the male spade terminal located on the lower center part of the 992 819 Relay.

Step 11: Remove the right side bolt and washer holding the 992 819 Relay to the firewall.

Slip the ring terminal attached to the wire covered in BLU heatshrink coming from WH-00063 Fwall Fwd Wiring Harness over the bolt then install the bolt and washer.

Step 12: Route the WH-K766 (PRP) forked wire up the WH-K760 (ORN) Start Power wire then attach the remainder to the FF-1216 Pitot Line as shown in Figure 1.

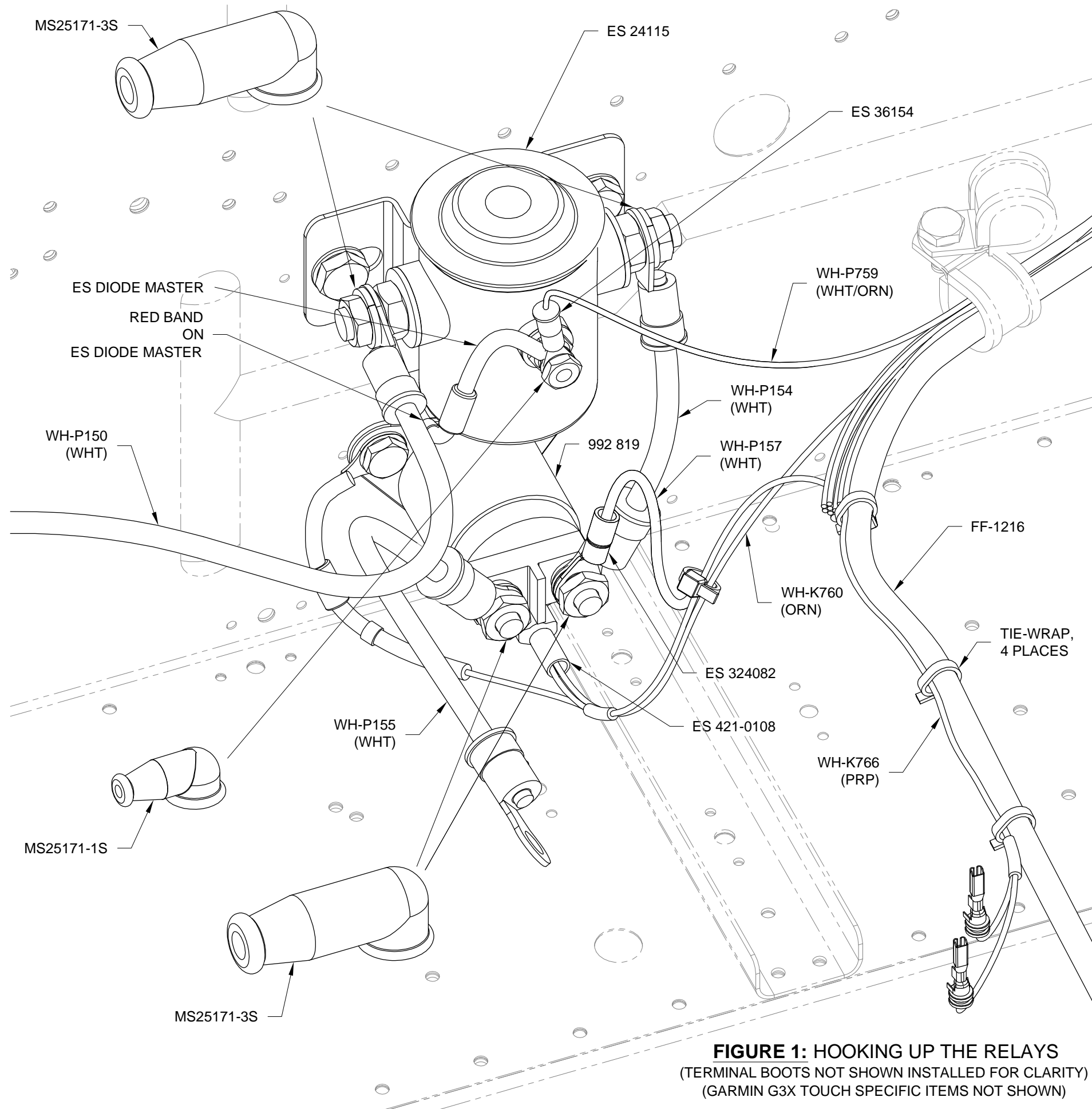
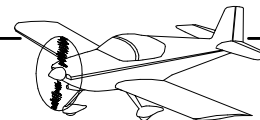


FIGURE 1: HOOKING UP THE RELAYS
(TERMINAL BOOTS NOT SHOWN INSTALLED FOR CLARITY)
(GARMIN G3X TOUCH SPECIFIC ITEMS NOT SHOWN)



Step 1 (Garmin G3X Touch): Locate the ES-00196 ATC Fuse Holder and strip the ends of both wires. Crimp a ring terminal to one of the wires coming from the fuse holder. See Figure 1.

Crimp a butt splice to the end of the other wire coming from the fuse holder. See Figure 1.

Strip the end of the WH-P1122 (RED) wire coming from the WH-00101 G3X Touch Harness.

Crimp the other end of the butt splice to the end of the WH-P1122 (RED) wire. See Figure 1.

Insert an ATC Fuse into the fuse holder. See Figure 1.

Install the ring terminal to the post of the ES-24115 Master Relay shown in Figure 1 along with wires already installed to the terminal post.

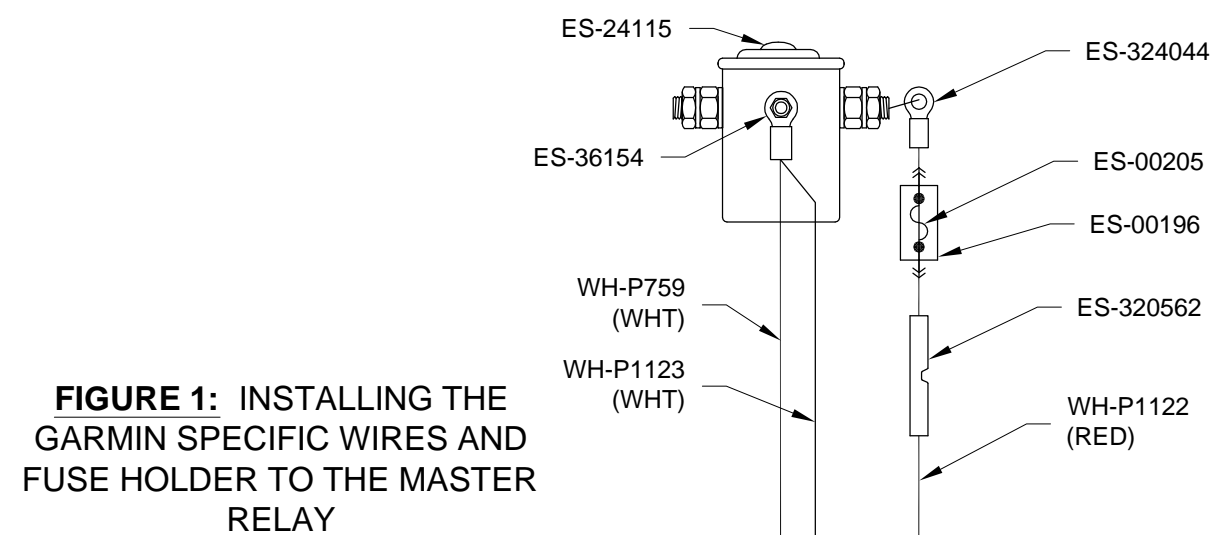
Step 2 (Garmin G3X Touch): Strip the end of the WH-P1123 (WHT) wire coming from the WH-00101 G3X Touch Harness.

Separate out the WH-P759 (WHT/ORN) Master Relay wire from the WH-00063 Rotax Fwall Fwd Wiring Harness. Strip the end of the wire.

Crimp both WH-P1123 (WHT) and WH-P759 (WHT) into a ring terminal. See Figure 1.

Slip the ring terminal on the end of the wires through an insulated boot and onto the stud on the front of the ES 24115 Master Relay.

Step 3 (Garmin G3X Touch): Use the nuts and lock washers provided with the master relay to tighten the terminals from Step 1 and Step 2 down on each stud.





CAUTION: Do not un-plug or plug in any connector in the aircraft electrical system with the electrical system turned on or any avionics component running off a backup battery!

Only adjust potentiometers using the TOOL-00000 Trimmer Adjustment Tool. If necessary carefully sand down the tip diameter of the trimmer adjustment tool to fit within the adjustment holes in the case of the AV-50000A Control Module.

When adjusting the potentiometers it is possible to run off the end of the adjustment range. The item being adjusted will then be completely turned off. If this happens turn the pot back into the normal adjustment range. The potentiometer has a built in clutch system which prevents damage if the potentiometer is turned past the end of its travel.

The four screws that attach the AV-50000A Control Module to the F-1202B Panel Base provide a ground connection. Do not power up the electrical system without the control module attached to the panel base!

Step 1: Make the potentiometers easily accessible. Remove the SkyView 10" Display then temporarily remove the four mounting screws that retain the AV-50000A Control Module. Gently pull the control module through the display opening in the panel leaving all the harnesses attached. If the routing of your harnesses prevent this remove the F-1240 Upper Forward Fuselage Skin to grant easy access to the control module.

CAUTION: Only use a battery charger compatible with your battery's specifications.

NOTE: If the SkyView AP-Knob Panels kit has been installed skip Step 2 (see Section 58). When using the knobs modules the trim rate will be controlled by the SV-AP-PANEL module which is pre-set with factory settings when the latest firmware-settings file is installed from the Van's Aircraft web site.

Step 2 (Garmin G3X Only): Turn off the autopilot switch.

Step 3: Double check that trim tab motion properly corresponds to trim switch input.

Use a battery charger to bring the bus voltage to approximately 13.6 volts.

Verify the time to run the trim motor stop to stop is approximately 25 seconds. The potentiometer is a 25 turn device. Turning the potentiometer clockwise will slow the motor travel, conversely turning it counter clockwise will speed the motor travel. After the first flight this setting may be fine tuned to builder preference.

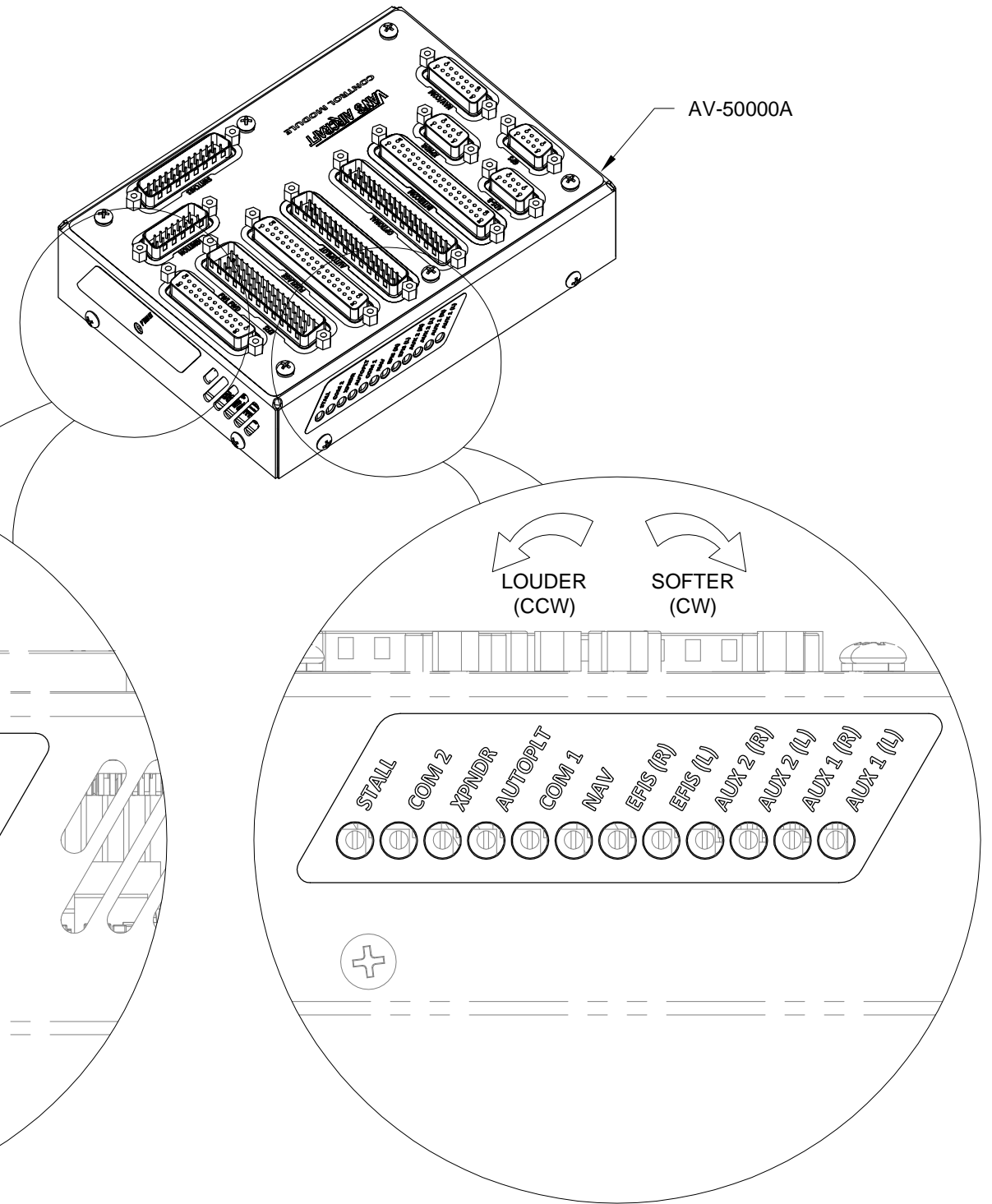
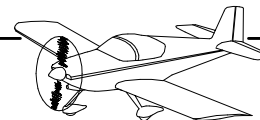


FIGURE 1: CONTROL MODULE SETTINGS



NOTE: This page describes how to make final adjustments to obtain the best performance from the audio mixer.

Before starting remove any outside voltage sources such as a battery charger.

What is an audio mixer? The design intent of an audio mixer is to combine audio signals together from many different sources into one balanced signal that then will be fed into an intercom. The potentiometers over which you have control first reduce each audio signal, the signals are combined then amplified back to a useable output level for the intercom.

The following is a list of the factory preset levels for the audio mixer. Levels are preset at the factory and should work well "out of the box". Levels are included here for future reference.

Volume max = 25 turns counter clockwise (CCW)

Volume off = 25 turns clockwise (CW)

Turning more than 25 turns will ensure the max or off condition.

Stall	Volume max
Com 2	Volume off
Xpndr	Volume off
AutoP	Volume off-SkyView/max-Garmin
Com 1	Volume max
Nav	Volume off
EFIS (R)	Volume 3 turns CCW from off
EFIS (L)	Volume 3 turns CCW from off
Aux 2 (R)	Volume off
Aux 2 (L)	Volume off
Aux 1 (R)	Volume max
Aux 1 (L)	Volume max

Step 1: Plug in and turn on a music device such as an iPod to the auxiliary music jack. Set the output volume of the device to 75% of full. Practice turning the potentiometers that control the Aux 1 (L) and Aux 1 (R) levels. Become familiar with the feel when tool is actually engaging the potentiometers and changing the output volume.

Notice that a very small range (possibly 6 depending on the music device you are using) of the pots 25 available turns are useful. Going back to the description of an audio mixer this means that some audio signals may need large reductions (more turns of the potentiometer) to match the strength of a weak audio signal.

Step 2: When you are comfortable adjusting the potentiometers make the following changes to the EFIS (L) and EFIS (R) levels. The goal is to maximize the EFIS alert output level while minimizing the background noise. There are background "noises" inherent to SkyView. By turning the EFIS (L) and (R) levels down as far as possible the "noise" is reduced as much as possible. To make the EFIS audio alerts loud enough to hear, turn the volume output up within the SkyView itself. Note the SkyView volume control only affects the volume of the alerts not the "noise". We have then minimized the noise while maximizing the audio alert volume.

Enter the Audio Setup menu within the SkyView display and set the Volume Control / Test to 100%. See Figure 1. If the audio from the display sounds distorted the audio mixer potentiometers in the control module are now set too high.

Slowly turn both the EFIS (L) and (R) levels down 1/2 turn at a time until the distortion disappears. Note that if the volume disappears altogether you have turned the potentiometer completely off. Turn the potentiometer back CCW until the volume comes back.

It may not be possible to obtain the perfect level setting. In this case turn down the volume within the display to remove the last hint of distortion. This should result in a sound level of 80% - 100% within the screen. The closer to 100% the quieter the "noise" will be.

Now that the setup has been maximized and distortion removed turn the screen volume level down even further if the maximized level is too loud for your combination of hearing health and headset quality.

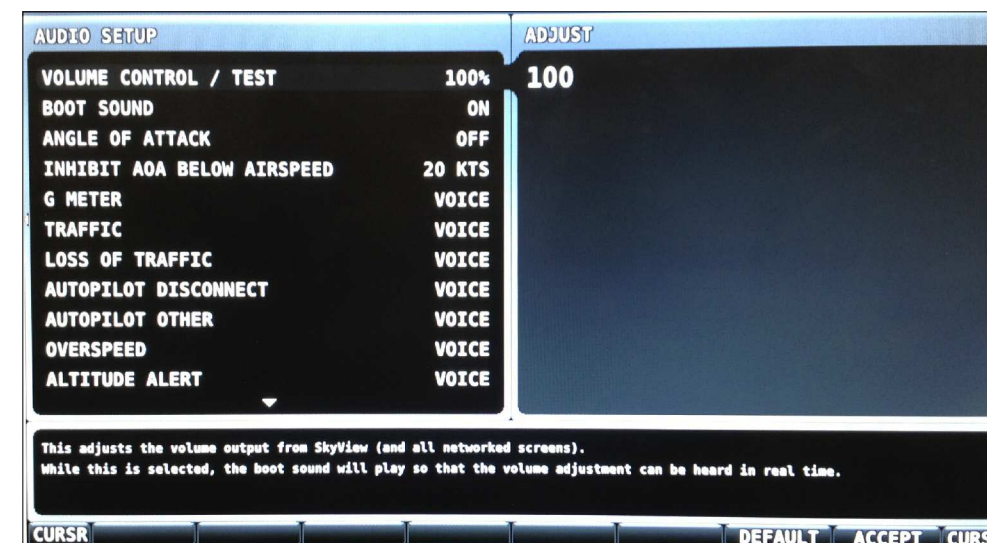


FIGURE 1: SKYVIEW VOLUME CONTROL

Step 3: Plug a headset into the pilot headset jacks. If the headset has volume control adjust the volume to the middle of the range. Turn on all audio devices connected to the board. Use a local ATIS or AWOS for radio input.

Step 4: Adjust the radio volume knob to full volume. Adjust the Com 1 sound level potentiometer on the AV-50000A Control Module until the radio is too loud and slightly distorted.

Step 5: Install the AV-50000A back onto the F-1202B Panel Base as shown in Section 42M.



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