

KITFOX AIRCRAFT

KITFOX SUPER SPORT FINAL ASSEMBLY

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Section A. Instrument Panel Installation

The standard instrument panel for the Super Sport is made from a single piece of aluminum sheet that is mounted to the fuselage on four welded tabs and two steel tube panel braces. The braces attach to the fuselage with cushioned loom clamps, and the welded tabs use rubber grommets as shock absorbers.

Panel space is sufficient for a well-equipped layout, and more than ample for the most common instrument combinations.

The panel comes uncut so you can determine your own specific layout. A template of standard instrument cutouts is provided on the fuselage template sheet and on Figure A-2. The nonstandard Rotax tachometer cutout pattern is also shown on Figure A-2.

Be patient and give the layout plenty of consideration. As you will spend many hours flying behind your panel, a little forethought now will go a long way toward your future flying satisfaction.

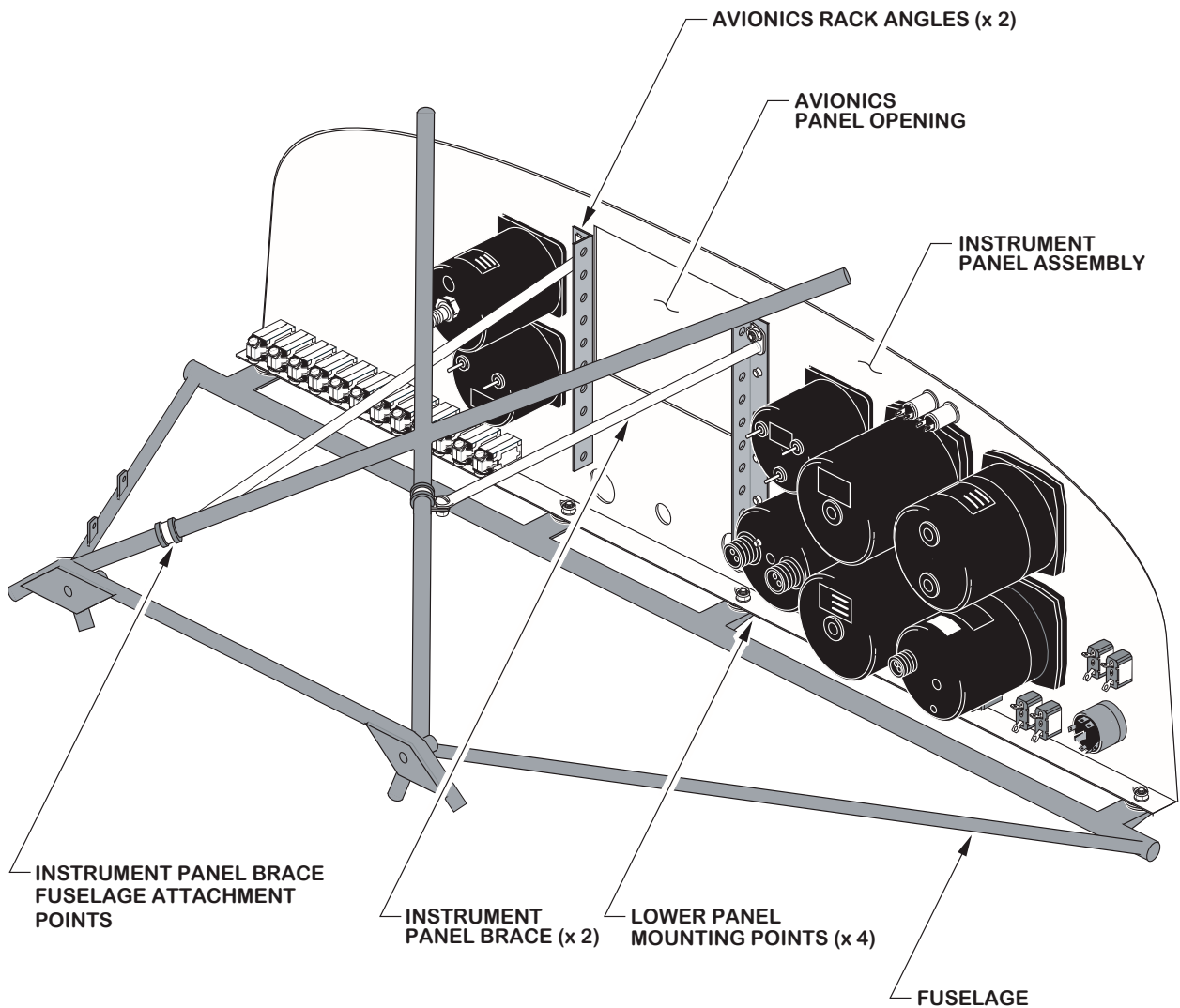


Figure A-1
Instrument Panel Overview

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- 1. Trim the instrument panel with a file until the desired shape is achieved. Hold the panel in the fuselage, centered over the panel mounting tabs, and mark the location of each tab on the panel.

NOTE

When planning the layout of the instruments and components in the panel, avoid placing them in the areas near the mounting tabs to prevent conflicts with the mounting hardware.

- 2. Make a list of every instrument and component that will be immediately installed in your panel, along with any instruments or components that you might be installing in the future. Create your desired panel layout, giving thought to the visibility of the instruments, accessibility of switches, interference with fuselage tubing or conflict with other instruments, possible resale value, and every other possible consideration that you can think of. When you are completely satisfied with your planning, cut the panel for the instruments and avionics. A fly-cutter mounted in a drill press is probably the best technique for making the larger instrument panel holes.

NOTE

Since instrument sizes can vary, we suggest that you actually obtain the instruments you desire to install and measure them prior to cutting the panel. This is especially true of automotive gauges and stereos, which do not conform to any aircraft standards.

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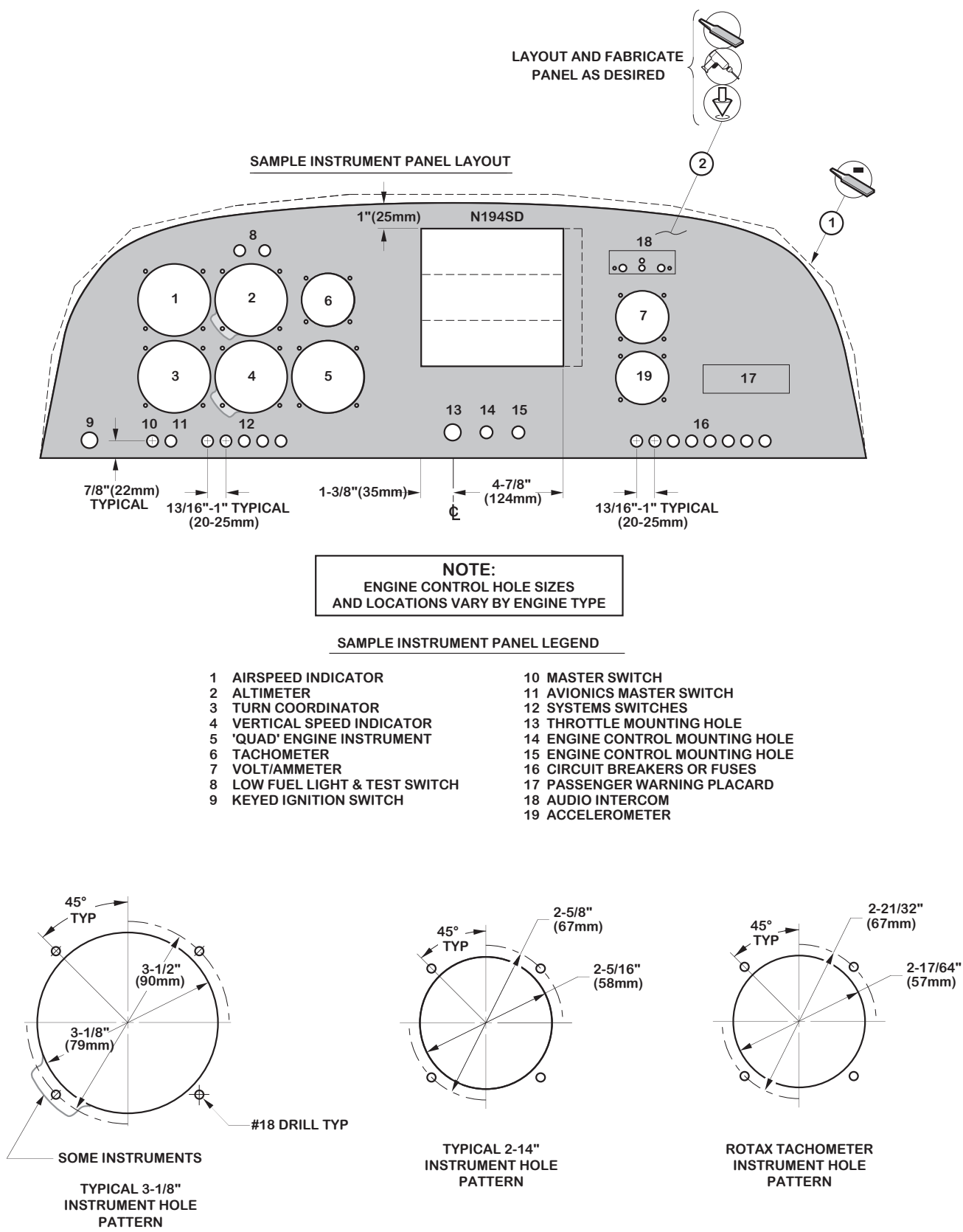


Figure A-2
Instrument Panel Layout and Preparation

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3. Place the panel in the aircraft and clamp it to the fuselage mounting tabs. Drill up through the steel tabs and into the lower mounting flange of the panel using a $\frac{3}{16}$ " bit. Deburr the panel holes after drilling.
4. Cut the supplied avionics rack angles to the required lengths for your installation. If necessary, trim the width of the avionics rack angle flanges to clear any instruments or components immediately next to the radios.
5. Drill the avionics rack angles and instrument panel for the angle mounting hardware and deburr, as shown in Detail "A" of Figure A-3. Countersink the lower five holes in the panel face; do not countersink the top hole on each side. Bond prep the mating surfaces of the angles and panel with Scotch-Brite and clean with denatured alcohol. Rivet and bond the angles in place using structural adhesive and the pop rivets shown.
6. Enlarge the two top holes to $\frac{9}{64}$ " for the AN526-632R8 screws. Cut two pieces of tubing to fit between the panel and fuselage as shown. Flatten about 1" of each end to create mounting tabs. Bend and drill the tabs to fit on the panel with the hardware shown. Mount the instrument panel braces to the instrument panel using the top hole of the avionics rack angles on each side. Install the braces loosely at this time.
7. Enlarge the holes in the four fuselage mounting tabs to $\frac{5}{16}$ " and deburr. Install the grommets into the tabs and temporarily install the panel in the aircraft using the hardware shown in Detail "B".
8. The forward ends of the instrument braces mount to the fuselage tubing with clamps as shown in Detail "C". Adjust the locations of the clamps and braces until the panel face is perpendicular to the longitudinal axis of the aircraft (instrument panel is plumb when fuselage is leveled longitudinally).
9. Fabricate and install the five glare shield mounting angles in the locations shown in Detail "D". The glare shield itself will be installed after the windshield installation. Remove the instrument panel from the aircraft.

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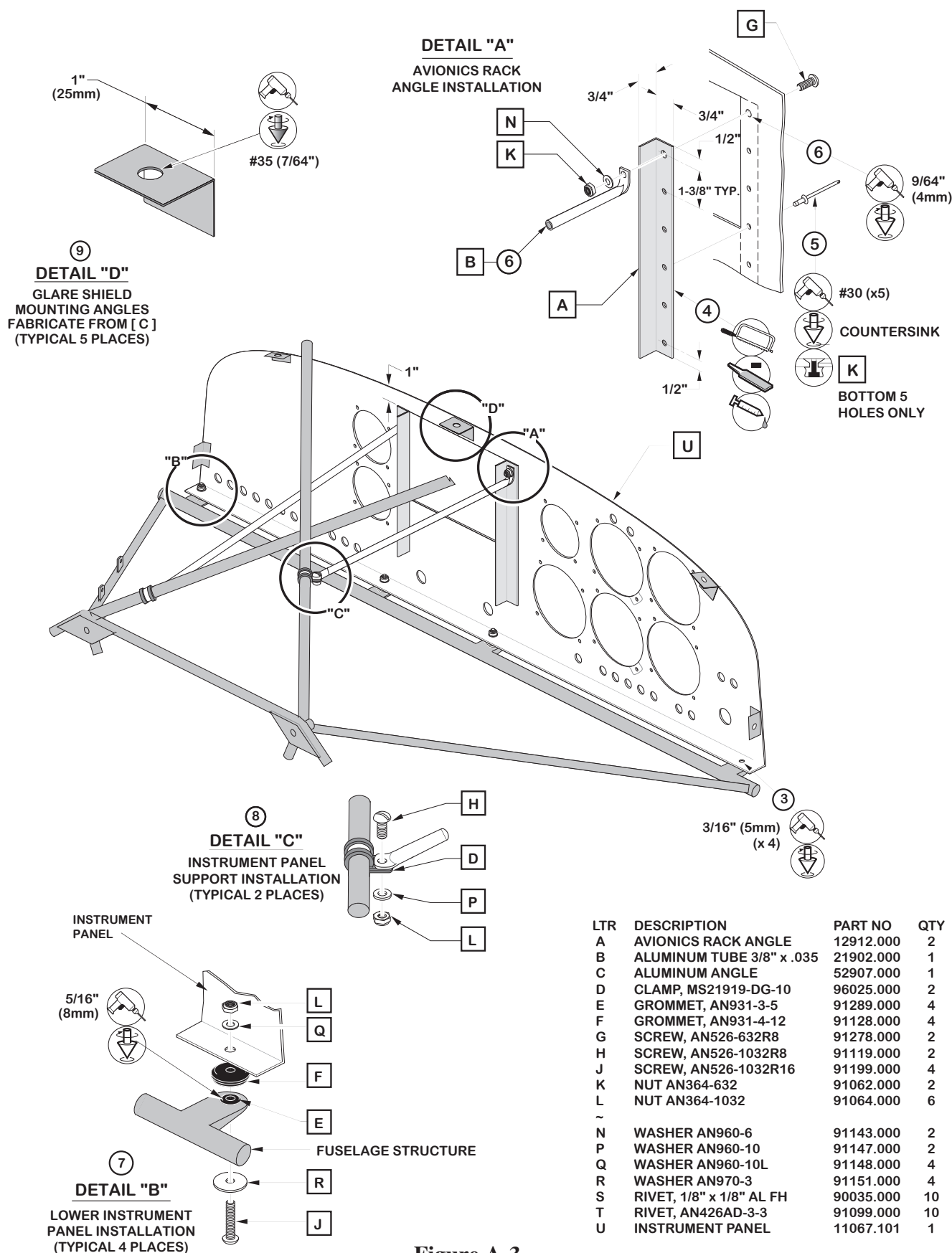


Figure A-3
Instrument Panel Installation

NOTE

The panel should be surface prepped, finish painted, and labeled prior to installing the instruments and components.

- 10. With the panel on the bench, install all instruments, switches, avionics mounting trays, etc. Wire the panel as much as possible, as it is much easier to do on the bench than in the aircraft.
- 11. Reinstall the panel in the aircraft and permanently mount it with the hardware previously utilized in the initial installation.

NOTE

Depending on the weight of your avionics installation, you may need to fabricate an avionics rack support to prevent the panel from sagging. Attach the support to the side or back of the avionics trays and secure it to the nearest structural tubing.

- 12. Make the various connections to the aircraft as required by your equipment. (Further information on airframe electrical installation is given in Section C of this chapter).

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CAUTION

The airspeed indicator will need to be properly marked for the operating range for the Kitfox Super Sport. These marks allow the pilot to quickly verify certain operating parameters in flight. Four colored bands are used which are described below.

RED LINE - 140 mph. The red mark is called the Never Exceed Speed (V_{NE}). This airspeed should never be exceeded.

YELLOW ARC - 120 to 139 mph. The yellow band is an airspeed range that should not be used unless in smooth air and then only with caution.

GREEN ARC - ?? to 119 mph. The green band is the normal airspeed operating range for the aircraft. The bottom of the green arc represents the airspeed that the aircraft will stall at under the following conditions: level flight, idle throttle, no flaps, and at gross weight. This speed must be determined during flight testing. The top of the green arc is the maximum structural cruising speed.

WHITE ARC - ?? to 80 mph. The white band is the flap operating airspeed range for the aircraft. The bottom of the white arc represents the airspeed that the aircraft will stall at under the following conditions: level flight, idle throttle, full flaps, and at gross weight. This speed must also be determined during flight testing. The top of the white arc is the maximum speed at which the flaps may be used.

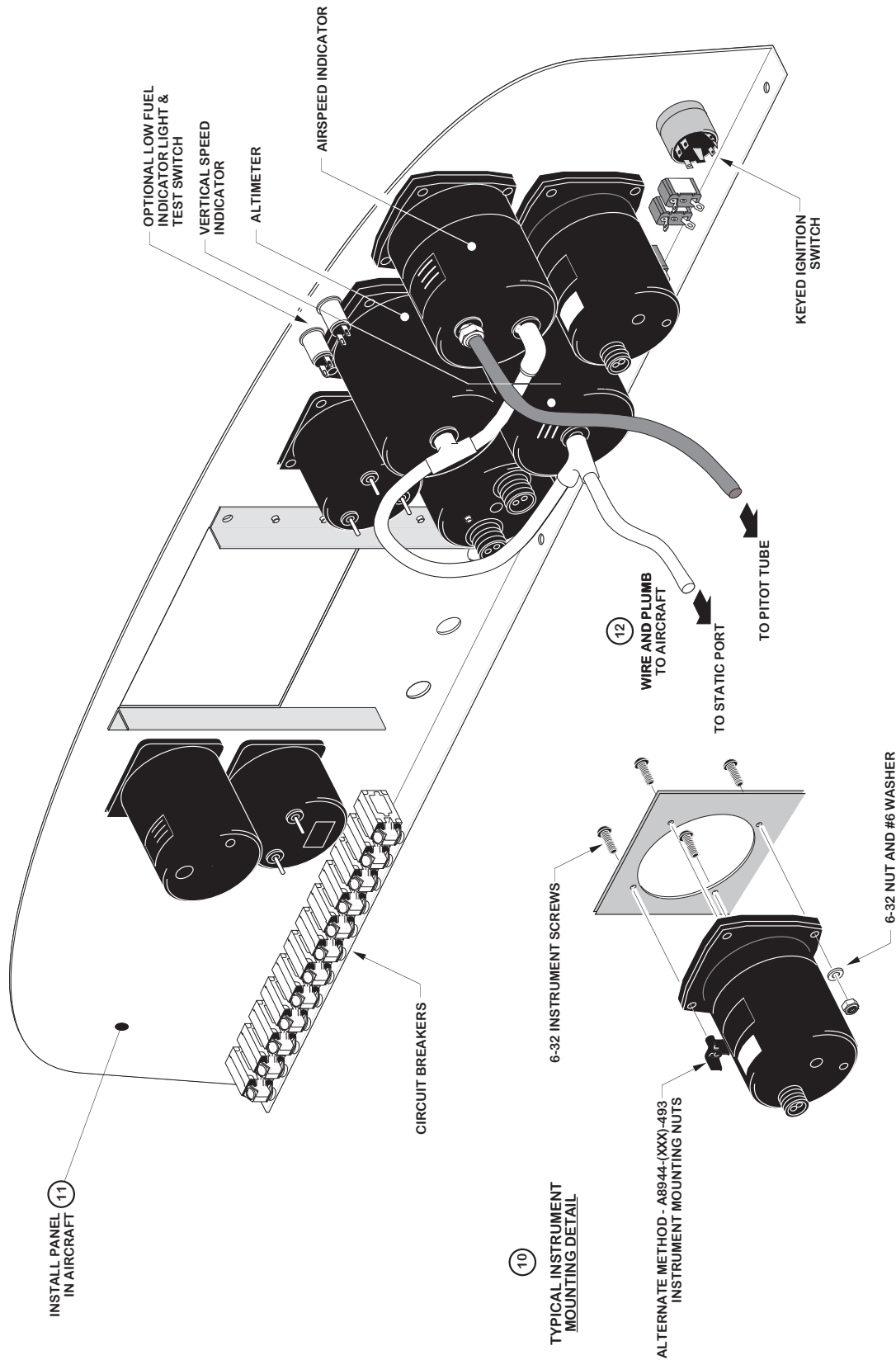


Figure A-4
Typical Instrument and Pitot-Static System Installation

Section B. Fuel System Installation

The Kitfox Super Sport fuel system uses two wing-mounted fuel tanks which gravity-feed fuel to a vented header tank. From the header tank, the fuel flows forward to a fuel shut-off valve, through the firewall, and to the engine fuel pump. The fuel system components downstream of the header tank are supplied with the engine component kit due to variations dependent upon the engine type selected.

A quick-drain fitting is provided in the bottom of the header tank for removal of water and sediment from the fuel (this is the fuel system's lowest point, and therefore acts as a sump). This drain should be checked during every preflight inspection. Quick-drain fittings are also provided in the sump of each fuel tank.

A simple sight gauge is provided on each fuel tank for an accurate indication of fuel remaining. An optional low fuel level warning system can provide you with a warning of impending fuel starvation, allowing you time to land the aircraft safely. A Low Level Fuel Sensor kit is available from Kitfox Aircraft part number 73504.000

The fuel system is vented by means of vented fuel tank caps. The header tank is vented to the right wing tank to allow trapped air to be easily vented to the wing tank.

CAUTION

Because of the added weight and possible loss of fuel, the wing tanks should be empty (or nearly so) before the wings are folded.

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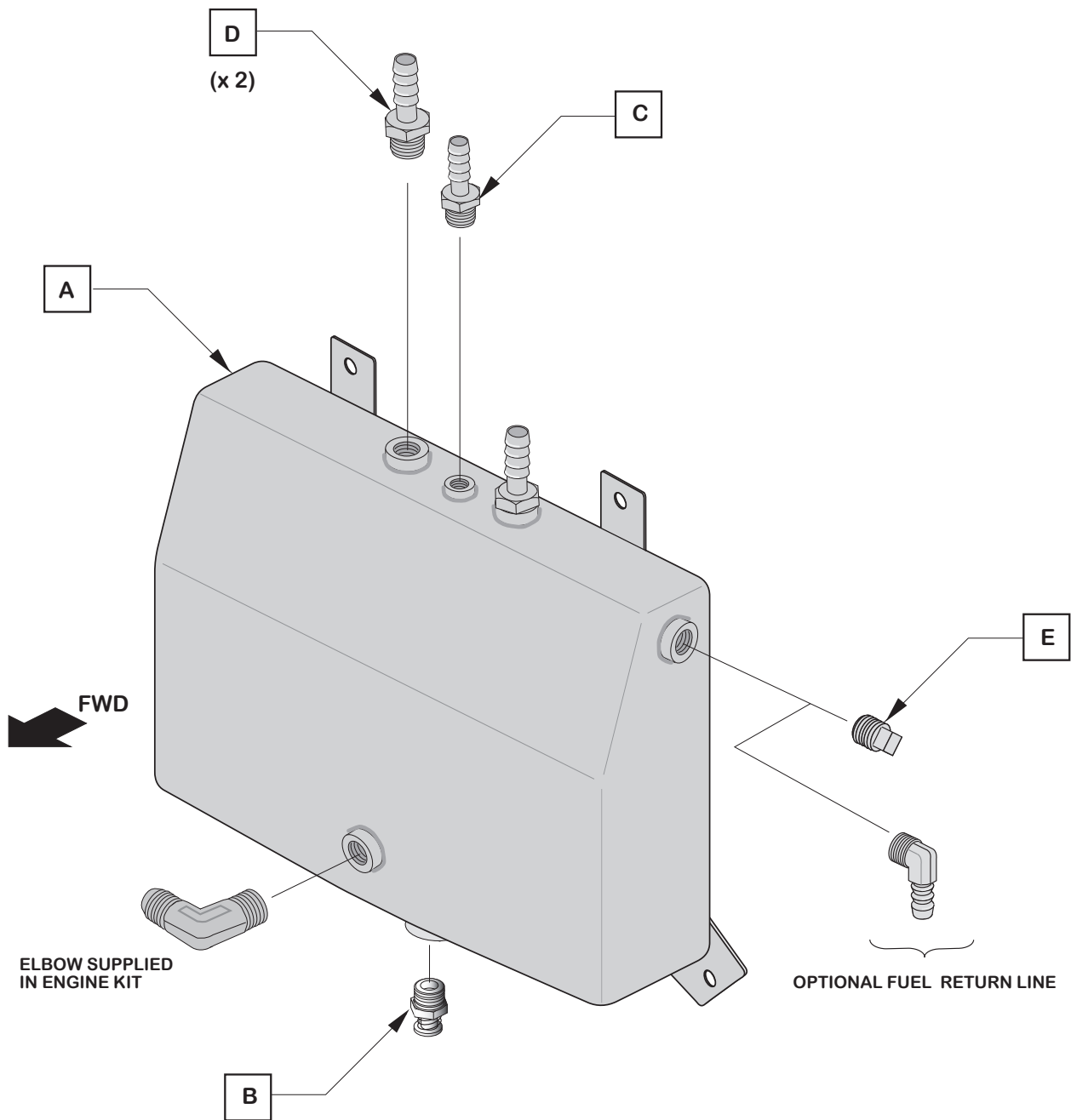
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- 1. Install the fittings in the header tank appropriate for your particular engine installation. Use a fuel-resistant, paste-type thread sealant such as Permatex® Tack & Seal 9AR on the fittings before installing them in the header tank.

NOTE

The header tank outlet fitting will vary depending on engine choice. The Rotax 912, 912S, and 914 engine installations use the P/N: 43036.000 (AN822-5-4D) elbow fitting for use with 5/16” O.D. fuel lines while the O-200, O-235, and IO-240 use a P/N: 90138.000 AN822-6D elbow fitting for use with 3/8” O.D. lines.

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LTR	DESCRIPTION	PART NO	QTY
A	HEADER TANK	74005.301	1
B	QUICK DRAIN	24012.000	1
C	FITTING, 1/4" NPT x 1/4" BARB	94014.000	1
D	FITTING, 1/4" NPT x 5/16" BARB	90064.000	2
E	PLUG, AN913-2D	94016.000	1

Figure B-2
Header Tank Assembly

2. Install the header tank onto the fuselage tubing, forward of the rear seat bulkhead tubing on the right side. The angled top of the header tank faces forward to ensure ample clearance with the seat back. You'll find that by adjusting the location of the header tank in relation to the tubing that there is one point where all the tabs will align with the mounting ears of the tank. Match drill the four mounting tabs. Use the hardware shown to install the tank.
3. Test fit and trim the P/N: 14042.103 shielding tube that seals the area between the header tank and the flange as required until the flange will sit flush against the inside face of the bottom fuselage fabric (stretch a scrap piece of fabric or an old cotton sheet across the bottom of the fuselage to simulate the approximate fabric line if the fuselage fabric is not installed).
4. During the fabric covering process, install a fabric reinforcing patch that is 2" larger in diameter than the P/N: 90068.000 flange to the bottom fuselage fabric directly under the header tank quick-drain.
5. With the shielding tube and flange installed on the header tank, apply Poly-Tak to the flange where it contacts the fabric and quickly, but lightly, press it against the inside face of the bottom fuselage fabric. When the adhesive has cured, cut open the fabric to allow access to the quick-drain fitting from outside the aircraft. The easiest and most secure way to do this is to make a series of slits with a razor blade across the inside diameter of the flange, forming pie-shaped sections of fabric. Do not completely cut away these sections of fabric; leave them attached to the ring formed by the outside diameter of the flange. Cement these pie-shaped sections of fabric to the wall of the flange with Poly-Tak.

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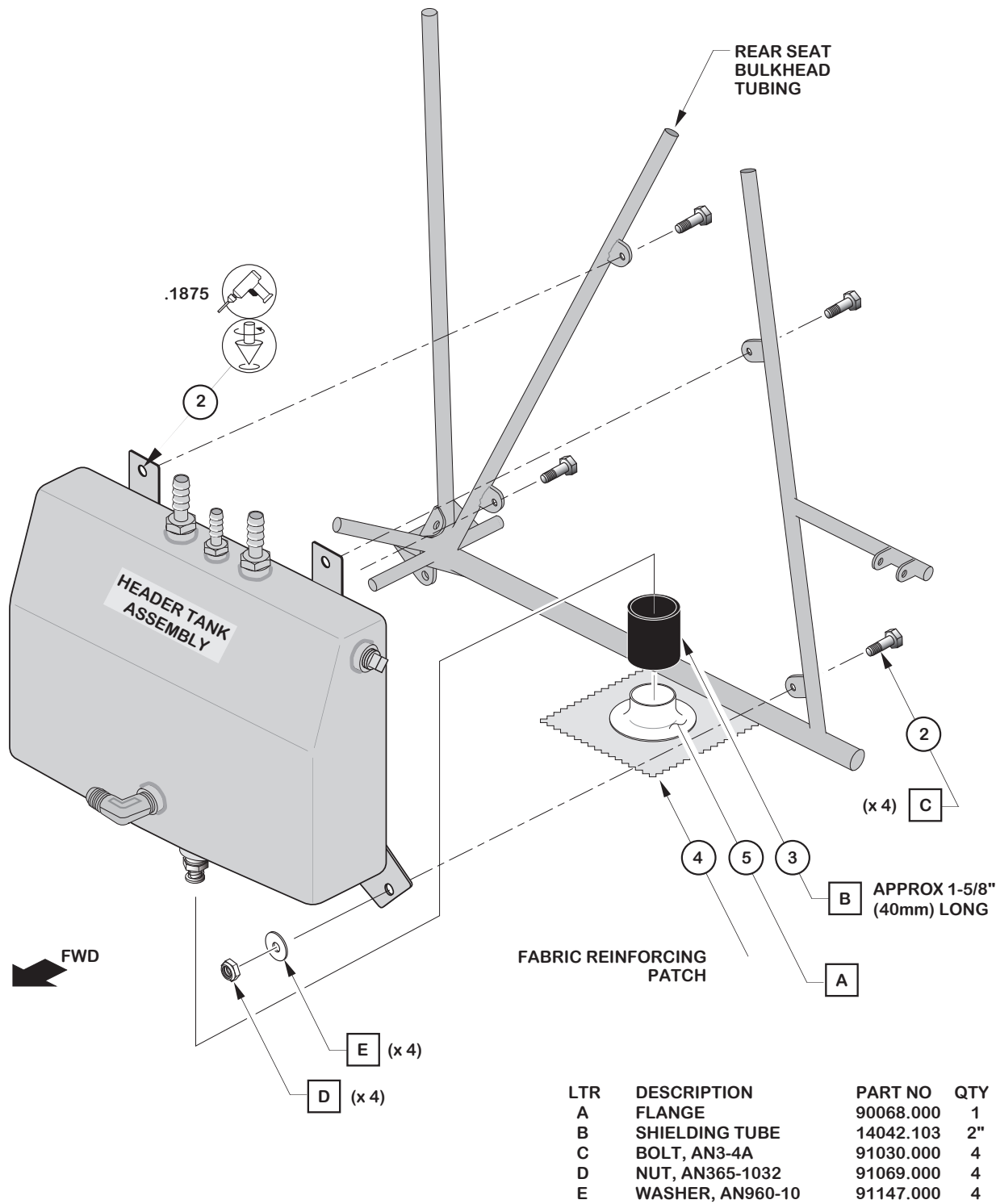


Figure B-3
Header Tank Installation

6. Install the fuel supply hoses and the fuel vent hose between the wing tanks and the header tank. Begin with the wings unfolded and start with the wing tank end of the hoses. Tape (or otherwise temporarily attach) the hose to its appropriate tank fitting and route the hose in a service loop around the aft spar bolt location and along the fuselage tubing to the header tank. With the tubing temporarily routed, test for sufficient service loop by having a helper fold the wings while you observe the hoses. Ensure that they are not stressed by the folding procedure and that they are not kinked or pinched with the wing in either position. When you are certain that the hose routings are correct, push the hoses onto the wing tank fittings and go through the folding procedure again. If all is still well, slide the loosened hose clamps onto the hoses and secure the hoses to the fuselage tubing with cable ties. Cut the hoses to length and push them onto the header tank fittings. Tighten the hose clamps to secure the installation.

WARNING

Ensure that the hoses run continuously downhill from the wing tank to the header tank without any high spots that could entrap air and cause an interruption in the supply of fuel to the engine. Check for this condition with the fuselage in a level flight attitude (fuselage level).

WARNING

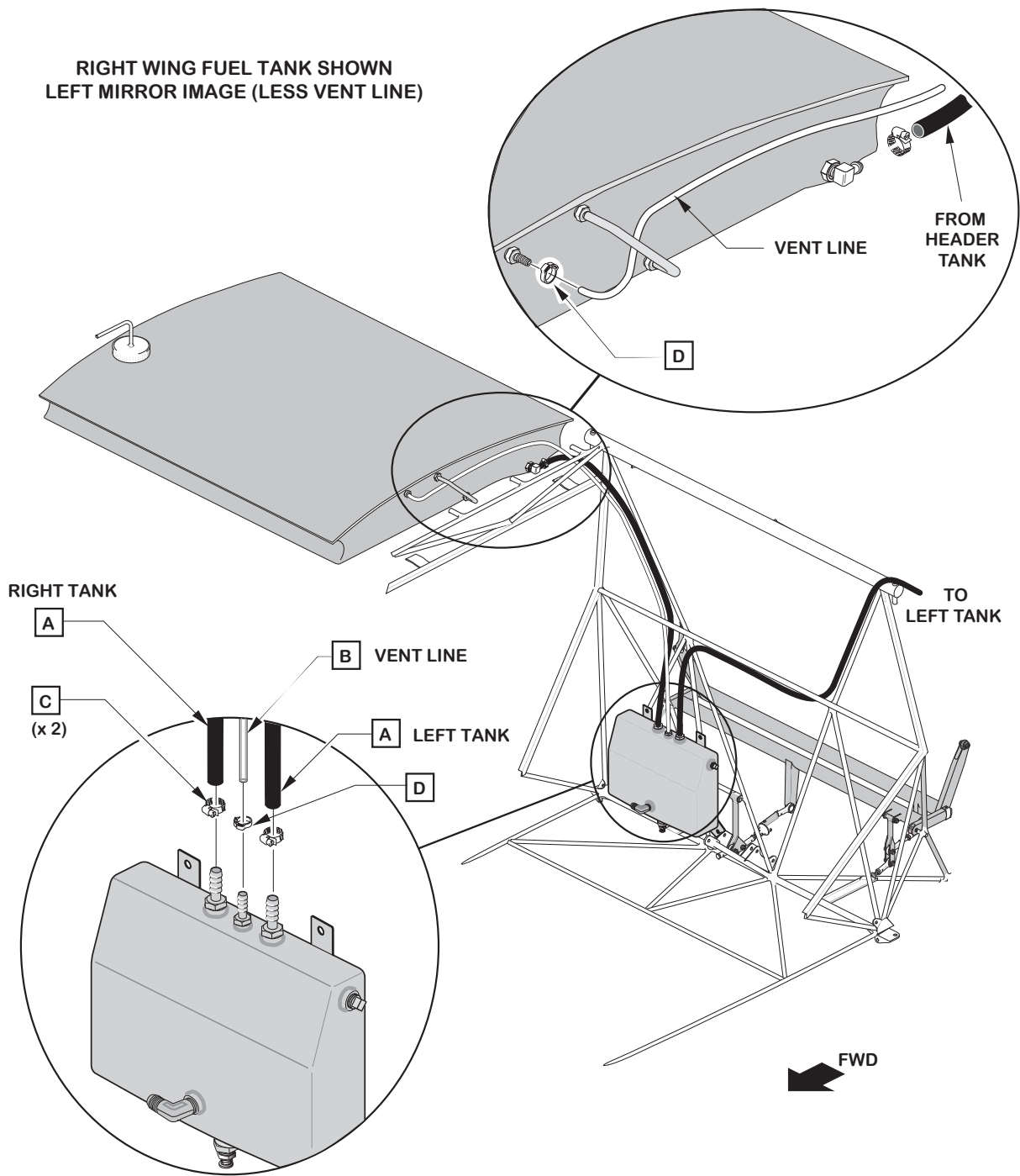
Be careful not to pinch the vent hose shut with an overly tight cable tie.

CAUTION

Be certain that there is sufficient service loop to allow the wings to fold without distressing or kinking the fuel hoses.

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LTR	DESCRIPTION	PART NO	QTY
A	HOSE, MIL-H-6000-5/16"	04076.000	X
B	TUBING, TYGON	04080.000	X
C	HOSE CLAMP	96022.000	4
D	CLAMP, PLASTIC	96014.000	2

Figure B-4
Fuel Hose Installation

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Section C. Airframe Electrical Installation

For the installation of the airframe electrical system we are going to start with the basic concepts and use an example of a single circuit to illustrate correct aircraft wiring principles. If you are already familiar with electrical system fundamentals you might wish to skip ahead. If electrical systems are a mysterious magic, and the thought of wiring your own aircraft makes your hands tremble, read on - it's much easier than you think.

Electricity, at its base level, is a bunch of electrons looking for a place to go. An electrical system, therefore, is a means of controlling travelling electrons by providing them with discrete paths of travel. EVERY component in an electrical system will have one of three functions: producing electrons that want to get somewhere, providing a path for the electrons to travel, or keeping the electrons on the desired path.

Components which provide electrons are generators, alternators, and batteries.

Components which provide a path are metallic conductors (wire, or the airframe tubing), wire terminals, solenoids, switches, circuit breakers, motors, lights, and avionics.

Components which keep electrons on the desired path are insulation (on the wire), circuit boards, grommets, wire ties, chafe protection, heat shrink, battery boxes, terminal screws, and nuts.

For the anxious-to-travel electrons, the path must form a complete loop, or circuit, for them to go anywhere. How many of the electrons travel down any given path depends on the resistance to electron flow of that path. A path with zero or very little resistance will have a great many electrons moving along it; a path with high resistance will have relatively few. Imagine a funnel full of sand with a large opening on the neck. The sand will run through it quickly. If the funnel neck is a bit smaller, not as many grains can get through in the same period of time. If the neck is so small that only one grain at a time can pass, you still have flowing sand, but at a very slow rate. Electrical circuits are the same way - the number of electrons that can flow in a circuit is limited by the highest restriction in that circuit.

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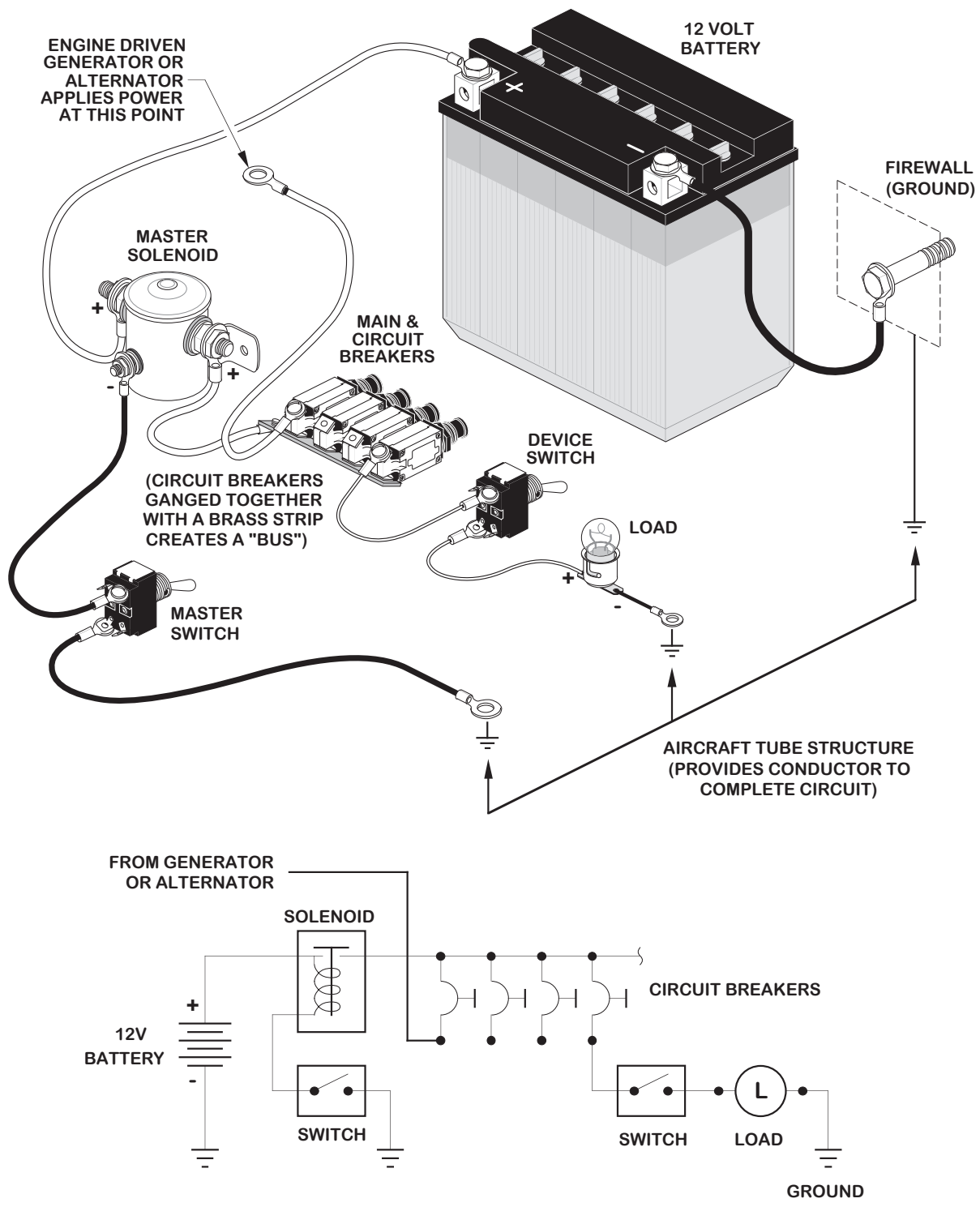


Figure C-1
Sample Circuit & Schematic Diagram

Lets look at some examples of circuits with different resistances. If a wrench is accidentally dropped across the top of a battery, a circuit with near-zero resistance is created. The result is a spectacular shower of sparks and a spray of molten metal. If you are lucky, the battery won't explode. On the opposite end of the spectrum, that same battery could be supplying electrons to a very high resistance device, such as a digital clock, and would probably last for many months before exhausting its stored electrons. An aircraft has circuits that range in resistance (and, therefore, current flow), as shown in Figure C-2.

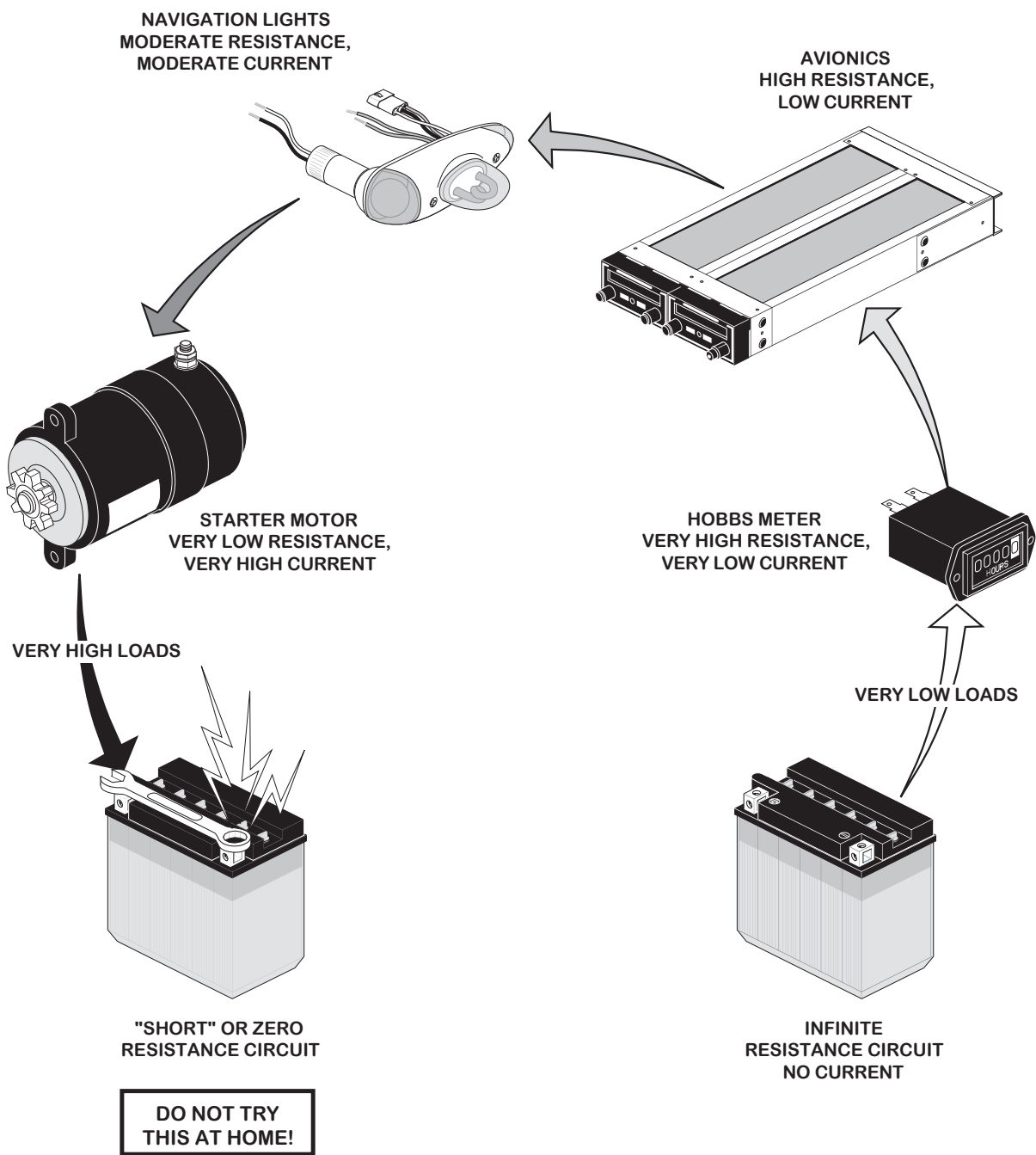


Figure C-2
Electrical Load Spectrum

Typical Components in an Electrical System

Loads These are the components in the circuit with the highest resistance and are the reason for the existence of the circuit in the first place. When you install a radio, light, or any other electrically-powered device, you are installing a load on the electrical system. The circuit that provides electrons to that load must be as low a resistance as practical so electrons can flow easily until the load is encountered.

Battery A battery is simply a storage device for electrons.

Wire This is the conductive path for electrons in circuits. A small wire will carry only a small number of electrons before presenting a resistance of its own. Remember, the most efficient circuits have the load as the most resistive component. The higher the load in the circuit, the larger the wire must be to carry the current. Wire suitable for aircraft use is composed of many small strands of wire, instead of a single, large conductor. Electrons are actually conducted on the outside surface, or 'skin', of a wire, therefore many small strands have more surface area per pound than the single conductor. Multi-stranded wire is also used in aircraft because it is more flexible than one solid wire and can tolerate more vibration without breaking. Wire is usually wrapped with insulation to prevent the formation of unintended circuit paths. Aircraft wire insulation is designed to be tougher, more abrasion-resistant, and more heat-resistant than other types of wires.

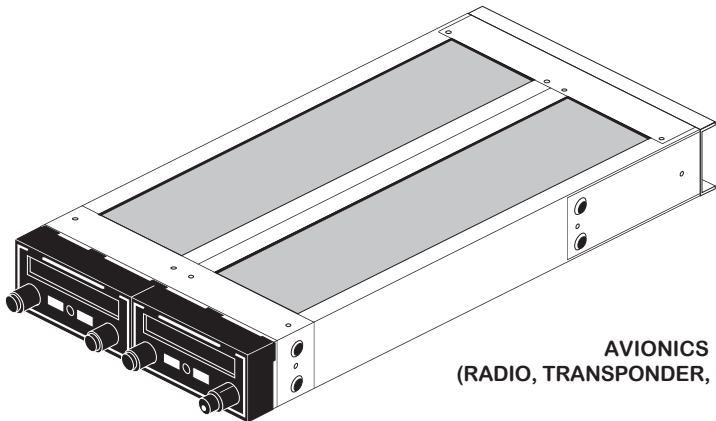
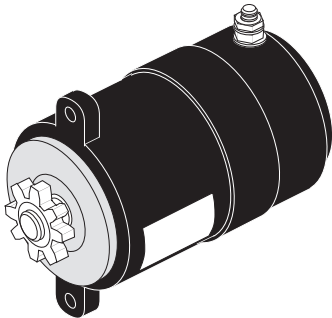
Ground This is the conductive path formed by the airframe structural tubing. Using the tubing as a conductor saves the weight and expense of having to run a ground wire to every device on the aircraft.

Circuit Breaker A current-sensitive device that opens the circuit if too much current is drawn. A circuit breaker should always be sized to prevent the wiring from ever becoming hot enough to emit smoke. Breakers are more convenient than fuses in that they can be reset after an overload trip. Aircraft circuit breakers must always be of the 'trip-free' type, which means that they will NOT restore the circuit even if manually held in the 'on' position. Some circuit breakers are designed to serve as a switch, however a breaker-switch is more expensive.

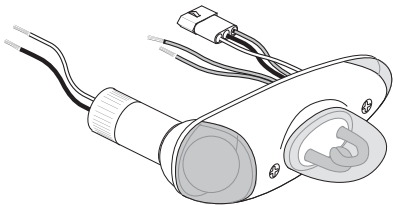
Fuse A fuse is similar to a circuit breaker but may only be overloaded once, which is, therefore, much less convenient. They function by presenting the current flow with a path that is only just strong enough to carry the intended amount of current. If any more current passes through the fuse, the path is overloaded and ruptures. This rupturing essentially 'breaks' the fuse, and it must be replaced in order for the circuit to function again. This can be very inconvenient during flight (Just where are those spares anyway?).

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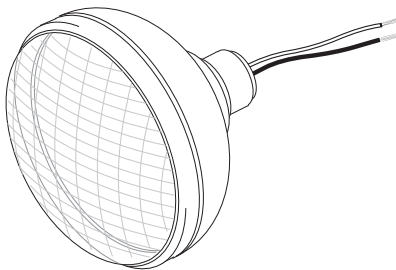
STARTER MOTOR



AVIONICS
(RADIO, TRANSPONDER, GPS, VOR . . .)



NAVIGATION LIGHTS
AND STROBES



LANDING LIGHTS

Figure C-3
Electrical Load Devices

Switch A switch is a device for opening and closing (“making” and “breaking”) the circuit. Most switches are manually operated by either a toggle or a rocker. A switch that is operated electrically is called a relay, or solenoid. Solenoids are typically used for high-current circuits, such as battery master switches or starter motor switches, so that the high current is not carried through a remotely-located switch. Solenoids are also divided into “continuous-duty” and “intermittent-duty” ratings. Always be certain a solenoid is rated appropriately for the service you require. A solenoid used for the “master” needs to be continuous-duty; a solenoid used for the starting system would only need to be intermittent-duty.

Switches must be capable of surviving many thousands of operations at rated load and have contacts made of materials which are resistant to burning or pitting. Switches must also be sized according to the load of the circuit multiplied by a “derating factor”. This derating factor is necessary because some types of loads draw much higher current initially than they do on a continuous basis. For example, an incandescent lamp with a cold filament has very low electrical resistance, and therefore draws high current initially. As the filament gets hot, its resistance increases and the current in the circuit is reduced. For this reason the derating factor for 12 volt incandescent circuits is 5. In other words, if your lamp circuit will draw 2 amps continuously, your switch should be capable of switching 10 amp loads.

Bus A bus is a common connection point for numerous terminals, usually in the form of a metal strip such as brass or copper. It is usually mounted in such a manner that it is insulated from the aircraft structure. Circuit breakers are often ganged together by a bus strip. A typical light aircraft can have a “main (or positive) bus”, an “avionics bus”, and a “ground bus”.

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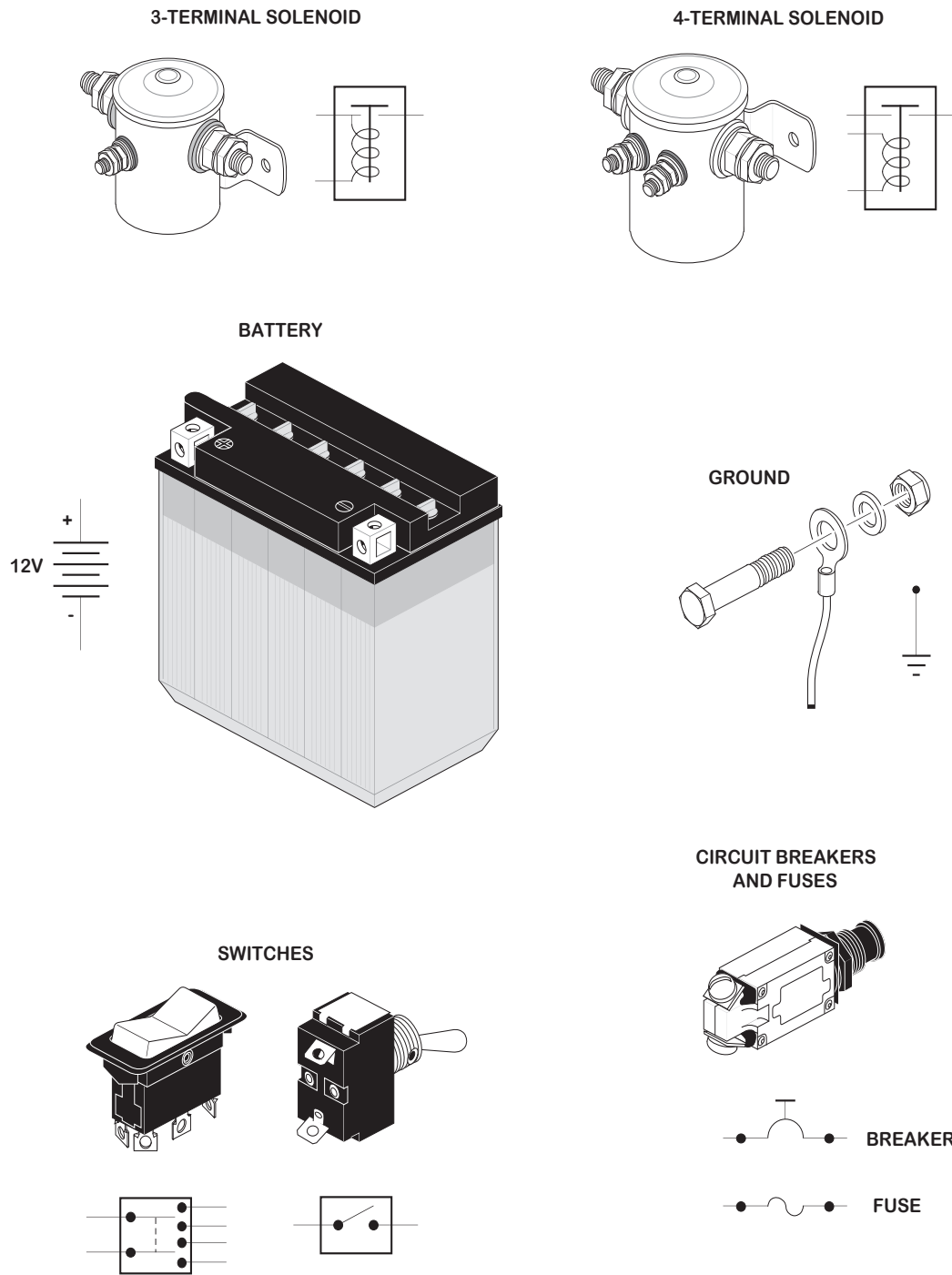


Figure C-4
Miscellaneous Electrical Components

Recommended Practices and Procedures

While installing your electrical system, bear in mind that there are primarily two things that you are trying to accomplish: 1) create a good, low-resistance path for the electrons to go exactly where you want them to, and 2) prevent electrons from going someplace you don't want them to.

To create a good, low-resistance path, observe the following practices:

- Use the appropriate type and size of wire.
- Use the proper wire terminals and install them correctly.
- Tighten terminal connections and make sure they stay tight.
- Make sure your ground connections are to bare metal.
- Use switches and circuit breakers that are appropriate for the loads applied to the circuit.

To prevent unwanted paths:

- Use wire with good insulation.
- Prevent the wire from chafing using clamps, grommets, cable ties, lacing cord, etc.
- Protect the wire from excessive heat by routing it away from exhaust pipes and other high heat sources.
- Never secure wires directly to or directly below flammable fluid lines.
- Keep battery and battery box (or tray) clean and dry.

Miscellaneous:

- Use a wire marking system to label EVERY WIRE at each end as you install it.
- Route your battery vent overboard or into a plastic film canister to prevent corrosive residue from getting on the aircraft structure.
- Label every switch on the panel to prevent confusion.
- Mount all switches so that they are up or forward for "ON", down or aft for "OFF", or so that the switch operates in the same direction as the device it controls.

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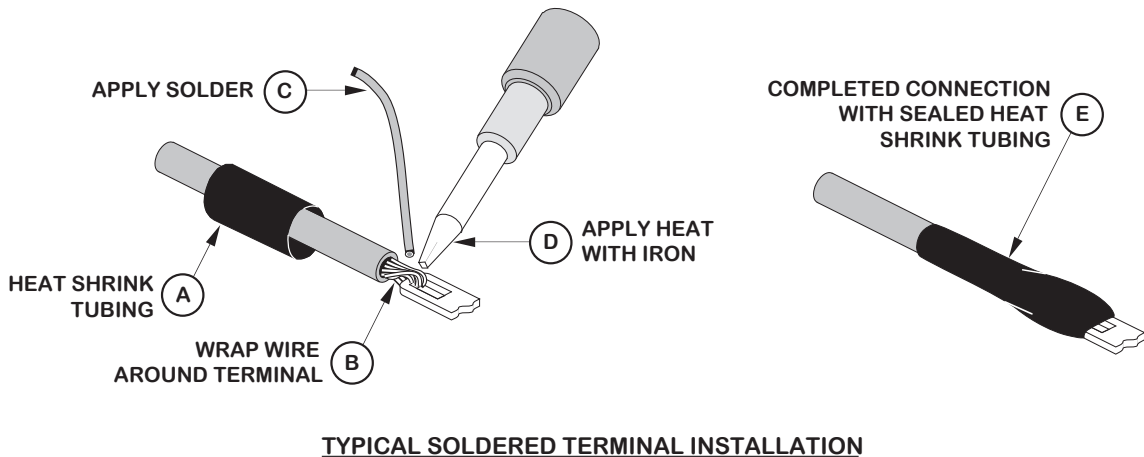
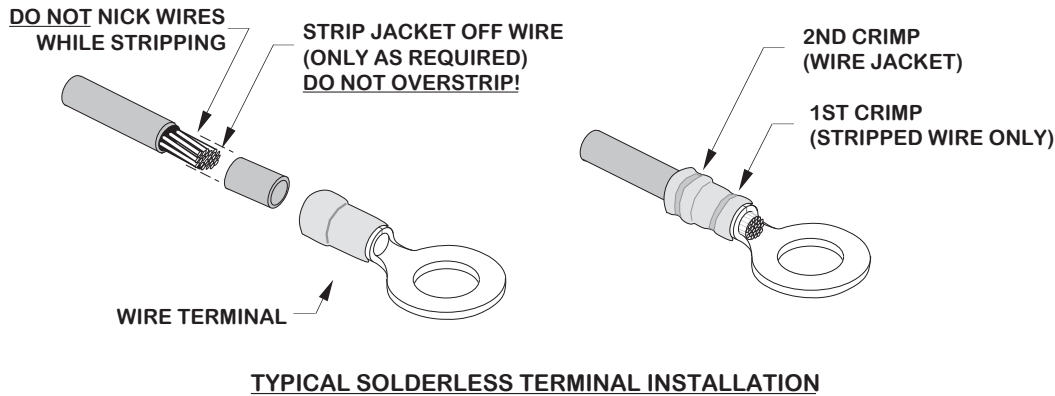
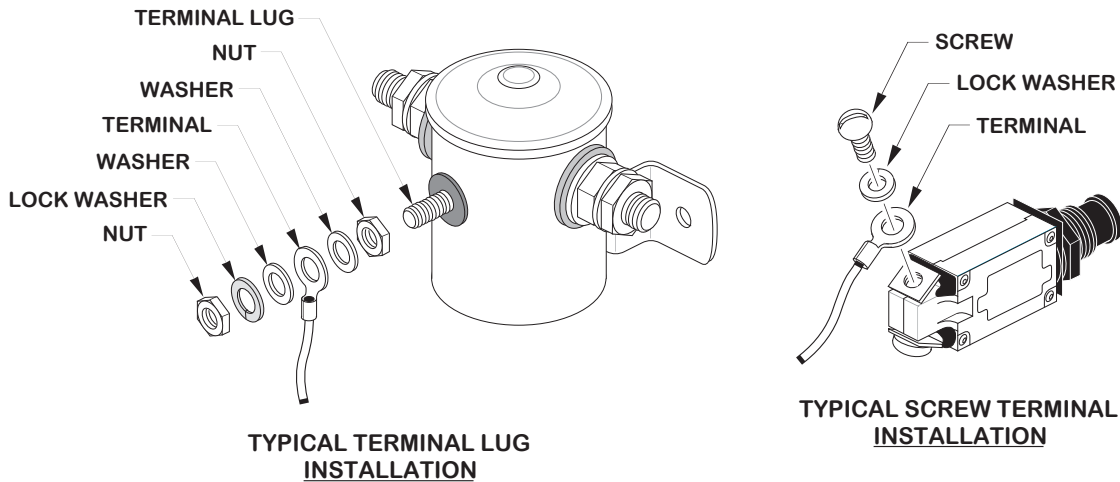


Figure C-5
Electrical Connection Techniques

Specific Details

Solderless Wire Terminals These are very useful for wiring, but a few precautions need to be observed. First, strip the wire carefully, preferably using an automatic stripping tool to prevent nicking or breaking strands, which effectively reduces the wire size and current handling capability. Next, make sure the crimp barrel of the terminal grips wire only and not the insulation. Use a proper crimping tool, not a pair of pliers, as under-crimped or over-crimped terminals often prove to be bad connections. The best quality terminals have a crimp barrel for the wire and a second barrel for the insulation to prevent the wire from vibrating at the wire barrel crimp. The best crimping tools will do both barrel crimps in one operation. After making your crimped connection, tug on the wire and terminal to check for any signs of looseness in the crimp (see Figure C-5).

Terminal Lugs These are usually found on switches, solenoids, circuit breakers, etc. The correct hardware and installations are shown in Figure C-5.

Soldered Terminals You may run across a soldered terminal, although, in general, they are not recommended for aircraft use. Strip the wire, slide on a piece of heat shrink tubing, and insert the wire into the terminal as shown in Figure C-5. Apply heat to both the wire and terminal and, when sufficiently hot, apply rosin core (NOT acid core) solder to the joint. If it is hot enough the solder will flow quickly into the individual strands of the wire and coat the terminal lug. The joint must remain motionless until the solder has cooled before sliding the heat shrink tubing over the wire end and terminal. Shrink the tubing with a heat gun, lighter, or match. The shrink tubing is important to help keep the soldered joint from vibrating, as the wire will be somewhat brittle at the point where the solder stopped flowing into the strands.

Solenoids A typical solenoid and wiring schematic are shown in Figure C-4. Make certain you use a continuous-duty rated solenoid for applications such as the battery master or avionics master. An intermittent-duty solenoid is fine for the starter motor.

Typically, the master solenoid has an internal jumper from the terminal marked ‘BATT’ to one end of the actuation coil. The opposite end of the action coil is connected to the small terminal on the solenoid. This small terminal is then switched to ground through the master switch.

On a starter solenoid with just one small terminal, one end of the actuation coil is internally grounded to the solenoid’s case and the opposite end is connected to the small terminal. The small terminal is connected to the starter switch, which supplies positive power to the actuating coil. The ground path is through the solenoid’s case and the mounting lugs where it is attached to the aircraft. On a starter solenoid with two small terminals, one end of the actuating coil is attached to each of the small terminals. One terminal is attached to a ground source, and the other is wired to the starter switch for positive power.

A solenoid operates by means of an electromagnet and a plunger, which carries the electrical contact points. When current flows in the coil, a magnetic field is developed that acts to pull the plunger into contact with the points. This ‘makes’ the electrical circuit. An advantage of this is that a small mechanical switch and a small current can be used to switch a much larger current. Thus, a small switch can be mounted on the instrument panel, for example, and the solenoid can be mounted much closer to the heavy load it is controlling. This saves weight in shorter cable runs of the heavier gauge wire.

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Section D. Flaperon Control Rigging

NOTE

The use of a digital, electronic level accurate to 1/10 degree is the most accurate and easiest method of rigging the flight controls.

- 1. Before starting the rigging process, level the aircraft both longitudinally (fore and aft) and laterally (side-to-side).
- 2. With the wings of the aircraft unfolded, insert the flaperon control horn assemblies into the flaperon spars. Adjust the angle of the flaperon control horns until they correspond with the holes and marks previously made in the flaperon spars during the wing assembly. Attach the horn assemblies to the spars using the pop rivets shown in Figure D-1.
- 3. To prepare the flaperons for rigging, install a flaperon clamping fixture on each flaperon just inboard of the center hinge. Fasten a 48” long straight board or level to the bottom of the clamping fixtures. Slide a 2-13/16” inch wood spacer between the level or board and the front spar. Secure it in place with strapping tape.

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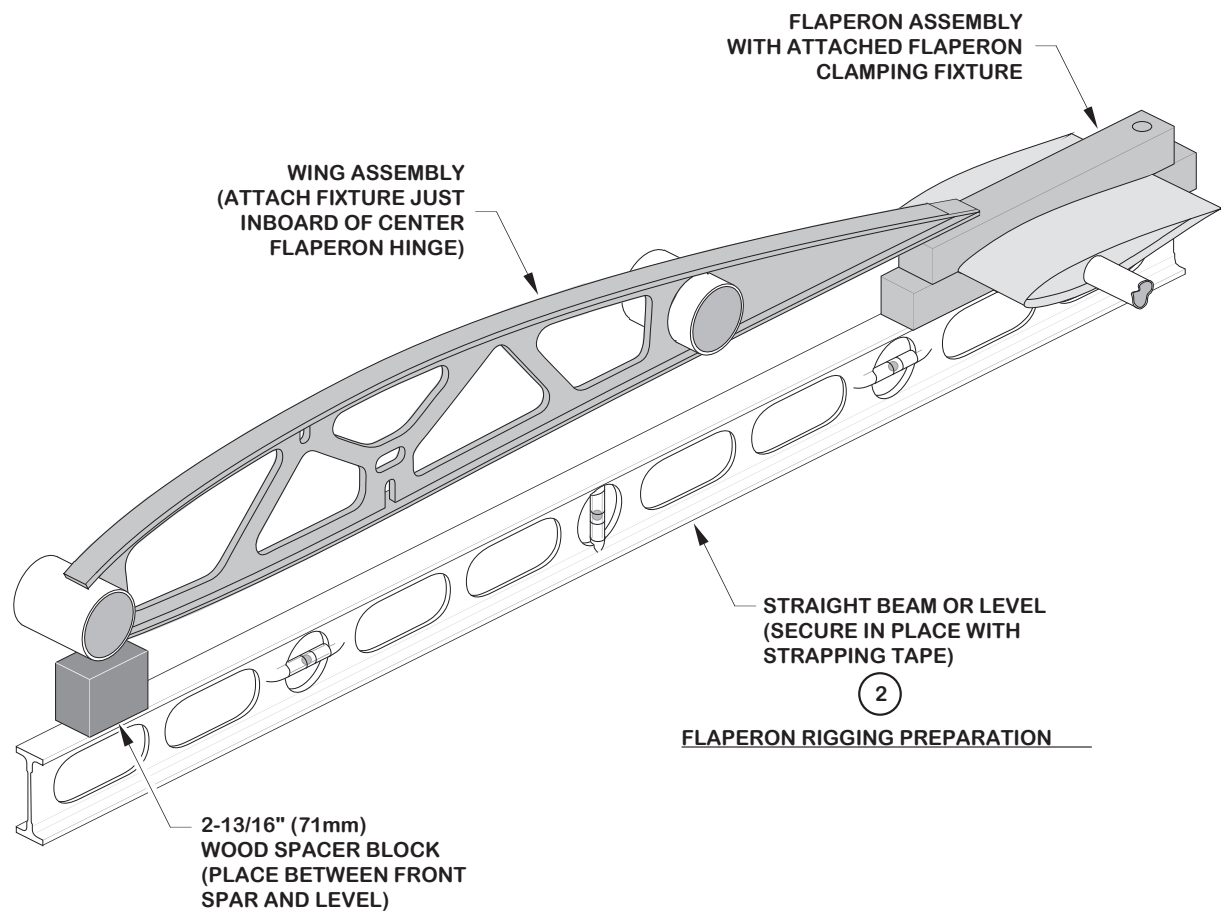


Figure D-1
Flaperon Rigging Preparation

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4. Position the control stick in the neutral (vertical or plumb) position and secure it in place by wrapping strapping tape around one lower door jamb, over and around the stick, and over to the opposite door jamb.

NOTE

The stick can be placed in the vertical position by using a small torpedo level or a digital electronic level (preferred) placed against the lower portion of the control stick. The aircraft must be level longitudinally and laterally for this to work!

5. Adjust the rod ends which connect the aileron bellcrank to the control stick pivot so the forward arm of the bellcrank is pointing forward and is perfectly parallel to the centerline of the fuselage. Do not tighten the check nut at this time.

NOTE

A small combination square or machinist's square placed against the forward seat bulkhead's uppermost lateral tube with the blade pointing forward provides a good alignment guide for the aileron bellcrank.

6. Disconnect the flaperon push-pull tubes from the flaperons (if connected). With the flap handle in the most forward (up) detent, adjust the flap push-pull tube so that the angle between the belly of the aircraft (the leveling area between the firewall and the lift strut attach carry-through tube) and the flap bellcrank is $11\frac{1}{2}^{\circ}$. Use a digital electronic level or a dial level to accurately position the bellcrank.
7. Adjust the rod ends on the aileron connect tube so the angles between the bellcrank arms and the vertical centerline are 32° for the right arm (forward of vertical) and 26° for the left arm (aft of vertical).
8. With the flaperons clamped in a neutral position, as described in Step 3, install the right and left flaperon connect tubes to the bellcrank arms using the hardware shown. Install a check nut and a rod end on the top of each of the flaperon connect tubes and secure the tubes to the flaperon control horns with the P/N: 15061.000 winged bolts provided. Remove the flaperon clamping fixtures and spacer blocks.

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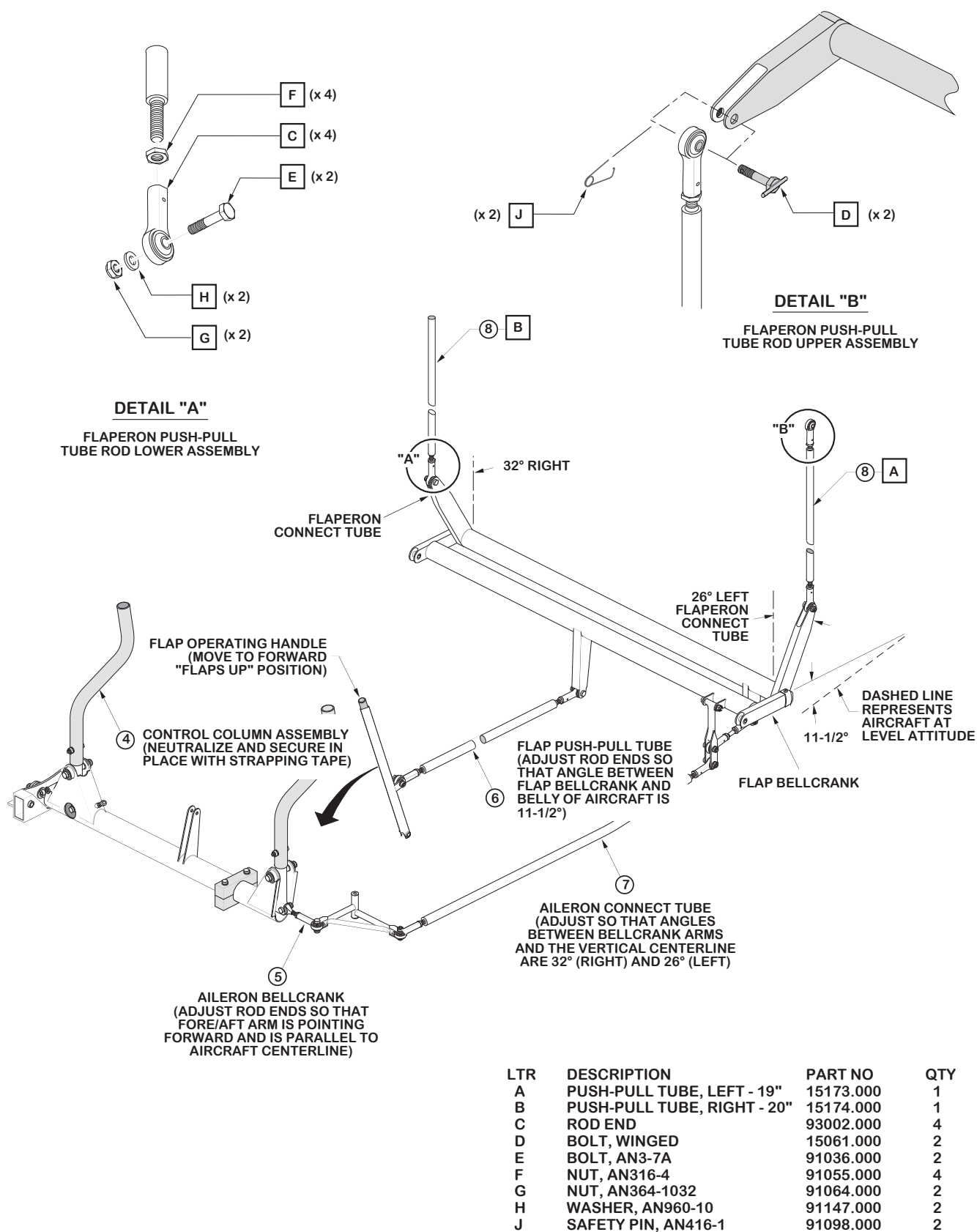


Figure D-2
Flaperon Control System Rigging

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9. Remove the tape from the control sticks and, with the aid of an assistant, set the control stops on the left and right side of the control column so the maximum deflection angles ('A' and 'A1') are those given in Figure D-3. Move the flap handle to the full down position and cycle the control sticks back and forth from left to right to make certain there is no binding of the control tubes. Adjust the check nuts on all of the rod ends so the rod end bearings have a small amount of rotational play when the control sticks are at their extreme throws. When the flap and aileron control systems are adjusted properly, tighten all of the rod end check nuts.

NOTE

The flap deployment angles ('B') shown in Figure D-3 are for reference only. The flap deployment angles are a function of the flap bellcrank in the mixer assembly, and any attempt to adjust the flap deployment angles will adversely affect the aileron deflection angles.

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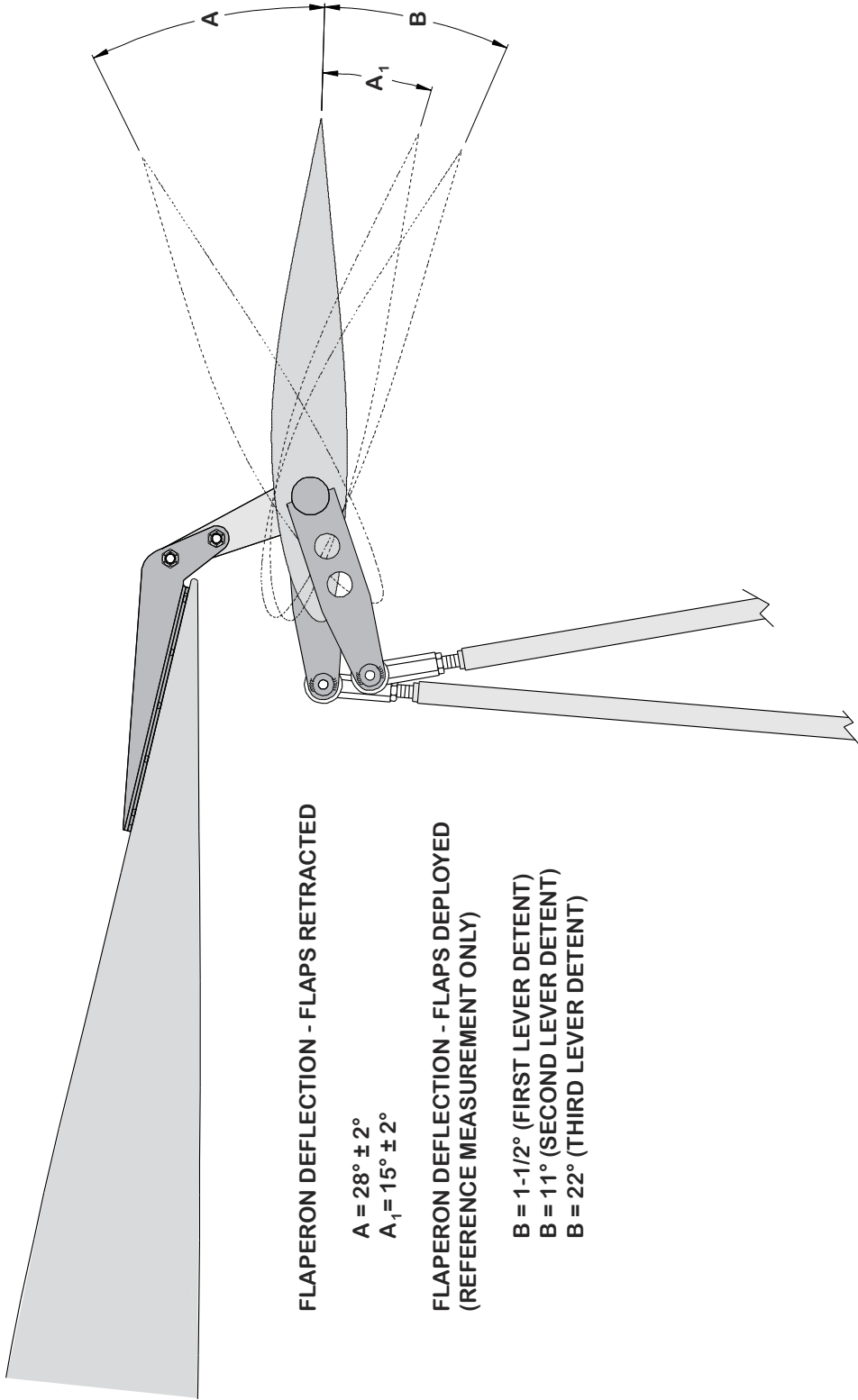


Figure D-3
Flaperon Deflection Angles

Section D. Pitch Trim Adjustment

1.

To adjust the pitch trim, begin by disconnecting the top end of the scissor links from the tabs on the horizontal stabilizer, as shown in Figure D-4. If the rod end is not threaded in all the way, loosen the check nut on the rod end and rotate the shaft of the actuator counterclockwise (as viewed from above) until it is. Temporarily reconnect the scissors links by pinning them in place with the attach bolt. Energize the pitch trim actuator and extend it to its full-stroke length.
2.

Disconnect the scissors links again, and rotate the shaft of the actuator until the distance between the top of the horizontal leading edge tube and the vertical stabilizer tube directly above it is $\frac{7}{16}'' \pm \frac{1}{16}''$. As the shaft is rotated, the stroke of the shaft is shortened if the rotation is clockwise. Tighten the check nut and reapply the power once the proper distance has been set between the two tubes. Extend the actuator to its full length again. Recheck the distance between the two tubes and repeat the procedure above, if necessary. Once the pitch trim rigging distance is set, tighten the check nut on the rod end and install the scissor links and its associated hardware to the stabilizer.

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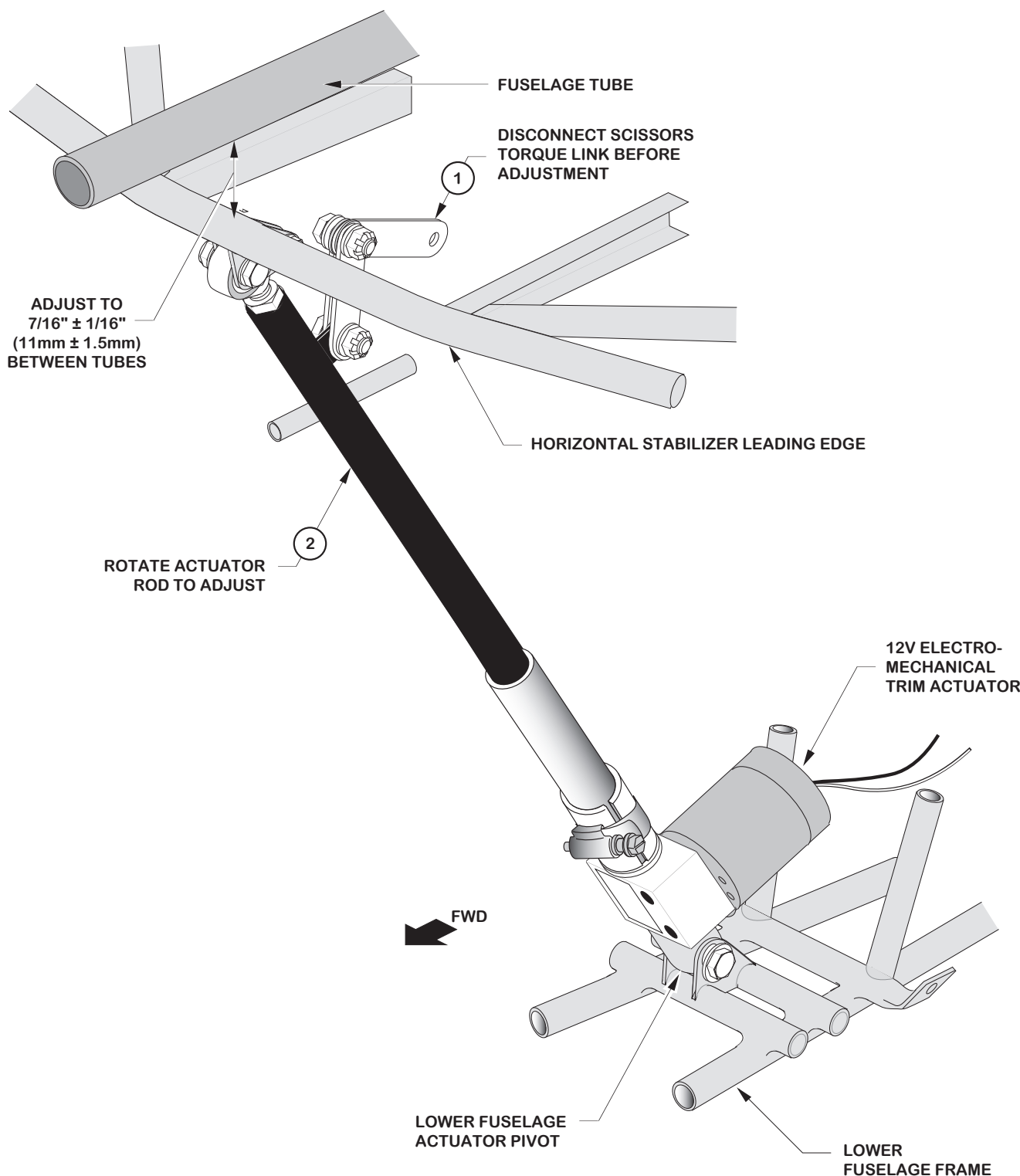


Figure D-4
Pitch Trim Adjustment

- 1. Using two thin, smooth, strips of wood and tape, clamp the elevator in a neutral position relative to the horizontal stabilizer. Reenergize the trim actuator and adjust it until the distance between the horizontal stabilizer and the vertical stabilizer tube is 1-⁵/₁₆".
- 2. Completely disconnect the forward and aft elevator push-pull tubes from their attach points at the control column assembly, elevator idler bellcrank, and the elevator control horn. Move the control column in the cockpit until the angle between the floor and the front side of the lower portion of the stick is 80°. Use strapping tape to secure the control column in this position.
- 3. Loosen the check nuts on the rod ends on both ends of the push-pull tubes. Adjust the rod ends on the forward tube so that there is ¹/₂" of threads exposed on each end. Retighten the check nuts and reinstall the tube. Now adjust the rod ends on the aft push-pull tube until it will fit between the idler bellcrank and the control horn, with equal amounts of threads exposed on each end. Verify that the threads appear through the witness holes in both rod ends, tighten the check nuts, and reinstall all the attach hardware for the push-pull tubes.
- 4. Remove the tape from the control column and the wood clamp from the horizontal stabilizer and elevator. Check the freedom of movement of the control column by cycling the stick, including combined elevator/aileron inputs.
- 5. You will use this mark to set the pitch trim for takeoff position on your first few flights. Verified this as a suitable location for takeoff trim.

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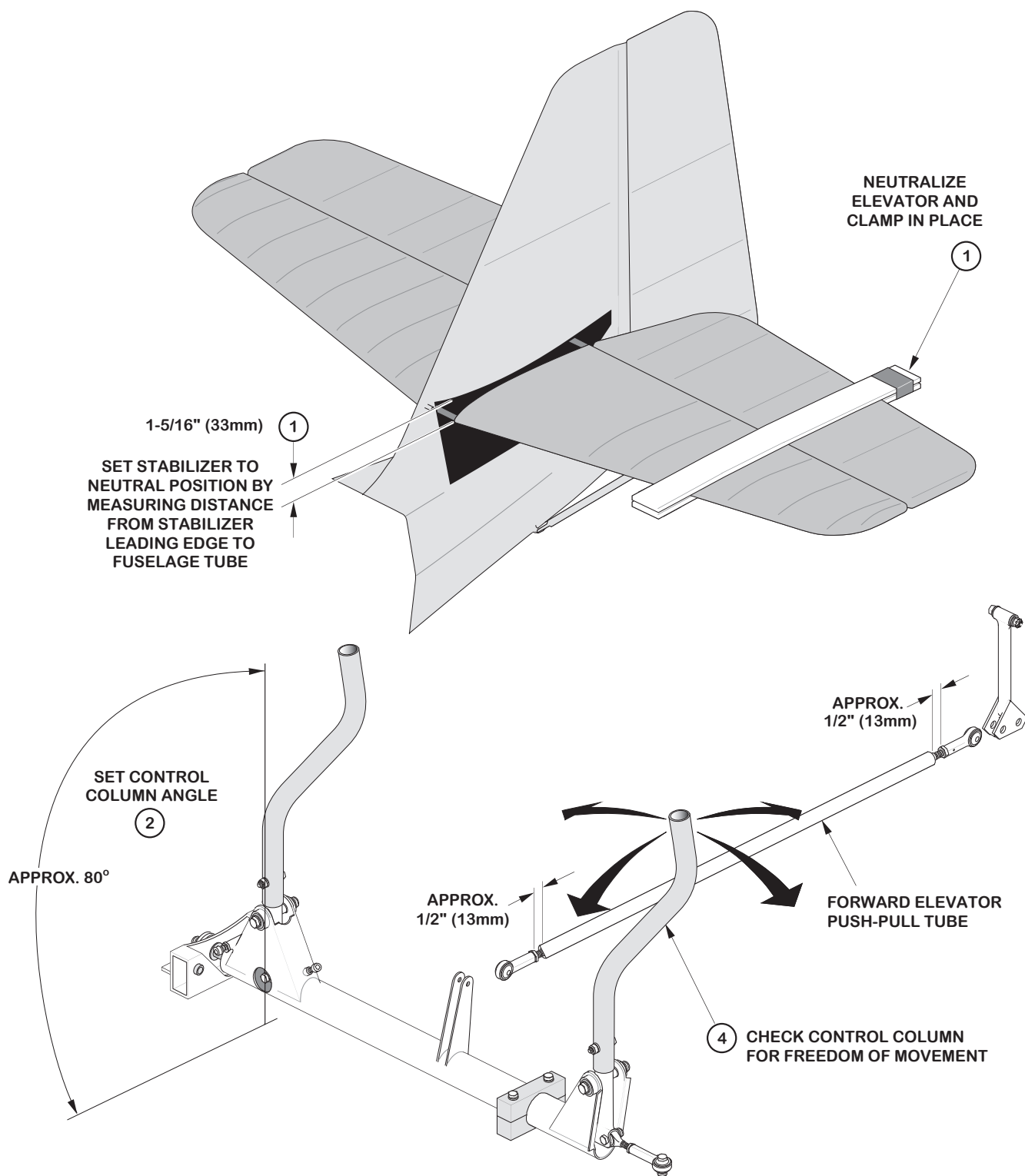


Figure D-5
Elevator Rigging

1. The deflection limits of the elevator can now be set. With the aid of an assistant and either a Smart Level, or a dial level , measure the angle of the elevator in its neutral position (in the same plane as the horizontal stabilizer). Calculate the angle that the level must display in order for the elevator deflection to be 39° TRAILING EDGE UP, and 20° TRAILING EDGE DOWN from this neutral angle. Now have the assistant pull back on the control stick until the first calculated angle is obtained ($\pm 1^\circ$). Once reached, the assistant will adjust the control stop set screw on the rear side of the control column while holding the control stick in place. In a similar manner, have the assistant push the stick forward until the second calculated angle is reached ($\pm 1^\circ$). The set screw on the front side of the column may now be set.
2. Finally, cycle the control stick through its full range of motion and verify there is no binding in the control system. If there is, locate the source of the binding and go back through the steps of this section and verify all of the settings in the control system.

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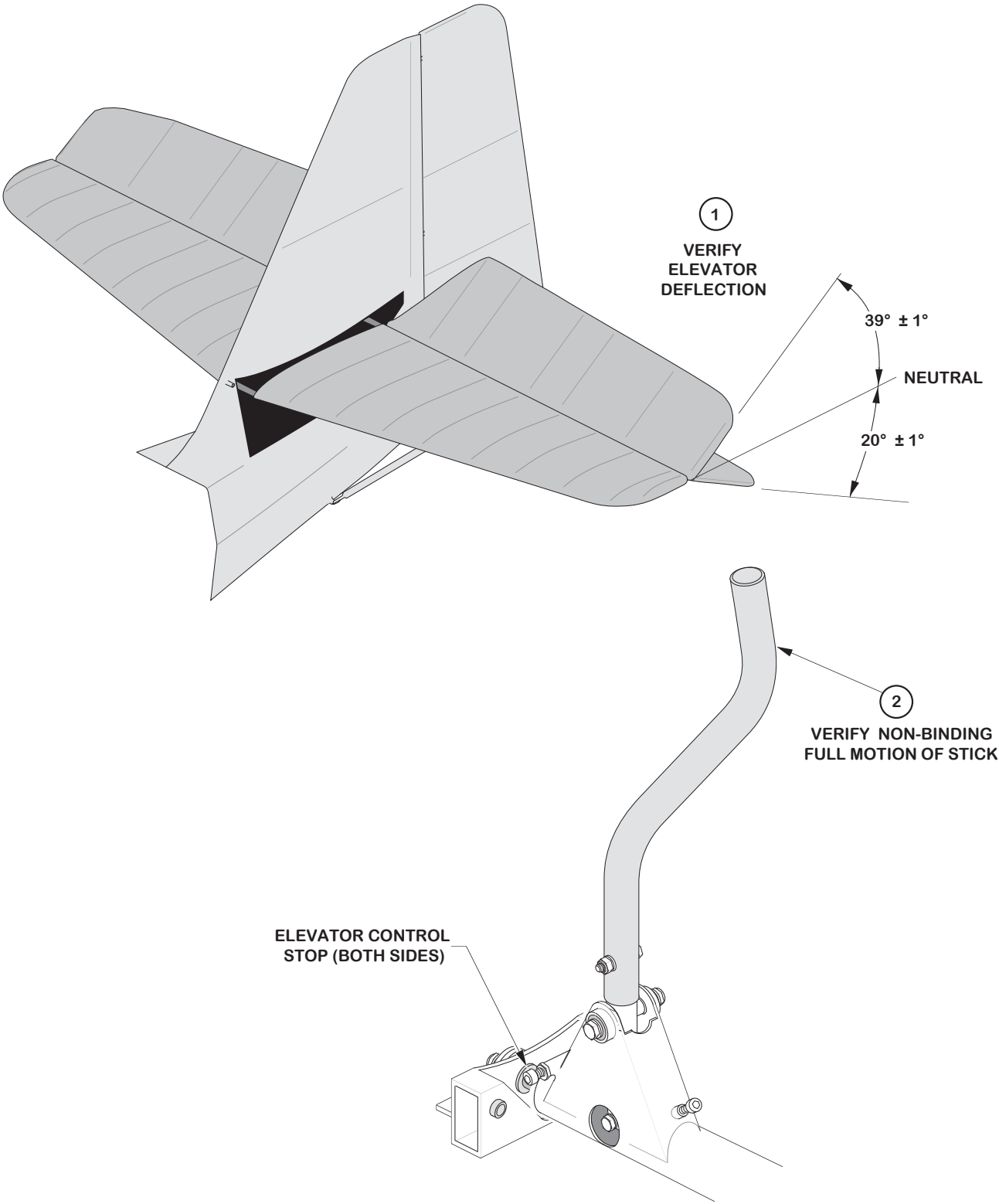


Figure D-6
Elevator Travel Limits Adjustment

Section E. Windshield and Glare Shield Installation

NOTE

Prior to beginning the installation of the windshield, the bonnet portion of the cowling must be temporarily installed on the fuselage with clecos. Refer to the instructions supplied with the engine component kit for details on cowling installation. Final installation of both the bonnet and the windshield should not be completed until the instrument panel has been installed in the aircraft and all wiring has been completed and checked. Once the windshield is installed, access to the area between the instrument panel and the firewall becomes restricted.

NOTE

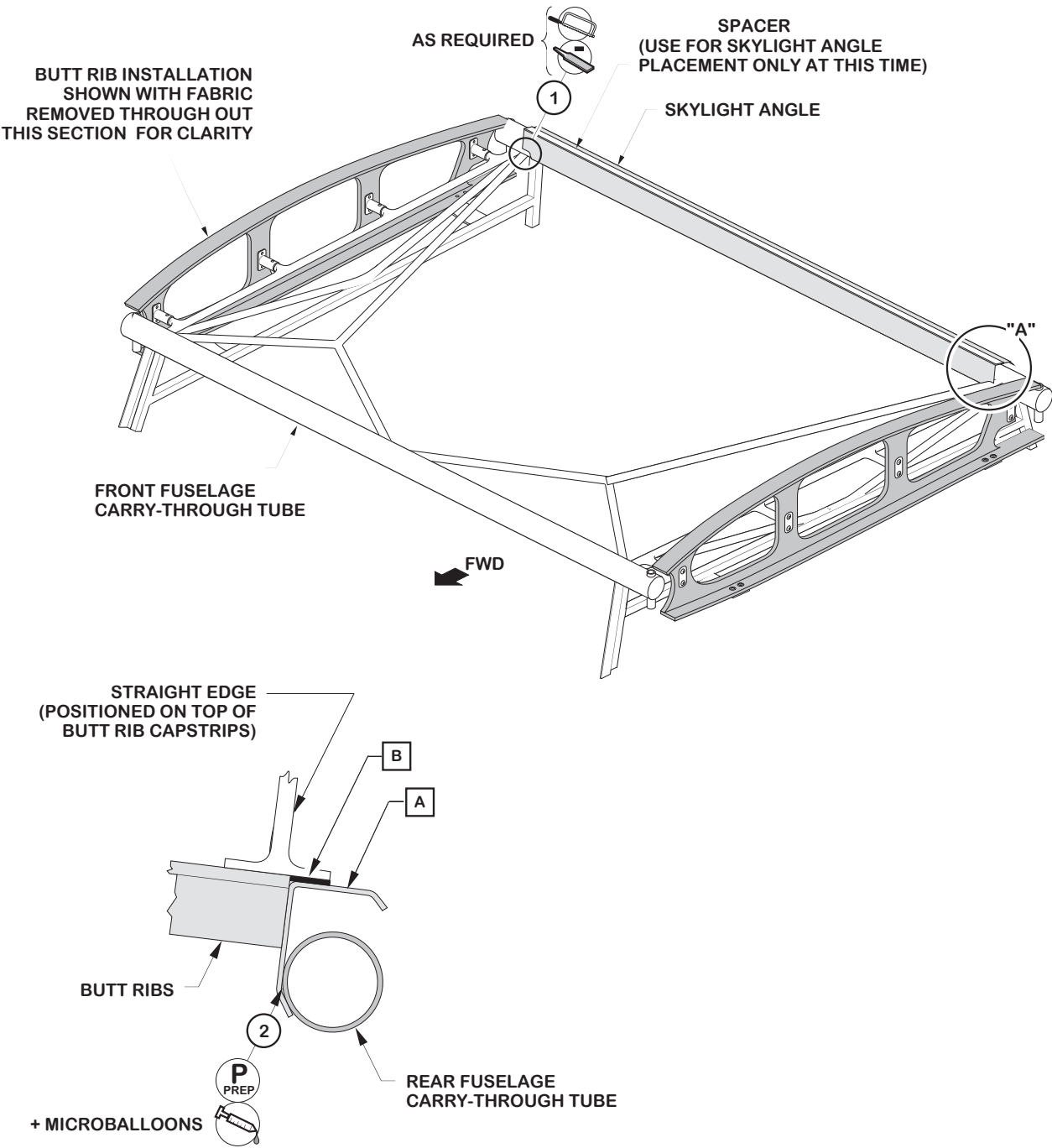
The butt ribs must be permanently installed and covered with fabric prior to installing the windshield and skylight.

CAUTION

The rear fuselage carry-through tube is a major structural member and must not be drilled through.

- 1. Clamp a long straight edge, such as a 48” level, between the top, aft ends of the two butt ribs. Tape the spacer to the top surface of the skylight angle and place the angle against the front side of the rear fuselage carry-through tube and adjust it until the spacer is flat against the underside of the straight edge as shown in Detail “A” in Figure E-1. Trim the angle as required to clear the headrack tubes.
- 2. When you are satisfied with the fit of the skylight angle, remove it and bond prep the mating surfaces of the carry-through tube and the angle with Scotch-Brite and clean with denatured alcohol. Bond the angle to the tube using structural adhesive mixed with microballoons.

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DETAIL "A"
SKYLIGHT ANGLE
INSTALLATION

LTR	DESCRIPTION	PART NO	QTY
A	SKYLIGHT ANGLE	17000.101	1
B	SPACER	11153.401	1

Figure E-1
Skylight Angle Installation

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CAUTION

The windshield is made from acrylic and requires special care when installing. Use only a bandsaw (14 tooth per inch or more blade), a rotary grinder with a cutoff wheel, or a rotary grinder with a coarse sanding disc (40 to 80 grit) to remove material. Drill using light pressure and only with the supplied acrylic bits.

3. Carefully place the windshield on the aircraft, centered side-to-side, and clamp the windshield to the butt ribs.
4. Trim the flange on the upper, rear edge of the boot cowl until it is 1 1/2" wide. Install the boot cowl on the fuselage and secure it with camlocs. Clamp the lower edges of the windshield to the boot cowl, making certain the center of the windshield is pushed up against the flange of the boot cowl.
5. Trim the portion of the windshield around the forward fuselage carry-through tube until there is sufficient clearance to keep the windshield from contacting the tube and to allow the wing mounting hardware to be easily installed and removed.
6. Peel the protective coating along the aft and side edges of the windshield back so you can clearly see through it. Using a fine-point marking pen, make a series of marks along the outboard edge of the butt rib cap strips, along the aft edge of the vertical mounting angles, and along the aft edge of the skylight angle.
7. Make a line on the protective coating of the windshield along the top edge of the boot cowl flange. Remove the boot cowl and make a second line on the windshield which is 2" below the first line.
8. Remove the windshield and trim it along the lower line and along the other lines made along the edges of the windshield. Smooth and round all edges of the windshield with a sanding block and fine (150-grit) sandpaper to help prevent edge cracks from forming over time.

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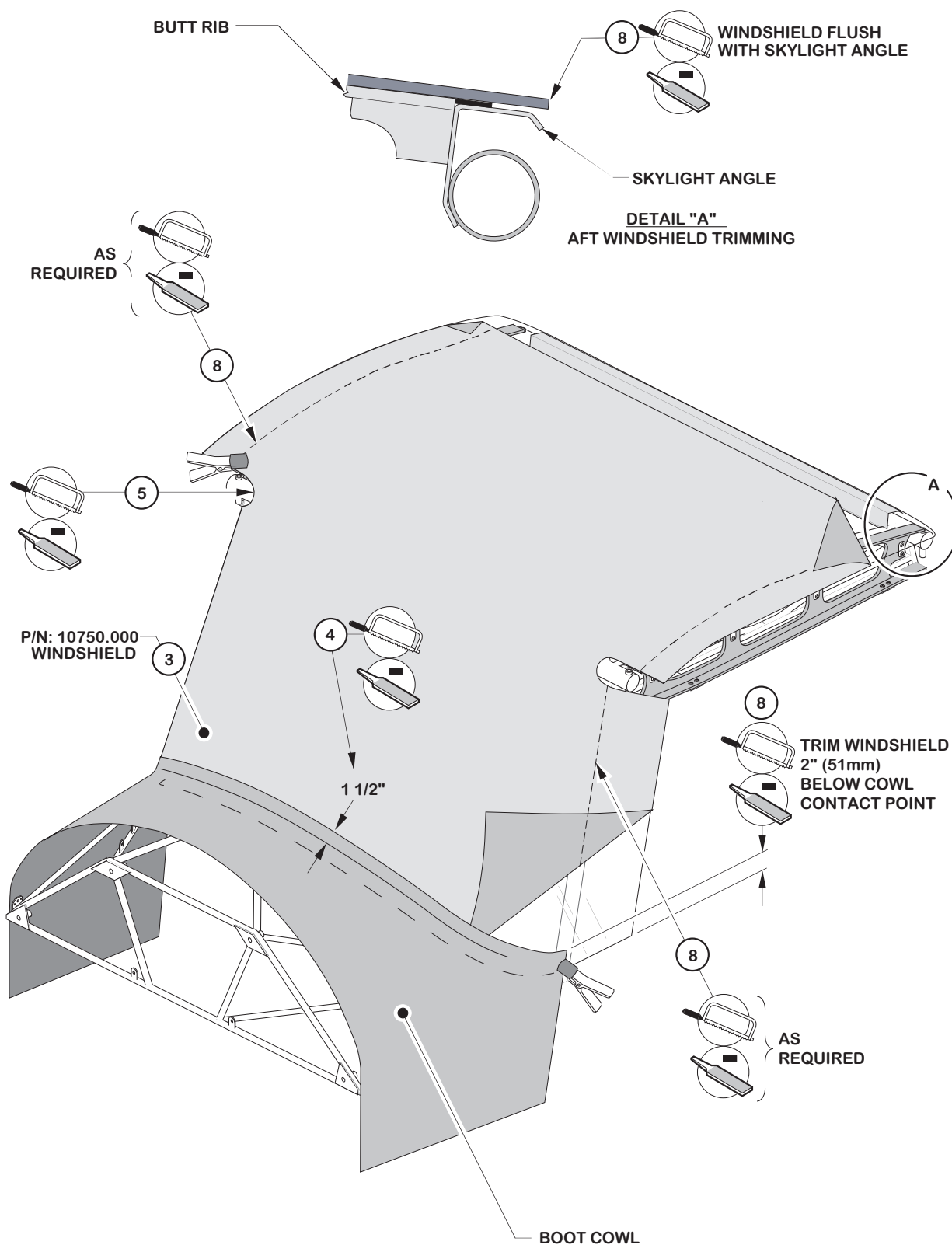


Figure E-2
Windshield Fitting and Trimming

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9. Drill #30 holes through the side mounting angles only at the spacing shown in Figure E-3 and deburr. The first hole will capture the top corner of the boot cowl as well as the windshield.

CAUTION
Only use the acrylic drill bits supplied when drilling any holes in the windshield.

10. Drill eight evenly spaced (approx 8") #30 holes across the top flange of the boot cowl. The first and last holes will align with the fuselage side mounting angles.
11. Reinstall the windshield and the boot cowl with the vertical sides of the windshield captured within (inside) the side mounting angles. Match-drill 1/8" holes through the windshield using the 1/8" **acrylic drill bit**. Install clecos as you proceed to maintain proper windshield alignment.
12. Match drill the windshield with the boot cowl using the 1/8" **acrylic drill bit**. Make sure the windshield is flush up against the boot cowl.
13. Drill eight evenly spaced 1/8" holes on each side of the top of the windshield along, and centered on, the upper capstrip of each butt rib using the 1/8" **acrylic drill bit**. Install clecos as you proceed to maintain proper alignment.

CAUTION
Do not drill into the rear fuselage carry-through tube when drilling through the skylight angle.

14. Drill ten evenly-spaced 1/8" holes on the aft edge of the top of the windshield along the skylight angle, centered on the spacer strip.
15. Remove the windshield and increase the size of the holes in the windshield with the 1/4" **acrylic drill bit**. This will allow the windshield to expand and contract with temperature variations, independent of the airframe, without damaging the windshield. Chamfer all the top and bottom edges of the holes slightly with a countersink to reduce stress forces around the holes.

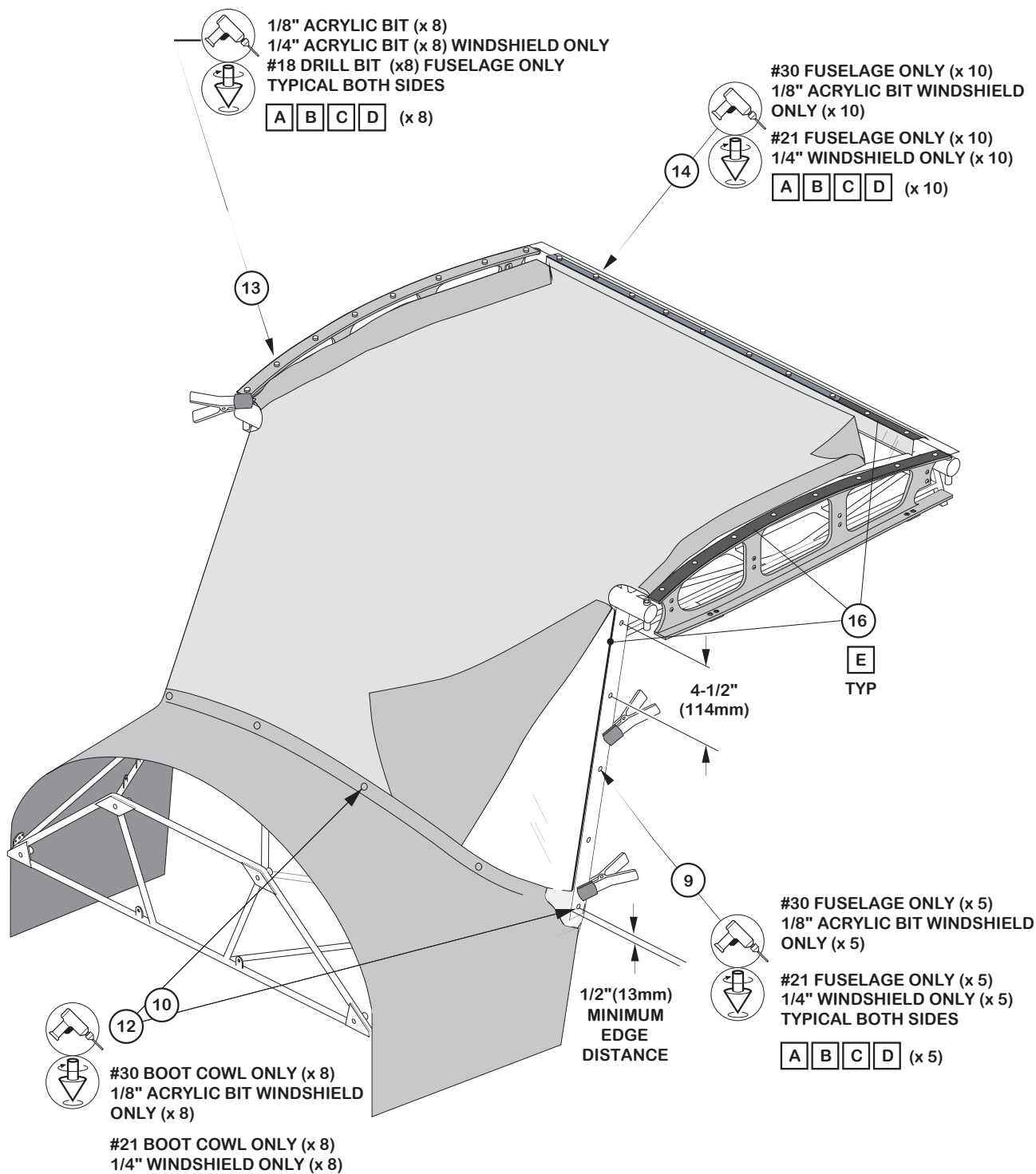
NOTE

All parts should be painted first as paint and paint solvent vapors can damage the windshield. Waiting until the remainder of the aircraft is complete to install the windshield will help prevent damage to the windshield.

16. Install the sealing tape to the upper capstrip of both butt ribs, the inside mounting angles, and the top of the spacer strip only on the skylight angle. Trim the sealing tape to fit with a small razor blade or X-Acto knife. Install the windshield using the screws, nuts, flat washers, and finishing washers supplied. Do not install hardware in the boot cowl until installing the glare shield. Carefully tighten the mounting hardware until you feel *slight resistance only*.

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LTR	DESCRIPTION	PART NO	QTY
A	SCREW, AN526-832R10	91118.000	36
B	NUT, AN364-832	91166.000	36
C	WASHER, PLASTIC	91245.000	36
D	WASHER, AN960-8	91252.000	36
E	SEALING TAPE	01301.000	25'

Figure E-3
Windshield Installation

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NOTE

Due to the curvature of the glare shield, it can be difficult to do the initial trimming, particularly around the diagonal braces of the fuselage just behind the windshield. Use a large piece of thin cardboard as a template for trimming the fiberglass.

17. Trim a notch in the glare shield to allow it to pass around the diagonal braces behind the windshield.
18. Fabricate four glare shield tabs as illustrated in Figure E-4 from .050 aluminum stock. Install the tabs on the four forward-most holes in the boot cowl where the glare shield will contact the windshield. See DETAIL "D". Bolt the windshield to the boot cowl without a tab where the glare shield does not touch the windshield (hole 2 & 7).
19. Notch the glare shield so that it will slide into the four tabs just installed.
20. Drill five #35 ($\frac{7}{64}$ ") holes through the glare shield which match the holes in the brackets on the instrument panel. Attach the glare shield to the instrument panel with the hardware shown.

NOTE

You may wish to make a strap duplicator to make this easier. A strap duplicator can be made by riveting two thin strips of metal together, drilling a #30 hole through the opposite end of both strips, and gluing a rivet with its mandrel cut off in the bottom hole. By placing the rivet from the bottom strip in the hole on the glare shield mounting bracket and placing the glare shield between the two strips of metal, the hole in the upper strip will be at the point where the mounting hole needs to be placed.

19. Trim the aft edge of the glare shield. You may wish to trim it flush with the face of the instrument panel, or you may wish to allow it to overhang as desired.

NOTE

If you will be upholstering the glare shield, you should do it prior to the final attachment to the windshield and instrument panel.

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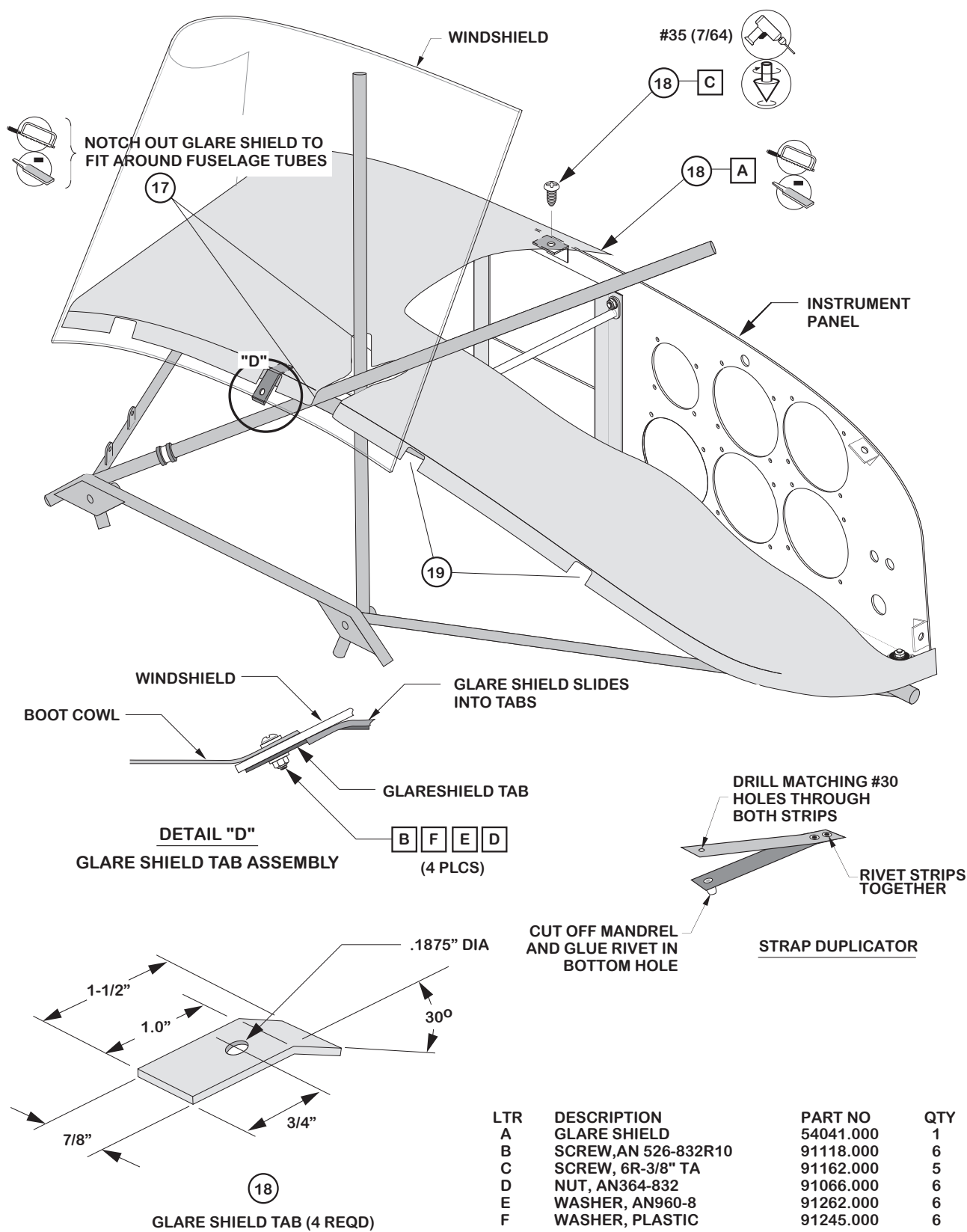


Figure E-4
Glare Shield Installation

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Section F. Quarter Window Installation

- 1. Use a piece of cardboard to cut a quarter window template that fits the window frame just behind each door. Allow clearance for existing rivets in the window angles and for the fuselage structural tubing. When you're comfortable with the fit, transfer the shape to the two P/N: 14072.000 polycarbonate sheets. Cut the window shapes out, round the corners, and smooth all edges with a sanding block with 150-grit or finer sandpaper.
- 2. Layout an evenly-spaced rivet pattern in the window frame on the fuselage and drill and deburr the holes.

NOTE

As an alternative to rivets, the quarter windows may be attached to the frames with a strong, double-sided tape (VHB), such as used for automotive trim. You can also simply use a clear silicone adhesive/sealer after the aircraft has been painted.

- 3. Use the window frame as a drill guide for drilling pilot holes in the windows. Cleco the window in place as you go.
- 4. Remove the windows and increase the size of the #30 holes to #21 in the window only and deburr. Over-sizing the holes in the polycarbonate allows the material to expand and contract with temperature changes independent of the airframe and keeps it from cracking.
- 5. Apply a bead of silicone sealant to the area where the window contacts the frame and rivet in place using the pop rivets and backup washers shown in Figure F-1. Clean up any excess silicone from the window pane.

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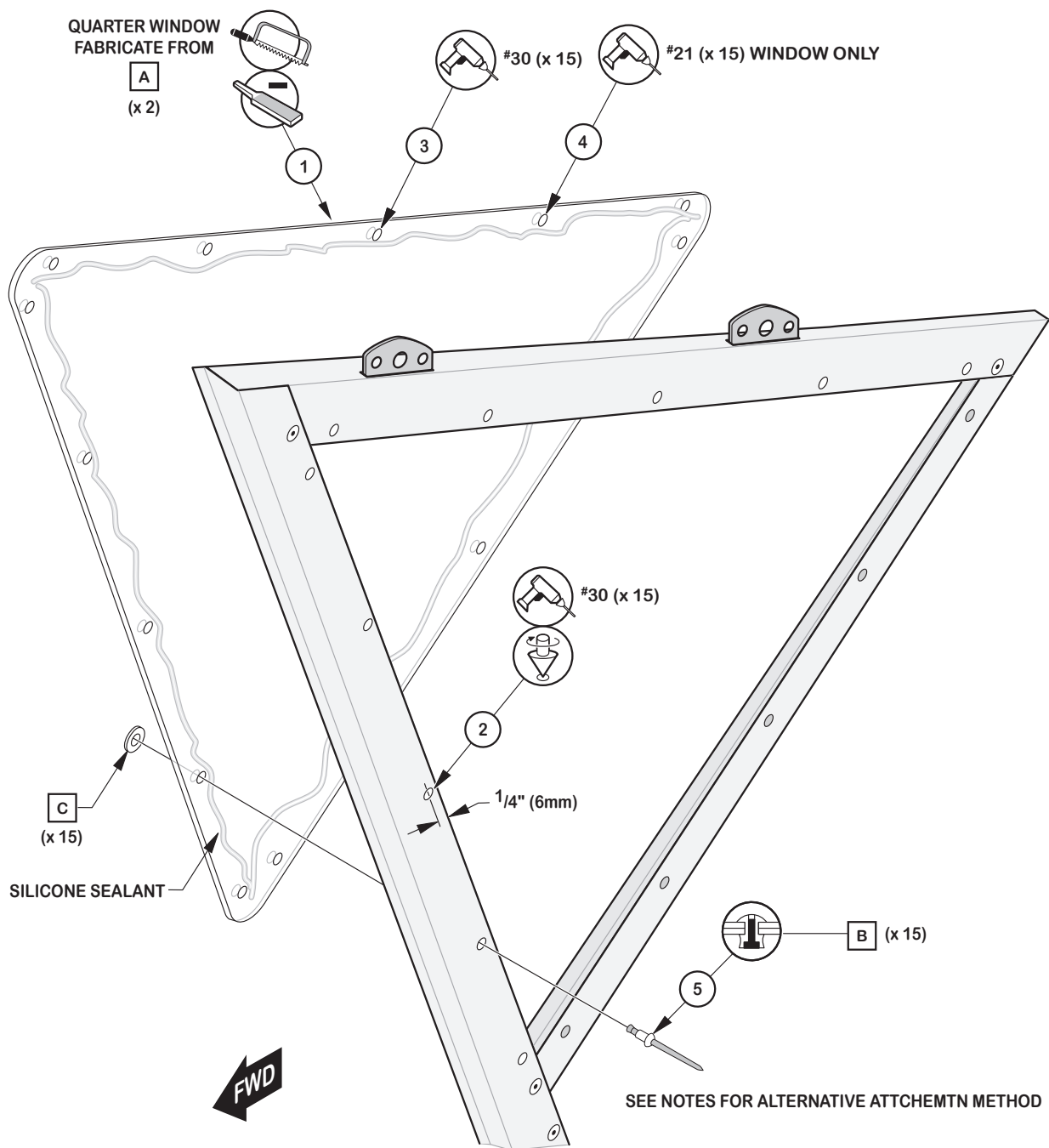


Figure F-1
Quarter Window Installation

LTR	DESCRIPTION	PART NO	QTY
A	POLYCARBONATE SHEET	14072.000	2
B	RIVET, 1/8" x 1/8" AL	90035.000	30
C	WASHER, 1/8" AL	90039.000	30

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Section G. Turtledeck Assembly and Installation

NOTE

The flaperons must be installed to fit the turtledeck to the fuselage. The windshield should be attached to the butt ribs to control the placement of the front edge of the turtledeck. Otherwise, a large piece of sheet metal or smooth plywood can be clamped across the aft end of the butt ribs over the skylight angle and spacer to simulate the aft end of the windshield.

1. Place the front edge of the turtledeck between the aft edge of the windshield and the top rear skylight angle on the rear fuselage carry-through tube. With the sides of the turtledeck resting on the flaperon spars, carefully push the turtledeck forward until the vertical sides contact the carry-through tube. Place a mark at the point where the turtledeck meets the carry-through and then remove the turtledeck.
2. Cut a circular notch in the sides of the turtledeck about the points marked with a $\frac{1}{8}$ " larger radius than that of the carry-through tube. Refit the turtledeck to the fuselage and check the size of the notch. Continue to enlarge the notch and check the fit until the front edge of the turtledeck butts up against the spacer between the angle and the skylight. File the edges of the notches smooth. Also, trim the turtledeck below the notch to allow it to clear the butt rib end plates.
3. With the turtledeck in place, butted up against the spacer, make a mark at the point where it contacts the flaperon spar. Remove the turtledeck and make a mark $\frac{3}{4}$ " on either side of these marks. Now attach a fine-point marking pen to a length of string. Holding one end of the string at the top, front corner of the turtledeck, swing an arc through each of the marks. These arcs represent the slot which will need to be cut for the turtledeck to clear the flaperon spar. Repeat this procedure on the other side. Remove the turtledeck and cut out the slots until the turtledeck will easily slide over the spars with its front edge against the spacer. The final length of the slots will vary from one aircraft to another, but they should be approximately $3\text{--}\frac{1}{2}$ " long. File the edges of the notches smooth and radius the top edges as shown.
4. Trim the bottom edges of the two sides to match the shape of the fuselage frame with approximately 1" overlap. Sand the edges smooth for a clean finish.

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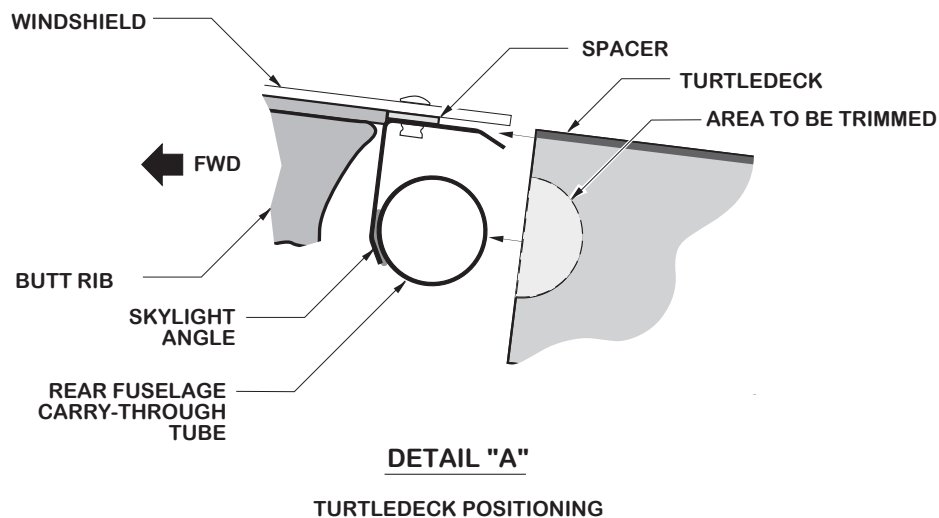
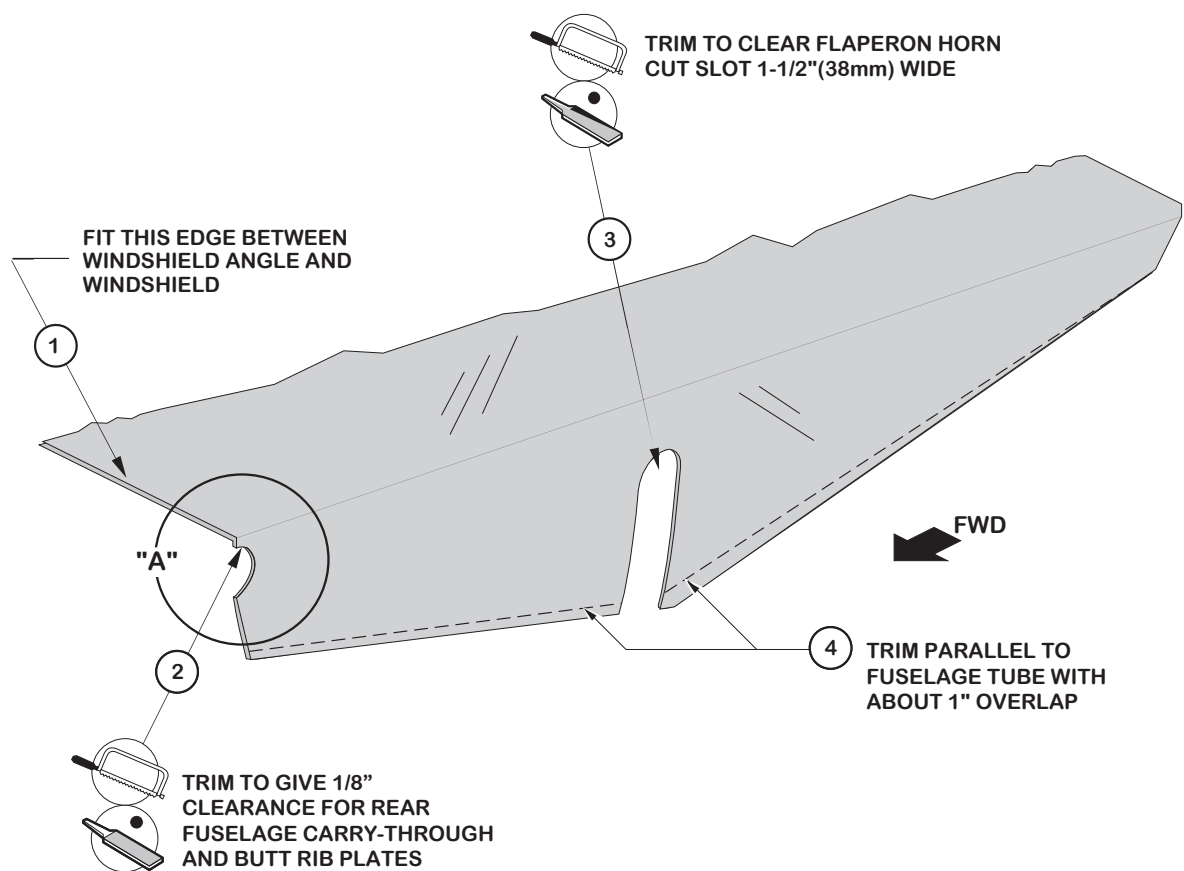


Figure G-1
Turtledeck Preparation

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5. Hold each of the strakes up to the top edge of the turtledeck and mark the area on the front edges which will need to be removed to match the carry-through tube clearance notch. Remove the material until the parts match. Drill eight #30 holes in each strake using the hole spacing shown. Match-drill through these holes into the sides of the turtledeck, clecoing the parts together as you progress. Remove the clecos, deburr, and rivet the strakes to the turtledeck.

NOTE

Review the camloc installation procedures in the Builder's Tips chapter before proceeding with the following steps.

6. Position the Turtle Deck Angle over the three rear camloc tabs. Notch the ends of the angle so that it fits flush over the tabs. Match drill the center hole of each mounting tab and the angle to 3/8". Drill and countersink the rivet mounting holes using a #40 bit. Body work the ends for a smooth transition to the fuselage. Install a camloc receptacle in each of the mounting tabs using flush rivets.

NOTE

The Turtle Deck Angle installation should be done after the fuselage has been covered. A 2-3" fabric tape may be placed over the angle and blended into the fuselage covering.

7. Place the turtledeck on the fuselage and adjust it until the front edge is butted up against the spacer under the windshield. When you are satisfied that it is positioned properly, clamp it in place. Now back drill each of the center holes in the camloc mounting tabs through the skin of the turtledeck.
8. Remove the turtledeck. Drill the center hole in each of the fuselage mounting tabs to 3/8". Drill and countersink the rivet mounting holes using a #40 bit. See Detail "A".
9. Install a camloc receptacle in each of the mounting tabs of the fuselage. See Detail "A".
10. Drill the camloc stud holes in the turtledeck skin assembly out to 1/4". Insert a stud into each hole and secure in place with a lock washer on the back side.

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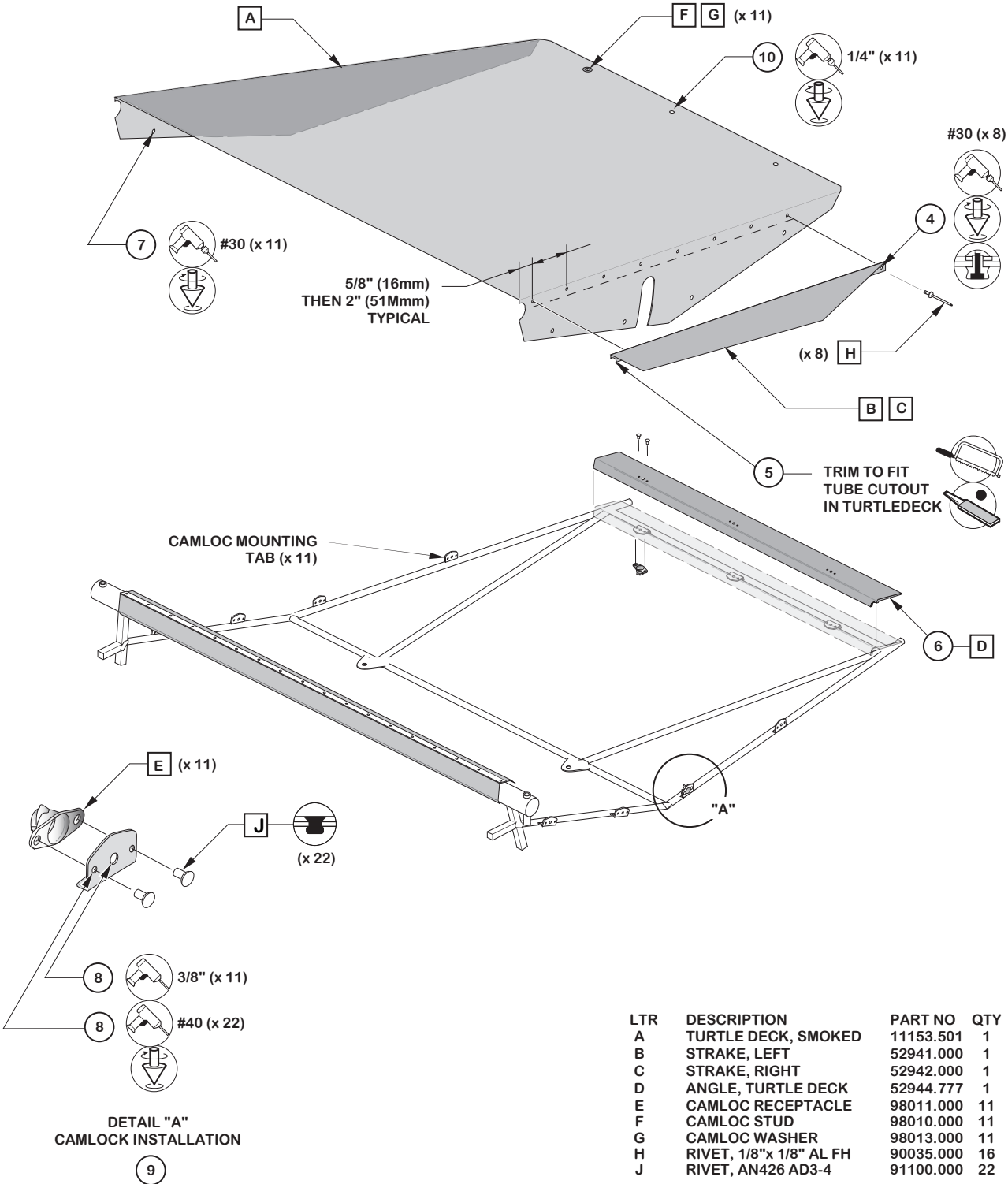


Figure G-2
Turtledeck Camloc Installation

Section H. Tail Access Cover Installation

1.

Make two forward tail access cover plates, as shown.
2.

Make two rear tail access cover plates, as shown.

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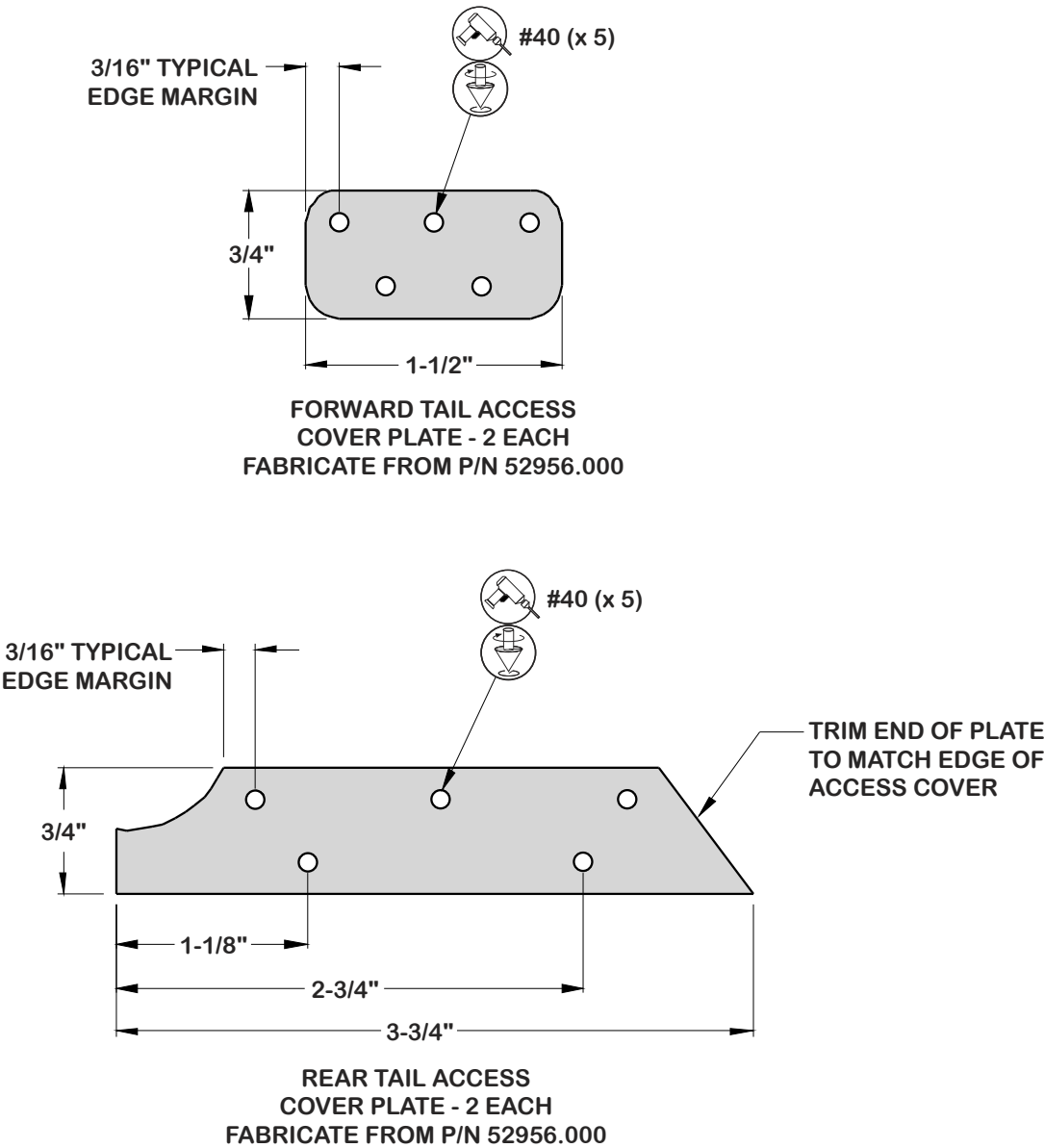


Figure H-1
Tail Access Cover Mounting Plates

3.

Make the appropriate cuts in the P/N: 11142.101 tail access covers based upon which vertical tail your aircraft has, as shown in Figure H-2. Deburr all edges.
4.

Mark the centerline of the front and rear access cover plates and clamp them to the access covers. Align the centerline of each plate with the corresponding cut line made in the covers. Match-drill the cover to the holes in the plates, clecoing as you proceed. Deburr the holes and rivet the plates to the covers.

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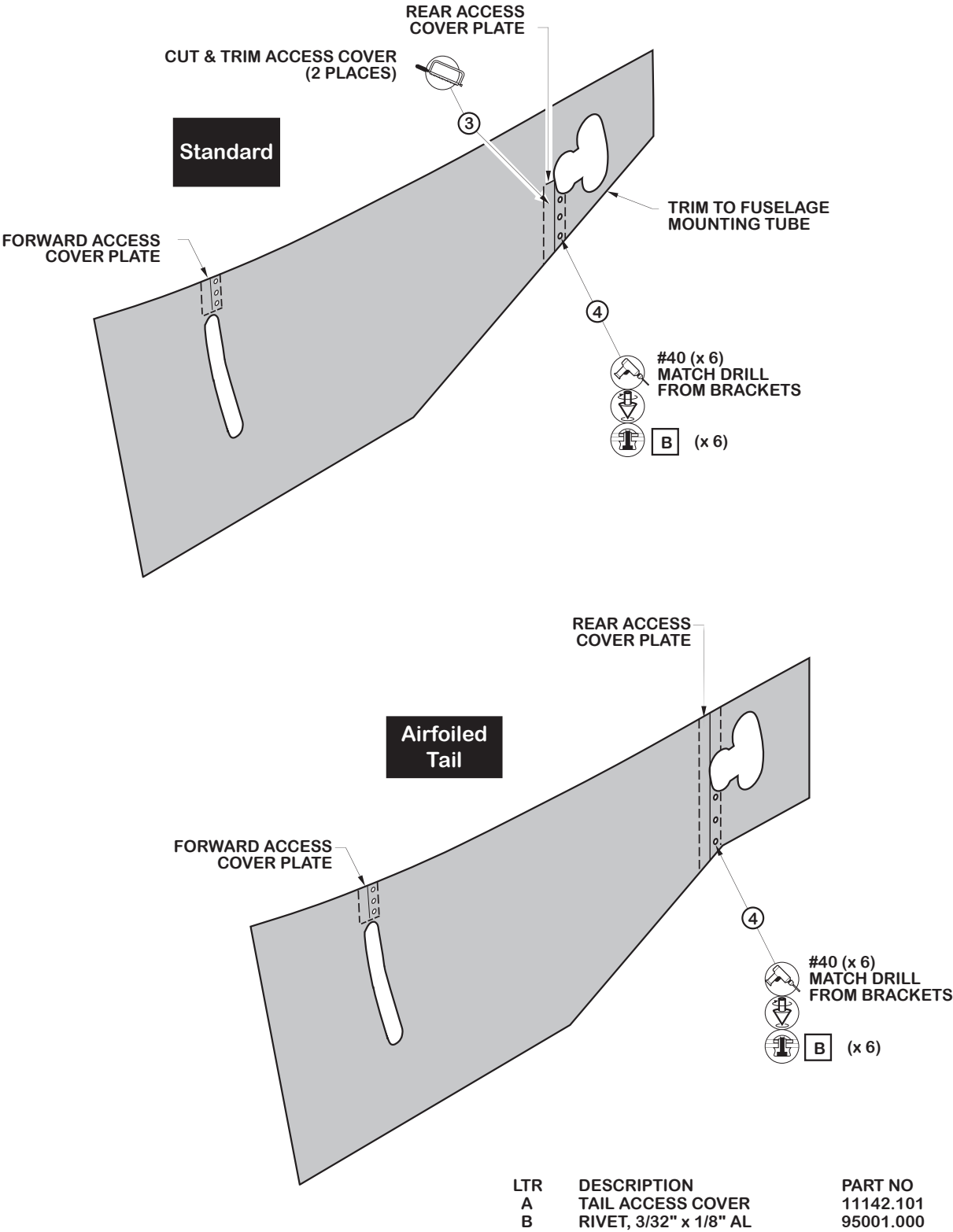


Figure H-2
Tail Access Cover Details

NOTE

Refer to Figure H-3 for the installation which is appropriate for the version of aircraft that you are building for the following steps.

5.

Place the left side tail access cover over the opening in the fuselage. Mark the location of each of the holes in the vertical stabilizer rib on the access cover. Remove the cover and drill a $\frac{5}{32}$ " hole at each marked location. Attach the cover to the rib using clecos. Apply a slight amount of pressure to the center of the panel to cause its front edge to conform to the contour of the fuselage. With this pressure applied, have an assistant back drill through the remaining mounting holes with a #40 drill bit. Also, back drill through the remaining holes in the plates that you riveted to the cover. Remove the cover and increase the size of each hole drilled to $\frac{5}{32}$ ". Repeat this step for the right-hand access cover.
6.

After the fuselage has been covered with fabric and painted, install the nutplates as shown and attach the covers.

Completion Date

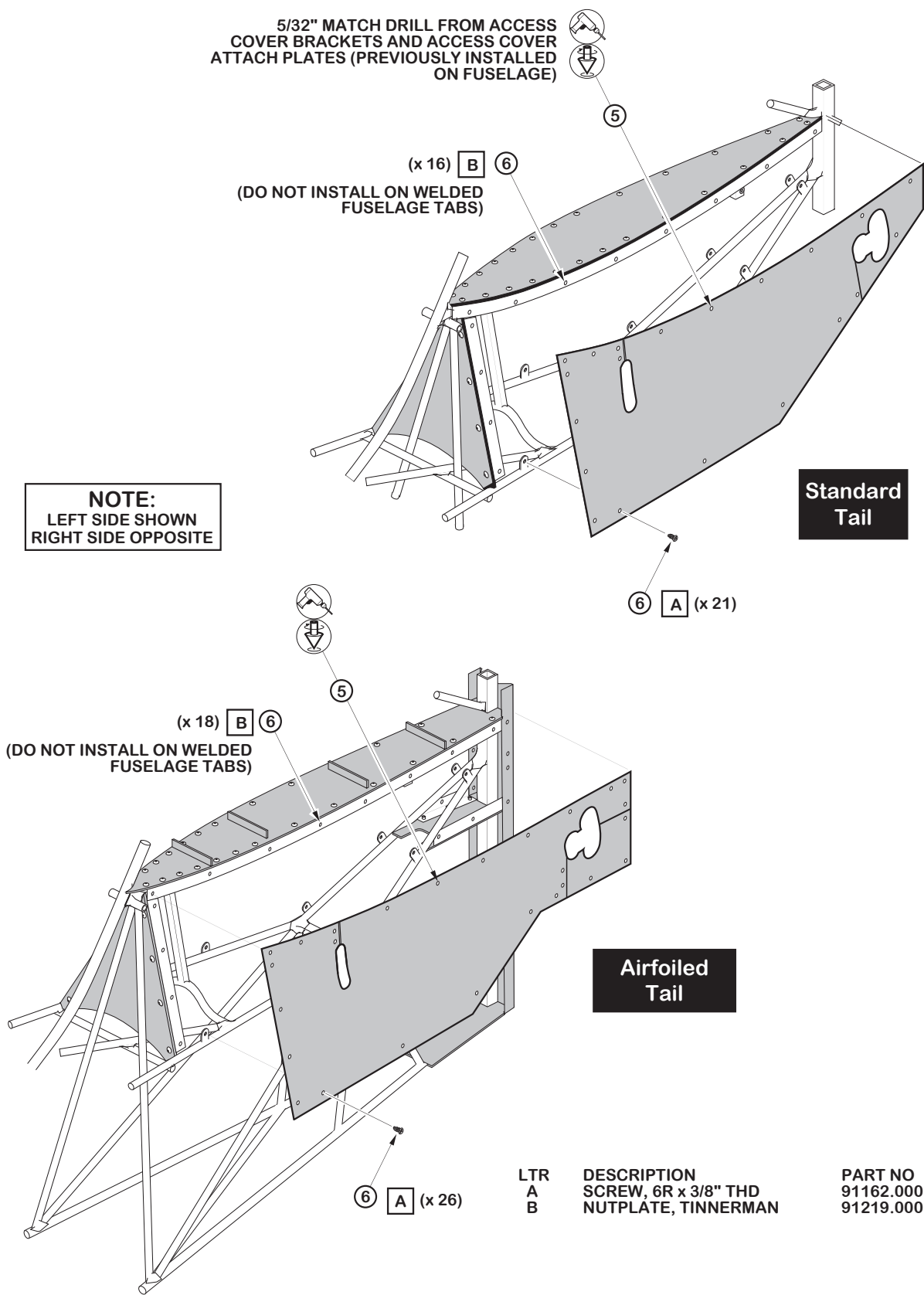


Figure H-3
Tail Access Cover Installation

Section I. Wing Root Fairing Installation

1. Cut the paper templates of the wing root fairings out of the wing template sheet.
2. Trace around the templates on a sheet of heavy bond paper, fiberboard, or non-corrugated cardboard. Transfer the hole locations to the cardboard also. With the wings installed, fit the cardboard fairing templates over the wing roots with the hole locations over the **inboard portion** of the capstrip on wing rib #1. Trim the cardboard fairing templates until there is a good fit.
3. Transfer the shape of the cardboard fairing and the hole locations to the fairing material, as shown. Cut out the metal fairing and file the edges smooth. Drill and deburr a #30 hole at the locations marked.
4. While holding the root fairing in place, make a mark through each of the holes in the fairing on the inboard edge of the capstrip of rib #1. Drill a #18 hole through the capstrip at each of these marks.

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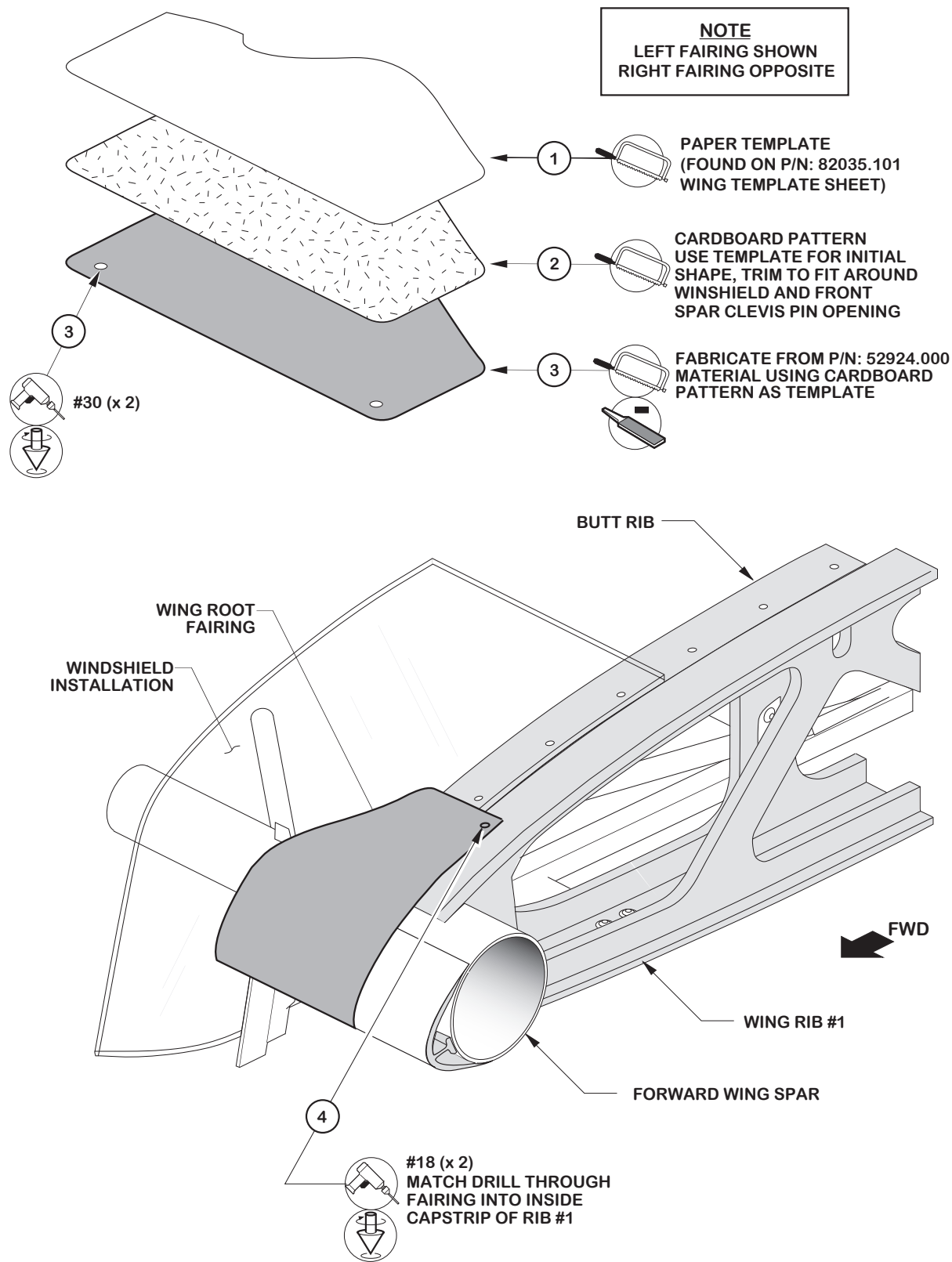


Figure I-1
Wing Root Fairing Fabrication

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5.

Temporarily place the nutplates on the outside of the capstrip over each of the holes just drilled and secure with one of the AN526-832R10 machine screws. Drill two #40 holes through each of the nutplate rivet holes. Move the nutplates to the inner surface of the capstrips and rivet in place with the rivets shown.
6.

Cut the 1/2" lip off the rubber channel strip and cut the length of the strip to match the length of the inboard edge of the fairing. Glue the strip to the fairing.
7.

Attach the fairing to the wing with the screws provided.

Completion Date

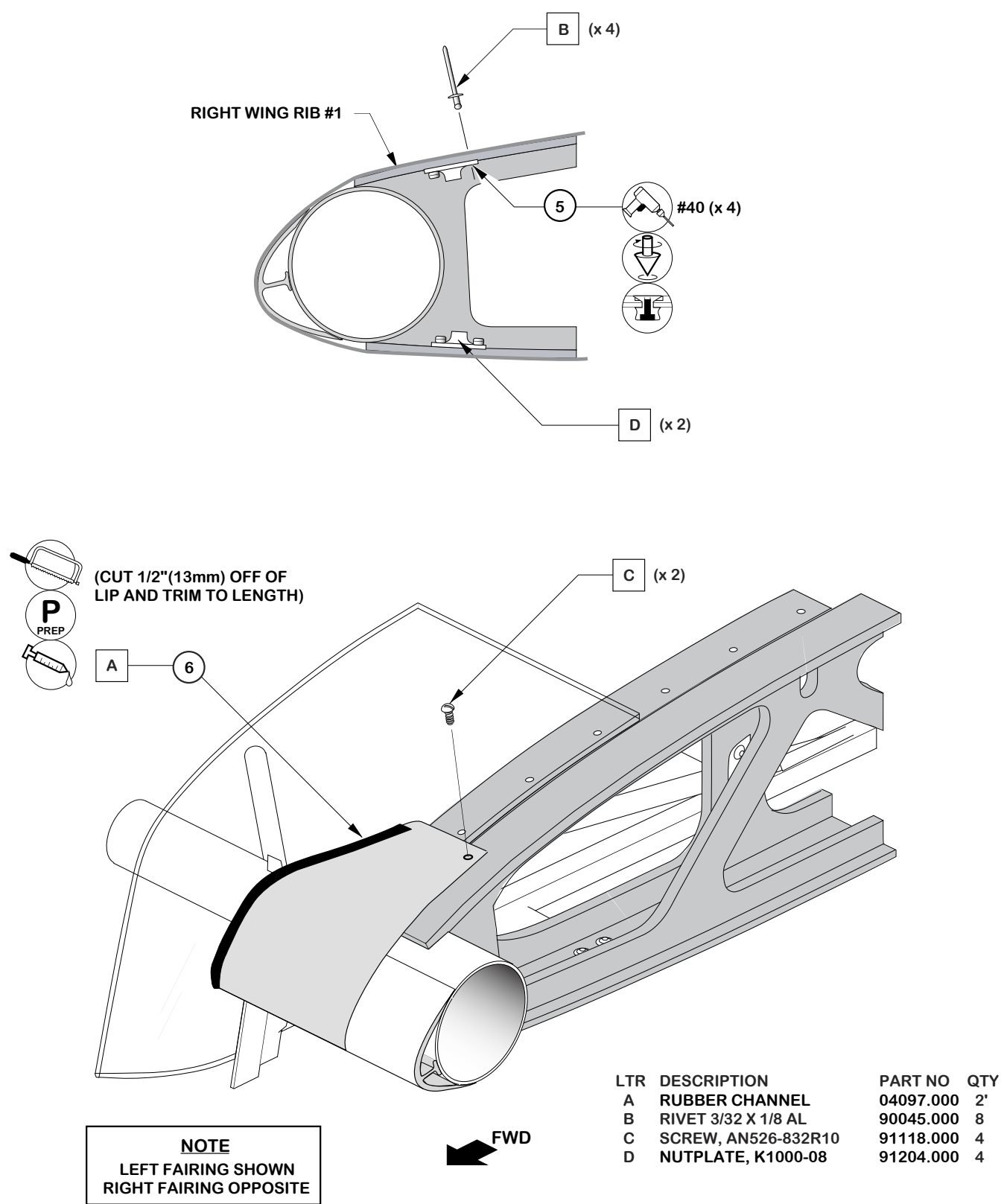


Figure I-2
Wing Root Fairing Installation

Section J. Brake System Routing and Bleeding

NOTE

Brake Reservoir components are part of the firewall forward component package. This section describes two different brake reservoir installations. If you are installing the either a Continental or Lycoming engine on your aircraft, skip ahead and begin the installation at Step 8.

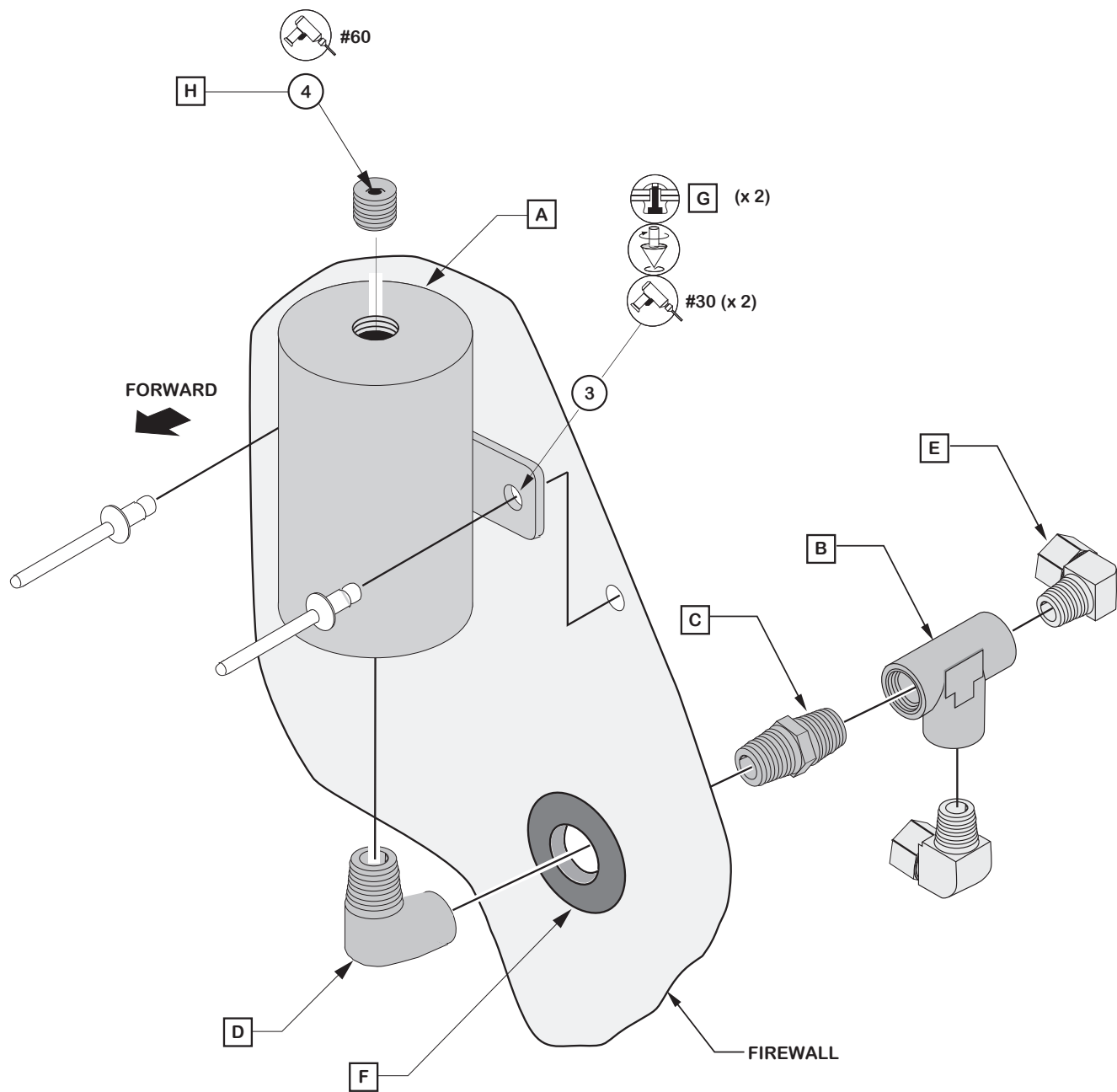
CAUTION

Do NOT use teflon tape to seal the threads of the brake system fittings. Use a good paste-type thread sealant only.

1. Apply thread sealant to the elbow fitting shown and thread it into the bottom port of the brake fluid reservoir. Tighten the fitting until it is perpendicular to mounting plate on the reservoir and oriented with its opening rearward as shown.
2. Insert the grommet in the hole located on the left side of the firewall. Place the reservoir assembly against the firewall with the elbow passing through the grommet.
3. Drill a #30 hole through each side of the reservoir plate and through the firewall, placing a cleco through the first hole before drilling the second. Remove the reservoir and deburr the holes. Rivet the assembly to the firewall.
4. Carefully drill a #60 hole through the center of the reservoir cap as shown. This will provide a vent for the system.
5. Install the remainder of the fittings as shown. Remember to use thread sealant on all fittings and a backup wrench to prevent damaging the reservoir or other fittings while tightening.
7. Skip ahead to Step 11.

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LTR	DESCRIPTION	PART NO	QTY
A	BRAKE RESERVOIR	35013.000	1
B	FITTING, AN917-1D TEE	94008.000	1
C	FITTING, AN911-1D NIPPLE	94211.000	1
D	FITTING, AN914-1D ELBOW	94212.000	1
E	FITTING, ELBOW	94024.000	2
F	GROMMET, AN931-8-13	91129.000	1
G	RIVET, 1/8" x 1/8" SS	95002.000	2
H	PLUG	94003.000	1

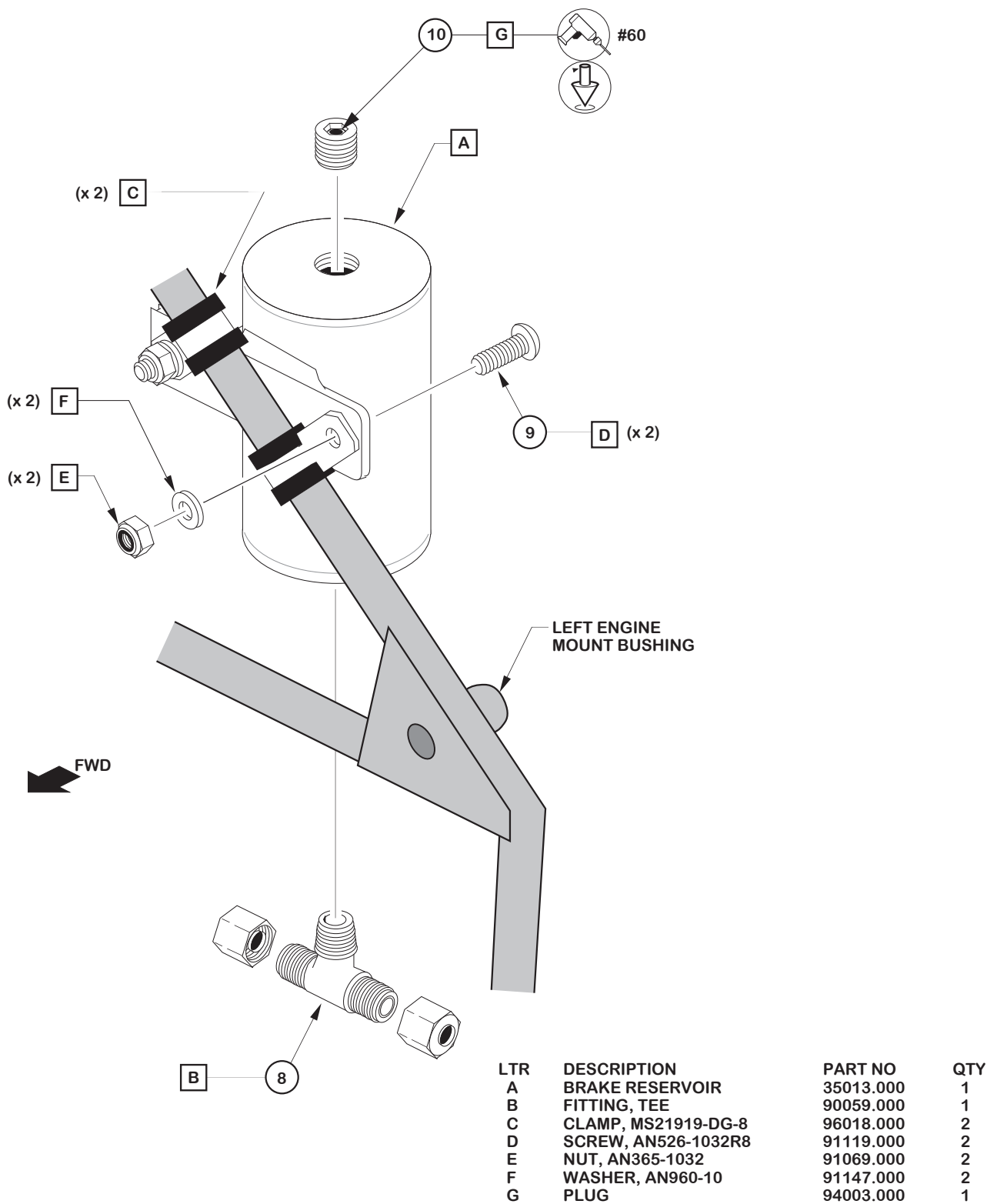
Brake Reservoir components are included in the Firewall forward kit.

Figure J-1
Rotax-Powered Aircraft Brake Reservoir Installation

8. Apply thread sealant to the tee fitting shown in Figure J-2 and thread it into the bottom of the brake fluid reservoir. Tighten the fitting until it is oriented parallel with the mounting plate on the reservoir.
9. Mount the reservoir to the structure of the firewall bulkhead as shown. The reservoir will be located just above the left engine mount bushing above the pilot's feet.
10. Carefully drill a #60 hole through the center of the reservoir cap as shown. This will provide a vent for the system.

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Brake Reservoir components are included in the Firewall forward kit.

Figure J-2
Continental and Lycoming-Powered Aircraft Brake Reservoir Installation

11. Thread an elbow fitting into both ports of each master brake cylinder as shown in Figure J-3.

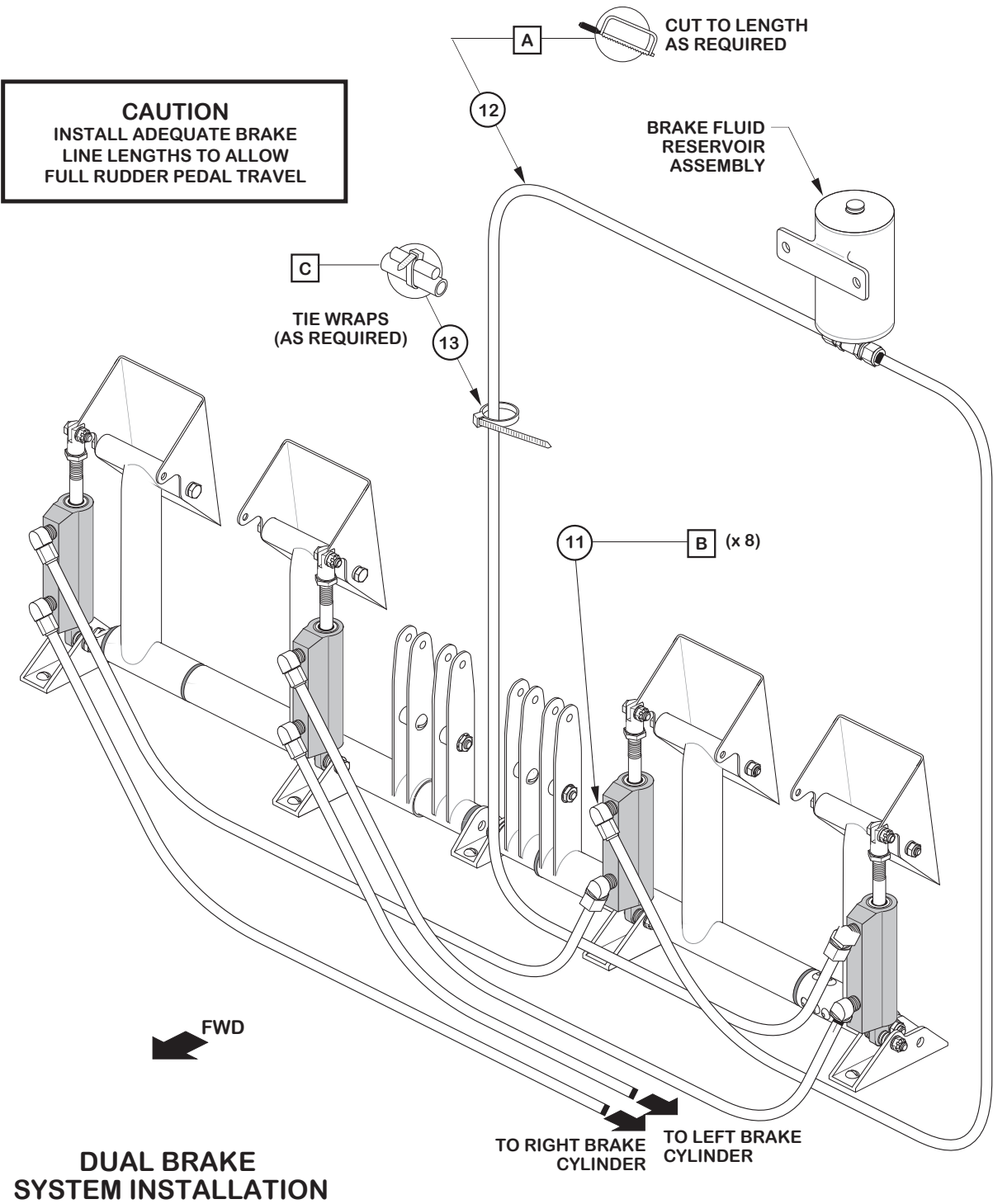
NOTE

Assemble the brake lines to the brass compression fittings using the procedure described in the Builder's Tips chapter of the manual. Ensure that the brake lines exit the fitting nut straight so that the line is not kinked against the side of the nut.

12. Cut two pieces of brake line which will fit between the reservoir and the pilot's master cylinders, allowing enough excess line to compensate for rudder pedal travel, including the fore-aft adjustment if the adjustable rudder pedal option was installed. Insert the nut from the threaded brass fitting over each end of the brake lines and insert a brass ferrule onto each end before attaching the lines to the fittings on the cylinders or reservoir.
13. Plumb the brake system in accordance with Figure J-3 if you are installing the dual brake option. Otherwise, refer to Figure J-6 for the standard brake line routing. After connecting the outlet lines from the copilot's master cylinders, route the lines through the center console. Be careful as you pass the lines around the rudder control system, however, to prevent a conflict between the brake lines and the rudder cables (or cable pulleys, if installed). Secure the lines in place where necessary with cable ties.

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LTR	DESCRIPTION	PART NO	QTY
A	BRAKE LINE	35014.000	
B	FITTING, ELBOW	94024.000	8
C	ZIP TIE, 4"	96003.000	*

Figure J-3
Brake Line to Master Cylinder Plumbing Details

14. Continue to route each of the brake lines from the aft end of the center to a point above their respective side of the landing gear. Using a small soldering iron, melt a small hole in the fabric to allow each line to pass through, as shown in Figure J-4.
15. Thread P/N: 94024.000 elbow fittings into the two ports on the front of the aluminum landing gear, on the bottom of each landing gear leg, and in each of the brake caliper housings. See Figures J-4 and J-5.
16. Connect the brake lines from the fuselage to the fittings on the top of the landing gear and connect the brake calipers to the landing gear with short lengths of brake line. Be certain to leave enough excess line to allow the brakes to be removed from the axles if necessary in the future.

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Figure J-4
Brake Line Connection to Gun-Drilled Landing Gear
(Left Side Tricycle Configuration Shown, Right Side Opposite)



Figure J-5
Brake Line Connection from Landing Gear to Caliper
(Left Gear Shown, Right Gear Opposite)

17. Check all of the fittings in the brake system to make sure they are properly tightened.
18. Remove the vented plug and temporarily install an overflow tube in the hole in the top of the brake reservoir with a cup at the end of the tube to catch the overflow.
19. Close both bleeder valves on the brake calipers. With a short length of flexible tubing, connect a pressure pot, oil can, or large syringe filled with MIL-H-5606G hydraulic fluid to one of the bleeder ports. Open the port and begin injecting fluid into the port until the fluid begins to come out of the overflow line. At this point, use your hand to apply pressure to the brake cylinder with the brake pedal. Release the pressure on the pedal and allow any air bubbles a moment to rise through the brake system. Continue to apply, and release, pressure on the brake pedal until the air is out of the system. Close the bleeder valve and remove the tubing from the valve. Repeat this procedure for the opposite side.

WARNING

Do not use any automotive-type brake fluids. Use only MIL-H-5606G hydraulic fluid. Also be certain to NOT let any brake fluid come in contact with the brakes themselves.

20. Remove hydraulic fluid from the top 1/2" of the brake reservoir and install the vented plug.
21. Sit in the aircraft and test the brakes. If they feel soft, bleed the system again until they feel solid.
22. Follow these procedures for properly conditioning the brake pads:
 - A. Taxi the aircraft for 1,500 feet with the engine at a high idle setting, while applying brake pedal force, as needed, to develop a 5-10 mph taxi speed.
 - B. Allow the brakes to cool for 10-15 minutes.
 - C. Perform a full-throttle ground run-up with the brakes applied. If the brakes hold, then the conditioning is complete.
 - D. If the brakes cannot hold the aircraft during the full-throttle ground run-up, then repeat steps A, B, and C after allowing the brakes to cool completely.

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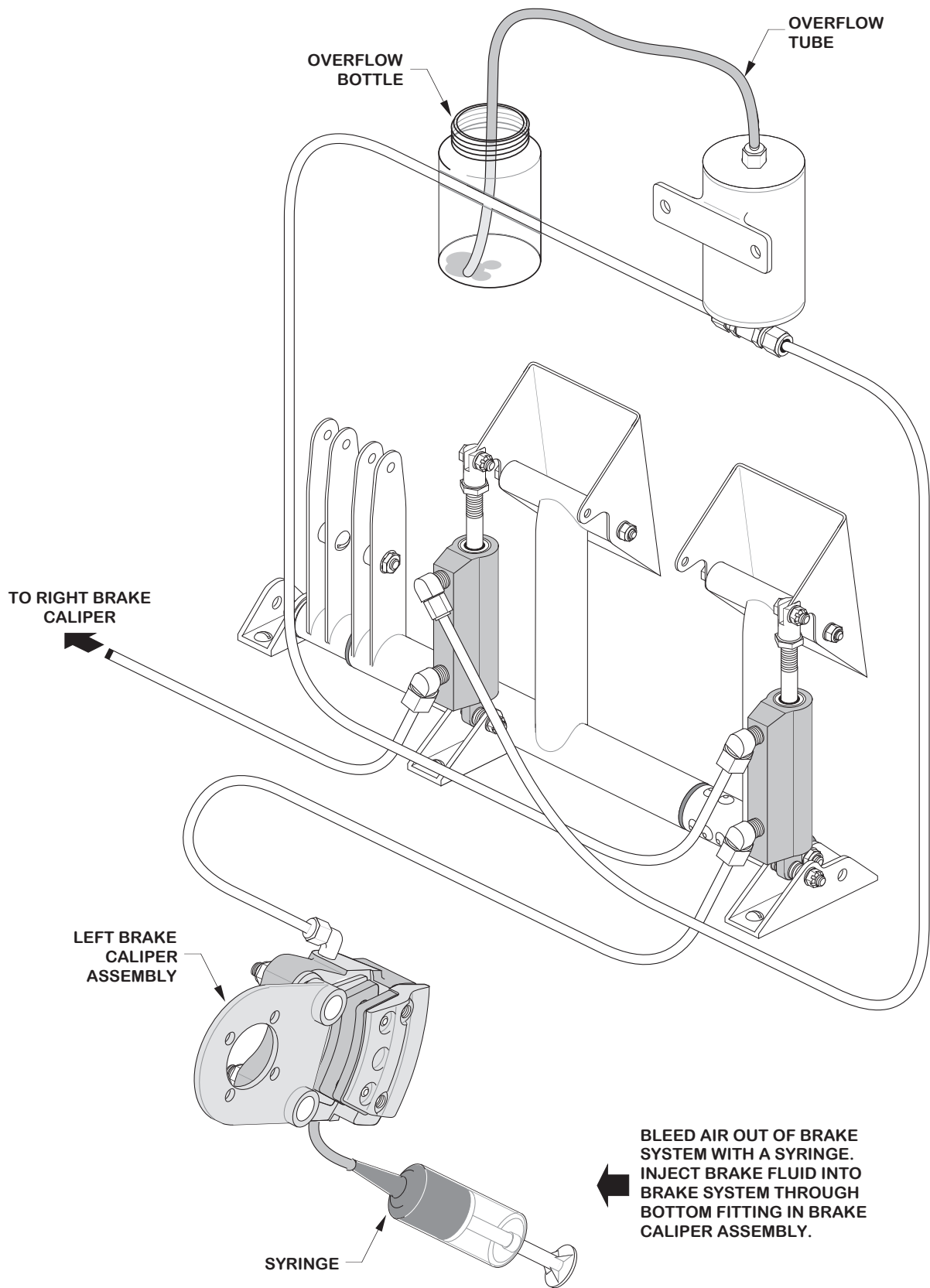


Figure J-6
Brake Bleeding Overview

Section K. Antenna Installation

This section describes good antenna installation techniques. Although the final mounting of the antennas will occur after the fabric is applied, **the mounting holes should be made prior to covering**. This will prevent the fabric from being damaged.

The installation procedures for each antenna will vary, so use the instructions provided by the antenna manufacturer for detailed installation information.

To get good results from your antenna installations, observe the following practices:

- It is important to have a good electrical bond between the antenna and the airframe. To reduce the electrical resistance between the two, thoroughly remove any paint or powder coating from the antenna mount until only bare metal is exposed. In order to control corrosion, paint the area surrounding the antenna mount after the installation has been completed.
- When routing the coaxial cables from the antennas, secure the them to the airframe tubing using cables ties with 1/4" lengths of Tygon tubing used as standoffs. Do not overtighten the cable ties around the 'coax', however, as this can damage the shielding underneath the jacket of the cable and reduce its effectiveness.
- Avoid letting coax come in contact with other cables. Try keeping at least 1" of space between the coax and other cables and wire bundles. Keep the coax away from the flight control systems and fuel lines. If it is in the vicinity of a fuel line, mount the coax above the line.
- Although the fuselage usually provides a sufficient ground plane, some builders have added an additional ground plane in an attempt to increase antenna performance. One way of doing this is to add a thin sheet of metal under the antenna (and under the fabric). Make certain there are no sharp edges and all corners are rounded if you choose to do this. A piece of metal foil or wire "spider" bonded to the inside of the fabric may also work as a ground plane.

- Do not paint the antennas. Although they may look nice with a coat of paint on them, some antennas will have decreased performance if painted.

- There has been some concern recently about the effects of electromagnetic fields (EMF) on the human body. At the time of this writing, no definitive studies have shown that the radio frequencies which are used in general aviation are harmful. For peace of mind, however, some builders are now placing a foil lining or metal mesh on the back side of the seat which is grounded to the airframe. This will place the pilot and passenger in an RF 'shadow' of the antennas located beneath the seat.

- When routing the coax to the antennas, use the shortest length required. Signal loss in coax at VHF frequencies can significantly reduce the performance of the transmitted signal when feedlines are long. In addition to this, avoid splicing coax together. If you must connect two pieces of coax, use BNC connectors and a union. Keep the number of junctions to an absolute minimum, however, to reduce losses.

- If you need more coax than is supplied with the antennas, use a high-quality coax which has a stranded center conductor and a braided shield (not foil). Also, use coax of the proper impedance specified by the avionics manufacturer (usually 50 ohms).

- Install BNC connectors on the ends of the coax as illustrated in Figure K-1. Never use a crimp-style BNC connector for radio communications equipment.

- Following the installation of all antennas after the fuselage has been covered with fabric, seal the joint between the antenna and the aircraft with silicone sealant.

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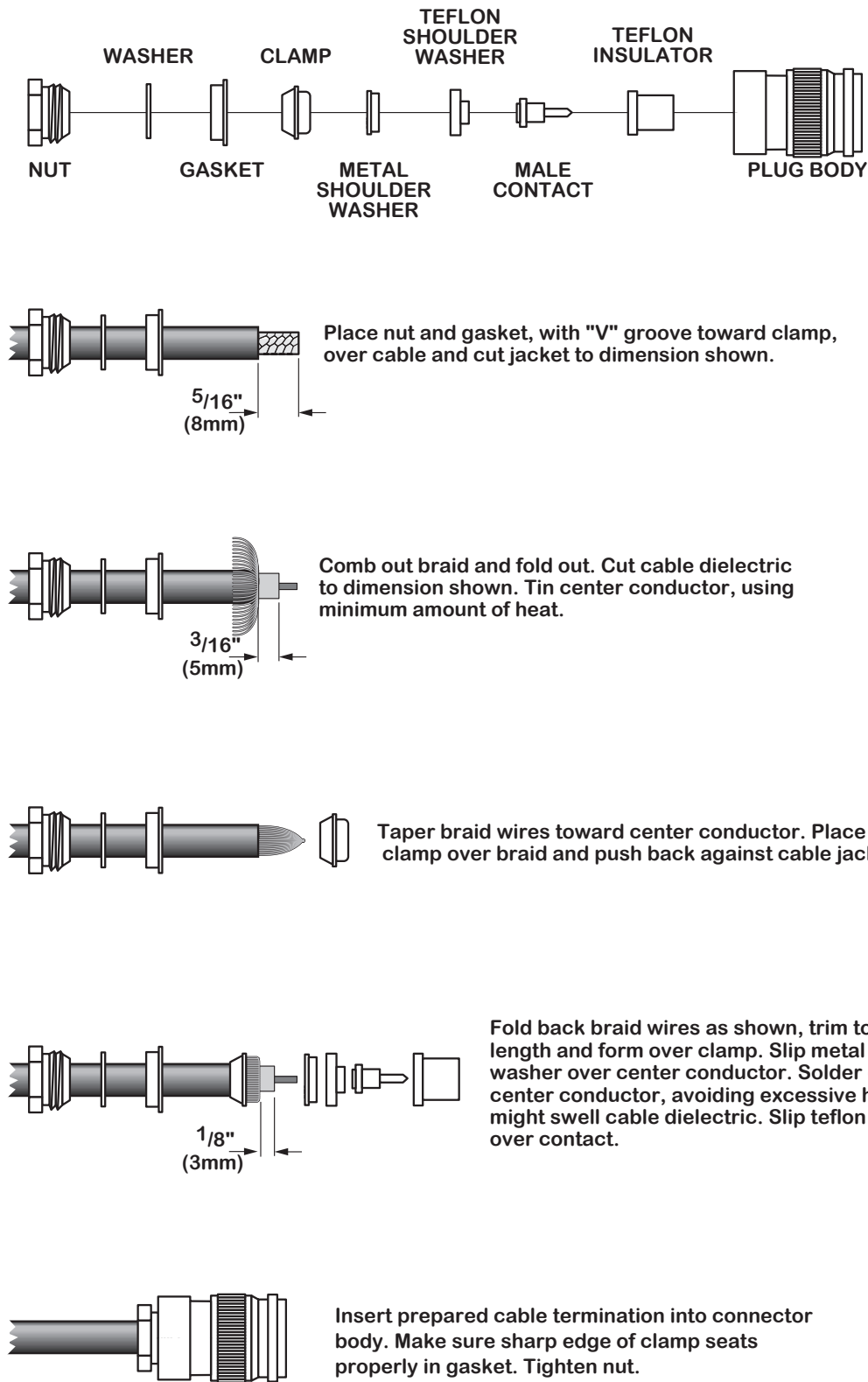


Figure K-1
Proper Installation of a BNC Connector

Section L. Systems Checkout

Fuel System

Because most aircraft engine failures are a result of a fuel-related problem, it is critical that you thoroughly check out the fuel system in your aircraft prior to operation. This section outlines the procedure which you should follow to be certain that any possible problems are corrected before they create an unsafe situation.

1. Go through the entire fuel system and check every fitting for the proper torque. After verifying the torque is correct, you may wish to apply a witness mark to each fitting.
2. Inspect the fuel lines from the wing tanks to the header tank and make sure there are no high spots in the line (the fuel line must travel continuously downhill) and that neither the fuel lines nor the vent line are pinched off or kinked at any point. Swing the wing from the flight position to the storage position to see if there are any conflicts between the fuel lines and any component of the aircraft. Return the wings to the flight position once again. Inspect the clamps on all of the hose connections to verify their security.
3. Check the quick drains in both the wing tanks and header tank to make sure they operate properly without sticking.
4. Remove the filler caps on the wing tanks and blow through the vents. Air should move freely through the vents if there are no obstructions. Also, make certain there is a gasket in place on the underside of each cap.
5. Shut off the main fuel valve and clamp the left tank fuel line shut. Place the aircraft in a flight attitude with the wings extended and pour one gallon of fuel into the right wing tank. Watch the header tank to see if it fills. While the header tank is filling, check the fuel system for leaks. Unclamp the left tank fuel line and pour a gallon of fuel into the left tank. The header tank should fill completely,

and fuel should be seen proceeding up the vent line. Make sure no leaks are present.

6. Turn the main fuel valve off and disconnect the fuel line at the engine (at the carburetors or fuel pump, depending upon which engine is installed). Place the end of the hose in a clean 5-gallon bucket. You may find it easier to do this with an additional piece of hose to reach the bucket. Add another gallon of fuel in each wing tank and turn the main fuel valve on. After the fuel begins to flow into the bucket, shut the valve off once again and carefully inspect the system for leaks. Open the valve and again let the fuel flow into the bucket. If the flow rate begins to show signs of slowing while there is still fuel in the system, continue to drain the system and then check all fuel lines and the vent line for possible obstructions.
7. Begin the calibration of the sight gauges by filling the header tank with fuel and clamping off both fuel lines from the wing tanks. Level the aircraft side-to-side. Add one gallon of fuel to each wing tank. If your aircraft has a conventional landing gear, place a mark on the metal piece behind the sight gauge tube even with the fuel level with the aircraft in the taxi attitude (tailwheel on the ground). Do this on both wings and then raise the tail of the aircraft up to flight attitude (aircraft level) and mark the metal at the fuel level on the opposite side of the tube from the mark from the taxi attitude. If you have a tricycle landing gear, only one mark will be made for each gallon of fuel added. Continue the process, adding one gallon to each wing tank at a time and letting it settle prior to making calibration marks. Once the tanks are full, label the marks on the plate with the quantity that each represents.

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Electrical System

8. Check all wire terminals for security. Do this by giving each wire a gentle tug. Do not rely on a visual inspection.
9. Disconnect the starter cable from the starter.
10. Insure the battery has a full charge before proceeding.
11. Remove all fuses or pull all circuit breakers.
12. Remove or disconnect all electrically-sensitive devices, such as avionics.
13. Turn all switches off.
14. Connect the battery to the electrical system.
15. Check for proper voltage (12.5 to 13.5 V typical) and polarity at the battery solenoid.
16. Turn the master switch on. You should hear the battery solenoid engage.
17. Check the positive bus to verify that it is at full battery voltage.
18. Check the starter solenoid to verify that it is at full battery voltage.
19. With the starter still disengaged, measure the voltage at the starter end of the cable when the starter switch is engaged. It should be full battery voltage.
20. Check the load devices (strobe lights, nav lights, landing lights, etc.) one at a time for proper operation.
21. Install or connect the avionics and other electrically-sensitive devices and check for proper operation in accordance with their installation manuals.

22. With all of the electrical loads turned off, start the engine and verify that the engine's charging system is providing positive current using the voltmeter and ammeter (if installed in the aircraft).

NOTE

It is easy to reverse the leads on the ammeter. Check to make certain they are installed properly if the meter is not indicating properly before suspecting trouble in the charging system.

Pitot-Static and Avionics Systems

23. Check all fittings in the system plumbing for proper torque.
24. Inspect both the pitot tube and static port (if installed) to verify that they are free from obstructions (especially paint or bugs).
25. Prior to the first flight, have an avionics technician test the pitot-static system with the appropriate test equipment. This testing will simulate the pressure at a given test altitude and will measure the leak rate of the static system. Although this specific test is not required for Experimental Amateur-Built aircraft under the Federal Aviation Regulations, as it is for "certified" aircraft, it is useful in proving the quality of the static system installation.
26. If your aircraft will be used for IFR flight, the static system, altimeter, and encoder must be checked in accordance with FAR §91.411.
27. If a transponder is installed in the aircraft, it must be inspected prior to flight and every 24 months following in accordance with FAR §91.413.

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Section M. Weight and Balance

Careful attention to weight and balance is essential to the safe operation of your Kitfox. The forms and examples provided here will help you determine your aircraft's empty weight and empty weight center of gravity. These calculations are necessary to determine your useful load and the loading schedule to ensure that you operate your aircraft within its center of gravity envelope.

Staying within the CG range and gross weight limitations is **essential** to safe flight. Exceeding the aircraft's gross weight means that you are reducing the margins of safety which are included in the aircraft design to allow for factors such as gust loads, material variations, and differences in construction techniques. Reducing the margin of safety opens the door for in-flight structural failure under conditions that an aircraft at, or below, gross weight would handle safely. Exceeding the center of gravity range will alter the stability of the aircraft and may change its controllability. If the CG is too far forward there may not be sufficient elevator authority to flare when landing. If the CG is too far aft, the aircraft may become unstable in pitch, may be unrecoverable from a stall, and is more prone to spinning. Obviously, a prudent builder and pilot will manage his weight and balance carefully.

The basic process involves leveling and weighing the aircraft and doing some simple math to find the empty weight center of gravity. From there, the useful load and loading schedule can be determined.

Weigh the aircraft in its final, ready-to-fly state, complete with final paint, all instruments, radios and antennas, ELT, wheel pants, fire extinguisher, **full engine oil, unusable fuel**, upholstery, seat belts, etc. Include everything that will be going aloft that isn't people, baggage, or usable fuel.

The aircraft is leveled by means of an accurate bubble level held on the lower fuselage fore and aft tubing in the area below the cabin. The datum (the reference point from which all measurements will be taken) is the leading edge of the wing at the root.

Useful Terms and Definitions

Center of Gravity (CG): The center of gravity may be defined, for the purpose of balance computations, as the point on the airplane about which the nose heavy (-) moments and the tail heavy (+) moments are exactly equal. If the aircraft were suspended from this point it would have no tendency to rotate in either direction (nose up or nose down). The weight of the aircraft can be **assumed** to be concentrated at its CG.

CG Range: The allowable variation of the CG location is called the "CG Range". Since CG limits constitute the range of movement that the flight CG can have without making the aircraft unstable or unsafe to fly, the CG of the **loaded** airplane must remain within these limits for all phases of flight. These limits are defined on the weight and balance sheet at the end of this section.

Forward and Aft CG: The most forward and most rearward allowable CG limits for the aircraft. These limits are determined by design and have been verified through Kitfox's flight test programs.

Weighing Points: The weighing points of an airplane are the points at which the airplane is supported at the time it is weighed. In the case of the Super Sport, the main landing gear and nose or tail wheel are the weighing points.

Maximum Gross Weight (MGW): Maximum allowable weight of the aircraft and its contents authorized for takeoff as determined by design limits.

The maximum gross weight of the Super Sport Kitfox with the Rotax 912 (80 hp) engine installed is 1,400 pounds.

The maximum gross weight of the Super Sport Kitfox with the Rotax 912S (100 hp), Continental O-200, Continental IO-240, or Lycoming O-235 engines installed is 1,550 pounds.

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Empty Weight (EW): The empty weight of an aircraft includes all operating equipment that has a fixed location and is normally carried in the aircraft and any other parts or equipment which are required for flight and are installed in the aircraft. Full oil and unusable fuel (that remains in the lines and tanks but is not available to the engine) are included in the empty weight.

Useful Load (UL): Useful load is the empty weight subtracted from the maximum allowable gross weight of the aircraft. This load consists of the pilot, passengers, fuel, and baggage.

Datum: An imaginary vertical plane from which all horizontal measurements are taken for balance purposes with the aircraft in a level attitude. The datum for the Kitfox Super Sport is the wing leading edge at the root.

Arm (or Moment Arm): The horizontal distance, in inches, from the datum to the center of gravity of an item. A positive (+) arm indicates the item is located aft of the datum. A negative (-) arm indicates the item is located forward of the datum.

Moment: Moment is the product of a weight (in pounds) multiplied by its arm (in inches).

Mean Aerodynamic Chord (MAC): The mean chord of the wing. For weight and balance purposes, it is used to determine the CG range of the aircraft. The mean aerodynamic chord of the Super Sport is 51.1 inches.

Tare: The weight of the equipment necessary for weighing the airplane (such as chocks, blocks, etc.) which is **included** in the scale readings but is not a part of the actual weight of the airplane. Tare must be subtracted from the scale readings in order to obtain the actual weight of the airplane.

Flight CG Limits:

Super Sport Aircraft, **No Wing Sweep**

Forward: Sta. 9.5

Rearward: Sta. 16.0

Super Sport Aircraft, **1° Forward Wing**

Sweep

Forward: Sta. 9.5

Rearward: Sta. 14.75

Weight and Balance Procedure

1. Ensure that the aircraft has everything on board that should be in place for finding the empty weight and CG. Move the aircraft inside a closed building to conduct the weight and balance measurements - even slight winds may yield inaccurate results if it is done outside. Place the aircraft on three scales (one under each wheel). The scales under the main wheels must be capable of accurately weighing up to 500 pounds each. Many EAA chapters have low platform scales which may be borrowed for weighing your aircraft. The main wheel scales should be level with one another so that the aircraft will be level laterally. If the aircraft is not level laterally, place shims under the main wheel on the low side until it is. For the conventional landing gear configuration, position a sturdy stand under the tailwheel with a scale between the stand and the wheel. Adjust the height of the stand until the airplane is level fore and aft. For the tricycle gear configuration, place the scale under the nose wheel. Use an accurate bubble level or electronic digital level on the fuselage floor tubing to verify that the aircraft is level.

2. With the aircraft level and all fixed equipment installed, record the scale readings and tare weights:

Right Main = _____ lbs - tare _____ lbs = _____ lbs
 Left Main = _____ lbs - tare _____ lbs = _____ lbs
 Nose/Tail = _____ lbs - tare _____ lbs = _____ lbs

Total the three net weights and record below:

Aircraft Empty Weight: _____ lbs

3. With the aircraft still level, drop a plumb line from the leading edge of the wing at the root (just out-board of the wing root fairing) and mark the floor at this point. A piece a masking tape and a fine-point marking pen work well for making the marks on the floor. Repeat this on the other side. Similarly, mark the floor at the points directly below the center of the axles of the three wheels. Roll the aircraft out of the way. Using a chalk line, make a line on the floor between the two datum points. With the aid of a carpenter's square, make a perpendicular chalk line from the nose/tailwheel axle mark to the datum line and perpendicular lines from the main gear axle marks to the datum line. Measure as accurately as possible along the perpendicular lines between the axle marks and the datum line and record the dimensions below (in decimals, not fractions).

Right Main Arm ± _____" Left Main Arm ± _____" Tailwheel Arm + _____"
 Nose Wheel Arm - _____"

4. Compute the aircraft moments by multiplying each scale reading by its arm.

Location	Net Weight (lbs)	Arm (in)	Moment (in·lbs)
Right Main	_____ x _____	_____ = _____	_____
Left Main	_____ x _____	_____ = _____	_____
Nose/Tail	_____ x _____	_____ = _____	_____
Total Weight	_____	Total Moment	_____

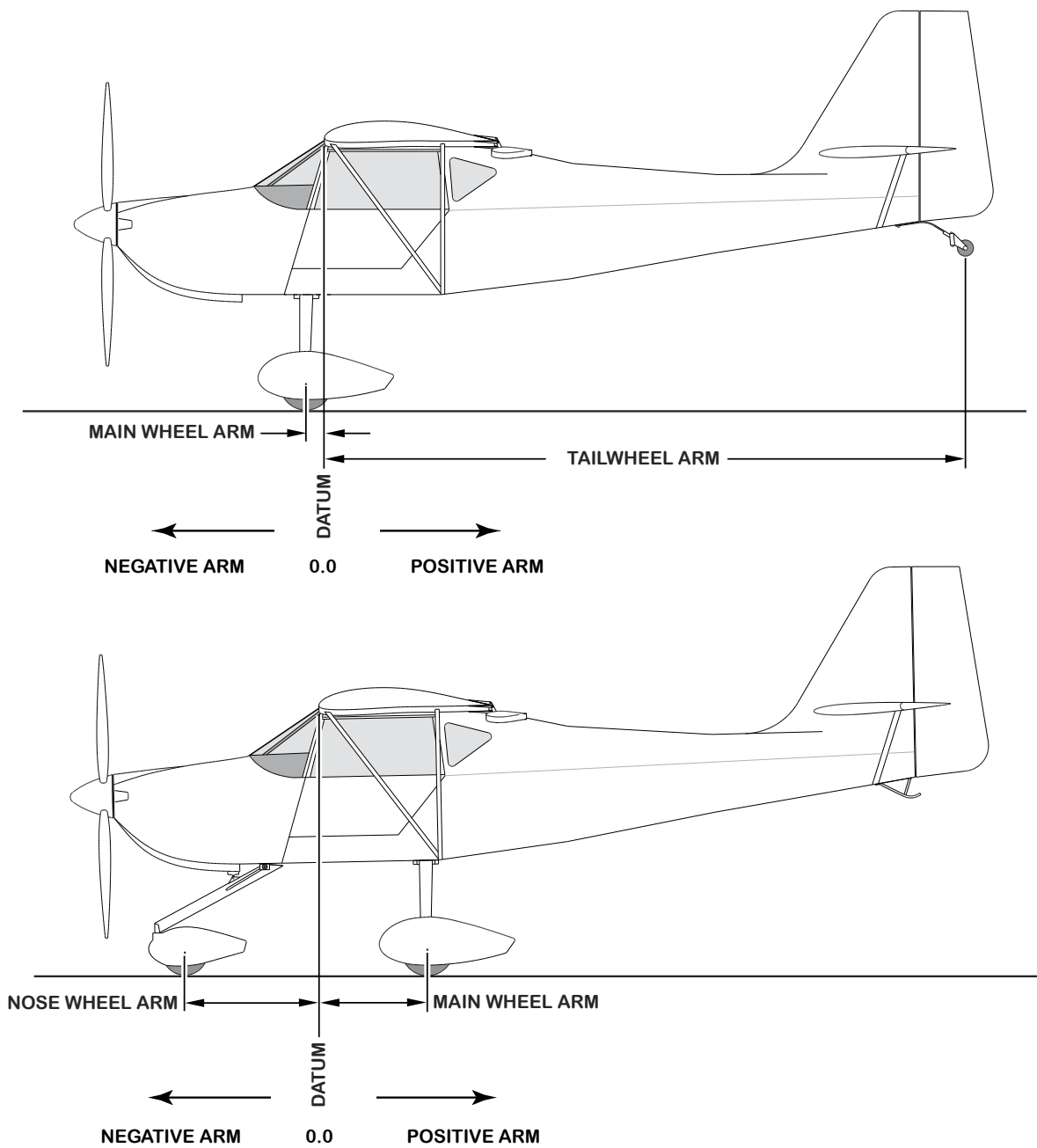


Figure M-1
Weight And Balance

5. Now that you know the empty weight and the total moment of the aircraft, divide the moment by the weight to obtain the empty weight CG in inches from the datum:

Total Moment _____ ÷ Total Weight _____ = **Empty Weight CG** _____

6. Photocopy of the blank chart provided and use the empty weight and moment to complete the most adverse forward and most adverse aft loading conditions. If the CG limits are exceeded in either case, the way the aircraft is loaded must be changed. For example, the battery mounting location may be changed or the cargo weight reduced. For the most adverse forward loading, use the minimum fuel weight required for flight (30-minute reserve at maximum power, 6 pounds per gallon fuel weight) and a single 170-pound occupant only. For the most adverse aft loading, begin with 150 pounds of cargo, then add two 170-pound occupants, and finally add full fuel weight. If the maximum gross weight of the aircraft is exceeded in this scenario, reduce the weight of the fuel until the gross weight is at the maximum limit. The example below illustrates the process. Note that in the most adverse aft loading example, using 'standard' occupant weight and full baggage (150 pounds) will place the CG behind the aft limit. Therefore, the amount of baggage must be reduced in order to maintain the CG within the limit. As most people don't weigh exactly 170 pounds, you should perform some 'real world' loading schedules in addition to those required by your governing aviation agency.

Empty Aircraft CG Data		Date: 29 November 2001					
Weighing Point		Weight (lbs) x Arm (in) = Moment (in-lbs)					
Right Main Wheel (less tare)		314	25.1	7881			
Left Main Wheel (less tare)		305	25.4	7747			
Nose/Tailwheel (less tare)		195	-35.4	-6903			
Total		814		8725			
Moment , Weight = Empty Weight CG = 10.7							
Loaded Aircraft CG		Most Adverse Forward			Most Adverse Aft		
Component		Weight (lbs) x Arm (in) = Moment (in-lbs)			Weight (lbs) x Arm (in) = Moment (in-lbs)		
Aircraft - Empty		814	10.7	8725	814	10.7	8725
Pilot		170	18.3	3111	170	18.3	3111
Passenger		170	18.3	0	170	18.3	3111
Fuel		18	16.5	297	156	16.5	2574
Cargo		0	46.9	0	110	46.9	5159
Total		1002		12133	1420		22680
Moment , Weight = CG		Most Forward CG			Most Aft CG		
		12.1			16.0		

Make: Kitfox

Model: Super Sport

Serial Number: _____

Registration Number: N_____

Reference Datum: Inboard leading edge of the wing

Leveling Means: Bubble level on longitudinal fuselage floor tubing below the cabin

Maximum Gross Weight: 1,550 lbs*

* The gross weight is limited to 1,400 pounds if the aircraft is powered with a Rotax 912 (80 hp) engine.

Mean Aerodynamic Chord: 51.1 in.

Flight CG Limits:

No Wing Sweep

Forward: Sta. 9.5

Aft: Sta. 16.0

1° Forward Wing Sweep

Forward: Sta. 9.5

Aft: Sta. 14.75

Empty Aircraft CG Data	Date: _____		
Weighing Point	Weight (lbs) x Arm (in) = Moment (in-lbs)		
Right Main Wheel (less tare)			
Left Main Wheel (less tare)			
Nose/Tailwheel (less tare)			
Total			
Moment ÷ Weight = Empty Weight CG =			

Loaded Aircraft CG	Most Adverse Forward		Most Adverse Aft	
Component	Weight (lbs) x Arm (in) = Moment (in-lbs)		Weight (lbs) x Arm (in) = Moment (in-lbs)	
Aircraft - Empty				
Pilot		18.3		18.3
Passenger		18.3		18.3
Fuel		16.5		16.5
Cargo		46.9		46.9
Total				
Moment ÷ Weight = CG	Most Forward CG		Most Aft CG	

Signature _____ Date _____

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Section N. Paperwork

NOTE

It is very important to remember that no two-place airplane may be flown (not even solo) in the United States unless it has an FAA 'N' number.

There is a certain amount of paperwork which must be carried in your aircraft. An easy mnemonic which will help you remember what paperwork is required is the word "arrow":

- A** Airworthiness certificate
- R** Registration paperwork
- R** Radio station license - If Required
- O** Owner's manual (or pilot's operating handbook) with operating limitations
- W** Weight and balance paperwork

You may find the following definitions helpful when preparing your paperwork:

Airworthiness - The state or quality of an aircraft or of an aircraft component which will enable safe performance according to specifications.

Airworthiness Certificate - A document which shows that an aircraft meets the safety requirements of the FAA. Along with this certificate the FAA inspector (or their designee) will impose operating limitations on the aircraft in the interest of safety. These limitations can vary from aircraft to aircraft and by geographic location.

Registration Certificate- A document which must be displayed in a US civil aircraft showing the owner as being registered with the FAA. An aircraft is eligible for registration only if it is owned by a citizen of the United States and not registered under the laws of a foreign country.

Radio Station License - A license which is issued by the Federal Communications Commission (FCC) which allows the transmission of signals from the radio equipment specified for a given aircraft.

Pilot's Operating Handbook (POH)- A handbook which typically gives information about the aircraft in the following areas:

- Aircraft dimensions and specifications
- Engine specifications
- Limitations
- Emergency procedures
- Normal procedures
- Performance
- Weight and balance
- Airplane and systems descriptions
- Airplane handling, service, and maintenance

Weight and Balance - A record of the distribution of weight in an aircraft and the determination of the center of gravity (CG) at takeoff and landing.

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NOTE

It is important that you plan ahead for registering your aircraft, as the process can take several months to be completed.

U.S. Identification Number

A registration number (which will eventually be displayed on the aircraft) must be obtained from the FAA Aircraft Registry by requesting it from them in writing, stating that the aircraft is being built by you from raw materials and parts and that it was never registered anywhere else. You must also describe the aircraft by class (airplane, rotorcraft, glider, or balloon), serial number, number of seats, type of engine installed, how many engines, and whether the aircraft is built for land or water operation. See the sample letter in this section. There is a \$5.00 fee charged for registration of a randomly-assigned number and a \$10.00 fee for a special registration number. You will need to enclose a check or money order payable to the Federal Aviation Administration along with your request.

Aircraft Registration

Once you have received your identification number ('N' number) assignment, fill out an application for registration (AC Form 8050-1) and the Aircraft Bill of Sale (AC Form 8050-2) which was supplied with your kit. Mail these forms to the FAA Registry at:

U.S. Department of Transportation
Federal Aviation Administration
Mike Monroney Aeronautical Center
FAA Aircraft Registry
P.O. Box 22504
Oklahoma City, OK 73125-0504

Enclose a check or money order for \$5.00 payable to the Federal Aviation Administration.

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You should contact your local FAA Flight Standards District Office (FSDO) as many have developed packets which include all the paperwork needed for registration. Otherwise, you can receive forms electronically via the internet at <http://www.faa.gov> or by calling 1-800-322-7873. You should also consult them on the application for the airworthiness certificate; they are very particular as to how this is to be filled out.

As you are going through the registration and inspection process, you may find it helpful to read Advisory Circular 20-27D "Certification and Operation of Amateur-Built Aircraft".

Repairman Certification

The builder of the aircraft may apply for a Repairman Certificate for his aircraft in accordance with FAR §65.104 using the procedure outlined in FAA Advisory Circular 65-23A "Certification of Repairmen (Experimental Aircraft Builders)". Having this certificate will allow the holder to maintain, inspect, and repair his or her own aircraft. This certificate may not, however, be transferred to another person if ownership of the aircraft should change in the future. You may not use the privileges of this certificate on aircraft other than the one you built (that aircraft is specified on the certificate).

Radio Station License

You will need to apply for the radio station license for your aircraft using Federal Communications Commission Form 605. You can get this form electronically (and even file electronically) via the internet at <http://www.fcc.gov>. Otherwise, you can call the FCC Form Distribution Center at 1-800-418-3676.

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U.S. Department of Transportation
Federal Aviation Administration
Mike Monroney Aeronautical Center
FAA Aircraft Registry
P.O. Box 25504
Oklahoma City, OK 73125-0504

Date: _____

Gentlemen:

This is a request for a United States identification number assignment for my home-built aircraft.

Aircraft description:

Make: _____

Type (airplane, rotorcraft, glider, etc.): _____

Model: _____

Serial Number: _____

This aircraft has not been previously registered anywhere (FAR §45.15).

☐ Normal request - \$5.00 (fee attached)

☐ Special registration number request - \$10.00 (fee attached)

Choices

1st _____
2nd _____
3rd _____
4th _____
5th _____

Sincerely,

Signature of Applicant

Section O. Final Inspection Checklist

The purpose of this guide is to offer advice and guidance for the annual inspection of your aircraft. We have assembled an exhaustive checklist to provide a system for checking all nuts, bolts, fittings, safety wire, cotter pins, systems, etc. Unlike a normal preflight inspection, this checklist follows a system-by-system approach. The intent is to make you think about the entire system that you are checking and to make certain that nothing has been overlooked.

Whatever you do, the most important thing to do is think. While you are inspecting a system (flight controls, for example) think about what the system is supposed to do. Look for any reason that the system might not function as intended.

While no checklist can ensure that you built the aircraft correctly, there are certain things that should be paramount in your mind. Cotter pins and safety wire are incredibly important. A missing cotter pin is an accident looking for a time to happen. Throughout the history of aviation there have already been many pilots and aircraft that have come to grief because a cotter pin was left out. Don't add your name and N-number to the list.

While most accidents in a Kitfox™ tend to be more of the fender-bender type instead of the "smoking hole in the ground" type, you should not be involved in either. A review of the statistics of accidents involving homebuilt aircraft shows that engine failures play a role in about one out of three, and fuel system problems are most often cited as the cause. These problems include fuel contamination, obstructed fuel vents, incorrectly assembled or adjusted carburetors and linkages, carburetor ice, fuel system leaks, and fuel mismanagement.

Terms used in this checklist are defined as follows:

Security- Proper fastener torque or tightness, correct hardware, installation robust enough to withstand service loads.

Lubrication- Application of a lubricant as specified in the builder's manual.

Thread engagement- Rod end bearings are threaded in far enough to cover the witness hole in the bearing shank; also, fastener threads extend beyond the end of a nut.

Assembly- All required components are properly fitted together.

Operation- Device moves to the full extent of its required travel without binding, chafing, etc.

Freedom of movement- Smooth travel of pivots and bearings; also, making certain that opposing rod ends are not clocked so that they force each other to bind against their mountings (links and push-pull tubes should be able to rotate slightly without binding).

Chafe protection- Clamps or ties are in place to hold parts firmly to each other or firmly away from each other; also, sleeves or sheaths used for abrasion protection.

Routing- Wire runs and hose runs which prevent damage by heat, moving or vibrating parts, etc.; also, free from kinks, tension, or twists that might impair function.

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Remove the following items for inspection:

- Engine cowlings
- Spinner
- Seat pan
- Wing root fairings
- Tail access covers
- Stabilizer brace access panels
- Turtledeck
- Inspection covers
- Center console sides
- Aft floorboards
- Fiberglass wingtips (if attached with machine screws)
- Wheelpants, if installed
- Baggage compartment

ENGINE

Engine Controls

- ☐ Check engine end of throttle control for security and proper operation.
- ☐ Check cockpit end of throttle control for security and proper operation.
- ☐ Check engine end of mixture control for security and proper operation, if applicable.
- ☐ Check cockpit end of mixture control for security and proper operation, if applicable.
- ☐ Check engine end of propeller control for security and proper operation, if applicable.
- ☐ Check cockpit end of propeller control for security and proper operation, if applicable.
- ☐ Check carburetors for synchronization, if applicable.
- ☐ Check choke cables at carburetors for security and adjustment, if applicable.
- ☐ Check cockpit end of choke control for security and freedom of operation, if applicable.

Engine Oil System

- ☐ Check oil tank for security.
- ☐ Check all oil lines for routing around hazards, chafe protection, and attachment.
- ☐ Check oil cooler, if installed, for attachment security.
- ☐ Check magnetic plug and drain fittings, as applicable, for security, safety wire.
- ☐ Check oil filter for security.
- ☐ Check oil quantity and reinstall oil filler cap.

Engine Cooling System

- ☐ Check coolant reservoir for security, if applicable.
- ☐ Check all coolant lines for routing, security, and chafe protection, if applicable.
- ☐ Check cabin heat exhaust muff for security, ducting, and proper operation, if applicable.
- ☐ Check cabin heater for security and hose or duct routing, if applicable.
- ☐ Check engine baffling for security and seal condition, if applicable.
- ☐ Check coolant level and secure filler cap, if applicable.

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Ignition System

- ☐ Check electronic ignition module brackets for security, if applicable.
- ☐ Check magnetos for timing and security and check P-lead connection, if applicable.
- ☐ Check ignition leads for routing and chafe protection.
- ☐ Check all spark plugs for proper torque (see engine manufacturer's manual).
- ☐ Reinstall spark plug leads on spark plugs and ensure tight connections.
- ☐ Check wiring and installation of ignition switch.

Induction System

- ☐ Check carb heat box for security, if applicable.
- ☐ Check carb heat actuator cable for security and proper operation, if applicable.
- ☐ Check carb heat ducting and clamps for security and chafe protection, if applicable.
- ☐ Check carb heat muff on the exhaust pipe for security, if applicable.
- ☐ Check engine air filter(s) for security.
- ☐ Check alternate intake air source for security and proper operation, if applicable.

Exhaust System

- ☐ Check each cylinder's exhaust flange nuts for security.
- ☐ Check the pipe-to-muffler connection for each cylinder.
- ☐ Check the muffler attachment brackets or springs for security.
- ☐ Check for adequate clearance between the exhaust outlet and lower cowl.

Spinner and Prop

- ☐ Check prop blade angle and adjust, if applicable.
- ☐ Check prop hub bolts and prop attachment bolts for proper torque.
- ☐ Safety wire prop attach bolts, if applicable.
- ☐ Install spinner and verify attachment security, if applicable.
- ☐ Check for positive clearance between spinner and cowl.
- ☐ Check propeller governor for proper operation and security, if applicable.

Engine Electrical

- ☐ Check starter cable connection for security.
- ☐ Check starter cable for proper routing and chafe protection.
- ☐ Check alternator wires for routing and chafe protection.
- ☐ Check all wiring that passes through the firewall for chafe protection.
- ☐ Check engine ground cable for security (both ends).
- ☐ Check engine instrumentation wiring for security, routing, and chafe protection.

Engine Miscellaneous

- ☐ Check engine mount and associated hardware.

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AIRFRAME

Primary Flight Controls

Rudder

- ☐ Check rudder hinge rod ends for proper thread engagement, lubrication, attachment hardware security, check nut security, and freedom of movement (3 places).
- ☐ Check rudder cable links for proper hardware, security, and cotter pin (one per link).
- ☐ Check the rear rudder cable eyes and sleeves for proper swage.
- ☐ Check the four rudder cable pulleys at the base of the rear seat bulkhead for security, freedom of movement, and anti-derail cotter pins.
- ☐ Check the front rudder cable adjustment links for proper hardware and assembly, adjustment, and cotter pin (one per link).
- ☐ Check the front rudder cables eyes and sleeves for proper swage.
- ☐ Check the rudder pedal torque tube mounting brackets for security.
- ☐ Check the rudder pedal return springs for proper installation and condition.

Horizontal Stabilizer and Elevator

- ☐ Check all elevator hinge points for proper assembly, lubrication, hardware security, and freedom of operation.
- ☐ Check rear elevator push-pull tube rod end for proper thread engagement, attachment hardware security, lubrication, check nut security, and freedom of movement.
- ☐ Check stabilizer brace attachment at the stabilizer for security, both sides.
- ☐ Check stabilizer brace attachment hardware at the fuselage for security, both sides.
- ☐ Check stabilizer brace rod ends for proper thread engagement, lubrication, freedom of movement, attachment hardware security, check nut security, both sides.
- ☐ Check the rear stabilizer attachment point for proper assembly and hardware security.
- ☐ Check the front stabilizer attachment point for proper assembly and hardware security.
- ☐ Check elevator trim system for proper assembly, attachment hardware security, lubrication, check nut security, and freedom of movement.
- ☐ Check elevator trim control assembly for proper lubrication, freedom of movement, and hardware security.

Flaperons

R L

- ☐ ☐ Inspect flaperon for cracks, dents, or damage.
- ☐ ☐ Check flaperon drain holes are free of obstructions.
- ☐ ☐ Inspect the flaperon mass balance weights for security.
- ☐ ☐ Check the flaperon hinges for proper hardware, security, lubrication, and freedom of movement.
- ☐ ☐ Check the flaperon control horns for proper installation, security, and freedom of movement.
- ☐ ☐ Check flaperon connect tube top rod end bearings for security, lubrication, thread engagement, horn attachment security, check nut security, and safety clip (one per rod end).
- ☐ ☐ Check flaperon connect tube bottom rod end bearings for security, lubrication, thread engagement, and check nut security.

Cabin Area Controls

- ☐ Check both control sticks for security and freedom of movement.
- ☐ Check control stick connect tube rod end bearings for security, lubrication, check nut security, thread engagement, and freedom of movement.
- ☐ Check control column bearing block for security.
- ☐ Check control column mounting bracket for security.
- ☐ Check control column travel stops for adjustment and check nut security.
- ☐ Check left control stick pivot-to-bellcrank link for thread engagement, lubrication, security, check nut security, and freedom of movement.
- ☐ Check aileron idler bellcrank for security, lubrication, freedom of movement, and cotter pin.
- ☐ Check aileron push-pull tube rod end bearings for security, thread engagement, lubrication, check nut security, and freedom of movement.
- ☐ Check the mixer idler bellcrank for security, lubrication, and freedom of movement.
- ☐ Check the aileron actuator link for rod end thread engagement, check nut security, lubrication, hardware security, and freedom of movement.
- ☐ Check aileron bellcrank pivot pin retaining straps for security.
- ☐ Check elevator forward connect tube rod end bearings (between the control column and idler bellcrank) for security, thread engagement, lubrication, check nut security, and freedom of movement.
- ☐ Check the elevator idler bellcrank for security, lubrication, freedom of movement, and cotter pin.
- ☐ Check the forward rod end bearing on the aft elevator push-pull tube for security, thread engagement, lubrication, check nut security, and freedom of movement.
- ☐ Check flap handle assembly for security, proper operation, lubrication, and cotter pin.
- ☐ Check flap connect tube rod end bearings for security, thread engagement, lubrication, check nut security, and freedom of movement.
- ☐ Check flaperon mixer assembly pivot bolts for security, lubrication, freedom of movement, and safety wire (1 place per pivot).

Fuel System

R L

- ☐ Check wing tank fittings for security.
- ☐ Check sight gauges for condition, leaks, and fitting security.
- ☐ Check drain fittings for security, leaks, and proper operation.
- ☐ Check hose clamps for security.
- ☐ Check routing of hoses to header tank (flow must be continuously downhill in flight attitude).
- ☐ Check hose routing to header tank for security, service loop, and chafe protection.
- ☐ Check vent line to be free from kinks or restrictions.

Left Wing

- ☐ Check wingtip for security, if installed.
- ☐ Check lift strut rod ends for security, thread engagement, lubrication, and check nut security.
- ☐ Check lift strut attachment at the fuselage for security and cotter pin (one place).
- ☐ Check all four jury strut attachment points for hardware security.
- ☐ Check the front spar pin for security and lock pin.
- ☐ Check the rear spar pivot bolt for security and cotter pin.

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Right Wing

- ☐ Check wingtip for security, if installed.
- ☐ Check lift strut rod ends for security, thread engagement, lubrication, and check nut security.
- ☐ Check lift strut attachment at the fuselage for security and cotter pin (one place).
- ☐ Check all four jury strut attachment points for hardware security.
- ☐ Check the front spar pin for security and lock pin.
- ☐ Check the rear spar pivot bolt for security and cotter pin.

Landing Gear

Main Gear

R L

- ☐ Check the gear mount pivot block for proper assembly and security.
- ☐ Check roll pins (inboard of pivot blocks) for security.
- ☐ Check axle mounting bolts for security.
- ☐ Check wheel bearings for lubrication.
- ☐ Check axle nut for proper pre-load and cotter pin.
- ☐ Check wheel through-bolts and nuts for security.
- ☐ Check tire for proper inflation.

Tailwheel

- ☐ Check tailwheel spring mounting bolt for security and cotter pin.
- ☐ Check tail spring clamp bolts for security.
- ☐ Check tailwheel assembly mounting bolt for security.
- ☐ Check tailwheel steering chains and springs for security.
- ☐ Check tailwheel wheel bearing for lubrication.
- ☐ Check tire pressure for proper inflation, if appropriate.

Nose Gear

- ☐ Check nose gear pivot brackets for security and proper lubrication.
- ☐ Check top bolt on shock strut assembly for security.
- ☐ Check rod end bearing at the bottom of the shock strut assembly for security, thread engagement, lubrication, check nut security, and freedom of movement.
- ☐ Check nose wheel fork belleville washer stack for proper assembly.
- ☐ Check nose wheel fork axle nut for security, proper preload, and cotter pin.
- ☐ Check that the moisture barrier plug is intact at the bottom of the nose gear strut.
- ☐ Check nose wheel fork for lubrication, freedom of movement.
- ☐ Check nose gear wheel bearings for lubrication, proper preload, freedom of movement, and cotter pins.
- ☐ Check wheel through-bolts for security.
- ☐ Check tire for proper inflation.

Brake System

- ☐ Check brake pedals for security and freedom of movement.
- ☐ Check each master cylinder for security, check nut security, and cotter pins (2 places per cylinder).
- ☐ Check fittings on each master cylinder for security.
- ☐ Check reservoir attachment and fittings for security.
- ☐ Check reservoir for proper fluid level.
- ☐ Check reservoir plug to ensure vent hole is unobstructed.
- ☐ Check lines between master cylinders and reservoir for security, routing, and chafe protection; recheck with the rudder pedals in their extremes of travel.
- ☐ ☐ Check lines from master cylinders to wheel cylinders for security, routing, and chafe protection; recheck this with the rudder pedals in their extremes of travel.
- ☐ ☐ Check wheel cylinder fittings for security.
- ☐ ☐ Check wheel cylinder caliper pins for security and lubrication.
- ☐ ☐ Check wheel cylinder brake pad mounting bolts for security.
- ☐ ☐ Check brakes for proper operation, firm pedal pressure, and free from leakage.

Miscellaneous

Electrical

- ☐ Check battery for security, liquid level, vent caps tight, vent tube open, and connections are tight.
- ☐ Check master solenoid for security, tight connections, and proper operation.
- ☐ Check all panel-mounted devices for security, labeling.
- ☐ Check each circuit one at a time for proper operation.
- ☐ Check panel wiring for security, routing, and chafe protection.
- ☐ Check airframe wiring for security, routing, and chafe protection.
- ☐ Check landing light (if installed) for security and proper operation.

Pitot-Static System

- ☐ Ensure static port is secure and free from obstructions.
- ☐ Check static port fitting security and line routing.
- ☐ Check static fittings on the flight instruments for security.
- ☐ Check pitot tube is installed securely and free from obstructions.
- ☐ Check pitot line to airspeed indicator for security and routing.
- ☐ Check pitot fitting on airspeed indicator for security.

- ☐ Check engine instruments for proper range markings.
- ☐ Ensure magnetic compass card is filled out.
- ☐ Verify weight and balance and paperwork are complete.

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Miscellaneous

- ☐ Check door attachments for security and cotter pins (2 places per door).
- ☐ Check door gas spring for security, safety clips, and proper operation.
- ☐ Check door latches for security and proper operation.
- ☐ Check seat belts for security.
- ☐ Check windshield and skylight for security.
- ☐ Check that required passenger warning placard is displayed.
- ☐ Check that the airspeed range markings are displayed.
- ☐ Check all installed antennas for security and tight connections.
- ☐ Check tail skid for security, if applicable.
- ☐ Check cargo compartment and cargo restraint system for security.

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Maintenance Information Summary

Flight control deflections (fill in values obtained when controls were rigged)

Rudder _____ ° left _____ ° right

Flaperons

Left _____ ° up _____ ° down

Right _____ ° up _____ ° down

Elevator _____ ° up _____ ° down

Recommended Lubricants

Rod end bearings - Tri-Flow

Wheel bearings - automotive wheel bearing grease

Flaperon hinges - LPS-1

Bellcrank pivots - automotive wheel bearing grease

Brake caliper pins - LPS-1

Tricycle gear nose gear fork - automotive wheel bearing grease

Elevator hinges - LPS-1

Control column pivot - automotive wheel bearing grease

Flap handle pivot - automotive wheel bearing grease

Flaperon mixer assembly pivots - automotive wheel bearing grease

Tricycle nose gear strut pivot pins - LPS-1

Tricycle nose gear shock assembly piston - LPS-1

Brake System

MIL-H-5606G hydraulic fluid (red)

Tire Types and Recommended Pressures

Most builders will typically inflate their tires anywhere from 16-25 psi, depending on their personal preference. The tires should not, however, be inflated in excess of the pressure given on the sidewall of the tire. For example,

McCreary Aero-Trainer 6.00-6, 6-ply - 42 psi

McCreary Aero-Trainer 6.00-6, 4-ply - 29 psi

McCreary Aero-Trainer 5.00-5, 6-ply - 45 psi

McCreary Air-Trac 8.00-6, 6-ply - 35 psi

Goodyear Flight Custom II 6.00-6, 6-ply - 42 psi

Goodyear Flight Custom II 6.00-6, 4-ply - 29 psi

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Section P. Airworthiness Certification Inspection

To help you with the airworthiness inspection that will be done by the FAA or their representative, we have included the following checklist of items you will need and tasks that should be done prior to their arrival.

1. Have the aircraft properly prepared for the inspection. You should have completed the final inspection using the checklist in Section O of this chapter and have already started and run the engine. Move the aircraft to a location where it is protected from wind and rain, such as a hangar. Remove the glare shield, the turtledeck, inspection or access covers, upholstery, and the engine cowlings and set them nearby but out of the way to keep them from getting damaged. Have a good flashlight on hand with fresh batteries.
2. Make sure all of the following are properly installed on or in the aircraft:
 - Passenger warning placard
 - The word EXPERIMENTAL in letters at least 2" high in the cabin in accordance with FAR §45.13.
 - A stainless steel identification plate located underneath the left side of the horizontal stabilizer on the fuselage
 - The aircraft registration number on the aircraft in accordance with FAR §45.29
3. Have the following documentation on hand:
 - A completed copy of your Application for Airworthiness Certificate, FAA Form 8130-6.
 - A letter written to the FAA requesting certification of the aircraft in the Experimental - Amateur Built Category.
 - The aircraft registration, AC Form 8050-3, issued by the FAA Aircraft Registry.
 - A three-view drawing of the aircraft showing all major dimensions.
 - The aircraft assembly manual and your personal log showing the progression of the project.
 - The aircraft log book.
 - The engine log book.
 - Weight and balance data showing all measured data and calculations and a list of equipment installed.
 - Pilot's Operating Handbook (available from Kitfox)
4. All instruments required by FAR §91.205 must be installed in the aircraft and have the appropriate limitations indicated on them. Cockpit controls must also be labeled; for example, fuel, throttle, carburetor heat, flaps, etc.
5. A functional ELT must be installed in accordance with FAR §91.207.

You may also find it helpful to write a tentative syllabus for your flight test program for the inspector to review. You can use FAA Advisory Circular 90-89 "Amateur-Built Flight Test Handbook" as a guideline as well as resources available from the EAA.

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