5W ELECTRICAL WIRING NOTES

Electricity: There are three primary units of measure or terms we must know to successfully wire our plane: voltage, current and power. The battery we will be dealing with is known as a 12V battery. Batteries in good charge will have a terminal voltage between 12 and 13 volts. When a battery is installed in an airframe and the alternator or generator is operating, the system voltage will be 13.5 to 14.5 volts. The second term is current which is measured in units of amps (A). Current is a value representing the flow of electrons through a wire. An analogy would be a measurement of the flow of fuel to the engine in gallons/hour. The amount of current (amps) flowing in a circuit will determine the size of the circuit breaker (or fuse), the type of switch to use and the size of wire to use. The last term we must understand is Watt (W), which is a measure of power being consumed by a circuit. Items such as lights are typically rated in watts.

Wiring: Stranded wire is preferred over a solid conductor. Solid conductor wire (a single strand of wire) is more susceptible to breakage from the normal vibrations of an aircraft. Automotive type wire can be used in most applications. The only exception would be where shielded wire is desired.

Wire should be supported such that it does not sag or swing freely. When passing through a bulkhead, use a grommet or support the wire in the center of the hole with clamps to prevent chaffing which could result in an in-flight electrical short. Bundling wires together is acceptable, except when a noisy wire is included with a sensitive circuit. an example would be including the transponder antenna lead or a strobe power lead in the same bundle with the mike wire or headset leads. The impulses created by either the transponder or the strobe could be picked up by the audio wiring.

WARNING: Antennas must be hooked up before turning on the transponder or radio. Refer to the transponder, radio, and antenna manual/installation instructions for more information.

Wire Colors: Wire colors are called out in the building plans as needed. Wire call outs are followed by their color in brackets (WIRE COLOR/STRIPE COLOR). Colors are abbreviated as follows: BLK = BLACK, BLU = BLU, BRN = BROWN, GRN = GREEN, ORN = ORANGE, PRP = PURPLE, RED = RED, WHT = WHITE, YEL = YELLOW. Harnesses are supplied with multi-colored wire or white wire with a label.

ELECTRICAL CONNECTIONS

NOTE: Terminals should be crimped, but not necessarily soldered. If a termination is soldered, the wire should be supported near the solder joint to ensure there is no movement of the wire at the solder joint. The point where the wire goes into the solder joint is subject to breakage if the wire is allowed to move freely (i.e. normal vibrations and flexing).

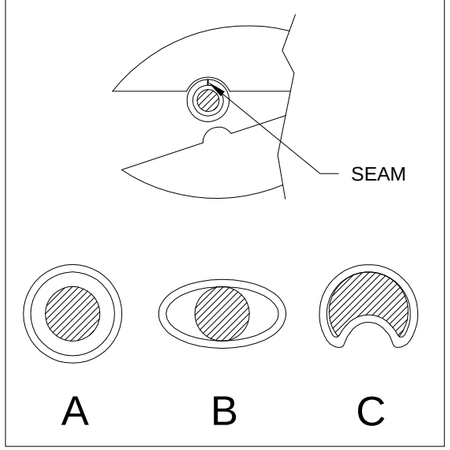
The most common terminal to be used on an aircraft will be a ring terminal. This is a device, which has a ring on one end and a barrel on the opposite end. The barrel is used to attach the wire and the ring is used by a screw for attachment to a terminal block, switch, meter, alternator, etc. The hole for the screw (stud size) comes in various sizes. The most common sizes used on our aircraft will be for a #6 screw (terminal blocks, switches, some instruments), #8 screw (instruments, circuit breaker switches), #10 screw (AN3 bolts), 1/4" bolt, 5/16" bolt (battery terminals, master and starter solenoids, and the starter).

Likewise the barrel comes in various sizes for the wires. The most common will be for wire sizes (AWG) 22-16, 16 - 14, 12-10, 8 for the alternator and the 2 gauge battery wires. Smaller barrels will accommodate more than one wire size, whereas the larger barrels are designed specifically for one wire size. Sometimes the barrel has insulation, which is the terminal type used in most of our applications. The larger terminals for 2 gauge wires are usually not insulated.

While some barrels are continuous or braised, the industrial quality barrel will be a folded or rolled barrel. When crimping it is important to note where the seam is to ensure that the crimp will not cause the barrel to spread open. See Figure 1.

There are several types of crimping pliers on the market. Most of them will flatten the barrel when the crimp is made (view "B") from its original round shape (view "A"), while others will form a crescent shape when crimped (view "C") . It is mportant when crimping to not squeeze the crimp so hard that the wire strands are broken or cut by the squeezed barrel, yet hard enough that the compressed barrel will securely hold the wire strands.

FIGURE 1



Backshell Assembly: There are a number of connections in the RV-12 which make use of d-sub assemblies sheathed with a backshell. There are a variety of backshell styles, two of which are discussed here and illustrated in Figure 2. For both styles of backshell, ensure that the wires are properly installed and heat shrink tubing is installed to to secure the wire bundle.

The **two piece backshell** contains two metal strain reliefs. These are secured around the wire bundle with two screws. One screw is installed from the top, and one from the bottom as shown in Figure 2. Position the strain reliefs so that they will fit the recess in the backshell halves.

Install the d-sub assembly in the bottom half of the backshell. Loosely attach the top and bottom halves of the backshell with the hardware as shown in Figure 2. Note that one screw is installed from above, and one is installed from below. Pry the backshell halves apart to insert the jack screws through the aft side of the assembled backshell halves. The jack screw shoulder will be captured by the top and bottom backshell halves and extend through the corresponding hole in the d-sub assembly. With the jack screws and saddle washers captured, tighten the top and bottom screws to complete the assembly. See Figure 2.

The **clamshell style backshell** has a plastic strain relief that nests in the bottom half of the clamshell and the wire bundle is secured with a metal strain relief on the top as shown in Figure 2. Jack screws snap into molded receptacles in the bottom half of the clamshell and extend through the holes in the d-sub assembly. To complete assembly the top half of the clamshell is closed and snapped into place with the molded posts and integrated side latch.

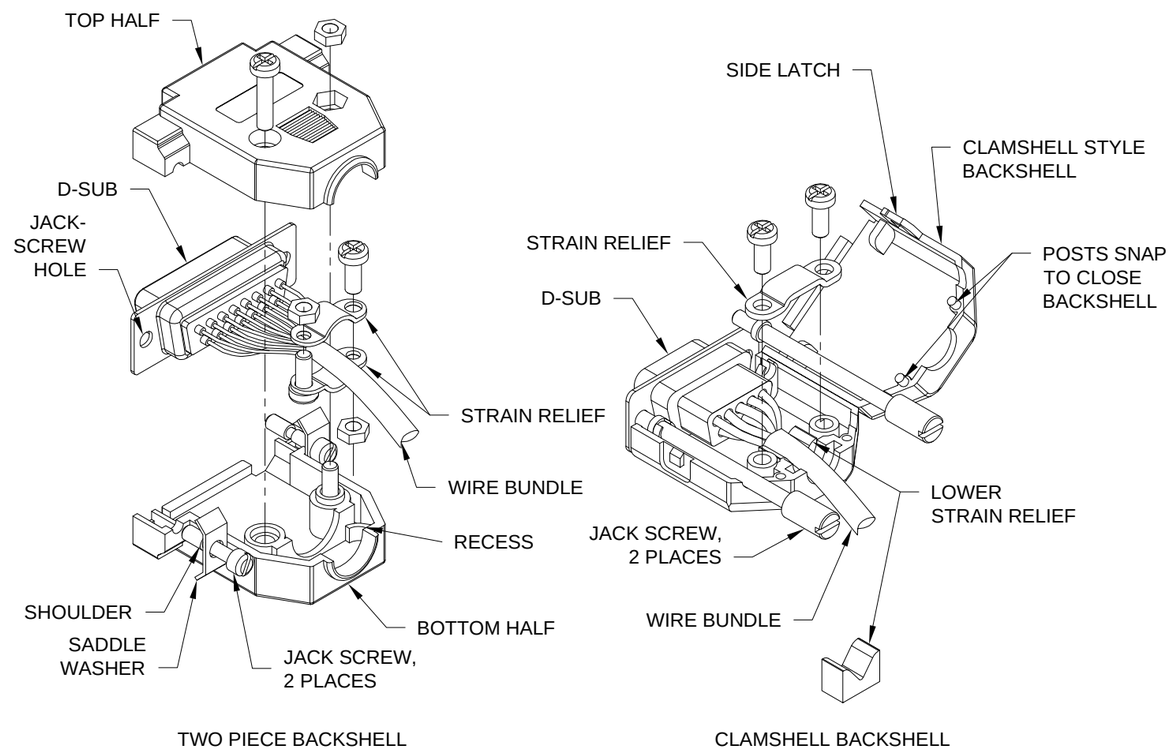


FIGURE 2: BACKSHELL ASSEMBLY