

Bob's TechTalk #17
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Anderson Powerpole® Connectors

This month we're going to pause on our trip from the antenna to the radio to discuss a timely subject. Next month we'll continue down the feed line and eventually reach the antenna tuner and transmitter. However, this month we are going to look at a standard power connection for 12 volt radios and accessories.

Why a standard?

Most all of today's VHF, UHF and HF radios, up to 100 watts, are designed to run on a nominal 12-volts DC power. The actual rating is usually 13.8 volts, which corresponds with a 12-volt automobile system with the engine running and the alternator charging the battery.

Wouldn't it be nice if there was a standard connector that had universal acceptance so everyone could hook their radios up in a moment to any of numerous power sources and be on the air without delay. It wouldn't be necessary to modify the radio, only the power cord. And if you have a favorite 'other' connector you only need to make an adapter or two and keep them available with the radio. Unfortunately, each manufacturer (and sometimes model) seems to use a different plug between the radio and the power cord. In an emergency, when time can be of the essence, connecting to an available power supply can be a problem unless the connectors are standardized.

The standard:

After some false starts, a standard connector has been agreed upon by most of the nation. The ARRL, Orange County RACES, and many law and safety organizations have selected the Anderson Powerpole® PP15/30/45 series of connectors as the standard. This is

the connector used on the Rig Runner 12V power distribution strips. For a 12V (13.8V) system Red (positive) and Black (negative) are the chosen colors. Figure 1 shows a photo of a typical Powerpole® two wire connector wired to the standard. Note that the red connector is on the left when facing the front of the connector and the opening is up. Figure 2 is a drawing of the two wire connector as seen from the front (the wires come out the back.)



Figure 1 – Anderson Powerpole® connector

The Connector:

The Anderson Powerpole® is a modular connector. It may be purchased as a set with the housing and contact, or the pieces can be bought individually, making stocking easier. While the connector comes in ratings up to 180 amps, only the 15, 30 and 45 amp ratings are part of the standard. The Anderson line of Powerpole® connectors offers the following features:

Modular – Housings dovetail together to make multi pole connectors. They're easily keyed. Housings are available not only in Red and Black, but also in nine other colors: Green, White, Blue, Yellow, Orange, Gray, Brown Purple and (for the YLs) Pink! Red should be reserved for 12 volt systems.

Androgynous (genderless) – There is no need to stock separate male and female parts.

Commonality – A single housing supports 15 ampere, 30 ampere or 45 ampere contacts. The different sized contacts are rated by the wire size they'll accept:

15A for #16 to #20 AWG
 30A for #12 to #16 AWG
 45A for #10 to #14 AWG

– The mating surfaces of the three sizes are identical so connectors using any of the three contact sizes will mate together, but the current will be limited by the smallest rated contact. The lower current connectors are ideal for accessories and lower power radios.

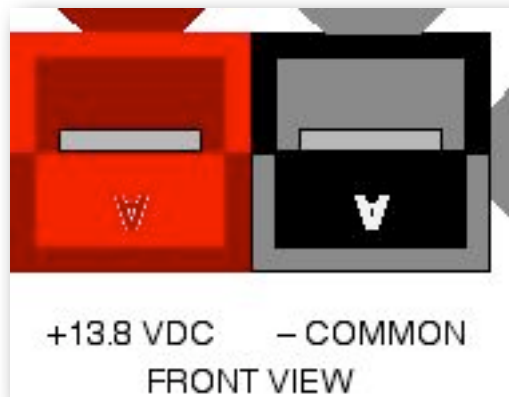


Fig 2 – A Front View of Anderson Connectors with RED 12V connector on left, when the front lip (contact-protector) is at the bottom of housing.

Low cost – Powerpole® connectors are inexpensive, especially when bought in bulk.

Connectors can be purchased in sets (a red and a black housing, two contacts and a roll pin – used to hold the housing pairs together) or the individual pieces can be bought in bulk. The housings are available in eleven different colors. Numerous other accessories are also available; we'll mention some later in the article.

Installation:

To make a standard connector slide a red and black housing together as shown in the

figures. Next strip insulation off of each lead of wire for 5/16 inch. Choose the correct contact for the wire size of the power cable and slide it over the wire. The contact can be either crimped or soldered to the wire. The 45 amp contacts are open-barrel type and need to be crimped; if you don't have the proper crimping tool, a pair of needle-nose pliers may be used and then the crimped part can be soldered for added security.

The contacts can then be slid into the housing with the convex side of the contact up (as viewed in figures 1 and 2.) Either an Anderson insertion tool or a small screwdriver can be used to help push the contact home. The positive lead should go into the red housing.

If you need to remove a contact the same Anderson insertion tool can be used, or you can use a small (jeweler's) screwdriver. Insert it in between the contact and the housing spring, depressing the spring, and remove the contact by pulling gently on the wire.

Soldering vs. Crimping:

Crimping is a very good way to make connections. That's why it's used on missiles and airplanes subject to high vibration; that's also why it is the method recommended by Anderson. The common 15 and 30 amp contacts have a barrel section that the wire slides in. If you don't have a crimping tool you can carefully flow solder into the hole once the wire is installed. The 45 amp contact is open barrel and has wings that must be crimped or bent over the wire. If you use a pair of pliers to accomplish this, a little solder can be flowed between the wire and contact to add strength. If you do solder the contact, be sure not to get any solder on the outside of the contact; it will have to be removed before the contact will fit into the housing. If you get solder on the contact surface you are

in for a problem down the road unless you replace the contact now.

Tools:

Good crimping tools are expensive; ones used in aircraft production are regularly calibrated to assure they are exerting the correct force. Good crimping tools are full cycle; once the crimp is started the tool cannot be opened until the correct amount of force has been applied and the crimp complete. If you are a serious hobbyist or professional you might consider buying a good crimping tool.

One moderately priced full cycle crimping tool I'd recommend is the Sargent 2100 series crimper. You can buy the tool as a bare frame alone or with a die installed. Dies are easily changeable and available for many different connectors including the 15 and 30 amp Powerpole®, most crimp type coax connectors, modular phone plugs, D-connector pins and sockets, etc. The Powerpole® die is part # 2100-82. This tool will set you back about \$60 for the frame and \$25 to \$60 for each die set.

Part No.	Description	Std.	Part No.	Description	Std.
	<u>(Housing and Contact Sets)</u>			<u>(Accessories)</u>	
1395	Red Housing with 15 amp contact	*	110G21	"Blok Lock" Retainer (2-pole)	
1395G1	Black Housing with 15 amp contact	*	1399G9	Mounting Wing (Red)	
1330	Red Housing with 30 amp contact	*	1399G8	Mounting Wing (Blue)	
1330G4	Black Housing with 30 amp contact	*	1399G6	Red Short Spacer	
1345	Red Housing with 45 amp contact		1399G1	Red Short Spacer (with end Hole)	
1345G6	Black Housing with 45 amp contact		1399G2	Red Long Spacer	
	<u>(Discrete Parts)</u>		1462G1	2 & 4 Pole Mounting Clamp Set	
1327	Red Housing (15, 30, 45 Amp)	*	1442G1	Splash Boot (Male)	
1327G6	Black Housing (15, 30, 45 Amp)	*	1441G1	Splash Boot (Female)	
1327G5	Green Housing (15, 30, 45 Amp)			<u>(Tools)</u>	
1327G7	White Housing (15, 30, 45 Amp)		111038G2	Insertion/Extraction Tool	
1332	15 amp (closed-barrel contact)	*	1309G2	Hand Crimp Tool (1331 contact)	
1331	30 amp (closed-barrel contact)	*	1309G2	Hand Crimp Tool (1332 contact)	
261G2-LPBK	45 amp (open-barrel contact)	*	1309G3	Hand Crimp tool (261G2 Contact)	
110G16	Retaining (roll) Pin (1 block high)	*			
110G17	Retaining (roll) Pin (2 blocks high)				

** This part is used in the Standard.*

Table 1 – Anderson Power-Pole Part Numbers

PowerWerk (<http://www.powerwerk.com>) sells an low-cost crimp tool for the Powerpole® for about \$10.00 that should suffice for ham applications.

Unfortunately, none of the tools mentioned above work with the 45 amp contacts. (Sargent may have come out with a die after my catalog was printed.) Anderson does sell a 45-amp crimper but it is expensive.

Anderson also sells an insertion/extraction tool for about \$10. It eases assembly and re-

pair and is worthwhile having if you plan to use a lot of these connectors. A set of tools including a crimping tool and insertion/extraction tool could be shared among a group of club members.

Accessories:

Anderson sells a line of Powerpole® accessories. Housings are available not only in Red and Black, but also in nine other colors: Green, White, Blue, Yellow, Orange, Gray, Brown Purple and (for the YLs) Pink! Red should be used for 12-volt systems. Red and

Blue mounting wings are available for mounting the connectors to a flat surface. A 'Blok Lok' is also available that locks a set of connectors together in rough environments; it replaces the roll pins. Long and short spacers are available for special keying of connector blocks when needed. Powerpole® connectors may be panel mounted using a mounting clamp accessory. Clamps are available for connectors of 2 to 8 poles. Part numbers for parts and accessories are shown in table one

In Closing:

After you modify all your radio power cables to use the new standard, modify your 12 volt accessories too. Scanners, 12V lamps and anything else that runs on 12 volts that might be handy in a time-of-emergency should be standardized. If your 12V power cord has a fuse, be sure it remains in the cable for safety sake. Also, remember that though Anderson Powerpole® connectors have a high current rating, they are not meant to be connected or disconnected "HOT". Turn off your device before plugging it into a 12 V power source.

Next month we'll continue on our RF journey. See you then.

73, from AF6C



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