

Technical Standard

DC Power Connector

1. Introduction

This Technical Standard identifies a standard, 12-volt, direct current (DC) connector to be used on equipment employed to support emergency communications provided by Tippecanoe County ARES. This allows various radio equipment, accessories, and DC power sources to be quickly and safely interchanged between ARES personnel.

The connector is the Anderson Powerpole. It is genderless and provides the greatest flexibility for powering DC equipment. The Anderson Powerpole connector has become the standard for ARES and RACES groups across the country. The contacts are self-cleaning and are available in 15, 30 and 45 ampere current capacities. Moreover, the connectors are inexpensive, costing \$1.00 or less per connector depending on the quantity purchased.

2. Responsibilities

All personnel are encouraged to equip their deployable 12-volt DC-powered equipment with the standard connector. All 12V-powered equipment donated to or purchased by Tippecanoe County ARES shall be equipped with the standard connector.

3. Related Publications

(None.)

4. Definition of Terms

ARES	Amateur Radio Emergency Service (ARES® and Amateur Radio Emergency Service® are registered service marks of the American Radio Relay League.)
DC	Direct Current

5. Standard

5.1. Connector Specification

The connector to be employed for 12-volt DC power connections for equipment employed within Tippecanoe County ARES is the Anderson Powerpole. The shells for the 15 A, 30 A and 45 A connectors are the same, while the contacts are designed for different wire sizes and maximum current capacities.

5.2. General Instructions

Verify the current capacity of the connector matches the equipment to which the connector is being attached and is fused properly.

If the connector is for a power supply and the power supply current rating is higher than that of the connector, multiple connectors should be used and each connector fused at the connector's current rating.

5.3. Connector Assembly

Care must be exercised to assemble the connector as specified to ensure interoperability within the ARES organization.



The housings should be mated according to the picture at left, viewing from the contact side (opposite the wire side), tongue down, hood up, RED on the LEFT, and BLACK on the RIGHT.

A **roll pin**, sometimes included with Powerpole assemblies to keep the housings from sliding apart, **should be discarded and NOT used**. This roll pin can easily become dislodged and fall into electronic circuitry, potentially causing an electrical short.

If your application is critical and you want to make the pairing of the housings permanent, you can use cyanocrylic glue (Crazy Glue) to hold the connector bodies together.

The 15A and 30A connector contacts can be crimped or soldered. The 45A contact is a crimp-type only contact. If crimping, ensure that the barrel of the contact is not deformed such that the contact will not insert into the insulating shell.

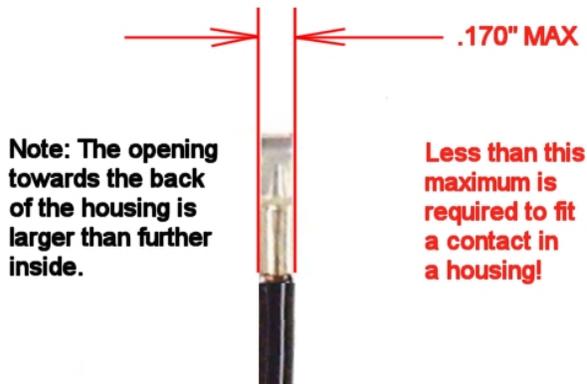
Put the connector housings together before putting the connector pins in, especially when using heavy gauge wire.

Before soldering or crimping the contacts onto heavy paired wire, orient the contacts so that they are both facing the correct direction. This will allow them to be inserted into the housings without twisting the wire.

The plastic housings are held together with dovetail joints. Always slide these joints together! They will be damaged if you try to snap them together or apart. They **ONLY** slide together in one direction. This should be obvious by looking at them carefully.

The contacts go in the housings only one way. Insert the contacts with their sharp edge down against the flat spring that is in the housing. They should slide in and click. If you do not hear a click, or they are not fully seated, fix them. When they are inserted fully you should notice that the contact and its wire "floats" slightly inside its housing. When looking in from the front of the

housing the contact tip should slide over the top of the internal housing spring. This is the clicking sound that you hear.



Be careful when crimping. You may make the contact out of round and it will not slide into the contact easily. This may occur with different types of crimpers and various gauges of wire.

To fix this situation you may have to rotate the contact 90 degrees from the original crimping orientation and re-crimp either with the original crimper or a pair of pliers. In any case you need to make the barrel of the contact round again so it can slide in the housing.

YOU WILL NOT BE ABLE TO INSERT THE CONTACTS INTO THE HOUSINGS IF THEY ARE TOO WIDE AFTER SOLDERING OR CRIMPING!

Cutaway view of a Powerpole connector:

Note that the contact must fit through the gap between the housing and the spring, and that the contact is snapped over the end of the spring.



Correct assembly:

The contacts are in proper alignment and ready to push into the housings. Listen for a click on each one to make sure they are fully inserted.



Tug slightly on the assembled connector to make sure the contacts are locked in place. If you have trouble getting the contact to lock into the housing you may have squashed the contact wider and deformed it. Also look at the side profile of the contacts before and after crimping. You may have to bend it back straight before inserting it in to the housing.

When soldering the contact pins, be careful not to use too much solder. Keep the solder inside, where the wire goes. If a blob of solder gets on the outside of the connector body you may have trouble putting the contact into the housing. If you get solder on the contact surface area it will not make good contact.

When crimping the contact pins, use a crimper tool that contains the wire completely inside the pin and doesn't spread the connector apart. A good crimp is one where the dimensions of the crimped portion are no more than an un-crimped pin. If the crimp is flattened out you will not be able to easily push the pin in to the body. If you bend the contact blade in relation to the crimp area you should straighten it before putting it in to the body.

It is possible to use larger or smaller gauge wire with the 30 and 45 amp connectors. The 30 amp contacts will work with difficulty with #10 wire if you cut the end cleanly and carefully put each and every strand of that wire in to the pin. It may be easier to use 45 amp connectors on #10 wire. Using 16 gauge or smaller wire in a 30 amp contact requires that you double or triple up the wire to fill the crimp receptacle of the contact to get a good crimp.

A properly crimped contact should have a minimum hold on the wire of more than 25 pounds. A pair of connectors should snap together with 6 to 8 pounds force.

Last but not least, MAKE SURE you have the polarity correct before plugging in your equipment.

5.4. Application

The Anderson Powerpole assembly has been adopted as the standard 12V DC connector by many ARES organizations, allowing interoperability between different groups. However, prior to interfacing with equipment from other organizations, verify that the configuration is the same.

Individuals have constructed special cable configurations for inserting into various circuits. The following applications are examples that have been used by others:

- Fused link with automotive blade-type fuse holder or 3AG-type fuse.
- Length of cable with a ferrite core for noise suppression.
- A fused link with a zener diode on the output side to blow the fuse if the voltage exceeds the zener voltage.

In addition, West Mountain Radio provides the RIGrunner, a commercial series of power distribution units, that provide fusing and Powerpole connectors for each circuit. Several of these units also include voltage-monitoring capabilities.

5.5. References

- Powerwerx, distributor of Anderson Powerpole connectors and associated tools (crimpers) and components: <http://www.powerwerx.com>
- West Mountain Radio, manufacturer of RIGrunner power distribution modules using the Anderson Powerpole connectors: <http://www.westmountainradio.com>

6. Release Information

The Assistant Emergency Coordinator for Operations is the author and maintainer of this document.

The date of publication for this document is 25 JUN 2008, and is the initial release.