
	<p>EMERGENCY MEASURES RADIO GROUP</p>
	<p>OTTAWA ARES</p>

Two Names - One Group - One Purpose

Revision Summary

2009-11-17 v1.0

Create drawings and notes

Purpose Of This Document

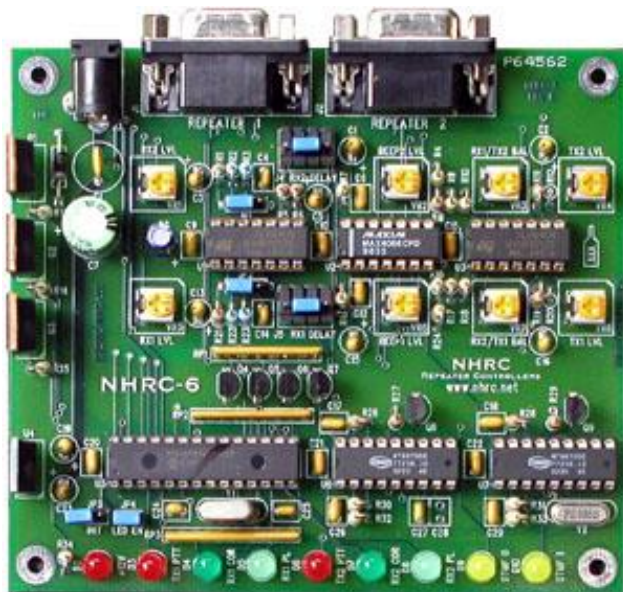
This document describes how to install and configure the NHRC-6 repeater controller for EMRG use, which includes using the Powerpole DC connector and the Standard Radio Interface (SRI).

		<p>EMRG-619</p>	<p>NHRC-6 Repeater Controller</p>	
<p>Drawing Title: Front Page</p>		<p>Name: Peter Gamble</p>		<p>Version: 1.0</p>
<p>Emergency Measures Radio Group</p>	<p>Ottawa ARES</p>	<p>Classification: Public</p>	<p>Date: 2009-11-17</p>	<p>Page: 1</p>

EMRG purchased several NHRC repeater controllers to build cross band repeaters installed in key buildings. The repeaters will provide portable radio coverage within the building.

The NHRC-6 Bridging Repeater Controller was selected because it supports bi-directional repeater capability.

- The controllers come fully assembled, with 2 DE9 F connectors for radio connections and a coaxial DC power connector.
- EMRG purchased Hammond 1590Q cases for the controller boards because the case is durable and just big enough to hold the circuit board, so the controller and two radios will fit in 2U rack space (3.5 in).



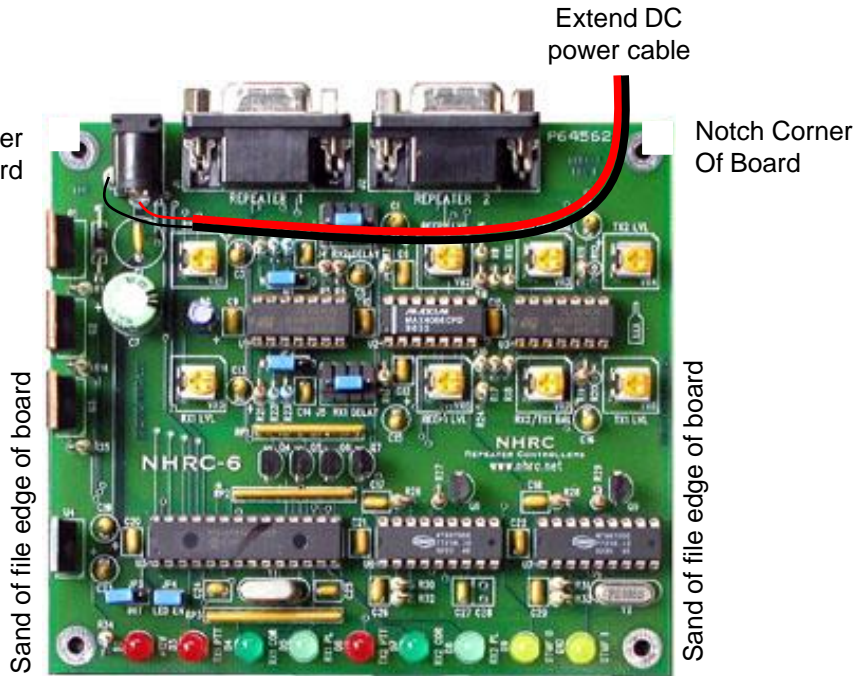
NHRC Repeater Controllers
 NHRC-6 Bridging Repeater Controller
<http://www.nhrc.net/nhrc-6/>

		EMRG-619		NHRC-6 Repeater Controller	
Drawing Title: Introduction of NHRC-6 Repeater Controller		Name: Peter Gamble			Version: 1.0
Emergency Measures Radio Group		Ottawa ARES		Classification: Public	Date: 2009-11-17
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Installing the NHRC-6 repeater controller in the Hammond 1590Q enclosure.

- The NHRC-6 circuit boards are fully assembled from the factory, so EMRG will minimize the modification of the boards.
- The DE9 connectors will be used with adapter cables to the EMRG DA15 Standard Radio Interface (SRI). For information on the SRI, see document EMRG-210 Standard Radio Interface.
- The DE9 connectors can have individual rectangular holes cut in the side of the case, or a single larger rectangular hole that fits both connectors. The small gap between the connectors is not critical.
- The LEDs provide no useful purpose unless there is a problem, so they are not being made visible outside the box. If required, the cover can be removed to view the LEDs.
- A DC power cable is being wired directly to the coaxial power connector pins on the top of the board, so there is no risk of the power cable coming unplugged. No hole is required in the box for the coaxial connector, but a hole is required for the DC power cable.
- The circuit board is wider from the transistors to the opposite side, than it is from the LEDs to the connectors. There is a slight slope to the sides of the box, so the wide ends of the circuit board bind in the last 1/8 in of the box. This requires a slight sanding or filing of each end of the board to make it fit freely in the box.
- The box has round posts in each corner for the cover screws. The circuit board requires the full width of the box in order to have the DE9 connectors protrude out the side of the box. To do this, the round mounting holes on the connector end of the circuit board must be notched out so the board can fit flush with the box.
 - With the corners cut, the only mounting support comes from the rear mounting holes and the transistors. A piece of double sided foam tape could be installed under the DE9 connectors to add additional support if required.

		EMRG-619		NHRC-6 Repeater Controller	
Drawing Title: EMRG Requirements & Objectives For Installation of NHRC-6		Name: Peter Gamble			Version: 1.0
Emergency Measures Radio Group		Ottawa ARES	Classification: Public	Date: 2009-11-17	Page: 3

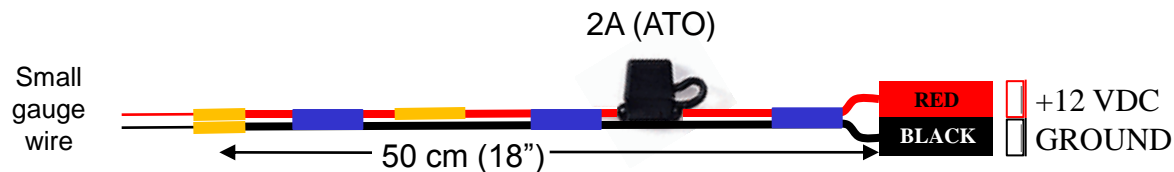


NHRC Repeater Controllers
 NHRC-6 Bridging Repeater Controller
<http://www.nhrc.net/nhrc-6/>

Hammond Manufacturing
 1590Q Solid aluminum enclosure
<http://www.hammondmfg.com/pdf/1590Q.pdf>



Drawing Title: Circuit Board Changes and Hammond Box		EMRG-619		NHRC-6 Repeater Controller	
Emergency Measures Radio Group		Ottawa ARES		Name: Peter Gamble	
		Classification: Public		Version: 1.0	
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**See the next page
for step by step
drawings**

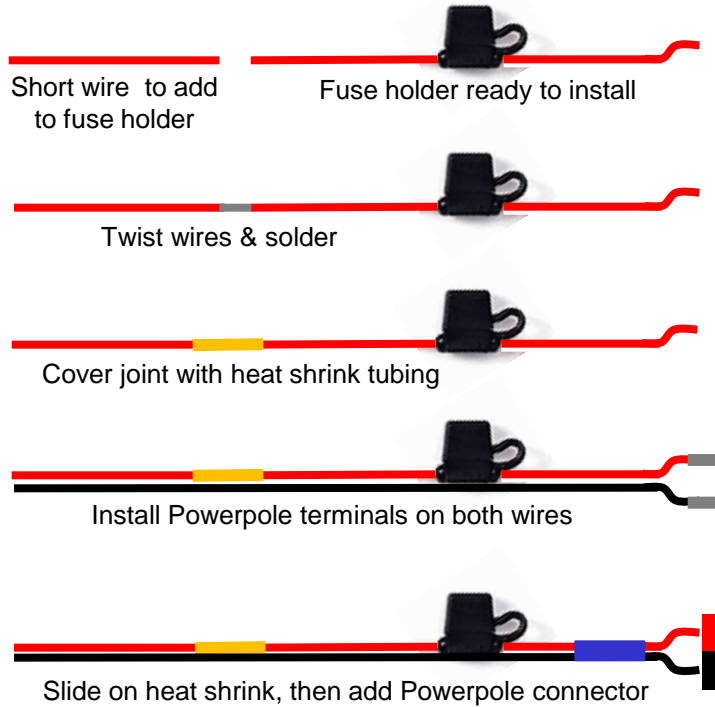
NOTES:

- The wire on the fuse holder and the wire used for the ground, should be 18 to 14 gauge, multi strand flexible cable. The large size is required to provide physical strength, not current carrying capacity.
- Some ATO inline fuse holders are made with the wire in a loop. Cut the cable in the middle of the loop.
- Some inline fuse holders use black wire, so add red tape or a short length of red heat shrink tubing on the fuse holder wires to indicate that this is the positive wire.
- Extend the fuse wire to the required 50 cm by adding a short length of wire. Twist and solder the wires together and cover the joint with heat shrink tubing (yellow in the drawing).
- Install the crimp terminals for the Powerpole connector on positive and ground wires. Slide a short length of heat shrink tubing over the two wires and attach the Powerpole connector. The heat shrink tubing (blue in the drawing) helps to hold the two wires together, making a neater cable. You need to add the heat shrink tubing before you add the Powerpole connector.
- Add two more short sections of heat shrink tubing (blue in the drawings), large enough to fit over the Red and Black wires. These help hold the two wires together making a neater cable.
- Install the power cable into the box for the controller, once the controller board is installed.
- Add short sections of small gauge wire (i.e. 24 g) to the larger power cables inside the box. Twist the wires and solder the connections, then cover each wire with heat shrink tubing. The smaller gauge wire is easier to attach to the coaxial connector and puts less strain on the solder joints.

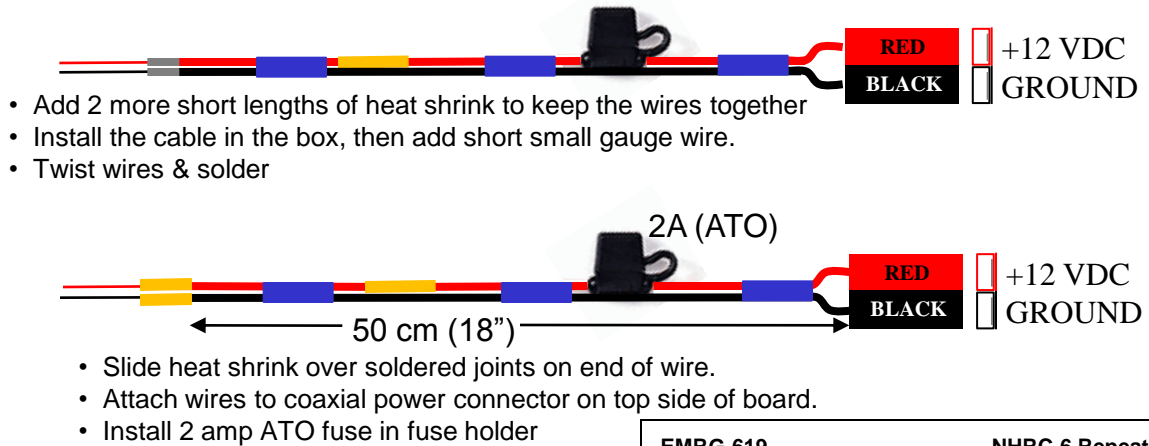
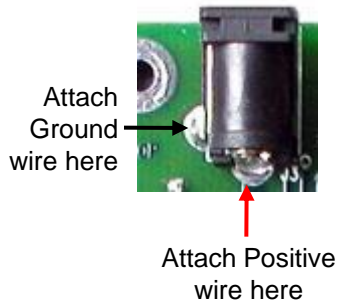
		EMRG-619		NHRC-6 Repeater Controller	
Drawing Title: DC Power Wiring		Name: Peter Gamble			Version: 1.0
Emergency Measures Radio Group		Ottawa ARES		Classification: Public	Date: 2009-11-17
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- Example of ATO inline fuse holder from Powerwerx.com
- The wire comes as a loop, so typically cut it in the middle.



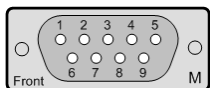
Coaxial Power Connector



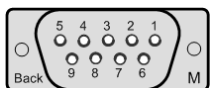
Drawing Title: Step by step wiring diagrams for DC power cable		EMRG-619		NHRC-6 Repeater Controller	
Emergency Measures Radio Group		Ottawa ARES		Name: Peter Gamble	
		Classification: Public		Version: 1.0	
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DE9 M Controller Ports (Wire Colour) DA15MSRI Connector

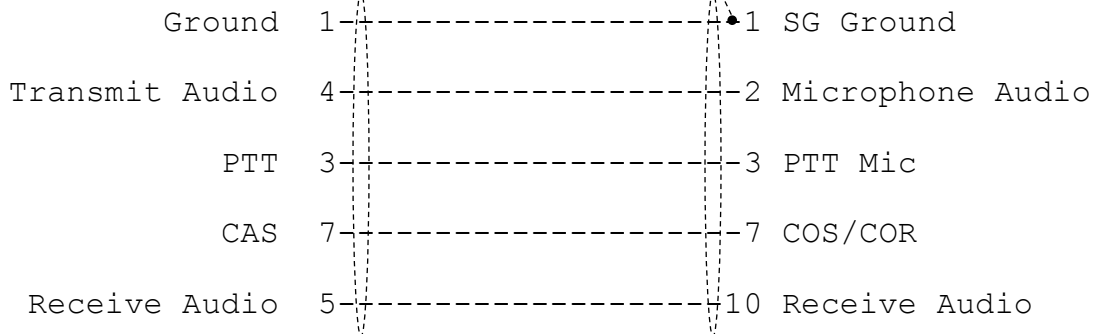
DE9 Male Plug



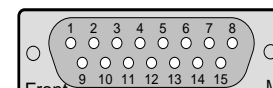
Front View



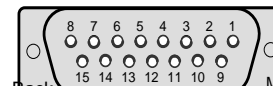
Back View
(Solder Cups)



SRI DA15M



Front View



Back View
(Solder Cups)

Attach cable ground wire at DA15 end only

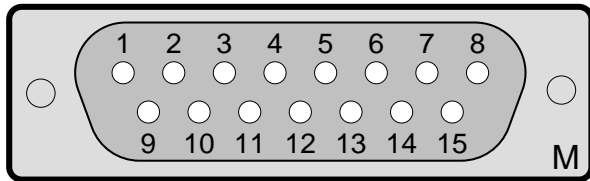
See the next page for details on installing DA15 shell

NOTES:

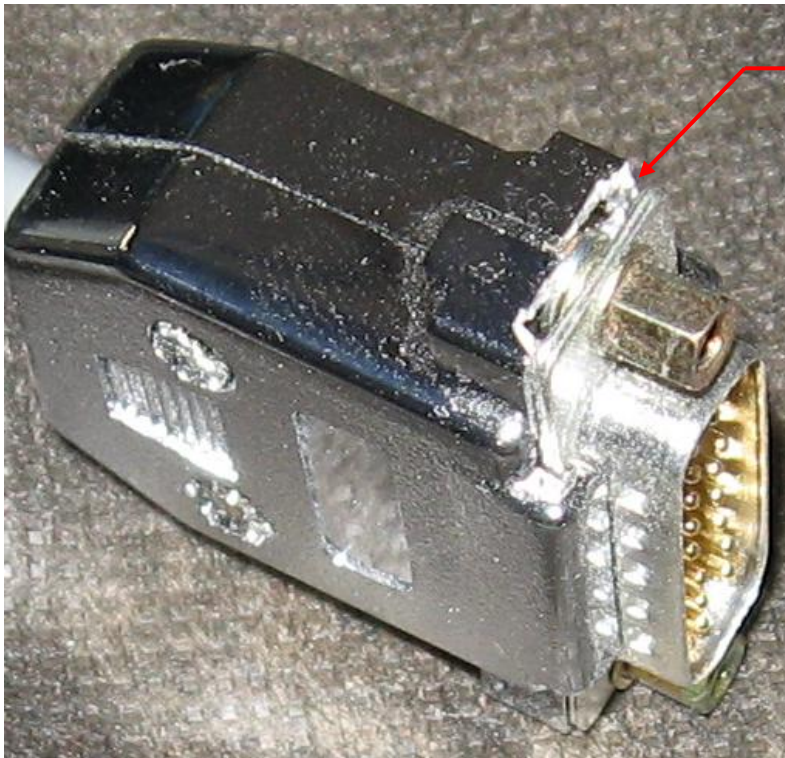
- 1) Since the main purpose of these controllers is in a cross band repeater configuration, it is assumed that all CTCSS encoding and decoding, as well as all pre-emphasis and de-emphasis is done in the radio.
 - TX audio output of the controller will go to the microphone input on the SRI connector
 - RX audio input of the controller will wire to the Receive Audio on the SRI connector
 - Receive Audio is a constant level signal, not the speaker output of the radio.
- 2) The controller is wired with the SRI so that it can plug into any radio, without requiring a custom cable. The audio levels will still probably need to be adjusted in the controller, if the radio is changed. (May not be a problem is same model of radio is used)
- 3) The controller does not use SRI power. There is a dedicated DC power connection.
- 4) Fan Control, controller Port 1, pin 9, is not used. The cross band repeaters are built to operate without the need for fans, by keeping power levels low and by using separate radios, so each radio has its own heatsink.
- 5) The drain wire in the cable used to make the adapter cable, should be connected to pin 1 of the SRI DA15 connector. Do not attach the drain wire at the DE9 connector end.
- 6) EMRG will use Belden 9536 cable (6 wire).

Drawing Title: SRI Adapter Cables From NHRC-6 Repeater Controller		EMRG-619		NHRC-6 Repeater Controller	
		Name: Peter Gamble		Version: 1.0	
Emergency Measures Radio Group		Ottawa ARES		Classification: Public	Date: 2009-11-17
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DA15 Male



Equipment such as Repeater Controllers, TNCs, Remote Interfaces, are wired with a DA15 Male connector. The Male connector is installed with internally threaded locking hardware, sometimes called a Jack Screw.



The plastic housing for the DA15 shell may need to have a bit nibbled away, so the shell will fit over the nut portion.



Install jack screws on the Male Plug, or use long nuts on the screw hardware, so the SRI plug from the radio can be secured to the TNC plug.



EMRG-619

NHRC-6 Repeater Controller

Drawing Title: DA15 Shell Installation Notes

Name: Peter Gamble

Version: 1.0

Classification: Public

Date: 2009-11-17

This section to be completed when ERMG determines the standard settings that will be used.

		EMRG-619		NHRC-6 Repeater Controller		
Drawing Title: EMRG Configuration Settings		Name: Peter Gamble			Version: 1.0	
Emergency Measures Radio Group		Ottawa ARES		Classification: Public	Date: 2009-11-17	Page: 9