

Relay Systems Ameritron AL82, AL1200, AL1500

Feb 1, 2024 CTR W8JI rev1

The AL12 series initially used one of three different types of open-frame relays. All are similar and interchangeable. All early relays, before 2008, are 3-pole double throw 12Vdc open-frame and about 100mA.

Later relays were a circuit board, which unfortunately normally left the factory with very poor wiring between the connectors and the board. This can contribute to unwanted ground loops and reduced efficiency on upper bands.

CTR Engineering has two relay systems, a small board using cube-style relays available in 12Vdc or 24Vdc, and a direct OEM-style drop-in using original-type relays. We do not sell nor recommend the MFJ dual relay system. Although it works perfectly if the wiring is cleaned up, it is an earlier and more complicated design of mine.

Open Frame Relays

CTR Engineering has a direct bolt-in OEM-type relay. Like all of the variations over the years, the outer two contacts have high-flexibility flying leads and solder directly to the antenna and radio connectors. The coil is the same as all OEM relays, 12Vdc at 100mA. This is safe for virtually all radios without a relay buffer. The coil connections are on the coil itself in all relays used by Ameritron. The upper terminal is positive. The lower terminal goes to the relay jack with a short wire.

The center relay contact is the variation between relays. Initially, the center contact was a standard double throw. Receive is better maintained by removing the unused normally closed pole. Removal of the unused normally-closed pole contact, or carefully bending it upward out of the way, increases spring pressure. This improves wiping of the RF carrying poles and provides better weak signal receiving reliability. This relay has a ~12mS T/R switch time.

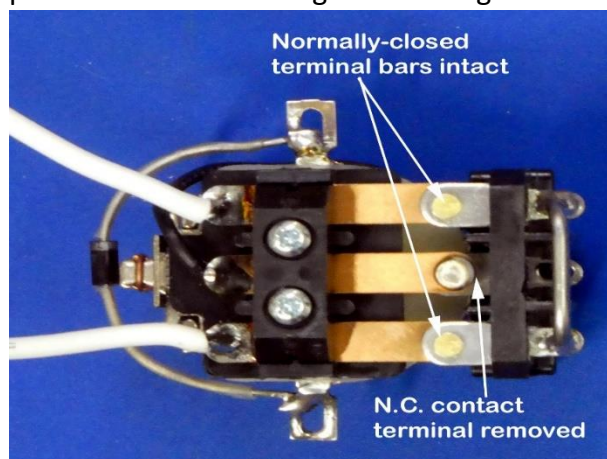


Figure 1 open frame style 1

Connections

Ameritron/MFJ unfortunately changes wire color from time to time. These are the most common wire colors, and the colors used and shown on early amplifier schematics. The wiring function label is correct.

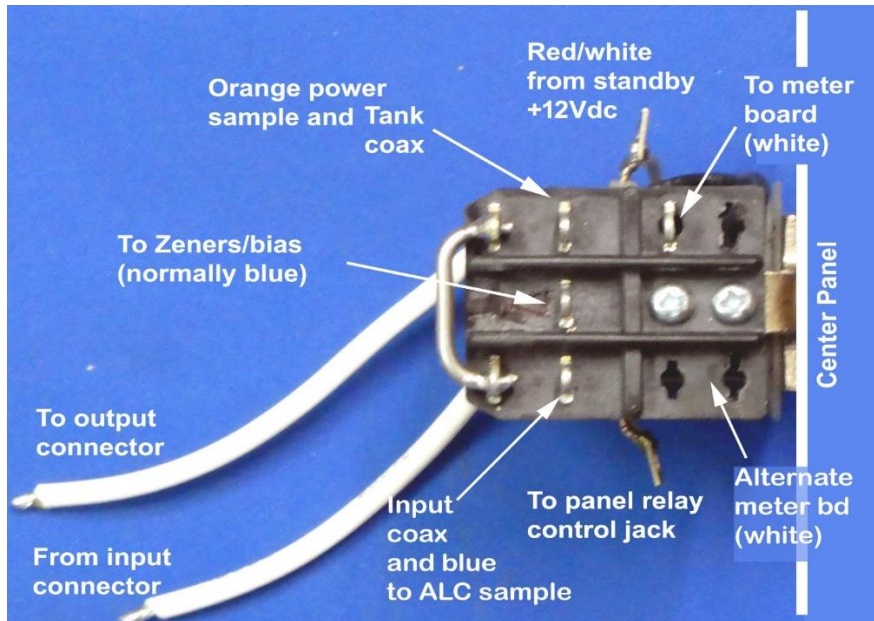


Figure 2 wire connections open frame factory relays

Ameritron Original Examples

Example one below, although there are several variations. The wiring is not so neat:

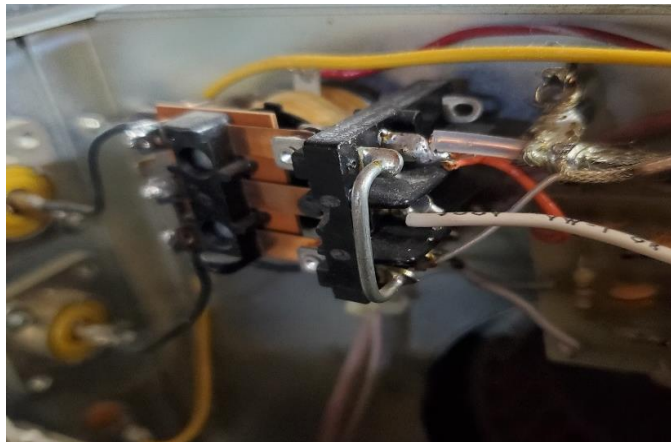


Figure 3

Example 2 shown below:

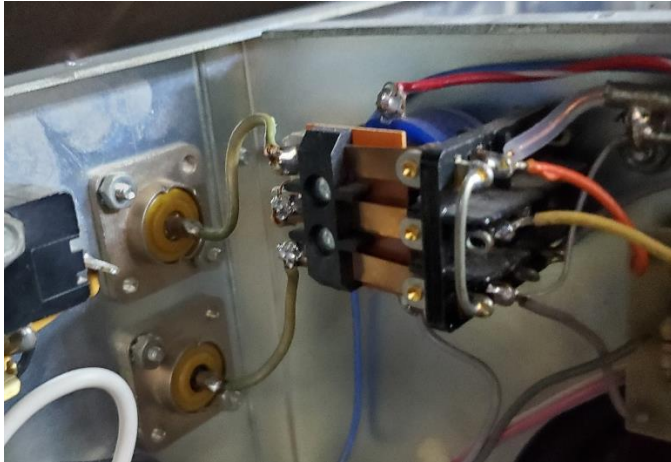


Figure 4

Example 3 below is a 1983 model, but over the years has a yellow replacement wire for the Zener lead:

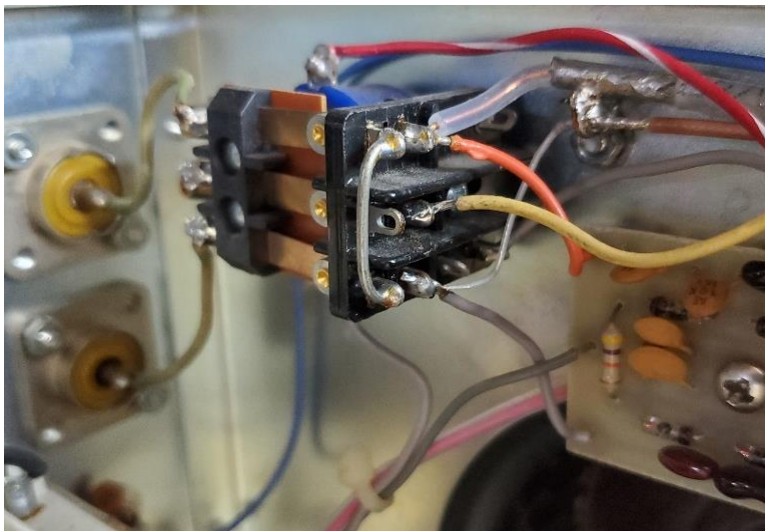


Figure 5

Post-2008 Ameritron Cube Relay System

The relays below are the more recent relay system. I designed this system when open frame

relays went obsolete. Unfortunately, MFJ never updated the mainframe schematics.

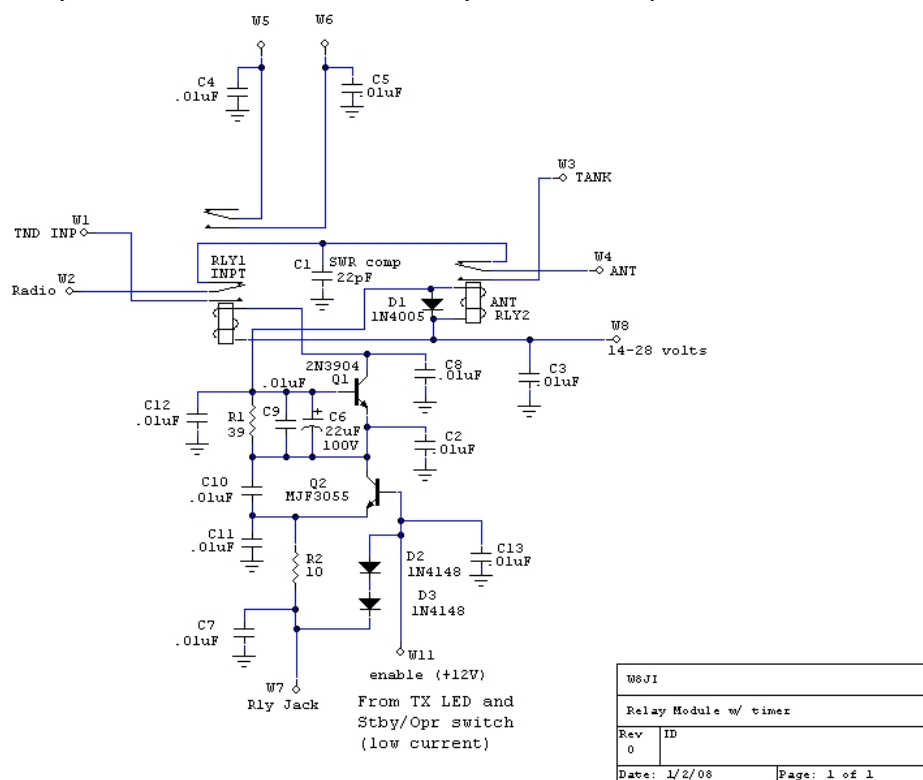


Figure 6 Cube Relay Board AL12 (relays should both be approved types DPDT 8 amp contact)

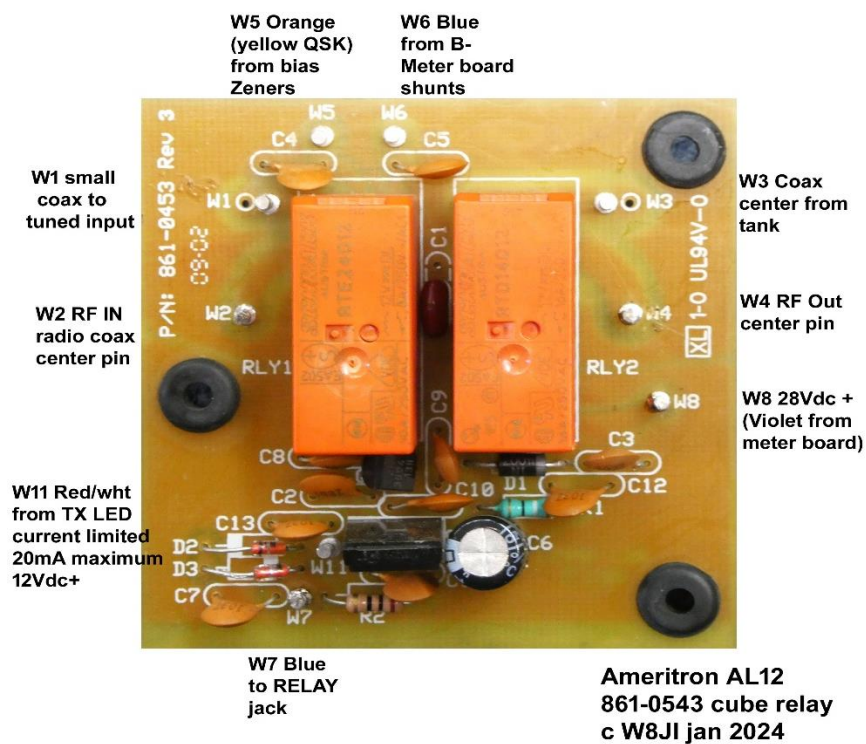


Figure 7 cube relay board W8J1 Prototype W5 and W6 are interchangeable

Ameritron 861-0543
cube relay bd
c W8JI Jan 2024

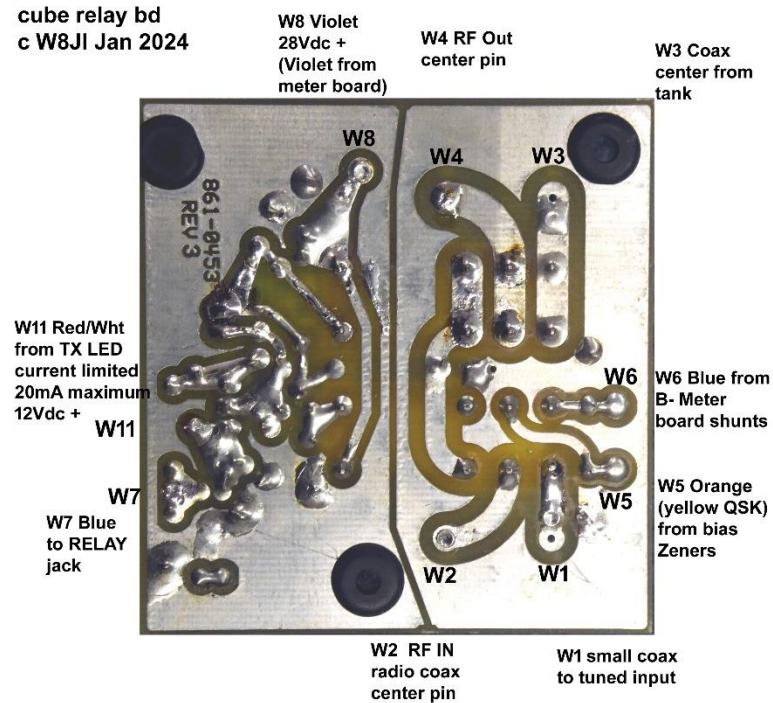


Figure 8 W6 and W5 are interchangeable

This is a properly cabled MFJ/Ameritron dual cube relay board. Note the coax shield to back panel is grounded at both ends on both cables:

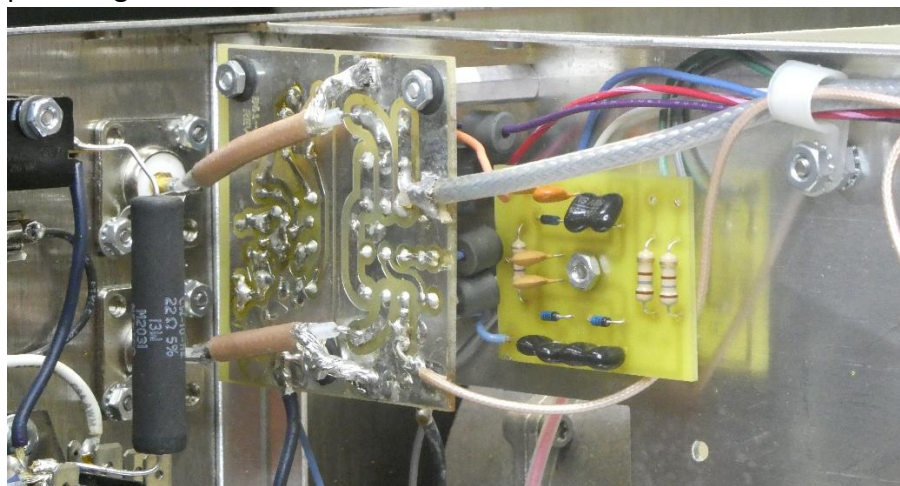


Figure 9

This is the worst case timing of the cube relay I designed for MFJ:

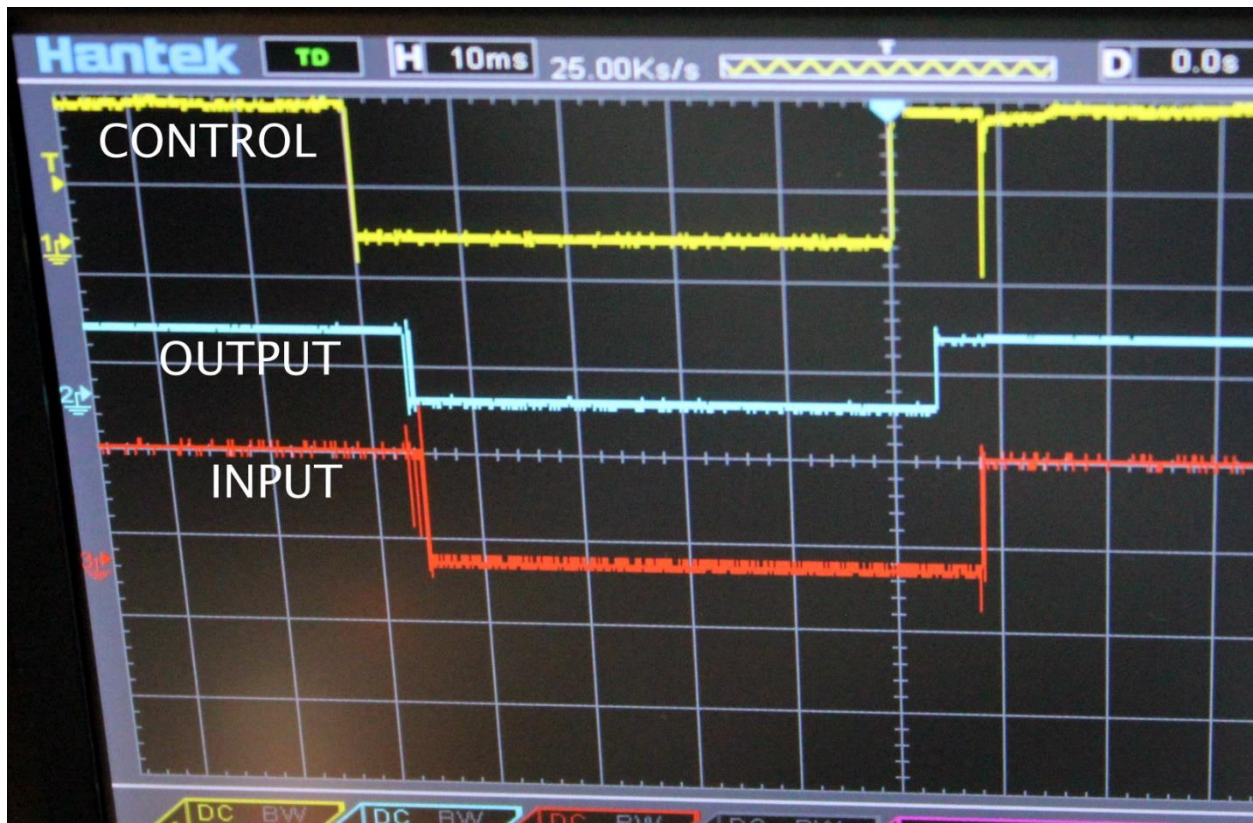


Figure 10 2008 AL12 worst case timing

CTR Replacement Board (available 2023)

I offer a simple smaller more reliable circuit to replace my more complex early cube relay designs. This new board uses the absolute minimum possible number of components to obtain

perfect reliable sequencing. There is no other method that can do this.

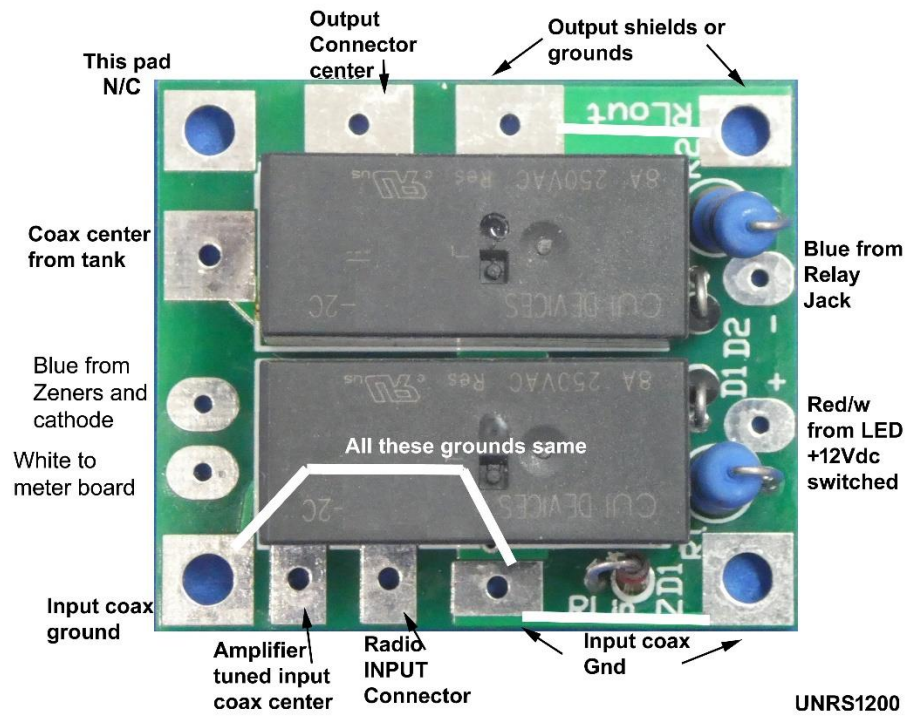


Figure 11

This is the worst-case measured timing of the new simpler circuit CTR board:

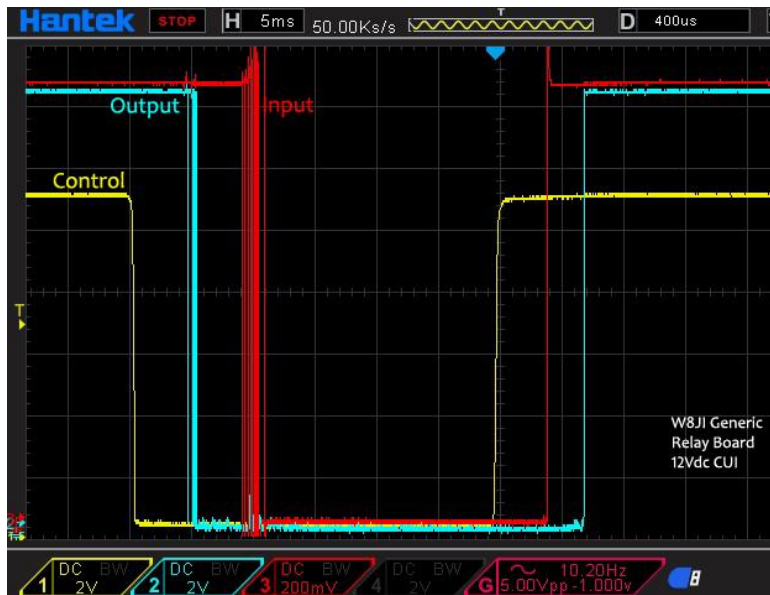


Figure 12 CTR relay 9mS **worst case** timing and no input overlap

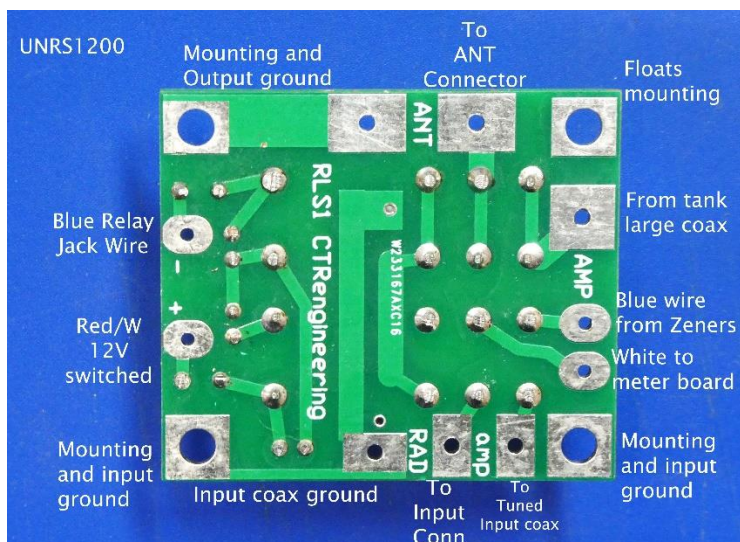


Figure 13

For details on this new system see: "Our Kits and Products" at <https://www.ctrengineeringinc.com/download-files-page/>

and look for [AL1200 AL82 AL1500 Antenna Relay T/R Relay instructions](#)

<https://www.ctrengineeringinc.com/shared-files/893/UNRS.pdf>