UNRS-AL12 12Vdc for AL1200/AL82/AL1500 Installation rev1 w8ji C2024

Parts included:

5” small coax before prep	16AWG output lead
UNRS-12 relay assembly	Mounting Tape
Lug and ground lead	#6-32 screw and nut

This fully-sequenced relay system replaces the pre-2008 standard AL12x amplifier series open frame T/R relays, as well as the post-2008 cube relay system. This board draws 100mA @ 15Vdc nominal. This device is polarity-sensitive. Do not reverse the + and – coil leads.

The measured timing at 13Vdc is:

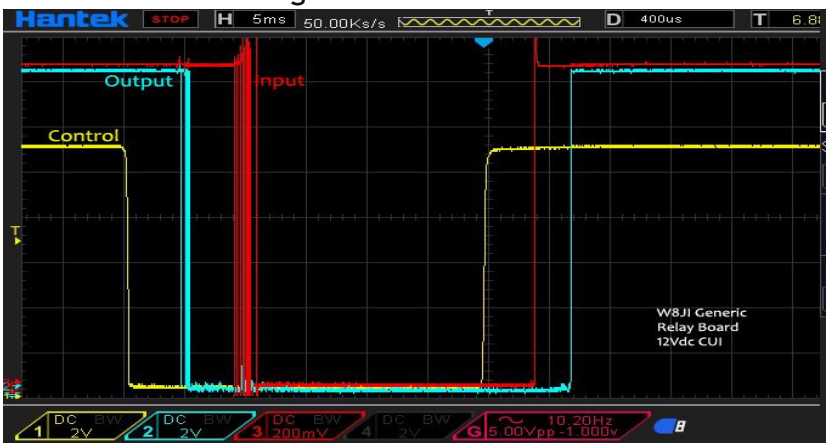

Figure 1 Timing (Worst case)

The output contacts close worst-case in 4-5mS. The input and bias contacts follow 3-4mS later. The relay drop is also properly sequenced, with input and bias turning off before the output contact release. The test above is at a nominal 13Vdc. Speed is faster with increased source voltage and slower at reduced voltage.

This board parallels two sets of 8-ampere contacts for output. This is far more reliable than a single 16-ampere contact.

AL12 series (AL82, AL1200, AL1500) Relay History

The AL12 Ameritron series uses two different relay systems. The original single-open-frame relay system used a factory-modified open-frame 3PDT 12Vdc 100mA relay. Three suppliers were used, Deltrol, Midtex, and P&B. With open frame relays, 12Vdc (small yellow wire) from the meter board is switched by the standby-operate switch. This switched 12Vdc runs through the Operate LED and a parallel resistor with a red/white wire to the relay positive. A blue wire from the rear panel RELAY jack

grounds the negative relay coil terminal to close the relay for transmitting. Original style relay connections are shown here:

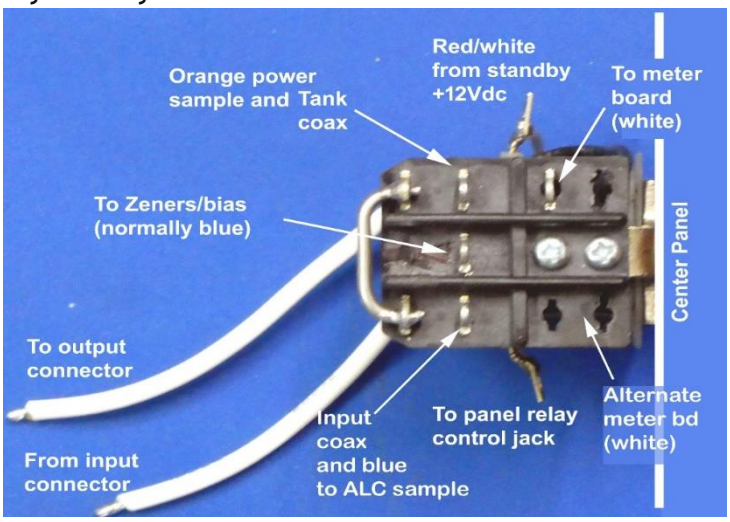

Figure 2

Our UNRS-AL12 replacement board connections are shown below:

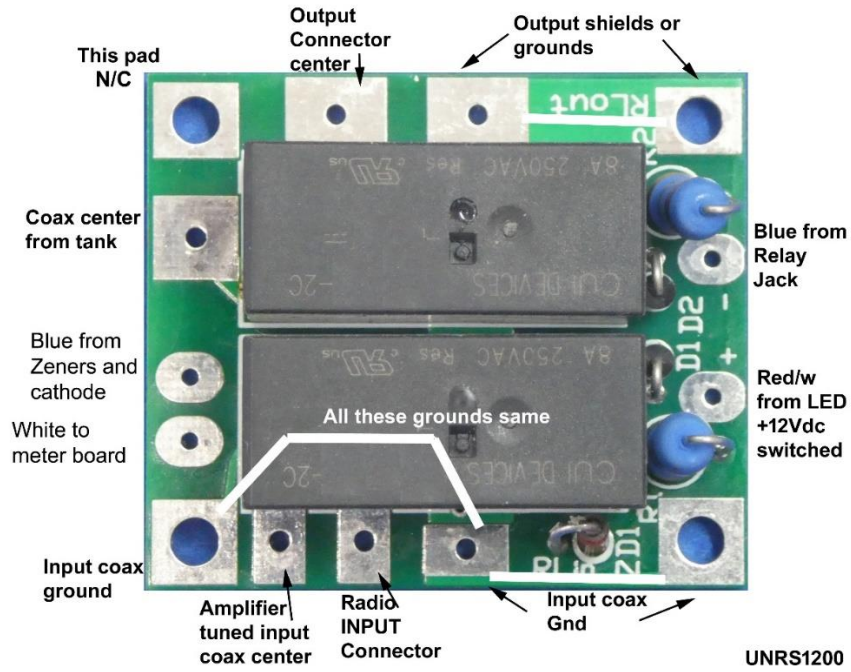

Figure 3 (relay-side view)

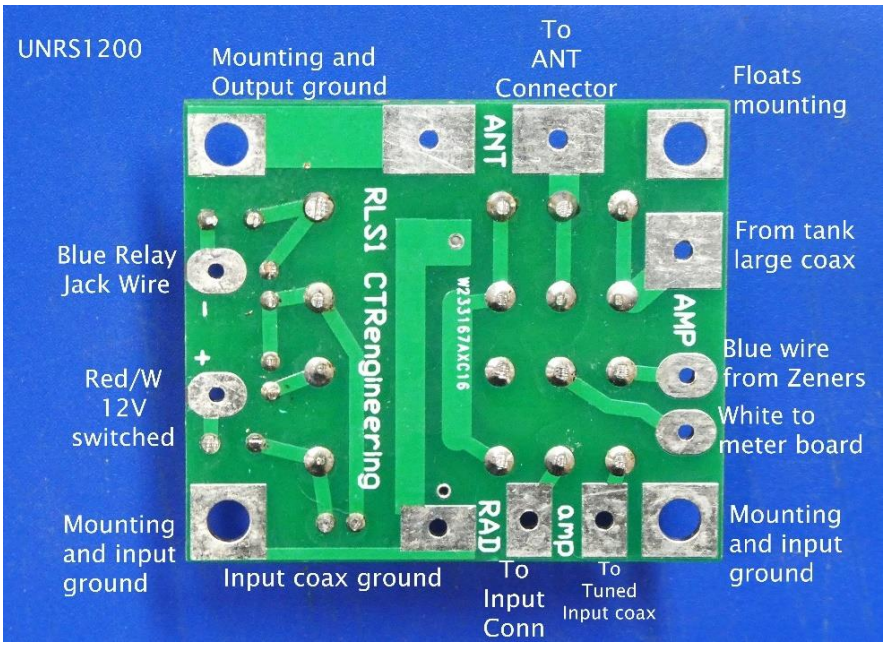

Figure 4 Bottom up connection view (normal mounting with cusioning tape on relay)

Older Open Relay Amplifiers

Other than mounting, this board is a direct swap for the 12-15mS switching time open frame relay in older amplifiers. This system cuts relay switching time nearly in half.

This lightweight board can be safely mounted with a single screw using a spacer, good 3M tape, or multiple screws and spacers. Tape will be quieter and allow better positioning than using spacers and good tape is more than adequate. Be sure that only grounds, shields, or mounting holes contact the amplifier chassis.

The smaller input coax's shield and the large coax from the tank shield must be grounded to the chassis center panel in a way that does not form common ground loops between input and output cables. If you follow the pictures later in our instructions this will be satisfied.

The original AL12-series used a double lug for both input and output shields with a center screw. This method is still okay if leads are too short to reach, but if you use the supplied input cable the input cable shield should move to the board end. In any case, trial fit the relay so leads all reach before mounting it with tape.

The board mounts as shown in later pictures. Old units are identical to replacing the newer cube relay board with two exceptions:

1.) The red/white wire connects directly to the + terminal. No buffer transistor is required

2.) Older amplifiers have a double lug that grounds the input coax shield and the output coax shield. You can either leave this alone as is and position the board so the cables reach, or change the wiring to the cube relay style.

Newer (post-2008) AL1200, AL82, and AL1500 Amplifiers

Newer AL12s (AL82, AL1200, AL1500) after ~2005 use a printed circuit board relay system. To run that system, MFJ cobbled a voltage doubler into the 1983 original bridge rectified meter board. This doubler provides around 13Vdc and 30Vdc. (I will have a replacement board set soon that adds true PEP forward and reflected power.) The newer (post-2008) cube relay board has the LED in series with a higher value resistor, 1k to 10k is fine. The LED current limited 12V from the standby switch biases the cube relay switch transistors on.

Changing relay types requires either an LED change back to the old parallel resistor style along with a safe disconnect of the violet 30Vdc wire, or a simple NPN transistor switch that can be mounted to any empty hole near the new 12Vdc board. (Do not overtighten the transistor mounting screw or bother using heatsink compound.)

LED Change Method

The factory PC board relay system supplies a direct ~30Vdc to the relay board on a violet wire. LED must be changed from a series 2.2k to 4.7k resistor to a 22- to 33-ohm shunt resistor. This is best done by dropping the front panel. The 30Vdc violet wire is not used.

NPN Transistor Method

This relay system draws approximately 100 mA. Using the 30Vdc violet wire from the metering board 30V supply, a series NPN transistor of at least 3W dissipation can be used. The running dissipation in the transistor will only be about 1.5 watts. For a nominal fee, we can supply a prepped MJF3055 plastic case transistor. This is the easier change. This transistor eliminates dropping the front panel and changing LED wiring.

The existing amplifier violet wire becomes a collector feed to the center transistor terminal. The LED red/white feeds the base. The emitter would go to the D1 + terminal using an orange wire.

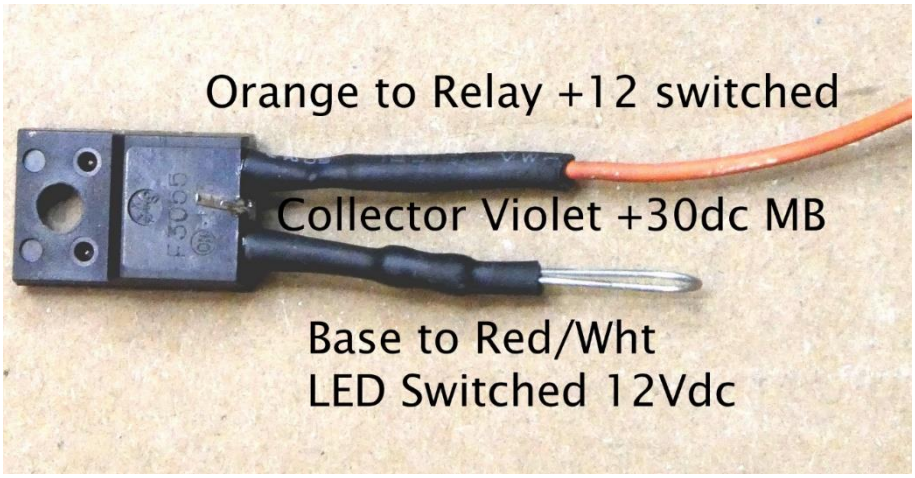

Figure 5 Plastic case 3055 transistor

Important Notes

MFJ often uses very long hookup wire leads from the rear panel RF connectors to the OEM printed circuit board. Please keep any unshielded RF wires as short as reasonably possible. Long open wires affect ten-meter SWR and add unnecessary stray feedback.

RF shields also must be grounded on BOTH cable ends or the shield will not be functionally acting as a shield! The coax from the tank ***must*** have its shield grounded at the relay system. Ideally, this ground should not share a long ground lead with the input cable, although they can share a common hole to the center panel right on the panel. Ameritron sometimes violates this good practice in their relay system wiring.

You do not have to use the ground pads on the UNRS board, but the input coax side grounds are also involved in on-board shielding. While not an absolute requirement, grounding one of the input coax side ground pads to the chassis is a good layout idea. If you use our supplied RF Input to board cable and follow our pictures this requirement is fulfilled.

Do not RF hot-switch these relays (or any relays)!!

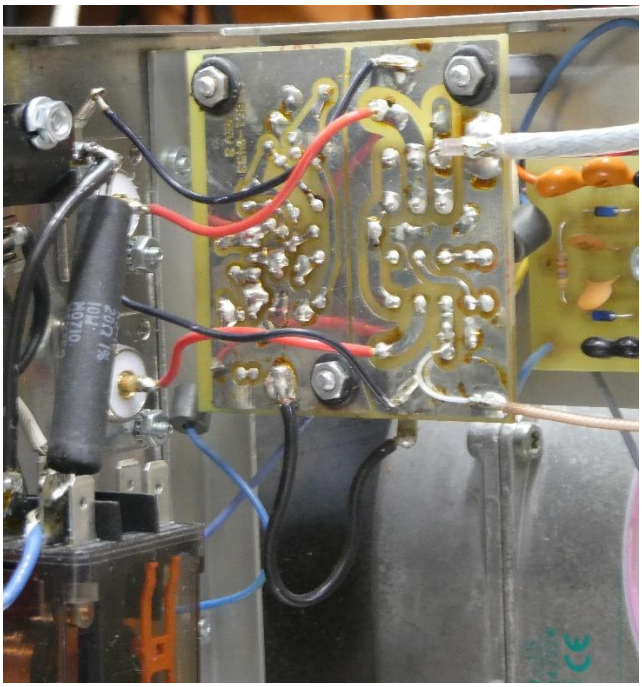

Figure 6 OEM Cube Relay system 2008+

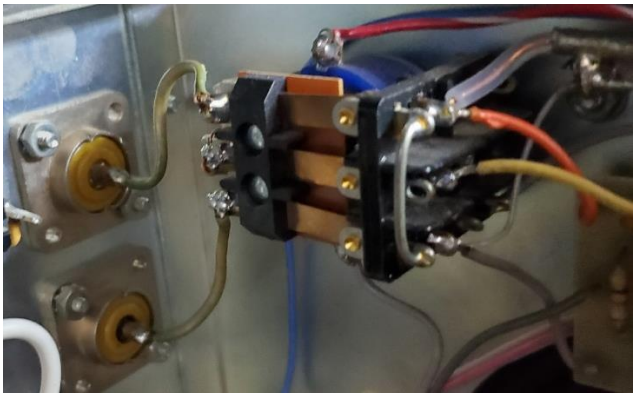

Figure 7 OEM style 1 (center NC contact should have been bent upward or removed to improve receive tension)

New Replacement Pictures

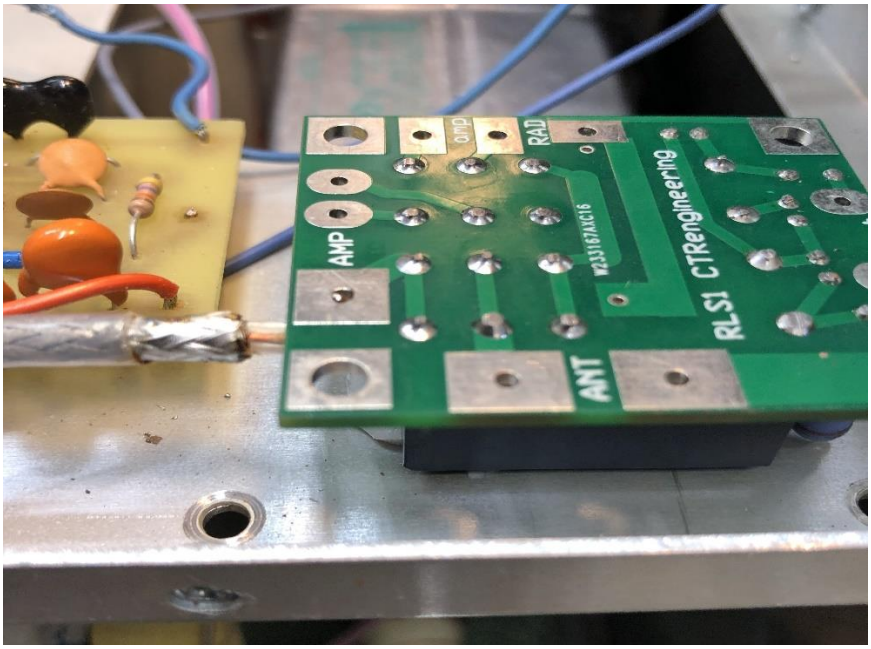

Figure 8 Mount so large coax cable reaches

The large coax, being hardest to deal with, sets the mounting position.

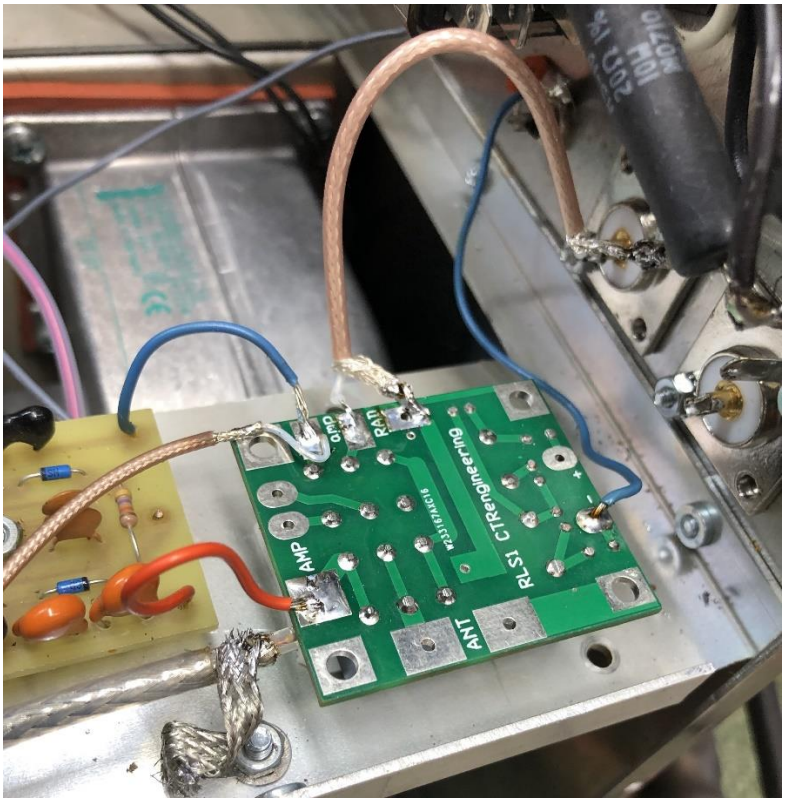

Figure 9 Wiring

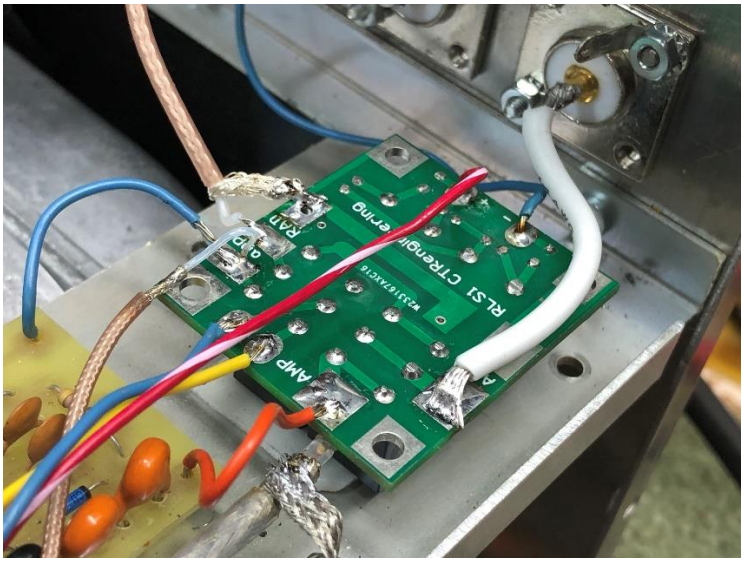

Figure 10 Wiring 12V high current supply units

Wiring shown is 12V high current supply such as pre-2008 or modified later units where 22 to 33-ohm resistor shunts LED.

Later 2008+ year units or units with a series LED and resistor have a low current red/white. They require a buffer transistor that can mount to any hole around the UNRS.

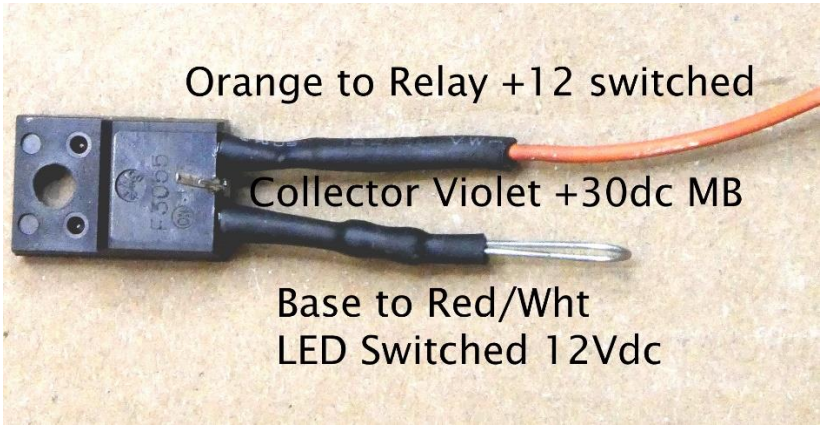

Figure 11 Buffer

The violet 30Vdc wire from the meter board goes to the collector. The orange goes to board +.

The LED red/white wire goes to the base.

Expect this document to improve or change as I get more pictures from more units.