UNRS-AL12U AL1200/AL82/AL1500 Models rev0A w8ji Feb17,2026
also AL80A and SB1000

Parts included:

UNRS-12U relay assembly with all attached wiring Mounting Tape	#6-32 screw and nut for ground to center panel #6 internal tooth lug and braiding output shield

This ***fully-sequenced*** universal relay system replaces the pre-2008 standard AL12x amplifier series open frame T/R relays. It also replaces all post-2008 cube relay systems. This board draws 100mA @ 15Vdc nominal. This device is polarity-sensitive. Do not reverse the + and – coil leads. It must be wired exactly as show.

The measured timing at 13Vdc (14Vdc supply) is:

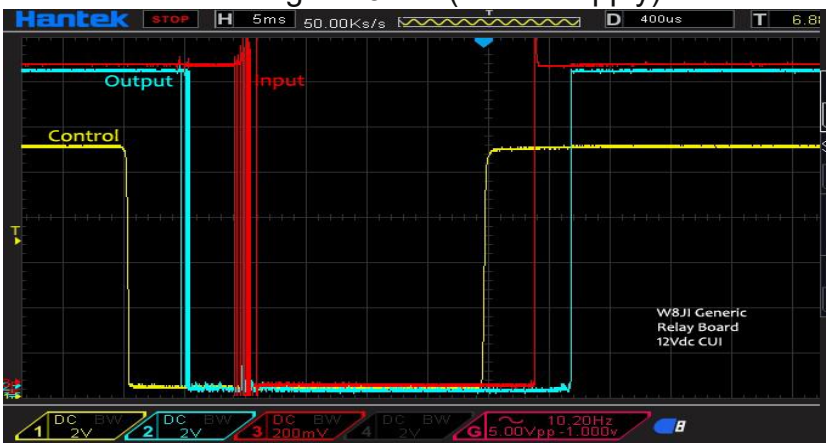

Figure 1 Timing (Worst case)

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.

AL82, AL1200, AL1500 (AL12X frame) 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. This

system was common to the AL80A, SB1000 Heathkit, and the AL12X mainframe. Three suppliers were used, Deltrol, Midtex, and P&B. With open frame relays, a 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 by 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:

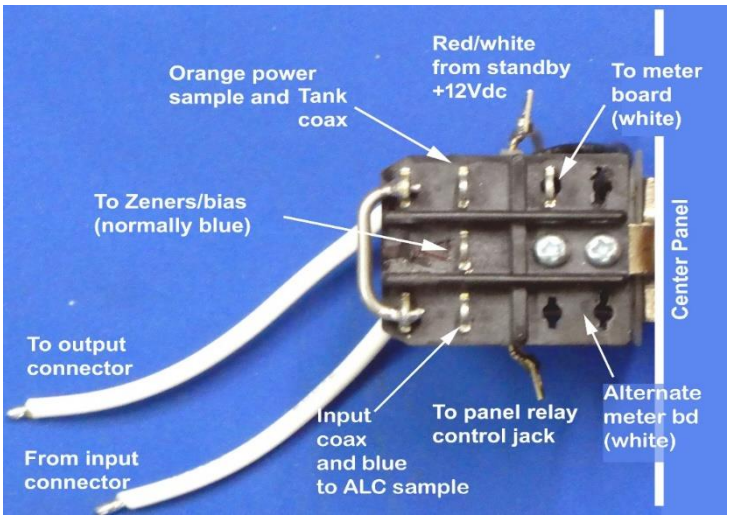

Figure 2 open frame relay connections

Our UNRS-AL12u replacement board basic connections are shown below:

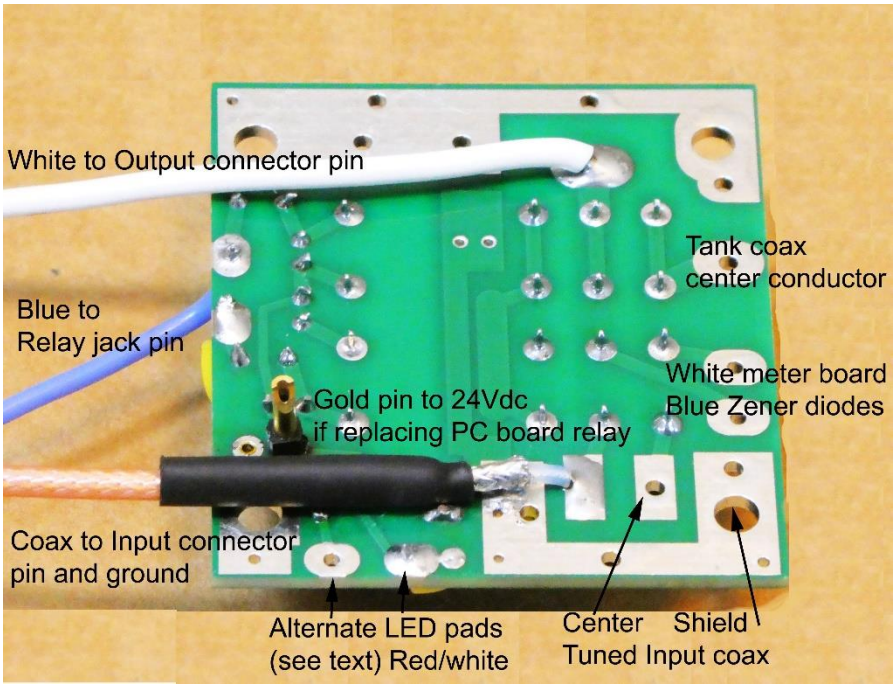

Figure 3 (relay-bottom view our newer board style)

In the 2000s when open frame relays went obsolete, the AL12 frame series switched to this dual-voltage twin-relay cube relay system (**figure 4**). At this point it diverted from the AL80A/SB1000 relay:

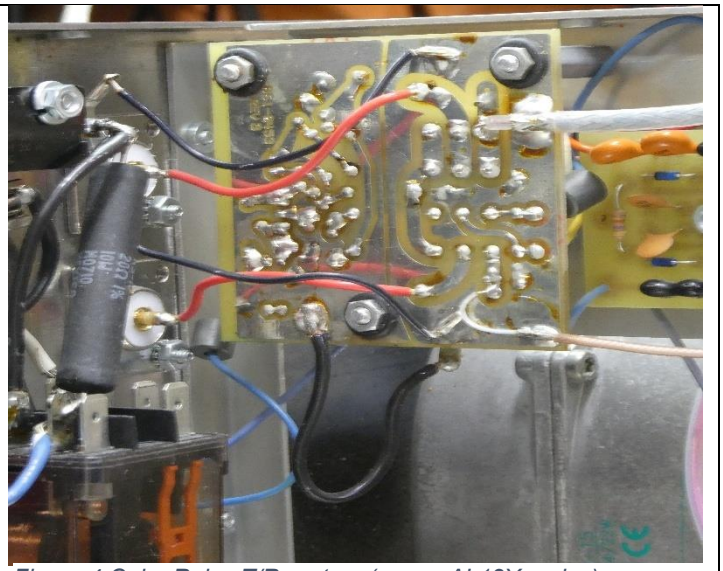

Figure 4 Cube Relay T/R system (newer AL12X series)

Other than mounting, this board is a direct swap for any AL80A, SB1000, AL1200, AL82, or AL1500 amplifier (called the AL12X frame) relay. This system reduces relay switching time over most stock open-frame relays by nearly 50%. The UnRS-AL12U is slightly faster than the Ameritron cube relay board.

Although this lightweight board can be safely mounted with screws using spacers, good thick 3M tape against the relays is the preferred method. Tape will be quieter and allow better positioning than using spacers. Good 3M tape should be adequate for decades.

Whatever method, ensure that only desired grounds for shields or isolated mounting holes electrically contact the amplifier chassis.

Do not ground the high-power tank output coax cable shield to any of the UnRS-AL12U circuit board ground traces. The tank output cable shield uses the chassis as a common ground. The tank coax, like all coaxial cables, must be grounded at both ends of the shield, otherwise a cable is not properly shielded. Improper treatment of cable grounds is a leading cause of high or unstable input SWR.

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. Following this instruction set will satisfy this

requirement. The antenna relay systems were the same in the AL80A, SB1000, and AL12X very early models.

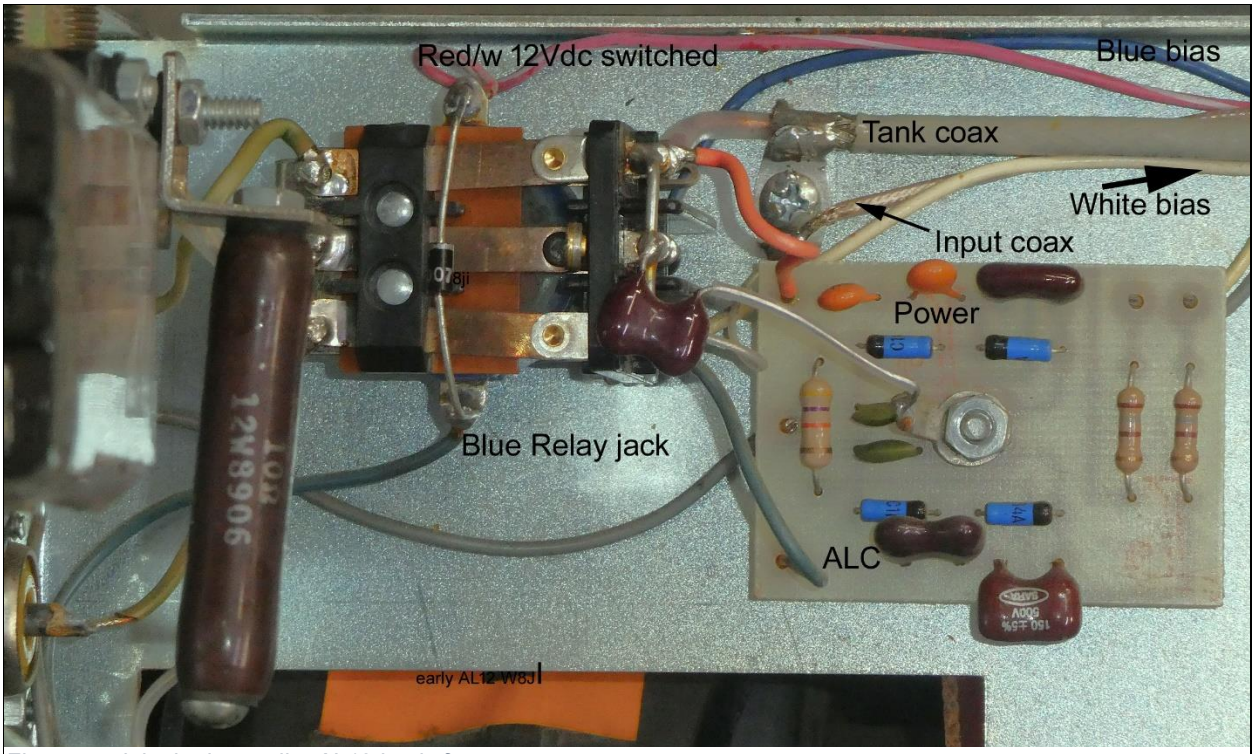

Figure 5 original relay earlier AL12 basic frame

The original AL12-series and AL80A used a double lug for both input and output shields with a center screw, as shown in **figure 5**. This method is still okay if the input circuit coax is too short to reach the UnRS-AL12U board, but the supplied input cable shield must have a reasonably short jumper to the input coax shield. If you have a cube relay AL12 you will have to ground the large shield as direct as possible to a chassis lug.

1.) Trial fit the relay, making sure important leads can reach before mounting it with tape. Some leads may need to be worked out or pulled out of the harness a little. On rare occasions one or two may need extended. Always avoid extending RF leads.

The new UnRS board mounts as shown in multiple pictures, with high power tank output coax/orange PO sample wire in the upper area and low power tuned input/blue ALC sample leads down. Older units with open frame relays are identical to replacing the newer cube relay board with two exceptions:

2.) The red/white wire connects directly to the + terminal (wire “C”). This is at either end of the yellow board wire. This will bypass the on-board 24V to 12V conversion and

switch transistor.

3.) Older unmolested amplifiers have a double lug that grounds the input coax shield and the output coax shield to the chassis. A 6-32 screw is in the middle of the lug. You can either leave this lug and cables as-is and position the board so the cables reach, or move the input cable shield to the UnRS-12U input bus. In either case, the input shield bus at the board bottom must be grounded to the chassis using a short black wire we supply. **"Wire B" is the Red/white LED lead in later model cube relay AL12 series.**

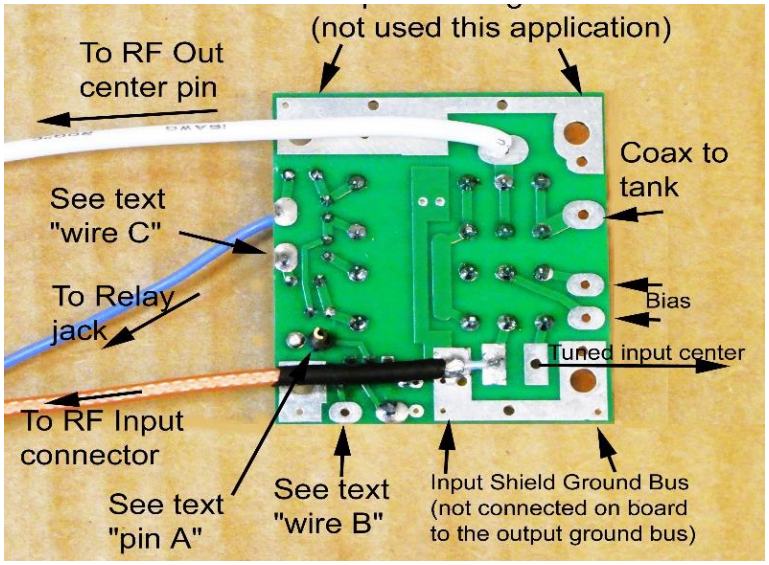

Figure 6 UnRS-AL12U RF connections newer units

1.) The Input coax shield grounds to the lug at input connector and again on the board bus via a black wire we supply. The tuned input coax shield ground either to that same shield foil on our board or to the chassis if it was originally on the chassis.

2.) The orange RF sample for PO tack on the same pad as the tank output coax center conductor.

3.) The blue ALC sample wire tacks on to the tuner input pad.

4.) Old amplifiers like the AL80A follow the early AL12X frame wiring. The antenna relay systems were the same in the AL80A, SB1000, and AL12X very early models.

5.) The RF output shield from the tank grounds to center panel lug only! If you have an older open frame relay unit, the red/white wire attaches to either point in fig 7.

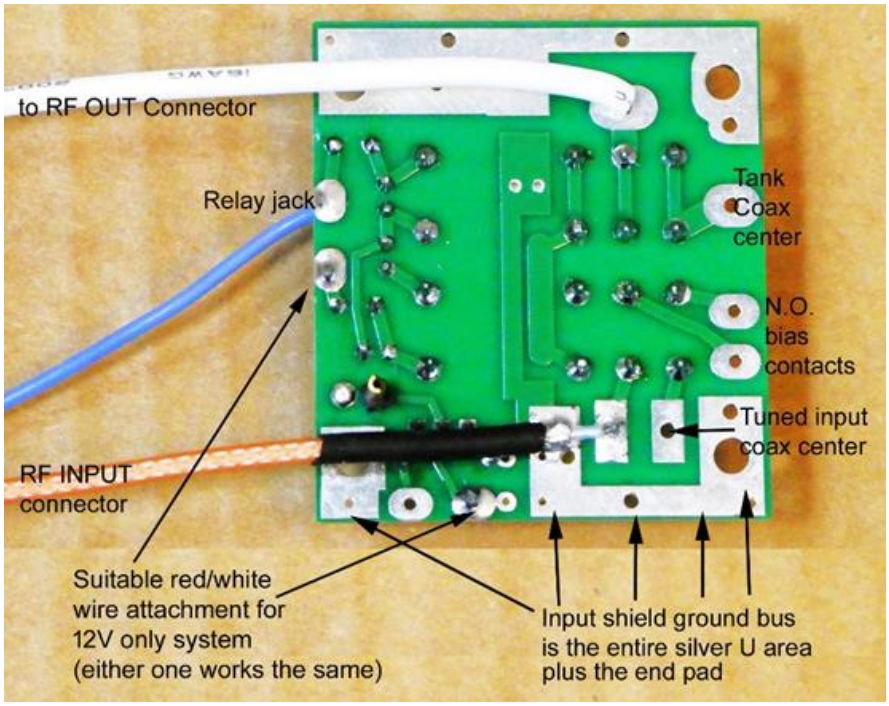

Figure 7 red/white 12Vdc connection in older units

Newer AL12-series with Cube Relay Board (NOT AL80A/SB1000)

Newer AL12s (AL82, AL1200, AL1500) after ~2005 ***use a printed circuit board relay system (figure 4).*** While some wiring overlaps, the red/white wire and LED resistor wiring changes. A new 28-volt line is added. This section is for pc board relay units, not the single 12Vdc open-frame relay.

The new relay circuit board system used both 28Vdc and 14Vdc. Rather than update the circuit board, MFJ “dead-bugged” a new full-wave voltage doubler onto the original 1983 bridge rectifier metering board. This doubler provides around 14Vdc and 28Vdc. This newer (post-2008) cube relay board system has a modest value resistor in series with the LED. The Standby/Operate switch still adds and removes 14-volts to the LED to switch the amplifier in and out of operation.

The LED and standby wiring remains as original with the UnRS-AL12U kit. Do not change the LED wiring or the metering board wiring.

MFJ sometimes used a small violet or blue wire for 28Vdc from the meter board, some units used a rather thick violet or blue wire. Pay attention to the wiring on your particular

unit. You can identify the wires by their location on the old board.

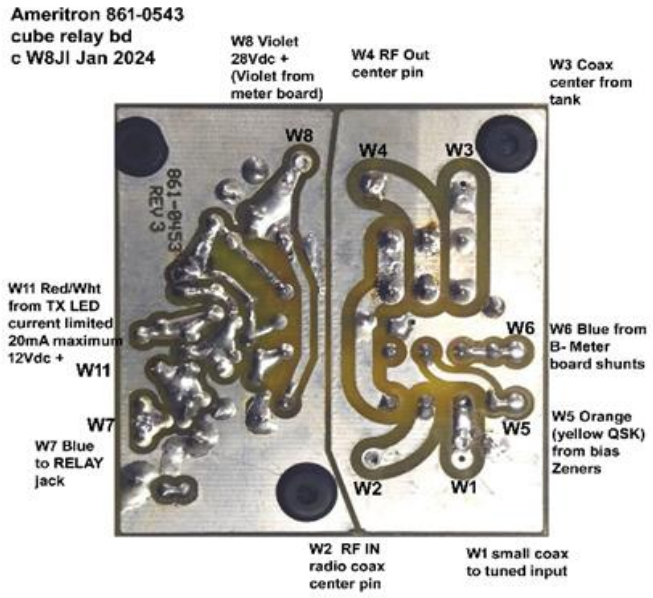

Figure 8 Cube relay OEM wiring

Newer units may not have the larger coax shield grounded to the chassis. It is better to ground the large cable shield to the center panel with the shortest lead possible.

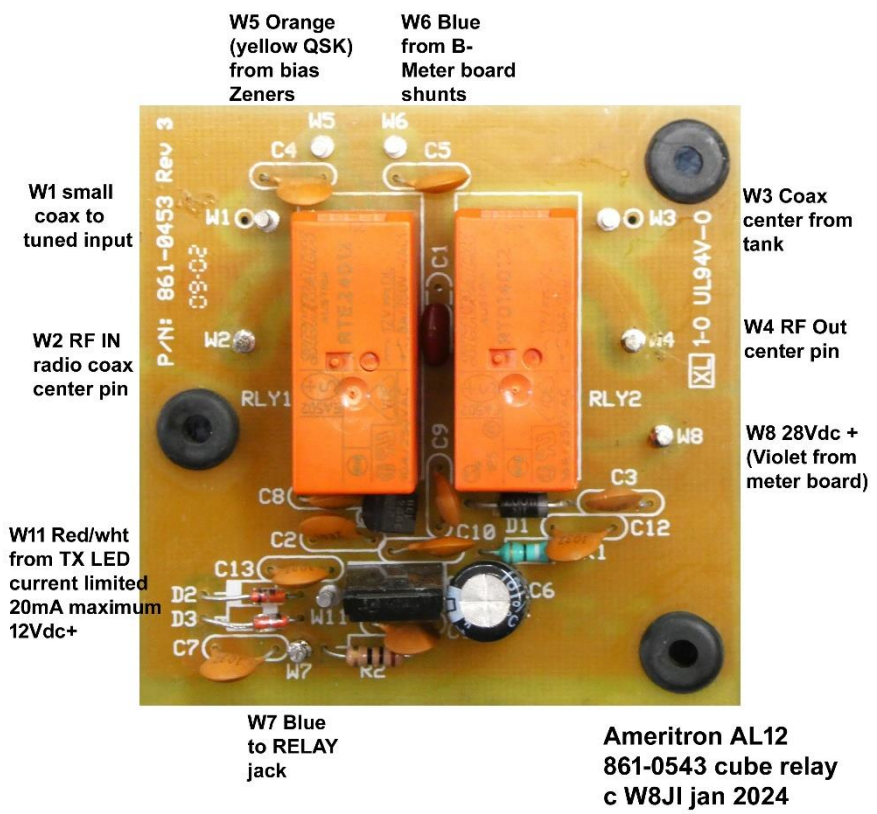

Figure 9 board top wiring cube OEM

This UnRS-AL12U works in either the 14Vdc supply open-frame relay system common to the SB1000, AL80A, AL12X fame, or the dual voltage 14/28 Vdc AL12X cube relay. The red/white wire changes locations between 14V only and dual voltage systems. A 28Vdc wire connection is required in newer units that used the cube relays.

In the AL12X frames, system voltages and relay operation can be tested by unplugging the HV transformer primary wires. This allows powering the filament and control transformer system for relay testing. Voltages to chassis or ground at any point inside the amplifier will be limited to 120Vac, generally safe for a reasonably skilled service technician.

The new blue/violet 28Vdc and standard *red/white switched 14V* control wires must connect to proper locations on this new board when replacing a dual voltage OEM system. The red/white wire location and the violet or blue 28Vdc wires, and perhaps the output coax shield ground, are the only wiring difference between newer dual voltage cube relays and the older single voltage open frame relay OEM systems.

Note: The TX LED will be fainter with the UnRS-12U system in newer units. LED control current is reduced.

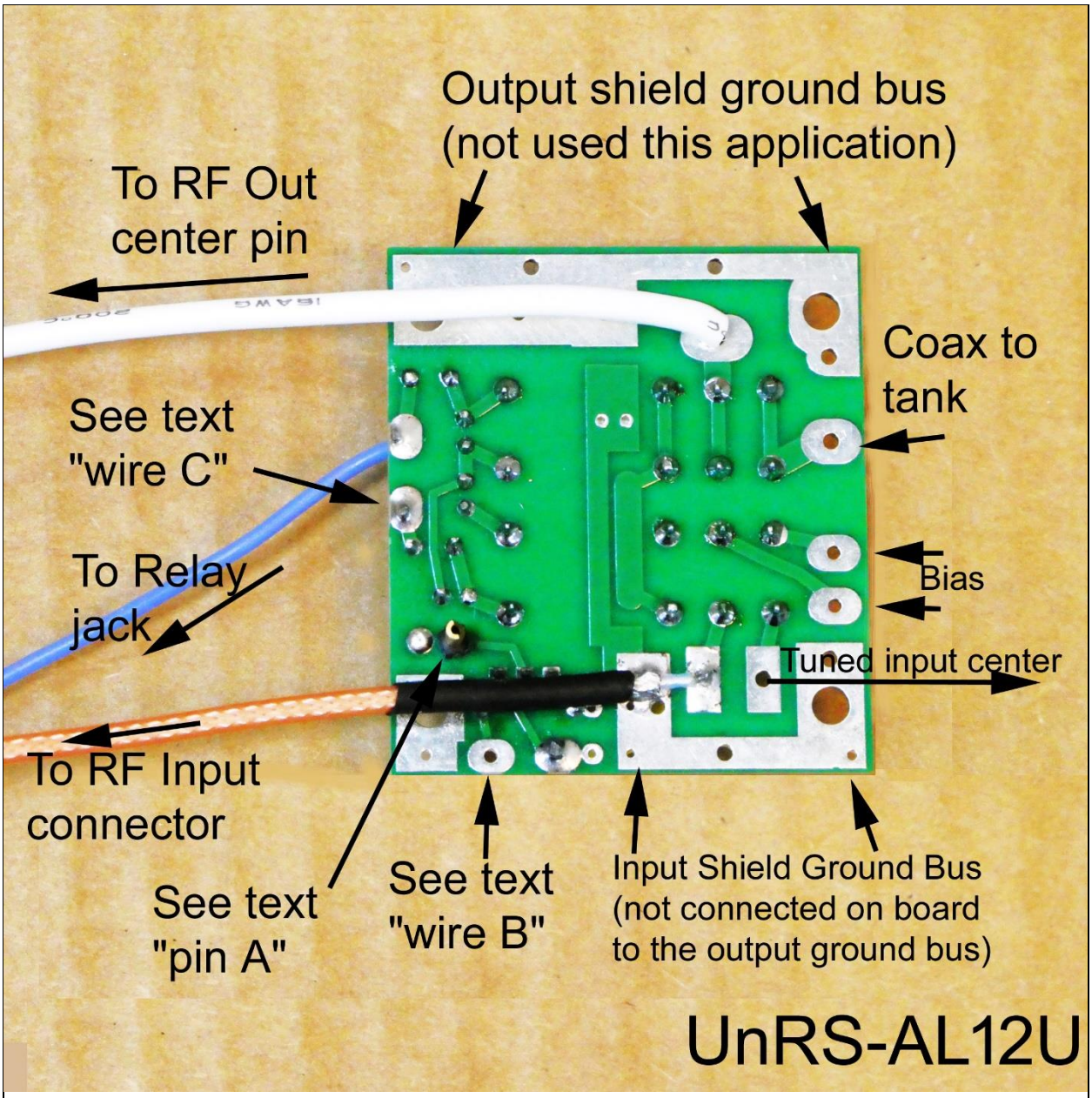

Figure 10 board wiring

In newer dual voltage relay systems, Pin A is the 28Vdc violet or blue wire. Do not short or bridge this wire to ground or other pads. This wire should ohm-test showing increasing resistance to ground as the low voltage supply filter capacitors charge.

In newer units, the red/white wire solders to the pad noted as “wire B”. Be careful. Do not accidentally bridge the red/white wire or pad to the input shield bus or any other pad! A good tack solder joint by sweat soldering is perfectly fine. With almost no current the primary concerns are mechanical life and not making an accidental short.

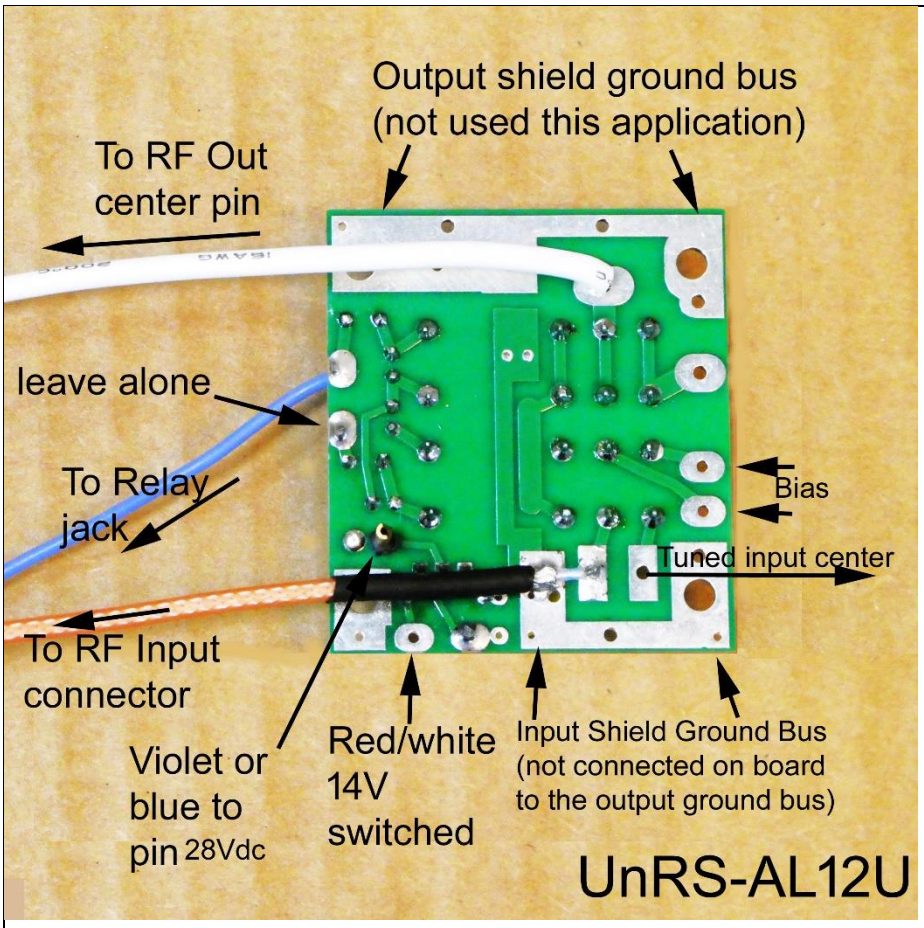

Figure 11 28V and 14V control wire connections dual voltage

Note in newer units that used factory cube relays on a circuit board:

1.) The red/white trigger wire is in a different location. It is on an empty oval shaped pad shown as “wire B” in some photos.

2.) A violet or blue 28Vdc wire must connect to the gold standoff pin.

3.) The tank coax shield might need to be grounded to the center panel, depending on how MFJ routed the cable.

In older units:

1.) The gold pin is not used.

2.) The red/white wire is high current 12V and can go to either one of the two spots as shown in photos. Use the spot easiest for you.

Figure 1 Timing (Worst case) 1
Figure 2 open frame relay connections 2
Figure 3 (relay-bottom view our newer board style) 2
Figure 4 Cube Relay T/R system (newer AL12X series) 3
Figure 5 original relay earlier AL12 basic frame 4
Figure 6 UnRS-AL12U RF connections newer units 5
Figure 7 red/white 12Vdc connection in older units 6
Figure 8 Cube relay OEM wiring 7
Figure 9 board top wiring cube OEM 8
Figure 10 board wiring 10
Figure 11 28V and 14V control wire connections dual voltage 11