TOF Installation in AL8X Platforms AL80B, AL800, AL572

Aug 31, 2025 W8JI

Please glance through this before starting, especially the supplemental pages at the end.

Excessive grid current causes splatter and puts tank components like the plate tuning capacitor or bandswitch at risk. With gold plated grids in metal-oxide cathode tubes, excessive current can migrate gold and poison the tube. If grid current is too low efficiency suffers. This causes a tube to run needlessly hot from excessive anode heat. We need to keep careful watch on grid current.

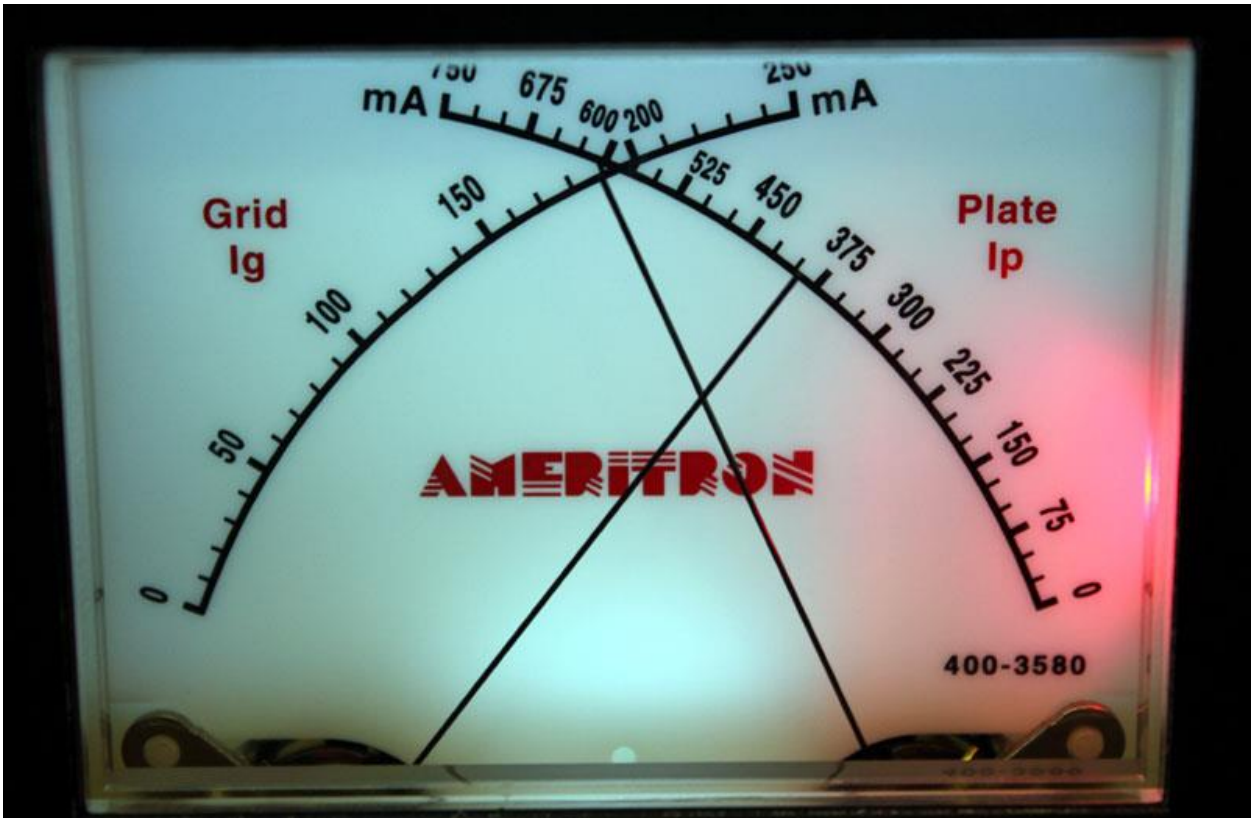
Normal grid current meters are useless unless in carrier mode. The TOF converts the average current indicating grid meter into a peak meter. Instead of needing a carrier, the meter displays peak grid current regardless of mode. Additionally, excessive current first triggers a red warning light. If grid current exceeds safe levels by about 20% or so the TOF disables the amplifier antenna relay. The fast peak detector will cause a very slight meter movement on standby, perhaps 5mA or less. This should be ignored.

LED Warning Indicator

The LED warns by illuminating when exceeding the typical maximum peak grid current for proper linear amplification. R6 on the TOF board sets the illumination point. 6800 ohms is approximately 190 mA in the AL8X platform. (The reading varies slightly with amplifier component tolerances.) If you slightly open the LOAD control clockwise and the LED does not go back to occasional sharp quick flashes, or does not stay completely off, the amplifier is being overdriven. Reduce the drive power until the LED just flashes occasionally, or stays completely off.

The warning LED may occasionally flash on voice peaks from radio power overshoot. This is generally not harmful or disruptive to others. If the LED illuminates longer than very brief flashes or blinks, or stays on with every word, the amplifier is being overdriven or is mistuned. The exact level where flashing occurs varies slightly with operator voice and the particular amplifier.

The LED can be mounted between the panel meters. The flash is much more noticeable than this photo.

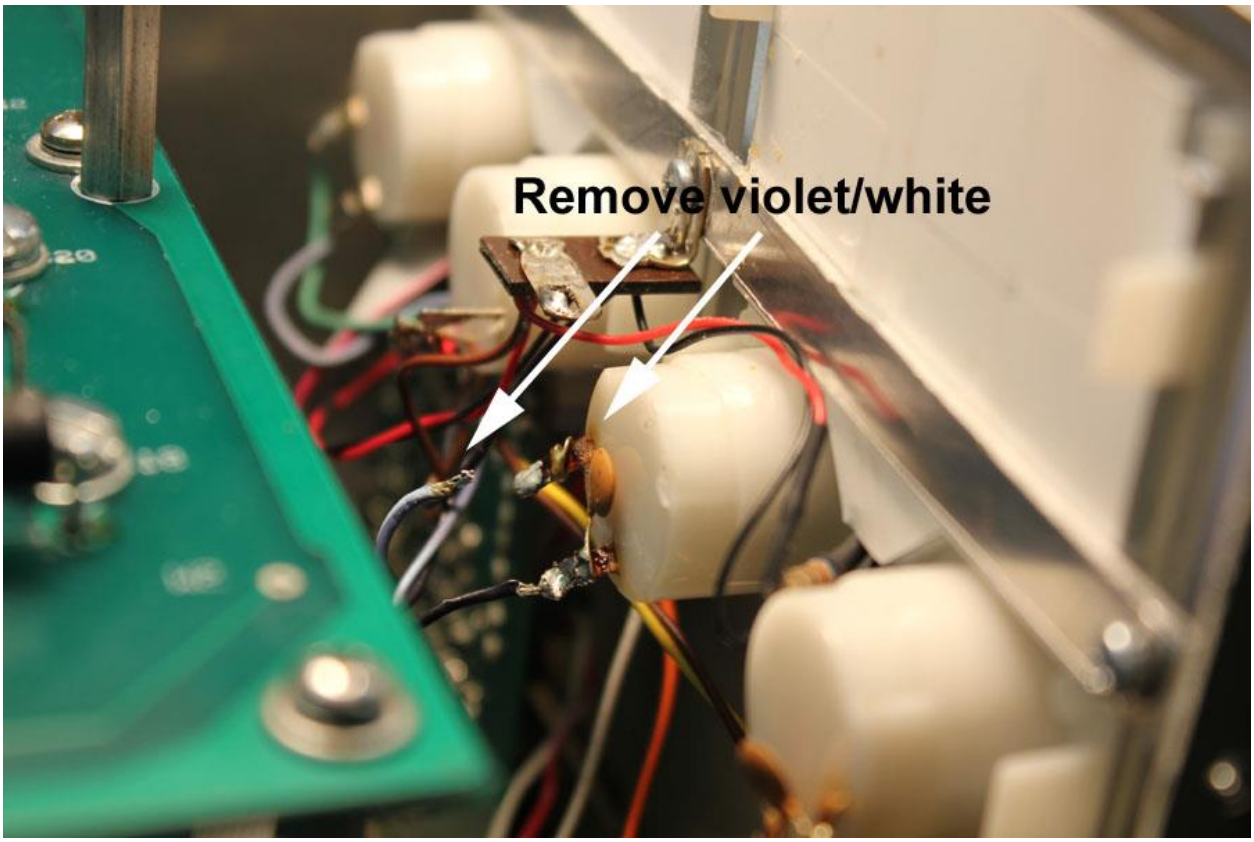


Installation

Tools required:
#1 and #2 Phillips screwdrivers
Soldering equipment with small rosin flux solder, preferably WRAP2 rating but any electronics solder will work
Included in kit:
TOF with precut wires
Solder lug
two small cable ties
Heat shrink

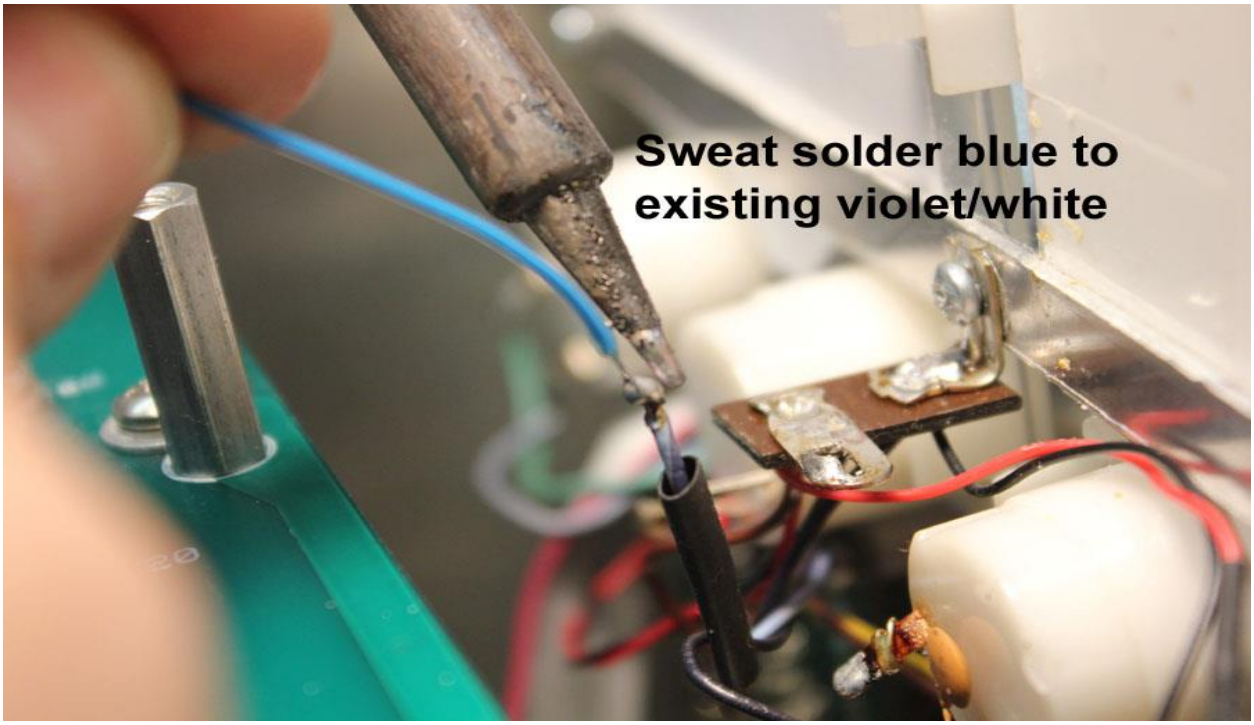
1.) Remove the power plug from the outlet, and after making sure the HV meter has reached zero, remove the cover.
2.) Position the TOF in a clear spot on the chassis bottom below or in front of the filter capacitors

3.) Remove the violet / white tracer wire from the second movement in. This is the grid meter positive lead.

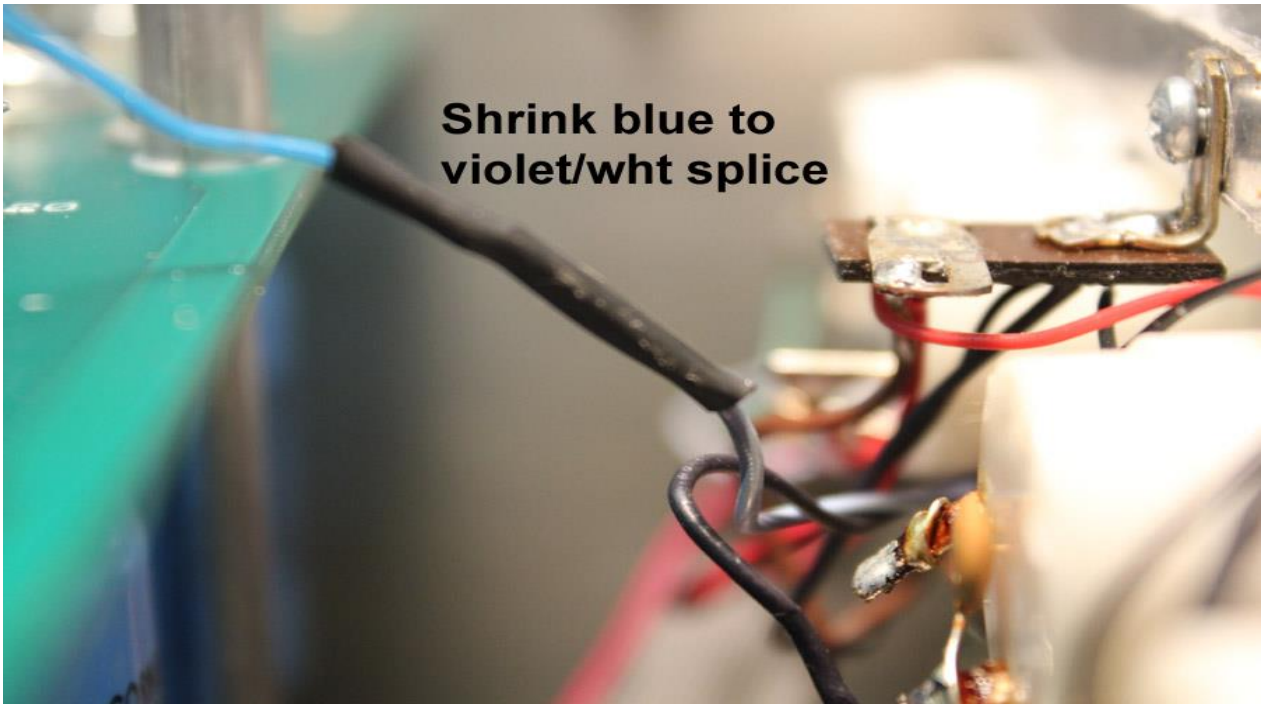


4.) Freshly tin the removed wire to improve solderability. After fully cooled slip heatshrink over the wire.

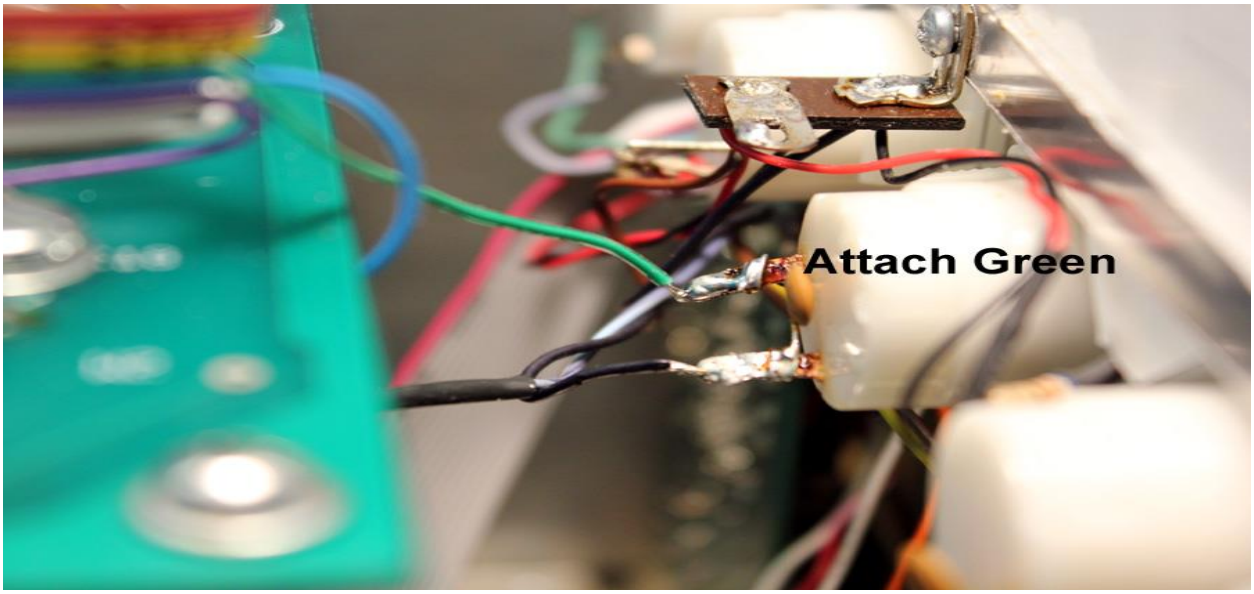
5.) Make sure both the blue TOF wire and Vi/W or Bu/W are pre-tinned with a thick layer of solder. Hold the wire ends together in parallel and quickly sweat solder them together. Do not wiggle wires when they are cooling. You can hook and solder if larger heatshrink is used.



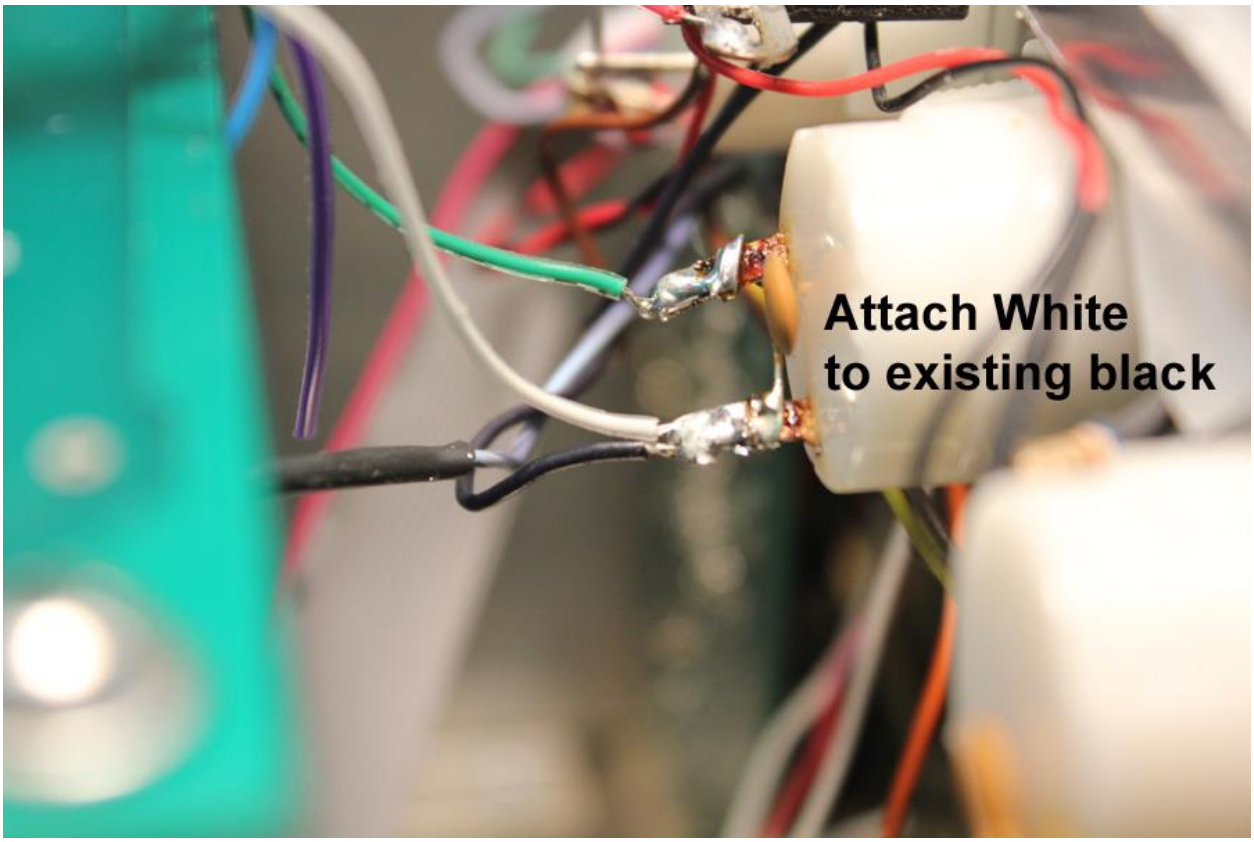
6.) Cover the solder joint with heat shrink. We include either clear or black heatshrink



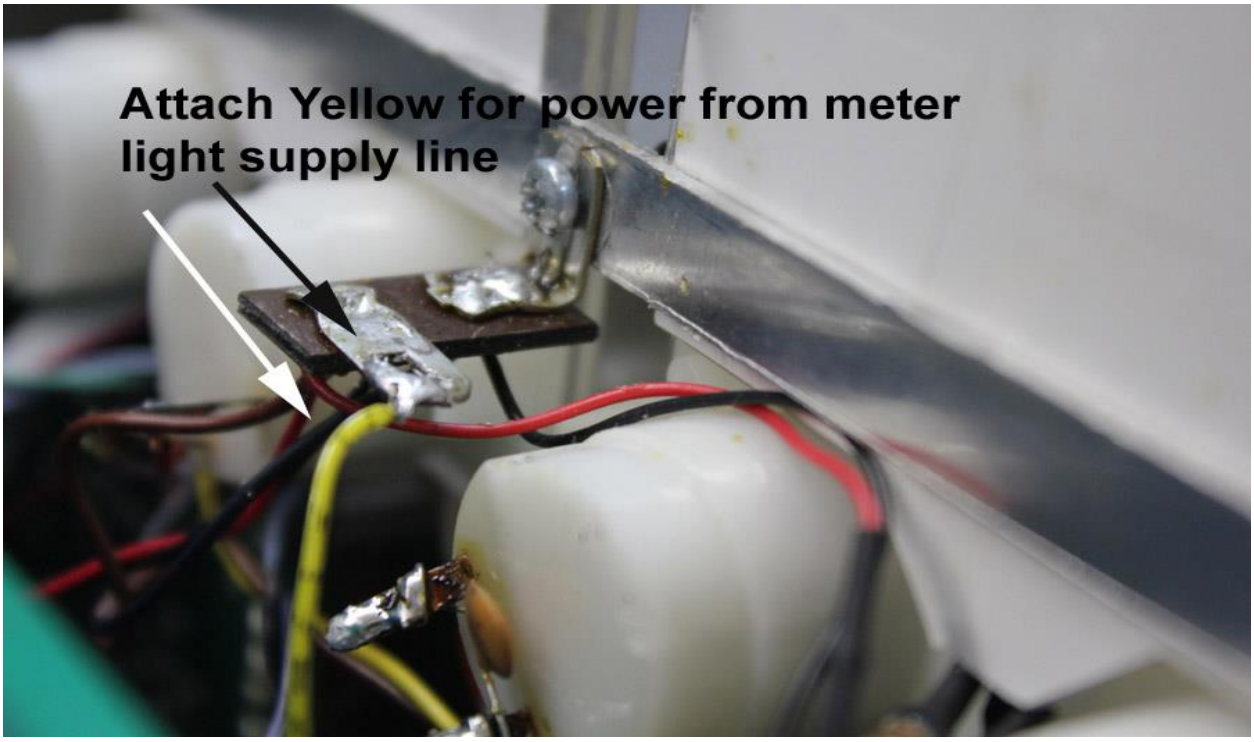
7.) The green TOF wire connects to the meter positive where the Bu/W or Vi/W was removed. This routes the grid meter voltage through the TOF.



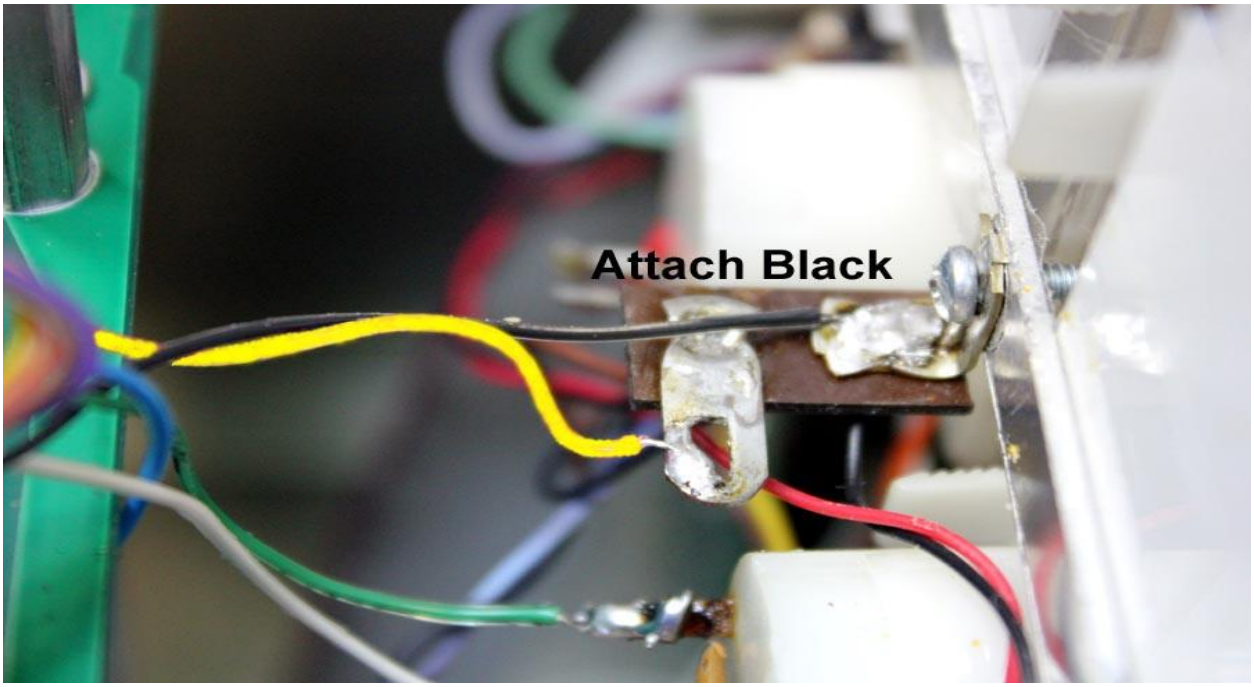
8.) Attach the TOF white wire to the black meter wire. If easier the TOF white and black can wires can just go to chassis ground. There is normally no difference in function.



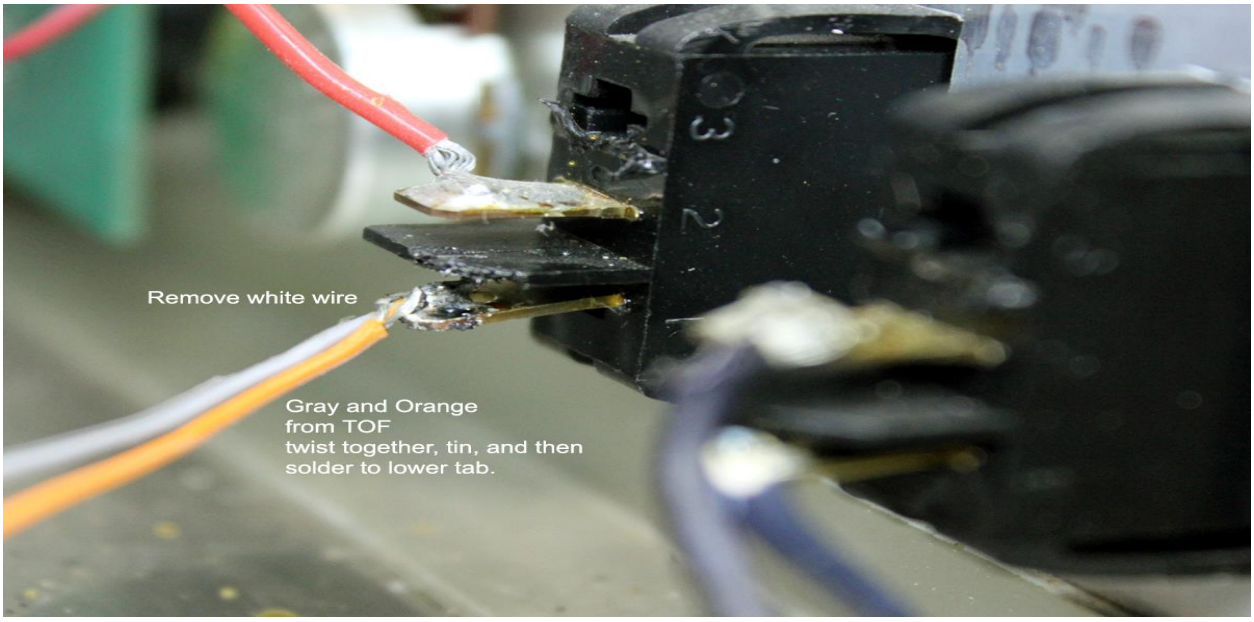
9.) The meter lights are an easy place to obtain 12V. The TOF requires 12Vdc continuous on the yellow TOF lead.



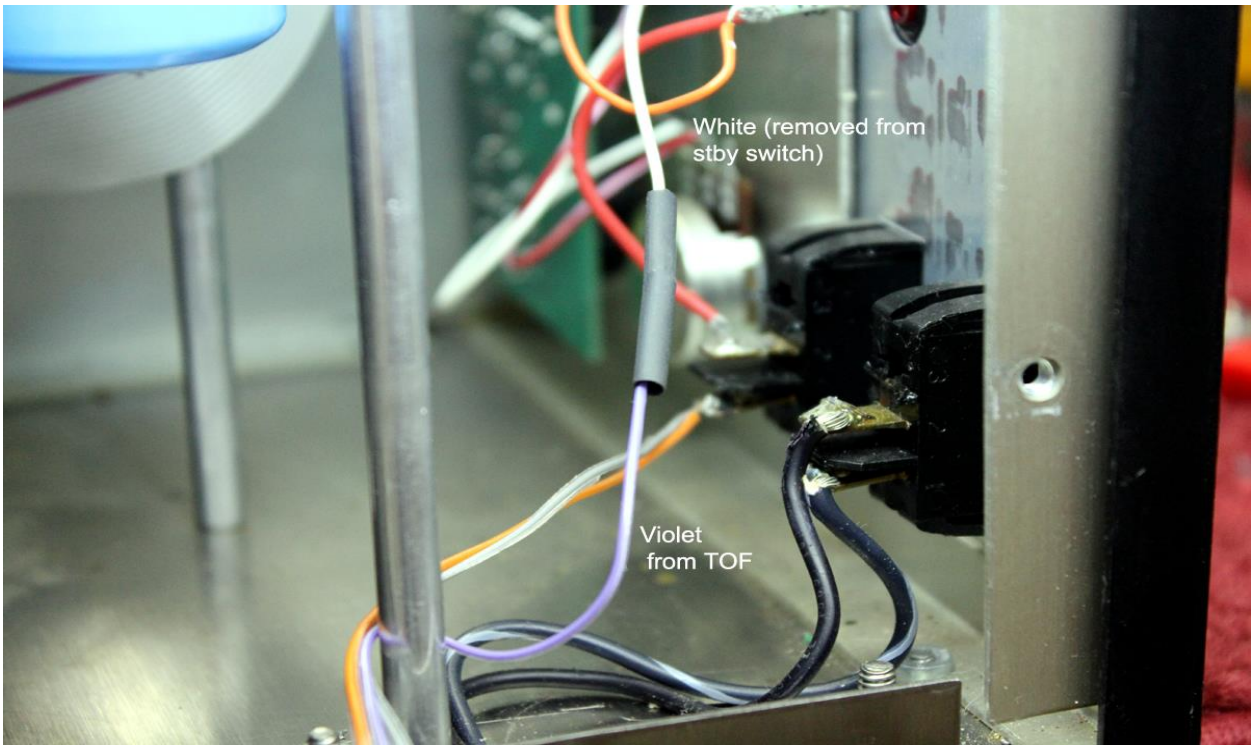
10.) The TOF black wire can go to the grounded foot of the meter light terminal strip.



11.) Remove the OEM white wire from the standby switch bottom terminal. Do not overheat the switch. The TOF gray and orange wires twist and solder together with liberal amounts of solder. They then quickly sweat onto the lower lug.

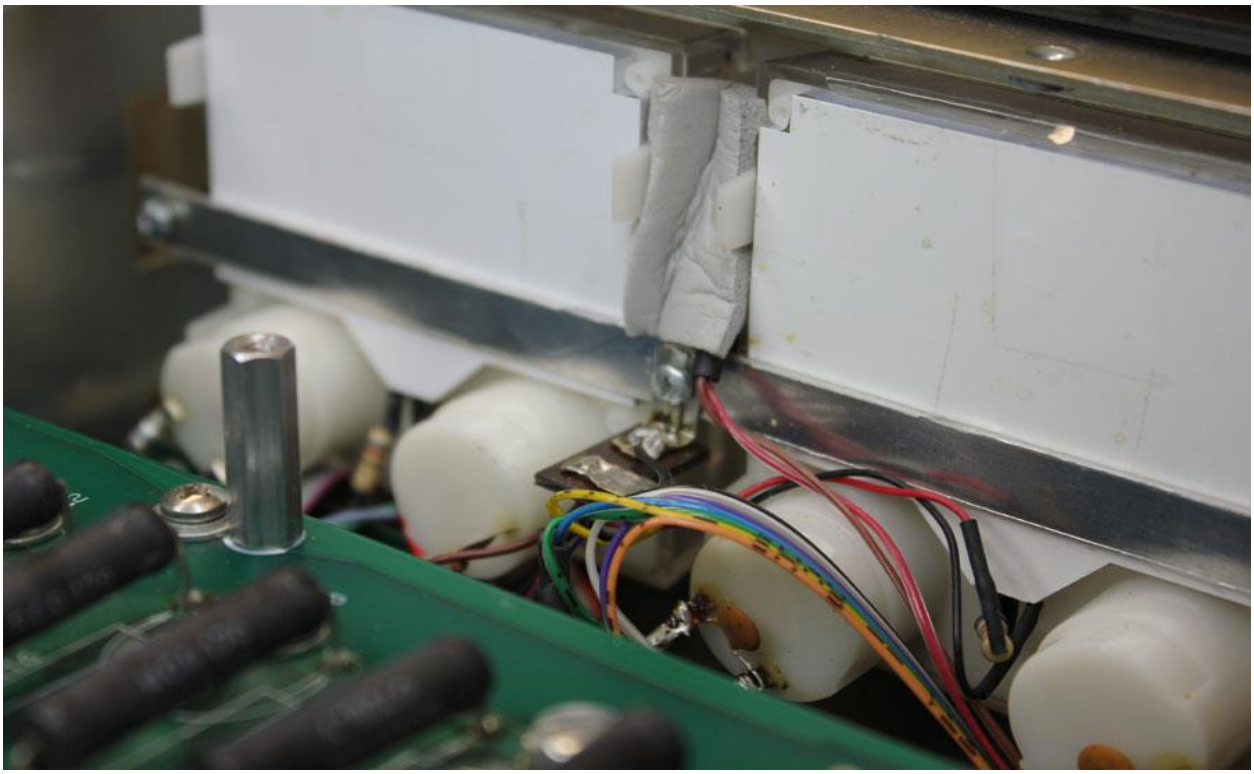


12.) Tin the white wire. When it cools slip heatshrink over the white up out of the way. Heavily tin the TOF violet wire. The white then sweat solders to the violet. Make sure you get a good connection.

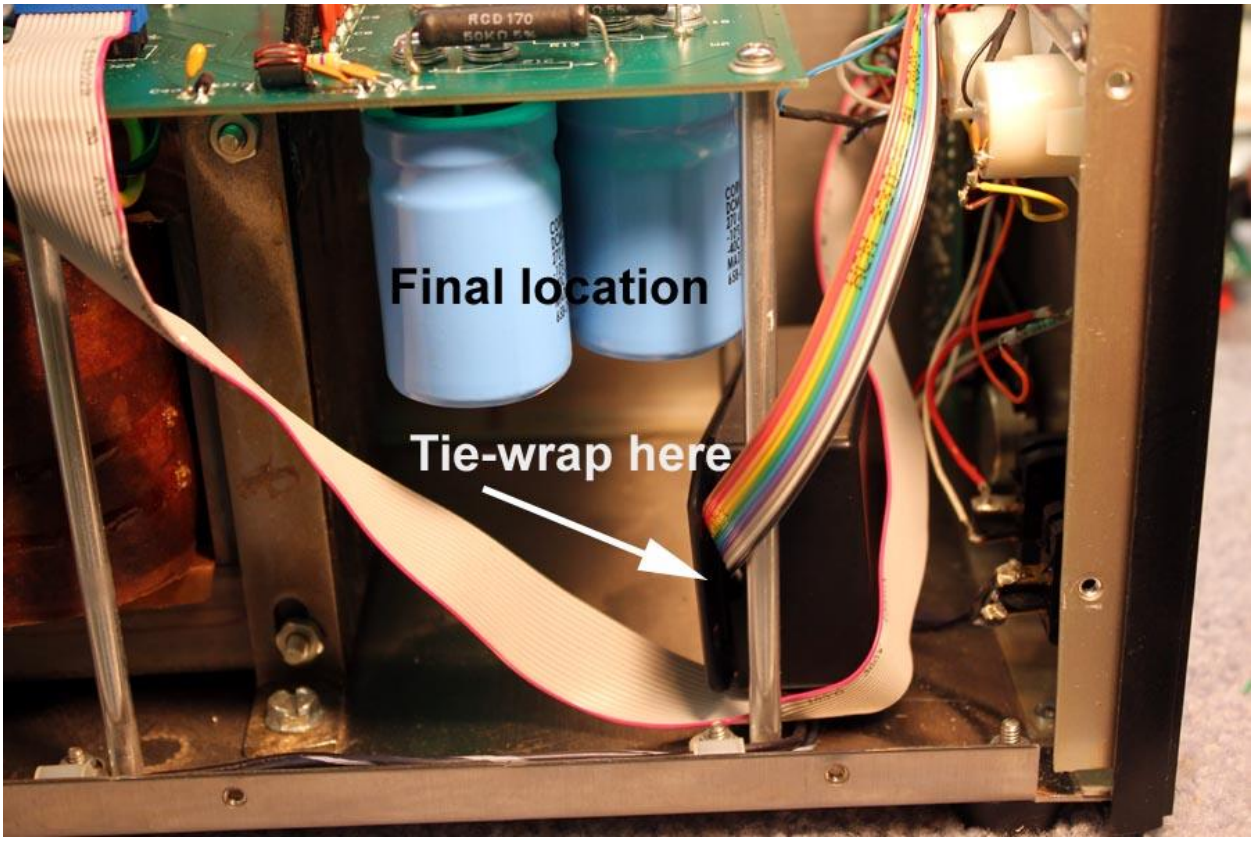


13.) Cut back or fold back and cover any unused wires

14.) The LED has a wide light pattern and is fairly bright. Position it between the meters and tape it in place. You can angle the LED front toward the grid meter for more light.



15.) The TOF can lay on the amplifier floor or fit up front. It is not sensitive to direction and has an insulated case. You can use double sided tape or tie-wrap it.



Operation notes:

The LED should light very solidly at 200 mA in the AL80B, less in other amplifiers. The exact amount varies with tube and component tolerances. Whatever your amplifier, we set the TOF red light to the grid current point where splatter is likely. If the light is flashing red on more than rare occasions, reduce drive power or increase the Load setting to a higher number. Fort cleanest signals do not push the amplifier to maximum possible RF output power. Leave a hundred watts or more headroom from the peak tuned grid current and power.

The overload disconnect trips off at 25% more current, approximately. This disconnect is to prevent damage, not splatter. It is reset by switching the amplifier to standby, and then back on.

TOF in Ameritron with GOP or Timer/Overload Boards

(Including the AL80B, AL572, AL1500, AL800, and AL800H series with GOP or Timer/Overload Boards) rev2 Sept 4 2025

Warning!!

1.) Amplifiers using indirectly heated tubes with time delay warm-up must retain the Ameritron board! Overload functions will move to the TOF system. The warm-up timer function must be retained using the original Ameritron board.

2.) Ameritron has changed the 12V control voltages. Some amplifiers will have more than 15Vdc on the 12Vdc control lines. IC chips and other parts were designed around a nominal 12Vdc supply. Amplifiers with more than 16Vdc on the 12V bus may exhibit premature relay or semiconductor failure. The safest way to verify this voltage is to measure either a 12Vdc rear panel jack if present, or “snake” a temporary 12V sample wire, like a clip lead, out of the cabinet to allow safe measurement with the cover laid in place. The AL8X kit or some other correction should be made to bring the +12V control voltage to +13.5Vdc nominal. 12.8 to 14.3 volts is acceptable with 13.5 ideal.

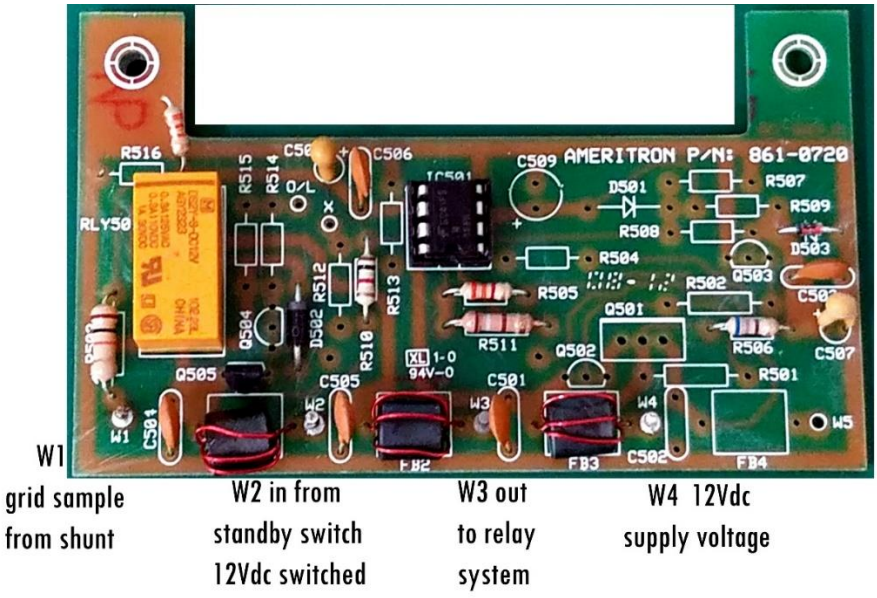


Figure 1 Overload only shown. This board is sold as "GOP" by omitting timer components

1.) Terminal Pad W5, if the board is fully populated, is the time-delayed 12Vdc control output. If used, any connections must be left alone.

2.) Terminal Pad W4 is the continuous 12Vdc supply. This wire, if present, must be left alone. To confirm the transformer meets the original design limits, the 12Vdc rail must never be more than 16Vdc. 15Vdc down to 12Vdc is safe. The connection point for W4 can be used to feed the TOF yellow wire, which is the TOFs 12Vdc continuous power feed.

3.) Terminal Pad W3 is the overload-protected 12Vdc output to the antenna relay system. This wire should be disconnected and used to feed the TOF violet wire when installing the TOF system. Alternatively, if you do not want to splice, you can follow the original wire back to its originating terminal and connect the violet there.

4.) Terminal Pad W2 is the standby-switched +12Vdc input to the boards. This provides a reset connection, as well as standby switching of the relay system. This wire, when 12Vdc is removed, resets the latched overload relay in these boards. This connection would become the gray and orange wire feeds.

Note: Some amplifiers use dual relays and have a 4.7k resistor in ***series*** with the LED. Older amplifiers using single 12Vdc TR relays use a resistor ***shunting*** or ***in parallel*** with the TX LED. Ameritron does not often document changes in schematics or by serial number. You must look to see if a 22-ohm to 33-ohm resistor is in parallel with the LED (dual relay models). If the resistor is in parallel (single TR relay model), the TOF gray and orange wires ***must both be used***. If there is a 4.7K in series with the LED at the standby switch, you eliminate that resistor and do **not** use the gray TOF wire. The gray wire is not connected, and an internal 4.7K becomes in circuit to the violet wire.

5.) The peak reading meter and grid current trip sensing wire is the BLUE TOF wire. This wire can go to where W1 on the original Ameritron GOP or Timer/Overload board connection point, or simply interrupt the positive terminal wire to the grid current meter. The TOF BLUE goes to the meter source, not to the meter terminal.

In most AL1500s W1 connects directly to the meter positive on a white wire. A second white wire comes from the meter board. The white wire from the meter board is the TOF grid current sample source. The white wire to W1 can be disconnected or removed. The TOF Blue will always be connected to the white wire from the metering board. This is the grid current sample point.

6.) The GREEN TOF wire becomes the wire that connects to the grid meter positive terminal. It should be the only wire on the grid meter's positive terminal.

Wiring Hints

Note:

It is okay to shorten wires to the length needed if you pull back the wires to separate as in instructions. The ground wires should not be needlessly long to the chassis grounding lug. It is best to ground to the chassis.

Red is LED positive that is current limited by a resistor inside the TOF

Brown is LED ground that simply goes to the chassis ground via the black wire

Orange must be a 12-15 volt positive switched lead. This lead feeds the TOF trip relay coil and the latching. When you interrupt voltage to this lead (if the overload is gone) the TOF resets. Not connecting this wire disables the overload because it prevents the relay from tripping. The maximum current here is about 50 mA when the internal relay trips and latches. **The orange and gray normally just tie together and are treated as one wire**.

Yellow has to be continuous 12-15Vdc positive at fairly low current, typically less than $1/10^{th}$ ampere. Most of the current is consumed by a Zener diode regulator/protection circuit so the current varies with supply voltage.

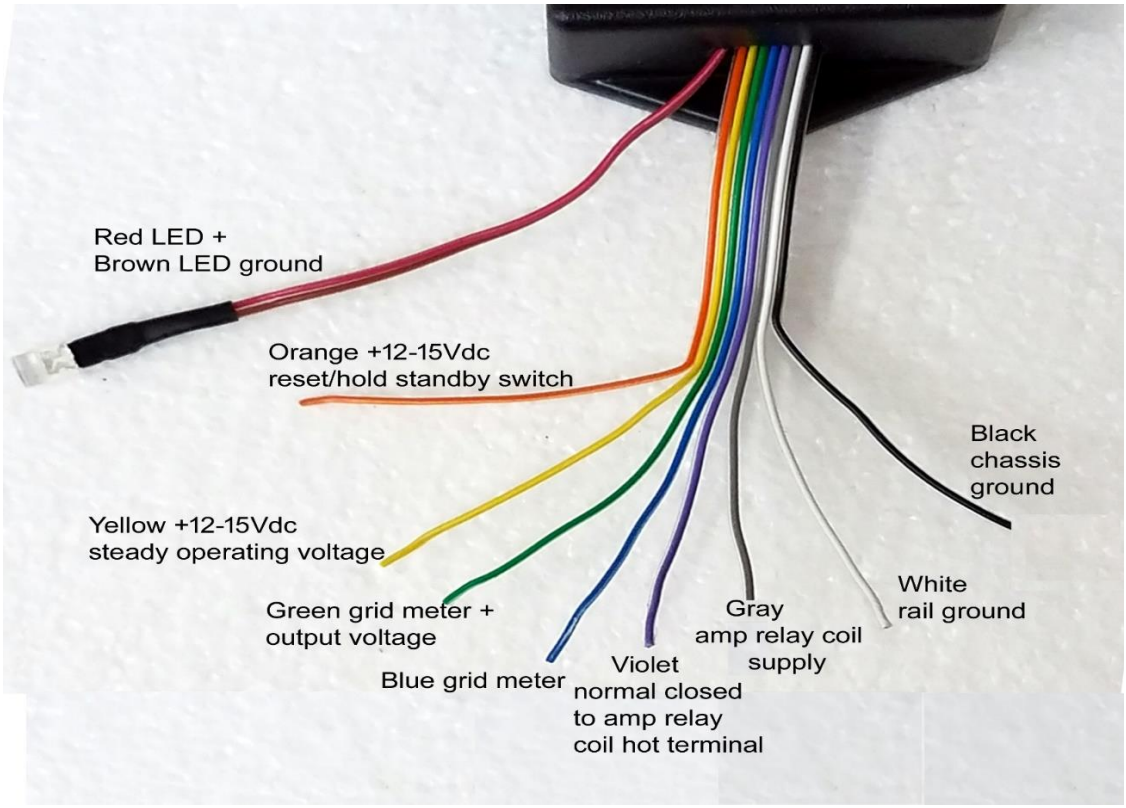
Green is the grid meter positive lead. There can be a very small meaningless off-zero voltage caused by ground loops and noise. This does not affect anything. This lead is RF bypassed and protected. It connects to the grid meter voltage source, normally the grid meter shunt. This is designed for a POSITIVE grid meter source that is referenced to the chassis. There are ways around this restriction by floating the voltage supply from ground if your amp has a non-chassis meter feed system, like an SB200 Heath.

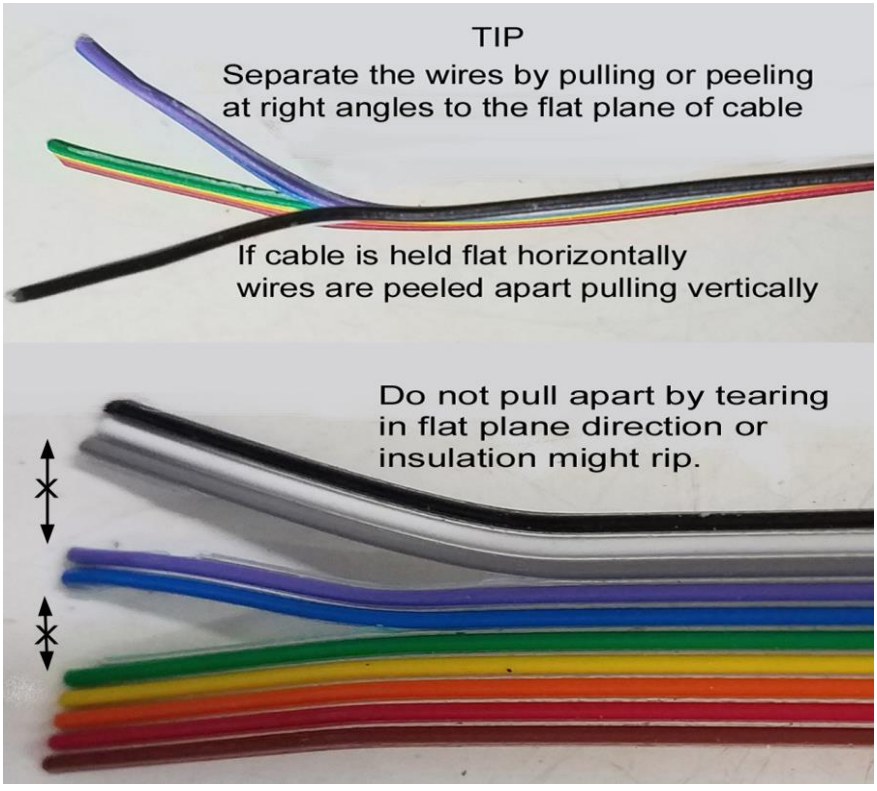
Blue goes to the grid meter positive source from the amplifier grid shunt resistor. The resistance of this path will affect the shunt voltage where the overload light and relay trips.

Violet is the normally closed relay contact used to run the amplifier relay circuit. It can be more than 12 volts but less than 30 volts, it is just a relay contact. It normally goes to the lead leaving the standby switch and going to the relay system with amplifiers using 12V relays.

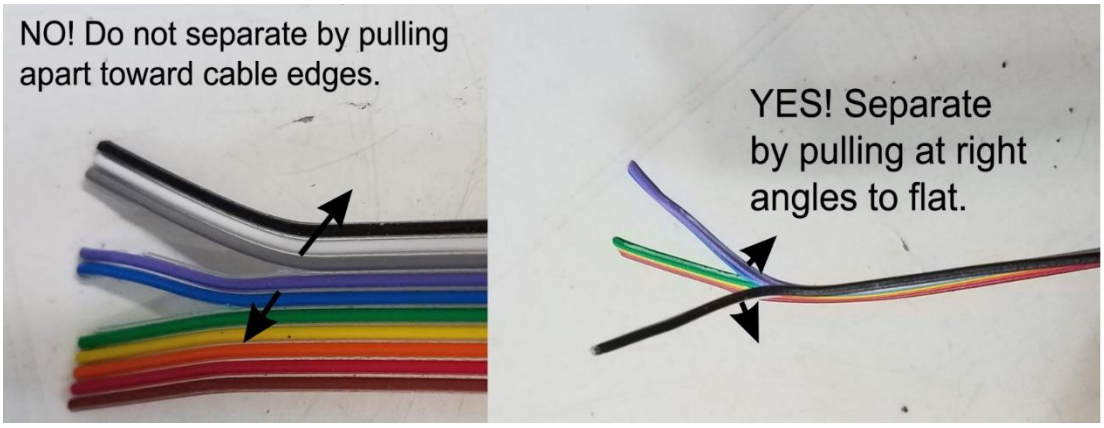
Gray connects to the supply that runs the amplifier relay. It is the relay common contact in the TOF. The relay inside the TOF interrupts the path to the Violet. There is a 4.7k resistor in the TOF tying the gray loosely to the Orange. ***The gray normally parallels the orange and goes to the amplifier 12V from standby switch.***

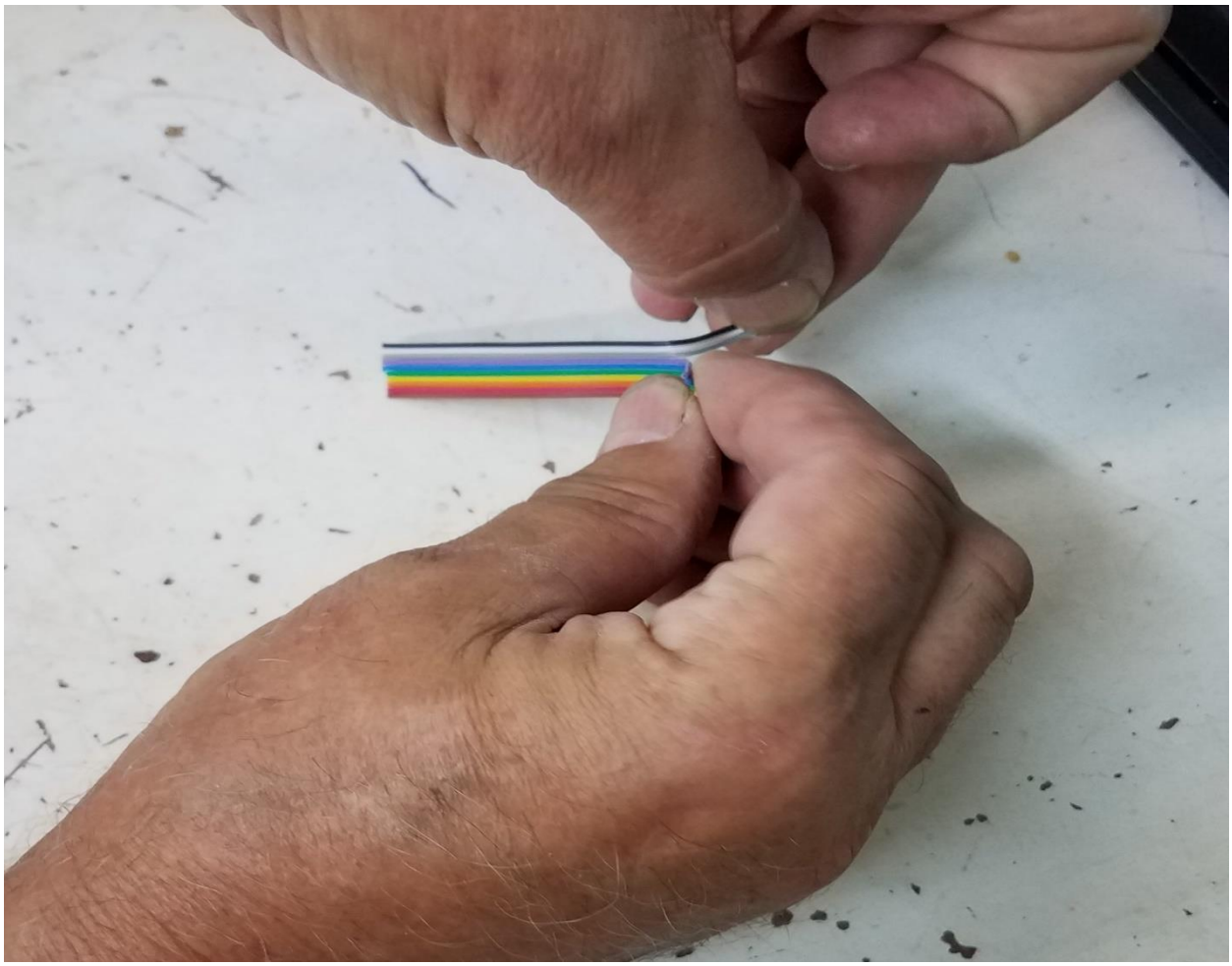
White and Black normally connect as short and direct as possible to the chassis. They are the grounds. The white is directly to op-amp ground bus on the TOF board, while the black is the main grounding bus in the TOF. Almost always they are tied together to amplifier chassis. It is best to connect them to a RF and dc offset zero voltage point, which is almost always the chassis.

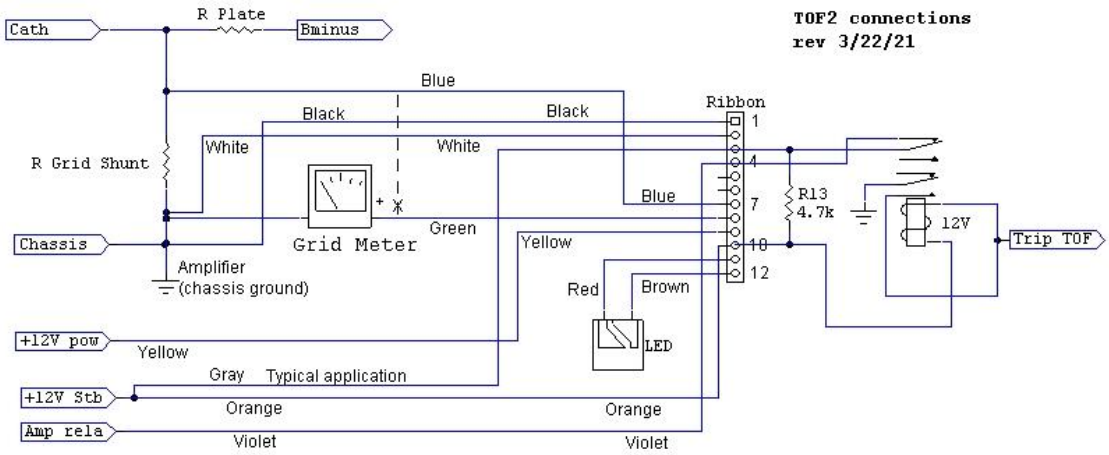




Warming the wires with a hair dryer can help with separating.


NO! Do not separate by pulling apart toward cable edges.
YES! Separate by pulling at right angles to flat.





1 Blk: Ground
2 Wht: Grid Meter - out
3 Gry: Trip relay common
4 Vio A: NC Trip relay
5 Vio B: NO Trip relay
6 Special use only
7 Blu: Grid Meter + input
8 Grn: Grid meter + output
9 Yel: TOF +power 12 to 15volts
10 Org: From standby switch 12V
11 Red: LED
12 Brn: GND

The original positive grid meter wire is interrupted and the TOF inserted. The blue TOF connects to the old meter + wire. The Green TOF wire connects to the meter +. This routes the meter's + wire through the TOF, in on the TOF's Blue and out on the TOF's Green to the meter.

The Orange wire (10) is a +12V latch hold wire for overload. Remove voltage to reset.

The gray wire is the amp relay coil pass through high current common. It normally connects for high current relays. It can be floated for current limited like some AL811H's if you wish to remove the external LED series feed resistor.

The violet is the amp relay normally closed pass through. It opens on overload.