# CONVERTING THE COLLINS 516F-2 POWER SUPPLY TO SOLID-STATE

These instructions describe how to convert the Collins 516F-2 power supply to solid-state using parts supplied in the conversion kit from Harbach Electronics, LLC. The main advantages of the conversion are the removal of heat from the 516F-2 and to prevent tube arc-over. The 516F-2's black power transformer absorbs quite a bit of heat from the rectifier tubes. Extending the life of this transformer is well worth the effort.

Collins engineers recommended solid-state conversion in SIL 1-76 (available on the CCA website – http://www.collinsradio.org). While this is not an official service bulletin, it does show their concern with tube arc-over. It is generally believed that Collins had a solid-state version of the 516F-2 in development, but was never released.

Another advantage is the reduction in filament current by removing the two rectifier tubes.

There has been quite a bit of controversy on modifying the 516F-2. Some believe that the conversion will allow B+ on the plates before the filaments are sufficiently warm. The rectifier tubes in the 516F-2 come to life (produce plate voltage) well before the tubes in the KWM-2 reach operating temperature. In addition, the 6146's are biased to cutoff at power-up, so no electron emission will take place until the PTT line is closed. There have also been many KWM-2 transceivers powered by a Heathkit HP-23 solid-state supply for years. In any case, thousands of owners have converted their 516F-2 with great success.

There are several recommendations to perform this conversion in addition to replacing the two rectifier tubes with some solid state equivalent. First, there is a transient suppressor that should be placed across the AC line input. Next, there is a 25-watt resistor to reduce the increased output voltage caused by the conversion. Then, there is a solid-state diode replacement for the selenium diode used in the bias supply circuit. Finally, there are two diodes connected back-to-back to eliminate the power-on slamming of the S-meter.

Read these instructions very carefully. Now unplug the power supply from the AC outlet and from the radio. Place the supply on the bench and remove the power supply chassis from the outer cabinet. You are now ready to proceed with the installation.

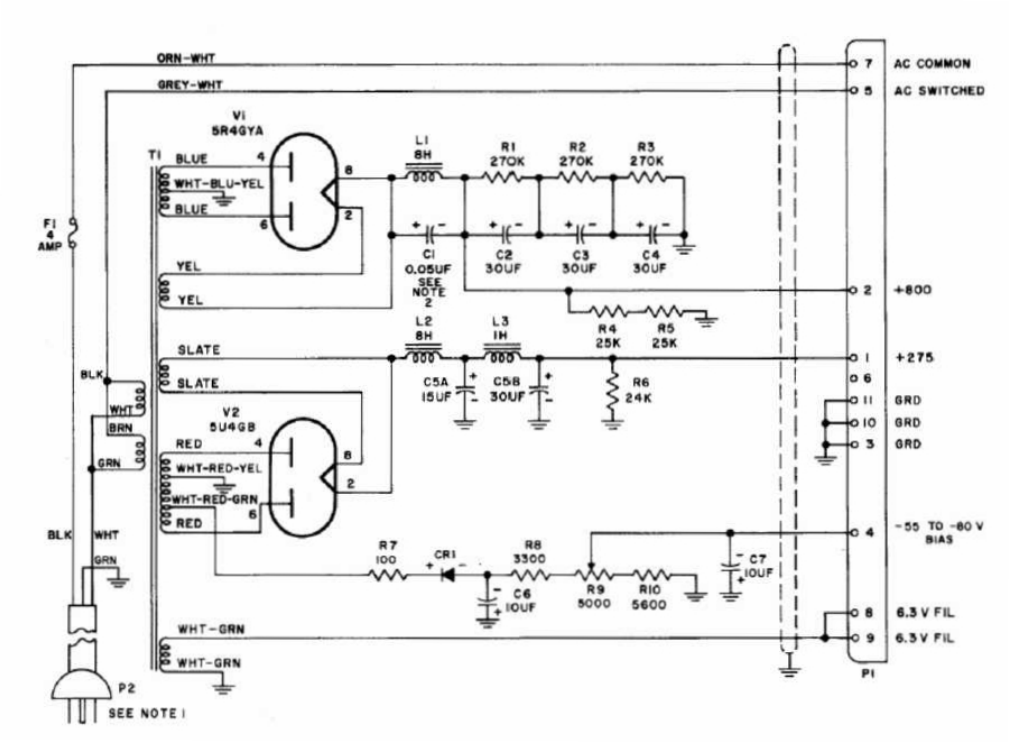
**Be sure to let the power supply voltages bleed off before beginning the conversion!!!**

( ) Verify that you have all of the parts shown in the following parts list.

PARTS LIST

| QUANTITY | PART |
|---|---|
| 2 | 5U4/5R4 SOLID-STATE TUBE REPLACEMENTS |
| 1 | 200Ω 25-WATT ALUMINUM-HOUSED RESISTOR |
| 1 | METAL OXIDE VARISTOR (V20E250P OR EQUIVALENT) |
| 1 | 1 KV @ 3A DIODE (1N5408 OR EQUIVALENT) |
| 2 | 1 KV @ 1A DIODE (1N4007 OR EQUIVALENT) |
| 1 | 12" #20 STRANDED BLACK WIRE |

For reference, the schematic diagram of the un-altered 516F-2 power supply is shown below:




( ) Remove the yellow wire from pin #2 of V1 (5R4) and solder it to pin #5 of V1 (5R4).

( ) Remove the yellow wire from pin #8 of V1 (5R4) and solder it to pin #7 of V1 (5R4). These 2 steps isolate the 5 VAC filament winding of the transformer as it is no longer needed.

( ) Remove the slate wire from pin #2 of V2 (5U4) and solder it to pin #5 of V2 (5U4).

( ) Remove the slate wire from pin #8 of V2 (5U4) and solder it to pin #7 of V2 (5U4). These 2 steps isolate the 5 VAC filament winding of the transformer as it is no longer needed.

( ) Remove the blue wire from pin #2 on V2 (5U4) and solder it to pin #1 on V1 (5R4). Pin #1 of the 5R4 is not used by the 5R4 or 516F-2. It will be used as a tie point for the dropping resistor.

( ) Mount the 200Ω 25-watt aluminum dropping resistor to a convenient location on the chassis. Connect and solder one end of the 200Ω 25-W dropping resistor to pin #8 on V2 (5U4) and the other end to pin #1 on V1 (5R4) using the supplied #20 black wire.

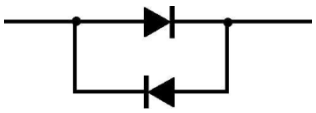
( ) Connect the Metal Oxide Varistor (MOV) across the transformer primary. Use one side of the fuse (**ring section, NOT tip**) and rear tie point mounting strip (the one with a black wire that connects to the transformer primary winding). The MOV transient suppressor is the one that looks like a large ceramic disc capacitor. This will protect the transformer primary from line voltage surges.

( ) Replace the selenium bias rectifier, CR1, with the 1N5408 diode. Be sure to observe the correct polarity.

( ) Remove the old 5U4 and 5R4 tubes and replace them with the solid-state replacements.

( ) Assemble the meter protection diodes (2 x 1N4007 diodes back-to-back) according to the schematic drawing below. This is most easily accomplished by placing the two diode bodies together (opposite

polarity) and wrapping the legs of one diode around the other, trimming and then soldering the wrapped legs to the straight diode legs.

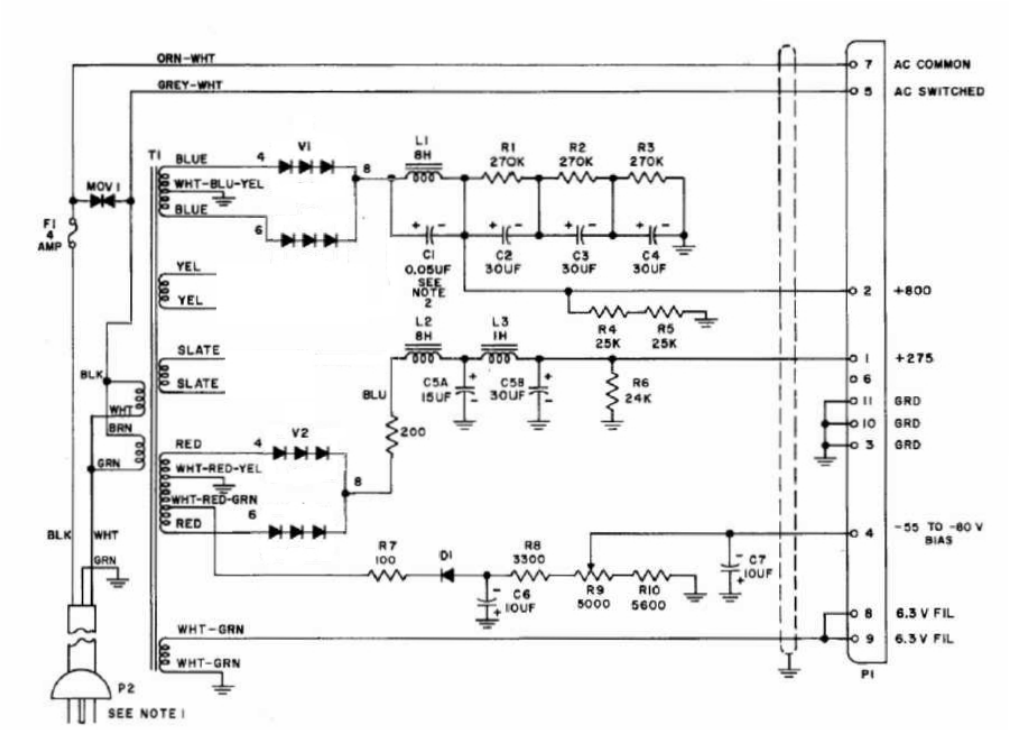


( ) Attach the meter protection diode assembly directly across the meter studs in the transceiver (KWM-2) or transmitter (32S-1/3), whichever may be the case. This protects the meter from slamming against the pin when first turned on. Leave any capacitor that may be connected across the meter studs.

( ) Check all of your wiring and make sure the modifications have been properly installed before applying power. You may want to check the output voltages of the supply before re-installing in the outer cabinet.

( ) Replace the power supply chassis back in the outer cabinet and re-connect all cables and switch power on. **Adjust R-9 bias potentiometer (right rear of the supply) for proper static current on the 6146's (approximately 40-50 mA).**

For reference, the schematic diagram of the solid-state 516F-2 power supply is shown below:

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