



045-0034-00

PC-52, PC-54
PC-57, PC-58

POWER SUPPLY IMPROVEMENT (OPTION 48)

For the following TEKTRONIX® Oscilloscopes with fixed power cords:

2213 Serial Numbers B010100 - B013039
2215 Serial Numbers B010100 - B014649

This kit contains parts and instructions to modify the power supply to make it less sensitive to power line transients. The triac preregulator circuitry on the Main circuit board and the Current Limit circuit board (A19) are replaced with a new Preregulator circuit board (A18). The RF coil, mounted on the rear of the chassis, is removed. The power receptacle is replaced with an RFI filter assembly (FL9001) and the line fuse (F901) is replaced with a 1A fuse. The CAUTION marker on the plastic rear cover is replaced with a marker with information for the new fuse printed on it.

PARTS INCLUDED IN MODIFICATION KIT:

Ckt No.	Quantity	Part Number	Description	
A18	1 ea		Assembly, Preregulator, consisting of: Shield, elec, pwr supply Support, circuit board, nylon Circuit board, Preregulator	
	1 ea	337-3047-00		
	3 ea	386-4923-00		
	1 ea	670-7706-00		
FL9001	1 ea		Assembly, RFI filter Filter, RFI, 1A 250VAC 48-440 Hz Nut, pl, assem wa, 6-32 x 0.312 in Screw, tpg, tr, 6-32 x 0.25 in, torx Bracket, line filter	
	1 ea	119-1563-00		
	2 ea	210-0457-00		
	2 ea	213-0881-00		
	1 ea	407-3021-00		
F901	1 ea	159-0019-00	Fuse, cartridge, 3AG, 1A 250v 20sec Insulation slvg, elec, 0.186 id, vinyl Cover, CRT, rear, Al Nut, pl, assem wa, 6-32 x 0.312 Screw, mach, 4-40 x 0.75, torx Screw, mach, 4-40 x 0.25, FLH, 100°, torx Screw, mach, 4-40 x 0.437, pnh, torx Capacitor, elctl, 470uf +50-10 pct 50V Resistor, cmpsn, 20k Ω 5 pct 0.25W Marker, ident, mkd CAUTION Bracket, heat sink, Al Wire, elec, 22AWG, bare Marker, ident, Option 48 Label, 045-kit	
	0.271 ft	162-0011-00		
	1 ea	200-2810-00		
	2 ea	210-0457-00		
	1 ea	211-0302-00		
	2 ea	211-0303-00		
	1 ea	211-0305-00		
	C937	1 ea		290-0831-00
	R953	1 ea		315-0203-00
		1 ea		334-5001-06
W952	1 ea	407-2729-01		
	0.063 ft			
	1 ea			
	1 ea			
	1 ea			

INSTRUCTIONS:

WARNING

Before proceeding, position the POWER switch to OFF, then disconnect the power cord from the power source.

CABINET REMOVAL

- () 1. Remove the screw from the right rear side of the cabinet and two screws from the rear panel. Remove the rear panel, feeding the power cord through the panel.
- () 2. Slide the instrument forward out of the cabinet.

HIGH VOLTAGE SHIELD REMOVAL

- () 3. Set the instrument on its left side (as viewed from the front panel) to gain access to the bottom side of the Main circuit board.
- () 4. Remove the screw securing the plastic high voltage cover to the Main circuit board. Press down on rear of cover, slide away from chassis, and remove.
- () 5. Remove the screw securing the high voltage shield to the Main circuit board (located below rear corner of cut-out in right chassis side, adjacent to TP500).
- () 6. Set instrument down and remove the two flat head screws securing the left rear of the high voltage shield to the rear of the chassis frame.
- () 7. Remove the screw securing the front upper right corner of the shield to the chassis.
- () 8. Remove the screw from the front upper left corner and rotate the plastic support bracket away from the high voltage shield.
- () 9. Remove screw securing the upper right rear corner of the shield to the rear of the chassis.
- () 10. Lift the shield up and out of the chassis frame by removing the right rear corner first.

CURRENT LIMIT CIRCUIT BOARD REMOVAL

- () 11. Disconnect the four wires from the Current Limit circuit board (A19).
- () 12. Remove F937, a 0.5A fuse, from the Current Limit circuit board and discard it.
- () 13. Remove the screw and nut securing the circuit board to the chassis. Remove the Current Limit circuit board and the ceramic heat sink located under Q938. Discard parts.
- () 14. Remove the screw and nut nearest the right rear corner of the chassis and transfer them to the hole previously used to mount the Current Limit circuit board.

RF COIL, L925, REMOVAL

- () 15. Disconnect the two leads of coil, L925, from P9025 (P925 in some instruments).

- () 16. Remove the two screws securing the coil/shield assembly to the rear of the chassis; remove and discard the assembly. Retain the screws for later use.

TRANSISTORS, Q940/Q942, REMOVAL

- () 17. Set the instrument on its left side.
- () 18. Locate the circuit board pads for Q940 and Q942 (transistors are mounted on heat sink bracket attached to right side of chassis).
- () 19. Unsolder the leads for Q940 and Q942 from the Main circuit board, using a vacuum-desoldering tool to remove the solder from the circuit board pads. Make sure the leads are free in their holes.
- () 20. Set instrument down. Remove the nut securing U985 to the tab on heat sink bracket. Retain for later reassembling.

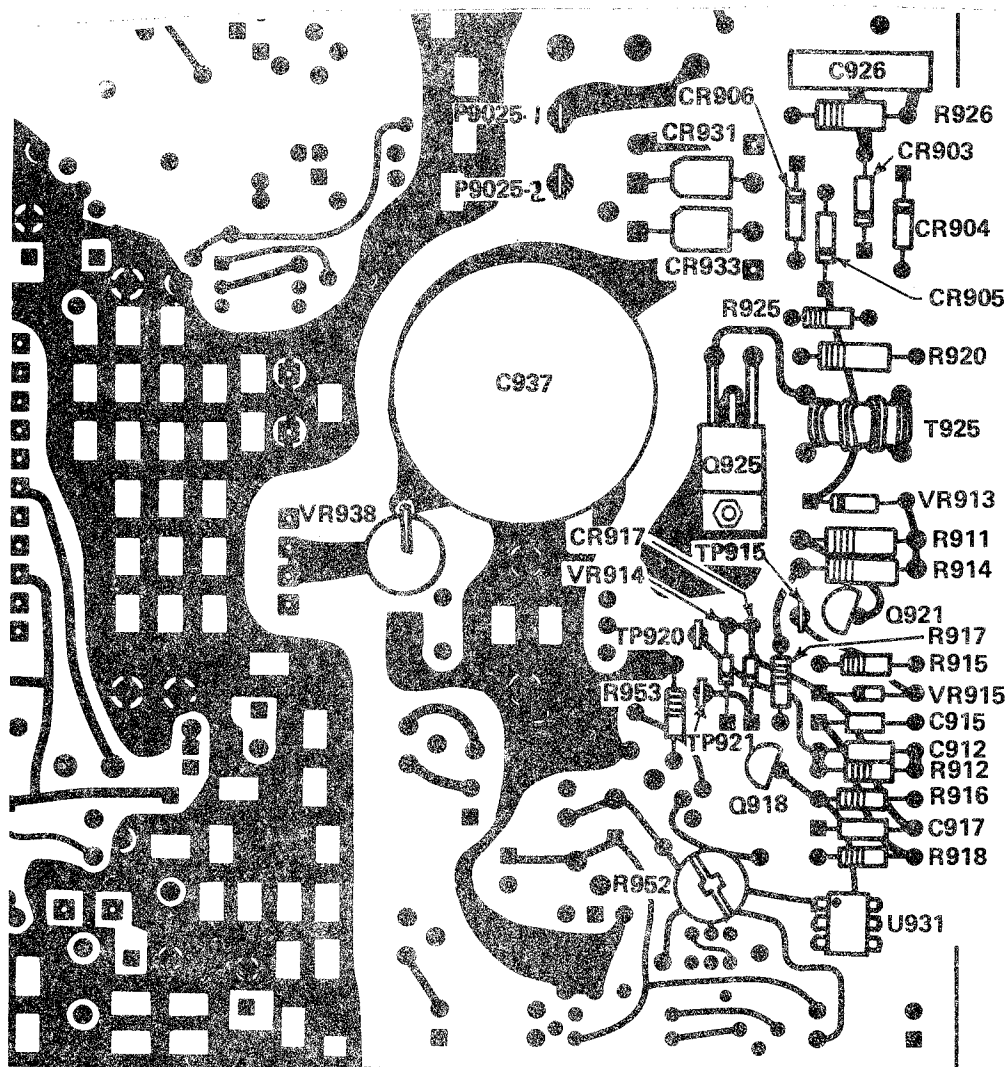


Fig. 1. LOCATIONS OF COMPONENTS REMOVED FROM MAIN CIRCUIT BOARD.

- () 21. Remove the two screws securing the heat sink bracket to the right side of the chassis. Retain for later reassembling.
- () 22. Remove heat sink bracket assembly with Q940 and Q942 attached. Retain for later reassembling.

REMOVAL OF COMPONENTS FROM MAIN CIRCUIT BOARD

NOTE

When performing step 23, it is recommended that the component leads be cut off instead of unsoldered, except where noted otherwise. This reduces the possibility of damaging the Main circuit board.

- () 23. Remove the following components from the Main circuit board (refer to Fig. 1 for locations):
 - (X) a. C926, a 0.068 μ F capacitor.
 - (X) b. R926, a 470 Ω resistor.
 - (U) c. P9025-1, P9025-2 (P925-1, P925-2 in some instruments), quick disconnect terminals. (Unsolder P925-1 and remove solder from pad.)
 - (U) d. CR931, a rectifier diode.
 - (X) e. CR933, a rectifier diode.
 - (X) f. CR906, a diode.
 - (X) g. CR905, a diode.
 - (U) h. CR903, a diode.
 - (U) i. CR904, a diode.
 - (X) j. R925, a 51 Ω resistor.
 - (X) k. R920, a 1M Ω resistor.
 - (U) l. T925, a toroid transformer.
 - (U) m. Q925, a triac thyristor.
 - (X) n. VR913, a zener diode.
 - (U) o. R911, a 180k Ω resistor.
 - (X) p. R914, a 180k Ω resistor.

- (✓) q. Q921, a unijunction transistor.
- (✓) r. TP920, a test point terminal.
- (✓) s. VR914, a zener diode.
- (✓) t. CR917, a diode.
- (✓) u. R917, a 150k Ω resistor.
- (✓) v. TP915, a test point terminal.
- (✓) w. R915, a 2.43k Ω resistor.
- (✓) x. VR915, a zener diode.
- (✓) y. C915, a 0.1 μ F electrolytic capacitor.
- (✓) z. C912, a 0.001 μ F capacitor.
- (✓) aa. R953, a 360 Ω resistor. *Remove solder*
- (✓) bb. TP921, a test point terminal.
- (✓) cc. Q918, an NPN transistor.
- (✓) dd. R912, a 100k Ω resistor.
- (✓) ee. R916, a 22k Ω resistor.
- (✓) ff. C917, a 2.7 μ F capacitor.
- (✓) gg. R918, a 75k Ω resistor.
- (✓) hh. Unsolder R952, a variable 2k Ω resistor, and remove solder from the pads.
- (✓) ii. U931, a six-pin microcircuit.
- (✓) jj. C937, an 1800 μ F electrolytic capacitor.
- (✓) kk. Unsolder VR938, a transient suppressor diode, and remove solder from the pads.

CHANGE WIRING ON MAIN CIRCUIT BOARD

- (✓) 24. Make the following changes to the cable that was connected to the Current Limit circuit board:
 - (✓) a. Unsolder the gray-black-orange and gray-black-yellow wires from the Main circuit board. Pull the two wires out of the insulation sleeving and retain the wires for later use.

- (✓) b. Unsolder the gray-black-brown wire from the circuit board and resolder it to P9025 (P925), pin 1. Pin 1 is the pin closest to P9000 (P900).

NOTE

Leave the gray-black-red wire connected where it is.

- (✓) 25. Trim the gray-black-yellow wire to the same length as the gray-black-orange wire (retained in step 24a).

- (✓) 26. Insert the two wires into the insulation sleeving provided in the kit.

- (✓) 27. Solder the gray-black-orange wire to the square pad vacated by VR938.

- (✓) 28. Solder the gray-black-yellow wire to the pad vacated by the anode of VR938.

- (✓) 29. Solder W952, a piece of the 22AWG bare wire provided in the kit, between the two outside pads vacated by R952.

ADD COMPONENTS TO MAIN CIRCUIT BOARD

- (✓) 30. Install the 20k Ω resistor, provided in the kit, in the pads for R953.

- (✓) 31. Install the 470 μ F electrolytic capacitor, provided in the kit, in the pads vacated by C937. Ensure the positive lead of the capacitor is soldered to the pad labeled "+".

- (✓) 32. Transfer Q940 and Q942, the heat sink plate insulator, and the transistor retainer from the old heat sink bracket (retained in step 22) to the new heat sink bracket, provided in the kit. Secure with the hardware removed from the old bracket. Discard old bracket.

NOTE

The ceramic heat sink plate insulator may be cracked. This does not affect its operation and it may be reused when reassembling the heat sink/transistor assembly.

- ✓) 33. Attach the heat sink/transistor assembly to the Main circuit board using the screw and nut retained from step 20. (Be sure the heat sink tab on U985 is secured to the heat sink bracket).
- ✓) 34. Secure the heat sink bracket to the right side of the chassis using the screws (retained in step 21) that previously secured the old heat sink bracket to the chassis.
- ✓) 35. Resolder the leads of Q940 and Q942 to the Main circuit board.

INSTALL NEW LINE FILTER, FL9001

- () 36. Slide the line fuseholder cover back and unsolder the brown wire from the fuseholder. Remove the fuseholder cover.
- () 37. Disconnect the blue power cord wire with the quick disconnect connector from P9000 (P900 in some instruments) on the Main circuit board, noting location for later reassembling.
- () 38. Cut off the blue wire as close to the quick disconnect connector as possible. Trim the insulation back about 1/8 inch.
- ✓) 39. Use the two screws retained in step 16 to mount the provided RFI filter assembly on the rear of the chassis where RF coil, L925, was removed. Thread the upper screw into the pressmounted nut on the filter bracket but do not tighten; tighten the lower mounting screw.

NOTE

The RFI filter assembly should be mounted with circuit board mounting tab towards the top. When mounted correctly, the three filter terminals will point towards the line fuseholder.

- () 40. Solder the brown, power cord wire to the RFI filter terminal directly across from the brown, filter lead.
- ✓) 41. Solder the blue, power cord wire to the RFI filter terminal directly across from the blue, filter lead.
- ✓) 42. Slide the fuseholder cover onto the brown lead of the RFI filter and solder the brown lead to the line fuseholder. Slide the cover over the fuseholder.
- ✓) 43. Plug the blue lead of the RFI filter onto P9000 (P900) on the Main circuit board in the location noted in step 37.

INSTALL PREREGULATOR CIRCUIT BOARD ASSEMBLY

NOTE

The new Preregulator circuit board (A18), provided in the kit, mounts component side down, above the Main circuit board. It is secured to the heat sink bracket and the oscilloscope chassis.

- () 44. Ensure that a thin film of thermal grease exists on both sides of the ceramic insulator/circuit board assembly that mounts between Q933 and the heat sink bracket.

WARNING

Handle silicone grease with care. Avoid getting the silicone grease in your eyes. Wash hands thoroughly after use.

- () 45. Connect the following wires with quick disconnect terminals to the Preregulator circuit board as follows:
 - () a. The gray-black-orange wire to P803.
 - () b. The gray-black-yellow wire to P804.
- () 46. Secure the Preregulator circuit board to the tab on the line filter bracket, using one of the 4-40 x 0.25 in flat head screws provided in the kit.

NOTE

After tightening the screw securing the circuit board to the tab on the filter bracket, tighten the upper screw securing the bracket to the chassis. This was left loose in step 39 to allow access to the circuit board mounting screw.

- () 47. Secure the Preregulator circuit board to the right side of the chassis (hole nearest right rear corner), using remaining 4-40 x 0.25 in flat head screw provided in the kit.
- () 48. Secure the right front corner of the Preregulator circuit board to the heat sink bracket using the 4-40 x 0.75 inch screw provided in the kit. (Note - this screw also secures the ceramic insulator/circuit board assembly for Q933 to the heat sink bracket.)

49. Connect the two remaining wires with quick disconnect terminals to the Preregulator circuit board as follows:
- a. The gray-black-brown wire to P801.
 - b. The gray-black-red wire to P802.

INSTALL HIGH VOLTAGE SHIELD AND COVER

NOTE

When reinstalling the high voltage shield, make sure the shield's upper rear edge is in the chassis frame guide, the CRT socket wire assembly is in its cut-out, and the Alt Sweep circuit board is in its plastic holder.

- 50. Set the metal high voltage shield in position.
- 51. Insert the 4-40 x 0.437 inch pan head screw, provided in the kit, into the perforation in the front of the high voltage shield that lines up with the press-mounted nut on the Preregulator circuit board EMI shield (second row of perforations, directly above CRT anode lead). Tighten screw.
- 52. Perform the reverse of the procedure in steps 3 through 9 to complete installation of the high voltage shield and plastic high voltage cover.

INSTALL NEW CRT COVER AND LINE FUSE

- 53. Install the rear CRT cover, provided in the kit, over the rear CRT socket and fasten to the rear of the chassis using the two nuts provided in the kit.
- 54. Replace line fuse, F901, with the 1A 250V fuse provided in the kit.

CHECK PERFORMANCE, INSTALL CABINET, ADD MARKER AND LABEL

- () 55. Refer to the Performance Check/Adjustment sections of the appropriate Service Manual and the attached Instruction Manual Modification Insert and make any necessary checks and adjustments.
- () 56. Replace the CAUTION identification marker on the plastic rear cover with the new, adhesive-backed CAUTION marker provided in the kit.
- () 57. Remove the protective backing from the Option 48 identification marker and apply the marker to a clean, dry area on the plastic rear cover.
- () 58. Remove the protective backing from the 045-Kit label, provided in the kit, and apply the label to a clean, dry area on the plastic rear cover. The label indicates this kit has been installed.
- () 59. Perform the reverse of the procedures in steps 1 and 2 to reinstall the cabinet and rear cover.
- () 60. For future reference, fasten the attached Instruction Manual Modification Insert into the Service Manual.

DH:cp