



050-1841-01

M35134, M56884

## BATTERY REPLACEMENT

For the following TEKTRONIX<sup>®</sup> Oscilloscopes:

211 Serial Numbers B010100 - UP  
212 Serial Numbers B010100 - B103453  
214 Serial Numbers B010100 - B113464

Battery Assembly, pn 146-0033-02, replaces Battery Assembly, pn 146-0033-00, which is no longer available. Use of the new assembly requires removing CR215 from the Power Supply circuit board and replacing it with a circuit board (the Rectifier Board circuit board, A5).

## NOTE

If the instrument serial number is greater than those listed above, or if this kit has already been installed, disregard these instructions and use pn 146-0033-02 as a direct replacement.

## KIT PARTS LIST:

Ckt. Number	Quantity	Part Number	Description
A5	2 ea	146-0033-02	Battery assy. set of 5
	1ea	214-3012-00	Fastener, snap-in
	1ea	670-8208-00	Circuit board, Rectfier
	1ea	-----	Label, 050-kit

## INSTRUCTIONS:

### WARNING

*To avoid electric-shock hazard, disconnect the instrument from all other electrical equipment and the power source before proceeding.*

*The following instructions are for use by qualified service personnel only. To avoid personal injury, do not perform any of the following procedures unless you are qualified to do so.*

## BATTERY REMOVAL

- ( ) 1. Lay the instrument upside down on the work surface.
- ( ) 2. Remove the two screws located at the front of the instrument, under the crt.
- ( ) 3. Remove the nylon screw, located at the center of the case.
- ( ) 4. Unwrap the probes and power cord from the case.
- ( ) 5. Remove the two screws located at the rear of the case (the screws are covered when the probes are wrapped around the case).
- ( ) 6. Grasping the handle (on the bottom of the instrument) with one hand, and using the thumb of the other hand to press against the crt to hold it in place, and using a gentle rocking motion, lift the bottom case up and away from the instrument.

**NOTE**

*To facilitate reassembly of the instrument, draw a diagram which details the routing of the probe leads and the ac line cord inside the instrument case.*

- ( ) 7. Lift the entire assembly from the top cover (the side cover does not need to be removed).
- ( ) 8. Carefully lift the Power Supply circuit board up off the assembly, and disconnect the batteries.

**NOTE**

*Before proceeding further, make a diagram detailing the orientation and location of all multipin connectors and cables, for use as a reference when reassembling the instrument.*

- ( ) 9. Disconnect the multipin connectors from the Power Supply circuit board.

**ADD THE A5 RECTIFIER CIRCUIT BOARD**

- ( ) 10. Locate CR215 on the Power Supply circuit board and remove it.
- ( ) 11. Solder the Rectifier circuit board (A5) into the holes vacated by CR215. For 211's, the front (component side) of the Rectifier circuit board should face C210 (See Fig. 1). For 212's and 214's, the front of the Rectifier circuit board should face the crt (See Fig. 2). Clip any long leads flush with the board.
- ( ) 12. On 212's and 214's, add the snap-in fastener to the Power Supply circuit board as shown in Fig. 2.
- ( ) 13. **211's only.** In order to provide clearance for the battery pack on the Power Supply circuit board, the insulating board attached to the Rectifier circuit board must be removed. The insulating board must not be removed from 212's or 214's.

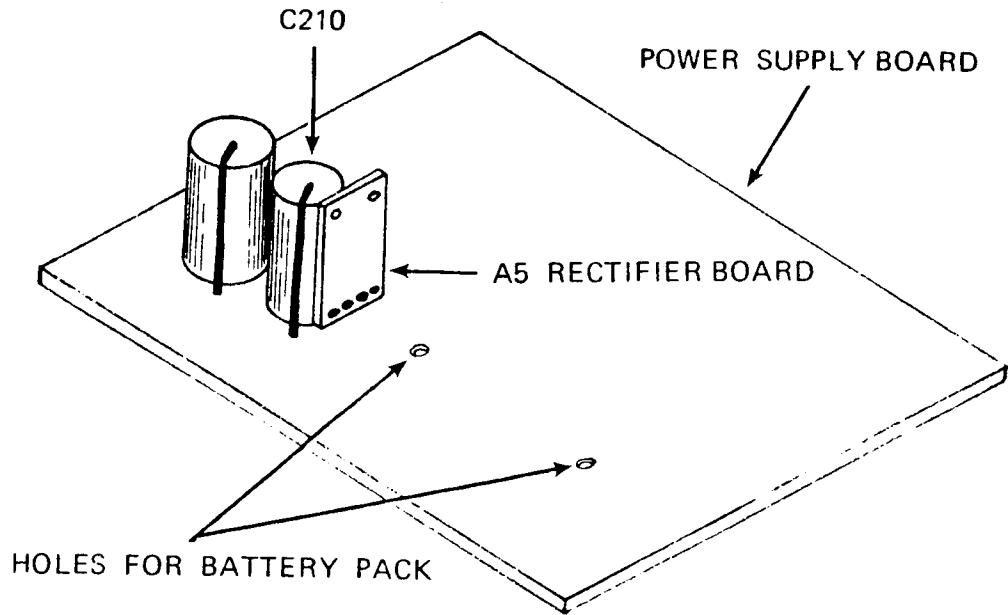


Fig. 1 - Power Supply circuit board

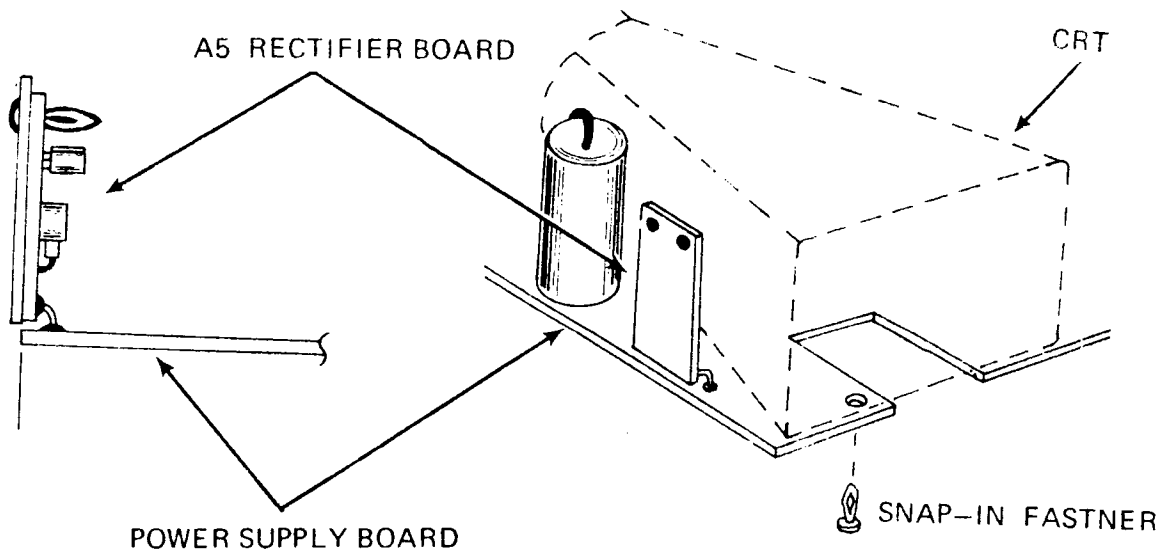


Fig. 2 - Snap-in fastener installation

## REASSEMBLE INSTRUMENT

- ( ) 14. Reconnect the multipin connectors to the Power Supply circuit board.
- ( ) 15. Mount the batteries onto the Amplifier circuit board. The nibs on the plastic end caps mount into holes in the Amplifier circuit board. The batteries should mount flush against the circuit board, there should not be any components between the batteries and the circuit board. It is best if the side of the battery pack on which the fuse is mounted faces the crt.
- ( ) 16. Connect the battery leads to the power Supply circuit board. Ensure proper orientation of the connector before pushing the connector onto the pins.

### CAUTION

*Before mounting the Power Supply circuit board, there are a number of components on the circuit board which should be pushed down against the circuit board so that they do not touch the crt shield when the circuit board is mounted. The components which should be pushed down are; 212: C216, C236, R239 (added after B068430), Q215 and VR238; 214: C216, C236, C512, VR238 and R239 (added after B077130), Q215 and P22. If these parts are not pushed down, they may short against the crt shield, resulting in damage to the instrument.*

- ( ) 17. Route the heavy cabling (P1, P2, and P3) behind the crt, and the cabling for P6, and P4 between the battery and the Input circuit board. Lay the Power Supply circuit board down onto the instrument. Ensure that no cabling is caught between the circuit board and the battery packs. The nibs on the battery end caps fit into holes on the Power Supply circuit board.
- ( ) 18. Refer to the Calibration section of the Instruction Manual and verify instrument performance (recalibrate as necessary).
- ( ) 19. Set the instrument (Amplifier circuit board down) into the top case, ensuring the mounting holes in the circuit board fit down over the mounting nibs on the case.
- ( ) 20. Ensure the crt filter is in place.

- ( ) 21. Carefully slide the front of the crt into the grooves in the case.
- ( ) 22. Route the probes and ac line cord according to the diagram made prior to step 7. Note that the metal bands (on the cables) should be inside the case so that they can prevent the cables from being pulled out of the instrument.
- ( ) 23. Set the bottom case down on top of the instrument. Note for 212's and 214's: Push the new Rectifier circuit board in, so it won't tear the foil on the inside of the case. Note that there are mounting nibs on the inside of the bottom case which fit into mounting holes in the Power Supply circuit board. Make sure the side panel is properly seated.
- ( ) 24. Slide in the cord wrap spool (212's and 214's).
- ( ) 25. Check for any pinched cabling between the top and bottom cases.
- ( ) 26. Reinstall the two screws at the rear of the case.
- ( ) 27. Reinstall the two screws at the front of the case, under the crt.
- ( ) 28. Reinstall the nylon screw in the center of the case. Be careful not to overtighten the screw.
- ( ) 29. Remove the protective backing from the 050-kit label, included in the kit, and affix it to a clean area of the bottom case to indicate installation of this kit.
- ( ) 30. Fasten the included Manual Modification Insert into the Instruction manual for future reference.

RH: rh

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# TEKTRONIX

## MANUAL MODIFICATION INSERT

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### BATTERY REPLACEMENT

for

211 Serial Numbers B010100-- UP  
212 Serial Numbers B010100--B113453  
214 Serial Numbers B010100--B113464

Installed in Type \_\_\_\_\_ SN \_\_\_\_\_ Date \_\_\_\_\_

This modification insert is provided to supplement the manual for the above listed product(s). The information given in this insert supersedes that given in the manual.

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### GENERAL INFORMATION

Battery Assembly, pn 146-0033-02, replaced Battery Assembly, pn 146-0033-00, which is no longer available. Use of the new assembly required removing CR215 from the Power Supply circuit board and replacing it with a circuit board (the A5 Rectifier Board).

# REPLACEABLE ELECTRICAL PARTS

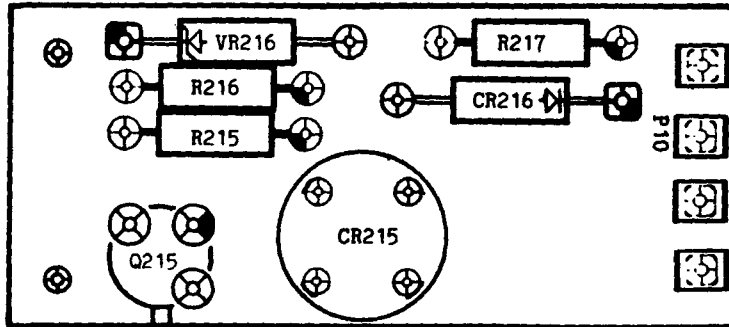
## ADD:

CKT. NO.	PART NUMBER		DESCRIPTION
A5	670-8208-00		CKT BOARD ASSY: RECTIFIER
Q215	151-0503-00	2N5060	SCR: SILICON
CR215	152-0585-00	2W10G	SEMICON DVC, DI: RECT, SI, 200V, 1A
CR216		1N4007	SEMICON DVC, DI: RECT, SI, 1000V, 1A
VR215	152-0590-00	1N5428	SEMICON DVC, DI: ZEN, SI, 18V, 5%, 0.4W
F216	159-0220-00		FUSE, WIRE LEAD: 3A, 125V, FAST
F217	159-0220-00		FUSE, WIRE LEAD: 3A, 125V, FAST
R215	307-0103-00		RES, FXD, CMPSN: 2.7 $\Omega$ , 5%, 0.25W
R216	315-0391-00		RES, FXD, CMPSN: 390 $\Omega$ , 5%, 0.25W
R217	315-0391-00		RES, FXD, CMPSN: 390 $\Omega$ , 5%, 0.25W

## CHANGE TO:

BT216	146-0033-02	BATTERY ASSY:	SET OF 5
BT217	146-0033-02	BATTERY ASSY:	SET OF 5

### A5 RECTIFIER CIRCUIT BOARD





CR 215 on the Power Supply board has been replaced with the new A5 RECTIFIER BOARD. The partial diagram below indicates how the A5 board is wired to the Power Supply Board.

Note that there are also two fuses (F216 and F217) being added to the battery packs. These are also shown in the partial diagram below.

