



050-2212-01

M59509  
M61239, M62945

## **CURSOR CONTROL (R9412) AND EXTENSION SHAFT REPLACEMENT**

For TEKTRONIX® 2230 Storage Oscilloscopes:

Serial Numbers B010100 - B019999

Extension shaft, pn 384-1669-01, and variable resistor, pn 311-2285-01, replace extension shaft, pn 384-1669-00, and variable resistor, pn 311-2285-00, which are no longer available.

Replacement of the extension shaft requires the use of a new shaft coupler and the original inner pin shaft. Replacement of the Cursor Control (R9412) requires the use of a new inner pin shaft, extension shaft and shaft coupler.

The new extension shaft assembly alleviates the Cursor Control wobble in the front panel.

### **NOTE**

If the serial number of this kit is greater than those listed above or if the Digital Storage Circuit Board Replacement kit, pn 050-2167-XX, has been installed, these instructions do not apply. If this kit has been installed, then disregard the instructions and use the extension shafts, coupler and variable resistor as direct replacements.

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## CAUTION

### STATIC SENSITIVE DEVICES

Static discharge can damage any semiconductor component in this instrument. Static voltages of 1kV to 30kV are common in unprotected environments.

#### TO AVOID DAMAGE, OBSERVE THE FOLLOWING:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist-strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work-surface covering capable of retaining a static-charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only approved, anti-static type, desoldering tools.

**KIT PARTS LIST:**

Ckt. No.	Quantity	Part Number	Description
R9412	1 ea	214-3697-01	Shaft, small, pin
	1 ea	311-2285-01	Resistor, var, 10k $\Omega$ , w/sw mom, SPDT
	1 ea	376-0052-02	Coupler, torque, modified
	1 ea	384-1669-01	Shaft, extension, cursor control
	1 ea	---- ----	Label, 050-kit

**INSTRUCTIONS:****WARNING**

*Dangerous shock hazards may be exposed when the instrument cabinet is removed. Before proceeding, ensure the POWER switch is in the OFF position. Then, disconnect the instrument from the power source. Disassembly should only be attempted by qualified service personnel.*

**CABINET REMOVAL:**

- ( ) 1. Disconnect the power cord from the instrument. For instruments with a power cord securing clamp, remove the philips-head screw holding the power cord securing clamp before disconnecting the power cord.
- ( ) 2. Remove the two screws from the cabinet, one from the right-rear side and one from the bottom front.
- ( ) 3. Remove the two screws used to secure the rear panel and power cord retainers. Set the power cord retainers and rear panel aside.
- ( ) 4. Remove the four screws used to secure the side panel to the left rear side of the instrument (if the instrument has GPIB, remove two screws and two standoffs or if the instrument has RS-232, remove two screws and four standoffs). Set the side panel aside.
- ( ) 5. Pull the front panel and attached chassis forward and out of the cabinet. Set the cabinet aside.

**PLACE THE STORAGE CIRCUIT BOARD IN THE SERVICING POSITION:**

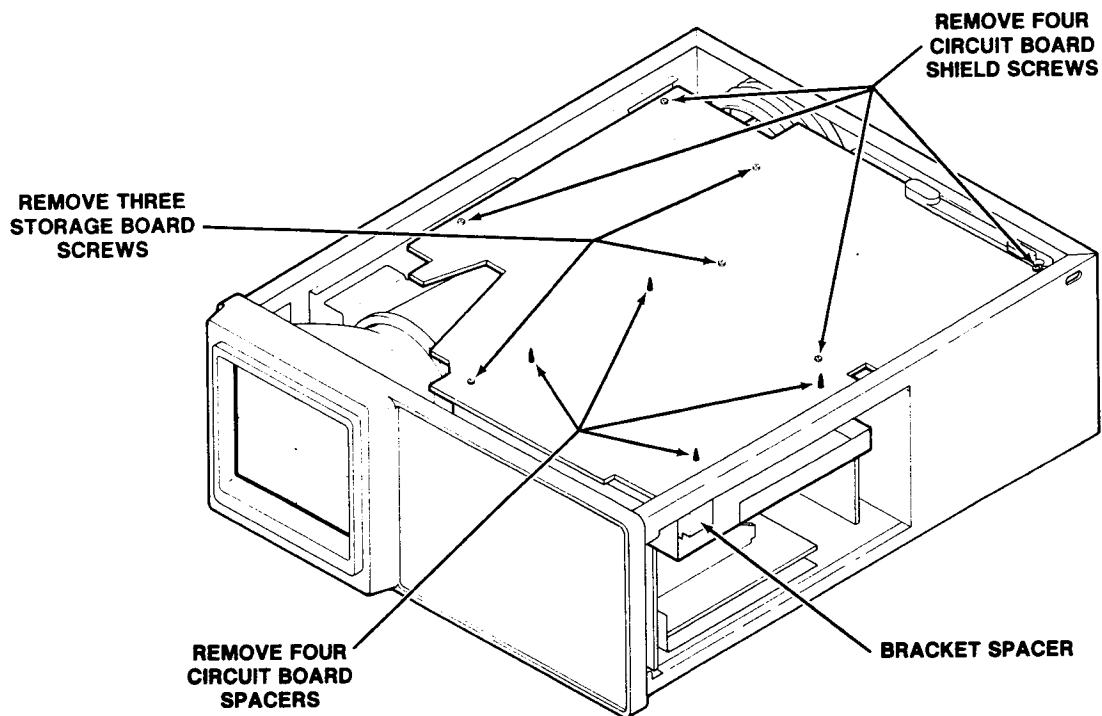
- ( ) 6. Remove the five MEMORY buttons, SELECT WAVEFORM button, four ACQUISITION buttons, STORE button, and extension shafts from their respective switches by inserting a small screwdriver between the extension shaft and the switch shaft. Push down and forward until the extension shaft is disengaged and pull the shafts straight back through the front panel.

- ( ) 7. Disconnect the following connectors from the middle-left edge of the Storage circuit board:
  - ( ) a. P2111, the four-wire CH1 connector. Mark this CH1 connector with a small piece of tape for easy identification when reconnecting.
  - ( ) b. P2112, the four-wire CH2 connector.
- ( ) 8. Remove the three Storage circuit board screws that are identified by the etched words "Remove To Lift Board". Refer to Fig. 1 for location of the three Storage board screws.
- ( ) 9. Remove the CURSORS control knobs and extension shafts. See Fig. 2.

**NOTE**

*If only replacing the extension shaft, save the existing inner pin shaft, pn 214-3697-00. This shaft is slightly shorter than the new pin shaft that must be used when replacing the CURSORS potentiometer, R9412.*

- ( ) 10. Raise the Storage circuit board to the service position ensuring that the board latch clears the top of the chassis side rail. Place the board latch tab in the chassis side rail slot.



**Fig. 1. Screws and Spacers on the Storage Board.**

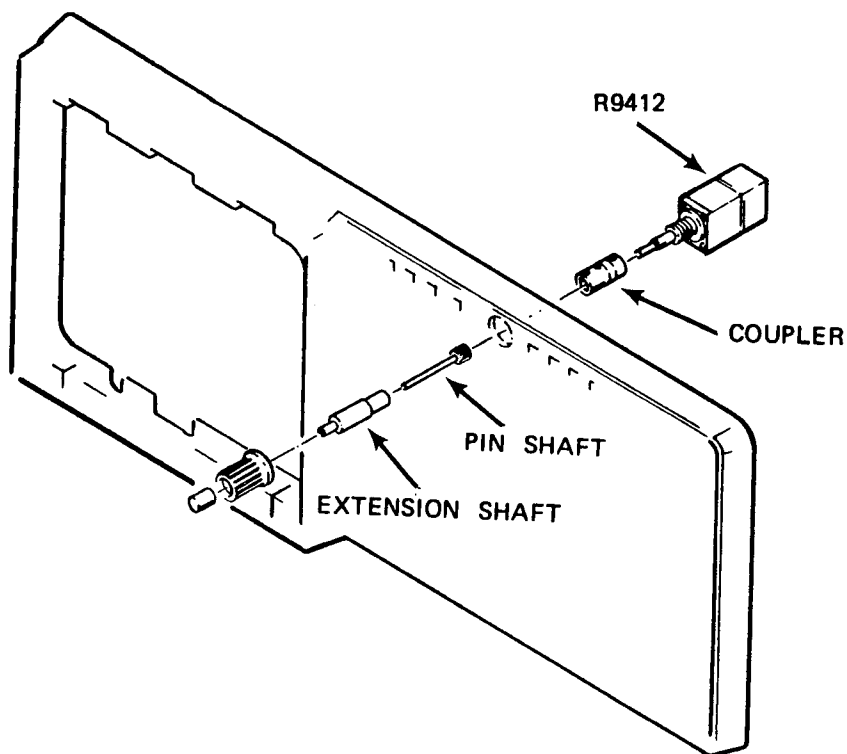


Fig. 2. Extension Shaft Installation.

REPLACE EXTENSION SHAFTS AND R9412:

NOTE

*If the potentiometer, R9412, is to be replaced in addition to the extension shaft, proceed with steps 11 through 17; otherwise, go to step 18.*

- ( ) 11. Remove the ground clip near the center edge of the Storage chassis (towards the instrument).
- ( ) 12. Unsolder the strap from the ground clip near the center of the Storage chassis.
- ( ) 13. Remove the four circuit board shield screws from the Storage circuit board (see Fig. 1 for location of the four circuit board shield screws). Remove the two screws located on top of the Storage circuit board last.
- ( ) 14. Remove the screw holding the bracket spacer (see Fig. 1). Be careful not to lose the insulator washer under this screw.
- ( ) 15. Pull the Storage board shield away from the back of the circuit board.

- ( ) 16. Replace the CURSORS potentiometer, R9412, on the Storage circuit board with the 10k $\Omega$  potentiometer included in this kit.
- ( ) 17. Install the Storage board shield by performing the reverse of the procedure described in steps 11 through 15.
- ( ) 18. Mount the new coupler, included in this kit, on the potentiometer shaft as shown in Fig. 2.

### CAUTION

*Do not tighten the center set screw in the coupler (see Fig. 2).*

- ( ) 19. Lower and secure the Storage circuit board using the reverse of the procedure described in steps 6 through 8. Ensure the new coupler clears the front chassis.

### NOTE

*When mounting the new extension shaft in the following step, use the new pin shaft included in this kit if replacing the CURSORS potentiometer, R9412; otherwise use the original pin shaft removed in step 9.*

- ( ) 20. Place the pin shaft into the new extension shaft and mount the extension shaft through the front panel as shown in Fig. 2.
- ( ) 21. Install the CURSORS control knobs removed in step 9.
- ( ) 22. Refer to the Performance Check Procedure in the 2230 Service Manual and verify instrument operation.
- ( ) 23. Install the instrument cabinet by performing the reverse of the procedure described in steps 1 through 5.
- ( ) 24. Remove the protective backing from the 050-kit label, included in this kit, and place label on a clean, flat surface of the rear panel to indicate this kit has been installed.
- ( ) 25. For future reference, update the Replaceable Electrical and Mechanical Parts list in the 2230 Service Manual with the information provided in the parts list of this kit.

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