



Removal and Installation Procedures

This subsection contains procedures for removal and installation of all mechanical and electrical modules. Any mechanical module, assembly, or part listed in Section 10 of this manual is a module.

WARNING

Before performing this or any other procedure in this manual, read the Safety Summary at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to components of this oscilloscope, read Before Servicing and Supplying Operating Power in Section 2 and Preventing ESD in this section.

This subsection contains the following:

- This preparatory information that you need to properly do the procedures that follow.
- List of Equipment required to remove and disassemble all modules.
- Procedures for removal and reinstallation of the electrical and mechanical modules.
- A circuit board module locator diagram (see Figure 6-1) for identifying the circuit boards in this oscilloscope.
- Module disassembly procedures.

WARNING

To prevent serious injury or death, disconnect the external power connection and the battery from the oscilloscope before doing any procedure in this subsection.

List of Modules

Section 8 lists all electrical modules and Section 10 lists all mechanical modules.

General Instructions



READ THESE GENERAL INSTRUCTIONS BEFORE REMOVING A MODULE.

First read over the *Summary of Procedures* that follows to understand how the procedures are grouped. Then read *Equipment Required* for a list of the tools needed to remove and install modules in this oscilloscope.

If you are disassembling this oscilloscope for cleaning or service, do the procedure *Front and Top Case* on page 6-13 and then the appropriate procedures for circuit board/assembly removal.

NOTE

Read the procedures in Inspection and Cleaning on page 6-5 before disassembling the oscilloscope for cleaning.

Summary of Procedures

The procedures are described in the order in which they appear in this section. In addition, you can look up any procedure for removal and reinstallation of any module in the *Table of Contents* of this manual.

- *Front and Top Case* procedure on page 6-13 removes the top and front case pieces to provide access to all internal modules.
- *CRT and Power Supply Board* procedure on page 6-16 removes the CRT and Power Supply board as an assembly from the bottom case.
- *CPU/Display Board* procedure on page 6-18 removes the CPU/Display board from the bottom case.
- *Acquisition board and Main board* procedure on page 6-19, removes the Acquisition and Main boards as an assembly from the bottom case.
- *Front Panel Board* procedure on page 6-22 separates the Front Panel board from the Front case.
- *Keypad board* removal procedure on page 6-23 separates the Keypad board from the Top case.
- *Pot board* procedure on page 6-24 removes the Pot board from the potentiometer bracket.

Equipment Required

Most modules in this oscilloscope can be removed with a screwdriver handle mounted with a size T-15, Torx® screwdriver tip. Table 6-4 lists the tools needed to remove and replace the modules in the oscilloscope. All equipment required to remove and reinstall each module is listed at the beginning of its procedure.

Table 6-4: Tools Required for Module Removal and Installation

Item No.	Name	Description	Tektronix Part Number
1	0.050 inch Hex wrench	L-shaped for best access to knob set screws	
2	Screwdriver handle	Accepts Torx® driver tips	003-0301-00
3	Torx head tip	T-15 tip (recommended 2 inch length)	003-0966-00
4	Angle-tipped Tweezers	Standard tool	
5	Adhesive	PRISM 454 gel, Loctite #45440	
6	Accelerator	Tak Pak spray, Loctite #14647	

Circuit Board Identification

Figure 6-1 identifies and shows the location of the oscilloscope circuit boards. The procedure *Front and Top Case* on page 6-13 provides access to the circuit boards.

CAUTION

All assembly and disassembly of the instrument must be done at an approved anti-static work station. The semiconductor devices in the instrument are highly susceptible to static discharge damage.

Removal and Installation

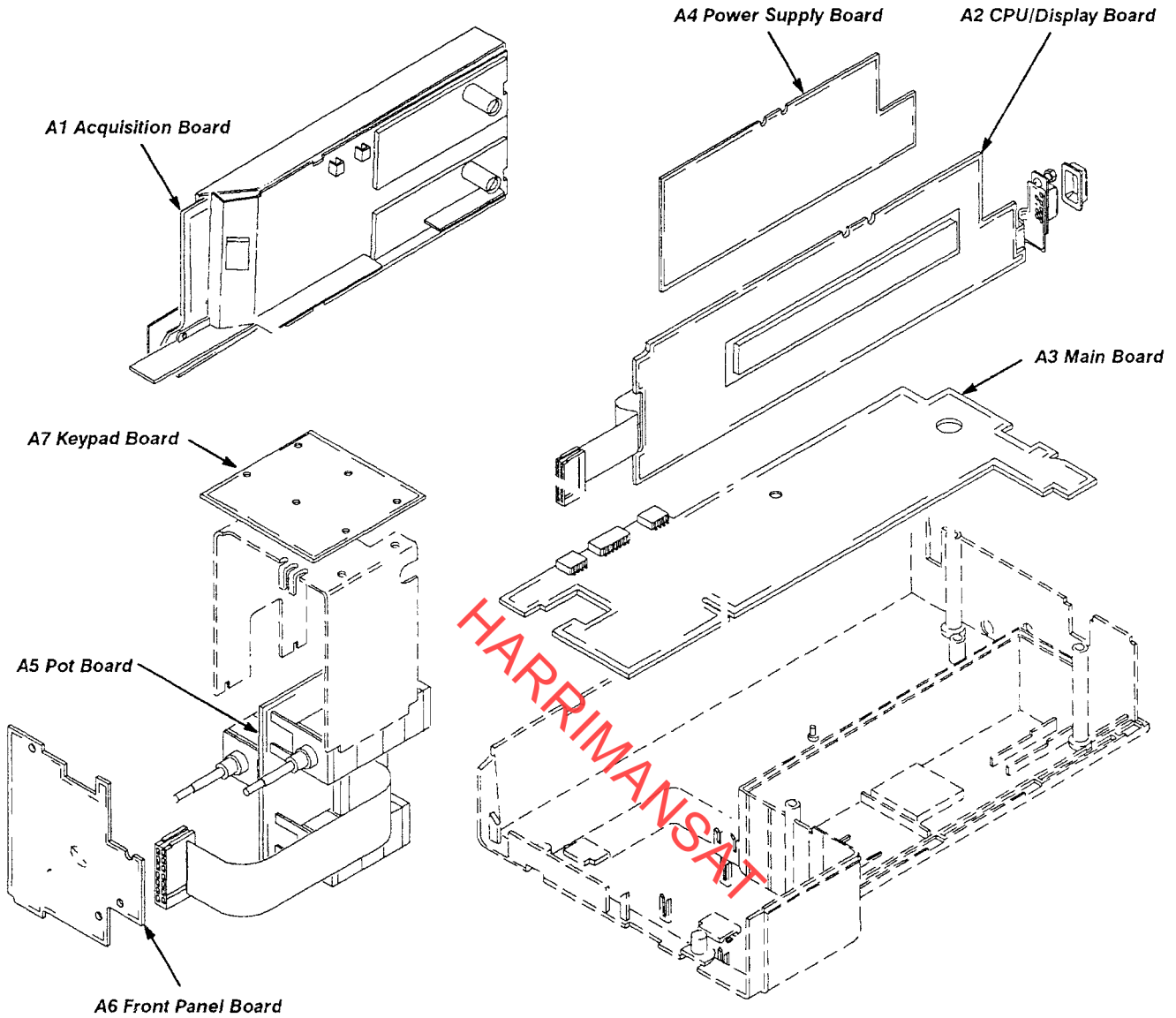


Figure 6-1: Circuit Board Identification

Front and Top Case

The Front and Top Case procedure prepares the oscilloscope for access to internal modules or to internal calibration adjustments. Refer to Figures 6-2 and 6-3 during the following procedure.

Equipment Required (See Table 6-4)

0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)

1. Remove probes, probe pouch and battery cover.
 - a. Unzip the probe pouch; unplug the probes (if connected) and remove the probes from the pouch.
 - b. Place the instrument on its side and slide the probe pouch and battery compartment cover toward the rear of the instrument to disengage the locking tabs.
 - c. Lift the probe pouch and battery compartment cover up and off the instrument.
2. Remove the battery: Disconnect the three wire battery connector and remove the battery pack from the compartment.
3. Remove the front-panel knob assemblies.
 - a. Remove the three smaller rubber knob shells labeled **POS** (two shells) and **AUTO LVL:PUSH**. This can easily be done by placing a small angle-tipped object (such as a tweezers) behind the knob shell and gently prying the knob shell off the knob insert. Figure 6-2 shows how to take the knobs off.
 - b. Using a 0.050 inch hexagonal wrench, loosen the setscrews in the exposed knob inserts and remove them.
 - c. Remove the three larger, knob shells and inserts in the same manner as the smaller ones.
4. Remove screws from the bottom case.
 - a. Place the instrument on its top case as shown in Figure 6-3. Lift the flip stand up.
 - b. Use a T-15 Torx-head tip screwdriver to remove the two short screws at the front, the two long screws at the rear, and the long screw located under the flip stand. Fold the flip stand back against the case.

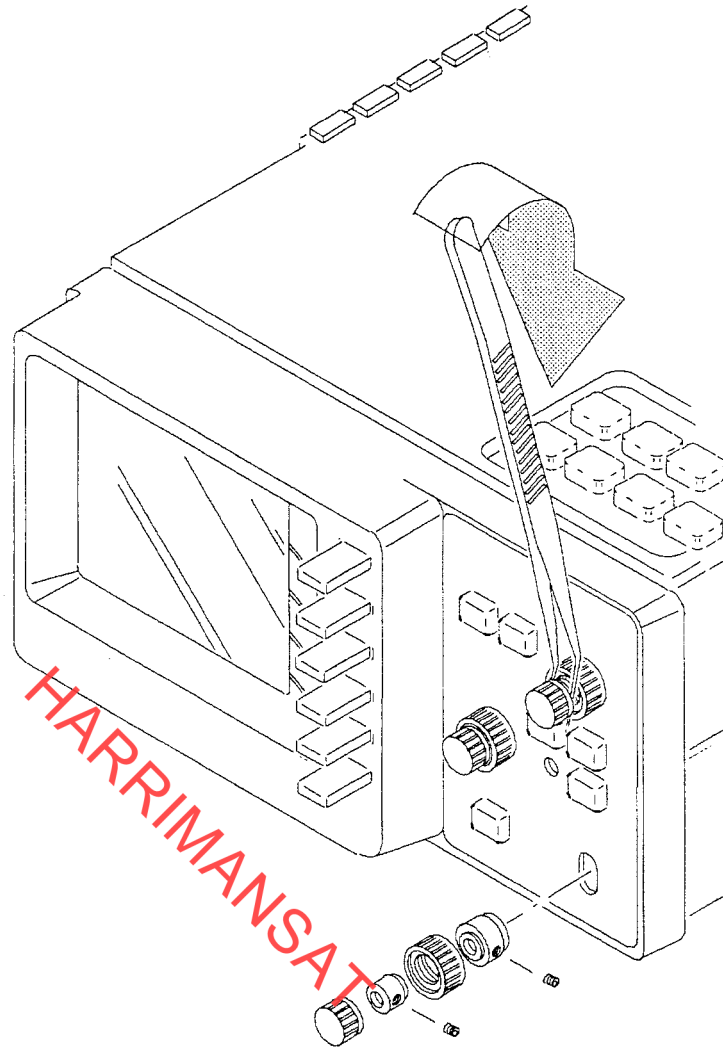


Figure 6-2: Removing Knobs From the Front Panel

5. Remove the front case.
 - a. Turn the instrument over and set it down with the front panel facing you.
 - b. Pull the bottom of the front case piece out until it clears the bottom case. Disengage the front case from the top case and carefully pull it away from the instrument, extending the connecting cables only about an inch.
 - c. Note the orientation of the six-wire cable that comes from the Keypad board (attached to the top case), to the Front Panel board for correct installation later. Disconnect the cable at the Front Panel board.

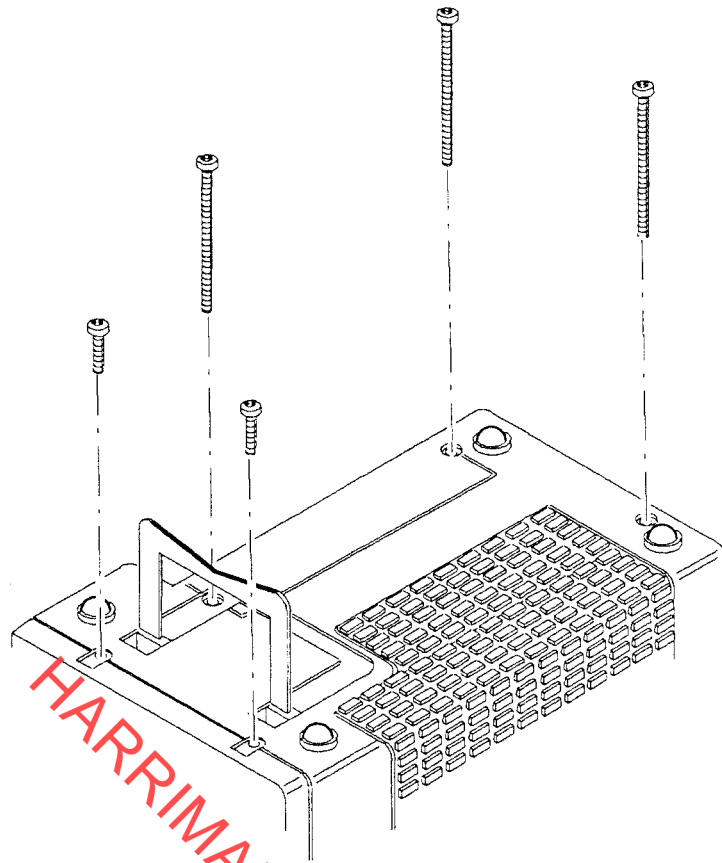


Figure 6-3: Removing Screws from the Bottom Case

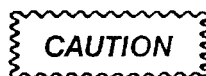
6. Lift the top case off the instrument.

NOTE

If you are removing the top case for calibration only, do not disassemble the instrument further. Do not separate the Front Panel or Keypad board from their case attachments unless you intend to change the boards or their rubber push-button actuators.

7. Reinstallation: If any circuit boards were removed, ensure that they are now positioned correctly for reassembly. To install the top case, carefully align the two halves while making sure the following items are all in place:
 - a. The probe receptacle is in its grooves and the COMM Port is in the case slot.
 - b. The Keypad board guide posts fit in the holes of the Pot board bracket.
 - c. The handle strap is properly captured between the top and bottom clips in the case halves.

Perform Steps 1–6 in reverse order. When installing the bottom case screws apply 4 in/lbs of torque. When replacing both sizes of knob inserts, position the smaller diameter surface towards the instrument. Space the large inserts 0.2" from the front case and the small knob inserts 0.2" from the large inserts to ensure travel for the center push button of each potentiometer.



Do not overtighten the setscrews in the knob inserts. Excessive pressure can burr the potentiometer shafts and make the knobs difficult to remove. The recommended torque is 2 in/lbs.

CRT and Power Supply Board

The CRT and Power Supply board removal procedure removes the CRT and Power Supply board as an assembly from the bottom case. Refer to Figure 6-4 during this procedure.

Equipment Required (See Table 6-4)

0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)

1. To gain access to the circuit board, remove the front case and top case: Perform the procedure *Front and Top Case* on page 6-13.

WARNING

The CRT is a high-vacuum component. Wear the proper eye protection when handling the CRT. Use care not to place excessive strain on the neck or connector pins. Place the CRT in a protected location while it is out of the instrument.

2. Remove the probe receptacle: Pull the probe receptacle up and out of the bottom case. You can leave the input signal cables connected to the Acquisition board.
3. Remove the CRT and the Power Supply board.
 - a. Pull up on the front of the CRT until you can grasp the Power Supply board. Leave the support bracket on the neck of the CRT.
 - b. Hold the CRT up a little while you pull the Power Supply board up from the front and out of its connectors on the Main board.

- c. Bring the CRT and Power Supply board forward and out of the instrument. The INTENSITY adjustment knob extends through the rear panel and must be moved forward for removal.

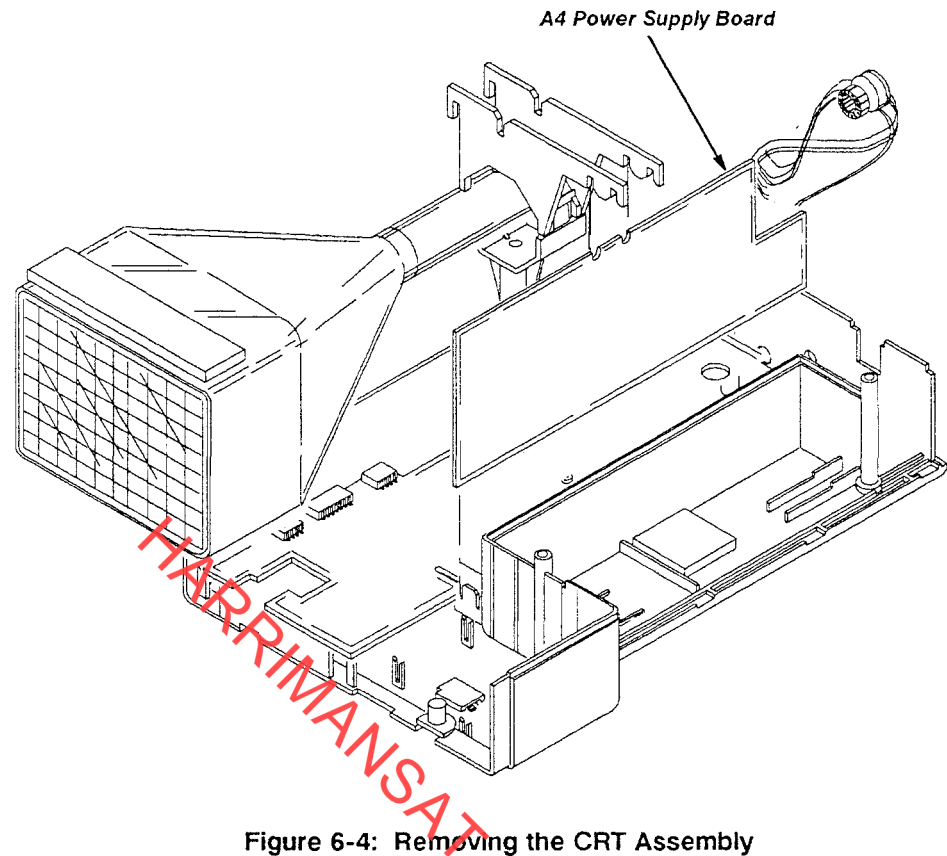


Figure 6-4: Removing the CRT Assembly

4. Disconnect the CRT: Grasp the CRT socket harness at its front while holding the CRT about its neck. Wiggle the socket back and forth as you pull it off the CRT. Take care not to pull the back cover off the socket as this will free the connecting wires from W1 on the Power Supply board and require their reinstallation in the socket.

To insert the connecting wires from W1 into the CRT socket, place the shielded lead at pin 1 (the isolated socket pin) and then insert pins 2 through 9 clockwise from pin 1. You might find it helpful to place the socket, minus the cap, on the CRT and then insert wires through the socket onto the CRT pins. The wires are color coded to match the pin numbering of the CRT pins and the W1 connections on the circuit board.

5. Replace the CRT: Place the CRT in a safe place if it is to be reinstalled or dispose of it safely if it is defective. If replacing the CRT, unsnap the bottom half of the support bracket from the top half and remove the brackets from the CRT.
6. Reinstallation: If you are replacing the Power Supply board, move the extension knob from the **INTEN** (intensity) control to the new board.

Perform Steps 1–5 in reverse order. Ensure that the CRT neck support bracket rests on the alignment pin in the bottom case. As you lower the CRT into place, align the support bracket guides with the slots on the Power Supply and CPU/Display boards and the square holes on the Acquisition board assembly.

CPU/Display Board

The CPU/Display board removal procedure removes the CPU/Display board from the bottom case. Refer to Figure 6-5 during this procedure.

Equipment Required (See Table 6-4)

0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)

1. To gain access to the circuit board, remove the front case and top case. Perform the procedure *Front and Top Case* on page 6-13.
2. Remove the probe receptacle: Pull the probe receptacle up and out of the bottom case. You can leave the input signal cables connected to the Acquisition board.
3. Remove the CRT and the Power Supply board.
 - a. Pull up on the front of the CRT until you can grasp the Power Supply board. Leave the support bracket on the neck of the CRT.
 - b. Hold the CRT up a little while you pull the Power Supply board up from the front and out of its connectors on the Main board.
 - c. Bring the CRT and Power Supply board forward and out of the instrument. The INTENSITY adjustment knob extends through the rear panel and must be moved forward for removal.
4. Remove the CPU/Display board: Hold the Main board down while you pull the CPU/Display board up at the center to disconnect it from the Main board. Lift the CPU/Display board out of the bottom case.
5. Reinstallation: Align the connectors at the front end of the CPU/Display board with the pins on the Main board. Ensure that the COMM PORT connector is properly seated in the case slot. You may have to guide the foam gasket strip on the back side of the board past the edge of the bottom case. Perform Steps 1–3 in reverse order.

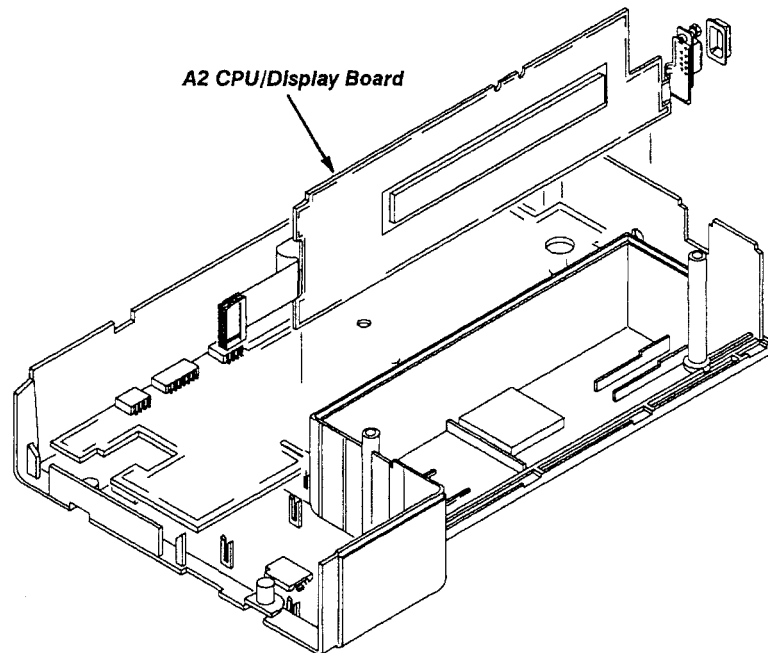


Figure 6-5: Removing the CPU/Display Board

Acquisition Board and Main Board

The Acquisition board and Main board procedure, removes the Acquisition and Main boards as an assembly from the bottom case. Once the assembly is out of the case, the two boards can be easily separated. Refer to Figure 6-6 during this procedure.

Equipment Required (See Table 6-4)

0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)

1. To gain access to the circuit board, remove the front case and top case: Perform the procedure *Front and Top Case* on page 6-13.
2. Remove the probe receptacle: Pull the probe receptacle up and out of the bottom case. Disconnect the input signal cables from the Acquisition board. Note that the CH 1 coax cable has a mark or white heat shrink at the metal end.
3. Remove the CRT and the Power Supply board.
 - a. Pull up on the front of the CRT until you can grasp the Power Supply board. Leave the support bracket on the neck of the CRT.
 - b. Hold the CRT up a little while you pull the Power Supply board up from the front and out of its connectors on the Main board.

- c. Bring the CRT and Power Supply board forward and out of the instrument. The INTENSITY adjustment knob extends through the rear panel and must be moved forward for removal.
4. Remove the securing screw from the Main board: Remove the T-15 Torx head screw (see Figure 6-6 for the location) that holds the Main board to the bottom case.
5. Remove the Acquisition and Main board assembly from the case: Grasp the square black component on the Main board and carefully pull straight up until the Main board is clear of the bottom case.
6. Separate the Acquisition board assembly from the Main board: Pull firmly and evenly on the front and lower edges of the Acquisition board assembly to separate it from the Main board.

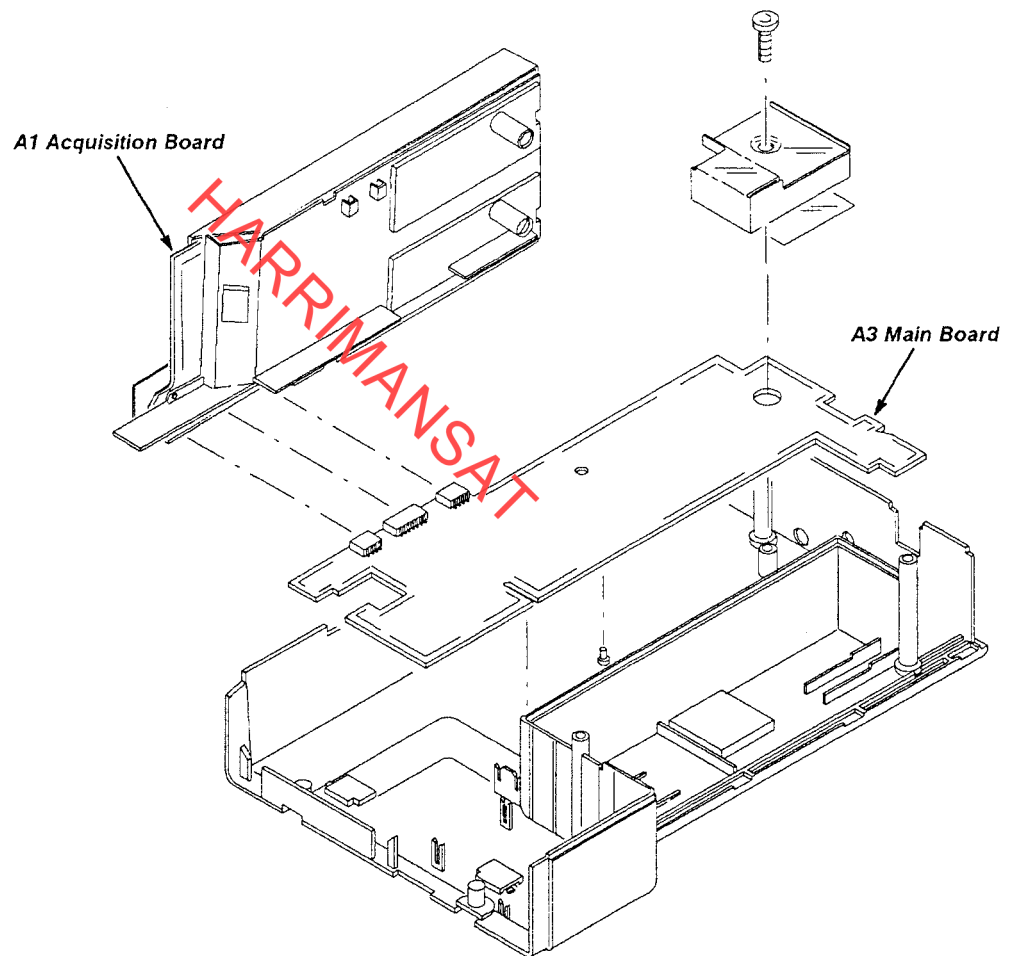


Figure 6-6: Removing the Main and Acquisition Boards as an Assembly

7. Remove the shielding from the Acquisition board.
 - a. Place the Acquisition board assembly on a static free work surface with the signal inputs up.
 - b. Unsnap the case halves using angle-tipped tweezers. This is best done by starting with the two snaps in the middle of the assembly and then the two at the rear.
 - c. Turn the assembly over and remove the shield piece.
 - d. Remove the Acquisition board from the other half.

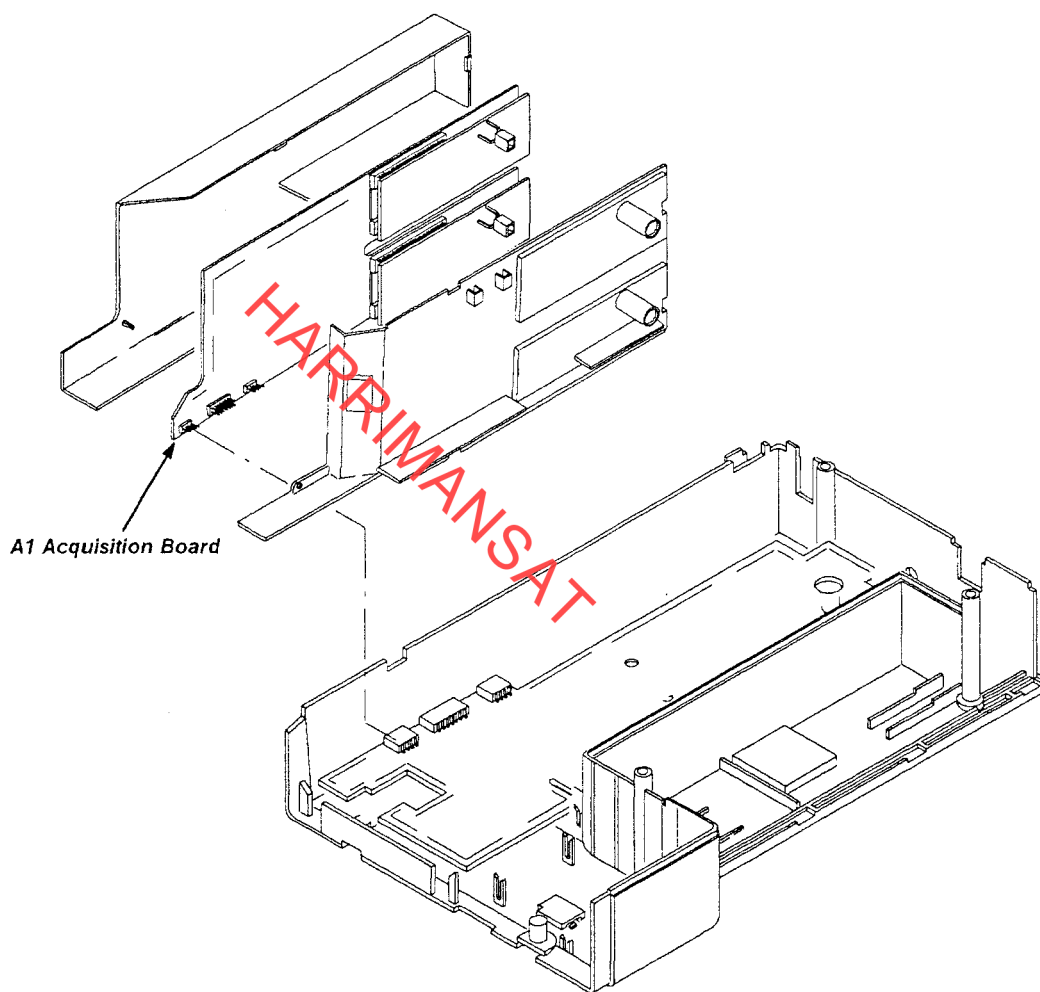


Figure 6-7: Removing the Acquisition Board Shield

8. Reinstallation: Perform Steps 1–7 in reverse order. When placing the Acquisition and Main board assembly in the bottom case, guide the foam gasket on the Acquisition board assembly past the edge of the bottom case.

Front Panel Board

The Front Panel board removal procedure separates the Front Panel board from the Front case. Refer to Figure 6-1 during the following procedure.

Equipment Required (See Table 6-4)

*0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)
Adhesive and Accelerator (Items 5 and 6)*

1. To gain access to the circuit board, remove the front case and top case: Perform the procedure *Front and Top Case* on page 6-13.
2. Disconnect cables to the Front Panel board: Disconnect the two 14-pin cables from the Front Panel board; lay the front case piece down on a static-free work surface.
3. Remove the Front Panel board: Remove the Front Panel board from the front case piece by carefully breaking the glue off the guide posts that protrude through the board.

CAUTION

Do not attempt to remove the glue by melting it with a heat gun. Excessive heat can damage the plastic front panel assembly.

4. If replacement is necessary, remove the the rubber pushbutton actuator mat.

CAUTION

Do not touch either the switch contact area on the Front Panel board or the carbon contact area on the pushbutton actuator with bare fingers. Body oils can corrode the contact surfaces.

5. Reinstallation: Perform Steps 1–3 in reverse order. Ensure that you orient the button text correctly. Secure the Front Panel board to the front case using a small amount of adhesive and accelerator on each guide post. Refer to the adhesive manufactures instructions for proper use and safety precautions.

Keypad Board

The Keypad board removal procedure separates the Keypad board from the Top case. Refer to Figure 6-1 during the following procedure.

Equipment Required (See Table 6-4)

0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)
Adhesive and Accelerator (Items 5 and 6)

1. To gain access to the circuit board, remove the front case and top case: Perform the procedure *Front and Top Case* on page 6-13.
2. Position the Top case: Lay the Top case down with the Keypad board visible.
3. Remove the Keypad board: Remove the Keypad board from the Top case by carefully breaking the glue off the guide posts protruding through the board. Remove the Keypad board.
4. Remove the rubber pushbutton actuator mat if replacement is necessary.

NOTE

Do not touch either the switch contact area on the Keypad board or the carbon contact area on the pushbutton actuators with bare fingers. Body oils can corrode the contact surfaces.

NOTE

Do not glue the two guide posts nearest the side of the case.

5. Reinstallation: Perform Steps 1–4 in reverse order. Ensure that the text is oriented correctly. Secure the Front Panel board to the Front case by applying a small amount of adhesive and accelerator on each guide post while applying slight pressure to the board. Refer to the adhesive manufacturer's instructions for proper use and safety precautions.

Pot Board

The Pot board removal procedure removes the Pot board from the potentiometer bracket. Refer to Figure 6-1 during the following procedure.

Equipment Required (See Table 6-4)

0.050 inch Hex wrench (Item 1)
Screwdriver handle with T-15 tip (Items 2 and 3)
Angle-tipped Tweezers (Item 4)
Adhesive and Accelerator (Items 5 and 6)

1. To gain access to the circuit board, remove the front case and top case: Perform the procedure *Front and Top Case* on page 6-13.
2. Remove the Pot board assembly: Lift the Pot board assembly out of the bottom case. Note the slots in the bottom case that align with slots in the metal bracket holding the Pot board.
3. Remove the Pot board: Remove the T-15 Torx head screw from the Pot board. Slide the Pot board from the metal bracket.
4. Reinstallation: Perform Steps 1–3 in reverse order.

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