

Installation, Operation, and Service Guide

**Agilent Technologies
85629B Test and Adjustment Module**



Agilent Technologies

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The following safety symbols are used throughout this manual. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

Caution The *caution* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a *caution* sign until the indicated conditions are fully understood and met.

Warning The *warning* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a *warning* sign until the indicated conditions are fully understood and met.

General Safety Considerations

Warning *Before this instrument is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact.*

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.

Warning **There are many points in the instrument which can, if contacted, cause personal injury. Be extremely careful.**

Any adjustments or service procedures that require operation of the instrument with protective covers removed should be performed only by trained service personnel.

Caution *Before this instrument is switched on, make sure its primary power circuitry has been adapted to the voltage of the ac power source.*

Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

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Introducing the 85629B

This section contains the following information about the 85629B Test and Adjustment Module (TAM):

- Service functions the TAM provides
- Accessories supplied with the TAM
- Locations of TAM installation, configuration, and user information
- TAMs covered by this supplement
- Spectrum analyzer compatibility
- TAM specifications and characteristics

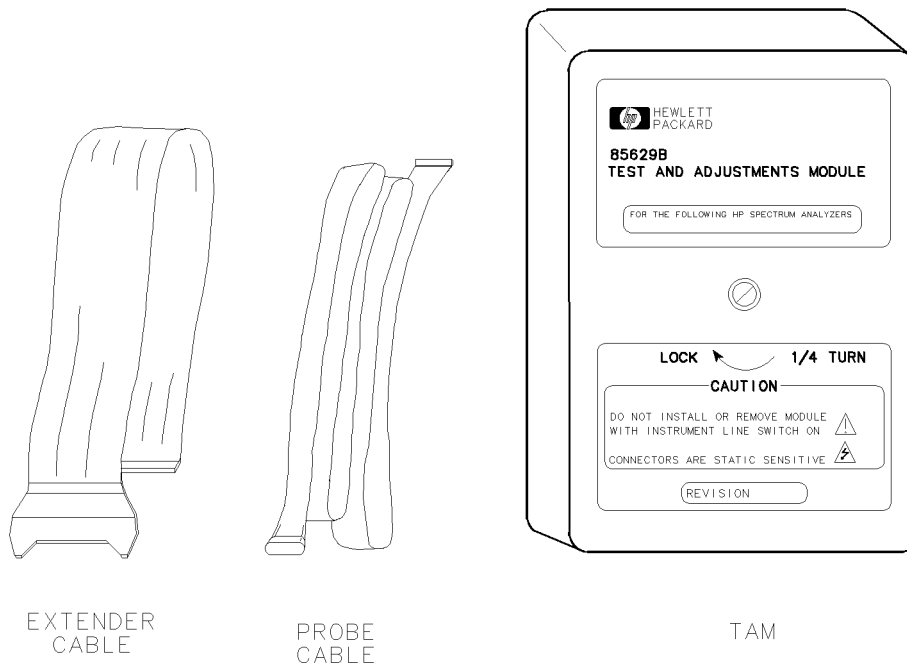


Figure 1-1. 85629B and Accessories

Description of the 85629B

The 85629B Test and Adjustment Module (TAM) is an optional service accessory for the 856X High Performance Portable Spectrum Analyzers. The TAM enables you to test, troubleshoot, and adjust the spectrum analyzer more quickly and conveniently than you could by using standard test equipment and procedures. The TAM provides the following service functions:

Test	quickly verifies basic operation of the spectrum analyzer, using a minimum of external test equipment.
Adjust	provides fully automatic and user-guided adjustments.
Diagnose	allows fault isolation within the spectrum analyzer to the assembly level using automatic functions, or allows verification of a failed assembly and further isolation of the failure using manual-probe troubleshooting.

The TAM mounts on the right-hand portion of the spectrum analyzer rear panel with a 1/4-turn fastener. It connects to the analyzer's electronics through a fixed connector. The TAM is typically installed on an analyzer only when the analyzer is to be tested, although it can be left in place if desired.

During testing with the TAM in place, the analyzer controls other instruments over GPIB, reads data, and formats data to assist you in interpreting the results. Use of the TAM yields fast, comprehensive data on the spectrum analyzer's performance. However, for full performance verification routines, refer to the spectrum analyzer installation manual; for complete troubleshooting and adjustment information, refer to the spectrum analyzer service manual.

Accessories for the 85629B

The following accessories are supplied with the TAM:

- **Extender Cable (part number 5062-0737):** allows use of the TAM when the A2 Controller assembly is in its service position, by extending the connector for the TAM from the rear panel to the A2 assembly.
- **Guided Probe (part number 5001-8743):** used to access numerous test connectors within the analyzer for rapid troubleshooting.
- **Service Board (part number 5021-7419):** a special circuit board that provides convenient connections for testing and adjusting the TAM. (The service board is shipped unassembled. Refer to Chapter 4 of this supplement for assembly information.)

Specifications and Characteristics

Specifications describe warranted TAM performance over the indicated temperature range. Characteristics provide useful information in the form of typical, nominal, or approximate values.

Specifications

The 85629B specifications are listed in Table 1-1. All specifications apply after the unit has reached a stable operating temperature.

Table 1-1. 85629B Specifications

Electrical Specifications	
DAC Accuracy –10 to +10 V dc	<±40 mV
ADC Accuracy –14 to +14 V dc	<±70 mV
General Specifications	
Environmental	When installed on an 856X High Performance Portable Spectrum Analyzer, the 85629B/856X system meets all environmental specifications as detailed in the spectrum analyzer installation manual.
Military Specifications	Per MIL-T-28800, Type III, Class 3, Style C, as detailed in the spectrum analyzer installation manual.
Temperature	
Operating	–10°C to +55°C
Nonoperating	–62°C to +85°C
Humidity (operating)	95% at 40°C for 5 days

Characteristics

The 85629B characteristics are listed in Table 1-2.

Table 1-2. 85629B Characteristics

Weight	
Net	454 (1 lb)
Shipping	1.59 kg (3.5 lb)
Dimensions	
131.25 mm high × 91.25 mm wide × 37 mm deep (5.25 in. high × 3.65 in. wide × 1.48 in. deep)	

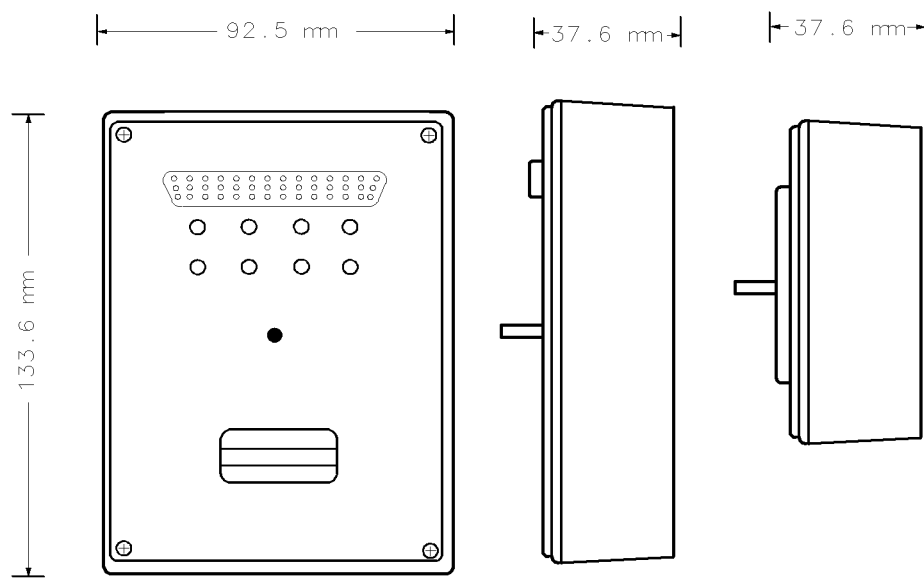


Figure 1-2. 85629B Dimensions

Preparation for Use

This section contains the following information:

- Initial inspection
- TAM and extender cable installation
- Packaging
- Operation verification

Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, keep it until you have verified that the contents are complete and you have tested the TAM.

The contents of the container should be as shown in Figure 2-1 and its accompanying legend. If the contents are incomplete, or if the TAM does not pass the operation verification tests, notify the nearest Agilent Technologies office. If the shipping container is damaged or the cushioning material shows signs of stress, also notify the carrier. Keep the shipping materials for the carrier's inspection. The Agilent Technologies office will arrange for repair or replacement without waiting for a claim settlement.

If the shipping container and cushioning material are in good condition, retain them. You may wish to ship the TAM to another location or to return it to Agilent Technologies for service. Instructions for repackaging and shipping are provided later in this section.

Note The diagrams in this manual show E-series instruments. However, the features illustrated in these diagrams are identical for both E-series and EC-series instruments.

Installation

Installing the TAM onto the Spectrum Analyzer

Caution Do not install the TAM unless the spectrum analyzer is turned off. The TAM or the analyzer or both may be damaged if installation is attempted while the analyzer is turned on.

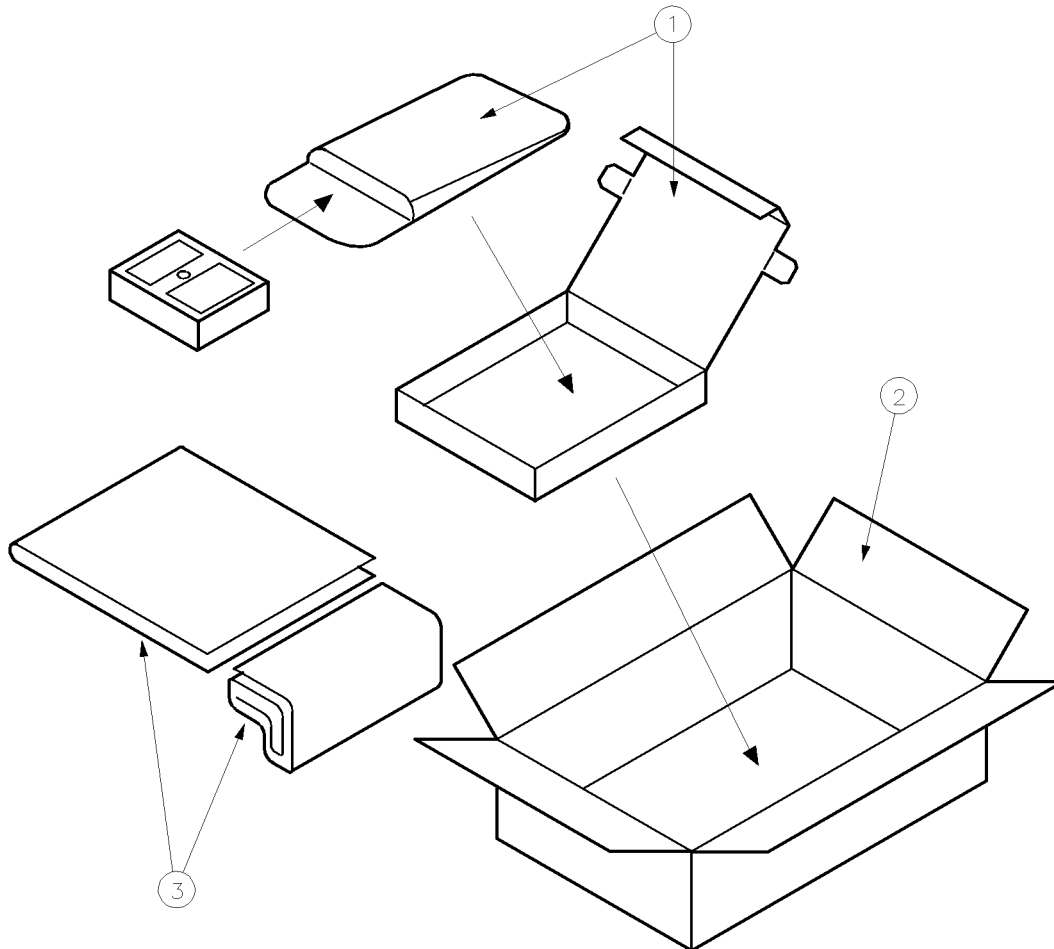


Figure 2-1. 85629B Shipping Container and Contents

Item	Name	Part Number	Check Digit	Qty
1	Carton, outer	9211-0046	2	1
2	Carton, inner (includes padded pouch)	9211-4916	3	1
3	Bubble-pack bag	9222-0785	9	3

2-2 Preparation for Use

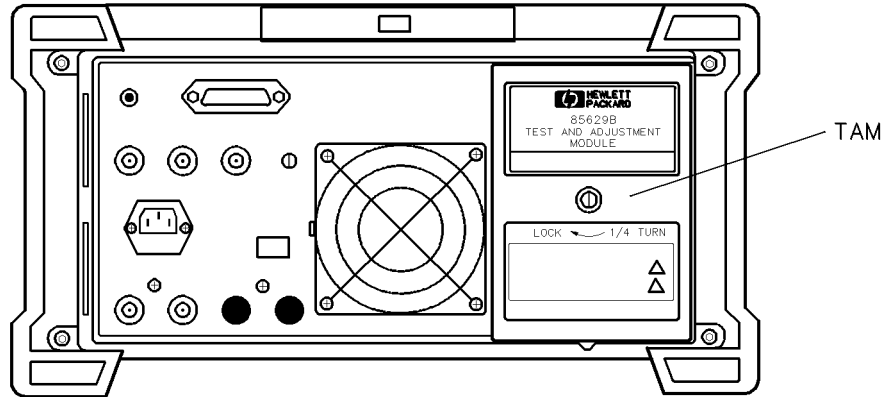


Figure 2-2. Installing an 85629B

Caution Do not touch the connector pins on either the TAM or the spectrum analyzer; they are static-sensitive. Be sure to read and follow the electrostatic discharge information contained in the spectrum analyzer installation manual.

Install the TAM as follows:

1. Line up the 50-pin connector on the back of the TAM with the OPTION MODULE connector (J3) on the rear panel of the analyzer.
2. Press the TAM into place.
3. Use a flat-blade screwdriver to secure the 1/4-turn fastener that holds the TAM in place. See Figure 2-2.

Using the Extender Cable

Note Do not attempt to use the extender cable unless you have an Agilent Technologies 856X spectrum analyzer service manual. The extender cable is intended for use during adjustments or manual-probe troubleshooting; the service manual provides procedures for these operations.

Most open-cover troubleshooting or adjustments require use of the extender cable. It allows you to use the Agilent Technologies 85629B when the spectrum analyzer A2 Controller assembly is folded down. The extender cable is connected to A2J6 on the controller board of E and EC-series analyzers. Note that EC-series instruments do not have a TAM manual test connector on the A2 Controller board, while E-series instruments do have a TAM manual connector on the A2 Controller board.

Caution The spectrum analyzer contains parts that are easily damaged by electrostatic discharge. Before disassembly of the spectrum analyzer, refer to the electrostatic discharge information in the installation manual.

Caution The extender cable (part number 5062-0737) is specifically designed for this application. Do not use a different cable; equipment damage may result.

Refer to Figure 2-3, and perform the following steps to install the extender cable:

Caution Be sure the spectrum analyzer power is turned off before you install or remove the extender cable. Extender cable installation or removal with power applied can damage the TAM.

1. Use the disassembly instructions in the spectrum analyzer service manual to remove the analyzer cover and fold down the A2 Controller assembly.
2. Attach one end of the extender cable to the 50-pin connector cable on the inside surface of the rear panel of the spectrum analyzer.
3. Attach the other end of the extender cable to A2J6 on the A2 Controller assembly.

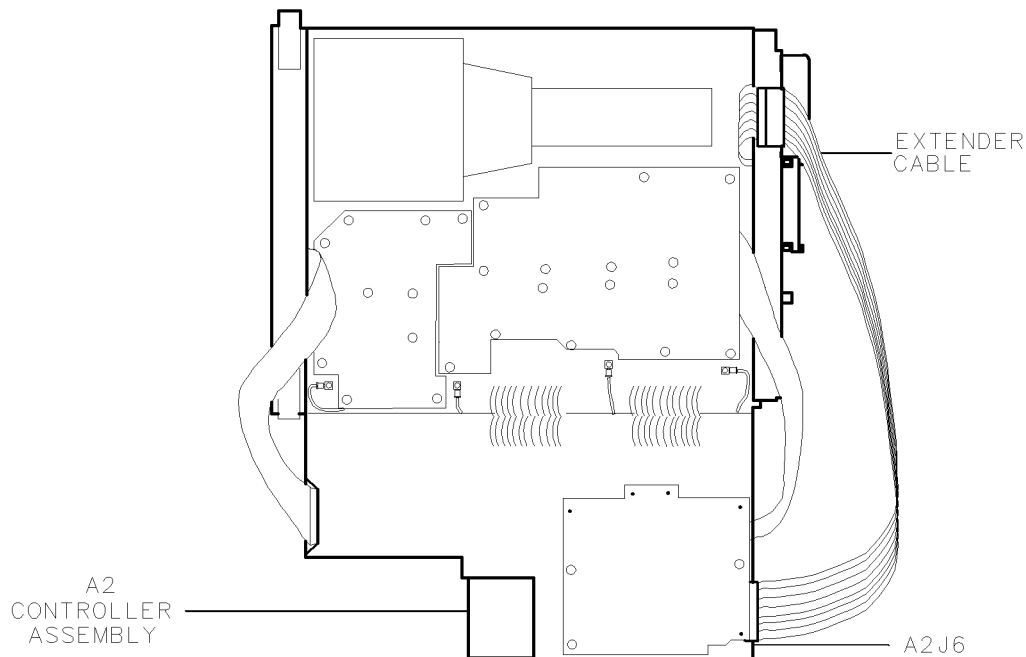


Figure 2-3. Using the Extender Cable

Packaging

Original Packaging

Save the original packaging materials to use when shipping the TAM. If the original material is not available, packaging material identical to the originals can be ordered through Agilent Technologies offices. Figure 2-1 lists the part numbers of each item.

Write “FRAGILE, HANDLE WITH CARE” on the outside of the shipping container. If the TAM is being returned to Agilent Technologies for servicing, include a tag that lists the following information:

1. Type of service required, including a description of the problem.
2. Return address and phone number of person to contact for more information.
3. Model number and full serial number of TAM.
4. List of any accessories returned with the TAM.

Other Packaging

If you need to use packaging materials other than the type used in original factory packaging, use the steps below to reduce the chance of electrical or mechanical damage to the TAM.

Caution Damage to the TAM may result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the equipment or prevent it from shifting in the carton. They can also cause equipment damage by generating static electricity.

1. Wrap the TAM in 2 to 3 inches of static-shielding cushioning materials (for example, S.D.-240 AirCap™ from Sealed Air Corporation, Commerce, California, 90001).
2. If the TAM is being returned to Agilent Technologies, include a tag with the information listed under “Original Packaging.”
3. Place the TAM in a strong shipping container. Make sure there is enough cushioning material to prevent the TAM from moving in the container. Seal the container securely.
4. Mark the shipping container “FRAGILE, HANDLE WITH CARE” to encourage careful handling.

Operation Verification

Verify that the TAM is operating properly by performing the “ADC Accuracy Performance Test” and the “TAM Address Line Check” in Chapter 4.

Operation

This section contains the following information:

- “Menu Structure” describes the main, procedure selection, and configuration menus.
- “Typical Configuration Processes” assists you in understanding the concept of configuring test setups with the TAM.

Note

The purpose of the operating information in this supplement is to give you a general understanding of the overall menu structure and methods of operating the 85629B. Detailed procedures for using the TAM to test and troubleshoot the spectrum analyzer are included as appropriate in the spectrum analyzer installation and service manuals.

Menu Structure

The 85629B menu system is structured to provide the inexperienced user with sufficient information to operate and test the TAM, while keeping the number of menus and required keystrokes to a minimum so that the more experienced user can proceed rapidly. The basic structure, as shown in Figure 3-1, involves:

- A main menu
- Three procedure selection menus
- A system configuration menu

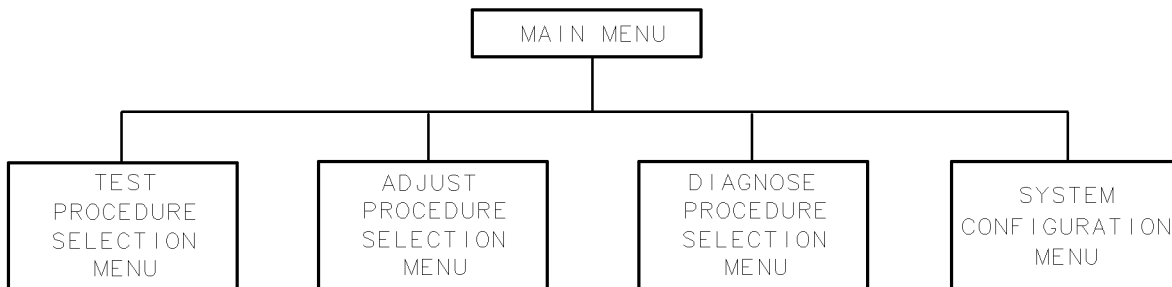


Figure 3-1. General TAM Menu Structure

Each menu lists a series of choices (such as a list of tests to be performed) and identifies several softkeys that cause specific actions (such as executing the test, accessing a help screen, or returning to the main menu). In several cases there are additional, subordinate menus that guide you through the various actions needed (such as configuring a test setup).

Entering the TAM Menu System

With the analyzer in normal operation, pressing the **MODULE** key on the analyzer front-panel accesses the main menu.

Exiting the TAM Menu System

There are several ways of exiting the TAM menus.

If you have only accessed the main menu and have not gone to any of the sub-menus: you can return to analyzer operation by pressing any hardkey (except the data keys or the step keys). Or you can press the **EXIT MODULE** softkey. In either case, the analyzer returns to normal operation in the same state as before the main menu was accessed.

If you have accessed lower-level menus and then returned to the main menu: pressing **EXIT MODULE** returns to normal analyzer operation. However, the analyzer automatically goes through a power-on sequence and returns to its power-on condition.

If you are operating in a lower-level menu: when operating in any menu level, pressing the **RETURN** softkey returns you to the next highest-level menu. You can press **RETURN** as necessary to return to the main menu. Or, instead of pressing **RETURN** successively to get back to the main menu, you can access the main menu directly from any menu level by

3-2 Operation

pressing **MODULE**. In either case, you can then exit from the main menu as described in the preceding paragraph.

If you want to exit directly from a lower-level menu: you can exit the TAM menu system from any level by pressing **PRESET**, which returns the analyzer to its power-on condition.

Main Menu

The main menu is the entry point to the menu system. It gives you the choice of selecting one of the three procedure selection menus, the system configuration menu, or exiting to normal spectrum analyzer operation.

The menu displays the titles of the next four menus:

- Test
- Adjust
- Diagnose
- Config

Each title has a corresponding softkey which, when pressed, accesses that menu.

Procedure Selection Menus

Refer to Figure 3-2. The three procedure selection menus are:

- Test: tests that evaluate the analyzer's performance.
- Adjust: automatic and guided adjustment procedures.
- Diagnose: troubleshooting aids and fault isolation procedures.

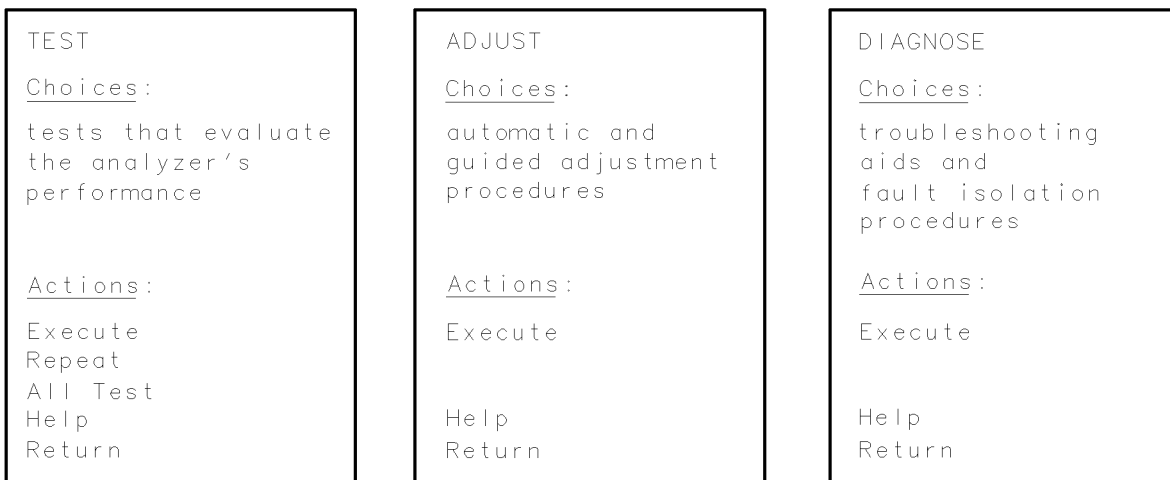


Figure 3-2. Procedure Selection Menu Structure

Each of these menus provides a list of the procedures that can be executed. To select a test, position the pointer (by using the knob or the step keys) to point at the test title; execute the test by pressing the appropriate softkey. You can also obtain additional information about the procedure by using the **Help** function.

External test equipment (such as a signal source or a power meter and related accessories) is needed for most of the test procedures. In each case, the program attempts to determine if the test equipment setup (configuration) is correct. If an incorrect setup is detected, or if you select **Help**, the appropriate setup diagram is displayed on the screen.

Test Menu: The Test menu lists the following functional tests of the analyzer:

1. Noise Sidebands
2. Residual FM
3. IF Gain Uncertainty
4. Scale Fidelity
5. Input Attenuator Accuracy
6. Frequency Marker Accuracy
7. Image, Mult, Out-of-Band Resp
8. Res BW Accy & Selectivity
9. 2nd Harmonic Distortion
10. Frequency Span Accuracy
11. Gain Compression
12. TOI
13. Frequency Response
14. 1st LO OUTPUT Amplitude
15. Displayed Average Noise Level
16. Residual Responses

In the Test menu, selections may be made singly (**Execute**), repeatedly (**Repeat**), or sequentially (**All Test**):

- In **Execute** mode, the program checks the test equipment setup before the test is attempted.
- In **Repeat** mode, the equipment is checked at the start of each test repetition. If a printer is configured and connected to GPIB, testing continues until you abort the process by pressing **ABORT**. The results of each test are sent to the printer. If a printer is not available, the system pauses to display the results at the completion of each test; pressing the **RETURN** softkey causes testing to continue. This sequence continues until the **ABORT** softkey is pressed.
- In **All Test** mode, the tests are executed in the order listed. This order allows the minimum number of setup changes and operator attention. You are prompted whenever the testing stops or your attention is needed.

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Adjust Menu: the Adjust menu lists the following analyzer adjustments:

8560A, 8561B, and 8563A: Revision Datecodes 911008 and Earlier 8561A and 8562A/B: All Revision Datecodes	8560A/E/EC, 8561B/E/EC, and 8563A/E/EC: Revision Datecodes 920122 and Later
<ol style="list-style-type: none"> 1. IF Bandpass - LC Poles 2. IF Bandpass - Crystal Poles 3. IF Amplitude 4. Sampling Oscillator 5. YTO 6. LO Distribution Amp 7. Dual Band Mixer 8. Low Band Flatness 9. High Band Flatness and YTF 10. Calibrator Amplitude 11. 10 MHz Reference Oscillator 12. External Mixer Bias 13. External Mixer Amplitude 	<ol style="list-style-type: none"> 1. IF Bandpass - LC Poles 2. IF Bandpass - Crystal Poles 3. IF Amplitude 4. Limiter Phase 5. Linear Fidelity 6. Log Fidelity 7. Sampling Oscillator 8. YTO 9. LO Distribution Amplifier 10. Dual Band Mixer 11. Low Band Flatness 12. High Band Flatness and YTF 13. Calibrator Amplitude 14. 10 MHz Reference Oscillator 15. External Mixer Bias 16. External Mixer Amplitude

Simply position the pointer next to the adjustment procedure to be run and press **Execute**. The screen displays messages or diagrams to indicate necessary manual steps to be performed by the operator.

Note Complete adjustment procedures are provided in the spectrum analyzer service manual; do not attempt to perform adjustments without using the manual.

Diagnose Menu: The diagnostics in the TAM comprise a series of troubleshooting routines that assist you in detecting a fault or isolating the failure to the lowest possible functional block level. Not all possible failures can be isolated or even detected, but the TAM's diagnostics provide substantial time savings when troubleshooting most faults. The diagnostics are designed to isolate failures to a board assembly level and, if possible, to a sub-board assembly level.

In the Diagnose menu, various types of diagnostic methods are listed for selection. Diagnostic methods for the spectrum analyzer include:

- Automatic Fault Isolation
- Manual Probe Troubleshooting
- RF Path Fault Isolation
- Cal Osc Troubleshooting Mode

Additional functions for testing operation of the TAM itself include:

- TAM 8-Channel Voltmeter
- TAM Output Signal Test

- TAM Connector Address Test
- TAM Calibration

Each procedure is selected by identifying it with the pointer and pressing **Execute**.

In automatic fault isolation, the TAM performs a series of tests on the analyzer. The screen indicates the progress of the procedure and the results when each test is completed. For failed tests, the probable causes of failure are also displayed, along with troubleshooting suggestions.

In manual probe troubleshooting, the operator uses the manual probe connected to the TAM to probe the 26 special test connectors within the analyzer. The TAM guides the user (through screen displays) with suggestions for additional areas to check, the readings expected, the actual readings, and possible causes of the problem.

System Configuration Menus

Many of the test and adjustment procedures require the use of additional, external test equipment. Three basic types of equipment may be used: a signal source, a power meter, and a printer. The system supports several specific models of each type; one model of each type is factory-selected as the default model.

The system configuration menus enable you to:

- Select any of the supported models of test equipment.
- Enter the necessary parameters to add a manually controlled source that is not on the standard list of supported models.
- Enter the necessary parameters to support specific sensors for the power meter.
- Change the GPIB address for each item.

The system configuration menu structure is shown in Figure 3-3.

Configure Menu: the Config menu displays the selected model for the source, power meter and printer, the GPIB address specified for each, and indicates whether a piece of equipment is actually responding from that address. The program does not determine *what* equipment is at that address; only that *something* is responding. It is the operator's responsibility to verify that the proper equipment is at each address.

Note The TAM acts as the active controller on the GPIB bus. No other active controller should be connected to the bus.

From the Config menu, you can press the **Change Equip** softkey to access three sub-menus:

- Source
- Pwr Mtr
- Printer

Each of these menus lists the models of each type that the system supports. In each case, you can select one of the models by positioning the pointer next to it and pressing the **Select** softkey. This returns you to the Config menu, which now lists the model you selected.

From the Config menu, you can also change the GPIB address of any item by selecting the item with the pointer, pressing the **Change Address** softkey and entering the new address via the data keys. When completed, terminate the entry by pressing the **Hz**, **kHz**, **MHz**, or **GHz** key.

3-6 Operation

The new configuration (specific equipment models, sensor data, and addresses) is stored as the new default condition by pressing the **Store Config** softkey.

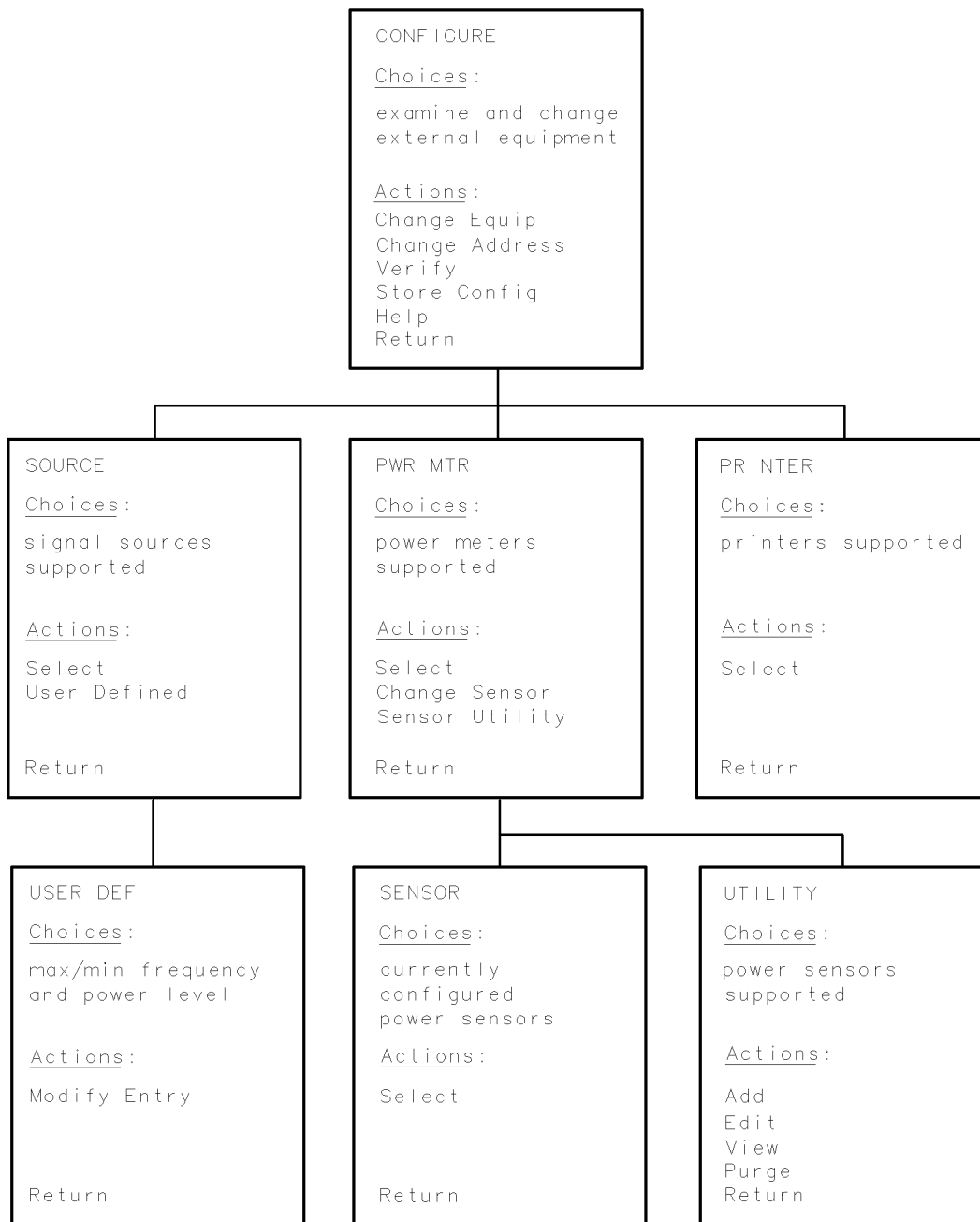


Figure 3-3. System Configuration Menu Structure

Equipment Selection/Definition Menus: as described above, the Source, Pwr Mtr, and Printer menus enable you to select (from a list of supported models) the specific model you wish to use. Additional sub-menus enable you to define a previously unsupported source model or the specific sensor(s) you wish to use with the power meter.

Default Configuration: the factory-selected default configuration is shown in Table 3-1.

Table 3-1. Initial Default Configuration

Type	Model	Address
Source	8340A	19
Power Meter*	436A	13
Printer	HP Thinkjet	1

*No sensor model or sensor calibration data defined

Typical Configuration Processes

The following paragraphs describe the general methods of changing the system configuration. This material is intended to give you an overall understanding of the processes used within the system configuration menus.

To change the source: in the Configure menu, move the pointer (using the front-panel knob or the step keys) to Source and press **Change Equip**. This brings up the Source menu, which lists the supported sources. Move the pointer to the desired source and press **Select**. The configuration menu appears; note that the source you selected is now listed in this menu.

To define an unlisted source: in the Configure menu, move the pointer to source and press **Change Equip**. In the Source menu, press **User Defined**. This brings up the User Def menu, which lists Max Freq, Min Freq, Max Level, and Min Level. Select one of these parameters with the pointer and press **Modify Entry**; then, using the data keys, enter the appropriate numbers and finish the entry with **(Hz)**, **(kHz)**, **(MHz)**, or **(GHz)**, as required. Press **RETURN** to return to the Config menu; **USER** is now listed in the Model column for Source, and the GPIB address is replaced with a dashed line. User-defined sources are controlled manually.

To change the power meter: in the Config menu, move the pointer to Pwr Mtr and press **Change Equip**. In the Pwr Mtr menu, select the desired meter and press **Select**.

To select a sensor: move the pointer to Pwr Mtr and press **Change Equip** to bring up the Pwr Mtr menu. Press **Change Sensor** to bring up the Sensor menu, which lists the currently defined sensors and their serial numbers. To use one of the listed sensors, move the pointer to it and press **Select**.

To configure a new sensor: to add a new sensor, you must enter its calibration data, along with its model number and serial number. From the Pwr Mtr menu, press **Sensor Utility**. This brings up the Utility menu, which lists the defined sensors and gives you the options of adding or purging (deleting) sensors, or of viewing or editing their stored calibration data. Position the pointer to the desired sensor model and select **Add**. Using the data keys, enter the last four digits of the sensor's serial number. Then enter the sensor calibration data for the frequencies listed on the screen. When you have entered all the requested data, the Utility menu is displayed.

To select a printer: in the Config menu, move the pointer to Printer and press **Change Equip**. The Printer menu lists Graphics Printer and Text Only Printer in addition to the HP ThinkJet. Examples of graphics printers are the HP 2671G, HP 2673A, HP 2876A, and HP 82906A. The HP 2671A and HP 2601A are examples of text-only printers.

To change a GPIB address: to change a device address, on the Config menu, select the desired device with the pointer and press **Change Address**. Use the numeric data keys on the analyzer front-panel to enter the new address number, then press **Hz** to conclude the entry. The Config menu displays the new address and places a dashed line (--) in the Found column. To poll the system and verify that the address is correct, press **Verify**; if there is a response from that address, **Yes** appears in the Found column.

To store a configuration: when you have completed the system configuration, you must store it to replace the previous configuration permanently. In the Config menu, press **Store Config**.

The message **STORING, DO NOT DISTURB** appears on the screen while storing takes place. (If you do not store the new configuration, it remains valid only until normal analyzer operation is resumed.)

Performance Tests

This section contains the following information:

- List of Recommended Test Equipment.
- ADC Accuracy Performance Test: procedure for testing the ADC accuracy.
- DAC Accuracy Performance Test: procedure for testing the DAC accuracy.
- TAM Address Line Check: procedure for verifying operation of the TAM address decoder.

Recommended Test Equipment

The test equipment listed in Table Table 4-1 is recommended for use in testing and troubleshooting the TAM.

Table 4-1. Recommended Test Equipment

Instrument	Critical Specifications	Recommended Model	Use*
Spectrum Analyzer	Compatible with 85629B Test and Adjustment Module; no substitute	8560A/E/EC 8561A/B/E/EC 8562A/B 8563A/E/EC	P, A, T, V
Digital Voltmeter (DVM)	Range: -15 V dc to $+15$ V dc Accuracy: $<\pm 1$ mV on 100 V range Input impedance: ≥ 1 megohm	3456A	P, A T, V
DVM Test Leads (2 pairs)	Length: ≥ 36 inches Connectors: banana plugs	34118A	P, A T, V
Power Supply	Output voltage range: 0 to 15 V dc Adjustability: $<\pm 0.5$ mV	6114A	P, T V
Service Board	Refer to "Service Board" documentation. A circuit board (no components) is included with the TAM.		P, A T, V
Printer (optional)	GPIB, text only	HP 2225A	A, T
*Note: P = Performance Tests; A = Adjustments; T = Troubleshooting; V = Operation Verification			

Service Board

The service board is needed for testing, adjusting, and troubleshooting the 85629B Test and Adjustment Module.

The service board is shipped unassembled (part number 5021-7419) with only one special connector (J4) included. Table 6-3 lists the supplied parts and the additional parts needed to assemble the service board. You can either order the parts from Agilent Technologies, using the part numbers given in Table 6-3, or buy them from an electronic supply store.

The locations of the components are marked on the service board. Assemble the service board with the components listed in Table 6-3, using these markings as guides. Refer also to Figure 6-2 (“Service Board Components Location”) and Figure 6-3 (“Service Board Schematic Diagram”).

Recording the Test Results

For your convenience in recording test results as you perform a procedure, a small test results table is provided at each appropriate point in the test procedure.

In addition, a complete performance test record form is provided as Table 4-2. We recommend that you make a copy of this table, record the complete test results on the copy, and keep the copy for your test record. This record could prove valuable in tracking gradual changes in test results over long periods of time.

ADC Accuracy Performance Test

Specification

$<\pm 70$ mV

Related Adjustment

TAM Calibration

Description

This test measures the accuracy of the TAM's analog-to-digital converter (ADC), which is used for manual probe troubleshooting. The following items summarize the ADC Accuracy Performance Test:

- Connect a power supply, DVM, and guided probe cable to the service board.
- Use the DVM to set the input to the measured signal lines (MSL) accurately.
- Monitor the voltages at each MSL in the TAM 8-Channel Voltmeter mode.
- Compare the voltages read by the TAM to the specification.

Recommended Equipment

Spectrum Analyzer	8560A, 8560E/EC, 8561A, 8561B, 8561E/EC, 8562A, 8562B, 8563A, or 8563E/EC
DVM	3456A
DVM Test Leads (<i>2 pairs required</i>)	34118A
Power Supply	6114A
Service Board Assembly	See "Service Board" information

Procedure

1. Connect the equipment as shown in Figure 1-1. Close all switch sections on SW2. Set SW1 to the MSL position. (DVM reads voltage on measured signal lines.)
2. Set the DVM for a 100 V dc range with 1 mV resolution.
3. Remove the jumper, if any, between the – and GND terminals of the power supply. Adjust the power supply voltage for a DVM reading of +14.000 V \pm 1 mV.
4. On the spectrum analyzer, press **MODULE**, **Diagnose**. Use the knob or step keys to select TAM 8-Channel Voltmeter.
5. After several measurements have been taken, press **PAUSE**. (The screen scrolls through the readings for all eight channels; measurements are taken continuously and the readings are updated approximately every half second; wait for at least two or three seconds before pressing **PAUSE** to allow several measurements to be taken.)

6. Record the voltage reading with the greatest deviation from +14000 mV as the “Worst Case Positive TAM Reading.” This reading should be within the limits shown.

Requirement: Between 13930 mV and 14070 mV	Record: Worst Case Positive TAM Reading: _____; mV
--	--

7. Reverse the leads to the power supply. Adjust the power supply voltage for a DVM reading of $-14.000\text{ V dc} \pm 1\text{ mV}$.
8. Press **CONTINUE**. After several measurements have been taken, press **PAUSE**.
9. Record the voltage reading with the greatest deviation from -14000 mV as the “Worst Case Negative TAM Reading.” This reading should be within the limits shown.

Requirement: Between -14070 mV and -13930 mV	Record: Worst Case Negative TAM Reading: _____; mV
--	--

10. Remove the negative lead from the power supply to the service board. Disconnect the positive lead from the power supply and connect J3 on the service board. The DVM should read $0.000 \pm 1\text{ mV}$.
11. Press **CONTINUE**. After several measurements have been taken, press **PAUSE**.
12. Record the voltage reading with the greatest deviation from 0 mV as the “Worst Case Zero TAM Reading.” This reading should be within the limits shown.

Requirement: Between -70 mV and $+70\text{ mV}$	Record: Worst Case Zero TAM Reading: _____; mV
--	--

13. Press **CONTINUE**, **ABORT**.

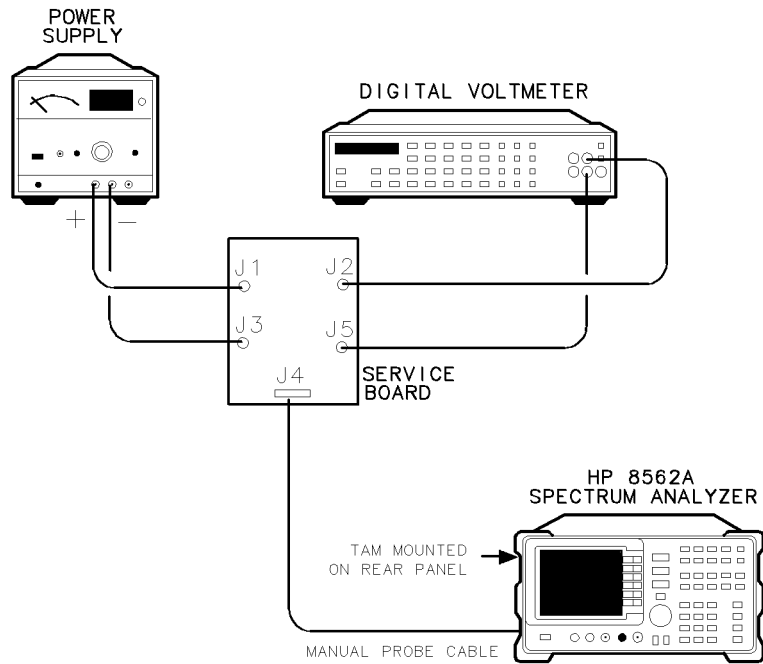


Figure 4-1. ADC Accuracy Performance Test Setup

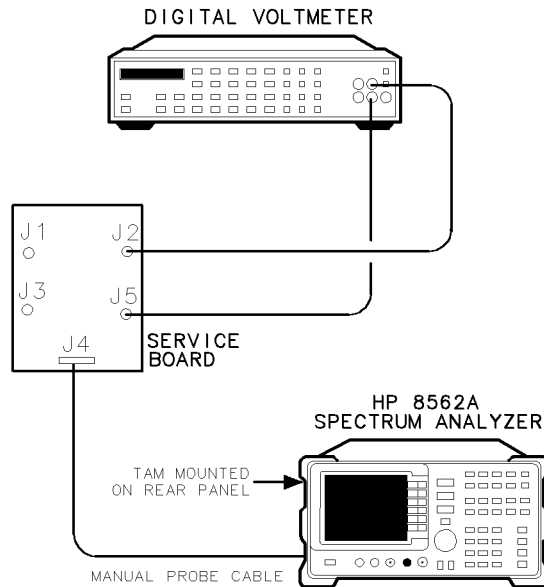


Figure 4-2. DAC Accuracy Performance Test Setup

DAC Accuracy Performance Test

Specification

$<\pm 40$ mV

Related Adjustment

TAM Calibration

Description

This test verifies the accuracy of the TAM's digital-to-analog converter (DAC). The DAC is used for signal injection when performing manual probe troubleshooting; it also provides a reference voltage for the ADC. The following items summarize the DAC Accuracy Performance Test:

- Set the DAC to full-scale positive, full-scale negative, and zero settings.
- At each setting, the voltage is read by a DVM and compared to specification.

Recommended Equipment

Spectrum Analyzer 8560A, 8560E/EC, 8561A, 8561B,
8561E/EC, 8562A, 8562B, 8563A, or 8563E/EC
DVM 3456A
DVM Test Leads (*2 pairs required*) 34118A
Service Board Assembly See "Service Board" information

Procedure

1. Connect the equipment as shown in Figure 4-2. Set switch SW1 to the OS1 position. (DVM reads voltage on output signal line.)
2. Set the DVM to its 10 V dc range with a 1 mV resolution.
3. On the spectrum analyzer, press **MODULE**, **Diagnose**. Use the knob or step keys to select TAM Output Signal Test.
4. Enter 10000 mV. Record the DVM reading. This reading should be within the limits shown.

Requirement: Between +9.960 V dc and +10.040 V dc	Record: 10000 m V dc Reading: _____ V dc
---	--

5. Enter -10000 mV. Record the DVM reading. This reading should be within the limits shown.

Requirement: Between -10.040 V dc and -9.960 V dc	Record: -10000 m V dc Reading: _____ V dc
---	---

6. Enter 0 mV. Record the DVM reading. This reading should be within the limits shown.

Requirement: Between -40 mV and +40 mV	Record: 0 mV Reading: _____ V dc
--	--

7. Press **ABORT**.

Table 4-2. Performance Test Record

Agilent Technologies Model Agilent 85629B Test and Adjustment Module	Tested by _____;		
	Date _____;		
	Serial No. _____;		
	Results		
Test Description	Minimum	Actual	Maximum
ADC Accuracy			
Worst Case Positive TAM Reading	+13930 m V dc	_____;	+14070 m V dc
Worst Case Negative TAM Reading	-14070 m V dc	_____;	-13930 m V dc
Worst Case Zero TAM Reading	-70 m V dc	_____;	+70 m V dc
DAC Accuracy			
+10000 mV Setting	+9.960 V dc	_____;	-10.040 V dc
-10000 mV Setting	-10.040 V dc	_____;	-9.960 V dc
0 mV Setting	-40 m V dc	_____;	+40 m V dc

TAM Address Line Check

Note This is not a performance test. This check is provided to verify the functionality of the TAM's address decoding.

Description

The TAM determines what tests to perform for a particular test connector based on the address of the connector. This check verifies the operability of the address decoding circuitry. The following items summarize the TAM Address Line Check:

- Use the service board to select a set of addresses with the TAM in the TAM Connector Address Check mode.
- Compare the selected addresses to those displayed on the analyzer CRT.

Recommended Equipment

Spectrum Analyzer 8560A, 8560E/EC, 8561A, 8561B,
8561E/EC, 8562A, A8562B, 8563A, or 8563E/EC
Service Board Assembly See "Service Board" information

Procedure

1. Connect the guided probe cable to J4 of the service board.
2. On the spectrum analyzer, press **MODULE**, **Diagnose**. Use the knob or step keys to select TAM Connector Address Check.
3. Close or open A0 through A4 sections of switch SW3 as indicated in Table 4-3. At each setting, the connector address shown on the analyzer screen should be the same as the address shown in the table.

Table 4-3. TAM Address Line Check Switch Settings

SW3 Settings					Address
A4	A3	A2	A1	A0	
o	o	o	o	o	31
o	x	x	x	x	16
x	o	x	x	x	8
x	x	o	x	x	4
x	x	x	o	x	2
x	x	x	x	o	1
x	x	x	x	x	0

Note: x = closed;
o = open

Adjustments

TAM Calibration

Assembly Adjusted

A1 TAM Board Assembly

Related Performance Tests

ADC Accuracy

DAC Accuracy

Description

The following items summarize the TAM Calibration:

- The DAC is set to full-scale output using a TAM internal calibration routine.
- Measure the DAC output voltage with a DVM.
- Enter the DVM reading into the TAM; this known full-scale output voltage is used as a voltage reference.

Recommended Equipment

Spectrum Analyzer	8560A, 8560E/EC, 8561A, 8561B, 8561E/EC, 8562A, 8562B, 8563A, or 8563E/EC
DVM	3456A
DVM Test Leads (2 pairs required)	34118A
Printer (optional)	2225A
Service Board Assembly	See “Service Board” information

Procedure

1. Connect the equipment as shown in Figure 5-1. (The setup is the same as for the “DAC Accuracy Performance Test.” See Figure 4-2.) Set the switch SW1 to the OS1 position. (DVM reads voltage on output signal line.)
2. Set the DVM to its 100 V dc range with 100 μ V resolution.
3. On the spectrum analyzer, press **MODULE** and **Diagnose**. Use the knob or step keys to select TAM Calibration. Press **Execute**.
4. Follow the instructions displayed on the analyzer screen to enter and verify the DAC output voltage.

5. If you want a printed record of the calibration data, and a printer is connected via GPIB, press **Print**. It is recommended that the serial number of the TAM and the current date be added to the printout for archiving.
6. Press **EXIT**.

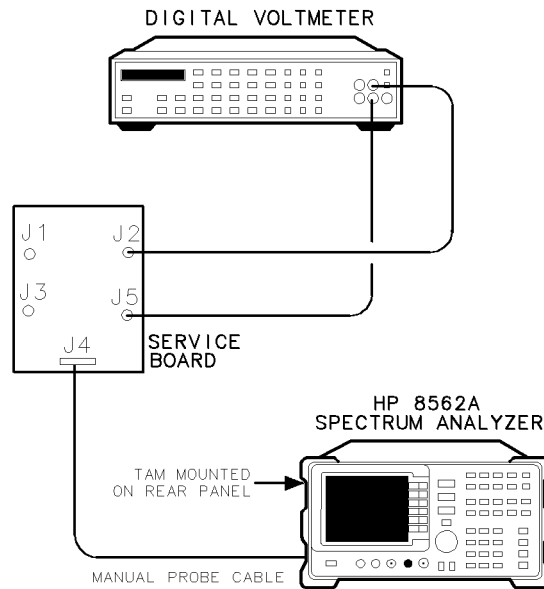


Figure 5-1. TAM Calibration Test Setup

Replaceable Parts

This section contains information for ordering replacement parts for the 85629B. Table 6-1 lists names and addresses that correspond to the manufacturer code numbers in the parts list. Table 6-2 lists the mechanical and electrical parts of the 85629B that are available for replacement. Table Table 6-3 lists the mechanical and electrical parts for the service board.

Replaceable Parts List

The list of replaceable parts (Table 6-2) is organized as follows:

1. Electrical parts (including board assembly).
2. Mechanical parts.

The following information is listed for each part:

1. The part number.
2. The part number check digit (CD).
3. The total quantity (Qty) in the TAM. (This quantity is only given once, at the first appearance of the part in the list.)
4. The description of the part.
5. A five-digit code indicating a typical manufacturer of the part.
6. The manufacturer's part number.

Ordering Information

To order a part listed in the replaceable parts table, quote the part number (with check digit), indicate the quantity required, and address the order to the nearest Agilent Technologies office.

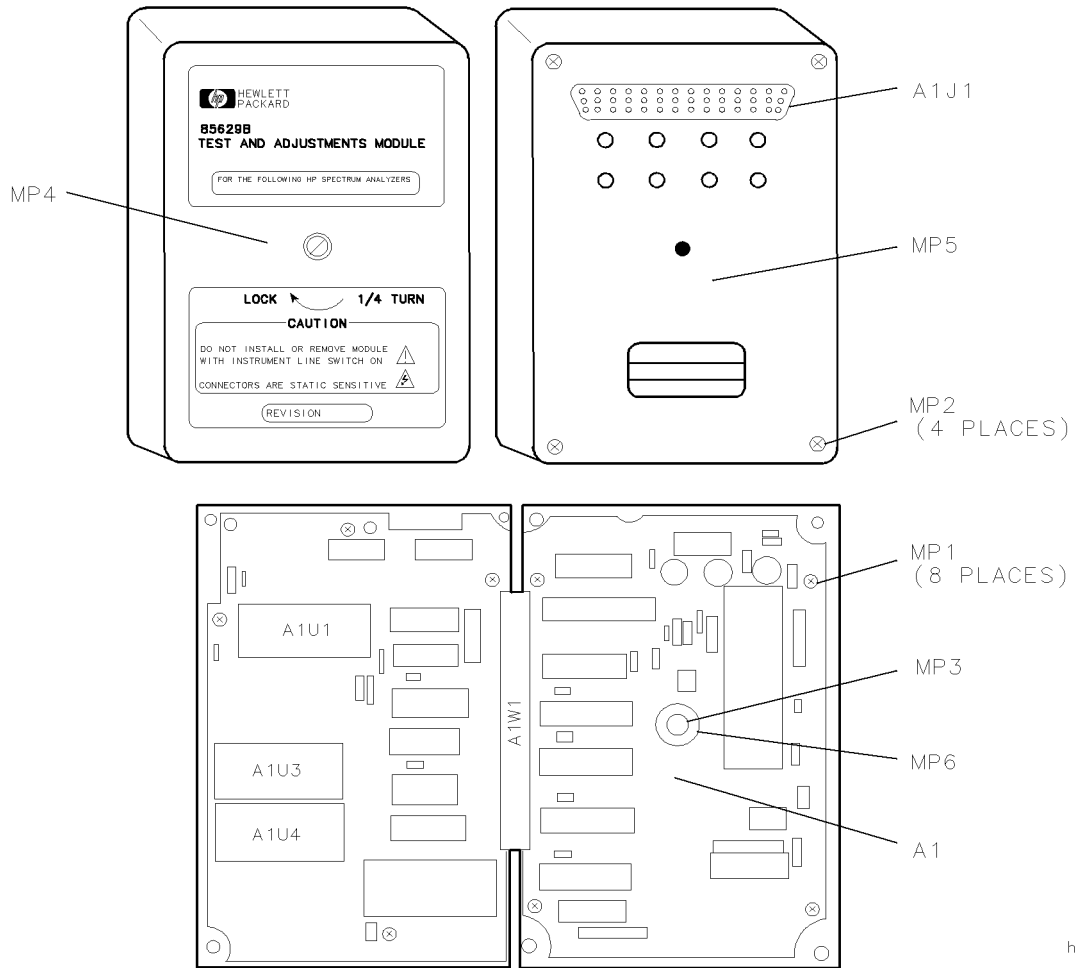
To order a part that is not listed in the replaceable parts table, include the TAM model number and serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Agilent Technologies office.

Table 6-1. Manufacturer's Code List

Mfr. No.	Manufacturer Name	Address	ZIP Code
28480	Agilent Technologies (Corporate Headquarters)	Palo Alto, CA	94304
71468	ITT Corporation Cannon Electric Division	Santa Ana, CA	92702

Table 6-2. 85629B Replaceable Parts

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
Electrical Parts						
A1	85629-60003	2	1	Test & Adjustments Module Board Assembly	28480	85629-60003
A1J1	1252-1263	5	1	Conn, Rect D-Submin 50-ckt 50-Cont	71468	DD50PVK102
A1J2	1252-1609	3	1	Conn, Post Type .100 pin-SPCG 16-Cont	28480	1252-1609
A1U1			1	See Firmware Note 5961-0432		
A1U3			1	See Firmware Note 5961-0432		
A1U4			1	See Firmware Note 5961-0432		
A1W1	8120-4857	7	1	Cbl Flex 30CSpec	28480	8120-4857
Mechanical Parts						
MP1	0515-0894	3	8	Screw, pan head pozi m2.5 × 0.45 × 6	28480	0515-0894
MP2	0515-1236	9	4	Screw, flat head, 90dg pozi m3.0 × 0.50 × 14	28480	0515-1236
MP3	1390-0750	5	1	Fastener-1/4 turn, oval head	28480	1390-0750
MP4	5021-9303	5	1	Cover, top	28480	5021-9303
MP5	5021-9304	6	1	Cover, bottom	28480	5021-9304
MP6	5041-7247	4	1	Spacer	28480	5041-7247
Miscellaneous Parts						
	5041-8973	6	1	Brace (holds the ROMs in place)	28480	5041-8973
	8160-0448	5	1	2 ft EMI Gasket	28480	8160-0448



hm22b

Figure 6-1. TAM Component Locations

Table 6-3. Service Board Replaceable Parts

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
Supplied Parts						
J4	5021-7419	0	1	Service Board for the 85629A/B	28480	-----
	1252-1200	0	1	Connector 16 Post M Polarized	28480	1252-1200
Additional Parts Needed (part numbers given are suggested parts. Equivalent parts can be bought at an electrical-parts store.)						
J1	1510-0091	3	2	Banana Plug - Female, Red	28480	1510-0090
J2	1510-0091	3		Banana Plug - Female, Red	28480	1510-0090
J3	1510-0107	2	2	Banana Plug - Female, Black	28480	1510-0107
J5	1510-0107	2		Banana Plug - Female, Black	28480	1510-0107
R1	0757-0280	3	1	Resistor 1K 1% .25W	28480	0757-0280
SW1	3101-0163	5	1	Switch SPDT	28480	3101-0163
SW2	3101-2243	6	*	Switch - Rocker 8 Post Dip	28480	3101-2343
SW3	3101-2340	4	*	Switch - Rocker 5 Post Dip	28480	3101-2340
Miscellaneous Parts						
	2950-0144	6	4	NUT-HEX 3/8-32 (for banana plugs J1-J4)	28480	2950-0140
	0380-0013	--	4	Spacer, 1.00 inch	----	-----
* SW3 can use the part listed above, or the 8 post rocker switch (part number 3101-2243) can be used for both SW2 and SW3.						

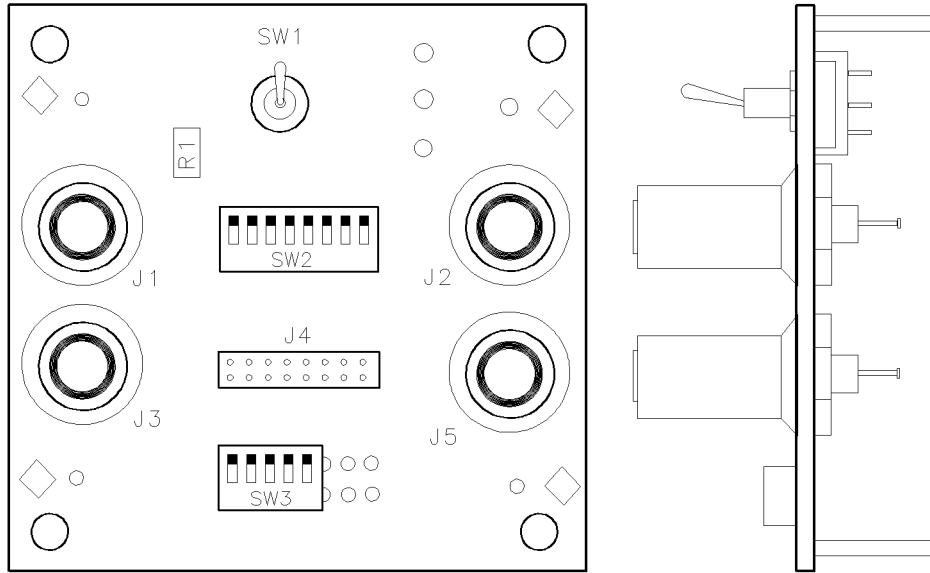


Figure 6-2. Service Board Component Locations

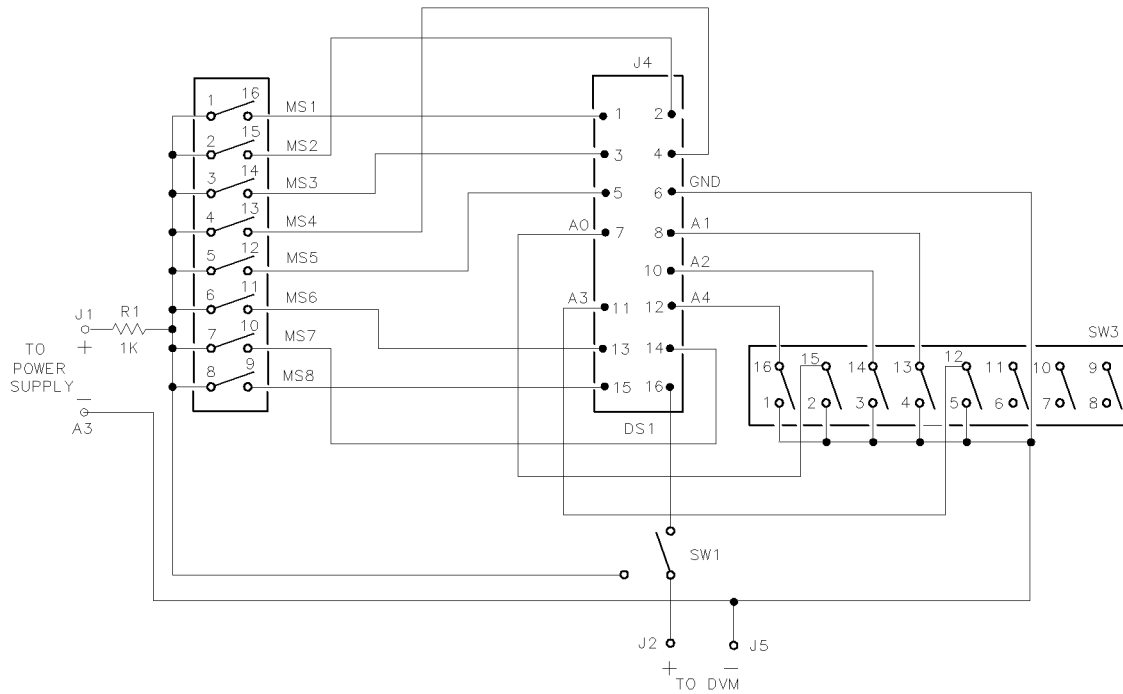


Figure 6-3. Service Board Schematic Diagram

Troubleshooting and Repair

This section includes the following information:

- **TAM Troubleshooting:** information for determining if the TAM is operating properly.
- **Firmware Replacement:** instructions for replacing the ROMs (Read Only Memory) of the 85629B.
- **Board Replacement:** instructions for replacing the internal printed circuit board assembly.

Caution

The 85629B Test and Adjustment Module (TAM) contains parts that are easily damaged by electrostatic discharge. All work on the TAM must be done at a static-safe workstation. Refer to the electrostatic discharge information in the spectrum analyzer service manual.

TAM Troubleshooting

The following procedure is a quick check of the analog circuitry in the TAM. Prior to performing it, place the spectrum analyzer in its service position with the A2 Controller and A3 Interface assemblies folded down.

1. See Figure 7-1. Connect the manual probe cable to A2J11 on the A2 Controller assembly of the analyzer.
2. On the analyzer, press **MODULE** and **Diagnose**, and select Manual Probe Troubleshooting.
3. Observe the yellow LED next to A2J11; it should blink for several seconds while the test is in progress. The system automatically runs the ADC/MUX and DAC tests. The screen displays the names of the tests and indicates whether the unit passed (**OK**) or failed (**FAIL**).

If either the ADC/MUX or the DAC test fails, the TAM's analog circuitry is faulty or out of adjustment. Perform the "ADC Accuracy Performance Test," "DAC Accuracy Performance Tests," and the "TAM Address Line Check" in Chapter 4.

- If the TAM Address Line Check fails, a TAM hardware problem exists.
- If either the ADC Accuracy or the DAC Accuracy performance test fails, perform the TAM calibration procedure (see Chapter 5) and repeat both performance tests. If either performance test fails again, a TAM hardware problem exists.

Firmware Replacement

If a ROM check-sum error is displayed on the analyzer screen (see Chapter 8 for error messages), it is possible to replace the defective ROM. If only one ROM requires replacement, replace it with a ROM with the same part number. A list of ROM part numbers for each firmware revision can be found in the Firmware Note, part number 5961-0432.

If you are replacing all four ROMs, it is recommended that they be replaced with the latest firmware revision which supports your 856X High Performance Portable Spectrum Analyzer(s). Refer to the “TAM Compatibility Matrix” in the spectrum analyzer service manual for more information on compatibility between spectrum analyzers and TAM firmware revisions.

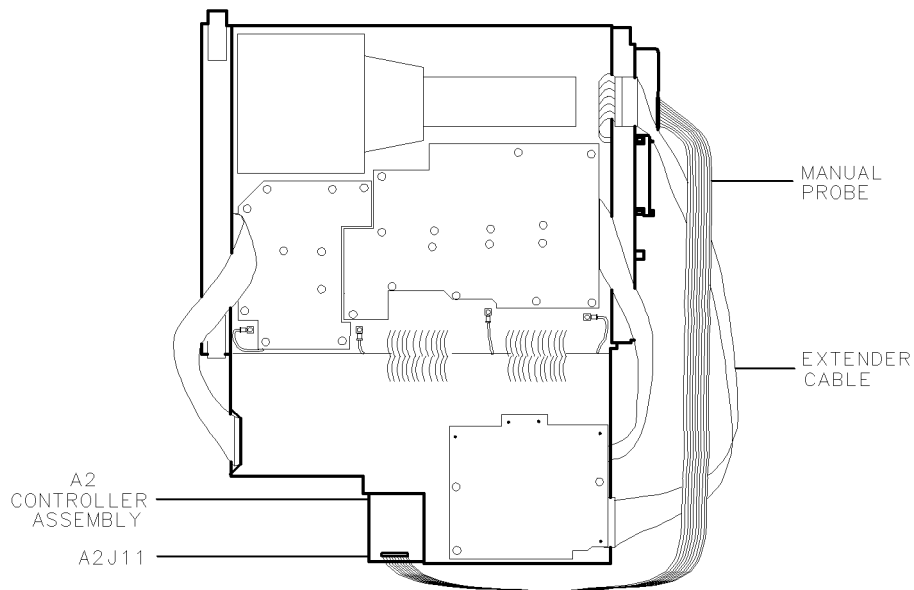


Figure 7-1. Connecting the Manual Probe to the Spectrum Analyzer

Refer to Figure 7-2 and perform the following steps to replace the firmware (ROMs) in the TAM:

Caution The TAM contains parts that are easily damaged by electrostatic discharge. All work on the TAM must be done at a static-free workstation. Refer to the electrostatic discharge information in the spectrum analyzer service manual.

1. Remove the four screws on the back of the TAM.
2. Carefully open the TAM, taking care not to damage the flexible connector between the two halves of the board.
3. Lift up the plastic ROM brace from the left-hand side of the TAM and set it aside.
4. Gently pry up and remove the ROMs.
5. Insert the new ROMs, making sure not to bend any of the pins.
6. Reassemble the TAM; reinstall the ROM brace removed in step 3 and replace the screws removed in step 1.

7-2 Troubleshooting and Repair

7. Place the new firmware revision label on the front of the unit, on top of the previous label.
(This step is not necessary if the new ROMs are the same firmware revision level as the previous ROMs.)

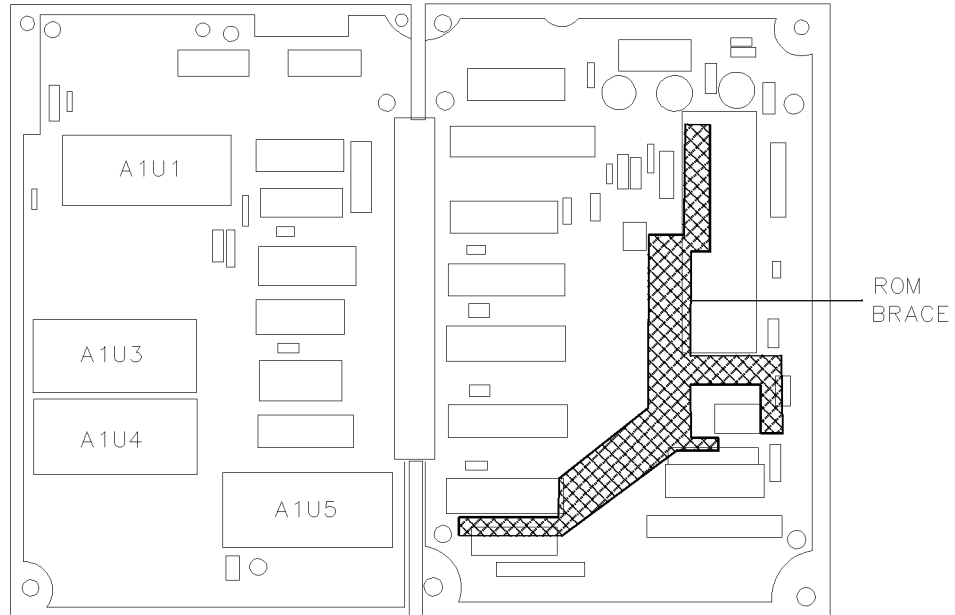


Figure 7-2. ROM or Board Replacement

Board Replacement

Replacement board assemblies available from Agilent Technologies contain the latest version of TAM firmware.

Refer to Figure 6-1 and Figure 7-2 and follow the steps below to replace the board assembly in the TAM.

Caution The TAM contains parts that are easily damaged by electrostatic discharge. All work on the TAM must be done at a static-free workstation. Refer to the electrostatic discharge information in the spectrum analyzer service manual.

1. Remove the four screws (items MP2, Figure 6-1) on the back of the TAM.
2. Carefully open the TAM, taking care not to damage the flexible connector between the two halves of the board.
3. Lift up the plastic ROM brace (see Figure 7-2) from the left-hand side of the TAM and set it aside.
4. Remove the eight small screws (items MP1, Figure 6-1) that hold the board in place.
5. Replace the old board assembly with the new board assembly and refasten with the eight small screws that were removed in step 4.
6. Reassemble the TAM; reinstall the ROM brace removed in step 3 and replace the four screws that were removed in step 1.

Error Messages

There are three types of error messages relating to the TAM that may appear on the screen of the spectrum analyzer. The following paragraphs describe each type, the conditions under which they may appear, what they indicate, and what can be done to correct the error condition.

When the analyzer power is initially turned on with the TAM installed: one or more of the following codes may appear in the bottom right-hand corner of the screen:

Error Code	Indicates
800 MODULE	ROM U4 doesn't checksum; TAM hardware failure.
810 MODULE	ROM U1 doesn't checksum; TAM hardware failure.
811 MODULE	ROM U3 doesn't checksum; TAM hardware failure.
813 MODULE	ROM selection failure; TAM hardware failure.

When the MODULE key is pressed while in analyzer mode but the TAM main menu does not appear: the following error messages may appear in the active function block of the screen:

Error Message	Indicates
MODULE NOT FOUND	Cannot identify TAM; TAM may not be properly installed; or there may be a TAM or analyzer hardware failure.
MODULE DEFECTIVE	TAM hardware failure.
MODULE INCOMPATIBLE VERSION	TAM firmware is incompatible with the spectrum analyzer; refer to the TAM compatibility matrix.

Whenever the **(MODULE)** key is pressed: one of the following three error messages may appear on the bottom line of the TAM main menu:

Error Message	Indicates
TAM CONFIGURATION DATA LOST	The TAM configuration data stored in ROM is invalid*; you must reconfigure the equipment in the configuration menu.
TAM CALIBRATION DATA LOST	The TAM calibration data stored in ROM is invalid; you must perform the TAM calibration routine.
TAM EEROM DATA LOST	Both the configuration and calibration data stored in ROM are invalid; you must reconfigure the equipment and recalibrate the TAM.
* If the most recent configuration data has been lost, the system may revert to its default configuration; be sure to check the exact configuration if test results are questionable.	