Errata

Title & Document Type: 8991A Peak Power Analyzer Calibration Guide

Manual Part Number: 08991-90023

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HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

About this Manual

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Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.

Agilent Technologies

Calibration Guide

HP 8991A Peak Power Analyzer

SERIAL NUMBERS

Attached to the rear panel of the instrument is a serial number plate. The serial number is in the form: 0000A00000. The first four digits and the letter are the serial number prefix. The last five digits are the suffix. The prefix is the same for identical instruments; it changes only when a configuration change is made to the instrument. The suffix, however, is assigned sequentially and is different for each instrument.

HEWLETT PACKARD

HP Part No. 08991-90023

NOTICE

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HEWLETT-PACKARD MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MANUAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hewlett-Packard shall not be liable for errors contained herein or direct, indirect, special, incidental or consequencial damages in connection with the furnishing, performance, or use of this material.

WARRANTY

A copy of the specific warranty terms applicable to your Hewlett-Packard product and replacement parts can be obtained from your local Sales and Service Office.

Herstellerbescheinigung

Hiermit wird bescheinigt, daß dieses Gerät/System in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/System angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Zusatzinformation für Meß- und Testgeräte:

Werden Meß- und Testgeräte mit ungeschirmten Kabeln und/oder in offenen Meßaufbauten verwendet so ist vom Betreiber sicherzustellen, daßdie Funkentstörbedingungen unter Betriebsbedingungen an seiner Grundstücksgrenze eingehalten werden.

Manufacturer's Declaration

This is to certify that this equipment is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation, and has been granted the right to check the equipment type for compliance with these requirements.

Note: If test and measurement equipment is operated with unshielded cables and/or used for measurements in open setups, the user must ensure that under these operating conditions, the radio frequency interference limits are met at the border of his premises.

Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This product is a Safety Class I system (provided with a protective earth terminal).

Before Applying Power

Verify that the product is set to match the available line voltage and the correct fuses are installed.

Safety Earth Ground

An uninterruptable safety earth ground must be provided from the main power source to the product input wiring terminals, power cable, or supplied power cable set.

Warning

Any interruption of the protective (grounding) conductor (inside or outside the system) or disconnecting the protective earth terminal will cause a potential shock hazard that could result in personal injury. (Grounding one conductor of a two conductor outlet is not sufficient protection.) In addition, verify that a common ground exists between the unit under test and the system prior to energizing either unit.

Whenever it is likely that the protection has been impaired, the system must be made inoperative and be secured against any unintended operation.

If this system is to be energized via an autotransformer (for voltage reduction) make sure the common terminal is connected to neutral (that is, the grounded side of the mains supply.)

Servicing instructions are for use by service-trained personnel only. To avoid dangerous electric shock, do not perform any servicing unless qualified to do so.

Adjustments described in the manual are performed with power supplied to the system's instruments while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside the system's instruments might still be charged even if the system has been disconnected from its source of supply.

For continued protection against fire hazard, replace the line fuses only with 250V fuses of the same current rating and type (for example, normal blow, time delay, etc.). Do not use repaired fuses or short circuited fuse holders.

Safety Symbols

Instruction manual symbol: The product will be marked with this symbol when it is necessary for the user to refer to the instruction manual (see Table of Contents for page references).

Indicates hazardous voltages.

Indicates earth (ground) terminal.

Warning

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

Caution

The CAUTION sign denotes a hazard. It calls attention to a procedure, practice, or the like which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

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Performance Tests

Introduction

The procedures in this section test the electrical performance of the instrument using the warranted specifications as performance standards. These tests are suitable for incoming inspection and necessary for calibration. All tests can be performed without access to the interior of the instrument.

Equipment Required

Equipment required for the performance tests is listed in table 1-1, Recommended Test Equipment. Unless noted otherwise, any equipment that satisfies the critical specifications given in the table may be substituted.

Performance Test Record

Results of the performance tests may be recorded in the Performance Test Record. The table is located at the end of this chapter. The Performance Test Record lists all of the tested specifications and their acceptable limits. Results recorded at incoming inspection can be used for comparison in periodic maintenance and troubleshooting, and after repairs or adjustments.

Calibration Cycle

This instrument requires periodic verification of performance. Under normal use and environmental conditions, the instrument should be calibrated annually. Normal use is defined to be about 2000 hours of use per year.

Performance Test Procedures

These tests are designed to verify published instrument specifications. Perform the tests in the order given, and record the data in the Performance Test Record.

In order to consider a performance test valid, the following is assumed:

- The Peak Power Analyzer has had a **one hour warm-up period** before the tests are performed.
- The person who performs the test understands how to use the specified test equipment.
- The tests are performed under normal operating conditions as stated in the specification table.
- The person who performs the test supplies whatever cables, connectors, and adapters are necessary.
- For certain tests, measurement limits are calculated using specific equipment. As noted in the tests, these limits must be recalculated if equipment other than that specified is used.
- A user calibration of the peak power measurement system is run prior to performance of these tests.

Table 1-1. Recommended Test Equipment

Equipment	Critical Specifications	Recommended Model	Use[1]
Adapter (BNC to Banana Plug)		HP 1251-2277	P
Adapter (SMC to BNC)		HP 1250-0331	P
Adapter (Type N to BNC)		HP 1250-1474	P
Attenuator, Reference	Attenuation: 30 dB	HP 11708A	P
Attenuator	Attenuation: 3 dB Frequency Range: dc to 8 GHz SWR: 1.1	HP 8493C	P
Attenuator, Step	Attenuation:0–70 dB Step Size: 10 dB	HP 8495G	P
Attenuator	Attenuation: 20 dB Frequency Range: dc to 1 GHz	HP 8491A (Option 020)	P
BNC Tee		HP 1250-0781	P
Cable, BNC		HP 10503A	P
Cable, Sensor	No substitute	HP 84812-60008	P
Load, 50 Ω	Frequency: dc to 1 GHz	HP 908A	P
Mixer	Double Balanced IF Port: dc coupled	Mini Circuits[2]ZFM-2	P

1 A= Adjustments, P=Performance, T=Troubleshooting, O=Operational Verification

2 Mini Circuits, PO Box 350116, Brooklyn, New York 11235-0003

Table 1-1. Recommended Test Equipment (continued)

Equipment	Critical Specifications	Recommended Model	Use[1]
Multimeter	No substitute	HP 3458A	P
Peak Power Sensor	No substitute	HP 84812A, 84813A, 84814A, and 84815A	P
Power Meter	Accuracy: 0.02 dB Frequency range: 100 MHz	HP 437B	P
Power Sensor	Power Meter compatible	HP 8482A	P
Power Sensor	Power Meter compatible	HP 8485A	P
Power Sensor	Power Meter compatible	HP 8485D	P
Pulse Generator	Frequency Range: 100 Hz to 1 kHz Sensitivity: 300 mVp-p to 5 Vp-p	HP 8116A	O
Power Supply	Range: 30 mV to 30 V Accuracy: 0.025%	HP 6114A	P
Pulse Generator	Risetime: $\leq$500 ps	HP 8131A	P
Signal Generator	Harmonics: $\leq$50 dBc Frequency: 3 GHz Level:$-$30 to + 10 dBm	HP 83620A	P
Signal Generator	Frequency Range: 1 MHz to 2 GHz Accuracy: 0.003%	HP 8657B	P
Switch Driver	No substitute	HP 11713A	P
Termination, 50 Ω		HP 1250-0207	P
Universal Source	No substitute	HP 3245A	P

1 A= Adjustments, P=Performance, T=Troubleshooting, O=Operational Verification

Checking Risetime/Falltime

Specification

Electrical Characteristics	Performance Limits	Conditions
Channels 1 & 4 Risetime/Falltime	<10 ns[1] <1 μs	HIGH LOW
Channels 2 & 3 Risetime/Falltime	< 5 ns	

1 The optional 20 foot long peak power cable degrades the specified risetime to 12 ns. Specification for the HP 84815A is <45 ns

Description

The risetime for RF channels 1 and 4 is measured using a fast risetime pulse which is mixed with a 2 GHz local oscillator. The resulting pulsed signal drives the peak power sensor. The amplitude of the pulsed waveform is varied by changing the output power level of the local oscillator. The risetime of each power range of the Peak Power Analyzer is checked by making automatic risetime measurements.

The risetime of video channels 2 and 3 is verified using a fast risetime pulse which is input directly to the Peak Power Analyzer.

Note

In the following procedure, the risetime/falltime specification is tested. Thus, if preferred, wherever the term "risetime" is used, the term "falltime" can be substituted in order to measure falltime.

Equipment

Pulse Generator	HP 8131A
Signal Generator	HP 8657B
Mixer	Mini Circuits ZFM-2
Peak Power Sensor	HP 84812A, 84813A, 84814A, or 84815A

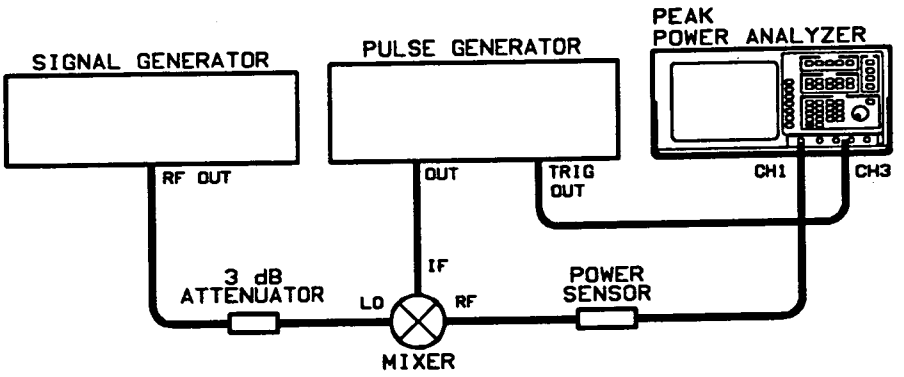


Figure 1-1. Checking Channel 1 and Channel 4 Risetime Equipment Setup

Procedure

To set up the test equipment

1. Set the signal generator as follows:
   a. Mode: CW
   b. Output Level: 15 dBm
   c. Frequency: 1 GHz
2. Set the pulse generator as follows:
   a. Mode: Continuous pulse stream
   b. Period: 3.0 μs
   c. Amplitude: 0.5 volt (low is 0V and high is 0.5V)
   d. Duty Cycle: 50%
3. Connect the equipment as shown in Figure 1-1.

Table 1-2.
Risetime/Falltime Settings and Expected Measurement Results

Bandwidth	Pulse Level	Risetime Falltime	Avgs
HIGH	−10 dBm→20 dBm	<10 ns[1]	32
LOW	−20 dBm→20 dBm	<1 μs	32

1 Specification for the HP 84815A is <45 ns

To set up the Peak Power Analyzer

1. Select the [CHAN/VERT] menu and set the following:
   a. Select the reference level softkey and set to 0 dBm by pressing [0] [dBm].
   b. Select the scale softkey and turn the knob until it is set to 5 dB/div.
2. Select the [CARRIER FREQ] menu, and set the following parameter using the displayed menu:
   a. Highlight **ch1≠ch4** with the top function key.
   b. Select **ch1** with the second function key.
   c. Enter 1 GHz with the knob or the keypad. If the keypad is used, terminate the entry with the **GHz** key on the right side of the keypad.
3. Select the [TRIG] menu and set the following parameter using the displayed menu:
   a. Highlight **trig'd** using the top softkey.
   b. Highlight edge using 2nd softkey from top.
   c. Set to positive edge trigger using the 5th softkey from the top.
   d. Highlight level and set to obtain stable trigger.
4. Select the [DISPLAY] menu, and set the following parameters using the displayed menu:

a. Highlight (select) norm with the first function key.

b. Highlight 1 with the # of screens function key.

c. Highlight grid with the fifth function key.

d. Highlight on with the connect dots function key.

5. Select the (CHAN/VERT) menu, and set the following parameters using the displayed menu:

a. Highlight 1 with the top function key.

b. Highlight HIGH with the bandwidth function key.

6. Select the (TIMEBASE) menu and set the following parameters using the displayed menu:

a. Highlight TIMEBASE and set to 500 ns.

b. Highlight cntr under the reference softkey.

c. Highlight delay and set by rotating the knob until the rising edge of the pulse on the screen is centered at 0.005

d. Highlight TIMEBASE and set to 10 ns/div.

To verify risetime

1. Select the (DISPLAY) menu:

a. Use the top softkey to highlight avg.

b. Set the number of averages to 32 using the knob.

c. Set the scale to 5 dB/division.

2. Make an automatic risetime measurement using the following steps:

a. Press the **BLUE** key, and then the **RISETIME** ((4)) key.

b. When #C appears at the bottom of the display, press [1].

3. Read the risetime at the bottom of the Peak Power Analyzer display. The risetime should be as shown in Table 1-2.

To verify falltime

1. Select the [TRIG] menu.
2. Highlight delay and add 1.5 μs to the existing delay. This should show the falling edge of the pulse.
3. Press the [BLUE] key, and then the FALLTIME [5] key.
4. When #C appears at the bottom of the display, press [1].
5. Read the falltime at the bottom of the peak power analyzer display. The falltime should be as shown in table 1-2.

To verify low bandwidth risetime/falltime.

1. Select the [CHAN/VERT] menu and highlight low under the bandwidth softkey.
2. Select the [TIMEBASE] menu and highlight the timebase setting by pressing the top softkey. Set the timebase to 500 ns/div using the knob.
3. Measure risetime and falltime as before. The results should agree with table 1-2.

To measure risetime/falltime of channel 4.

Repeat the above procedure with the sensor connected to channel 4.

To verify the risetime of Channels 2 and 3

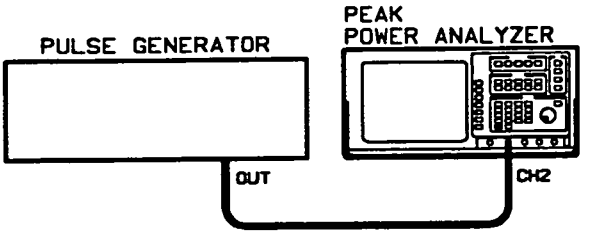


Figure 1-2. Checking Channel 2 and Channel 3 Risetime Equipment Setup

1. Set up the equipment as shown in Figure 1-2.
2. Set the pulse generator as follows:

   Period: 20 μs

   Risetime: < 500 ps

   Amplitude: 0.5 volt
3. Press (AUTOSCALE) on the Peak Power Analyzer.
4. Select the (TIMEBASE) menu, and set the following parameter using the displayed menu:

   Set the timebase to 5 ns/division using the top function key. Change the timebase with the knob or the keypad. If the keypad is used, terminate the entry with the **ns** key on the right side of the keypad.
5. Make an automatic risetime measurement using the following steps:

   Press the **BLUE** key, and then the **RISETIME** ((4)) key.

   When #C appears at the bottom of the display, press (1). If C# is not displayed, rotate the knob.

6. Read the risetime at the bottom of the Peak Power Analyzer display. The risetime measured by the Peak Power Analyzer should be less than 5 ns.
7. Disconnect the cable from channel 2 and connect it to channel 3.
8. Repeat the procedure for channel 3.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails:

- Was the equipment set up correctly?
- Are the BNC connectors on the Peak Power Analyzer dirty?
- The Peak Power Analyzer may need to have a vertical calibration performed. The vertical calibration procedure can be found in the Operating Manual or in the adjustments section of this guide under the A1 Control Board Assembly Adjustments.
- When checking risetime on channel 1 or channel 4, the A1 Control Board or A6 Baseband Board is probably bad.

If the Peak Power Analyzer and peak power sensor continue to fail any or all parts of this procedure, refer to the *Peak Power Analyzer Service Guide* to determine whether the Peak Power Analyzer or the peak power sensor is at fault.

If necessary, results of this procedure can be recorded in the Performance Test Record at the end of this chapter.

Checking Instrumentation Uncertainty

Specification

Electrical Characteristics	Performance Limits	Conditions
Instrumentation Uncertainty[1]	0.08 + (1/signal power in dBm + 26	HIGH Bandwidth
	0.08 + (1.3/signal power in dBm + 33)	LOW, CW Bandwidth

1 With a displayed signal height ≥2 divisions, 128 averages, ≤2 dB/division, and signal power ≥−25 dBm (supplemental below −25 dbm). Includes noise and offset. Add ±0.07 dB for 5 dB/division.

Description

Instrumentation Uncertainty is comprised of several errors: vertical calibration uncertainty, quantization error, delta temperature drift, and distortion error.

This performance test is intended to verify that your Peak Power Analyzer meets the specified instrumentation measurement uncertainty. This test verifies only this specification. All other specifications must be verified using the other tests outlined in this chapter.

Note

This software package does **NOT** verify that the Peak Power Analyzer is fully calibrated. It only verifies the instrumentation measurement uncertainty of the Peak Power Analyzer. Refer to the "instr cal menu" section of the Utility Menu for complete calibration procedures.

Controllers

Any HP Model 9000 series 200/300 computer.

At least 4 megabytes of RAM.

HP-IB interface.

A 3.5 inch dual sided floppy drive unit.

Operating System

HP BASIC 5.1 or above with the following language extensions loaded:

Name	Description
GRAPH	Graphics
GRAPHX	Graphics Extensions
IO	I/O
TRANS	Transfer
MAT	Matrix Statements
PDEV	Program Development
XREF	Cross Reference
KBD	Keyboard Extensions
CLOCK	Clock
MS	Mass Storage
SRM	Shared Resource Management
ERR	Error Messages
DISC	Small Disc Driver
CS80	CS80 Disc Driver
HPIB	HPIB Interface Driver
CRTB	Bit-mapped CRT Driver
CRTA	Alpha CRT Driver
COMPLEX	Complex Arithmetic
CRTX	CRT Extensions
EDIT	List and Edit
HFS	Hierarchical File System

Equipment

Multimeter	HP 3458A
Adapter (SMC to BNC)	HP 1250-0331
Peak Power Sensor Cable	HP 84812-60008
Controller	HP 9000 Series 200\300
Thinkjet Printer	HP 2225A
22.0 kΩ resistor	

Installing the Software

The software needed to perform this test is located at the back of this manual.

Using a Floppy Disc Drive

Make a backup copy of the supplied disks.

Make sure that your working disk is write-enabled.

Using a Shared Resource Management (SRM) or Hierarchical File System (HFS) Hard Disc

Create a directory that will contain the program and its associated files. Copy all of the files on the 3.5 inch disk to this directory.

Running the Software

1. Make sure that the software has been copied into a directory (if HFS or SRM) or copied to a work disk (if running from a floppy).
2. Set the default mass storage to the directory or floppy disk that contains the test software. This is done using the BASIC MSI command. See the BASIC Language Reference for more information on setting the default mass storage.
3. Load the program by typing LOAD "IUM_8990" and pressing ENTER or RETURN.
4. Start the test program by typing RUN and pressing ENTER or RETURN.
5. The program will prompt you for the following information:

- Company Name
- Your Name
- Customer Service Order Number
- Ambient Temperature (°C)
- Ambient Relative Humidity
- HP-IB Address of the 8991A(default=707)
- 8991A is Option 001, Delete Ch. 4 (default=No)
- HP-IB Address of the 3458A (default=722)
- Print Hardcopy (default=no)

The test takes 15 minutes per channel.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails. Use the suggestions in the order listed:

1. Was the equipment set up correctly?
2. The Peak Power Analyzer may need to have a vertical calibration performed. The vertical calibration procedure can be found in the *Operating Manual* or in the adjustments section of this guide under the A1 Control Board Assembly Adjustments.
3. Swap the A6 Baseband Boards, if another board is available, and rerun the performance test. Swapping the boards may determine if the A6 Baseband Board is causing the test to fail.
4. In the adjustment section of this guide, perform the Signal Path Adjustments.

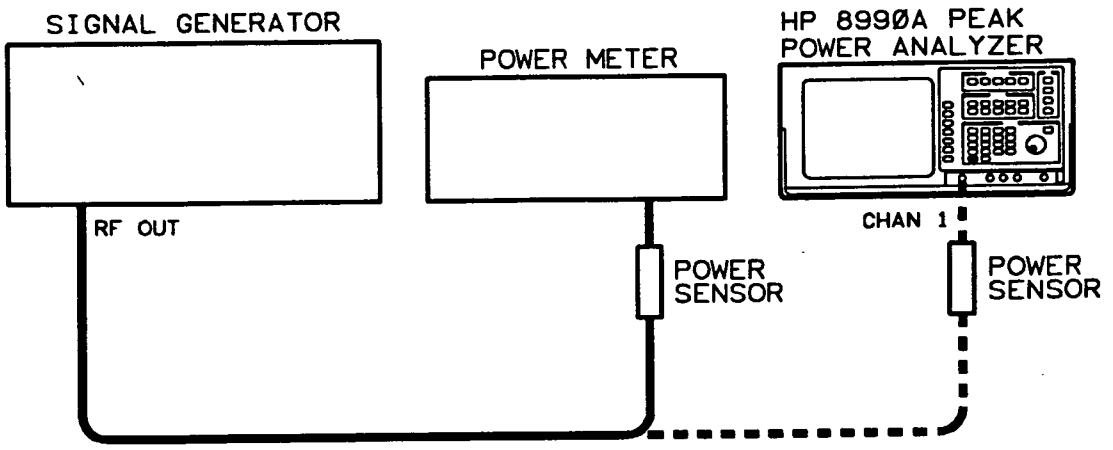


Figure 1-3. Peak Power Sensor Cable Electrical Connector

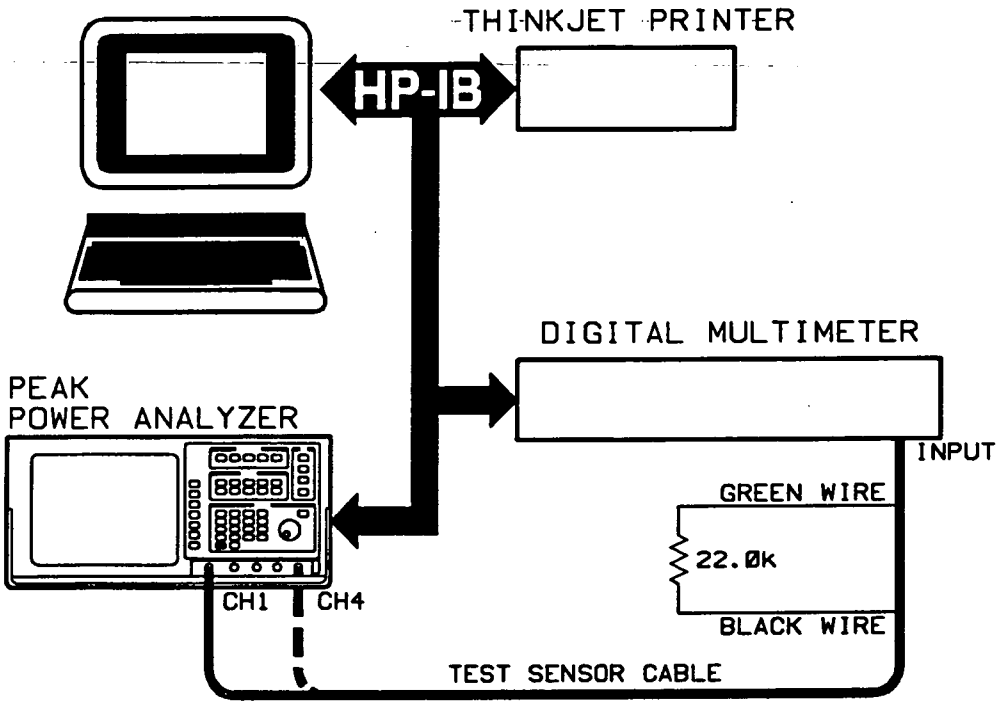


Figure 1-4. Instrumentation Uncertainty Connection

Checking Sensor Check Source Power Level (Option 003 Only)

Specification

Electrical Characteristics	Performance Limits	Conditions
Power Level	+10 dBm ±0.5 dB	

Description

Since it is basically independent of other instrument circuits, the output level of the Sensor Check Source is checked with the Peak Power Analyzer and peak power sensor. Both the CW and pulse power levels are checked.

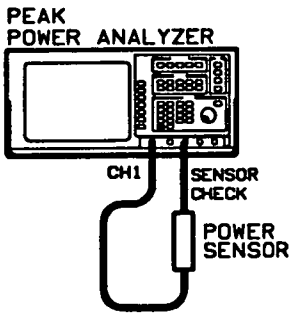


Figure 1-5. Checking Sensor Check Source Equipment Setup

Equipment

Peak Power Sensor..... HP 84812A, 84813A, 84814A, or 84815A

Note

Prior to performing this test, the performance tests which verify proper operation of channel 1 on the Peak Power Analyzer and operation of the peak power sensor should be complete. These tests include Checking Power Measurement Range, Checking Instrumentation Uncertainty, and Checking Sensor SWR.

Procedure

To set up the equipment

1. Connect the equipment as shown in Figure 1-5.
2. Turn on the sensor check source and set it to cw mode.
   a. Press the [UTIL] key.
   b. Press the `check source` function key until **CW** is highlighted.
3. Set the carrier frequency to 1 GHz.
   a. Press the [CARRIER FREQ] menu key.
   b. Enter 1 GHz using the keypad or the knob. If the keypad is used, the entry must be terminated with the [GHz] key.
4. Press [AUTOSCALE] to automatically scale the signal to the Peak Power Analyzer display.

   Wait until the message `running` appears at the top of the display before proceeding.

To measure sensor check source power

1. Make an automatic average power measurement.
   a. Press the **BLUE** key and then the **AVG** ([8]) key.
   b. Press [1] when **C#** appears at the bottom of the display.

The display will read:avg(1) XXX where XXX is the current average power measured.

The average power displayed should be between 8.9 mW and 11.2 mW (10 dBm ±0.5 dB).

2. Change the sensor check source power to pulse.
   a. Select the (UTIL) menu.
   b. Set the check source to pulse mode (highlight **pulse**).
3. Autoscale the Peak Power Analyzer by pressing (AUTOSCALE).
4. Make a pulse "top" measurement.
   a. Press the **BLUE** key and then the **TOP** ((9)) key.
   b. Press (1) when **C#** appears at the bottom of the display.

   The average power displayed should be between 8.9 mW and 11.2 mW (10 dBm ±0.5 dB).

If the Performance Test Fails

The following suggestions may be of help if the performance test fails:

- Was the equipment set up correctly?
- Perform the adjustment for the A8 Sensor Check Source in the adjustments chapter of this guide.
- Measure the sensor check source with an average power meter. Set the power meter for a duty cycle of 50% when the sensor check source is set to pulse mode.

If either part of the test continues to fail and all RF channel and sensor performance tests have passed, refer to the Peak Power Analyzer Service Guide.

If necessary, results of this procedure may be recorded in the Performance Test Record at the end of this chapter.

Checking Bandwidth

Specification

Electrical Characteristics	Performance Limits	Conditions
Bandwidth	dc to 100 MHz	Repetitive
	dc to 1 MHz	Single-shot

Description

This test measures the bandwidth of channels 2 and 3 at the −3 dB point. The bandwidth limits are verified by inputting a signal of known frequency and power to the Peak Power Analyzer and to an average power meter system.

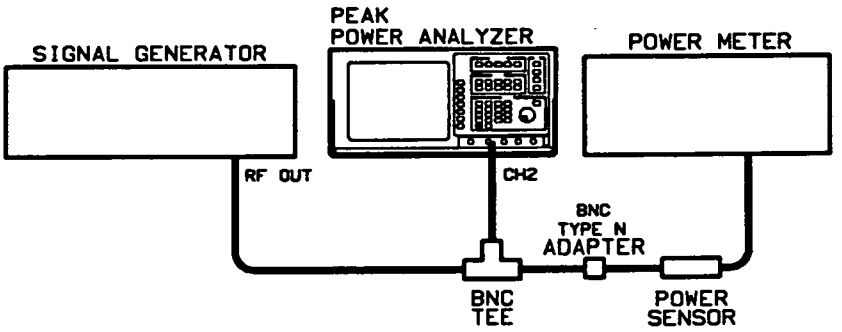


Figure 1-6. Checking Bandwidth Equipment Setup

Equipment

Signal Generator..... HP 8657B
Power Meter..... HP 437B
Power Sensor..... HP 8482A

Procedure

To set up the test equipment and Peak Power Analyzer

1. Connect the equipment as shown in Figure 1-6.
2. Set the signal generator to 100 kHz and 0 dBm.
3. Press [RECALL] and then [CLEAR] on the Peak Power Analyzer.
4. Press [AUTOSCALE] on the Peak Power Analyzer.
5. Press the [DISPLAY] menu key, and select (highlight) **grid** from the displayed menu.
6. Set the Peak Power Analyzer scale to 100 mV/div using the following steps:
   a. Press the [CHAN/VERT] menu key.
   b. Select the third function key.
   c. Set the scale to 100 mV/div using the keypad or the knob. If the keypad is used, terminate the entry with the **mV** key.
7. Adjust the signal generator output power so the waveform is exactly eight divisions peak-to-peak.
8. Adjust the **offset** as needed to center the waveform on the Peak Power Analyzer display using the following steps:
   a. Select the fourth function key.
   b. Set the offset with the keypad or the knob. If the knob is used, more resolution may be selected by pressing the [FINE] key.
9. On the average power meter, enter the calibration factor for 100 kHz.

To verify the bandwidth limits of Channels 2 and 3

1. Set the power meter to make a relative measurement. Make the reference 0 dB.

2. Change the signal generator to 100 MHz.
3. Set the Peak Power Analyzer timebase to 10 ns/division using the following steps:
   a. Press the (TIMEBASE) menu key.
   b. The timebase is enabled (highlighted) when the menu is selected. Adjust the timebase using the keypad or the knob.
4. Adjust the Peak Power Analyzer trigger level, if necessary, for a stable display.
   a. Select the (TRIG) menu key.
   b. Verify that the `source` is set (highlighted) to **2**.
   c. Adjust the `level` with the keypad or knob until the waveform is stable.
5. On the average power meter, enter the calibration factor for 100 MHz.
6. Adjust the signal generator output power for 0 dBm as read on the power meter.
7. Observe the waveform on the Peak Power Analyzer display. The waveform should be greater than or equal to 5.6 divisions peak-to-peak.
8. Disconnect the signal generator from channel 2 and connect it to channel 3.
9. Repeat this full procedure for channel 3.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails. Use the suggestions in the order listed:

1. Was the equipment set up correctly?
2. Was the cabling connected correctly?

3. If the test is still failing, the A1 Control Board is most likely at fault.

If either of the measurements continue to fail, refer to the *Peak Power Analyzer Service Guide.*

If necessary, test results may be recorded in the Performance Test Record at the end of this chapter.

Checking Offset Accuracy

Specification

Electrical Characteristics	Performance Limits	Conditions
Offset Accuracy	±2% of offset + 0.2 x (V/div)	

Description

This test measures an average dc voltage at maximum vertical offset on channels 2 and 3. The offset accuracy is checked by supplying an accurate voltage and displaying it at a known offset and vertical sensitivity. The offset and scale are chosen such that the calculated maximum permissible offset from the center of the display is easily read using the division markings on the screen.

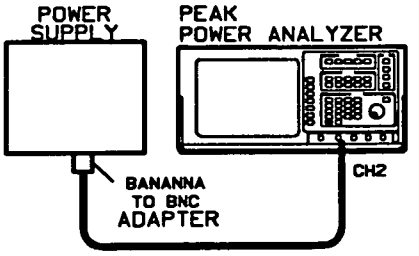


Figure 1-7. Checking Offset Accuracy Equipment Setup

Equipment Required

Power Supply..... HP 6114A
BNC to Banana Plug Adapter..... HP 1251-2277

Procedure

To set up the test equipment and the Peak Power Analyzer

1. Connect the equipment as shown in Figure 1-7.
2. Press (RECALL) and then (CLEAR) on the Peak Power Analyzer.
3. Adjust the power supply to read +1.00 volt.
4. On the Peak Power Analyzer, press the (DISPLAY) menu key, and select (highlight) **grid** with the fifth function key.
5. Set the timebase to 1 μs/division using the following steps:
   a. Select the (TIMEBASE) menu key.
   b. Set the timebase using the keypad or the knob. If the keypad is used, terminate the entry with the μs key.
6. On the Peak Power Analyzer, turn channel 2 on and the other channels off using the following steps:
   a. Press the (CHAN/VERT) menu key.
   b. Press the top function key, and select (highlight) the desired channel.
   c. Press the second function key until **on** or **off** is highlighted.

To verify offset accuracy for Channel 2

1. Set the Peak Power Analyzer scale to 100 mV/division with the following steps:
   a. Press the third function key.
   b. Set the scale using the keypad or the knob.
2. Set the Peak Power Analyzer coupling to **dc**.

a. Press the fifth function key until **dc** is highlighted.

3. Set the **offset** on the Peak Power Analyzer to 1 volt.
   a. Press the fourth function key.
   b. Set the offset using the keypad or the knob.
4. Verify that the level displayed on the Peak Power Analyzer is within 0.4 divisions of the center horizontal line (as calculated from the vertical sensitivity and offset).
5. Select a scale of 200 mV/division on the Peak Power Analyzer.
6. Set the Peak Power Analyzer offset to +2 volts.
7. Adjust the power supply to +2.00 volts.
8. Verify that the level displayed on the Analyzer is within 0.4 divisions of the center horizontal line.

Note

The performance test is temperature sensitive. Test limits given in this procedure assume that the instrument is operating at the temperature at which it was calibrated. If the operating temperature is not the same as the calibration temperature, the error is increased by 0.075 divisions/degree C change (0.15 divisions/degree C change, on 5 mV/division range).

To verify offset accuracy for Channel 3

1. Disconnect the input to **CH 2** and connect it to **CH 3**.
2. Turn channel 3 on and channel 2 off.
3. Set the scale for channel 3 to 200 mV/division.
4. Set the offset for channel 3 to + 2 volts.
5. Verify that the Peak Power Analyzer signal level displayed is within 0.4 divisions of the center horizontal line.

6. Change the power supply to +1.00 volt.
7. Set the Peak Power Analyzer scale to 100 mV/div.
8. Set the offset to 1 volt.
9. Verify that the level displayed is within 0.4 divisions of the center horizontal line.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails. Use the suggestions in the order listed:

1. Was the equipment set up correctly?
2. The Peak Power Analyzer may need to have a vertical calibration performed. The vertical calibration procedure can be found in the *Operating Manual* or in the adjustments section of this guide under the A1 Control Board Assembly Adjustments.
3. Perform the Signal Path Adjustments in the adjustments chapter of this guide.

If the test continues to fail, refer to the *Peak Power Analyzer Service Guide*.

If necessary, you may record the measurement results of this test in the Performance Test Record at the end of this chapter.

Checking Channel 1 and Channel 4 Trigger Sensitivity

Specification

Electrical Characteristics	Limits	BW Mode
Trigger Sensitivity	−15 to +20 dBm −25 to +20 dBm	HIGH LOW
Bandwidth	1 MHz	

Description

The channel 1 and channel 4 trigger sensitivity performance test verifies that the Peak Power Analyzer can trigger on a signal equal to the specified sensitivity. A signal generator is connected to the Peak Power Analyzer. The reference level and scale are set on the Peak Power Analyzer, and then, the signal generator output level is set to the low end of the specified limit for the bandwidth mode selected. Finally, the trigger level is adjusted for a stable signal.

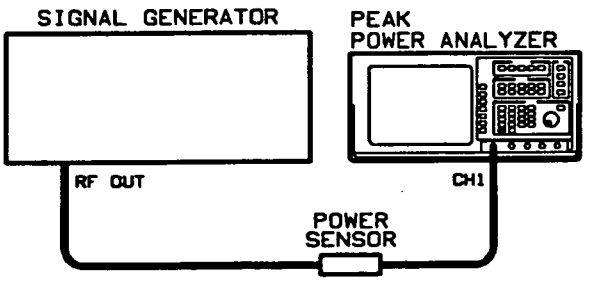


Figure 1-8.
Checking Channel 1 and Channel 4 Trigger Sensitivity Equipment Setup

Equipment

Signal Generator.....	HP 83620A (or HP 83624A)
Peak Power Sensor.....	HP 84812A/84813A/ 84814A/84815A

Procedure

To set up the test equipment and the Peak Power Analyzer

1. Set the signal generator as follows:

   Frequency: 3 GHz

   Output Level: −15 dBm

   Duty Cycle: 50%

   Repetition rate: 1 MHz

2. Set the Peak Power Analyzer display as follows:

   Press the [DISPLAY] key.

   Select norm with the top function key.

   Select **grid** with the 5th function key from the top.

3. Connect the peak power sensor to **CH 1** as in Figure 1-8.

4. Turn channel 1 **on** and all other channels **off**.

   Press the [CHAN/VERT] menu key.

   Highlight the desired channel. Turn the channel on or off using the second function key.

5. Set the carrier frequency of the Peak Power Analyzer to 3 GHz.

   Press the [CARRIER FREQ] menu key.

   Press the top function key until ch1≠ch4 is highlighted.

Enter 3 GHz with the knob or the keypad.

6. Select HIGH bandwidth.

   Press the [CHAN/VERT] key.

   Select the **bandwidth** softkey and highlight **HIGH**.

To verify internal triggering down to −15 dBm

1. Set display to log mode by pressing the [DISPLAY] menu key and highlighting [LOG] under power display.
2. Connect the peak power sensor to the signal generator as in Figure 1-8.
3. Change the reference level of the Peak Power Analyzer to −13 dBm using the following steps:

   Press the [CHAN/VERT] menu key.

   Press the **ref level** softkey.

   Press [−] [1] [3] [dBm] on the keypad.
4. Set the scale to 2 dB/div using the following steps:

   Press the [SCALE] softkey.

   Turn the knob until 2.0 dB/div is displayed.
5. The pulse top displayed on the Peak Power Analyzer should be one major division from the top of the screen.
6. Change the timebase setting using the following steps:

   Press the [TIMEBASE] menu key.

   Press the top softkey.

   Adjust the timebase with the knob until two or three pulses are displayed.
7. Adjust the trigger level using the following steps:

Press the (TRIG) menu key.

Press the top softkey until **auto** is highlighted.

Press the second softkey until **edge** is highlighted.

Press the fifth softkey until the rising edge is highlighted.

Adjust the trigger `level` with the knob so that the trigger level (horizontal broken line) is on the waveform and the signal is stable. The (FINE) key enables the level to be changed in smaller steps.

8. If the waveform can not be stabilized, the test fails.
9. Change the settings on the signal generator and the Peak Power Analyzer as shown in table 1-3, and repeat the procedure.

Table 1-3.
Channel 1 and Channel 4 Trigger Sensitivity

Reference Level	Scale	Input level	Repetition Rate	Duty Cycle
−13 dBm	2	−15 dBm	1 MHz	50%
−23 dBm	2	−25 dBm	1 MHz	50%

10. Select auto bandwidth.
    a. Press the (CHAN/VERT)
    b. Select the `bandwidth` softkey and highlight `low`.

To verify internal triggering down to −25 dBm.

11. Connect the peak power sensor to the signal generator as in figure 1-8.
12. Change the reference level of the Peak Power Analyzer to −23 dBm using the following steps:
    a. Press the (CHAN/VERT)

b. Press the ref level softkey

c. Press (–) (2) (3) (dBm) on the keypad.

13. Set the output level of the signal generator to −25 dBm.
14. Press the (TRIG) menu key. Adjust the trigger level with the knob so that the trigger level (horizontal broken line) is on the waveform and the signal is stable. The (FINE) key enables the level to be changed in smaller steps.
15. If the waveform cannot be stabilized, the test fails.
16. Repeat the procedure for channel 4.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails. Use the suggestions in the order listed:

1. Was the equipment set up correctly?
2. The Peak Power Analyzer may need to have a vertical calibration performed. The vertical calibration procedure can be found in the *Operating Manual* or in the adjustments section of this guide under the A1 Control Board Assembly Adjustments.

If any of the measurements continue to fail, refer to the troubleshooting section in the *Peak Power Analyzer Service Guide*.

If necessary, you may record measurement results in the Performance Test Record at the end of this chapter.

Checking Channel 2 and 3 Trigger Sensitivity

Specification

Electrical Characteristics	Performance Limits	Conditions
Trigger Sensitivity	0.2 V pp	dc–1 MHz
	0.5 V pp	1 MHz–100 MHz

Description

The channel 2 and 3 trigger sensitivity test verifies that the Peak Power Analyzer can trigger on a signal equal to the specified sensitivity. To verify external trigger sensitivity, the minimum triggerable signal, as displayed on the Peak Power Analyzer, is input to channel 2 or 3. The trigger level is then adjusted until a stable display is achieved.

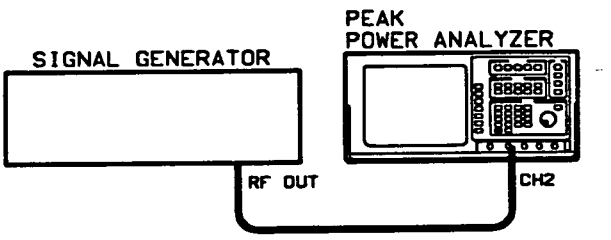


Figure 1-9.
Checking Channel 2 and Channel 3 Trigger Sensitivity Equipment Setup

Equipment

Signal Generator..... HP 8657B

Procedure

To set up the test equipment and the Peak Power Analyzer

1. Connect the equipment as shown in Figure 1-9.
2. Press the [DISPLAY] menu key, and select (highlight) **grid** with the fifth function key.

To check Channel 2 and 3 trigger sensitivity from dc to 1 MHz

1. Set the signal generator to 1 MHz and approximately 0 dBm.
2. Press [AUTOSCALE] on the Peak Power Analyzer.
3. Adjust the trigger level for a stable display, if necessary with the following steps:
   a. Press the [TRIG] menu key.
   b. Adjust the `level` with the knob or the keypad. If the knob is used, press the [FINE] key for more resolution.
4. Adjust the signal generator amplitude for a 200 mV peak-to-peak signal as displayed on the Peak Power Analyzer. If desired, use the following steps to adjust the vertical sensitivity of the channel:
   a. Select the [CHAN/VERT] menu.
   b. Press the third function key.
   c. Change the vertical scale with the knob or the keypad. If the keypad is used, terminate the entry with one of the suffix keys on the right side of the keypad.

5. Adjust the Peak Power Analyzer trigger level for a stable display. If the display can be stabilized, the trigger sensitivity from dc to 1 MHz test passes.

   If a stable trigger level is not found, the test fails.

6. Repeat the channel 2 and 3 trigger sensitivity procedure from dc to 1 MHz for channel 3.

   If necessary, you may record the measurement results of this test in the Performance Test Record at the end of this chapter.

To check Channel 2 and 3 trigger sensitivity from 1 MHz to 100 MHz

1. Disconnect the signal generator output from channel 3 and connect it to channel 2.
2. Change the signal generator output to 100 MHz and 0 dBm.
3. Press (AUTOSCALE).
4. Adjust the signal generator amplitude for a 500 mV peak-to-peak signal as displayed on the Peak Power Analyzer.
5. Adjust the Peak Power Analyzer trigger level for a stable display.

   If the display can be stabilized, the trigger sensitivity from 1 MHz to 100 MHz test passes.

   If a stable trigger level is not found, the test fails.

6. Repeat this procedure for channel 3.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails. Use the suggestions in the order listed:

1. Was the equipment set up correctly?
2. Use the other channel as the trigger.
3. The Peak Power Analyzer may need to have a vertical calibration performed. The vertical calibration procedure can be found in the *Operating Manual* or in the adjustments section of this guide under the A1 Control Board Assembly Adjustments.

If any of the measurements continue to fail, refer to the troubleshooting section in the *Peak Power Analyzer Service Guide*.

If necessary, you may record measurement results in the Performance Test Record at the end of this chapter.

Checking Delta-t Accuracy

Specification

Electrical Characteristics	Performance Limits	Conditions
Delta-t Accuracy	1 ns ±(5E-5)×Delta t ±0.02×(t/division)[1]	

1 Delta t accuracy for dual-cursor, single-channel measurement, or for channel-to-channel measurement after visual time null calibration has been done.

Description

Timebase linearity and the 100 MHz startable oscillator accuracy are the variables that determine delta-t accuracy. Delta-t accuracy is checked by supplying a very stable signal to channels 2 and 3. Then, the timebase and the measured delta-t are used to calculate delta-t accuracy according to the following equation: 1 ns ±(5E-5) x Delta-t ±0.02 x (t/division). Digital averaging is used to minimize the influence of noise.

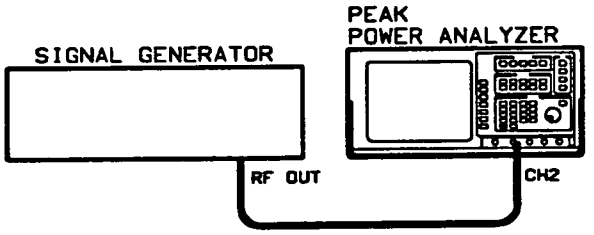


Figure 1-10. Checking Delta-t Accuracy Equipment Setup

Equipment

Signal Generator..... HP 8657B
BNC Cable..... HP 10503A

Procedure

To set up the test equipment and the Peak Power Analyzer

1. Connect the equipment as shown in Figure 1-10.
2. Set the signal generator to 100 MHz and 0 dBm.
3. Press [AUTOSCALE] on the Peak Power Analyzer.
4. Adjust the signal generator's output power until the waveform displayed on the Analyzer is between 6 and 8 divisions peak-to-peak.
5. Change the timebase to 5 ns/division, and set the delay to 0.00000 seconds using the following steps:
   a. Select the [TIMEBASE] menu key.
   b. Change the timebase (top function key) and the delay (second function key) by pressing the desired function key and entering the time using the keypad or the knob. If the keypad is used, terminate the entry with one of the time suffix keys.
6. Press the [DISPLAY] menu key. Set the following parameters using the displayed menu:
   a. Push the top function key until **avg** is highlighted.
   b. Set the `# of avg` to **2048** with the keypad or the knob. If the keypad is used, terminate the entry with any of the suffix keys.
   c. Press the fifth function key until **grid** is highlighted.
   d. Press `connect dots` until **on** is highlighted.

Using the markers to measure delta t

1. Select the (MKRS) menu.
2. Press the time markers key until **on** is highlighted.
3. Select the start marker function key.
4. Set the start marker (large dashed vertical line) to the mid-screen crossover point on the left side of the displayed signal as shown in Figure 1-11. The knob changes the position of the marker.
5. Select the stop marker function key.
6. Set the stop marker (small dashed vertical line) to the mid-screen crossover point on the right side of the displayed signal as shown in Figure 1-11.
7. Read the delta-t from the bottom of the display. It should be between 38.7 and 41.3 ns.

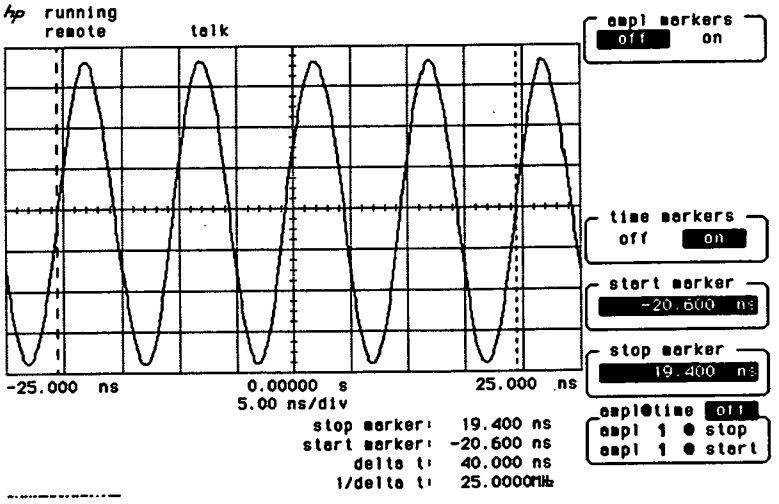


Figure 1-11. Mid-Screen Crossover

8. Disconnect the signal generator from channel 2 and connect it to channel 3.
9. Repeat the procedure for channel 3.

If the Performance Test Fails

The following suggestions may be of help if the performance test fails. Use the suggestions in the order listed:

1. Was the equipment set up correctly?
2. Perform the Logic Trigger Delay Calibration in the A1 Control Board Assembly Adjustments section of this guide.

If delta-t accuracy continues fail on either channel, refer to the *Peak Power Analyzer Service Guide*.

If necessary, you may record measurement results in the Performance Test Record at the end of this chapter.

Table 1-4. Performance Test Record

Hewlett-Packard Company
HP 8990A Peak Power Analyzer
Serial Number _____

Tested By _____

Date _____

Test	Minimum	Actual	Maximum
RISETIME AND FALLTIME			
Channels 1 and 4			
High BW		_____	10 ns[1]
Low BW		_____	1 μs[1]
RISETIME AND FALLTIME			
Channels 2 and 3		_____	5 ns
INSTRUMENTATION UNCERTAINTY (Attach Test Printout)			
SENSOR CHECK SOURCE POWER LEVEL			
CW	8.9 mW	_____	11.2 mW
Pulse	8.9 mW	_____	11.2 mW
BANDWIDTH			
Channel 2	5.6 Divisions	_____	
Channel 3	5.6 Divisions	_____	

1 Specification for the HP 84815A is <45 ns.

Performance Test Record (continued)

Test	Minimum	Actual	Maximum
OFFSET ACCURACY			
1 Volt (Channel 2)		_____	0.4 Divisions
1 Volt (Channel 3)		_____	0.4 Divisions
2 Volts (Channel 2)		_____	0.4 Divisions
2 Volts (Channel 3)		_____	0.4 Divisions
TRIGGER SENSITIVITY			
Stable Display at 500 μW			
Channel 1		yes/no	
Channel 4		yes/no	
Stable Display at 5 μW			
Channel 1		yes/no	
Channel 4		yes/no	
Stable Display at 500 nW			
Channel 1		yes/no	
Channel 4		yes/no	
Stable Display at 1 MHz			
Channel 2		yes/no	
Channel 3		yes/no	
Stable Display at 100 MHz			
Channel 2		yes/no	
Channel 3		yes/no	
DELTA-T ACCURACY			
Channel 2	38.7 ns	_____	41.3 ns
Channel 3	38.7 ns	_____	41.3 ns

2

Adjustments

Introduction

This chapter contains the adjustments for the Peak Power Analyzer. Adjustments are not required on any scheduled basis, and normally are performed only after a repair or when a performance test indicates that some parameters are out of specification.

Safety Considerations

This paragraph contains important information that must be followed for your protection and to avoid damage to the equipment.

Warning

Adjustments described in this chapter are performed with power applied to the instrument and with protective covers removed.

Maintenance should be performed only by service-trained personnel who are aware of the hazards involved (for example, fire and electrical shock). When the maintenance procedure can be performed without power, the power should be removed.

For additional safety information, refer to the Safety Considerations page found at the beginning of this guide.

After Making a Repair

When an assembly is replaced, perform the adjustment/calibration and/or performance test listed for that assembly in table 2-1.

After a Performance Test Has Failed

When a performance test fails, perform the adjustments in table 2-2 that pertain to the performance test that has failed. If the performance test continues to fail, use the *Peak Power Analyzer Service Guide* to begin troubleshooting.

Equipment Required

A full listing of all recommended test equipment used for the adjustments can be found in table 2-3. If substitutions must be made for the models recommended, the test equipment must meet the critical specifications listed in table 2-3.

Service Kit

For some of the adjustments it is necessary to remove the power supply from the Peak Power Analyzer. The HP 8991A Service Kit contains a selection of cables that enable the power supply to be operational while not installed in the instrument. Order HP part number 08990-60045.

Warning

When the service kit line module is connected to the power cord, turned ON, and NOT connected to the power supply, a potential shock hazard exists at the line module connector. See figure 2-1.

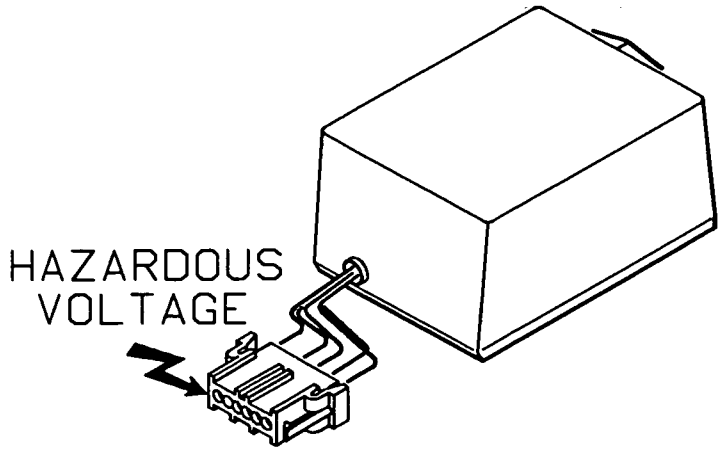


Figure 2-1. Service Kit Line Module

Locating Assemblies and Cables

Throughout the procedures, references are made to the assemblies and cables within the Peak Power Analyzer. Figures 2-2 and 2-3 will be helpful in identifying and locating these assemblies.

Note

The Peak Power Analyzer needs to be warmed up for thirty minutes before any of the adjustments are performed.

Table 2-1. Post-repair Adjustments and Performance Tests

Repaired Assembly	Adjustments/Calibration	Performance Tests
A1 Control Board	Control Board Assy adjustments where applicable/Channel 1 and Channel 4 Vertical Calibrations	Risetime\Falltime and Instrumentation Uncertainty
A2 Memory Board	Selftests, Default Calibration, and Vertical Cal on all channels	None
A3 CRT Driver Board Assembly	CRT Monitor Assembly Adjustments	None
A4 Keyboard Assembly	None	None
A5 Power Supply Assembly	A5 Power Supply Assembly Adjustment	None
A6 Baseband Board Assembly	Channel 1 and Channel 4 Vertical Calibrations, and risetime adjustment.	Risetime\Falltime and Instrumentation Uncertainty
A8 Sensor Check Source	A8 Sensor Check Source Adjustments	Sensor Check Source Power Level

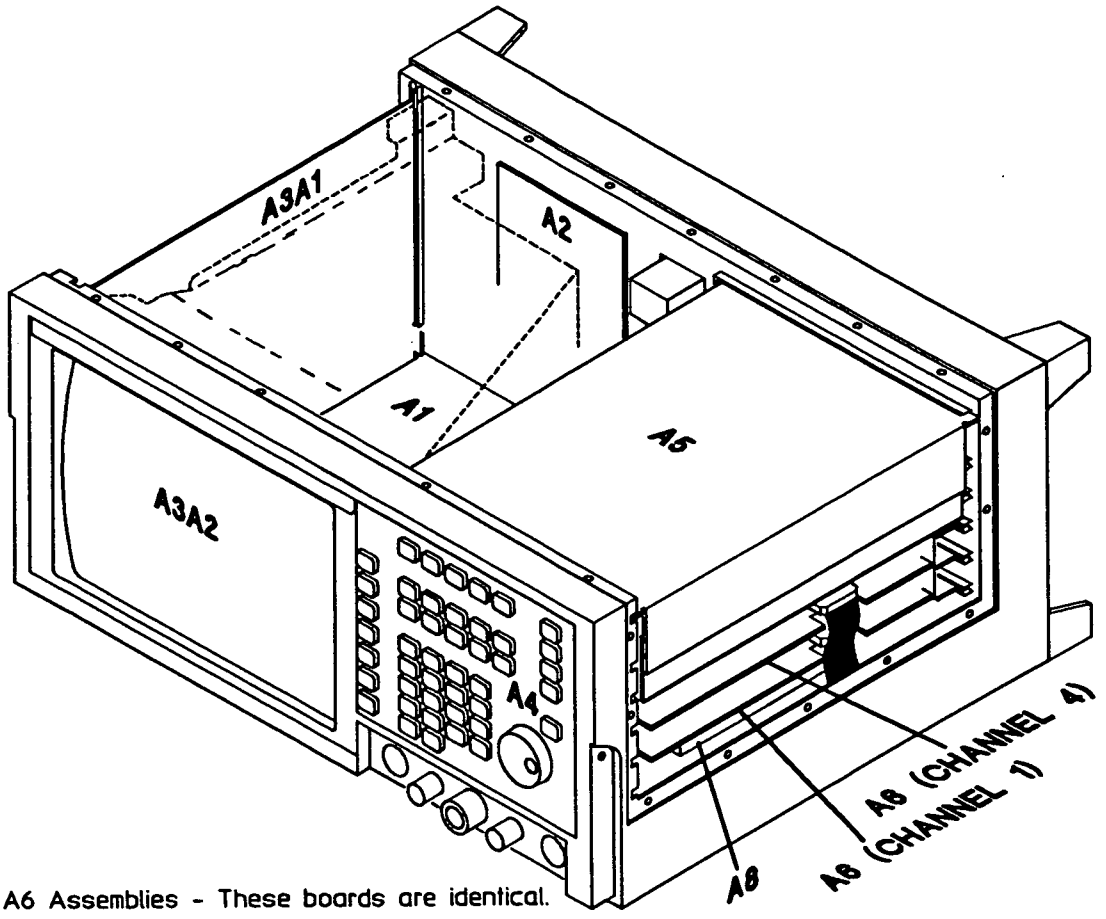
Table 2-2. Failed Performance Test Adjustments

Failed Performance Test	Perform These Adjustments:
Risetime/Falltime	Baseband Board Adjustment
Power Measurement Range	Signal Path Adjustments
Instrumentation Uncertainty	Signal Path Adjustments
Sensor Check Source Power Level	Sensor Check Source Power Level Adjustment
Offset Accuracy	Signal Path Adjustments
Channel 1 and 4 Trigger Sensitivity	Signal Path Adjustments
Channel 2 and 3 Trigger Sensitivity	None
Delta-t Accuracy	Logic Trigger Delay Cal

Table 2-3. Recommended Test Equipment

Instrument	Critical Specifications	Recommended Model	Use[1]
Controller		HP 9000 Series 200 Model 236	A
Digital Voltmeter	Resolution: 0.01 volt	HP 3456A	A
Function Generator		HP 8116A	A
Oscilloscope	Bandwidth: 100 MHz	HP 54111D	A
Peak Power Sensor		HP 84812A	A
Power Meter	Single Channel	HP 437B	A
Power Sensor	Frequency: 1.05 GHz Power Range: 10 dBm	HP 8482A	A
Pulse Generator	Risetime <3 ns Overshoot <0.2 dB	HP 8131A	A

1 T=Troubleshooting, A=Adjustments, P=Performance Tests



A6 Assemblies - These boards are identical.

A7 designator - not assigned.

Figure 2-2. HP 8991A Peak Power Analyzer Major Assemblies

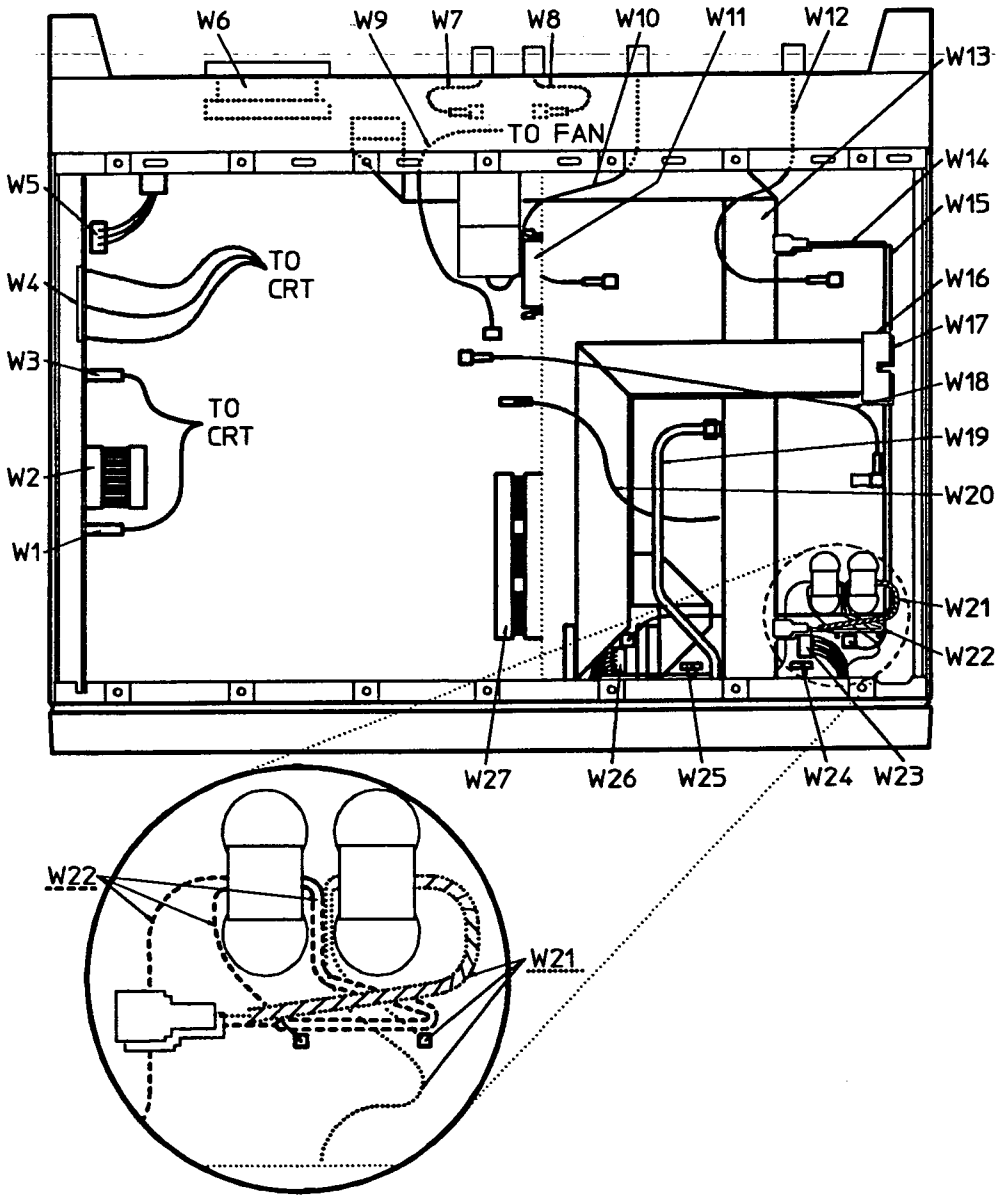


Figure 2-3. HP 8991A Peak Power Analyzer Cable Assemblies

A5 Power Supply Assembly Adjustment

Description

A digital multimeter is used to monitor the +5.15 V power supply while it is adjusted to +5.15 V ±0.05 V. The +5.15 V power supply is the only supply that is adjustable.

Equipment

Digital Multimeter..... HP 3456A
Service Kit..... HP 08990-60045

Procedure

1. Set the rear panel line (mains) switch to OFF (○).
2. Disconnect the power cable from the rear of the Peak Power Analyzer.
3. Remove six screws from the top and two screws from each side of the Peak Power Analyzer's cabinet with a #10 TORX® screwdriver.
4. Remove the top cover.
5. Remove the two PCB (printed circuit board) retainers securing the A5 Power Supply Assembly from the right front and right rear corners of the instrument cabinet. Pull up on the retainers to remove them.
6. Slide the power supply assembly a little toward the side of the instrument cabinet.
7. Remove the cable (W27) from the A5 Power Supply Assembly to the A1 Control Board Assembly.
8. Disconnect the cable from the line module to the power supply. Squeeze in on the two connector tabs while pulling the connector straight back.

9. Slide the power supply assembly out through the side of the instrument cabinet.
10. Perform the following steps in preparation of reconnecting the power supply outside of the instrument:

Caution

Under normal conditions, the power supply is cooled by the instrument fan. Operating the power supply outside of the instrument may cause the power supply to over heat. If the power supply over heats, the power supplies thermal circuit will shut the power supply down. To avoid having the power supply shut down, direct the airflow from a fan over the power supply while it is operating outside of the instrument.

a. Remove the two screws securing the line module/switch to the rear panel.
b. Slide the line module/switch halfway out the back panel.
c. Loosen the screw that attaches the A2 Memory Board assembly to the rear chassis of the instrument.
d. While holding the spacer that is between the memory board and rear chassis, pull the screw through the hole in the memory board, and remove the spacer.
e. Gently disconnect the A2 Memory Board from the A1 Control Board Assembly.
f. Remove the two screws securing the covers to the A6 Baseband Boards Housing Assembly.

Note

Before performing the next step, make a note of where the cables are connected. The top board is for RF channel 4 and the bottom board is for RF channel 1.

g. Disconnect the coaxial and ribbon cables connected to the A6 Baseband Board Assemblies.

h. Slide the A6 Baseband Boards Housing Assembly out through the side of the instrument cabinet.

i. Disconnect W27 at A1J9.

11. Reconnect the A2 Memory Board Assembly.

12. Reconnect the A5 Power Supply outside of the instrument using the cable extender and line module from the service kit.

13. Connect the common (ground) lead of the digital multimeter to the Peak Power Analyzer chassis.

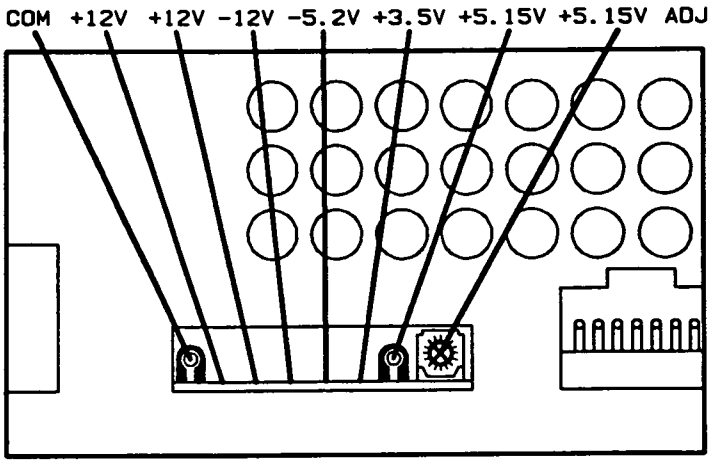


Figure 2-4.
A5 Power Supply Assembly Testpoint and Adjustment Locations

14. Connect the positive lead of the digital multimeter to the test point labeled "+5.15 V" in figure 2-4.

15. Connect the instrument power cable to the lines (mains) voltage and set the power switch to ON (|).

The digital multimeter should indicate a voltage in the range of +5.1 V to +5.2 V.

16. If the digital multimeter reading is not within this range, adjust the potentiometer labeled "+5.15 ADJ" until the digital multimeter reading is +5.15 V ±0.05 V. See figure 2-4.
17. Set the line switch to OFF, disconnect the power cable from the line (mains) voltage, and reinstall the assemblies.

If the Adjustment Fails

Verify the following:

1. Is the test setup correct?
2. Was the test equipment functional?

Replace the A5 Power Supply if the test setup and test equipment seem to be okay.

CRT Monitor Assembly Adjustments

Description The CRT monitor assembly brightness, focus, contrast, and horizontal and vertical alignment are adjusted while viewing the Peak Power Analyzer's display test pattern.

Equipment No equipment is required for this adjustment.

Procedure

Note

All CRT monitor assembly adjustments are set at the factory and should not need readjustment. Perform these adjustments only when the test pattern shows obvious differences from what is shown in figure 2-5.

1. Set the rear panel line (mains) switch to OFF (○).
2. Disconnect the power cord from the rear of the Peak Power Analyzer.
3. Remove six screws from the top and two screws from each side of the Peak Power Analyzer's cabinet with a #10 TORX® screwdriver.
4. Remove the top cover.

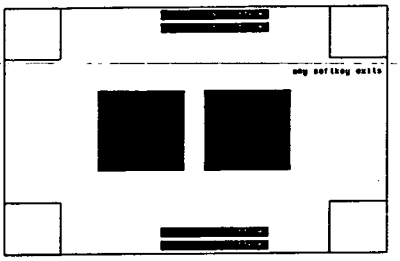


Figure 2-5. CRT Test Pattern

5. Connect the instrument power cord to the lines (mains) voltage and set the power switch to ON (|).
6. Invoke the Peak Power Analyzer's test pattern by using the following steps:
   a. Press the (UTIL) menu key.
   b. Press the `selftest menu` softkey. Press the `more` softkey, if the `selftest menu` softkey is not displayed.
   c. Press the uppermost softkey until "**misc**" is highlighted.
   d. Press the second softkey from the top until "**crt test**" is highlighted.
   e. Press the `start test` softkey.
7. See figure 2-6 for all CRT adjustment locations.

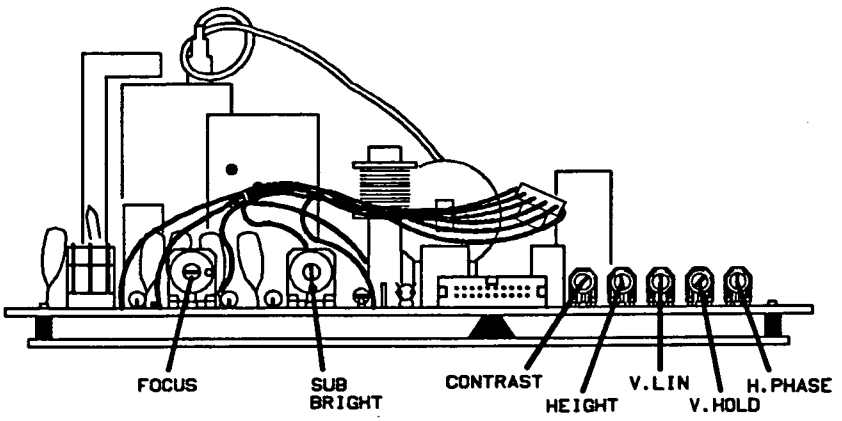


Figure 2-6. CRT Adjustment Locations

Vertical Hold Adjustment

Vertical hold needs adjusting if the display is not stable. The display will either be rolling rapidly or will be jumbled in the vertical center of the display.

Go directly to the "Intensity, Sub-bright, and Contrast Adjustment," if the display appears as shown in figure 2-5. Otherwise, adjust the potentiometer labeled **V.HOLD** until the display is stable.

Intensity, Sub-bright, and Contrast Adjustment

1. Set the rear panel DISPLAY INTENSITY control to mid-range.
2. Adjust the **SUB-BRIGHT** potentiometer to where the lower intensity blocks in the test pattern are visible.
3. Adjust the rear panel DISPLAY INTENSITY control to three-quarters counterclockwise.
4. Adjust the **"CONTRAST"** potentiometer for the best contrast between the low and high intensity blocks in the test pattern. The text in the lower intensity blocks must be legible.

Focus Adjustment and Horizontal Phase Adjustments

1. Adjust the **H.PHASE** potentiometer to center the test pattern horizontally within the screen boundary.
2. Adjust the **FOCUS** potentiometer to achieve the sharpest focus. Observe the percent (%) symbol in the test pattern while adjusting the focus.

Vertical Linearity and Height Adjustments

Note

The **V.LIN** and **HEIGHT** adjustments are interactive and may need to be repeated to achieve the desired result.

1. Adjust the "**V.LIN**" potentiometer until the vertical sides of all four corner squares in the test pattern are equal.
2. Adjust the "**HEIGHT**" potentiometer until the space between the test pattern border and the edge of the screen is equal around all four sides.
3. Readjust "**V.LIN**" and "**HEIGHT**" as necessary until the two conditions are met.

If the Adjustment Fails

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem.

A1 Control Board Assembly Adjustments

Description

This section describes how to make the following adjustments on the A1 Control Board Assembly: DAC Reference Adjustment, Signal Path Adjustment, Channel 2 and Channel 3 Compensation Adjustments, and Channel 2 and Channel 3 Pulse Flatness Adjustments.

Equipment

Controller	HP 9000 Series 200 Model 236
Digital Multimeter	HP 3456A
Digitizing Oscilloscope	HP 54111D
Function Generator	HP 8116A
Peak Power Sensor	HP 84812A
Pulse Generator	HP 8131A
Service Kit	HP 08990-60045

Operating System

HP BASIC 5.1 with the following language extensions loaded:

Name	Description
GRAPH	Graphics
GRAPHX	Graphics Extensions
IO	I/O
TRANS	Transfer
MAT	Matrix Statements
PDEV	Program Development
XREF	Cross Reference
KBD	Keyboard Extensions
CLOCK	Clock
MS	Mass Storage
SRM	Shared Resource Management
ERR	Error Messages
DISC	Small Disc Driver
CS80	CS80 Disc Driver
HPIB	HPIB Interface Driver
CRTB	Bit-mapped CRT Driver
CRTA	Alpha CRT Driver
COMPLEX	Complex Arithmetic
CRTX	CRT Extensions
EDIT	List and Edit
HFS	Hierarchical File System

Installing the Software

The software needed to perform this test is located at the back of this manual.

Using a Floppy Disc Drive

Make a backup copy of the supplied disks.

Make sure that your working disk is write-enabled.

About the Adjustments

When all of the adjustments for the A1 Control Board are being performed, the adjustments must be performed in the order listed. However, the adjustments can be performed individually. The procedure for accessing the testpoint and adjustment locations is provided only at the beginning of this section.

Procedure

1. Set the rear panel line (mains) switch to OFF (○).
2. Disconnect the power cable from the rear of the Peak Power Analyzer.
3. Remove six screws from the top and two screws from each side of the Peak Power Analyzer's cabinet with a #10 TORX® screwdriver.
4. Remove the top cover.
5. Remove the two PCB (printed circuit board) retainers securing the A5 Power Supply Assembly from the right front and right rear corners of the instrument cabinet. Pull up on the retainers to remove them.
6. Slide the power supply assembly a little toward the side of the instrument cabinet.
7. Remove the cable (W27) from the A5 Power Supply Assembly to the A1 Control Board Assembly.
8. Disconnect the cable from the line module to the power supply. Squeeze in on the two connector tabs while pulling the connector straight back.
9. Slide the power supply assembly out through the side of the instrument cabinet.
10. Remove the two screws securing the covers to the A6 Baseband Boards Housing Assembly. See figure 2-7.

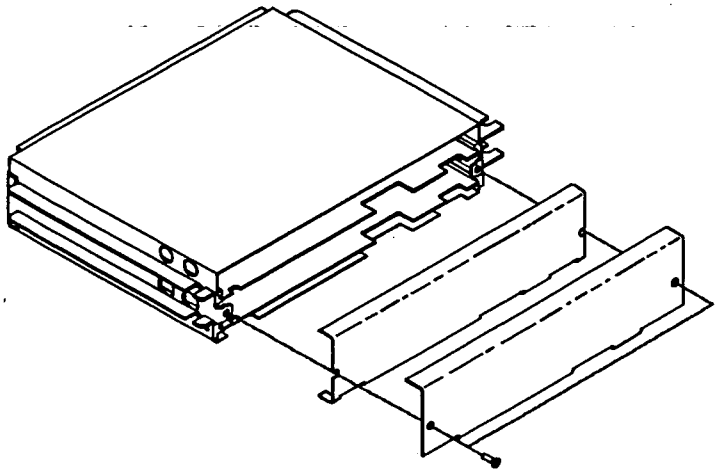


Figure 2-7. A6 Baseband Housing Shield Covers

Note

Before performing the next step, make a note of where the cables are connected. The top board is for RF channel 4 and the bottom board is for RF channel 1.

11. Disconnect the coaxial and ribbon cables connected to the A6 Baseband Board Assemblies.
12. Slide the A6 Baseband Boards Housing Assembly out through the side of the instrument cabinet.
13. Disconnect the semirigid cable from the sensor check source, if the instrument has one.

Note

When reconnecting the semirigid cable, the torque specification for the connector is 14 to 16 inch-pounds.

14. Disconnect the coaxial cable (W18; gray and brown) at the A8 Sensor Check Source and at the A1 Control Board Assembly.

15. Disconnect the other cable (W20; multiple wires) at the A1 Control Board Assembly.
16. Gently pull on the narrower portion of the sensor check source. The assembly should come right out.
17. Perform the following steps in preparation of reconnecting the power supply outside of the instrument:

Caution

Under normal conditions, the power supply is cooled by the instrument fan. Operating the power supply outside of the instrument may cause the power supply to over heat. If the power supply over heats, the power supplies thermal circuit will shut the power supply down. To avoid having the power supply shut down, direct the airflow from a fan over the power supply while it is operating outside of the instrument.

   a. Remove the two screws securing the line module/switch to the rear panel.
   b. Slide the line module/switch halfway out the back panel.
   c. Loosen the screw that attaches the A2 Memory Board assembly to the rear chassis of the instrument.
   d. While holding the spacer that is between the memory board and rear chassis, pull the screw through the hole in the memory board, and remove the spacer.
   e. Gently disconnect the A2 Memory Board from the A1 Control Board Assembly.
   f. Disconnect W27 at A1J9.

18. Reconnect the A2 Memory Board Assembly.

19. Reconnect the A5 Power Supply outside of the instrument using the cable extender and line module from the service kit.
20. Connect the power cable to the line (mains) voltage and set the power switch to ON (|).
21. Load the program "CNTRL_CA15" from the supplied disk.
22. Run the program.

Default Calibration

Use the following steps to load default calibration data.

1. Set the CALIBRATION switch on the rear panel of the Peak Power Analyzer to UNPROTECTED.
2. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey until **addressed** is highlighted.
   d. Set the address using the front panel knob.
3. Select "Default cal" from the controller menu using the "Next" softkey.
4. Set up the equipment as shown in figure 2-8.
5. Press the "Select" softkey on the controller.

Note

Leave the rear panel CALIBRATION switch set to UNPROTECTED.

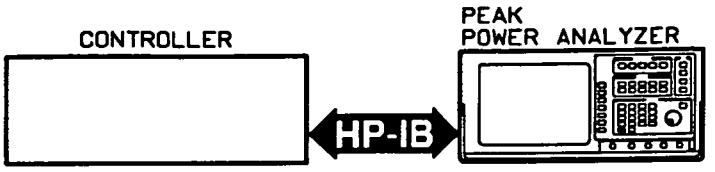


Figure 2-8. Default Calibration Setup

If the Calibration Fails

Verify the following:

- Is the Peak Power Analyzer address set to seven (7)?
- Is the rear panel CALIBRATION switch set to UNPROTECTED?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

DAC Reference Adjustment

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Set the address of the digital voltmeter to twenty-two (22).
3. Select "Dac reference adj." from the controller menu using the "Next" softkey.

4. Connect the Peak Power Analyzer and the test equipment as shown in figure 2-9 and described on the controller display after the "Select" softkey is pressed.
5. Press the "Select" softkey on the controller.
6. Follow the displayed instructions.
7. See figure 2-10 for the location of A1R306.

Supplementary Information

Use the following information to supplement the instructions displayed on the controller:

Adjust A1R306 to four decimal places as read on the digital multimeter. Wait for the digital multimeter to stabilize before pressing continue.

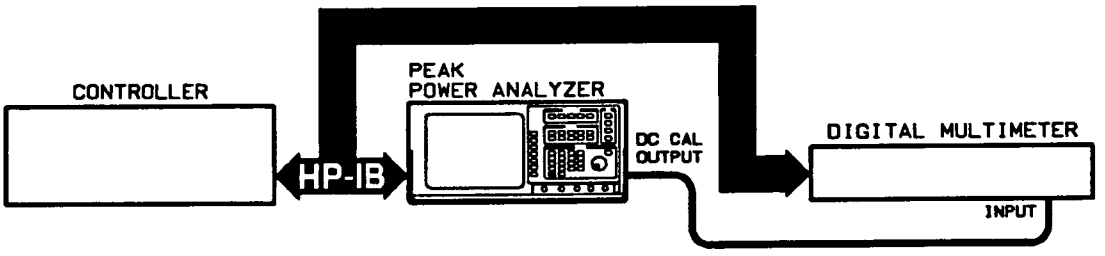


Figure 2-9. DAC Reference Adjustment Setup

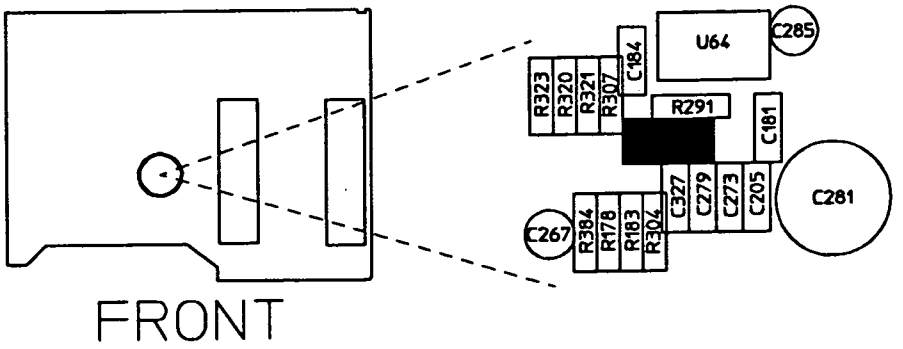


Figure 2-10. A1R306 Adjustment Location

If the Adjustment Fails

Verify the following:

1. Was the address of the Peak Power Analyzer set to seven (7)?
2. Was the address of the digital multimeter set to twenty-two (22)?
3. Is the test setup correct?
4. Was the test equipment functional?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Channel 2 Vertical Calibration

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.

2. Select "Vertical cal ch2" from the displayed controller menu using the "Next" softkey.
3. Press the "Select" softkey on the controller.
4. Connect the equipment as described on the screen and shown in figure 2-11.

Note

The calibration takes a few minutes to complete.

5. Follow the displayed instructions.

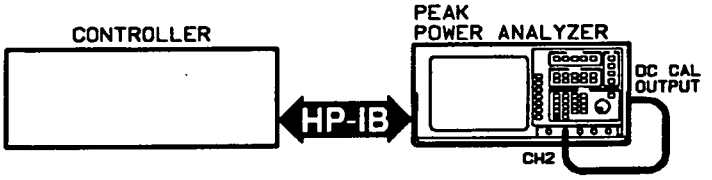


Figure 2-11. Channel 2 Vertical Calibration Setup

If the Calibration Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the rear panel CALIBRATION switch set to UNPROTECTED?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Logic Trigger Delay Cal

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Select "Logic trigger delay cal" from the displayed controller menu using the "Next" softkey.
3. Press the "Select" softkey on the controller.
4. Connect the equipment as shown in figure 2-12.
5. Follow the instructions on the controller and the Peak Power Analyzer.
6. Place the asterisk within the brackets ([*]) by adjusting A1C121. Some drift of the 100 MHz oscillator is normal. The adjustment is in specification when the asterisk is within the brackets.
7. Press `continue` on the Peak Power Analyzer when the asterisk is within the brackets.
8. Pass or fail will be displayed on the controller.
9. The location of A1C121 is shown in figure 2-13.

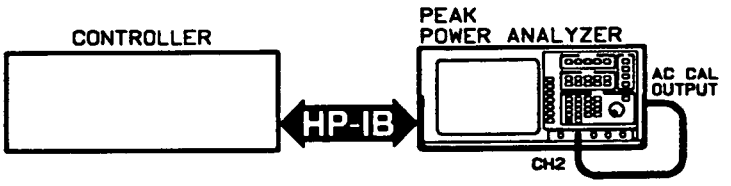


Figure 2-12. Logic Trigger Delay Calibration Setup

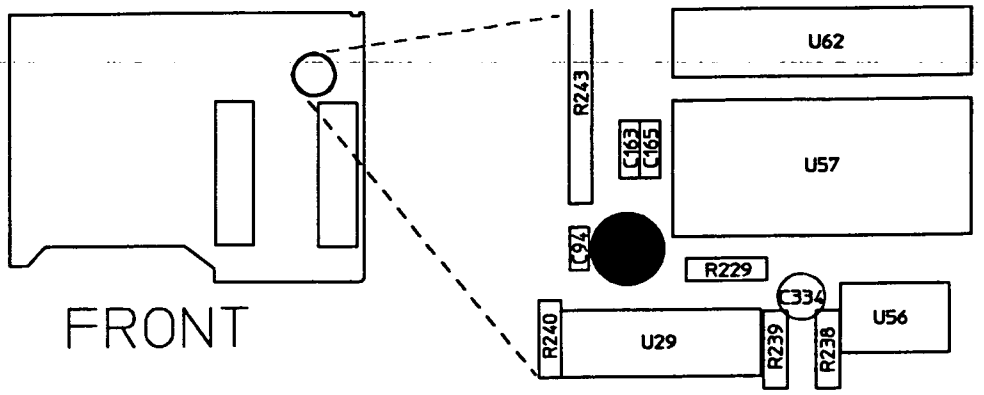


Figure 2-13. A1C121 Adjustment Location

If the Calibration Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the rear panel CALIBRATION switch set to UNPROTECTED?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Channel 2 Delay Calibration

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.

d. Set the address using the front panel knob.

2. Ensure the rear panel "CALIBRATOR" switch is in the "UNPROTECTED" position.
3. Select "Delay cal ch2" from the displayed controller menu using the "Next" softkey.
4. Press the "Select" softkey on the controller.
5. Connect the equipment as described on the screen and shown in figure 2-14.
6. Follow the displayed instructions.

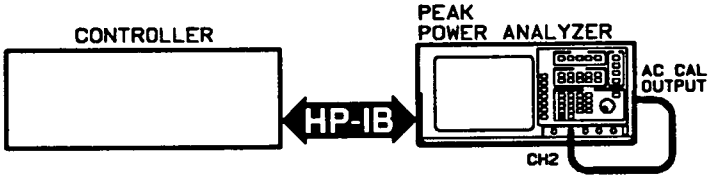


Figure 2-14. Channel 2 Delay Calibration Setup

If the Calibration Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the rear panel CALIBRATION switch set to UNPROTECTED?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Channel 3 Vertical Calibration

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Select "Vertical cal ch3" from the displayed controller menu using the "Next" softkey.
3. Press the "Select" softkey on the controller.
4. Connect the equipment as described on the screen and shown in figure 2-15.

Note

The calibration takes a few minutes to complete.

5. Follow the displayed instructions.

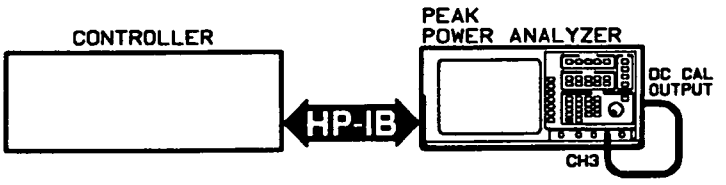


Figure 2-15. Channel 3 Vertical Calibration Setup

If the Calibration Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the rear panel CALIBRATION switch set to UNPROTECTED?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Channel 3 Delay Calibration

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Ensure the rear panel "CALIBRATOR" switch is in the "UNPROTECTED" position.
3. Select "Delay cal ch3" from the displayed controller menu using the "Next" softkey.
4. Press the "Select" softkey on the controller.
5. Connect the equipment as described on the screen and shown in figure 2-16.
6. Follow the displayed instructions.

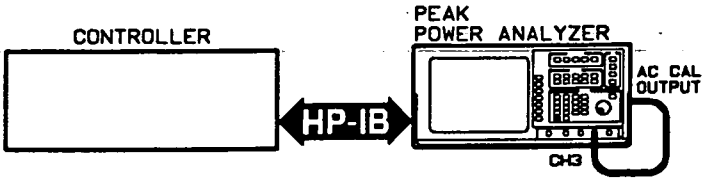


Figure 2-16. Channel 3 Delay Calibration Setup

If the Calibration Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the rear panel CALIBRATION switch set to UNPROTECTED?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Selftests

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Select "Self tests" from the displayed controller menu using the "Next" softkey.
3. Press the "Select" softkey on the controller.

Note

It is normal for the D/A test to fail if both of the A6 Baseband Boards are not connected. The D/A test will also fail when Option 001, single channel option, is installed.

4. Follow the displayed instructions.

If the Selftests Fail

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Signal Path Adjustment

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Set the line (mains) switch to OFF (○).
3. Disconnect the instrument power cord from the rear panel of the Peak Power Analyzer.

Note

Before performing the next step, note how the cables are routed.

4. Remove the two silver rectangular shields from the A1 Control Board.
5. Remove the A6 Baseband Board, associated with the channel being adjusted, from the A6 Baseband Boards Shield Assembly. Channel 1 is on the bottom and channel 4 is on the top.
6. Reconnect the A6 Baseband Board outside of the Peak Power Analyzer. The channel 1 cables are W14, W16, and W22 and the channel 4 cables are W15, W17, and W21. See figure 2-3.
7. Depending on the channel being adjusted, disconnect W22 at A1J1 (CH1) or W21 at A1J4 (CH4).

Warning

Turn the Peak Power Analyzer OFF and disconnect the power cord when finished adjusting the first channel and preparing to adjust the second channel.

8. Select "Signal path adjustment" from the displayed controller menu using the "Next" softkey.
9. Press the "Select" softkey on the controller.
10. Connect the equipment as described on the screen and as shown in figures 2-17 and 2-18.

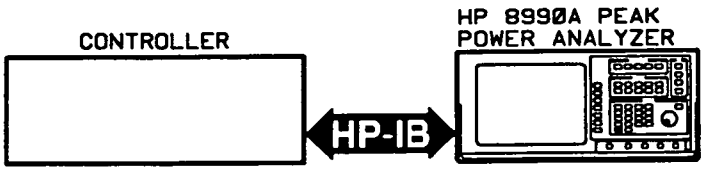


Figure 2-17. Signal Path Adjustment Setup (Controller)

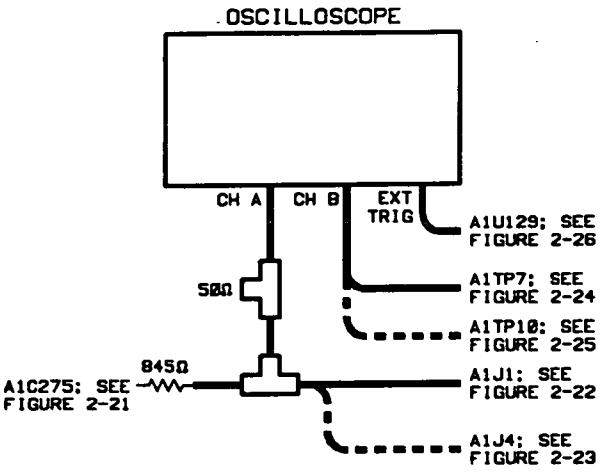


Figure 2-18. Signal Path Adjustment Setup (Oscilloscope)

11. Set the oscilloscope as shown below:

    Channel A

    Vertical Scale: 5 mV/division

    Coupling: ac

    Channel B

    Vertical Scale: 100 mV/division

    Coupling: dc

    Timebase: 50 ns/division

    Trigger: Channel B

    Main Trigger: External

    Display: Alternate

    An X10 probe should be used for channel B and for the external trigger input.

12. Set the pulse generator as shown below:

    Frequency: 1 kHz

Amplitude: 0—0.5 volts (into 50 Ω)

Duty Cycle: 50 %

13. Set the ground trace for channel B at 0 volts, and channel A at approximately +2 volts.
14. Connect the power cord to the line (mains) voltage and set the power switch to ON (|).
15. Follow the displayed instructions.
16. See figures 2-19 through 2-52 for the connector locations, adjustment locations, and waveforms.

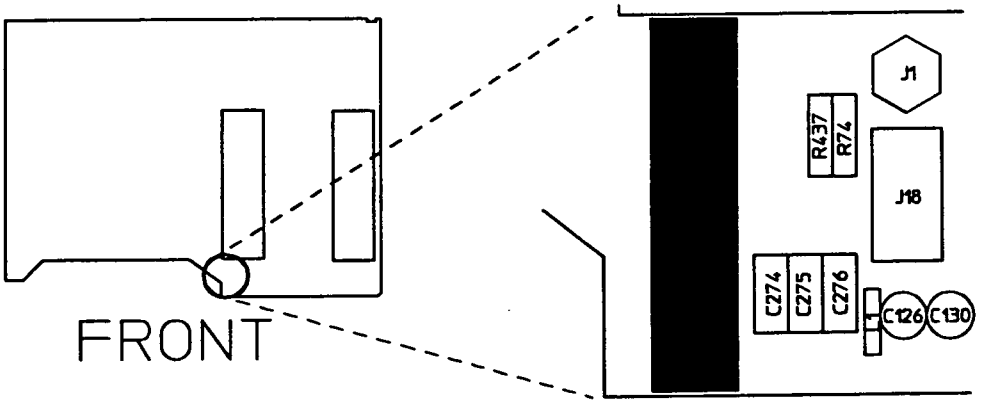


Figure 2-19. A1J11 Location

17. When the adjustments are complete, turn the Peak Power Analyzer OFF, disconnect the power cord from the line (mains), and reinstall the assemblies that were removed.

Supplementary Information

Use the following information to supplement the instructions displayed on the controller:

Verify that the channel being adjusted is turned on. The circle below the channel number in the upper right-hand corner of the display should be filled in. Verify that the peak power sensor is connected to the front panel channel 1 or channel 4 connector.

If A1R212 (Channel 1) or A1R222 (Channel 4) is adjusted to maximum, re-adjust A1R225 (Channel 1) or A1R264 (Channel 4) to raise the level of the channel B waveform, then readjust A1R212 (Channel 1) or A1R222 (Channel 4).

Figure 2-49 shows typical waveforms after adjustment. The channel A display should show residual spikes after the square wave has been nulled. These spikes may be unipolar as shown, or may have some negative going components.

If Any of the Adjustments Fail

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the test setup correct?
- Was the procedure followed correctly?

If an A6 Baseband Board is used during the adjustment, replace it with the other A6 Baseband Board, if one is available. Repeat the adjustment. Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if the adjustment still fails.

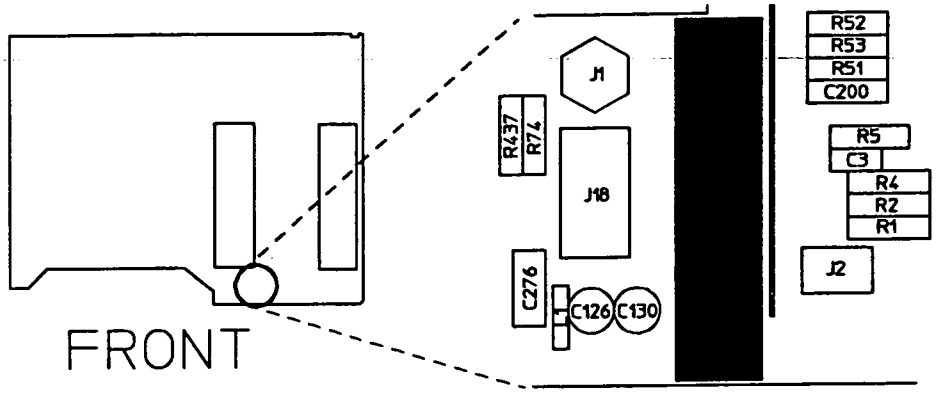


Figure 2-20. A1J12 Location

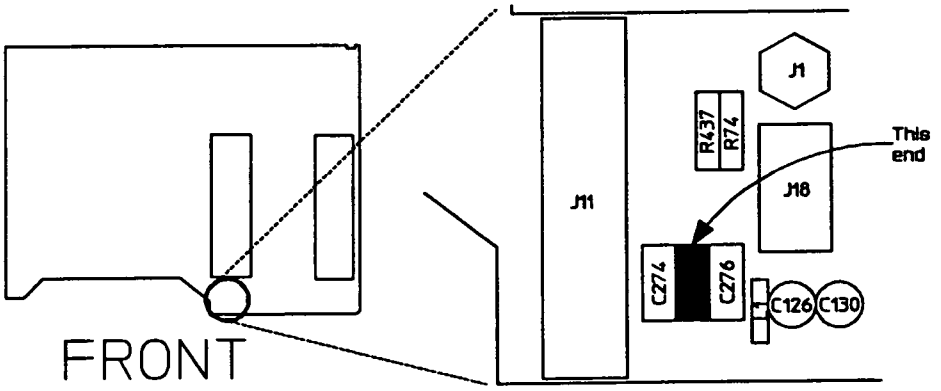


Figure 2-21. A1C275 Location

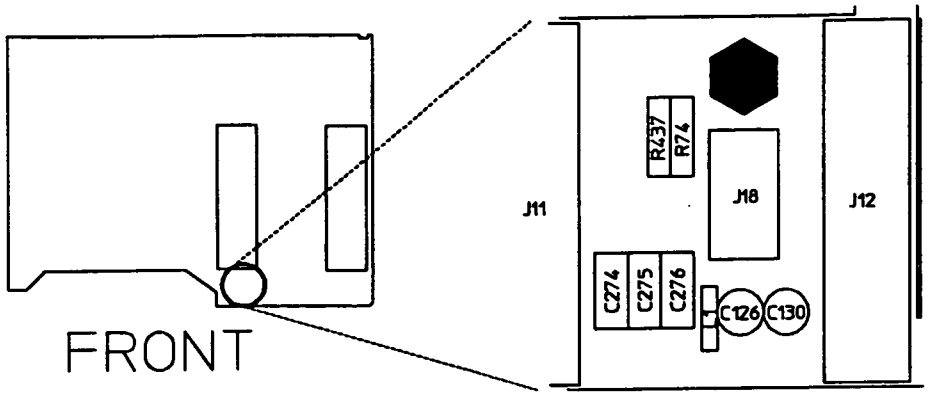


Figure 2-22. A1J1 Location

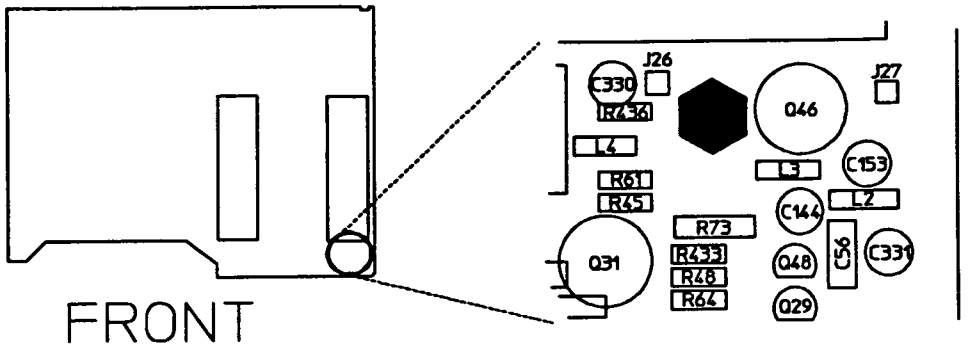


Figure 2-23. A1J4 Location

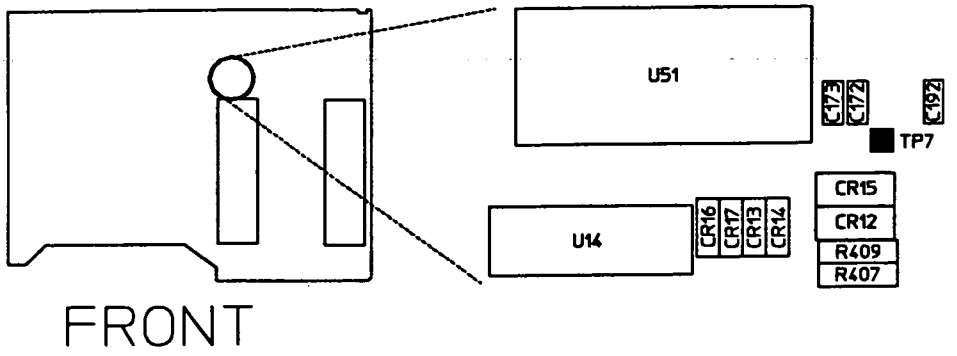


Figure 2-24. A1TP7 Location

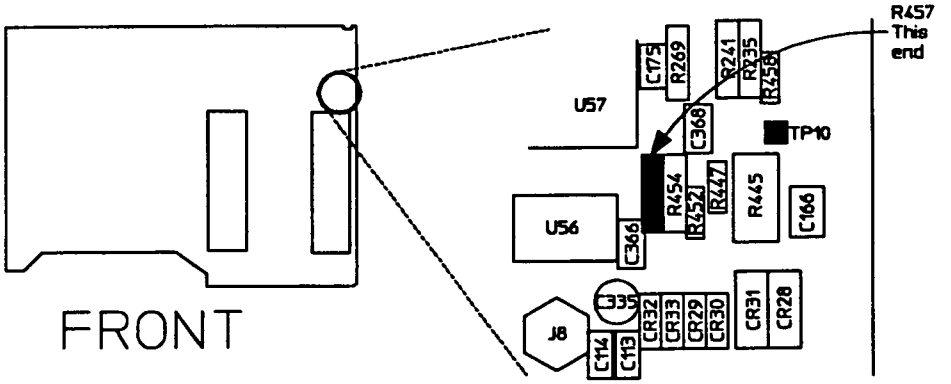


Figure 2-25. A1TP10 and R457 Locations

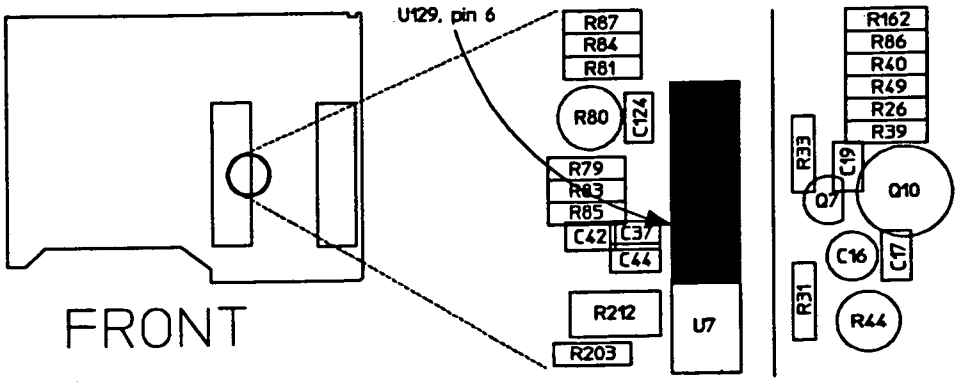


Figure 2-26. A1U129 Location

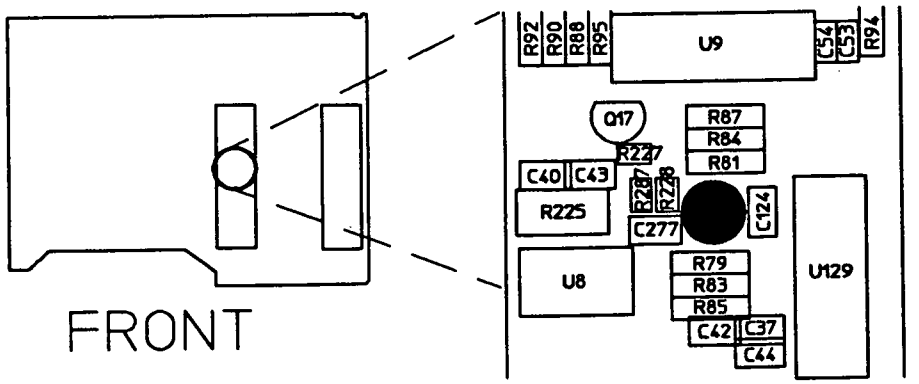


Figure 2-27. A1R80 Adjustment Location

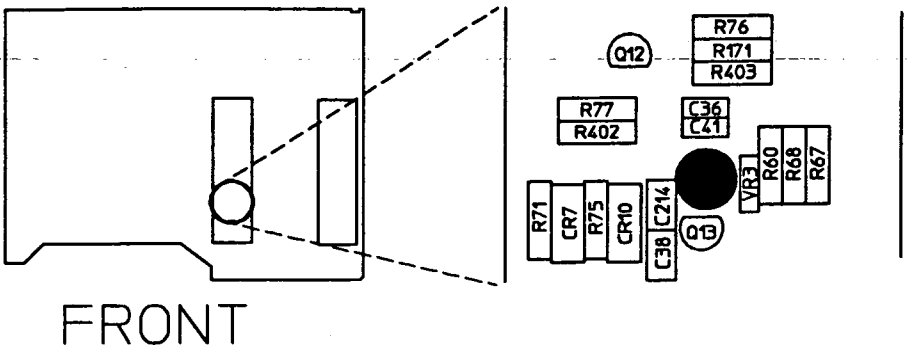


Figure 2-28. A1R170 Adjustment Location

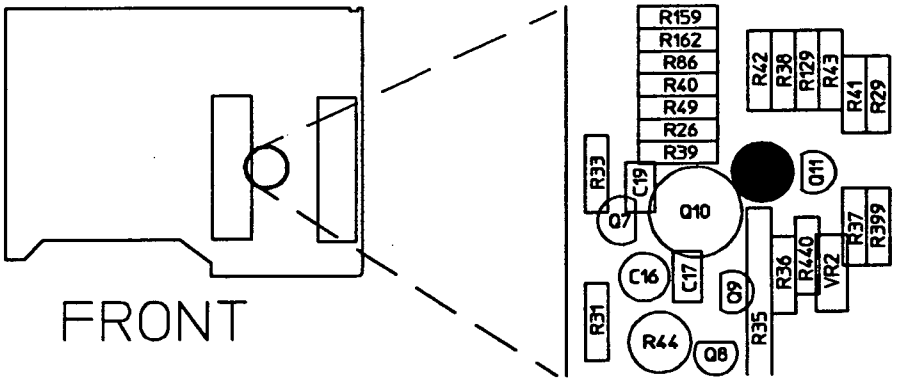


Figure 2-29. A1R55 Adjustment Location

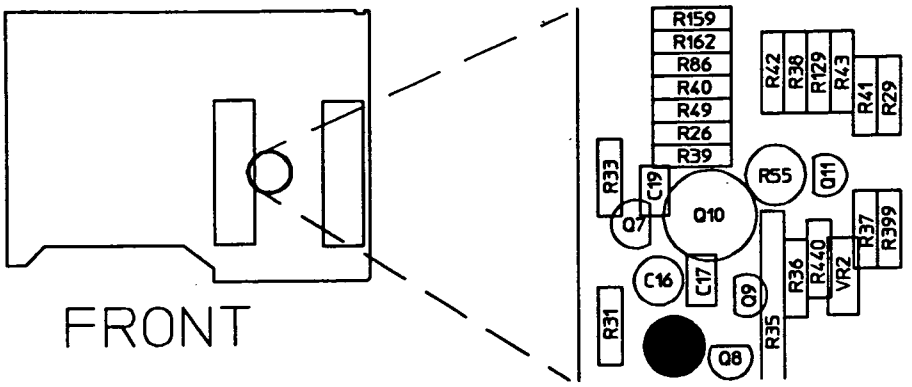


Figure 2-30. A1R44 Adjustment Location

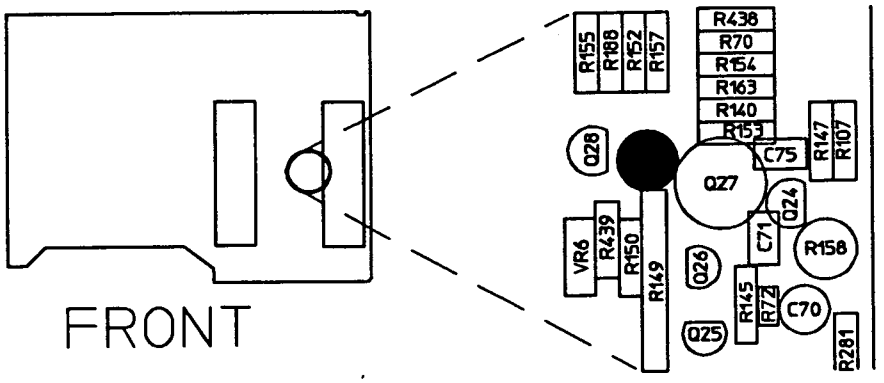


Figure 2-31. A1R169 Adjustment Location

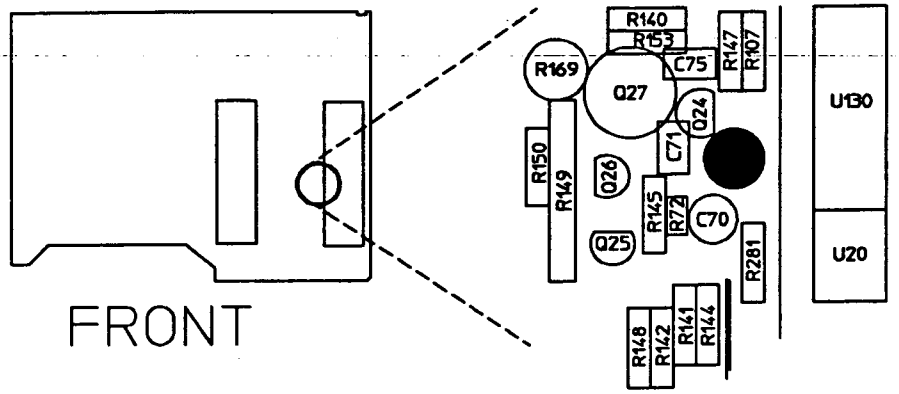


Figure 2-32. A1R158 Adjustment Location

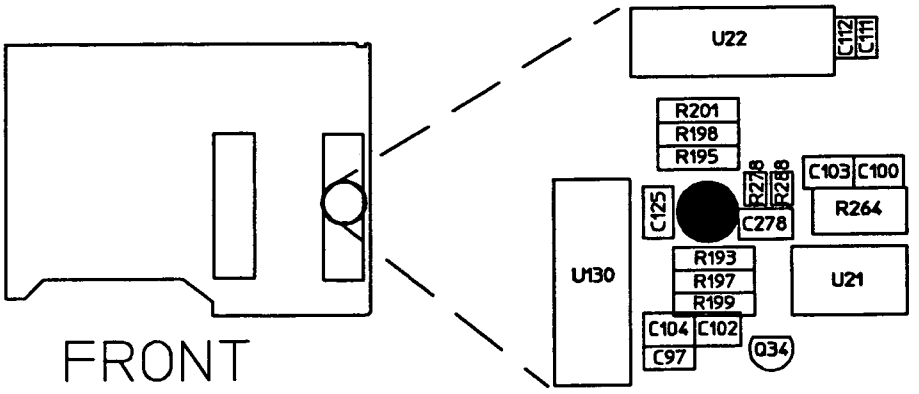


Figure 2-33. A1R194 Adjustment Location

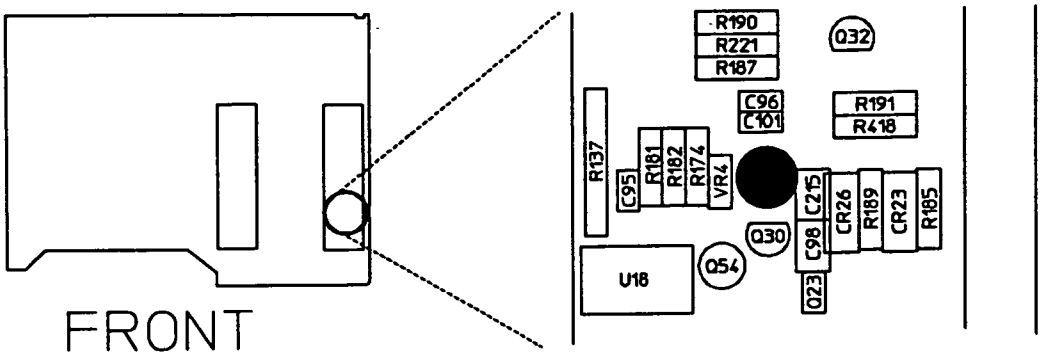


Figure 2-34. A1R220 Adjustment Location

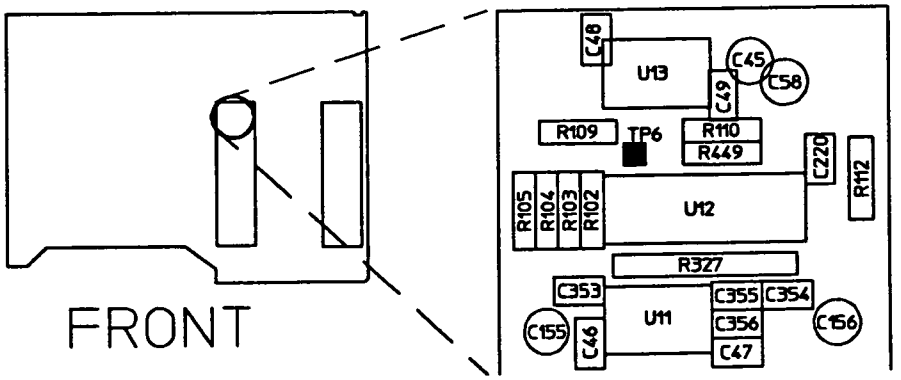


Figure 2-35. A1TP6 Location

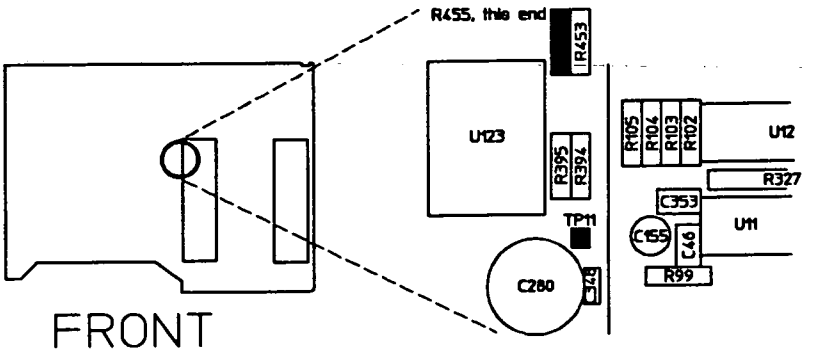


Figure 2-36. A1TP11 and R455 Locations

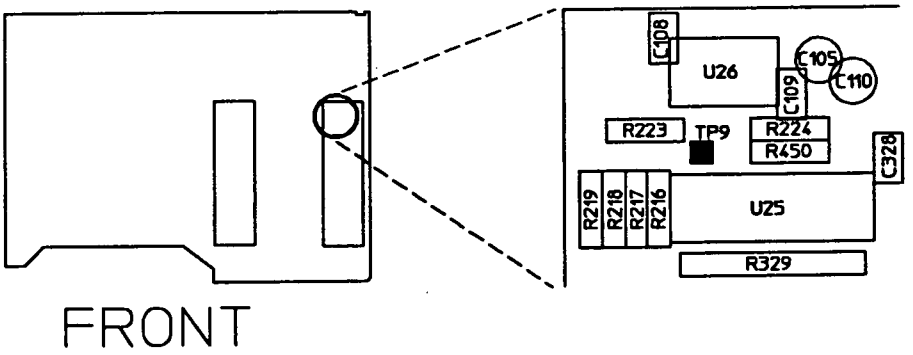


Figure 2-37. A1TP9 Location

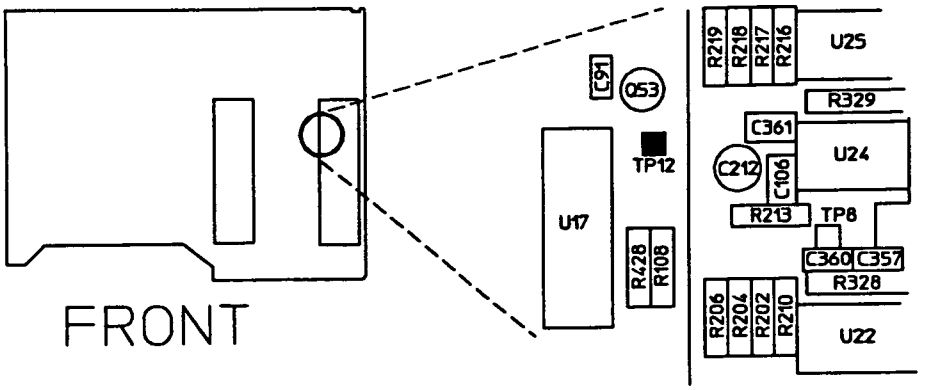


Figure 2-38. A1TP12 Location

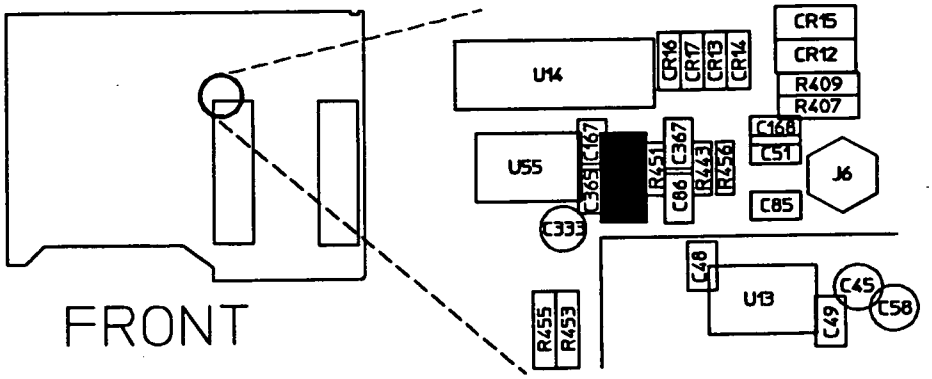


Figure 2-39. A1R441 Adjustment Location

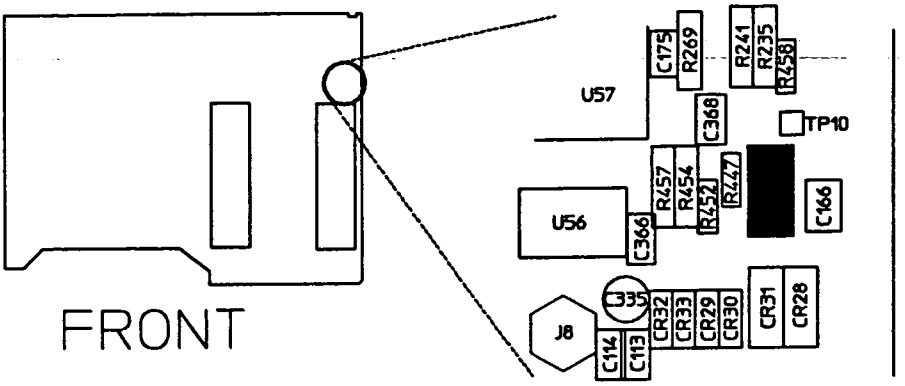


Figure 2-40. A1R445 Adjustment Location

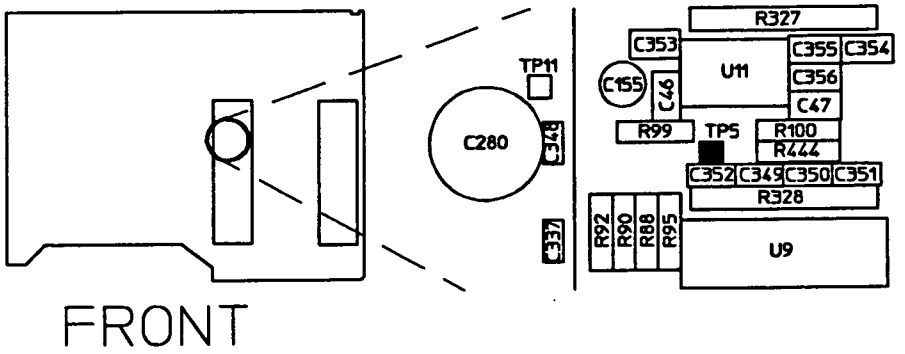


Figure 2-41. A1TP5 Location

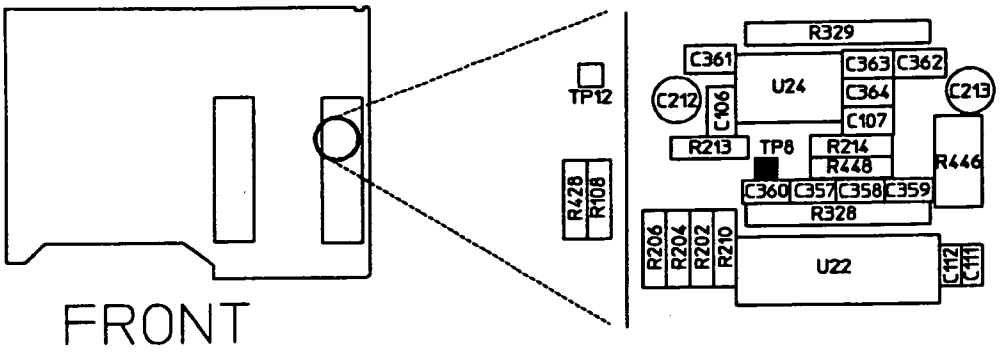


Figure 2-42. A1TP8 Location

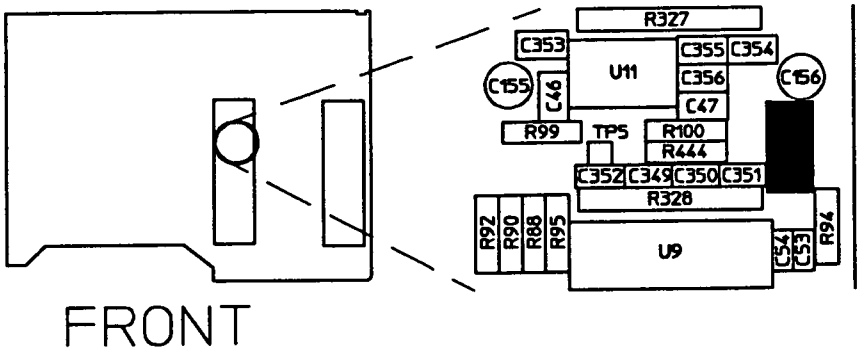


Figure 2-43. A1R442 Adjustment Location

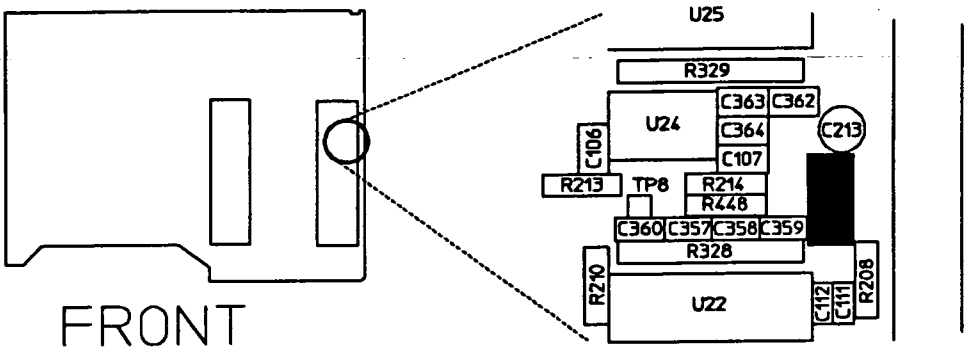


Figure 2-44. A1R446 Adjustment Location

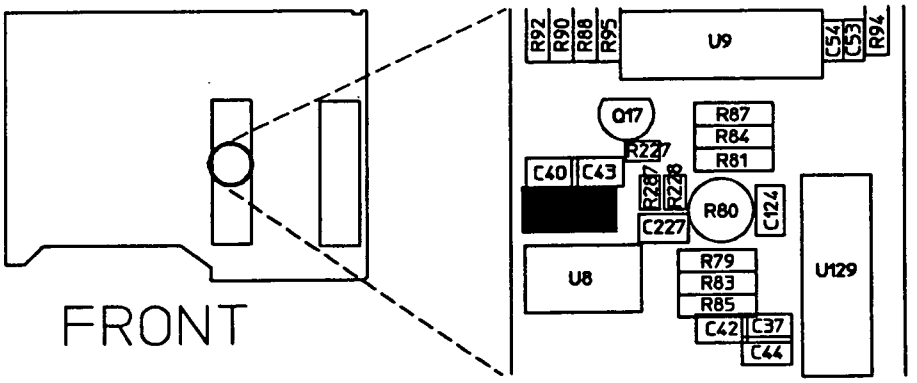


Figure 2-45. A1R225 Adjustment Location

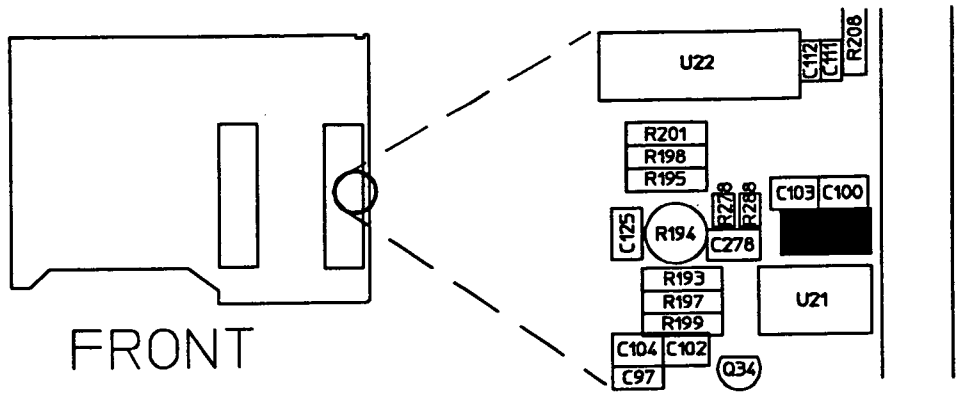


Figure 2-46. A1R264 Adjustment Location

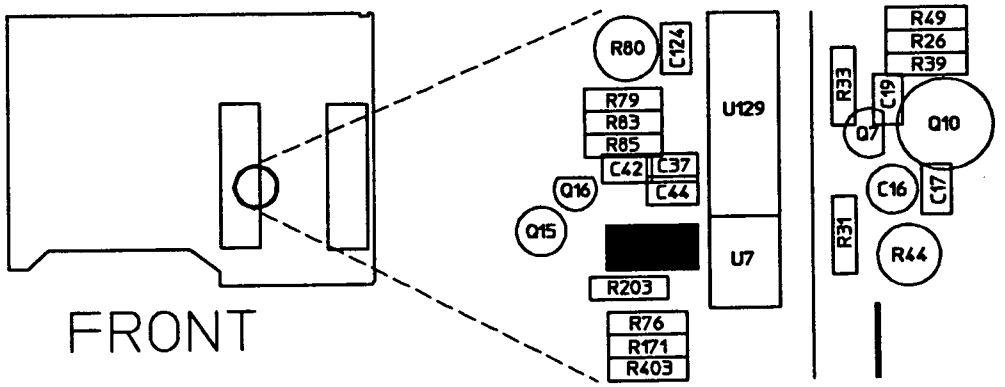


Figure 2-47. A1R212 Adjustment Location

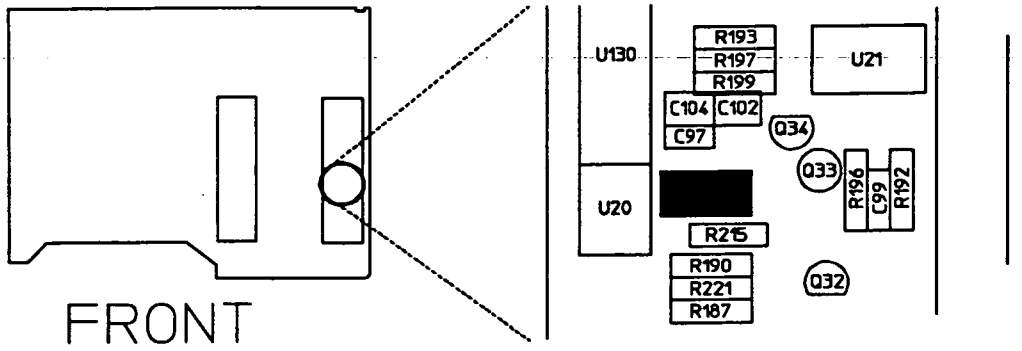


Figure 2-48. A1R222 Adjustment Location

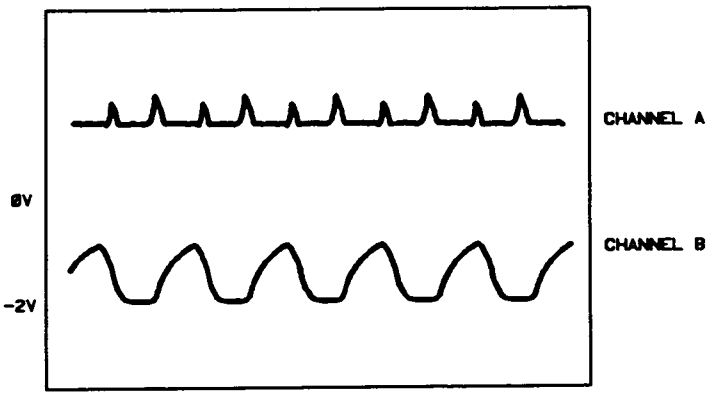


Figure 2-49.
Typical Squarewave and Sawtooth Waveforms after Proper Adjustment

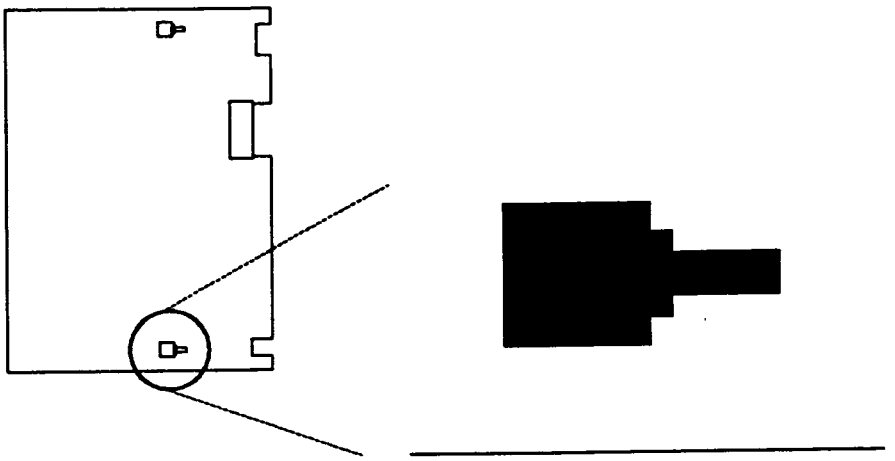


Figure 2-50. A6J1 Location

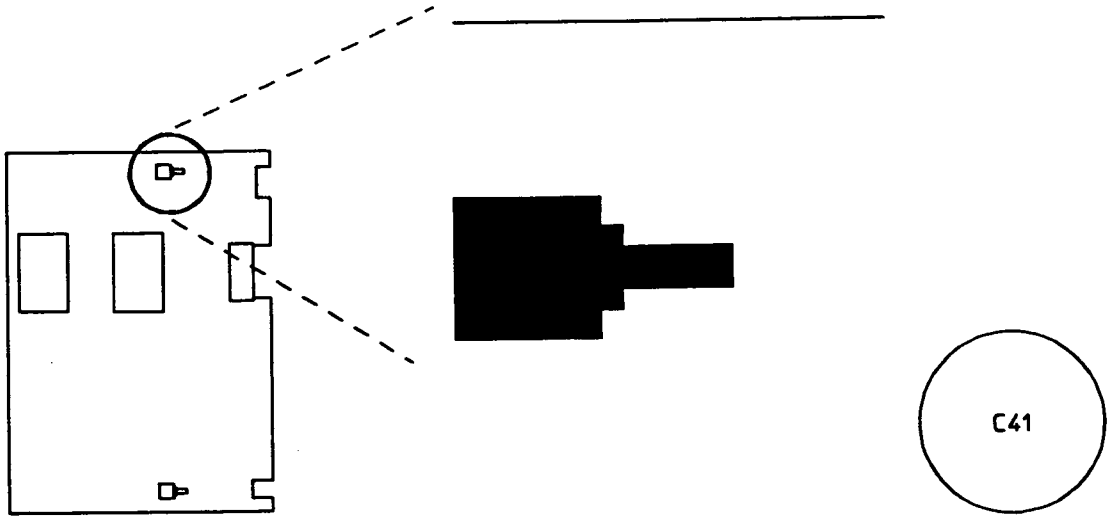


Figure 2-51. A6J2 Location

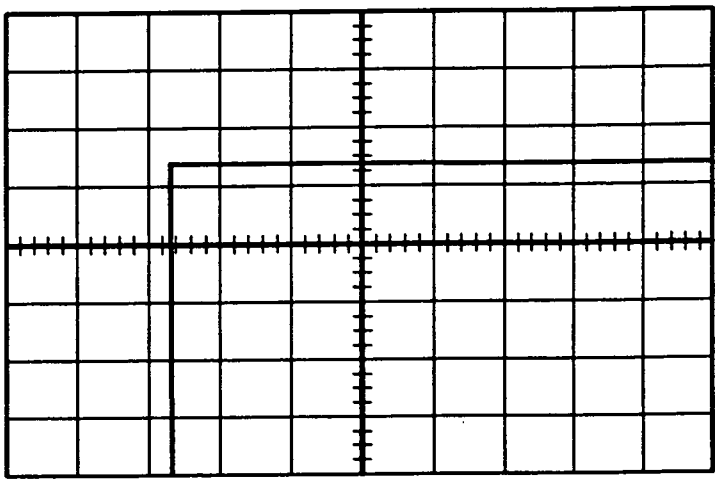


Figure 2-52. Pulse Flatness

Compensation Adjustments

1. Set the power switch on the Peak Power Analyzer to ON (|).
2. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
3. Set the address of the function generator to sixteen (16).

4. Select "Compensation" from the displayed controller menu using the "Next" softkey.
5. Press the "Select" softkey on the controller.
6. Connect the equipment as described on the screen and shown in figure 2-53.

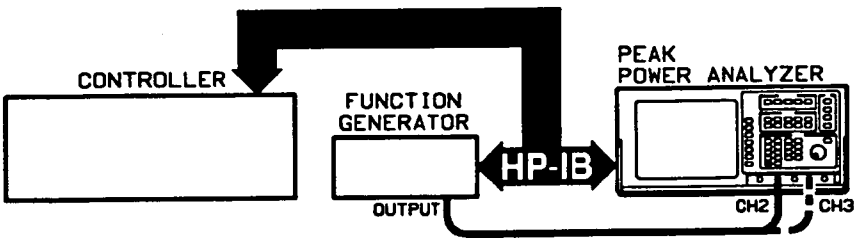


Figure 2-53. Compensation Adjustment Setup

7. Follow the instructions on the screen.
8. The adjustments and waveforms are shown in figures 2-54 through 2-59.

Supplementary Information

Use the following information to supplement the displayed instructions:

If the pulse is not centered on the display, use the front panel knob to adjust the offset.

If the pulse is not stable, use the following steps to adjust the trigger level:

1. Press the front panel (TRIG) menu key.
2. Press the `level` softkey.
3. Adjust the level with the front panel knob.

If the Adjustment Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the address of the function generator set to sixteen (16)?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

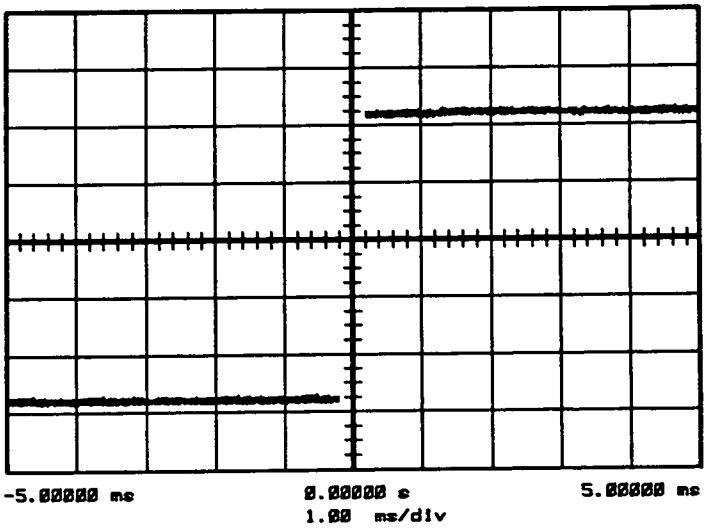


Figure 2-54. Pulse Centered

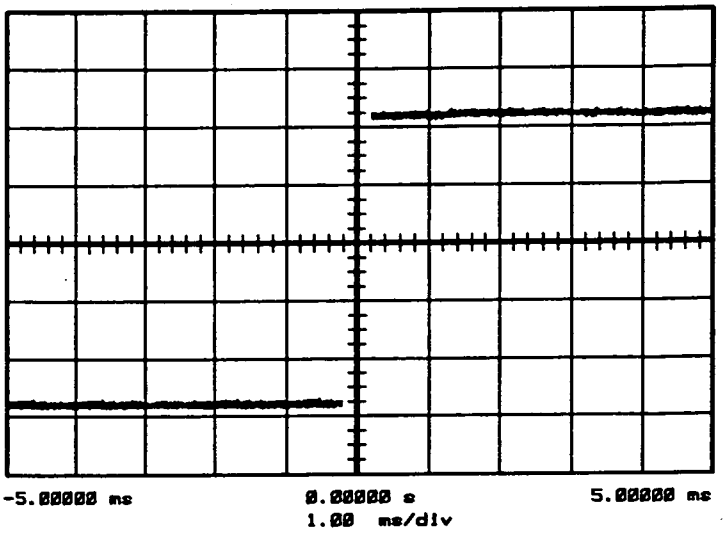


Figure 2-55. Pulse Flatness

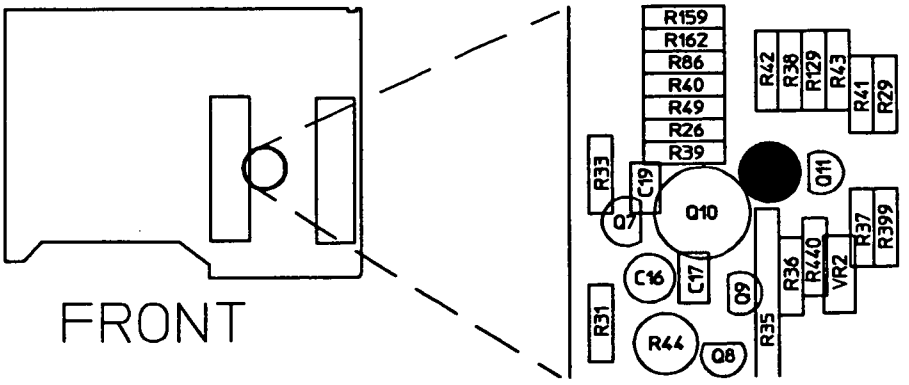


Figure 2-56. A1R55 Adjustment Location

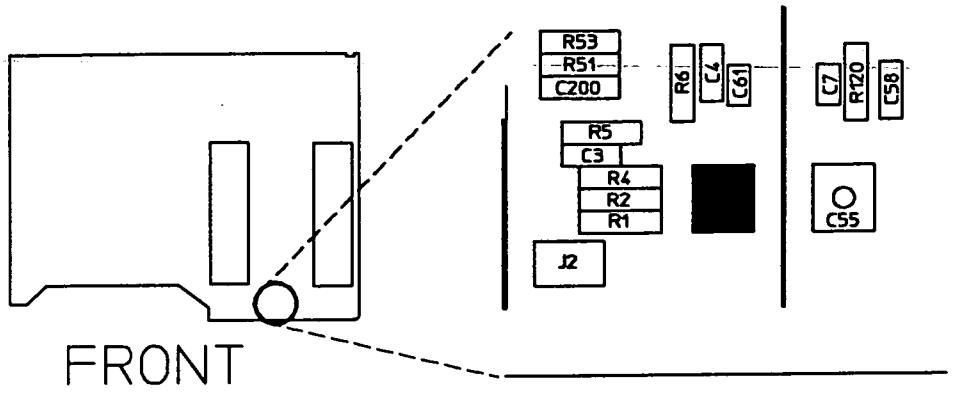


Figure 2-57. A1C1 Adjustment Location

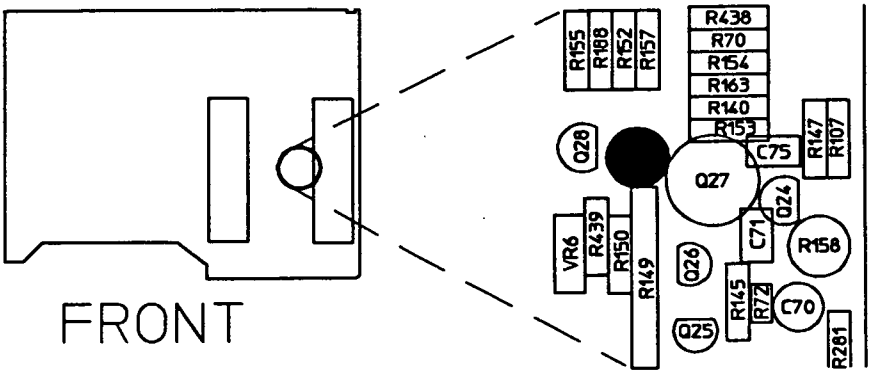


Figure 2-58. A1R169 Adjustment Location

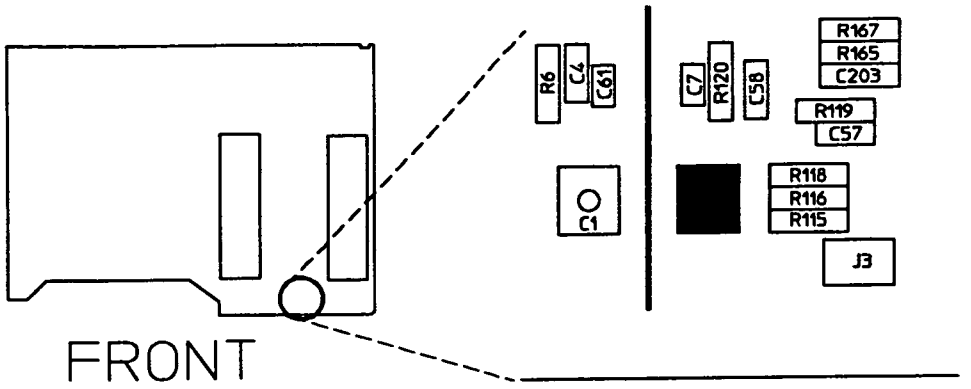


Figure 2-59. A1C55 Adjustment Location

Pulse Flatness Adjustment for Channels 2 and 3

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Set the power switch on the Peak Power Analyzer to ON (|).
3. Select "Pulse flatness" from the displayed controller menu using the "Next" softkey.
4. Press the "Select" softkey on the controller.
5. Connect the equipment as described on the screen and shown in figure 2-60.
6. Follow the instructions on the screen.

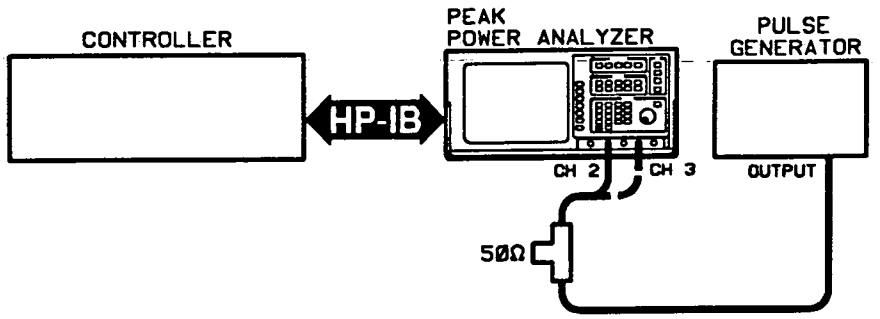


Figure 2-60. Pulse Flatness Adjustment Setup

7. The adjustments and waveforms are shown in figures 2-61 through 2-65.

If the Adjustment Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the test setup correct?
- Was the procedure followed correctly?

Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if everything was done correctly.

Supplementary Information

Use the following information to supplement the instructions displayed on the controller:

If the pulse transition is not visible, use the following steps to display the pulse transition:

1. Press the [TIMEBASE] menu key.
2. Press the `delay` softkey.
3. Adjust the delay with the front panel knob.

4. Press the reference softkey to shift the position of the pulse on the display.

Use the front panel key CLEAR DISPLAY to quickly rewrite the signal on the display. Averaging causes the display to respond slowly.

Use the following steps to set up the amplitude markers. One of the markers is used as a reference during the adjustment:

1. Press the ampl markers softkey until **on** is highlighted.
2. Press the marker 2 softkey.
3. Place the marker at the average of the pulse bottom (some "dip" above and below is normal).
4. Adjust the flatness so that the dip closest to the falling edge of the pulse is just touching the average line as indicated by the marker. For channel 2, the dip should be positioned slightly above the average line (1 minor division).

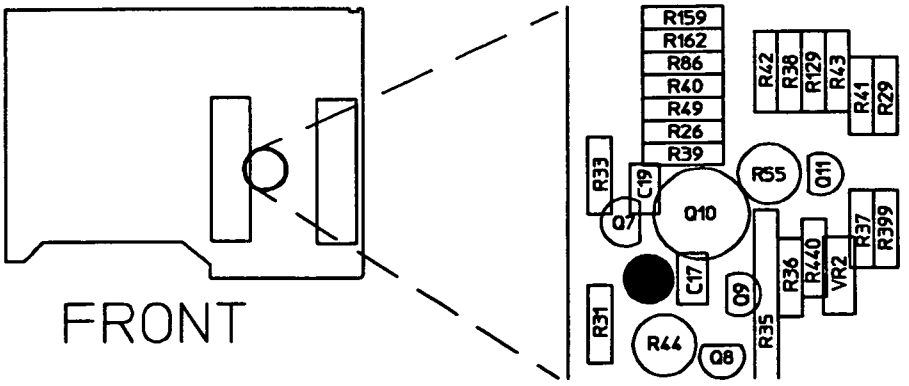


Figure 2-61. A1C16 Adjustment Location

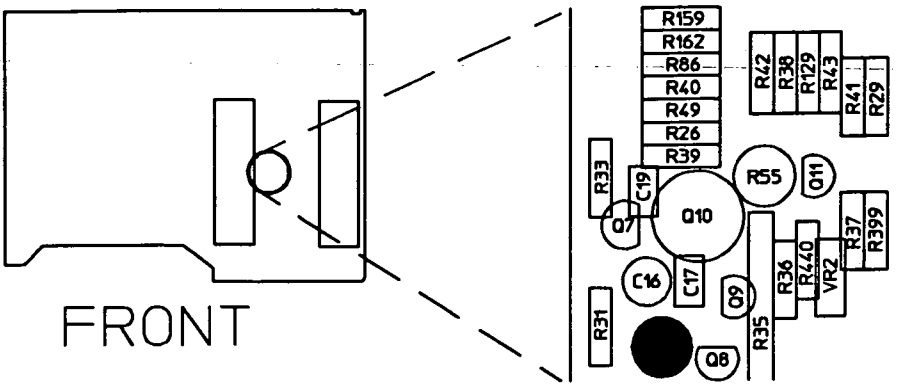


Figure 2-62. A1R44 Adjustment Location

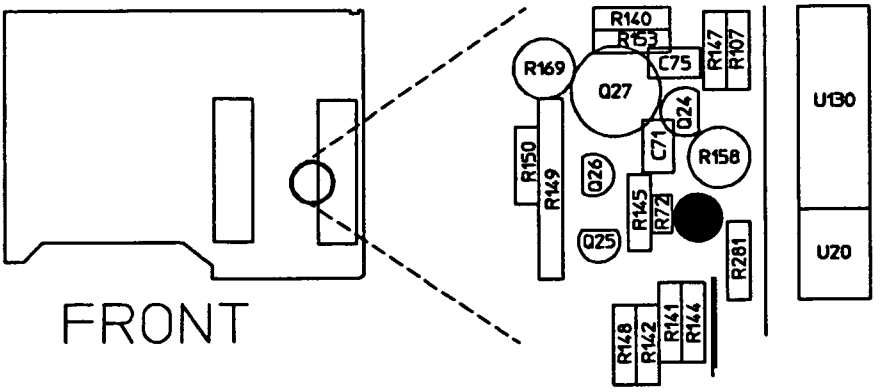


Figure 2-63. A1C70 Adjustment Location

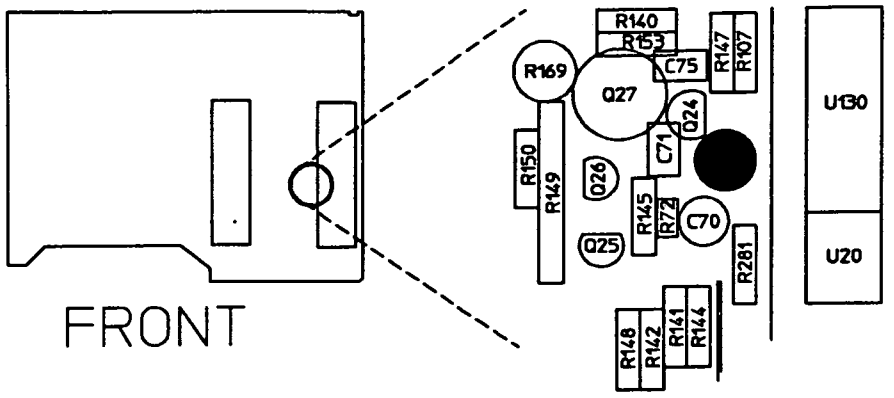


Figure 2-64. A1R158 Adjustment Location

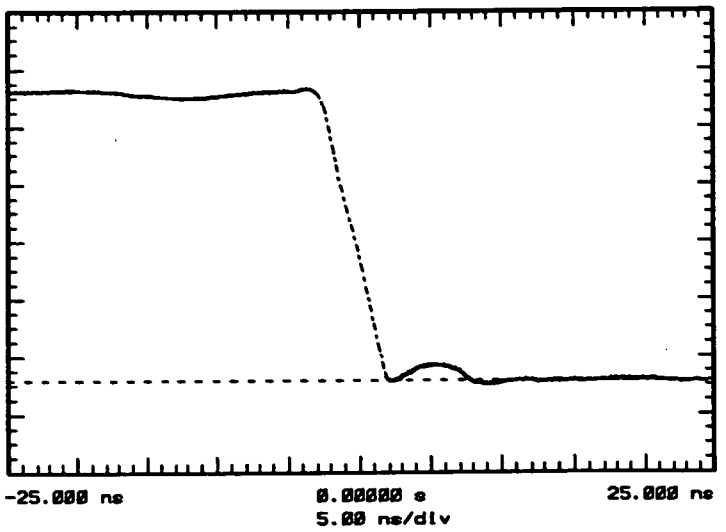


Figure 2-65. Pulse Flatness

A6 Baseband Board Assembly Adjustments

Description A fast rise pulse is input to the baseband board and displayed on the instrument CRT. This display is used to set the risetime adjustment on the board.

Note

The two baseband assemblies in the instrument are identical. The following procedure is used to adjust either the channel 1 or channel 4 baseband assembly.

The adjustment procedure applies to all configurations of the Peak Power Analyzer. However, for instruments prefixed below 3220A, the potentiometers on the A6 Baseband Board Assembly have designators that are different from instruments prefixed 3220A and above. This is why two designators are listed for each of the potentiometers in the procedure.

Equipment

Controller	HP 9000 Series 200 Model 236
Pulse Generator	HP 8131A

Operating System

HP BASIC 5.1 with the following language extensions loaded:

Name	Description
GRAPH	Graphics
GRAPHX	Graphics Extensions
IO	I/O
TRANS	Transfer
MAT	Matrix Statements
PDEV	Program Development
XREF	Cross Reference
KBD	Keyboard Extensions
CLOCK	Clock
MS	Mass Storage
SRM	Shared Resource Management
ERR	Error Messages
DISC	Small Disc Driver
CS80	CS80 Disc Driver
HPIB	HPIB Interface Driver
CRTB	Bit-mapped CRT Driver
CRTA	Alpha CRT Driver
COMPLEX	Complex Arithmetic
CRTX	CRT Extensions
EDIT	List and Edit
HFS	Hierarchical File System

Installing the Software

The software needed to perform this test is located at the back of this manual.

Using a Floppy Disc Drive

Make a backup copy of the supplied disks.

Make sure that your working disk is write-enabled.

Procedure

1. Set the address of the Peak Power Analyzer to seven (7) using the following steps:
   a. Press the (UTIL) menu key on the front panel of the Peak Power Analyzer.
   b. Press the `HP-IB menu` softkey. Press the `more` softkey if the `HP-IB menu` softkey is not displayed.
   c. Press the top softkey unitl **addressed** is highlighted.
   d. Set the address using the front panel knob.
2. Set the rear panel line (mains) switch on the Peak Power Analyzer to OFF (○).
3. Disconnect the power cable from the rear of the Peak Power Analyzer.
4. Remove six screws from the top and two screws from each side of the Peak Power Analyzer's cabinet with a #10 TORX® screwdriver.
5. Remove the top cover.
6. Remove the two screws securing the covers to the A6 Baseband Boards Housing Assembly. See figure 2-71.

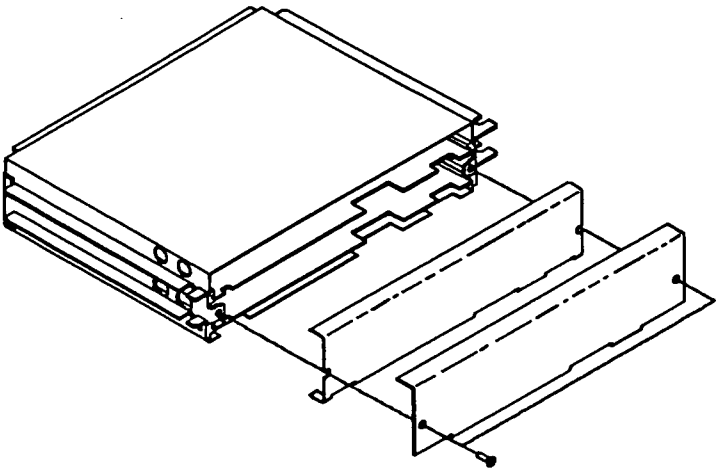


Figure 2-66. A6 Baseband Boards Shield Covers

Note

Before performing the next step, make a note of where the cables are connected. The top board is for RF channel 4 and the bottom board is for RF channel 1.

7. Disconnect the coaxial and ribbon cables connected to the A6 Baseband Board Assembly being adjusted.
8. Remove the A6 Baseband Board from the baseband board housing.
9. Place the A6 Baseband Board on the bench with the notched end facing you.
10. With the board outside of the Peak Power Analyzer, reconnect the coaxial and ribbon cables to A6J2 (see Figure 2-67) and A6J4 (see Figure 2-68).

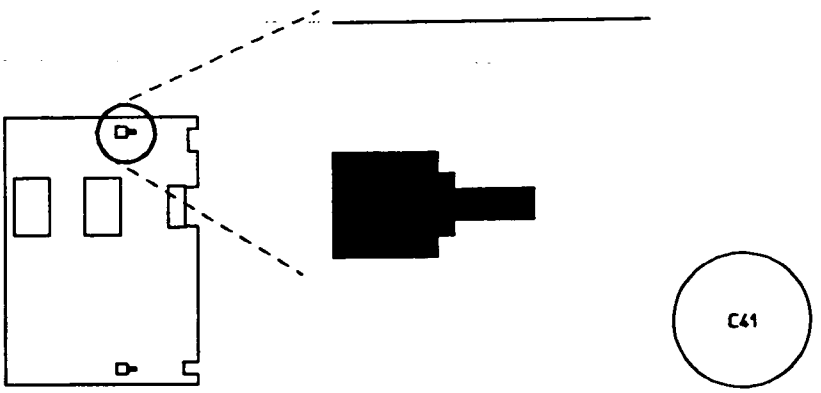


Figure 2-67. A6J2 Location

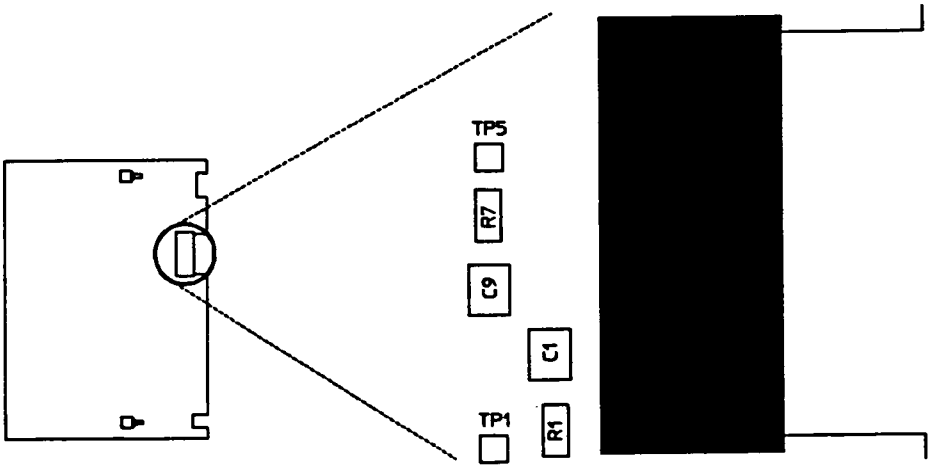


Figure 2-68. A6J4 Location

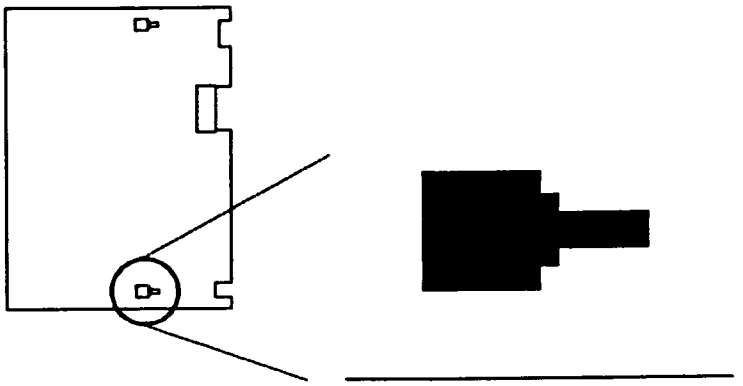


Figure 2-69. A6J1 Location

11. Connect the Peak Power Analyzer and test equipment as shown in Figure 2-70. Connect the peak power sensor to channel 1 and the trigger output to channel 3 when adjusting channel 1. Connect the peak power sensor to channel 4 and the trigger output to channel 2 when adjusting channel 4.

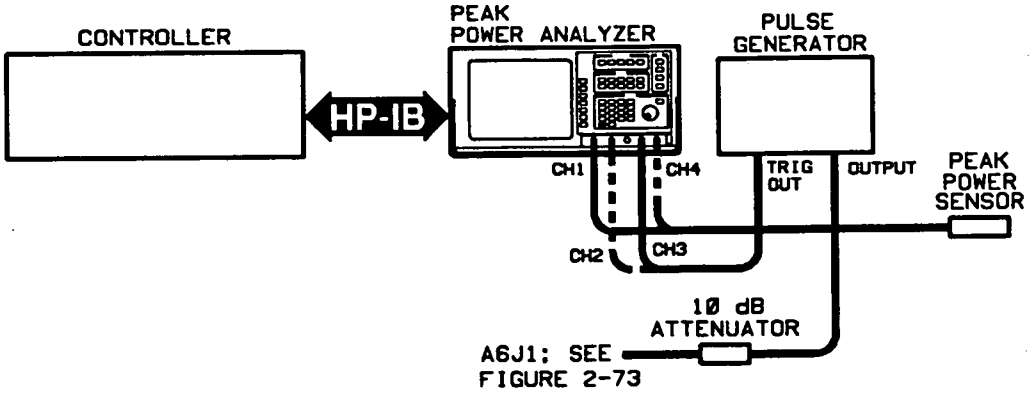


Figure 2-70. Baseband Board Adjustments Setup

12. Connect the power cable to the line (mains) voltage and set the power switch to ON (|).
13. Set the pulse generator as follows:

    Frequency: 1 kHz

    Amplitude: 0—0.5 volts (into 50 Ω)

    Duty Cycle: 50 %
14. Load "BBPULSE_ADJ" from the supplied disk.
15. Run the program and follow the instructions.
16. See figures 2-66 through 2-72 for connector locations, adjustment locations and waveforms.

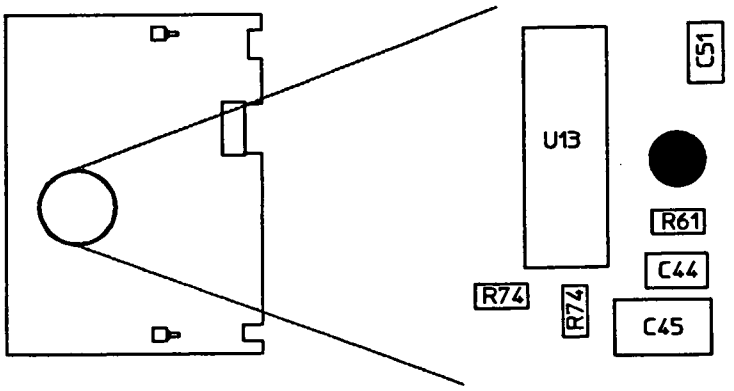


Figure 2-71. A6C40 Risetime Adjustment Location

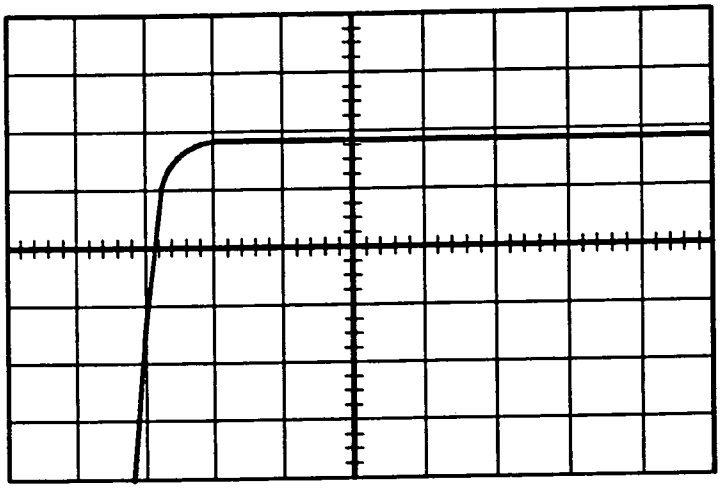


Figure 2-72. Risetime Waveform

If the Adjustment Fails

Verify the following:

- Is the address of the Peak Power Analyzer set to seven (7)?
- Is the test setup correct?
- Was the procedure followed correctly?

Replace the A6 Baseband Board with another A6 Baseband Board, if one is available. Repeat the adjustment. Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem, if the adjustment still fails.

A8 Sensor Check Source Adjustments

Description

There are two adjustments for the A8 Sensor Check Source: frequency and output power. Before the output power is adjusted, the frequency is verified to be within the specified limits. A microwave frequency counter is connected to the front panel SENSOR CHECK connector, and the frequency is verified to be 1.05 GHz ±20 MHz. If necessary, the frequency is adjusted to the specified limit. The output power is monitored by connecting a power meter to the front panel SENSOR CHECK connector. The A8 Sensor Check Source is adjusted for a power meter reading of +10 dBm±0.5 dB.

Equipment

Power Meter	HP 437B
Power Sensor	HP 8482A
Frequency Counter	HP 5343A

To Verify the Frequency

Note

Before continuing with "To Verify the Frequency", determine if your instrument has a frequency adjustment. The first versions of the A8 Sensor Check Source did not have a frequency adjustment. The location of the frequency adjustment is shown in figure 2-78.

1. Connect the instrument power cord to the line (mains) voltage and set the power switch to ON (|).

2. Connect a microwave frequency counter to the front panel SENSOR CHECK connector. The frequency you will be measuring is 1.05 GHz.
3. Turn the sensor check source on using the following steps:
   a. Press the front panel [UTIL] menu key.
   b. Press the third softkey from the top until "CW" is highlighted. It may be necessary to press the `more` softkey to display the `check source` softkey.
4. Verify that the frequency is 1.05 GHz ±20 MHz. If the frequency is within the specified limits, go to "To Verify the Output Power." Otherwise, continue with the next step.
5. Set the rear panel line (mains) switch to OFF (○).
6. Disconnect the power cord from the rear of the Peak Power Analyzer.
7. Remove six screws from the top and two screws from each side of the Peak Power Analyzer's cabinet with a #10 TORX® screwdriver.
8. Remove the top cover.
9. Remove the two PCB (printed circuit board) retainers securing the A5 Power Supply Assembly from the right front and right rear corners of the instrument cabinet. The retainers are removed by pulling up and out.
10. Slide the Power Supply Assembly a little toward the side of the instrument cabinet.
11. Remove the cable (W27) connected from the A5 Power Supply Assembly to the A1 Control Board Assembly.

12. Disconnect the cable from the line module to the A5 Assembly. To remove the cable, squeeze in on the two connector tabs while pulling the connector straight back.
13. Slide the Power Supply Assembly out through the side of the instrument cabinet.
14. Remove the two screws securing the covers to the A6 Baseband Boards Housing Assembly. See figure 2-73.

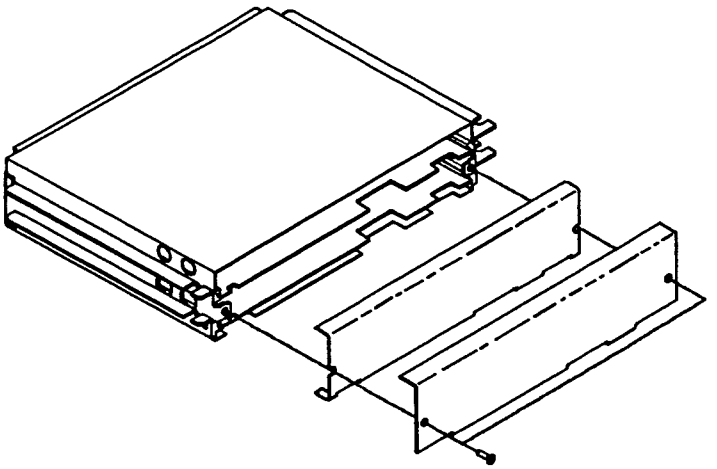


Figure 2-73. A6 Baseband Boards Shield Covers

Note

Before performing the next step, make a note of where the cables are connected. The top board is for RF channel 4 and the bottom board is for RF channel 1.

15. Disconnect the coaxial and ribbon cables connected to the A6 Baseband Board Assemblies.
16. Slide the A6 Baseband Boards Housing Assembly out through the side of the instrument cabinet.
17. Tuck the coaxial cables under the A8 Sensor Check Source Assembly.

18. Disconnect the semirigid cable at the A8 Assembly.

Note When reconnecting the semirigid cable, the torque specification for the connector is 14 to 16 inch/pounds.

19. Disconnect the coaxial cable (W18; gray and brown) at the A8 Assembly.
20. The other cable (W20; multiple wires) must remain connected to the A1 Control Board Assembly.
21. Gently pull on the narrower portion of the A8 Assembly. The assembly should come right out.
22. Disconnect the microwave counter from the front panel connector, and connect it to the port on the A8 Assembly that was connected to the semirigid cable.
23. Re-install the power supply.
24. The adjustment is made through the hole to the left of the port that was connected to the semirigid cable or to the left of the port that was connected to W18.
25. Connect the instrument power cord to the line (mains) voltage and set the power switch to ON (|).

Note The adjustment requires the use of a long narrow non-metallic adjustment tool.

26. Adjust the frequency of the A8 Sensor Check Source to 1.05 GHz ±20 MHz.
27. Set the rear panel line (mains) switch to OFF (○).
28. Disconnect the power cord from the rear of the Peak Power Analyzer.
29. Re-install the assemblies that were removed, and continue with "To Verify the Output Power."

To Verify the Output Power

This procedure assumes that the A8 Sensor Check Source frequency has been verified to be within the specified limits.

1. Set the rear panel line (mains) switch to OFF (○).
2. Disconnect the power cord from the rear of the Peak Power Analyzer.
3. Remove six screws from the top and two screws from each side of the Peak Power Analyzer's cabinet with a #10 TORX® screwdriver.
4. Remove the top cover.
5. Zero and calibrate the power meter. The output frequency of the sensor check source is 1.05 GHz.
6. Connect the power meter to the front panel SENSOR CHECK connector.
7. Connect the instrument power cord to the line (mains) voltage and set the power switch to ON (|).
8. The sensor check source should be still set to **cw**.
9. Turn the Peak Power Analyzer so the end with the A5 Power Supply is facing you.
10. Adjust the A8 Sensor Check Source for a reading of +10 dBm±0.5 dB on the power meter. The location of the adjustment is shown in figure 2-74.

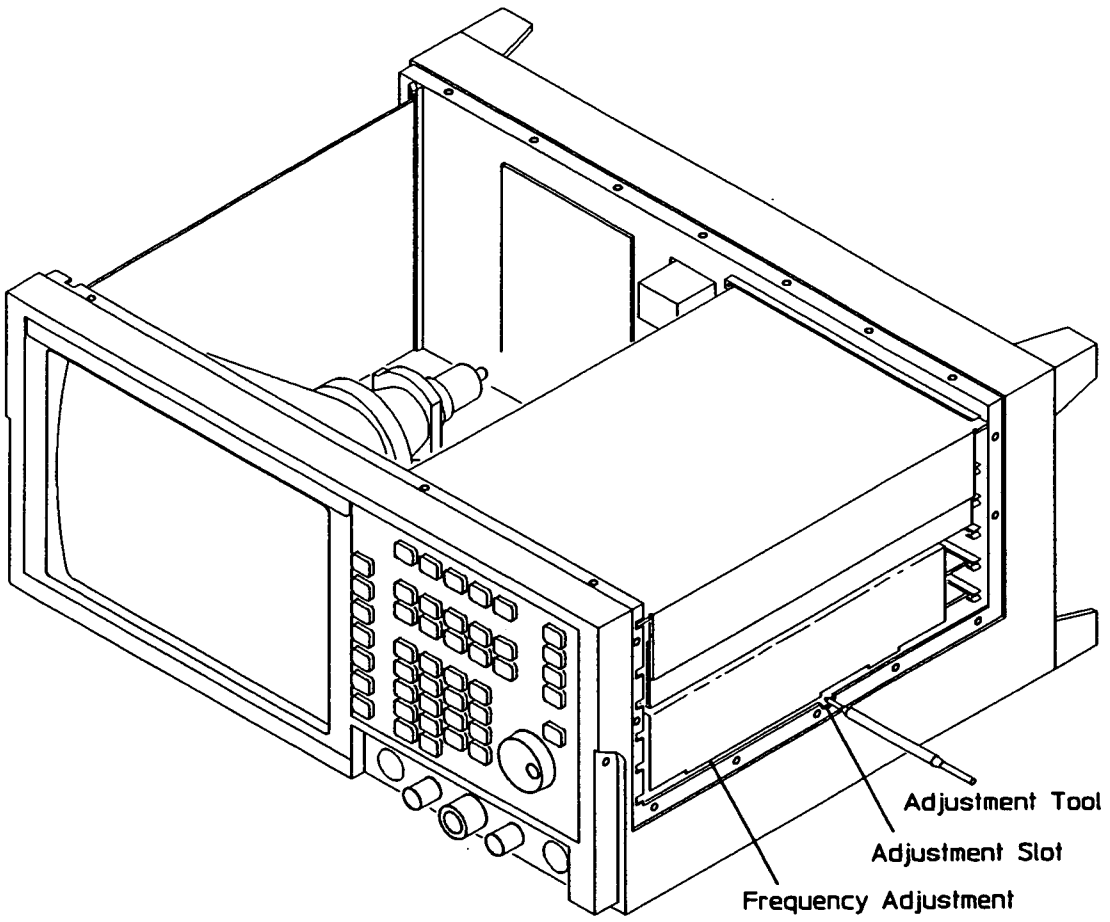


Figure 2-74. A8 Sensor Check Source Adjustment Location

If the Adjustment Fails Use the *Peak Power Analyzer Service Guide* to troubleshoot the problem.