HEWLETT PACKARD

HP 85082A
50 ohm Input Module (300kHz to 2GHz)
Operating and Service Manual Insert

PLEASE READ THIS FIRST

INTRODUCTION

This package is designed to be used with the HP 8508A Vector Voltmeter mainframe Operating and Service Manual (HP part number 08508-90000) and the HP 70138A MMS Vector Voltmeter Service Manual (HP part number 70138-90002). The HP Model 85082A 50ohm Input Probe cannot be used independently of the HP 8508A or HP 70138A Vector Voltmeters.

INSTALLING THIS PACKAGE

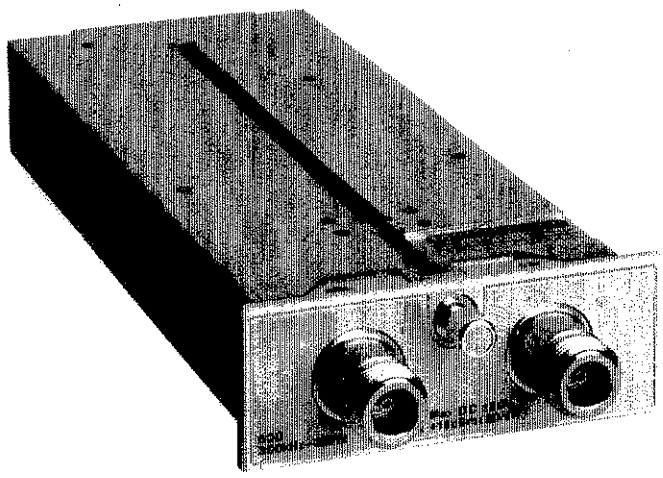
Remove the skin-packing material from this package. Insert the package at the rear of the HP 8508A Vector Voltmeter Operating and Service Manual binder or at the rear of the HP 70138A MMS Vector Voltmeter binder. This package has different coloured tabbing from the mainframe content, for ease of identification.

HP 85082A 50ohm Input Module Insert (HP part number 85082-90000)

OPERATING AND SERVICE MANUAL INSERT

HP 85082A

50 ohm INPUT MODULE (300kHz to 2GHz)



HEWLETT PACKARD

HP 85082A
50 ohm
INPUT MODULE

Operating and Service Manual Insert

First Edition

Operating and Service Manual Insert HP Part 85082-90000

Microfiche Operating and Service Manual Insert HP Part 85082-90001

Printed in U.K. : March 1989

HEWLETT PACKARD

CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to the Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HP SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided in this manual.

Contents

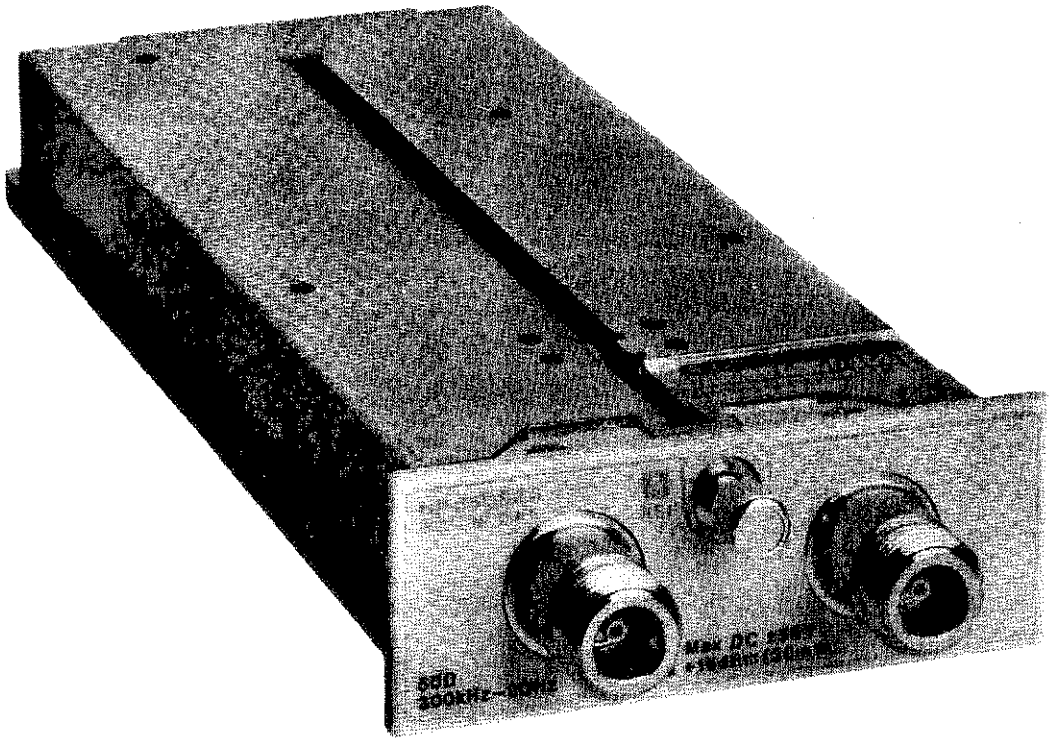


Figure 1-1. The HP 85082A 50 ohm Input Module

General Information

Section 1

1-1 INTRODUCTION

This service manual contains information required to install, test, adjust and service the Hewlett-Packard Model 85082A 50 ohm Input Probe. The HP 85082A 50 ohm Input Probe is shown in Figure 1-1.

On the title page of this manual is a Microfiche Part Number. This number can be used to order 4 x 6 inch micro-film transparencies of the manual. Each microfiche contains up to 96 photo duplicates of the manual pages.

1-2 SPECIFICATIONS

Instrument specifications are listed in Table 1-2. These specifications are the performance standards or limits against which the instrument is tested. The specifications listed apply when the HP 85082A is installed in either an HP 8508A Vector Voltmeter mainframe, or an HP 70138A MMS Vector Voltmeter Module.

1-3 ANTI-STATIC PRECAUTIONS

The printed circuit board contained in this instrument and the probes have components that are susceptable to damage by electrostatic discharge (ESD). To minimize the risks of damaging or decreasing the reliability of the instrument, the following procedures and cautions should be observed.

Static-free Workstation: All unpackaging and servicing should be carried out at a static-free workstation whenever practical.

De-soldering: When de-soldering components, ensure that the soldering iron is earthed. Always use a metalized solder remover.

Anti-Static Freezer Spray: When attempting to locate a temperature-related fault, use only an approved anti-static freezer spray.

Anti-Static Products: Table 1-1 contains details of anti-static products which are available from Hewlett-Packard.

Table 1-1. Anti-Static Products

Product	HP Part Number
Anti-static workstation kit	9300-0792
Metalized Solder Remover	8690-0227
Wrist-strap	9300-0970

1-4 INSTRUMENTS COVERED BY MANUAL

DATE CODE

The year and week of manufacture are stamped on the circuit board and also on the outer casing of the module. Example: "8-18" would indicate week 18 of 1988. There is no serial number.

SERIES CODE

A four-digit series number is contained on a serial number plate. This number should match the series number on the title page of this manual. An instrument manufactured after the printing of this manual may have a series number that is not listed on the title page. The unlisted series number indicates that the instrument is different from those described in this manual. The manual for this new instrument may be accompanied by a Manual Changes supplement. This supplement contains "change information" that explains how to adapt the manual to the new instrument.

In addition to change information, the supplement may also contain information for correcting errors in the manual. To keep this manual as current and as accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is identified by the manual print date and part number (both of which appear on the manual title page). Complimentary copies of the supplement are available from Hewlett-Packard. For information concerning a series number that is not listed on the page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

1-5 DESCRIPTION

The Hewlett-Packard Model 85082A 50 ohm Input Probe is a plug-in module for the HP 8508A Vector Voltmeter and the HP 70138A MMS Vector Voltmeter Module. The HP 85082A can measure signals in the frequency range 300kHz to 2GHz and at levels from -47dBm to 13dBm.

1-6 RECOMMENDED TEST EQUIPMENT

Table 1-1 in the HP 8508A Vector Voltmeter manual lists the test equipment required for testing, adjusting and servicing the HP 8508A Vector Voltmeter and the HP 85082A 50ohm Input Probe. Table 1-1 in the HP 70138A MMS Vector Voltmeter Service Manual lists the equipment required for testing and adjusting the HP 70138A MMS Vector Voltmeter and the HP 85082A 50ohm Input Probe. The Critical Specifications column describes the essential requirements for each piece of test equipment. Other equipment can be substituted if it meets or exceeds the critical specifications.

Table 1-2. Specifications

Specifications describe the instrument's warranted performance over the temperature range 0 to 55 deg C unless otherwise stated. Typical values describe typical, but non-warranted, performance. Nominal values are given as a guide to expected performance.

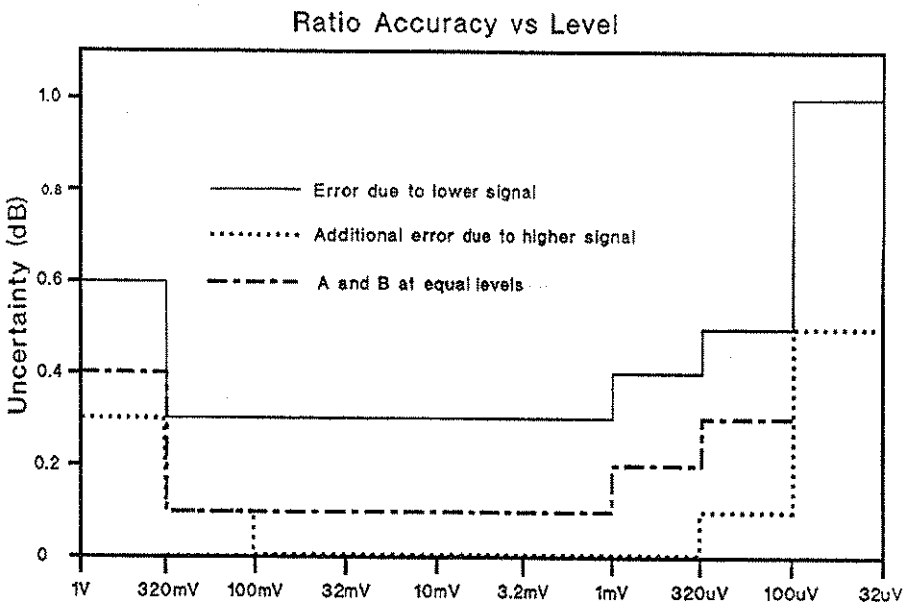
Measurement conditions:All specifications apply to measurements in a 50 ohm system and with frequency autoranging off, unless otherwise stated.

Frequency Range	300kHz-2GHz	
Maximum Input	16dBm, ±50Vdc	
Measurement Range		
A and B Channel maximum	Magnitude measurements	3dBm, 300kHz-1MHz, 1GHz-2GHz 13dBm, 1MHz-1GHz
	Phase measurements	3dBm, 300kHz-2GHz
A (Ref) Channel minimum		-47dBm, 300kHz-3MHz -57dBm, 3MHz-2GHz
B (Meas) Channel noise floor		-87dBm, 300kHz-2GHz
Measurement bandwidth	1kHz (nominal)	
Input Crosstalk	>100dB, 300kHz-500MHz >80dB, 500MHz-1GHz >70dB, 1GHz-2GHz	
Impedance	SWR<1.2, 300kHz-1.5GHz SWR<1.5, 1.5GHz-2GHz	
Magnitude Characteristics		
Resolution:	3 1/2 digits	
Accuracy:	Amplitude accuracy is specified for both ratio and absolute measurements. Each case has two components - accuracy vs level and accuracy vs frequency. Add either the ratio or the absolute uncertainty components from the following graphs, using the information on each graph to decide if the uncertainty applies to the particular measurement.	

Ratio Accuracy vs Level (1) (3)

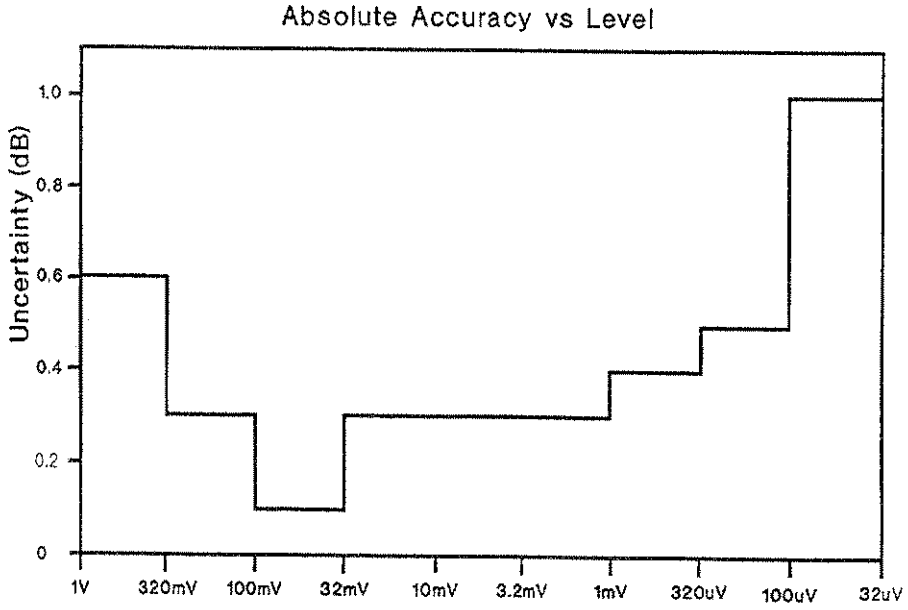
Add this term when making:
Ratio measurements at any single frequency.

(Accuracy vs level is normally determined by the lower level signal. Noise (<320uV) and compression (>100mV) effects cause additional errors.)



Absolute Accuracy vs Level (1) (2) (3)

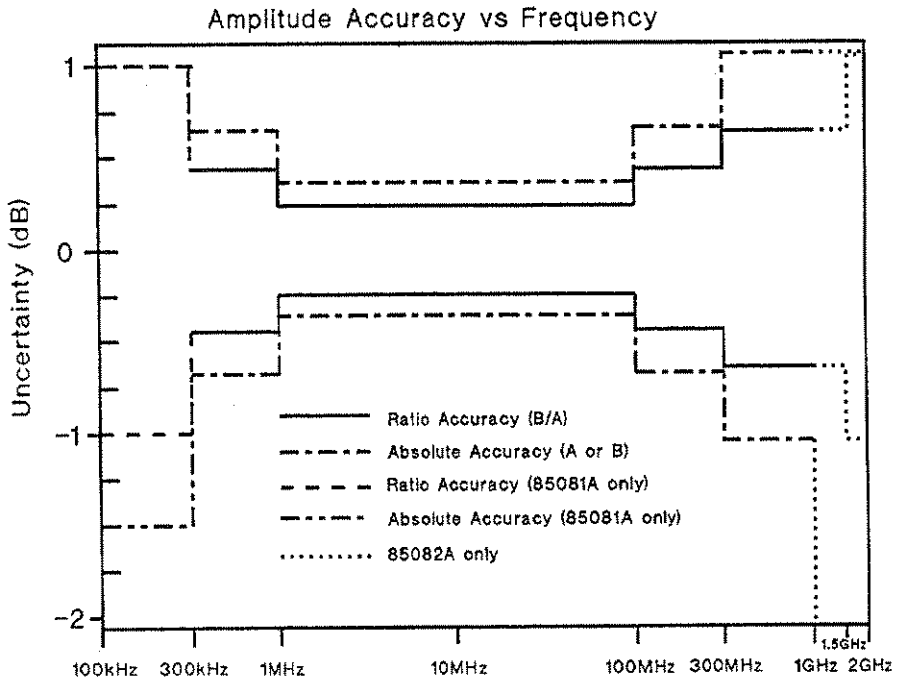
Add this term when making:
Absolute measurements.



Amplitude Accuracy vs Frequency(1) (4)
(A and B 100mV nominal)

Add this term when making:
Absolute measurements.
Ratio measurements over a frequency range.

Ignore this term when making:
Ratio measurements where the measurement is normalized to a reference at each new frequency.

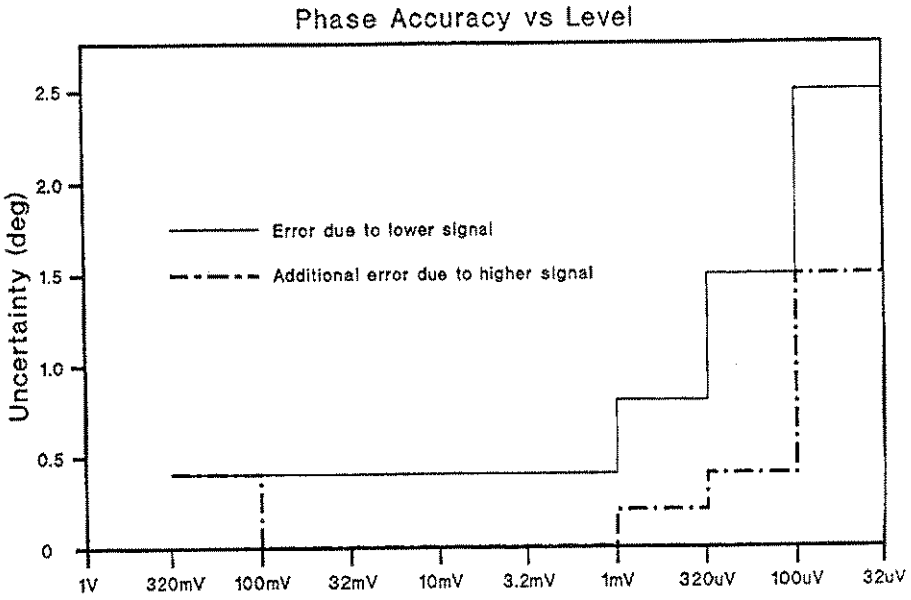


Phase Characteristics

Display Range:	-179.9 to +180.0 degrees
Display Resolution:	0.1 degrees
Accuracy:	Phase accuracy has two components - phase accuracy vs level and phase accuracy vs frequency. Add the uncertainty components from the following graphs using the information on each graph to decide if the uncertainty applies to the particular measurement.

Phase Accuracy vs Level (5) (6) (7)

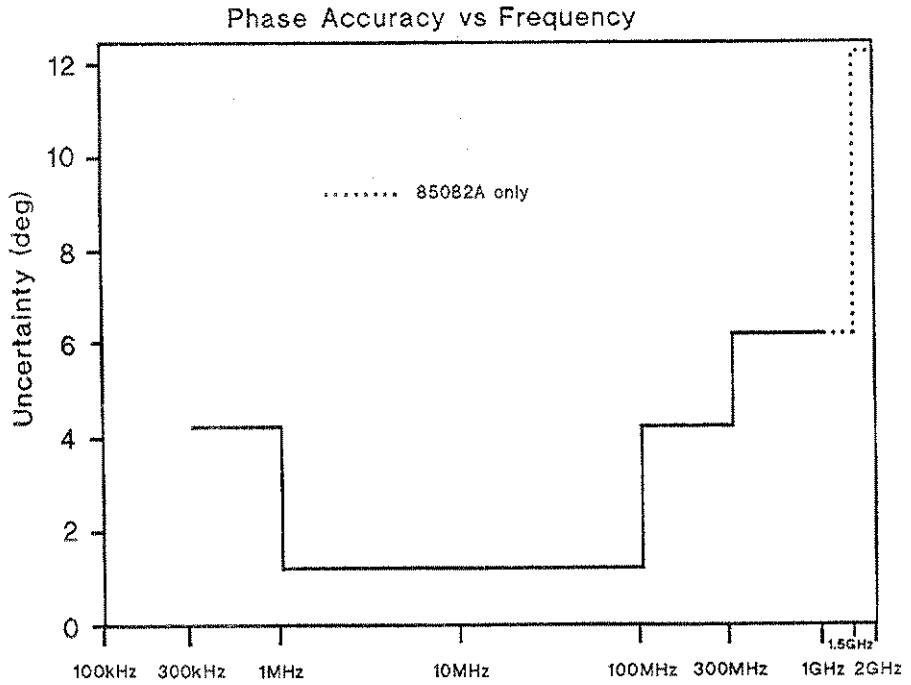
Add this term when making:
Phase measurements at any single frequency.



Phase Accuracy vs Frequency (5) (6)
(A and B 100mV nominal)

Add this term when making:
Phase measurements over a frequency range.

Ignore this term when making:
Phase measurements where the measurement is normalized to a reference at each new frequency.



Footnotes
(1) 15 to 30 degrees C. Add ±0.1dB per 5 deg C outside this range.
(2) A minimum input level depends on frequency. See Measurement Range.
(3) Add ±0.5dB for signals above 100mV at frequencies greater than 500MHz.
(4) A and B absolute value includes ±0.15dB source traceability error.
(5) 15 to 30 degrees C. Add 1 deg per 5 deg C outside this range.
(6) Add ±3 deg for signals above 100mV at frequencies greater than 500MHz.
(7) Add ±0.4 deg phase non-linearity for measurements other than 0 deg.

General

Search and lock time
Automatic tuning starts from lowest frequency and searches consecutive bands. Total search and lock time depends on the number of bands to be scanned and the lockup time within the selected band.

Process start time:	50ms after lock is lost.
Lockup (within 1 range):	40ms, frequencies up to 3MHz 20ms, frequencies greater than 3MHz
Ranges (MHz):	0.1-0.2, 0.2-0.6, 0.6-1, 1-3, 3-5, 5-8, 8-15, 15-25, 25-50, 50-80, 80-150, 150-250, 250-500, 500-1000, 1000-2000

Rear Panel Outputs:

Normal Operation: Provides an analog representation of the digital display values, including internal instrument correction factors.
OUTPUT 1 corresponds to DISPLAY 1, OUTPUT 2 corresponds to DISPLAY 2.
Range: 0 to ±1999 display counts.
Sensitivity: 1mV represents 1 display count (nominal).
For readings greater than ±1999 counts, the rear panel output voltage will remain fixed at ±2.0 Volts.
Display resolution can be controlled by manual ranging.
Update rate: Approximately 3 readings per second.

Direct Analog Output: Provides continuous direct output from the internal magnitude and phase detectors through 800Hz low-pass filters. No internal correction is applied.
OUTPUT 1 corresponds to linear magnitude (A or B selected by front panel control).
Sensitivity: 1V equals displayed full scale deflection (nominal). Can be controlled by manual ranging.
OUTPUT 2 corresponds to B-A phase.
Sensitivity: 10mV per degree (nominal).
Phase Jitter: < 3 deg rms (typical, A=100mV, B=100uV)

HP-IB Capability

Interface functions:	SH1 AH1 T6 TE0 L4 LE0 SR1 RL1 PP0 DC1 DT1 C0
Transfer Rate:	Normal Operation: Approximately 12 readings per second. Measurement Conditions: Triggered measurement, default averaging. Maximum Rate: Approximately 1 reading per 18ms. Measurement conditions: Continuous output, averaging count 0, system format FP64, display rate off, equal steady state signals at A and B inputs, single output of phase or linear A or B voltage.

Probe Power Supply

Supplies:	+12 and -12 volts and ground

This supply is sufficient to operate 1 HP 85024A High Impedance Probe.

Environment

Temperature:	0 to 55 deg C (operating), -40 to 70 deg C (storage)
Humidity:	0 to 95%, non-condensing
Altitude:	0 to 4500m (operating), 0 to 15000m (storage)

RFI:	Conducted and radiated interference is within the requirements of Messempfaenger-Postverfuegung 526/527/79.
Power:	100, 120, 220 or 240V +5/-10%, 48 to 440 Hz, 40VA
Size:	Std: 133mm (5.25in) H x 425.5mm (16.75in) W x 473.3mm (18.65in) D
Weight:	Std: 8.1kg (net) 11kg (shipping)

Installation

Section 2

2-1 INTRODUCTION

This section provides installation instructions for the Hewlett-Packard Model 85082A 50 ohm Input Module. This section also includes information about initial inspection and damage claims, preparation for use, packaging, storage and shipment.

2-2 INITIAL INSPECTION

WARNING

IF THERE IS ANY SIGN OF SHIPPING DAMAGE TO THE INSTRUMENT, DO NOT INSTALL IN THE HP 8508A MAINFRAME, OR THE HP 70138A MMS MODULE. RETURN THE INSTRUMENT TO THE NEAREST HEWLETT-PACKARD OFFICE FOR CHECKING.

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. The Performance Tests check the complete specification of the instrument.

If the contents of the shipment are incomplete, if there is mechanical damage or defect, or if the instrument performance fails to meet specification, notify the nearest Hewlett-Packard office. If the shipping container is damaged or the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping material for the carrier's inspection. The Hewlett-Packard office will arrange for repair or replacement at Hewlett-Packard's option without waiting for a claims settlement, providing that Hewlett-Packard and/or the carrier are notified within 12 days of shipment.

2-3 INSTALLING THE MODULE

The HP 85082A is installed in the opening on the front panel of the HP 8508A Vector Voltmeter or the HP 70138A MMS Vector Voltmeter. The HP 85082A should be carefully slid into the guides and pushed firmly to ensure the connectors are mated. The module should now be locked in place by turning the knob of the locking mechanism clockwise.

2-4 POWER REQUIREMENTS

The HP 85082A derives its power directly from the HP 8508A Vector Voltmeter mainframe or the HP 70138A MMS Vector Voltmeter.

2-5 OPERATING ENVIRONMENT

Temperature: The instrument may be operated in temperatures from 0° Centigrade to +50° Centigrade. (Refer to the specifications for limitations.)

Humidity: The instrument may be operated with humidity up to 90% up to 40° Centigrade. However, the instrument should also be protected from temperature extremes which may cause condensation within the instrument.

Altitude: The instrument may be operated at altitudes up to 4600m (15000ft).

2-6 STORAGE AND SHIPMENT

Environment

The instrument may be stored or shipped in environments within the following limits:

Temperature: -40° Centigrade to +75° Centigrade.
Humidity: up to 90% at 65° Centigrade.
Altitude: 15300m (50000ft).

The instrument should also be protected from temperature extremes which may cause condensation within the instrument.

Packaging

Tagging for Service: If the instrument is being returned to Hewlett-Packard for service, please complete one of the blue repair tags located at the front of this manual and attach it to the instrument.

Original Packaging: Containers and material identical to those used in the factory packing are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, model number and full serial number. Also mark the container "FRAGILE" to ensure careful handling.

Other Packaging: The following general instructions should be used for re-packaging with commercially available materials.

(a) Wrap the instrument in heavy paper or plastic. (If shipping to Hewlett-Packard office or service centre, attach a tag indicating the type of service required, return address, model number and full serial number.)

(b) Use a strong shipping container. A double-walled carton of 350-pound test material is adequate.

(c) Use a layer of shock absorbing material 70mm to 100mm (3 to 4 inch) thick around all sides of the instrument to provide firm cushioning and prevent movement inside the container. Protect the control panel with cardboard.

(d) Securely seal the shipping container.

(e) Mark the shipping container "FRAGILE" to ensure careful handling.

(f) In any correspondence, refer to the instrument by model number and date code.

Operation

Section 3

3-1 INTRODUCTION

This information is contained in the HP 8508A Vector Voltmeter mainframe and HP 70138A MMS Vector Voltmeter manuals.

Performance Tests Section 4

4-1 INTRODUCTION

The Performance Test procedures in this section of the manual test the instruments electrical performance using the specifications listed in Table 1-2 of this manual as the perfomance standard. These specifications apply equally when the HP 85082A is used in either the HP 8508A or the HP 70138A Vector Voltmeter.

In the event of failure, refer to the Troubleshooting information in section 8 of this manual, except where specific reference is made to the Adjustment Procedures in section 5.

Power-on Checks

The Power-on Checks are performed automatically at switch-on. These checks test the operation of the mainframe processor, the functionality of the measurement modes and the presence of the HP 85082A Input Module. The Power-on Checks are part of the self-test routine used for operational verification.

Failure of these tests results in an Error Code number being displayed. Errors relating to the HP 85082A are in the 600 Series.

Performance Tests

The Performance Tests verify that the instrument is operating within the limits of the full specification. It should be noted, however, that the specifications apply to measurements in a 50 ohm system with the autoranging off.

In the event of a performance test failure, the test should be repeated with manual range selection and a check made of Adjustment Procedures and, if necessary, the Troubleshooting section.

4-2 TEST EQUIPMENT REQUIRED

Equipment required for the Performance Tests is listed in Table 1-1 in the HP 8508A or HP 70138A Vector Voltmeter manual. Any equipment which meets or exceeds the critical specifications may be substituted for the recommended model.

4-3 TEST RECORDS

The results of the Performance Tests may be recorded in Tables 4-2 to 4-10. The Test Records list all of the tested specifications and their acceptable limits. The results recorded at incoming inspection can be used for comparison in periodic maintenance and troubleshooting after repair or calibration.

4-4 CALIBRATION CYCLE

This instrument requires periodic verification of performance. Depending upon the use and environmental conditions, the instrument should be checked using the Performance Tests at yearly intervals.

4-5 PERFORMANCE TESTS

The Performance Test procedures provide a complete check of the instrument's electrical performance using the specifications listed in Table 1-2 as the performance standard. Table 4-1 gives a complete list of the Performance Tests. If any of the Performance Tests are out of specification, refer to section 5 of this manual and the appropriate Vector Voltmeter manual. If, after adjustment, the Specifications still cannot be met, refer to section 8 of this manual.

Table 4-1. Performance Tests

Test Title	Paragraph Number
Isolation between Channels (Input Crosstalk)	4-7
Reference Channel Lock Level and Channel B Noise Floor	4-8
Phase Accuracy vs Frequency	4-9
Phase Offset Accuracy	4-10
Phase Accuracy vs Level	4-11
Absolute Accuracy vs Frequency	4-12
Amplitude Accuracy vs Input Level (and rear panel output check)	4-13
Voltage Ratio Accuracy vs Level	4-14
SWR Measurement	4-15

4-6 WARM-UP TIME

The instrument must be switched on for a minimum of 30 minutes before carrying out any tests. Once the instrument's operating temperature has stabilized, perform an automatic internal instrument calibration by selecting [SHIFT] [CAL TEST] on the HP8508A or [Misc] [CAL] on the HP 70138A MMS system.

4-7 ISOLATION BETWEEN CHANNELS (INPUT CROSSTALK)

SPECIFICATIONS:

Input Crosstalk:	1 MHz - 500 MHz	> 100 dB
	500 MHz - 1 GHz	> 80 dB
	1GHz - 2GHz	> 70dB

DESCRIPTION:

Crosstalk is defined as the leakage interference between the instrument input channels. Crosstalk is tested by observing the signal level on a terminated input while applying a signal to the other input.

In this procedure, a maximum level signal of 1Vrms is applied to the Channel A input of the HP 85082A Input Module while the Channel B input is terminated in 50 ohms.

The crosstalk from Channel A to Channel B is indicated by an amplitude ratio measurement in DISPLAY 1.

EQUIPMENT:

Instrument	Critical Specification		Recommended Model
Signal Source	Frequency Range	1.0 -2000 MHz	HP 8642B
	Amplitude	1.0 V rms	
50 Ohm Termination			HP 909C
N(m)-N(m) Cable			HP 11500A

PROCEDURE:

1. Configure the equipment as shown in Figure 4-1.

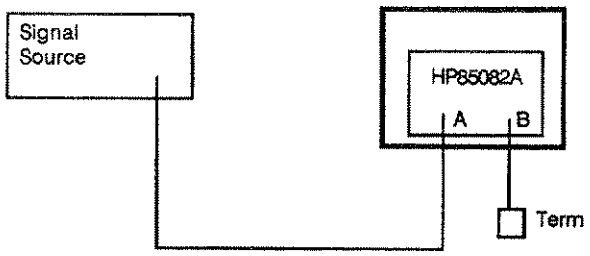


Figure 4-1. Channel Isolation Test Setup

2. Signal source setup:

Frequency:	1.0 MHz
Amplitude:	1.0 V rms

3.

HP 8508A setup	HP 70138A Setup	Function
[PRESET]	[I-P]	Instrument preset
[B/A MAG] [DISPLAY] dB	[Mag/Ph] [B/A MAG] [Format Functn] [dB]	B/A ratio measurement in dB, in DISPLAY 1.
[LOCK RANGE] [SHIFT] [VIEW RANGE] "up"/"down" arrow keys to select 1-3MHz	[Lock Range] [1.0-3.0MHz]	Set frequency range.
[LOCK RANGE]	[Lock Range] [AUTO LOCK]	Unlock frequency range.
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration

4. Note the value obtained for the Input Isolation in DISPLAY 1 and record this value in the Performance Test Record (which is located at the end of the Performance Tests section).

5. Repeat this procedure for each frequency noted in the Performance Test Record.

Should the results in any particular frequency range fall outwith the specification limits, the test should be repeated with the instrument locked in the appropriate frequency range. The process for locking the frequency range is shown below.

The instrument can be locked into a particular frequency range as follows:

HP 8508A	HP 70138A
[LOCK RANGE]	[Lock Range] [*required frequency range*]
[SHIFT] [VIEW RANGE] "up"/"down" keys to select frequency range	
[LOCK RANGE]	[Lock Range] [AUTO LOCK]

Note: The frequency points in the Performance Test Record are a minimum requirement as they have been selected to coincide with the specification needs and ranges of the instrument.

4-8 REFERENCE CHANNEL LOCK LEVEL AND CHANNEL B NOISE FLOOR

SPECIFICATIONS:

Reference Channel Lock Level:	-47dBm, 300kz - 3.0 MHz. -57dBm, 3.0 MHz - 2.0 GHz.
Channel B Noise Floor:	-87dBm, 300kHz - 2.0GHz.

DESCRIPTION:

In this procedure, Channel B is terminated in 50 ohms and the minimum signal amplitude (appropriate to the frequency), is applied to the reference channel (Channel A). The channel should then be locked onto this signal.

The noise floor is defined with the minimum signal applied to Channel A while Channel B is terminated in 50 ohms.

EQUIPMENT:

Instrument	Critical Specification		Recommended Model
Signal Source	Frequency Range Amplitude	0.3 - 2000MHz 1mV	HP 8642B
50 Ohm Termination			HP 909C
N(m) - N(m) Cable			HP 11500A

PROCEDURE:

1. Configure the test equipment as in Figure 4-2.

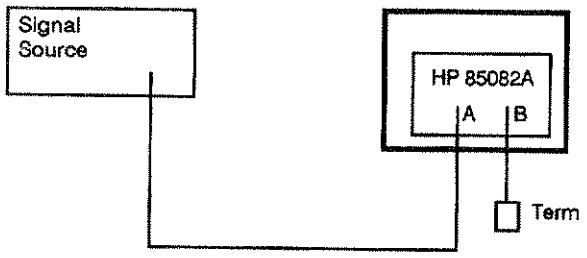


Figure 4-2. Test Setup for Reference Channel Lock Level and Channel B Noise Floor

2. Signal source setup:

Frequency:	300 kHz
Amplitude:	-47dBm

3.

HP 8508A setup	HP 70138A setup	Function
[PRESET]	[I-P]	Instrument preset
[B]	[Mag/Ph Measure] [DISPLAY 2] [B]	'A' voltage in DISPLAY 1 'B' voltage in DISPLAY 2
[POWER MEAS]	[Format Functn] [dB]	Display readings in dBm.
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration.

4. Disconnect and reconnect Channel A and check that Channel A relocks (indicated by a reading on DISPLAY 1).

5. Note the noise floor readings and enter them in the Performance Test Record (which is located at the end of the Performance Tests section.)

6. Repeat this procedure for each frequency defined in the Performance Test Record. At each point, check that Channel A is locked and note the Channel B noise floor level, as appropriate, at the different points.

Should the results in any particular range fall outwith the specification limits, the test should be repeated with the instrument locked in the appropriate frequency range.

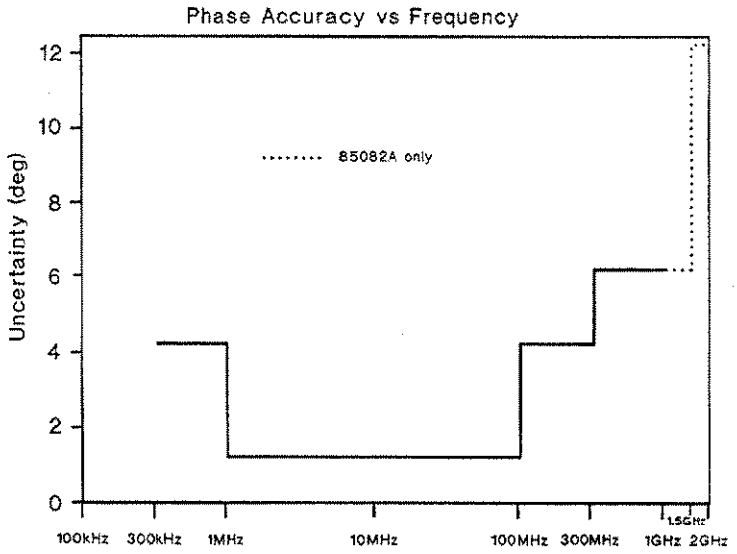
The instrument can be locked into a particular frequency range as follows:

HP 8508A	HP 70138A
[LOCK RANGE]	[Lock Range] [*required frequency range*]
[SHIFT] [VIEW RANGE] "up"/"down" keys to select frequency range	
[LOCK RANGE]	[Lock Range] [AUTO LOCK]

Note: The frequency points in the Performance Test Record are a minimum requirement as they have been selected to coincide with the Specification needs and frequency ranges of the instrument.

4-9 PHASE ACCURACY vs FREQUENCY

SPECIFICATIONS:



DESCRIPTION:

In this test, the Phase Uncertainty is tested through the frequency range of the instrument, from 300kHz to 2GHz, at a reference level of 100mV and zero phase difference between the channel inputs.

The test looks at the phase difference in the phase tracking of the two channels.

EQUIPMENT:

Instrument	**Critical Specification**		**Recommended Model**
Signal Source	Frequency Range	0.3 - 2000MHz	HP 8642B
	Amplitude	200 mV	
Power Divider			HP 11636A
50 Ohm Termination			HP 909C
Phase Matched Cables			HP 11851B

PROCEDURE:

1. Configure the equipment as shown in Figure 4-3, connecting the probe divider outputs to the HP 85082A inputs with the phase matched cables.

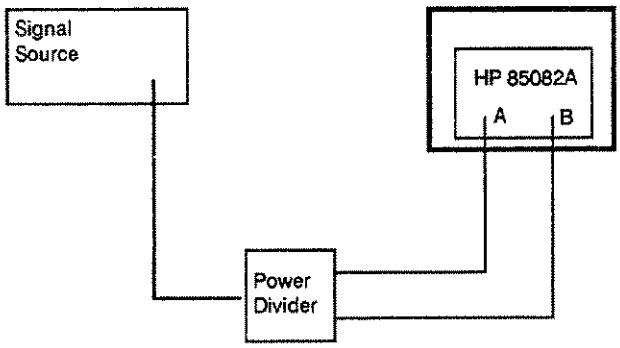


Figure 4-3. Phase Accuracy vs Frequency Test Setup

2. Signal source setup:

Frequency:	1.0 MHz
Amplitude:	200mV (to produce a nominal output level of 100mV at the ouput of the power divider).

3:	HP 8508A setup	HP 70138A Setup	Function
	[PRESET]	[I-P]	Instrument preset
	[B-A PHASE]	[Mag/Ph Measure] [DISPLAY 2] [B-A PHASE]	'A' voltage in DISPLAY 1 Phase in DISPLAY 2
	[LOCK RANGE] [SHIFT] [VIEW RANGE] "up"/"down" keys to select 1-3MHz	[Lock Range] [1.0-3.0MHz]	Set frequency range.
	[LOCK RANGE]	[Lock Range] [AUTO LOCK]	Unlock frequency range.
	[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration

4. With the source output level maintained, at 200mV, vary the frequency in the sequence shown in the Performance Test Record and record the phase reading at each step. The Performance Test Record is located at the end of the Performance Test section.

NOTE: For this measurement, it is critical that the differences in electrical path lengths and phase tracking of the power divider are removed from the measurement to minimize phase measurement errors. For any frequency point that may be outwith the specification limits, this source of error should be balanced out by using manual frequency range selection in conjunction with the following notes.

a) Repeat the measurement as previously detailed and make a note of the phase lag or lead.

b) Press [LOCK RANGE] on the HP 8508A, or [Lock Range] [AUTO LOCK] on the HP 70138A, to ensure that the instrument stays on the same range for both measurements.

c) Interchange the two cables at the input of the HP 85082A, without disturbing the rest of the test setup.

d) Make a note of this new value of phase lag or lead.

e) These two measurements should be summed and the result divided by two. This result is the phase error due to the HP 85082A. The rest is due to phase unbalance.

e) Repeat this process for any frequency noted as being out of specification.

4-10 PHASE OFFSET ACCURACY

SPECIFICATIONS:

Non-linearity of phase from 0 degrees is ±0.4 degrees.

DESCRIPTION:

In this test, the channels are set up for a nominal level of 100mV, at a frequency of 1.0MHz. The phase between the two channels is then varied.

EQUIPMENT:

Instrument	Critical Specification	Recommended Model
Signal Source	Dual Channel Synthesizer Frequency Range dc-13 MHz Amplitude 100mV	HP 3326A
Phase Matched Cables		HP 11850B
Adaptor N(f) to BNC (m) (2)		HP 1250-0077

PROCEDURE:

1. Configure the equipment as shown in Figure 4-4.

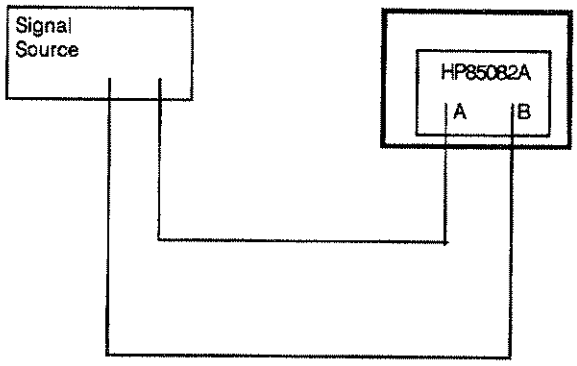


Figure 4-4. Phase Offset Accuracy Setup

2. Signal source Setup:

Frequency:	1.0 MHz on both channels.
Amplitude:	100mV rms on both Channels.
Phase Offset:	Zero.

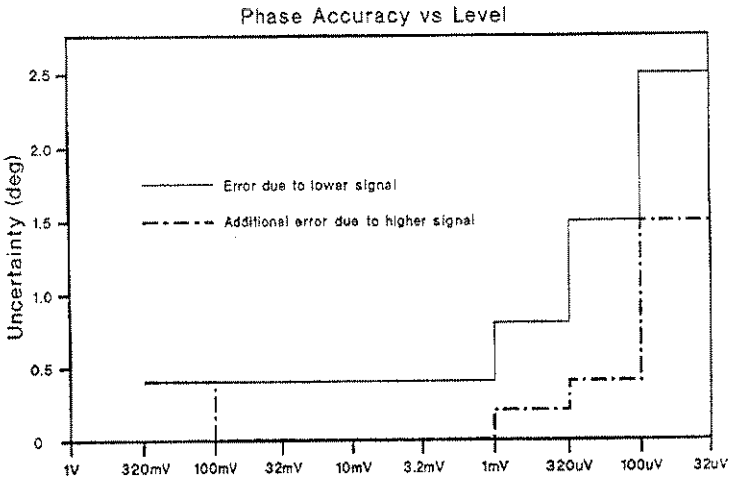
3.

HP 8508A Setup	HP 70138A Setup	Function
[PRESET]	[I-P]	Instrument preset
[B-A PHASE]	[Mag/Ph Measure] [DISPLAY 2] [B-A PHASE]	Amplitude in DISPLAY 1 Phase in DISPLAY 2
[LOCK RANGE] [SHIFT] [VIEW RANGE] "up"/"down" arrow keys to select 1-3MHz	[Lock Range] [1.0-3.0MHz]	Set frequency range.
[LOCK RANGE]	[Lock Range] [AUTO LOCK]	Unlock frequency range.
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration
[SHIFT] [SAVE REF]	[Ref] [SAVE REF]	Normalize system

4. With the frequency and level unchanged, vary the signal source phase offset between the channels as defined in the Performance Test Record and note the instrument reading at each step. The Performance Test Record is located at the end of the Performance Test section.

4-11 PHASE ACCURACY vs LEVEL

SPECIFICATIONS:



DESCRIPTION:

This test is a measure of the instrument's ability to measure phase as the signal level is varied. This is a function of the IF performance. This test can be repeated for other frequencies as required.

EQUIPMENT:

Instrument	**Critical Specification**		**Recommended Model**
Signal Source	Frequency Range	0.3 - 13MHz	HP 3326A
	Amplitude	19dBm	
Power Divider	dc - 4 GHz		HP 11636A
	Ins Loss	6 dB	
	O/P Tracking	< = 0.4 dB	
	Phase Tracking	2deg or better	
Attenuator (2)	0-110 dB in 10 dB steps		HP 8496A/G Opt 890*
Attenuator Driver	Required for HP 8496G		HP 11713A**
Phase Matched Cables			HP 11851B

*Calibration required.

NOTE: The construction of the HP 8496 attenuator series is such that the change in electrical length (phase response) as attenuator sections are switched in and out is substantially less than the HP 85082A specifications. This may not be the case if different attenuators are substituted.

** Required if HP 8496G programmable attenuator is used.

PROCEDURE:

1. Configure the Test Equipment as shown in Figure 4-5.

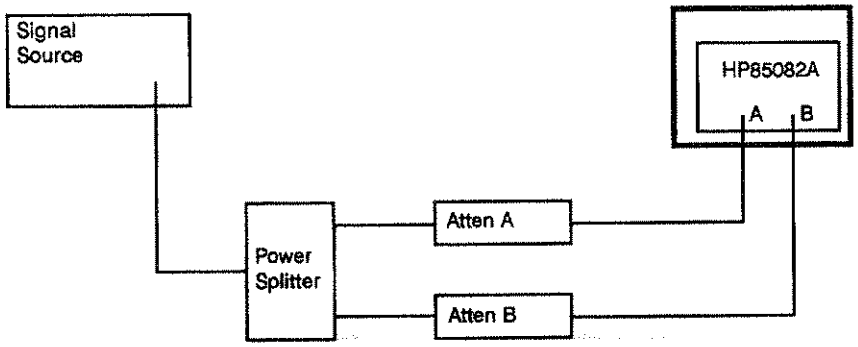


Figure 4-5. Phase Accuracy vs Level Test Setup

2. Set both attenuators to 20 dB.

3. Signal source setup:

Frequency:	1 MHz
Amplitude:	+19dBm

4.

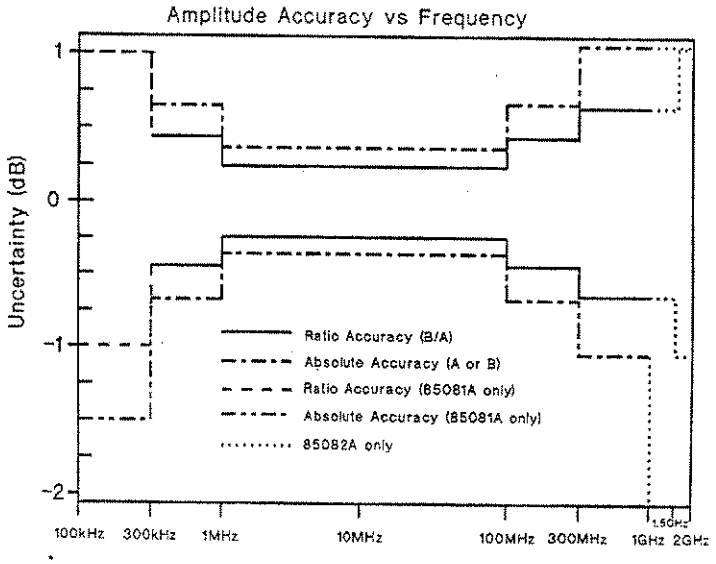
HP 8508A setup	HP 70138A Setup	Function
[PRESET]	[I-P]	Instrument preset
[B-A PHASE]	[Mag/Ph Measure] [DISPLAY 2] [B-A PHASE]	Amplitude in DISPLAY 1 Phase in DISPLAY 2
[LOCK RANGE] [SHIFT] [VIEW RANGE] "up"/"down" arrow keys to select 1-3MHz	[Lock Range] [1.0-3.0MHz]	Select frequency range
[LOCK RANGE]	[Lock Range] [AUTO LOCK]	Unlock frequency range.
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration
[SHIFT] [SAVE REF]	[Ref] [SAVE REF]	Normalize system

5. Note the Phase reading in DISPLAY 2 and record this in the Performance Test Table which is located at the end of the Performance Tests section.

6. Repeat this process for the attenuator settings defined in the Performance Test Record and note the phase reading at each step.

4-12 AMPLITUDE ACCURACY vs FREQUENCY

SPECIFICATION:



DESCRIPTION:

The voltage amplitude accuracy is measured with the channel input level set to -7.00dBm ±0.1dBm at each frequency point being checked.

The signal level is checked with the power meter. Care must be taken to ensure that the power meter calibration factor is corrected for the frequency being used.

To allow measurement of Channel B, a power splitter is used to divide the signal and provide a lock reference to Channel A.

EQUIPMENT:

Instrument	Critical Specification		Recommended Model
Signal source	Frequency Range Ampliude	300kHz to 2GHz 200mV	HP 8642B
Power Divider			HP 11636A
Phase Matched Cables			HP 11851B
RF Power Meter	Accuracy Power Ref NBS Traceable.	±0.02dB 50MHz 1.00mW	HP 436A/HP 438A
Power Sensor			HP 8482A
Adaptor N(f)-N(f)			HP 1250-1472

PROCEDURE:

1. Configure the equipment as shown in Figure 4-6 step (a), with the power meter connected to port 2 of the power splitter and Channel B of the HP 85082A connected to port 3 of the power splitter.

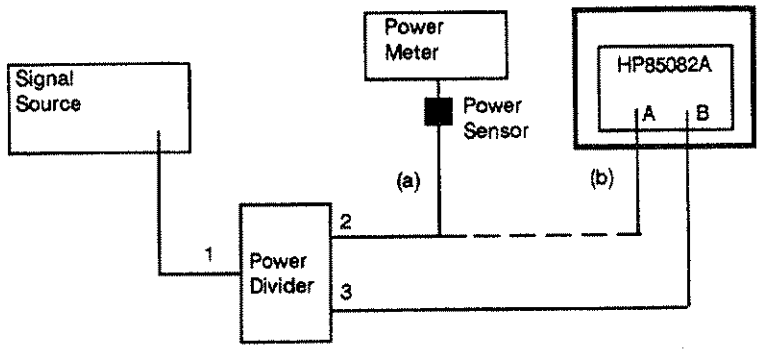


Figure 4-6. Voltage Accuracy Equipment Setup

2. Signal source setup:

FREQUENCY: 1.0 MHz.
AMPLITUDE: -1 dBm. To produce a power meter reading of -7.0 dBm, ±0.1dB.

3. Record the power meter reading in the Performance Tests Results table at the rear of this section.

4. Reconfigure the equipment as shown in Figure 4-6 step (b), with Channel A of the HP 85082A connected to port 2 of the power splitter.

5.	HP 8508A setup	HP 70138A setup	Function
	[PRESET]	[I-P]	Instrument preset
	[B]	[Mag/Ph Measure] [DISPLAY 2] [B]	'A' voltage in DISPLAY 1. 'B' voltage in DISPLAY 2.
	[POWER MEAS] [DISPLAY] dB	[Format Functn] [dB]	dBm display
	[LOCK RANGE] [SHIFT] [VIEW RANGE] "up"/"down" arrow keys to select 1-3MHz	[Lock Range] [1.0-3.0MHz]	Set frequency range.
	[SHIFT] [CAL]	[Misc] [CAL]	Self calibration

6. Record the DISPLAY 1 reading in the Performance Tests Results table.

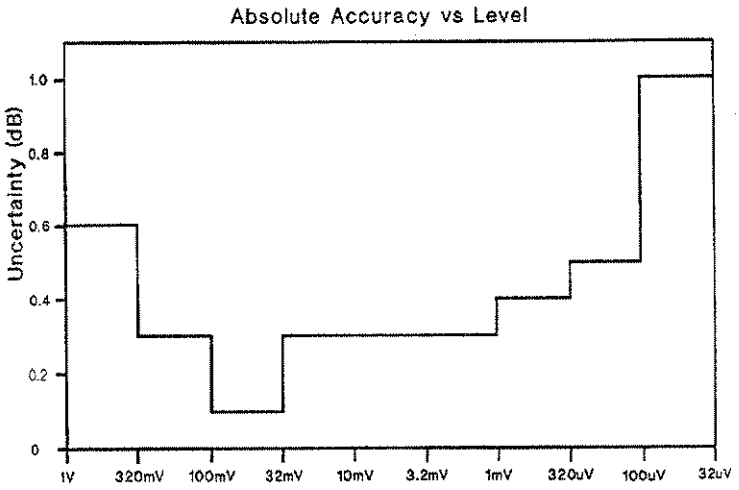
7. Interchange the connections at the Channel A and B inputs of the HP 85082A and record the value of the reading in DISPLAY 2 in the Performance Tests Results table.

8. Repeat the entire test for each frequency point required.

NOTE: Ensure that you set the power meter calibration factors to the value appropriate to the frequency being used.

4-13 AMPLITUDE ACCURACY vs INPUT LEVEL (and rear panel output check)

SPECIFICATIONS:



DESCRIPTION:

The amplitude accuracy is tested by applying known signal levels and comparing these with the results displayed by the Vector Voltmeter.

Rear panel ouput signals are checked for a nominal sensitivity of 1mV per display count.

EQUIPMENT:

Instrument	Critical Specification	Recommended Model
Signal Source	Dual Channel (+13dBm per channel)	HP 3326A
Attenuator (2)	0 to 110dB in 10dB steps	HP 8496A/G Opt890*
Attenuator Driver	Required for HP 8496G	HP 11713A **
Phase Matched Cables		HP 11851B
Adaptor N(m)-BNC(m)		HP 1250-0082
Power Meter	Accuracy ±0.02dB Ref Output 50MHz, 0.0dBm Traceable to NBS	HP 436A/HP 438A
Power Sensor		HP 8482A
DVM		HP 3456A

* Calibration data required.

** Required if HP 8496G programmable attenuator is used.

PROCEDURE:

1. Configure the equipment as shown in Figure 4-7.

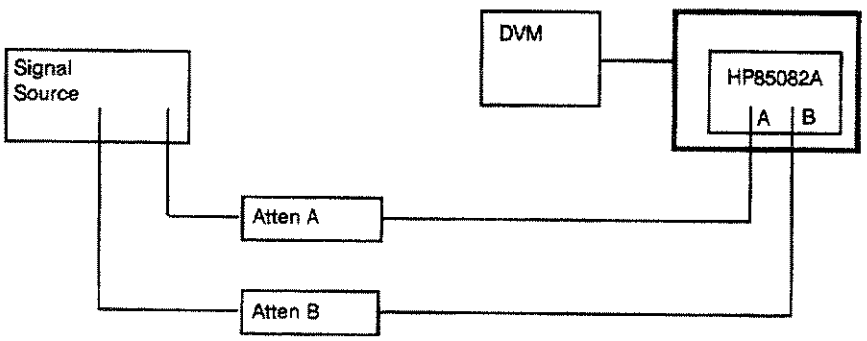


Figure 4-7. Amplitude Accuracy vs Input Level (and rear panel output check) Test Setup

2. Set both attenuators to 20dB.

3. Set both channels of the signal source as follows:

Frequency:	10MHz
Amplitude:	+13dBm

4. Measure the signal source output level with the power meter to verify an output level of +13dBm ±0.1dBm on each channel. Adjust the source ouput level as necessary to achieve this result.

5.

HP 8508A setup	HP 70138A setup	Function
[PRESET]	[I-P]	Instrument preset
[B] [POWER MEAS] [DISPLAY] dB	[Mag/Ph Measure] [Format Functn] [dB]	Set up for dBm in both displays.
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration
[SHIFT] [SAVE REF]	[Ref] [SAVE REF]	Normalize system

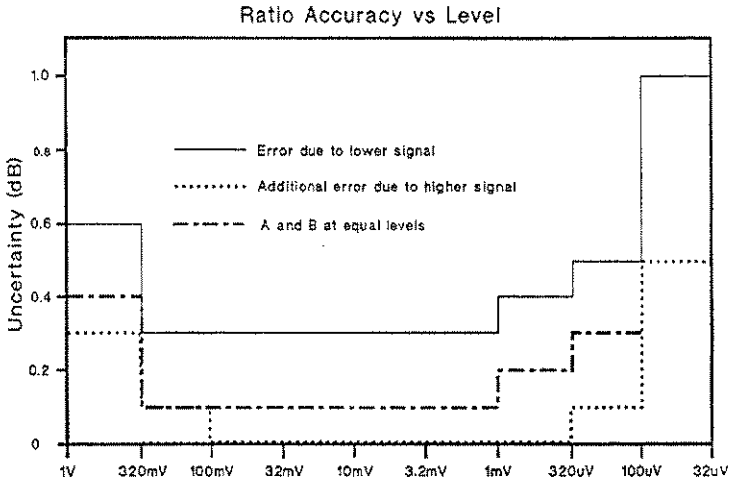
6. Vary the attenuator settings as shown in the Performance Test Table and note the channel readings at each step. Check that these are within the permitted tolerance.

Note the value of the appropriate rear panel output. This has a nominal sensitivity of 1mV per display count.

7. Repeat step 6 for Channel B.

4-14 VOLTAGE RATIO ACCURACY vs LEVEL

SPECIFICATIONS:



DESCRIPTION:

The voltage ratio accuracy is tested by applying known signal levels and comparing these with the results displayed by the Vector Voltmeter.

EQUIPMENT:

Instrument	Critical Specification	Recommended Model
Signal Source	Dual Channel (+13dBm per channel)	HP 3326A
Attenuator (2)	0 to 110dB in 10dB steps	HP 8496A/G Opt890*
Attenuator Driver	Required for HP 8496G	HP 11713A **
Phase Matched Cables		HP 11851B
Adaptor N(m)-BNC(m)		HP 1250-0082
Power Meter	Accuracy ±0.02dB Ref Output 50MHz, 0.0dBm Traceable to NBS	HP 436A/HP 438A
Power Sensor		HP 8482A
DVM		HP 3456A

* Calibration data required.

** Required if HP 8496G programmable attenuator is used.

PROCEDURE:

1. Configure the equipment as shown in Figure 4-8.

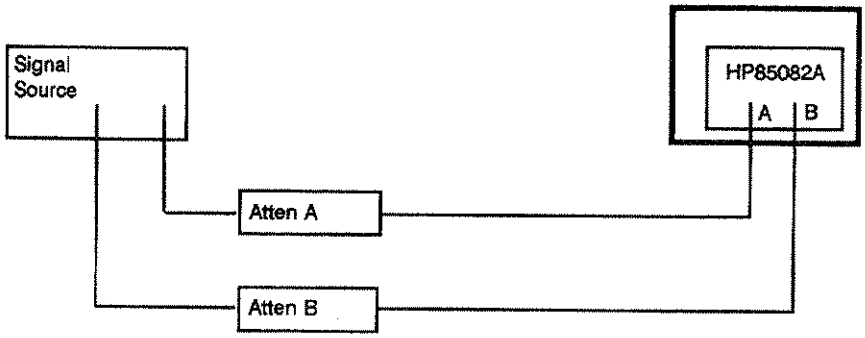


Figure 4-8. Voltage Ratio Accuracy vs Level Test Setup

2. Set both attenuators to 20dB.

3. Set both channels of the signal source as follows:

Frequency:	1.0MHz
Amplitude:	+13dBm

4. Measure the signal source output level with the power meter to verify an output level of +13dBm ±0.1dBm. Adjust the level as necessary to achieve this result.

5.

HP 8508A setup	HP 70138A setup	Function
[PRESET]	**[I-P]**	Instrument preset
[B/A MAG] [DISPLAY] dB	[Mag/Ph Measure] [B/A MAG] [Format Functn] [dB]	B/A ratio measurement, in dB, in DISPLAY 1.
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Self calibration

6. Enter the corrected attenuator figures in the Performance Test Record (which is contained at the end of the Performance Tests section).

7. Vary the attenuator settings as shown in the Performance Test Table and note the channel readings at each step.

8. Calculate the actual errors and check for compliance with the instrument specification.

4-15 SWR MEASUREMENT

SPECIFICATIONS:

SWR <1.2	300kHz to 1.5GHz	(Return loss = -21dB)
SWR <1.9	1.5GHz to 2.0GHz	(Return loss = -14dB)

DESCRIPTION:

The SWR of each input is measured over the operating frequency range of 300kHz to 2GHz.

EQUIPMENT:

Instrument	Critical Specification	Recommended Model
Network Analyzer		HP 8753A
S Parameter Test Set		HP 85046A
Cables (N)m-(N)m (2)		HP 11500A

PROCEDURE:

1. Connect the equipment as shown in Figure 4-9.

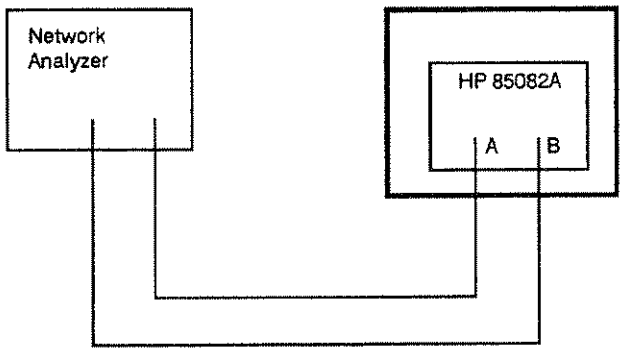


Figure 4-9. SWR Measurement Setup

2. Set up the Network Analyzer for SWR measurement.

3. Measure the SWR over the frequency range 300kHz to 2GHz and record the results in the Performance Test Record (which is contained at the end of the Performance Tests section).

Table 4-2. Performance Test Record (1 of 9)

Paragraph 4-7

ISOLATION BETWEEN CHANNELS (INPUT CROSSTALK)			
Frequency Range (MHz)	Frequency (MHz)	Isolation (dB in A)	Specification
1.0-3.0	1.0	_____	> -100 dB
3.0-5.0	4.0	_____	> -100 dB
5.0-8.0	6.5	_____	> -100 dB
8.0-15.0	11.5	_____	> -100 dB
15.0-25.0	20.0	_____	> -100 dB
25.0-50.0	35.0	_____	> -100 dB
50.0-80.0	65.0	_____	> -100 dB
80.0-150.0	100.0	_____	> -100 dB
150.0-250.0	200.0	_____	> -100 dB
250.0-500.0	400.0	_____	> -100 dB
500.0-1000.0	750.0	_____	> -80 dB
500.0-1000.0	1000.0	_____	> -80 dB
1000.0-2000.0	1200.0	_____	> -70 dB
1000.0-2000.0	1500.0	_____	> -70 dB
1000.0-2000.0	2000.0	_____	> -70 dB

Table 4-3. Performance Test Record (2 of 9)

Paragraph 4-8

REFERENCE CHANNEL LOCK LEVEL AND CHANNEL B NOISE FLOOR					
Frequency Range (MHz)	Frequency (MHz)	Channel A Input Level (dBm)	Lock OK?	Noise Floor Measured	Maximum
0.2-0.6	0.3	-47.0	___	_____	-87 dBm
0.6-1.0	0.8	-47.0	___	_____	-87 dBm
1.0-3.0	1.0	-47.0	___	_____	-87 dBm
3.0-5.0	4.0	-57.0	___	_____	-87 dBm
5.0-8.0	6.5	-57.0	___	_____	-87 dBm
8.0-15.0	11.5	-57.0	___	_____	-87 dBm
15.0-25.0	20.0	-57.0	___	_____	-87 dBm
25.0-50.0	35.0	-57.0	___	_____	-87 dBm
50.0-80.0	50.0	-57.0	___	_____	-87 dBm
50.0-80.0	65.0	-57.0	___	_____	-87 dBm
80.0-150.0	115.0	-57.0	___	_____	-87 dBm
150.0-250.0	200.0	-57.0	___	_____	-87 dBm
250.0-500.0	400.0	-57.0	___	_____	-87 dBm
500.0-1000.0	750.0	-57.0	___	_____	-87 dBm
500.0-1000.0	1000.0	-57.0	___	_____	-87 dBm
1000.0-2000.0	1200.0	-57.0	___	_____	-87 dBm
1000.0-2000.0	1500.0	-57.0	___	_____	-87 dBm
1000.0-2000.0	2000.0	-57.0	___	_____	-87 dBm

Table 4-4. Performance Test Record (3 of 9)

Paragraph 4-9

PHASE ACCURACY vs FREQUENCY at Reference Level			
Frequency Range (MHz)	Frequency (MHz)	Phase Reading (DISPLAY 2)	Tolerance
0.2-0.6	0.3	_____	± 4.2 Deg
0.6-1.0	0.8	_____	± 4.2 Deg
1.0-3.0	1.0	_____	± 1.2 Deg
3.0-5.0	4.0	_____	± 1.2 Deg
5.0-8.0	6.5	_____	± 1.2 Deg
8.0-15.0	11.5	_____	± 1.2 Deg
15.0-25.0	20.0	_____	± 1.2 Deg
25.0-50.0	35.0	_____	± 1.2 Deg
50.0-80.0	50.0	_____	± 1.2 Deg
50.0-80.0	65.0	_____	± 1.2 Deg
80.0-150.0	115.0	_____	± 4.2 Deg
150.0-250.0	200.0	_____	± 4.2 Deg
250.0-500.0	400.0	_____	± 6.2 Deg
500.0-1000.0	750.0	_____	± 6.2 Deg
500.0-1000.0	1000.0	_____	± 6.2 Deg
1000.0-2000.0	1200.0	_____	± 6.2 Deg
1000.0-2000.0	1500.0	_____	± 6.2 Deg
1000.0-2000.0	2000.0	_____	± 12.2 Deg

Table 4-5. Performance Test Record (4 of 9)

Paragraph 4-10

PHASE OFFSET ACCURACY			
Signal Source Phase Offset (Deg)	Vector Voltmeter Phase Reading (DISPLAY 2)	Display Error	Tolerance (Degrees)
+ 180	_____	_____	±0.4
+ 150	_____	_____	±0.4
+ 120	_____	_____	±0.4
+ 90	_____	_____	±0.4
+ 30	_____	_____	±0.4
000	_____	_____	±0.00
- 30	_____	_____	±0.4
- 90	_____	_____	±0.4
- 120	_____	_____	±0.4
- 150	_____	_____	±0.4
- 180	_____	_____	±0.4

Table 4-6. Performance Test Record (5 of 9)

Paragraph 4-11

PHASE ACCURACY vs SIGNAL LEVEL					
Attenuator A Setting	Attenuator B Setting	Channel A Input Level	Channel B Input Level	Phase Reading	Tolerance (Degrees)
20 dB	20 dB	100mV	100mV	_____	0
20 dB	10 dB	100mV	320mV	_____	±0.4
20 dB	30 dB	100mV	32mV	_____	±0.4
20 dB	40 dB	100mV	10mV	_____	±0.4
20 dB	50 dB	100mV	3.2mV	_____	±0.4
20 dB	60 dB	100mV	1.0mV	_____	±0.4
20 dB	70 dB	100mV	320uV	_____	±0.8
10dB	20dB	320mV	100mV	_____	±0.4
30dB	20dB	32mV	100mV	_____	±0.4
40dB	20dB	10mV	100mV	_____	±0.4
50dB	20dB	3.2mV	100mV	_____	±0.4
60dB	20dB	1.0mV	100mV	_____	±0.4
70dB	20dB	320uV	100mV	_____	±0.8

Table 4-7. Performance Test Record (6 of 9)

Paragraph 4-12

AMPLITUDE ACCURACY vs FREQUENCY						
Frequency (MHz)	Power Meter Reading (M) (dBm)	Display Reading 1	Display Reading 2	Errors Channel A (M-1)	Errors Channel B (M-2)	Limits
0.300	_____	_____	_____	_____	_____	±0.65
1.000	_____	_____	_____	_____	_____	±0.35
10.000	_____	_____	_____	_____	_____	±0.35
50.000	_____	_____	_____	_____	_____	±0.35
100.000	_____	_____	_____	_____	_____	±0.35
300.000	_____	_____	_____	_____	_____	±0.65
700.000	_____	_____	_____	_____	_____	±1.0
1000.000	_____	_____	_____	_____	_____	±1.0
1500.000	_____	_____	_____	_____	_____	+1.20
		_____	_____	_____	_____	-2.00
2000.00	_____	_____	_____	_____	_____	+1.20
		_____	_____	_____	_____	-2.0

Table 4-8. Performance Test Record (7 of 9)

Paragraph 4-13

AMPLITUDE ACCURACY - CHANNEL A (Source Output +13dBm, ±0.1dBm)						
Attenuator A Setting	Attenuator 'A' Cal Data (A)*	Channel A Input Level (L) = (13-A)	Display 1 Reading (D)	Measurement Error (E) = (L-D)	Limits	Rear Panel Output 1
20dB	_____	_____	_____	_____	±0.0	_____
10dB	_____	_____	_____	_____	±0.3	_____
0dB	_____	_____	_____	_____	±0.6	_____
30dB	_____	_____	_____	_____	±0.1	_____
40dB	_____	_____	_____	_____	±0.3	_____
50dB	_____	_____	_____	_____	±0.3	_____
60dB	_____	_____	_____	_____	±0.3	_____
70dB	_____	_____	_____	_____	±0.4	_____

* Data from Calibration Certificate.

AMPLITUDE ACCURACY - CHANNEL B (Source Output +13dBm, ±0.1dBm)						
Attenuator B Setting	Attenuator 'B' Cal Data (B)*	Channel B Input Level (L) = (13-B)	Display 2 Reading (D)	Measurement Error (E) = (L-D)	Limits	Rear Panel Output 2
20dB	_____	_____	_____	_____	±0.0	_____
10dB	_____	_____	_____	_____	±0.3	_____
0dB	_____	_____	_____	_____	±0.6	_____
30dB	_____	_____	_____	_____	±0.1	_____
40dB	_____	_____	_____	_____	±0.3	_____
50dB	_____	_____	_____	_____	±0.3	_____
60dB	_____	_____	_____	_____	±0.3	_____
70dB	_____	_____	_____	_____	±0.4	_____
80dB	_____	_____	_____	_____	±0.5	_____
90dB	_____	_____	_____	_____	±1.0	_____

* Data from Calibration Certificate.

Table 4-9. Performance Test Record (8 of 9)

Paragraph 4-14

VOLTAGE RATIO ACCURACY vs LEVEL (for Level A = Level B up to 300MHz)								
Nominal I/P Level	Atten A Setting (dB)	Atten B Setting (dB)	Atten A Actual * A	Atten B Actual * B	(B-A) Actual (R)	Display Reading (D)	Error (D-R)	Spec (dB)
100mV	20	20	____	____	____	____	____	±0.1
320mV	10	10	____	____	____	____	____	±0.1
1000mV	0	0	____	____	____	____	____	±0.6
32mV	30	30	____	____	____	____	____	±0.1
10mV	40	40	____	____	____	____	____	±0.1
3.2mV	50	50	____	____	____	____	____	±0.1
1.0mV	60	60	____	____	____	____	____	±0.1
320uV	70	70	____	____	____	____	____	±0.2

* Data from Calibration Certificate.

B/A RATIO ACCURACY vs LEVEL (where A and B vary)								
Nominal I/P Level A B	Atten A Setting (dB)	Atten B Setting (dB)	Atten A Actual * A	Atten B Actual * B	(B-A) Actual (R)	Display Reading (D)	Error (D-R)	Spec (dB)
100mV	100mV	20	20	____	____	____	____	±0.1
100mV	32mV	20	30	____	____	____	____	±0.3
100mV	10mV	20	40	____	____	____	____	±0.3
100mV	3.2mV	20	50	____	____	____	____	±0.3
100mV	1.0mV	20	60	____	____	____	____	±0.3
100mV	320uV	20	70	____	____	____	____	±0.4
100mV	100uV	20	80	____	____	____	____	±0.5
100mV	32uV	20	90	____	____	____	____	±1.0
100mV	320mV	20	10	____	____	____	____	±0.6
100mV	1000mV	20	0	____	____	____	____	±0.6

* Data from Calibration Certificate.

Table 4-10. Performance Test Record (9 of 9)

Paragraph 4-15

SWR MEASUREMENT		
Frequency Range	Measured SWR	Specification
300kHz - 1.5GHz	_____	< 1.2
1.5GHz - 2.0GHz	_____	< 1.5

Adjustments

Section 5

5-1 INTRODUCTION

This section describes the adjustment procedures required to enable the HP 8508A Vector Voltmeter mainframe or the HP 70138A MMS Vector Voltmeter module with the HP 85082A 50 ohm Input Module to meet the specifications listed in Table 1-2 of this manual. Adjustments should only be made after determining that the instrument is out of calibration or if a repair has been carried out.

5-2 WARM-UP TIME

The HP 8508A or HP 70138A Vector Voltmeter with HP 85082A must be switched on for a minimum of 30 minutes before carrying out any adjustments. This allows the instrument to reach a stable operating temperature.

5-3 SAFETY CONSIDERATIONS

WARNING

PROCEDURES DESCRIBED IN THIS SECTION ARE PERFORMED WITH THE MAINFRAME PROTECTIVE COVERS REMOVED AND POWER SUPPLIED TO THE INSTRUMENT. SERVICING SHOULD ONLY BE PERFORMED BY TRAINED PERSONNEL WHO ARE AWARE OF THE HAZARDS INVOLVED.

Anti-Static Precautions

The printed circuit board contained in this instrument has components and devices which are susceptible to damage by electrostatic discharge (ESD). To minimize the risks of damaging or decreasing the reliability of the instrument, the following procedures and cautions should be observed when servicing the instrument.

Static-free Workstation

All servicing should be carried out at a static-free workstation whenever practical.

De-soldering

When de-soldering components, ensure that the soldering iron is grounded. Always use a metalized solder remover.

Anti-Static Freezer Spray

When attempting to locate a temperature related fault, use only an approved anti-static freezer spray.

Anti-Static Products

Table 5-1 contains details of anti-static products which are available from Hewlett-Packard.

Table 5-1. Anti-Static Products

Product	HP Part Number
Anti-static workstation kit	9300-0792
Metalized Solder Remover	8690-0227
Wrist-strap and cord	9300-0970

5-4 EQUIPMENT REQUIRED

All adjustment procedures contain a list of required test equipment. The test equipment is also identified by callouts in the test setup diagrams, where included. If substitutions must be made for the specified test equipment, refer to the Recommended Test Equipment table in the HP 8508A Vector Voltmeter mainframe manual or the HP 70138A MMS Vector Voltmeter module manual for the minimum specifications. It is important that the test equipment meet the critical specifications listed in the table if the Vector Voltmeter and the 50 ohm Input Module are to meet their performance requirements.

Note: Use a non-metalic tool whenever possible (HP Part Number 8830-0024).

When performing the adjustments to an HP 85082A which is contained in an HP 70138A MMS Vector Voltmeter, a module extender (HP Part Number 08508-60032) is required. Access to the delay adjustment can then be made from the underside of the HP 85082A.

5-5 POST REPAIR ADJUSTMENTS

In the event of a module repair, it will be necessary to carry out all the adjustments as listed in Table 5-2.

5-6 RELATED ADJUSTMENTS

Several of the HP 85082A adjustments are interdependent and isolated adjustments should not be attempted. Because of their interactive nature, the adjustments for SRD Bias, Channel Bias, and Delay should be checked at least twice.

5-7 ADJUSTABLE COMPONENTS

Table 5-2 lists all adjustable components in the HP 85082A 50 ohm Input Module.

Table 5-2. Adjustable Components

Reference Designator	Adjustment Name	Adjustment Paragraph
A6R32	SRD Bias	5-8
A6R15/R115	Channel A and B Bias	5-8
A6DD 01	Delay Line	5-8
A6R10/R110	Channel A and B Symmetry	5-9
A6R3/R103	Channel A and B Gain	5-10
A6R38	LF Phase	5-11

5- 8 Set up the SRD Bias, Channel A and B Bias, and the Delay Line Adjustments

DESCRIPTION

The bias level of the SRD is adjusted for a maximum reading in the UHF amplitude response. The Channel Bias is set for optimum flatness of the high frequency amplitude, and the Delay Line is adjusted to compensate for the differences in electrical length within the HP 85082A.

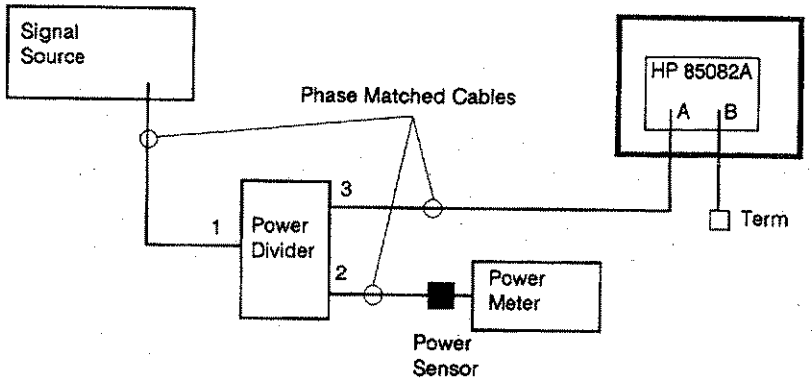


Figure 5-1. SRD Bias Adjust Setup

EQUIPMENT

Instrument	Recommended Model
Signal Source	HP 8642B
Power Divider	HP 11636A
Power Meter	HP 436A/437A/438A
Power Sensor	HP 8482A
Phase Matched Cables	HP 11851B
50ohm Termination	HP 909C
Adaptor N(f)-N(f)	HP 1250-0777

PROCEDURE

This procedure is in three interdependent parts. Perform all three parts in sequence at least twice to ensure correct adjustment.

A. SRD Bias Adjustment

1. Configure the equipment as shown in Figure 5-1.

2. Switch on the equipment and allow to warm up for 30 minutes.

3. On the signal generator:

Frequency	390kHz
Level	-1.0dBm. Adjust for a power meter reading of -7.0dBm ±0.1dBm.

4.

HP 8508A Setup	HP 70138A Setup	Function:
[PRESET]	[I-P]	DISPLAY 1 reads Channel A.

5. Adjust A6R32 to obtain a maximum reading on DISPLAY 1.
   NOTE: Adjustment of A6R32 changes the calibration settings for the entire HP 85082A.

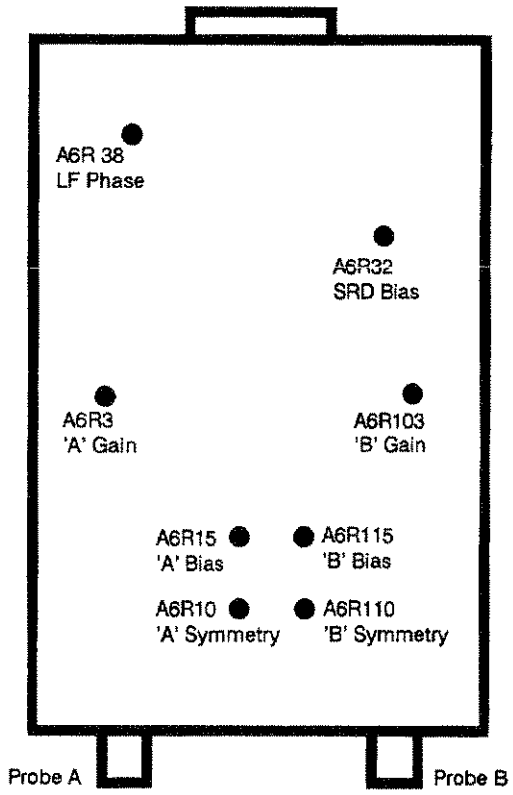


Figure 5-2. Input Module Adjustment Locations

B. Channels A and B Bias Adjustment (Amplitude vs Frequency)

DESCRIPTION

The bias level is adjusted for optimum flatness of the high frequency amplitude.

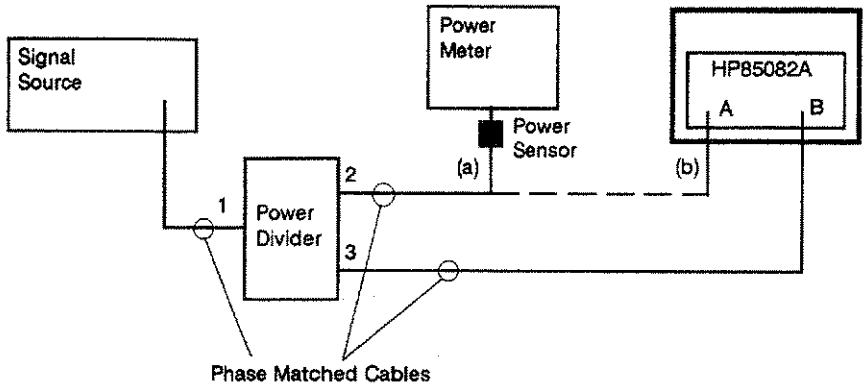


Figure 5-3 . Bias Adjustment Setup

PROCEDURE

1. Configure the equipment as shown in Figure 5-3 step (a). Connect the power meter to port 2 of the power divider and Channel B of the HP 85082A to port 3, using the phase matched cables.

2. On the signal generator:

Frequency	50MHz
Level	-1.0dBm. Adjust for a power meter reading of -7.0dBm ±0.1dBm.

3. Normalize the power meter reading. The power meter should now read "0".

4. Reconfigure the equipment as shown in Figure 5-3 step (b). Connecting Channel A of the HP 85082A to port 2 of the power divider and Channel B of the HP 85082A to port 3, using the phase matched cables.

5.	HP 8508A Setup	HP 70138A Setup	Function
	[PRESET]	**[I-P]**	Preset status
	[B]	[Mag/Ph Measure] [DISPLAY 2] [B]	
	[POWER MEAS] [DISPLAY] **dB**	[Format Functn] [dB]	
	[SHIFT] [SAVE REF]	[Ref] [SAVE REF]	Normalize displays

6. Reconfigure the equipment as in Figure 5-3 step (a).

7. Readjust the signal generator as follows, and change the power meter calibration factor to accommodate the change of frequency.

Frequency	1.5GHz
Output level	Adjust for a power meter reading of "0".

8. Reconfigure the equipment as shown in Figure 5-3 step (b).

9. Adjust A6R15 (Channel A Bias adjustment) for a reading of 0.6dB in DISPLAY 1.

The process is now repeated for the Channel B adjustment.

10. Reconfigure the equipment as shown in Figure 5-3 step (a).

11. Readjust the signal generator as follows, and change the power meter calibration factor to accommodate the change of frequency.

Frequency	50MHz
Output level	Adjust for a power meter reading of "0".

12. Reconfigure the equipment as shown in Figure 5-3 step (b).

13.

HP 8508A Setup	HP 70138A Setup	Function
[PRESET]	[I-P]	Preset status
[B]	[Mag/Ph Measure] [DISPLAY 2] [B]	
[POWER MEAS] [DISPLAY] dB	[Format Functn] [dB]	
[SHIFT] [SAVE REF]	[Ref] [SAVE REF]	Normalize Displays

14. Reconfigure the equipment as shown in Figure 5-3 step (a).

15. Readjust the signal generator as follows, and change the power meter calibration factor to accommodate the change of frequency.

Frequency	1.5GHz
Output level	Adjust for a power meter reading of "0".

16. Reconfigure the equipment as shown in Figure 5-3 step (b).

17. Adjust A6R115 (Channel B Bias adjustment) for a reading of 0.6dB in DISPLAY 2.

18. Cancel the normalization of the power meter.

C. DELAY LINE Adjustment (Phase vs Frequency)

DESCRIPTION

This adjustment compensates for the differences in electrical length of the probes and cables.

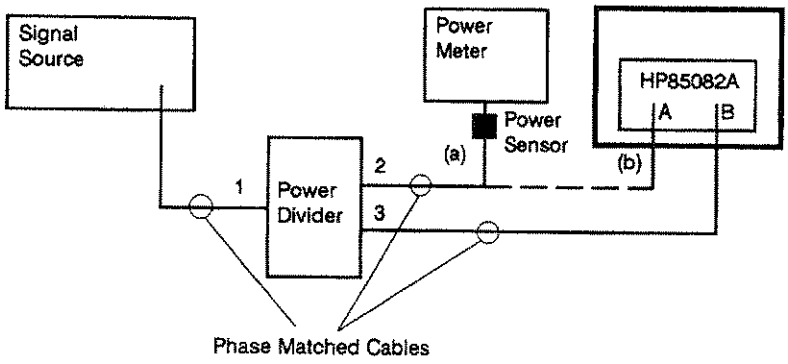


Figure 5-4. Delay Line Adjust Setup

PROCEDURE

1. Configure the equipment as shown in Figure 5-4 step (a). Connect the power meter to port 2 of the power divider and Channel B of the HP 85082A to port 3, using the phase matched cables.

2. On the signal generator:

Frequency	50 MHz
Output level	-1.0dBm

3. Adjust the signal generator output level to produce a power meter reading of -7.00dBm ±0.1dBm.

4. Normalize the power meter reading which should now read "0".

5. Reconfigure the equipment as shown in Figure 5-4 step (b). Connecting Channel A of the HP 85082A to port 2 of the power divider and Channel B of the HP 85082A to port 3, using the phase matched cables.

6.

HP 8508A Setup	HP 70138A Setup	Function
[PRESET]	[I-P]	Preset Status
[B-A PHASE]	[Mag/Ph Measure] [DISPLAY 2] [B-A PHASE]	DISPLAY 1 - Magnitude DISPLAY 2 - Phase
[SHIFT] [CAL TEST]	[Misc] [CAL]	Instrument Calibration
[SHIFT] [SAVE REF]	[Ref] [SAVE REF]	Normalizes Instrument

7. Reconfigure the equipment as shown in Figure 5-4 step (a).

8. Readjust the signal generator as follows and change the power meter calibration factor to accommodate the change of frequency.

Frequency	1.5GHz
Signal level	Adjust for a power meter reading of "0".

9. Disconnect the power meter and reconfigure the equipment as shown in Figure 5-4 step (b).

10. Note the phase reading in DISPLAY 2. If this is within the range ±2.0 deg, it will not be necessary to make any delay adjustment. However, if the reading is greater than ±2.0 deg, then continue with the procedure.
NOTE: Twists in the probe cables or loose cable connections could affect this reading.

11. The delay adjuster should be set to give a reading of 0 in DISPLAY 2.

The delay adjustment is on the underside of the HP 85082A and access to this is dependent upon the mainframe being used.

HP 8508A: In this case, the bottom cover should be removed from the HP 8508A Vector Voltmeter mainframe and the instrument turned onto its right side. With the HP 85082A Input Module installed in the HP 8508A, the delay adjustment can be accessed through a hole in the bottom panel of the HP 8508A.

In some early instruments, this hole may not have been provided. However, information is given in Section 7 of the HP 8508A Service Manual as to how this hole can be added.

The alternative process is to extend the HP 85082A Input Module from the HP 8508A Vector Voltmeter mainframe using a module extender (HP Part Number 08508-60032). Access to this adjustment can then be made from the underside of the HP 85082A.

HP 70138A: In this case, the HP 85082A Input Module should be used with the module extender (HP Part Number 08508-60032). Access to the delay adjustment can then be made from the underside of the HP 85082A.

12. Interchange the connections at the input of the HP 85082A and note the phase reading obtained in DISPLAY 2.

13. The delay adjuster should now be adjusted for a reading equivalent to half the value obtained in step 12.

14. Cancel the normalization of the power meter.

NOTE: After completing this adjustment, repeat the SRD Bias, Channel Bias, and Delay adjustments at least once more until the results are stable. When the results are stable, you can continue with the other adjustment procedures.

5-9 Set up the SYMMETRY Adjustment for Channels A and B

DESCRIPTION

Minimizes the residual signal at the sampler inputs.

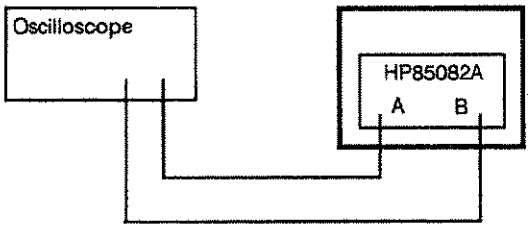


Figure 5- 5. Symmetry Adjust Setup

EQUIPMENT

Instrument	Recommended Model
Oscilloscope 275MHz	HP 54100D
Phase Matched Cables	HP 11851B
Adaptors N(f)-BNC(m)	HP 1250-0077

PROCEDURE

1. Configure the equipment as shown in Figure 5-5.

2. Switch on the equipment and allow to warm up for 30 minutes.

3. On the oscilloscope:

Display	Alt
Sweep Speed	1us/div
Sensitivity	10uV/div
Input Coupling	50ohm
Triggering	As required.

4.	HP 8508A Setup:	HP 70138A Setup:	Function:
	[PRESET]	**[I-P]**	Instrument Preset
	[LOCK RANGE] [SHIFT] [VIEW RANGE] 'up'/'down' arrow keys to select 1000-2000MHz	[Lock Range] [1-2GHz]	Select 1-2 GHz frequency range

5. Adjust A6R10 (Channel A Symmetry) and A6R110 (Channel B Symmetry) in turn so that the sampler pulses displayed on the oscilloscope traces are symmetrical about the baseline.

The pulse leakage display is typically spikes in the order of 10mV in amplitude and they should be symmetrical about the baseline.

NOTE: If this result cannot be achieved, sampler damage is indicated.

6. Cancel the [LOCK RANGE] or [AUTO LOCK] as appropriate.

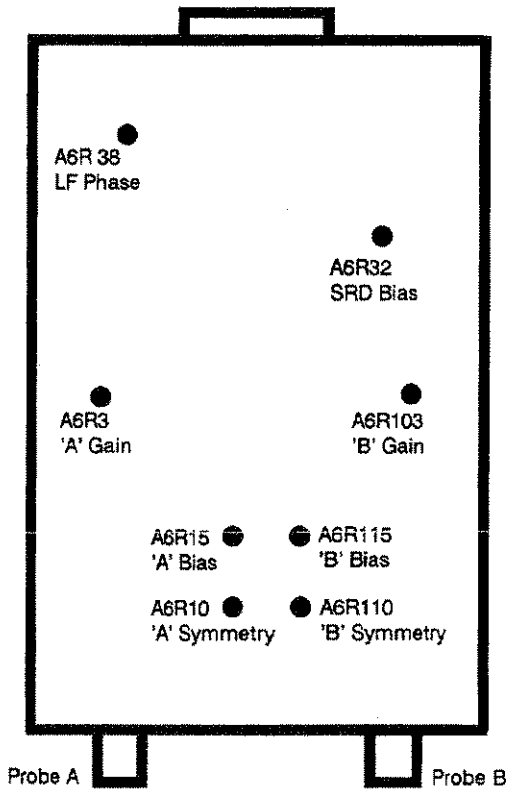


Figure 5-6. Input Module Adjustment Locations

5-10 Adjustment of the Gain of Channels A and B

DESCRIPTION

These adjustments set up the overall absolute gain of the HP 85082A Input Module. Note that this adjustment changes the gain at all frequencies.

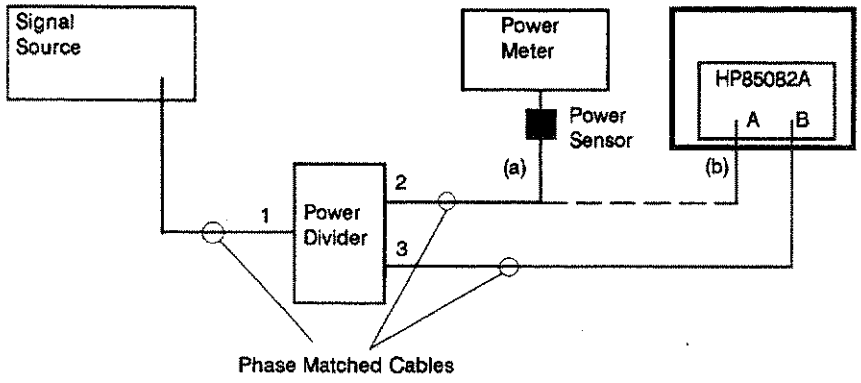


Figure 5-7. Channel Gain Setup

EQUIPMENT

Instrument	Recommended Model
Signal Source	HP 8642A
Power Divider	HP 11636A
Power Meter	HP 436A/437A/438A
Power Sensor	HP 8482A
Phase Matched Cables	HP 11851B
Adpator N(f)-N(f)	HP 1250-0777

PROCEDURE

1. Configure the equipment as shown in Figure 5-7 step (a), using the phase matched cables to connect the power divider to the signal source, power meter, and HP 85082A.

2. Switch on the equipment and allow to warm up for 30 minutes.

3. On the signal generator:

Frequency	50 MHz
Level	-1.0 dBm

4. Adjust the signal generator output as necessary for a power meter reading of -7.0dBm ±0.1dBm. Record the value of the power meter reading.

5. Interchange the cable connections so that port 2 of the power divider is connected to Channel A of the HP 85082A and port 3 is connected to the power meter. Record the value of the power meter reading.

6. Reconfigure the equipment as in Figure 5-7 step (b).

7.

HP 8508A Setup	HP 70138A Setup	Function
[PRESET]	[I-P]	Instrument preset
[POWER MEAS] [DISPLAY] **dB**	[Mag/Ph Measure] [DISPLAY 2] [B] [Format Functn] [dB]	dBm magnitude in both displays
[SHIFT] [CAL/TEST]	[Misc] [CAL]	Instrument calibration

8. Adjust A6R3 (Channel A Gain) until the reading in DISPLAY 1 is the same as the power meter reading obtained in step 4.

9. Adjust A6R103 (Channel B Gain) until the reading in DISPLAY 2 is the same as the power meter reading obtained in step 5.

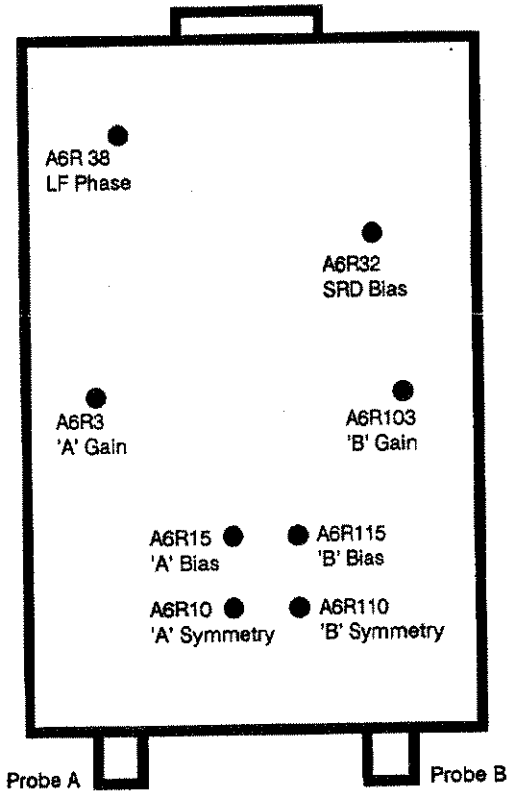


Figure 5-8. Input Module Adjustment Locations

5-11 Set up the Module Phase and Impedance

DESCRIPTION

This adjustment is controlled by an internal test routine which will affect the phase readings at all frequencies.

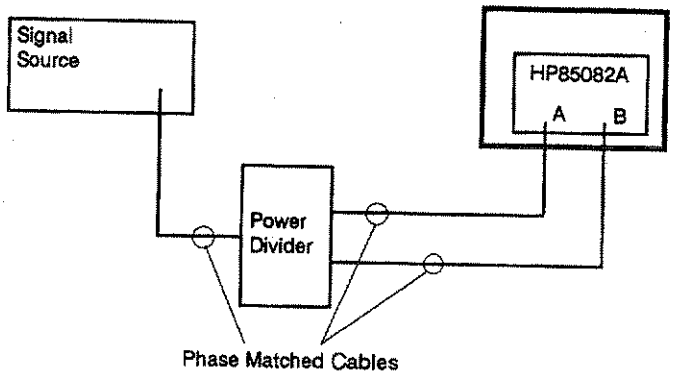


Figure 5-9. LF Phase Adjust Setup

EQUIPMENT

Instrument	Recommended Model
Signal Source	HP 8642B
Power Divider	HP 11636A
Phase Matched Cables	HP 11851B

PROCEDURE

1. Configure the equipment as shown in Figure 5-9.

2. Switch on the equipment and allow to warm up for 30 minutes.

3. On the signal generator

Frequency	50 MHz
Level	200mV

4.	HP 8508A Setup	HP 70138A Setup	Function
	[PRESET]	[I-P]	Instrument preset
	[SHIFT] [POWER MEAS]	[MISC] [7] [0] [1] [3] [8] [MISC] [SELF TEST MENU]	Instrument into self-test setup mode.
	'up'/'down' keys for test "6"	'up'/'down' keys for test "6"	Setup code for test 6.
	[HOLD VALUE] check that indicator is on	[Misc] [TEST ON]	Runs test.

5. **HP 8508A:** DISPLAY 1 should show the characters 50 (this is the identification for the HP 85082A 50ohm Input Module). If other characters are displayed, adjust A6R38 until the display shows the characters 50 in DISPLAY 1.

HP 70138A: At the right hand of the MMS screen, the lower display should show the characters 50 (this is the identification for the HP 85082A 50ohm Input Module). If other characters are displayed, adjust A6R38 until the characters 50 appears.

6. **HP 8508A:** Adjust A6R38 for a reading of 0.0 in DISPLAY 2, and 50 in DISPLAY 1. Select [HOLD VALUE] to cancel the test.

HP 70138A: Adjust A6R38 for a reading of 0.0 in the upper display at the right-hand side of the MMS screen, and a reading of 50 in the lower display. Select [Misc] [TEST OFF].

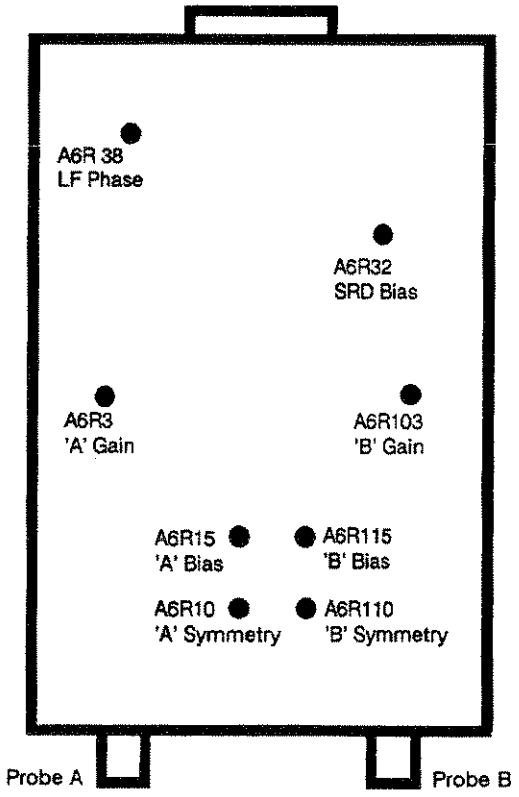


Figure 5-10. Input Module Adjustment Locations

Replaceable Parts

Section 6

6-1 INTRODUCTION

This section contains information for ordering parts. Table 6-2 lists the abbreviations used in the parts list and throughout the manual. Table 6-3 lists all replaceable parts in reference designator order and Table 6-4 lists the names and addresses that correspond to the manufacturer's code number used in the parts list.

6-2 ABBREVIATIONS

Table 6-2 lists all the abbreviations used in the parts lists and throughout the manual. In some cases, two forms of an abbreviation are given, one in all capital letters and the other in partial or no capital letters. This is because the abbreviations used in the parts list are always all capitals; however, in other parts of the manual, abbreviations are used in partial or no capital letters.

6-3 REPLACEABLE PARTS LIST

Table 6-3 is organized as follows:

(a) Electrical assemblies and their components in alpha-numeric order followed by reference designation.
(b) Chassis-mounted parts in alpha-numeric order by reference designation.
(c) Miscellaneous parts.

The information given for each part consists of the following:

(a) The Hewlett-Packard part number.
(b) Part number check digit (CD).
(c) The total quantity (QTY) in the instrument.
(d) The description of the part.
(e) A typical manufacturer of the part (in a five-digit code).
(f) The manufacturer's part number for that part.

The total quantity for each part is given only once - at the first appearance of the part in the list.

6-4 ORDERING INFORMATION

To order a part listed in the replaceable parts list table, quote the Hewlett-Packard part number (with the check digit), indicate the quantity required, and address the order to the nearest Hewlett-Packard office. The check digit will ensure accurate and timely processing of your order.

To order a part that is not listed in the Replaceable Parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

6-5 DIRECT MAIL ORDER SYSTEM

Within the USA, Hewlett-Packard can supply parts through a direct mail order system. Advantages of using the system are as follows:

(a) Direct ordering and shipment from the HP Parts Centre in Roseville, California.

(b) No maximum or minimum order value on any mail order (there is a minimum order amount for parts ordered through a local HP office when the orders require billing and invoicing).

(c) Prepaid transportation (there is a small handling charge for each order).

(d) No invoices - to provide these advantages, a cheque or money order must accompany each order.

Mail order forms and specific ordering information are available through your local HP office. Addresses and phone numbers are located at the back of this manual.

Table 6-1. Reference Designations

REFERENCE DESIGNATIONS

A ..... assembly
AT ..... attenuator; isolator; termination
B ..... fan; motor
BT ..... battery
C ..... capacitor
CP ..... coupler
CR ..... diode; diode thyristor; varactor
DC ..... directional coupler
DL ..... delay line
DS ..... annunciator; signaling device (audible or visual); lamp; LED
E ..... miscellaneous electrical part
F ..... fuse
FL ..... filter
H ..... hardware
HY ..... circulator
J ..... electrical connector (stationary portion); jack
K ..... relay
L ..... coil; inductor
M ..... meter
MP ..... miscellaneous mechanical part
P ..... electrical connector (movable portion); plug
Q ..... transistor; SCR; triode thyristor; FET
R ..... resistor
RT ..... thermistor
S ..... switch
T ..... transformer
TB ..... terminal board
TC ..... thermocouple
TP ..... test point
U ..... integrated circuit; microcircuit
V ..... electron tube
VR ..... voltage regulator; breakdown diode
W ..... cable; transmission path; wire
X ..... socket
Y ..... crystal unit (piezoelectric or quartz)
Z ..... tuned cavity; tuned circuit

Table 6-2. Abbreviations (1 of 2)

ABBREVIATIONS

A ..... ampere
ac ..... alternating current
ACCESS ..... accessory
ADJ ..... adjustment
A/D ..... analog-to-digital
AF ..... audio frequency
AFC ..... automatic frequency control
AGC ..... automatic gain control
AL ..... aluminum
ALC ..... automatic level control
AM ..... amplitude modulation
AMPL ..... amplifier
APC ..... automatic phase control
ASSY ..... assembly
AUX ..... auxiliary
avg ..... average
AWG ..... American wire gauge
BAL ..... balance
BCD ..... binary coded decimal
BD ..... board
BECU ..... beryllium copper
BFO ..... beat frequency oscillator
BH ..... binder head
BKDN ..... breakdown
BP ..... bandpass
BPF ..... bandpass filter
BRS ..... brass
BWO ..... backware-wave oscillator
CAL ..... calibrate
ccw ..... counter-clockwise
CER ..... ceramic
CHAN ..... channel
cm ..... centimeter
CMO ..... cabinet mount only
COAX ..... coaxial
COEF ..... coefficient
COM ..... common
COMP ..... composition
COMPL ..... complete
CONN ..... connector
CP ..... cadmium plate
CRT ..... cathode-ray tube
CTL ..... complementary transistor logic
CW ..... continuous wave
cw ..... clockwise
cm ..... centimeter
D/A ..... digital-to-analog
dB ..... decibel
dBm ..... decibel referred to 1 mW
dc ..... direct current
deg ..... degree (temperature interval or difference)
...° ..... degree (plane angle)
°C ..... degree Celsius (centigrade)
°F ..... degree Fahrenheit
°K ..... degree Kelvin
DEPC ..... deposited carbon
DET ..... detector
diam ..... diameter
DIA ..... diameter (used in parts list)
DIFF AMPL ..... differential amplifier
div ..... division
DPDT ..... double-pole, double-throw
DR ..... drive
DSB ..... double sideband
DTL ..... diode transistor logic
DVM ..... digital voltmeter
ECL ..... emitter coupled logic
EMF ..... electromotive force
EDP ..... electronic data processing
ELECT ..... electrolytic
ENCAP ..... encapsulated
EXT ..... external
F ..... farad
FET ..... field-effect transistor
F/F ..... flip-flop
FH ..... flat head
FIL H ..... fillister head
FM ..... frequency modulation
FP ..... front panel
FREQ ..... frequency
FXD ..... fixed
g ..... gram
GE ..... germanium
GHz ..... gigahertz
GL ..... glass
GRD ..... ground(ed)
H ..... henry
h ..... hour
HET ..... heterodyne
HEX ..... hexagonal
HD ..... head
HDW ..... hardware
HF ..... high frequency
HG ..... mercury
HI ..... high
HP ..... Hewlett-Packard
HPF ..... high pass filter
HR ..... hour (used in parts list)
HV ..... high voltage
Hz ..... Hertz
IC ..... integrated circuit
ID ..... inside diameter
IF ..... intermediate frequency
IMPG ..... impregnated
in ..... incandescent
INCL ..... include(s)
INP ..... input
INS ..... insulation
INT ..... internal
kg ..... kilogram
kHz ..... kilohertz
k ..... kilohm
kV ..... kilovolt
lb ..... pound
LC ..... inductance-capacitance
LED ..... light-emitting diode
LF ..... low frequency
LG ..... long
LH ..... left hand
LIM ..... limit
LIN ..... linear taper (used in parts list)
LK WASH ..... lock washer
LO ..... low; local oscillator
LOG ..... logarithmic taper (used in parts list)
log ..... logarithm(ic)
LPF ..... low pass filter
LV ..... low voltage
m ..... meter (distance)
mA ..... milliampere
MAX ..... maximum
M ..... megohm
MEG ..... meg (10^6) (used in parts list)
MET FLM ..... metal film
MET OX ..... metallic oxide
MF ..... medium frequency; microfarad (used in parts list)
MFR ..... manufacturer
mg ..... milligram
MHz ..... megahertz
mH ..... millihenry
mho ..... mho
min ..... minute (time)
... . minute (plane angle)
MINAT ..... miniature
mm ..... millimeter

NOTE

All abbreviations in the parts list will be in upper-case.

Table 6-2. Abbreviations (2 of 2)

MOD ..... modulator
MOM ..... momentary
MOS ..... metal-oxide semiconductor
ms ..... millisecond
MTG ..... mounting
MTR ..... meter (indicating device)
mV ..... millivolt
mVac ..... millivolt, ac
mVdc ..... millivolt, dc
mVpk ..... millivolt, peak
mVp-p ..... millivolt, peak-to-peak
mVrms ..... millivolt, rms
mW ..... milliwatt
MUX ..... multiplex
MY ..... mylar
µA ..... microampere
µF ..... microfarad
µH ..... microhenry
µmho ..... micromho
µs ..... microsecond
µV ..... microvolt
µVac ..... microvolt, ac
µVdc ..... microvolt, dc
µVpk ..... microvolt, peak
µVp-p ..... microvolt, peak-to-peak
µVrms ..... microvolt, rms
µW ..... microwatt
nA ..... nanoampere
NC ..... no connection
N/C ..... normally closed
NE ..... neon
NEG ..... negative
nF ..... nanofarad
NI PL ..... nickel plate
N/O ..... normally open
NOM ..... nominal
NORM ..... normal
NPN ..... negative-positive-negative
NPO ..... negative-positive zero (zero temperature coefficient)
NRFR ..... not recommended for field replacement
NSR ..... not separately replaceable
ns ..... nanosecond
nW ..... nanowatt
OBD ..... order by description
OD ..... outside diameter
OH ..... oval head
OP AMPL ..... operational amplifier
OPT ..... option
OSC ..... oscillator
OX ..... oxide
oz ..... ounce
Ω ..... ohm
P ..... peak (used in parts list)
PAM ..... pulse-amplitude modulation
PC ..... printed circuit
PCM ..... pulse-code modulation; pulse-count modulation
PDM ..... pulse-duration modulation
pF ..... picofarad
PH BRZ ..... phosphor bronze
PHL ..... Phillips
PIN ..... positive-intrinsic-negative
PIV ..... peak inverse voltage
pk ..... peak
PL ..... phase lock
PLO ..... phase lock oscillator
PM ..... phase modulation
PNP ..... positive-negative-positive
P/O ..... part of
POLY ..... polystyrene
PORC ..... porcelain
POS ..... positive; position(s) (used in parts list)
POSN ..... position
POT ..... potentiometer
p-p ..... peak-to-peak
PP ..... peak-to-peak (used in parts list)
PPM ..... pulse-position modulation
PREAMPL ..... preamplifier
PRF ..... pulse-repetition frequency
PRR ..... pulse repetition rate
ps ..... picosecond
PT ..... point
PTM ..... pulse-time modulation
PWM ..... pulse-width modulation
PWV ..... peak working voltage
RC ..... resistance-capacitance
RECT ..... rectifier
REF ..... reference
REG ..... regulated
REPL ..... replaceable
RF ..... radio frequency
RFI ..... radio frequency interference
RH ... round head; right hand
RLC ..... resistance-inductance-capacitance
RMO ..... rack mount only
rms ..... root-mean-square
RND ..... round
ROM ..... read-only memory
R&P ..... rack and panel
RWV ..... reverse working voltage
S ..... scattering parameter
s ..... second (time)
... " ..... second (plane angle)
S-B ..... slow-blow (fuse) (used in parts list)
SCR ..... silicon controlled rectifier; screw
SE ..... selenium
SECT ..... sections
SEMICON ..... semiconductor
SHF ..... superhigh frequency
SI ..... silicon
SIL ..... silver
SL ..... slide
SNR ..... signal-to-noise ratio
SPDT ..... single-pole, double-throw
SPG ..... spring
SR ..... split ring
SPST ..... single-pole, single-throw
SS ..... Service Sheet
SSB ..... single sideband
SST ..... stainless steel
STL ..... steel
SQ ..... square
SWR ..... standing-wave ratio
SYNC ..... synchronize
T ..... timed (slow-blow fuse)
TA ..... tantalum
TC ..... temperature compensating
TD ..... time delay
TERM ..... terminal
TFT ..... thin-film transistor
TGL ..... toggle
THD ..... thread
THRU ..... through
TI ..... titanium
TOL ..... tolerance
TRIM ..... trimmer
TSTR ..... transistor
TTL ..... transistor-transistor logic
TV ..... television
TVI ..... television interference
TWT ..... traveling wave tube
U ..... micro (10^{-6}) (used in parts list)
UF ..... microfarad (used in parts list)
UHF ..... ultrahigh frequency
UNDEF ..... undefined
UNREG ..... unregulated
V ..... volt
VA ..... voltampere
Vac ..... volts, ac
VAR ..... variable
VCO ..... voltage-controlled oscillator
Vdc ..... volts, dc
VDCW ..... volts, dc, working (used in parts list)
V(F) ..... volts, filtered
VFO ..... variable-frequency oscillator
VHF ..... very-high frequency
Vpk ..... volts, peak
Vp-p ..... volts, peak-to-peak
Vrms ..... volts, rms
VSWR ..... voltage standing wave ratio
VTO ..... voltage-tune oscillator
VTVM ..... vacuum-tube voltmeter
V(X) ..... volts, switched
W ..... watt
W/ ..... with
WIV ..... working inverse voltage
WW ..... wirewound
W/O ..... without
YIG ..... yttrium-iron-garnet
Z_o ..... characteristic impedance

NOTE

All abbreviations in the parts list will be in upper-case.

MULTIPLIERS

Abbreviation	Prefix	Multiple
T	tera	10^{12}
G	giga	10^{9}
M	mega	10^{6}
k	kilo	10^{3}
da	deka	10
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
µ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}
a	atto	10^{-18}

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code
	85082-69100	7	1	Rebuilt 50 ohm Input Module	
	85081-20105	9	1	Rod, Module Locking	
	85081-20107	1	1	Knob, Module Locking	
	0510-0070	7	2	Retainer, Crsnt.Ext Ring Retaining	
	85082-00001	3	1	Label - Horizontal (HP 8508A System)	
	85082-00005	7	1	Label - Vertical (HP 70138A System)	

Mfr Code	Manufacturer Name	Address	Zip Code
08792	PAPST-MOTOREN KG	SCHWARZWALD GM	7742
09188	VTM A/S	GLOSTRUP DK	2080
09027	SCHUPTER AG	LUZERN SW	CH-60
50167	FUJITSU MICROELECTRONICS INC	SANTA CLARA CA US	95054
54013	HITACHI AMERICA LTD	SUNNYVALE CA US	94086
00779	AMP INC	HARRISBURG PA US	17111
01121	ALLEN-BRADLEY CO INC	EL PASO TX US	79935
01295	TEXAS INSTRUMENTS INC	DALLAS TX US	75265
02111	SPECTROL ELECTRONICS CORP	CITY OF IND CA	91745
03508	GE CO SEMICONDUCTOR PROD DEPT	AUBURN NY US	13201
03888	K D I PYROFILM CORP	WHIPPANY NJ	07981
04713	MOTOROLA INC SEMI-COND PROD	PHOENIX AZ US	85008
07263	FAIRCHILD CORP	MOUNTAIN VIEW CA US	94042
07933	RAYTHEON CO SEMICONDUCTOR DIV HQ	MOUNTAIN VIEW CA	94040
09353	C & K COMPONENTS INC	NEWTON MA US	02158
10582	CTS CORP ASHEVILLE DIV	SKYLAND NC US	28776
10899	EASTERN AIR DEVICES INC	GREAT NECK NY	11021
11236	CTS CORP BERNE DIV	BERNE IN US	46711
14433	ITT SEMICONDUCTORS DIV	TUSTIN CA US	92680
14936	GENERAL INSTRUMENT CORP (01OOE)	HICKSVILLE NY US	11802
15818	TELEDYNE SEMICONDUCTOR	MOUNTAIN VIEW CA	94043
17856	SILICONIX INC	SANTA CLARA CA	95054
18324	SIGNETICS CORP	SUNNYVALE CA US	94086
19701	MEPCO/CENTRALAB INC	WEST PALM BEACH FL US	33407
2M627	POWR CORP	IRVINE CA US	92715
24355	ANALOG DEVICES INC	NORWOOD MA US	02062
24546	CORNING ELECTRONICS	SANTA CLARA CA US	95050
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA US	95052
27167	CORNING GLASS WORKS (WILMINGTON)	WILMINGTON NC	28401
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
3L585	RCA CORP SOLID STATE DIV	SOMERVILLE NJ	
3L680	BEMAN MFG INC	ETTERS PA	17319
32293	INTERSIL INC	CUPERTINO CA CA	95014
34649	INTEL CORP	SANTA CLARA CA US	95054
51642	CENTRE ENGINEERING INC	STATE COLLEGE PA	16801
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
71468	ITT CORP CANNON ELECTRIC DIV	SANTA ANA CA US	92702
72136	ELECTRO MOTIVE CORP	FLORENCE SC	06226
73899	J F D ELECTRONICS CORP	BROOKLYN NY	11219
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
9M171	UNITRODE CORP	LEXINGTON MA US	02173
9N283	WORKSAFE INC	NEW YORK NY	10001
91637	DALE ELECTRONICS INC	EL PASO TX US	79936

Manual Changes

Section 7

7-1 INTRODUCTION

This section normally contains information for adapting this manual to instruments for which the content does not directly apply. Since this manual does directly apply to instruments having the series code listed on the title page, no change information is given here. Refer to INSTRUMENTS COVERED BY MANUAL in Section 1 for additional important information about date code and series code coverage.

Service Section 8

8-1 INTRODUCTION

The HP 85082A is not repairable to component level. Should a unit prove to be defective, it should be replaced with a rebuilt assembly (exchange unit) obtainable through your local HP Service Office.

8-2 ANTI-STATIC PRECAUTIONS

The printed circuit board of this instrument is susceptable to damage by electrostatic discharge (ESD). To minimize the risks of damaging or decreasing the reliability of the instrument, the following procedures and cautions should be observed when servicing the instrument.

Static-free Workstation
All servicing should be carried out at a static-free workstation.

De-soldering
When desoldering, ensure that the soldering iron is earthed. Always use a metalized solder remover.

Anti-static freezer spray
When attempting to locate a temperature related fault, use only an approved anti-static freezer spray.

Anti-static Products
Table 8-1 contains details of anti-static products which are available from Hewlett-Packard.

Table 8-1. Anti-Static Products

Product	HP Part No.
Anti-static workstation kit	9300-0792
Metalized Solder Remover	8690-0227
Wrist-strap and cord	9300-0970

8-3 RECOMMENDED TEST EQUIPMENT

Equipment required to troubleshoot the HP 85082A is listed in Table 1-2. Other equipment may be substituted if it meets or exceeds the critical specifications listed in the table.

8-4 TROUBLESHOOTING

GENERAL DESCRIPTION

The HP 85082A is a two-channel RF to IF convertor plug-in module with a 50ohm input impedance, that operates in the 300kHz to 2GHz frequency range. The module reconstructs two RF signals (having the same fundamental frequency) into two IF signals at a frequency of 20kHz. These re-constructed signals have the same amplitude and phase relationships of the original RF signal.

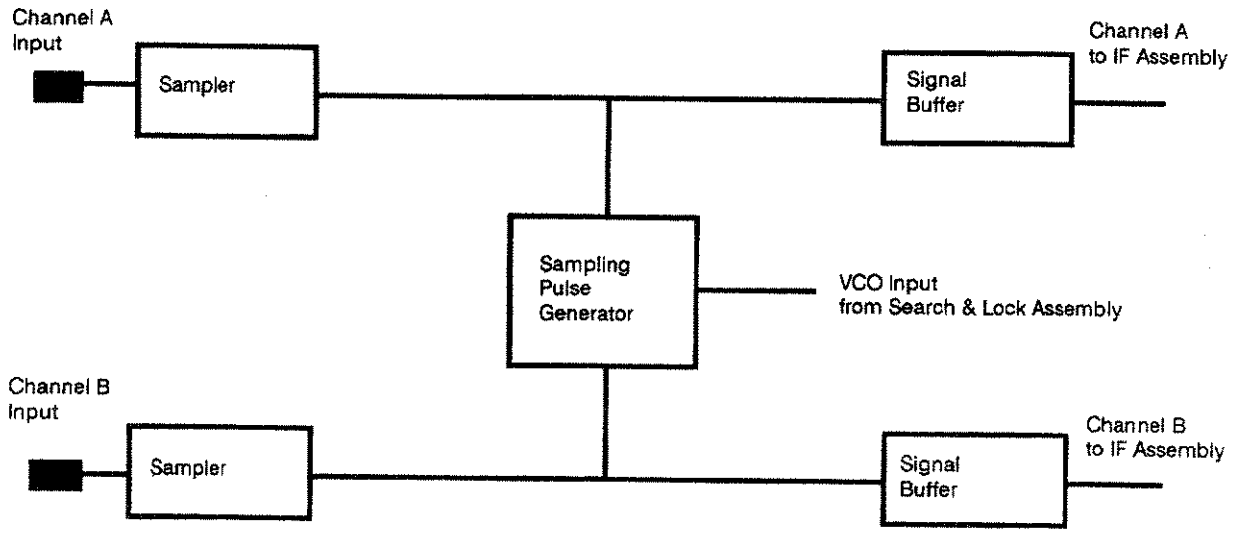


Figure 8-1. Simplified Block Diagram

The Input Module forms a dual-channel sampling system. The main elements of which are a Pulse Generator, two Sampling Bridges and two Signal Buffers.

SERVICING THE INPUT MODULE

The Input Module must be installed in either an HP 8508A mainframe or an HP 70138A MMS Vector Voltmeter before it can be tested. Should the Self Test process detect a failure in the Input Module, an appropriate Error Code in the 600 Series will be shown in DISPLAY 2 of the instrument.

TROUBLESHOOTING PROCEDURE

An HP 85082A failure will be indicated in one of two ways. Either the HP 8508A or the MMS System will display an error code in the 600 Series, or no digits will be shown in the displays.

1. Check that the HP 85082A is properly installed in the HP 8508A Vector Voltmeter mainframe or the HP 70138A MMS Vector Voltmeter Module.

2. Cycle the instrument power.

3. If a 600 Series error code persists, the HP 85082A should be replaced with a rebuilt (exchange) unit.

4. If no digits are shown on the displays, the HP 85082A adjustments should be checked with the procedures given in Section 5 of this manual.

5. If the HP 85082A adjustments are completed successfully, then this indicates that the problem is in either the HP 8508A Vector Voltmeter mainframe, or the HP 70138A MMS Vector Voltmeter module.

Failure of the HP 85082A adjustments indicates that the HP 85082A should be replaced.

The replacement module is already calibrated and no adjustments should be necessary when this is installed.

Please send directory corrections to:
Test & Measurement Catalog
Hewlett-Packard Company
3200 Hillview Avenue
Palo Alto, CA 94304
Tel: (415) 857-4706
Fax: (415) 857-3880

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Telex: 21905 HPBR BR
Cable: HEWPACK Rio de Janeiro

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Jalan Tutong
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