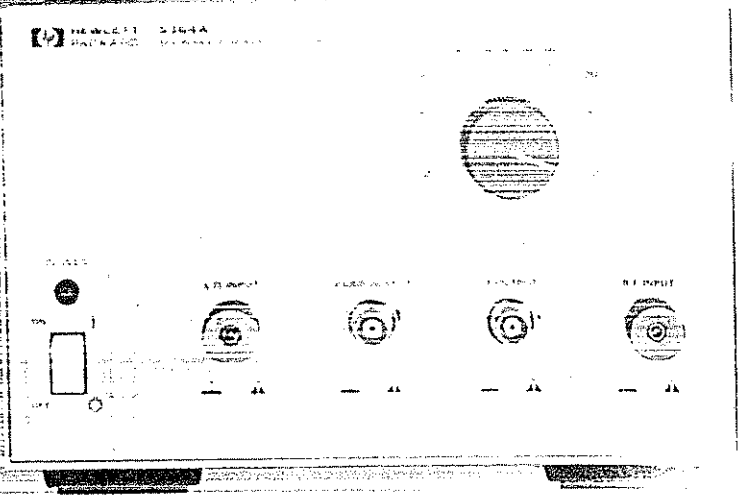
HEWLETT-PACKARD

OPERATING AND SERVICE MANUAL

5364A
Microwave Mixer/Detector



RETURN TO
INSTRUMENTATION

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 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 at the back of this manual.

OPERATING AND SERVICE MANUAL

HP 5364A
Microwave Mixer/Detector

SERIAL NUMBERS

This manual applies directly to Hewlett-Packard Model 5364A Microwave Mixer/Detectors with serial numbers prefixed 2812A.

Edition 1
E0588

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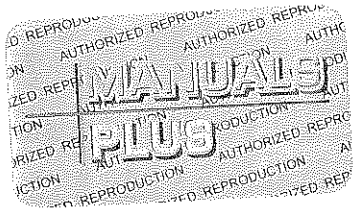

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HEWLETT
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SAFETY CONSIDERATIONS

GENERAL

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

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

BEFORE APPLYING POWER

Verify that the product is set to match the available line voltage and the correct fuse is installed. Refer to Operating Manual, Appendix B, INSTALLATION.

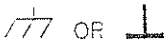
SAFETY EARTH GROUND

An uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

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.

Indicates hazardous voltages.



Indicates terminal is connected to chassis when such connection is not apparent.

Alternating current.

Direct current.

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.

The **CAUTION** sign denotes a hazard. It calls attention to an operating 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.

SAFETY INFORMATION

WARNING

Any interruption of the protective grounding conductor (inside or outside the instrument) 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.)

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

If this instrument is to be energized via an autotransformer (for voltage reduction) make sure the common terminal is connected to the earthed pole terminal (neutral) of the power source.

Instructions for adjustments while covers are removed and for servicing are for use by service-trained personnel only. To avoid dangerous electric shock, do not perform such adjustments or servicing unless qualified to do so.

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

When measuring power line signals, be extremely careful and always use a step-down isolation transformer whose output voltage is compatible with the input measurement capabilities of this product. This product's front and rear panels are typically at earth ground, so NEVER TRY TO MEASURE AC POWER LINE SIGNALS WITHOUT AN ISOLATION TRANSFORMER.

PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional pages and replacement pages to be merged into the manual by the user. Title page dates change only when a new edition or a new update is published.

Many product updates and improvements do not require manual changes and, conversely, manual corrections are sometimes independent of product changes. Therefor, there may not be a one-to-one correspondence between product updates and manual updates.

Edition 1 June 1988 05364-90001 E0588

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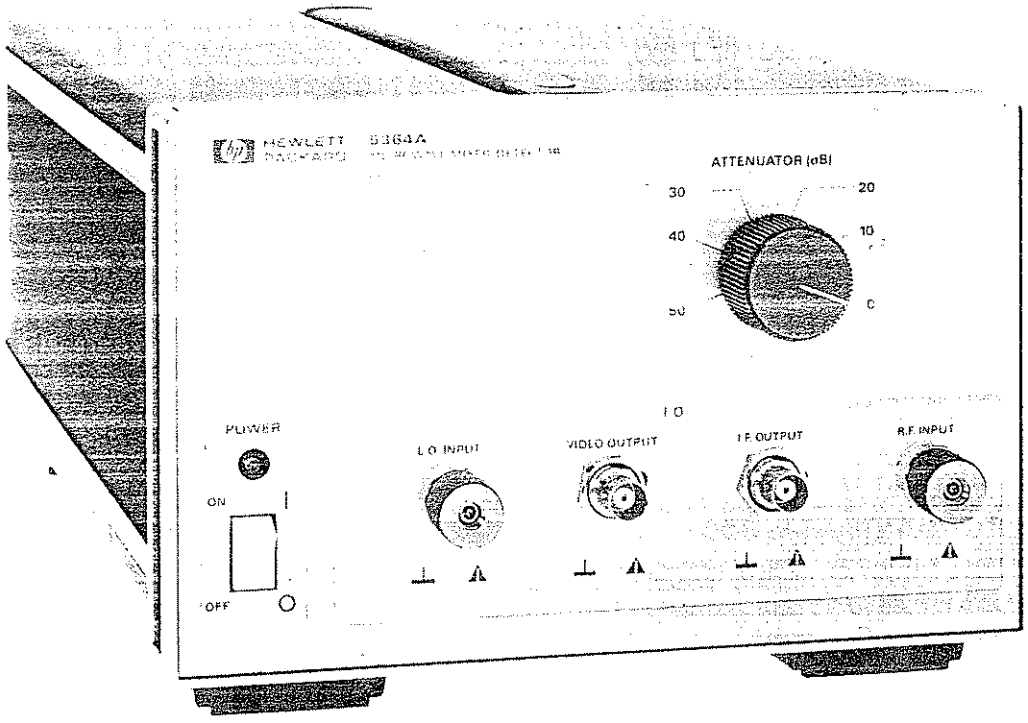
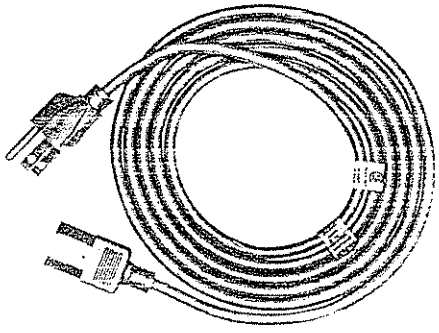


HP 5364A



LINE CORD

Figure 1-1. HP 5364A Microwave Mixer/Detector

SECTION 1
GENERAL INFORMATION

1-1. DESCRIPTION

The HP Model 5364A Microwave Mixer/Detector is a frequency downconverter consisting of a mixer, an r.f. detector, and signal-conditioning i.f. and video amplifiers.

An R.F. INPUT signal in the 2-18 GHz range is heterodyned with an L.O. INPUT from an external Local Oscillator to produce an I.F. OUTPUT signal in the 10-500 MHz range. This output can be used as an input by measuring devices that cannot directly handle a signal in the 2-18 GHz frequency range.

The I.F. is filtered to suppress Local Oscillator feedthru. The I.F. channel group delay variation is less than 1.5 ns over the output frequency range.

In addition to the I.F. channel described above, the HP 5364A contains a detector and amplifier circuit that generates a VIDEO OUTPUT signal from the R.F. INPUT signal. This signal can be used as a measurementtriggering signal.

The video detector minimum rise time is 5 ns for an R.F. INPUT signal rise time of less than 1 ns. The detector operates in the square-law region and can be used as an a.m. demodulator for repetitive or non-repetitive signals. The output signal —

- can be sent to an HP 5371A or other instruments for making pulse measurements such as —
  - PRF (pulse repetition frequency) and stagger PRF,
  - PRI (Pulse Repetition Interval) and stagger PRI,
  - Pulse width and pulse width modulation,
  - Rise time,
  - Fall time.
- can be sent to an HP 5371A to provide a sync arming signal,
- can be sent to a digitizer to obtain relative amplitude information.

The Model 5364A has no internal adjustments and does not require calibration.

Physically, the Model 5364A is a self-contained package that can be used as a bench-top or rack-mounted unit. (Rack-mounting requires use of an adapter. Hewlett-Packard offers several Rack Mount Adapter Kits for this purpose. Refer to an HP catalog or your HP Sales office for more information.)

The most-used signal connections are made via front-panel connectors. APC 3.5 connectors are used for R.F. INPUT and L.O. INPUT. BNC connectors are used for I.F. OUTPUT and VIDEO OUTPUT. HewlettPackard offers cables and adapters for use with APC 3.5 and BNC connectors; for a listing of available products, refer to the HP catalog or contact your HP sales office.

The HP Model 5364A Microwave Mixer/Detector, and the accessories supplied with it, are shown in *Figure 1-1.*

A typical measurement system in which the HP 5364A would be used is shown in *Figure 1-2.* Such a system requires items that are not supplied as part of the HP 5364A. Hewlett-Packard offers a wide variety of equipment (signal sources, analyzers, counters, etc.) that might be used in such a system. For a listing of available products, refer to the HP catalog or contact your HP sales office.

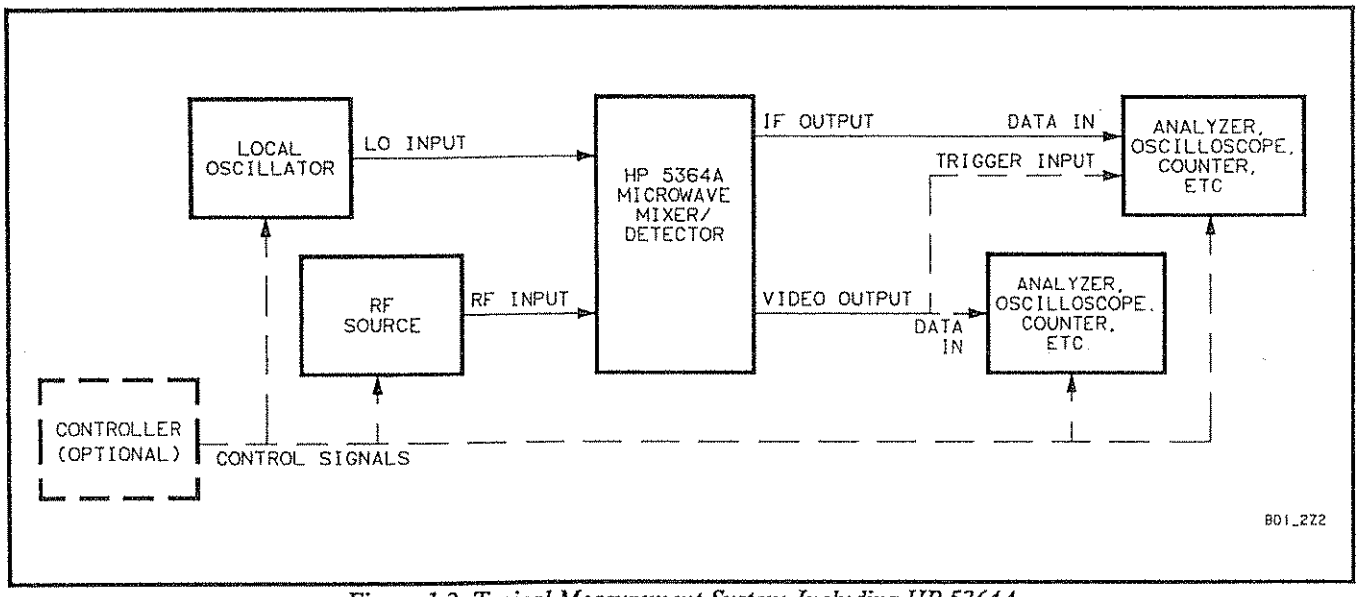


Figure 1-2. Typical Measurement System Including HP 5364A

1-2. SPECIFICATIONS AND SUPPLEMENTAL CHARACTERISTICS

Specifications for the Model 5364A Microwave Mixer/Detector are given in *Table 1-1.*

Table 1-1 also includes a listing of supplemental characteristics for the HP 5364A. Supplemental characteristics are not specifications, but are typical characteristics, included as additional information for the user.

The line power connection, line voltage selector, and line fuse are all accessible at the the rear of the unit.

Specifications describe the instrument's warranted performance. Supplemental Characteristics are intended to provide information useful in applying the instrument by giving typical, non-warranted performance parameters and descriptive material. These are denoted as "typical" or "nominal".

RF INPUT

Frequency Range: 2 to 18 GHz
Impedance: 50 ohms nominal
Maximum Level: + 28 dBm CW, + 48 dBm Pulse typical
Damage Level: + 30 dBm average, 30 dBm peak (10 μsec pulse width)
Dynamic Range: 73 dB Pulse, 53 dB CW[1]
Input Attenuator: 0 to 50 dB in 10 dB steps nominal
Connector: APC 3.5 (M)

RF TO IF ISOLATION: > 40 dB nominal

LO INPUT

Frequency Range: 2.2 to 18 GHz
Impedance: 50 ohms nominal
Input Level: +8 dBm recommended; + 20 dBm Max
Connector: APC 3.5 (M)

LO TO RF ISOLATION: > 36 dB nominal

IF OUTPUT

Frequency Range: 10 to 500 MHz
Conversion Gain: > 4.5 dB (> 7 dB Typical) 2-<12.4 GHz RF[2] > 1.5 dB (> 6 dB Typical) 12.4-18 GHz RF
Maximum Rolloff: 8 dB (4 dB Typical) 10-500 MHz 3 dB (1.5 dB Typical) 10-90 MHz
Gain Linearity -20 to -3 dBm RF: +/- 1.3 dB[3]
Compression @ -3 dBm RF: < 1 dB[3]
IF Group Delay Ripple: < 1.5 nsec 20 - 500 MHz[4] (1.0 nsec Typical)
Coupling: AC
Connector: BNC (F)

VIDEO OUTPUT

Polarity: Negative
Detection Slope: Square Law[5]
Output Level @ -12 dBm RF Input: > 50 mV p-p 2 to <10 GHz (80 mV Typical) > 10 mV p-p 10 to 18 GHz (30 mV Typical)
Deviation From Square Law - 12 dBm to + 2 dBm RF: +/- 2 dB[3] (+/- 1 dB Typical)
Compression @ + 2 dBm RF: < 1 dB[3]
Rise Time 20 to 80 % @ -10 dBm RF: < 7.5 nsec (< 5 nsec Typical)
Coupling: DC
Connector: BNC (F)

GENERAL

Power Requirements: 100,120V,220, or 240 VAC (+10%, -10%) 50-60, 400 Hz; 30 VA maximum
Weight: net 4.34 kg (9.55 lbs); shipping 6.23 kg (13.7 lbs)
Dimensions: 21.27 cm (8.375 in.)W X 13.34 cm (5.25 in.)H X 34.29 cm (13.5 in.)D
Operating Temperature: 0 to 50 degrees C

NOTES

1. For input power range of -25 dBm to +48 dBm Pulse and -25 dBm to +28 dBm CW.
2. Conversion gain at 10 MHz I.F.
3. Linearity/Compression measured at 80 MHz I.F. is the slope of the Input/Output data with 1 dB increments in the RF input power. LO power is at + 8 dBm, attenuator at 0 dB.
4. Group delay measured from the rear panel I.F. input connector to the front panel I.F. Output connector.
5. Video output changes 2 dB for each 1 dB input increment. That is, the output voltage is equal to the square of the input voltage.

1-3. SAFETY AND OTHER CONSIDERATIONS

The HP 5364A Microwave Mixer/Detector is designed to receive its power from a Safety Class I product. It is designed and tested in accordance with international safety standard IEC 348. The instrument and the manual should be inspected and reviewed for safety markings and instructions before operation. A safety summary is included on the page following the title page.

The following warnings and cautions must be followed for your protection and to avoid damage to the equipment.

WARNING

TO REDUCE THE RISK OF ELECTRIC SHOCK, BE SURE ALL ELECTRICALLY OPERATED EQUIPMENT YOU USE IS PROPERLY GROUNDED.

CAUTION

Be sure to turn electrical power off whenever you are connecting or disconnecting test equipment, installing or removing parts, etc.

1-4. RECOMMENDED TEST EQUIPMENT AND TOOLS

Table 1-2, below, lists test equipment recommended or required in order to test or troubleshoot the HP 5364A. *Table 1-3*, below, lists tools required to perform parts replacement procedures in Section 6 of this manual. The test equipment and tools are not included as part of the HP 5364A.

Table 1-2. Recommended/Required Test Equipment

EQUIPMENT NAME	REQUIRED CHARACTERISTICS	RECOM-MENDED MODEL	USE (See NOTE)
Synthesized Sweeper	CW: 2 GHz to 18 GHz Pulse Modulation: 10 GHz Power Level Range: –20 dBm to +3 dBm Sweep: 2.21 GHz to 2.7 GHz 12.41 GHz to 12.9 GHz 17.51 GHz to 18 GHz	HP 8340A	2, 5, 8
Synthesized Signal Generator	CW: 2 GHz to 18 GHz Power Level: +8 dBm	HP 8672A (or HP 8350B with HP 83592A plug-in)	2, 5, 8
Power Meter	–20 dBm to +3 dBm	HP 436A	2, 5, 8
Pulse/Function Generator	Pulse Function 500 kHz to 1 MHz 100 ns to 1 μs Width TTL Output	HP 8116A	2, 5, 8
Spectrum Analyzer	10 to 500 MHz –20 dBm to +10 dBm	HP 8566B	2, 5, 8
Oscilloscope	Capable of displaying a 500 kHz square wave having a 50% duty cycle.	HP 54111A	2, 5, 8
Network Analyzer	20 MHz to 500 MHz	HP 8753A with HP 85046A (or HP 8510A with HP 8515A)	5a

NOTE:

2 = Operational Verification – see Section 2

5 = Performance Test(s) – see Section 5

5a = Performance Test(s) – see Section 5. OPTIONAL. Required for direct testing of I.F. Group Delay Ripple performance only. HP 8753A/HP 85046A covers full 20-500 MHz range over which I.F. Group Delay Ripple is specified; HP 8510A/HP 8515A covers 45-500 MHz only. An indirect test for I.F. Group Delay Ripple performance, using the Spectrum Analyzer, is also presented in this manual.

8 = Troubleshooting – see Section 8

Table 1-2. Recommended/Required Test Equipment (Continued)

RECOMMENDED ACCESSORIES

EQUIPMENT NAME	QTY	REQUIRED CHARACTERISTICS	RECOMMENDED MODEL (HP Part Number)	USE (See NOTE)
Power Sensor	1	–20 dBm to +10 dBm 2 GHz to 18 GHz	HP 8481A	2, 5, 8
Power Splitter	1	2 GHz to 18 GHz	HP 11667A	5
Mixer	1	2 GHz to 18 GHz < 1 ns transition time for pulse modulation	0955-0431 NOTE This mixer is the same as the one used in the HP 5364A.	5
Cable	2	2 GHz to 18 GHz APC-3.5(m) to APC-3.5(m)	HP 11500E	2, 5, 8
Adapter	1	N(m) to BNC(f)	1250-0780	2, 5, 8
Adapter	4	N(m) to APC-3.5(f)	1250-0780	2, 5, 8
Adapter	2	APC-3.5(f) to APC-3.5(f)	1250-1749	2, 5, 8
Adapter	1	APC-3.5(f) to N(f)	1250-1745	2, 5, 8
Adapter	1	SMA(m) to BNC(f)	1250-1200	5
Calculator	1	+, −, ×, /, $\log_{10}$	HP 11C	5

NOTE:

2 = Operational Verification — see Section 2
5 = Performance Test(s) — see Section 5
8 = Troubleshooting — see Section 8

Table 1-3. Tools Required for Maintenance

Description	Required Characteristics
Allen-drive	5/64-inch
Screwdriver	Pozidrive, #1
Screwdriver	Pozidrive, #2
Nutdriver	1/2 inch
Wrench, Open-end	5/16-inch
Wrench, Torque	Open-end, 5/16-inch, 8 inch-lb
Wrench, Open-end	5/8-inch

1-5. WARRANTY

Hewlett-Packard's Warranty for the Model 5364A Microwave Mixer/Detector is printed on the inside front cover of this manual. Please take time to read the Warranty thoroughly at least once before you proceed to read the rest of this manual or to install or use this product.

1-6. SERVICE CONTRACT

Hewlett-Packard offers various servicing procedures on a contract basis. Contact your local Hewlett-Packard Sales office for more information.

1-7. ABOUT THIS MANUAL

1-8. Manual and Microfiche Part Numbers

The HP Part Number of this manual is listed on the title page.

The "Microfiche No." listed on the title page is the HP Part Number of this manual in microfiche form. In this form, the manual is provided on one or more 100 x 150 mm (4 x 6-inch) microfilm transparency sheets, each containing up to 96 photo-duplicates of the manual's pages. The microfiche package also includes the latest MANUAL CHANGES supplement (described below), as well as any pertinent Service Note(s).

1-9. Instruments Covered by this Manual

Each HP 5364A is identified by a Serial Number as described in the "IDENTIFICATION" paragraphs below. The contents of this manual apply to a Model 5364A whose Serial Number Prefix is listed under "SERIAL NUMBERS" on the title page.

1-10. Manual Changes Supplement

An HP 5364A manufactured after this manual was printed may have a Serial Number Prefix that is not listed on the title page. This unlisted Serial Number Prefix indicates that the product may be different from those described in this manual. The manual for this new product is accompanied by a "Manual Changes" supplement containing "change" information that explains how to adapt the manual to the newer product.

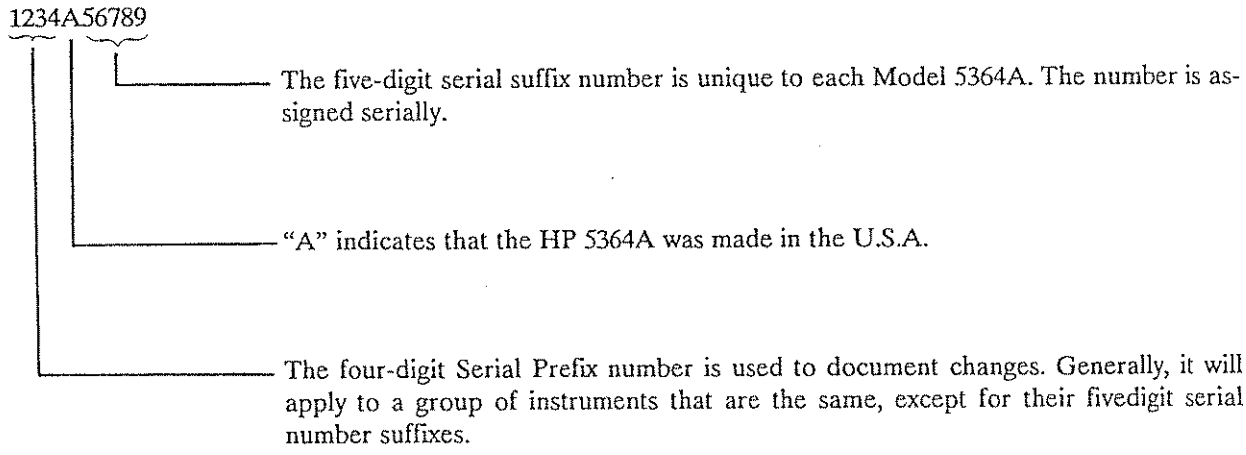
In addition to "change" information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is identified with the manual's Part Number and Print Date, both of which appear on the manual's title page. Complimentary copies of the supplement are available from Hewlett-Packard.

For information concerning a Serial Number Prefix that is not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

1-11. IDENTIFICATION

1-12. Serial Number

Each Model 5364A is identified by a unique serial number having the format –



The HP 5364A Serial Number is on a stick-on label on the rear-panel.

1-13. Series Number

Some parts in the HP 5364A may have a "SERIES" number on them.

The SERIES number is similar in function to the prefix portion of the Model 5364A's Serial Number. Generally, all parts having the same HP Part Number are the same; parts having the same Part Number, but different SERIES numbers are similar, but not identical.

1-14. OPTIONS

Currently-available Options for the HP 5364A are listed in *Table 1-4*, below.

Table 1-4. Options

Option Number	Description
W30	Two-year additional service
907	Front Handles
908	Rack Mounting Kit
909	Front Handles and Rack-Mounting Kit (combines Options 907 and 908)
910	Additional Manual

SECTION 2
PREPARATION FOR USE

2-1. INTRODUCTION

The HP 5364A Microwave Mixer/Detector is a self-contained unit in a half-rack-width modular package. It can be used as a bench-top unit or installed in a standard rack (using HP rack installation hardware).

Preparing the HP 5364A for use consists of –

1) Unpacking and inspection.

2) Making sure the power supply is set up correctly for the line voltage to be used.

3) Connecting the unit in a measurement system.

4) Turning on the measurement system.

5) Verifying proper operation of the HP 5364A in the measurement system.

NOTE

The last three steps above are combined into the "Operational Verification" procedure at the end of this manual section.

2-2. UNPACKING AND INSPECTION

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 HP 5364A has been checked mechanically and electrically.

The contents of the shipment should be as shown in *Figure 1-1*. Procedures for checking electrical performance are given in Section 5 of this manual.

If the contents are incomplete, if there is mechanical damage or defect, or if the HP 5364A fails its performance test (see Section 5 of this manual), 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 materials for the carrier's inspection. The HP office will arrange for repair or replacement at HP's option without waiting for a claim settlement.

⚠ 2-3. LINE VOLTAGE, LINE FUSE, LINE CORD

The HP 5364A line voltage specification is given in *Table 1-1.*

A listing of line fuses for the HP 5364A is given in *Table 2-1.*

A listing of line cords available for the HP 5364A is given in *Table 2-2.* The line cord shipped with the unit should be the one shown for the destination country shown in the table.

To connect the HP5364A to the power line –

a. Be sure that the correct fuse for the line voltage to be used is installed, and that the line voltage selector is correctly set, as follows –

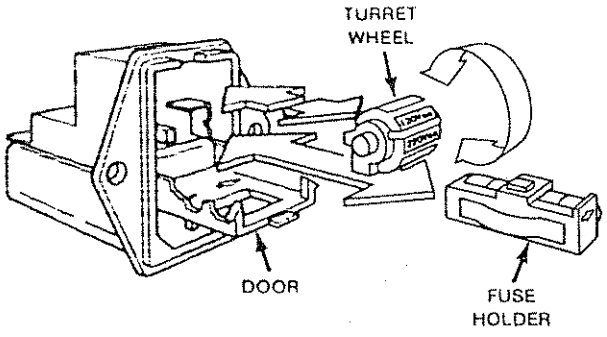
   1. Disconnect the line cord from the power line, if it is connected.
   2. Disconnect the line cord from the HP5364A's rear-panel power line module, if it is connected.
   3. Using a narrow flat-bladed screwdriver, pry open the power line module's line fuse/voltage selector door (see *Figure 2-1.*)
   4. Remove the line voltage selector drum and set it in a place where it won't be lost.
   5. Remove the fuse holder and fuse by pulling on the fuse holder handle at the lower right-hand side of the normally-covered compartment.
   6. Remove the fuse from the fuse holder.
   7. Install a fuse having the correct rating in the fuse holder.
   8. Install the fuse holder containing the fuse in its receptacle at the lower right-hand corner of the normally-covered compartment in the power line module. The fuse holder is keyed so it can be installed only one way.
   9. Install the line voltage selector drum in its position at the top of the compartment so the desired line voltage indication will be readable through the hole in the door when the door is closed.
   10. Close the door of the compartment.

b. Insert the mating end of the line cord into the receptacle portion of the line power module.

c. Insert the other end of the line cord into the power line receptacle.

Table 2-1. Line Fuse Values

Line Voltage Nominal (Range)	Fuse	
	Rating	HP Part Number
100 (90 - 110)	0.25 A slow-blow	2110-0201
120 (108 - 132)		
220 (198 - 242)	0.125 A slow-blow	2110-0318
240 (216 - 264)		

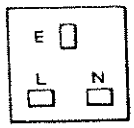
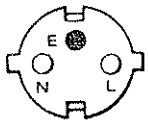
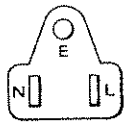
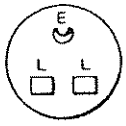
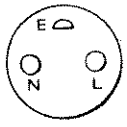


SELECTION OF OPERATING VOLTAGE

1. Using a small, flat-head screwdriver, snap open the power module door to access the fuse and turret wheel.
2. REMOVE the turret wheel before turning to desired voltage. DO NOT turn turret wheel while installed in module. Push wheel firmly into module slot.
3. To change or install fuse, pull fuse holder and re-insert fuse in holder, using caution to select correct fuse value. Re-insert fuse and holder.
4. Close the power module door. The selected operating voltage is shown in module window.

Figure 2-1. Power Line Module

Table 2-2. Line Cords Available

PLUG TYPE	CABLE HP PART NO.	*CD	PLUG DESCRIPTION	CABLE LENGTH (INCHES)	CABLE COLOR	FOR USE IN COUNTRY
250V 	8120-1351 8120-1703	0 6	Straight **BS1363A 90°	90 90	Mint Gray Mint Gray	United Kingdom, Cyprus, Nigeria Rhodesia, Singapore
250V 	8120-1369 8120-0696	0 4	Straight **NZSS198/ASC112 90°	79 87	Gray Gray	Austrailia, New Zealand
250V 	8120-1689 8120-1692	7 2	Straight **CEE7-Y11 90°	79 79	Mint Gray Mint Gray	East and West Europe, Saudi Arabia, Egypt, So Africa, India (Unpolarized in many nations)
125V 	8120-1348 8120-1398 8120-1754 8120-1378 8120-1521 8120-1676	5 5 7 1 6 2	Straight **NEMA5-15P 90° Straight **NEMA5-15P Straight **NEMA5-15P 90° Straight **NEMA5-15P	80 80 36 80 80 30	Black Black Black Jade Gray Jade Gray Jade Gray	United States, Canada, Japan (100V or 200V), Mexico, Philippines, Taiwan
250V 	8120-2104	3	Straight **SEV1011 1959-24507 Type 12	79	Gray	Switzerland
250V 	8120-0698	6	Straight **NEMA6-15P			United States, Canada
220V 	8120-2956 8120-2957	2 3	Straight **DHCK 107 90°	79 79	Gray Gray	Denmark

*CD = Check Digit (refer to Section VI).

**Part number shown for plug is industry identifier for plug only. Number shown for cable is HP Part Number for complete cable including plug.

E = Earth Ground L = Line N = Neutral

2-4. OPERATIONAL VERIFICATION

2-5. Equipment Set-up

a. Connect HP 5364A Mixer/Detector, Synthesized Signal Generator, Synthesized Sweeper, and Spectrum Analyzer as shown in *Figure 2-2*.

- Set the Synthesized Signal Generator to apply a 10 GHz, +8 dBm signal at the HP 5364A L.O. INPUT, via a cable rated for at least 10 GHz. (Adapters may be required.) Use a Power Meter to verify the L.O. INPUT signal level.
- Set the Synthesized Sweeper to apply a 10.01 GHz, –3 dBm signal at the HP 5364A R.F. INPUT, via a cable rated for at least 10 GHz. (Adapters may be required.) Use a Power Meter to verify the R.F. INPUT signal level.

b. Set the Spectrum Analyzer for –

Center Frequency = 10 MHz
Frequency Span = 1 GHz (or 100 MHz/Div)
Reference Level = 10 dBm
Log Scale = 10 dB/Div
Resolution BW = 300 kHz

c. Set HP 5364A Attenuator to 0 dB.

2-6. I.F. OUTPUT Verification

2-7. CONVERSION GAIN

The Spectrum Analyzer must show that the I.F. OUTPUT power level is +1.5 dBm or greater.

2-8. ATTENUATOR

a. Rotate the HP 5364A Attenuator knob through all its positions.

b. The Spectrum Analyzer must show that the I.F. OUTPUT power level changes by the same amount as the HP 5364A attenuator is changed.

2-9. I.F. Flatness

a. Set the Synthesized Sweeper to –

SWEEP TIME = 5 seconds
START FREQ = 10.01 GHz
STOP FREQ = 10.5 GHz

b. Set HP 5364A attenuator to 0 dB.

c. The Spectrum Analyzer must show that the I.F. OUTPUT frequency sweeps from 10 MHz to 500 MHz, and that its power level does not vary more than 8 dB.

2-10. VIDEO OUTPUT Verification

a. Turn off or disconnect any signal source at the HP 5364A L.O. INPUT.

b. Set the Pulse/Function Generator to apply the following signal to the Synthesized Sweeper PULSE Modulation Input (see *Figure 2-2*) —

Function = Pulse (press pulse symbol key)
Pulse Width = 1 µs (select WID, then use RANGE and VERNIER controls)
Pulse Repetition Rate = 2 µs (select FRQ, then use RANGE and VERNIER controls to set 500 kHz)
Pulse Level = 0 to 5 volts (use LOL, HIL, and RANGE and VERNIER controls to set these levels respectively)

c. Set the Synthesized Sweeper to —

CW = 10.5 GHz
PULSE MODULATION = ON (LED lit)
POWER LEVEL = 0 dBm

d. The Digitizing Oscilloscope must show that the HP 5364A VIDEO OUTPUT is a negative-polarity pulse, greater than 50 mV (p-p), 1 µs wide, 2 µs interval.

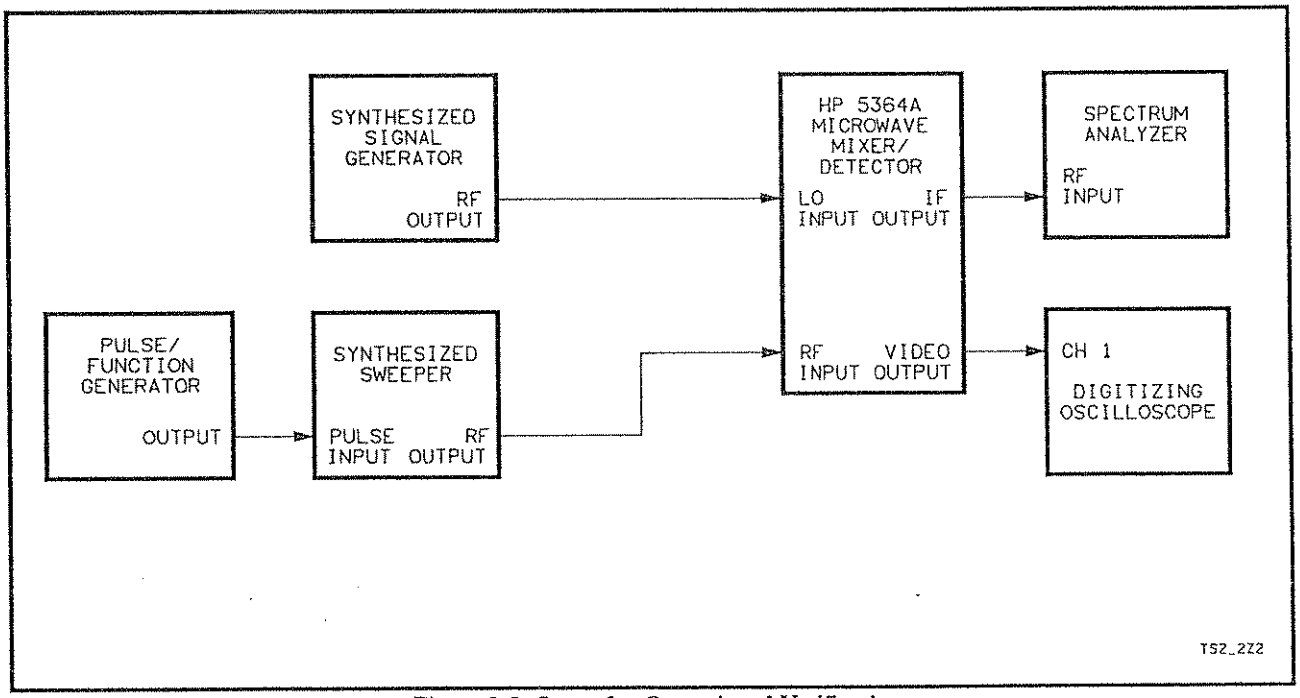


Figure 2-2. Setup for Operational Verification

SECTION 3
OPERATION

3-1. INTRODUCTION

The HP 5364A I.F. OUTPUT signal is a 10-500 MHz signal that is the difference between the R.F. INPUT and L.O. INPUT signals.

The HP 5364A VIDEO OUTPUT signal is a negative-going waveform representing the detected modulation envelope of the R.F. INPUT signal. (See *Figure 3-4.*)

This manual section provides operating instructions for the HP 5364A.

Instructions for preparation for use are in Section 2 of this manual.

An Operational Verification procedure is provided in Section 2.4 of this manual.

3-2. SAFETY AND OTHER CONSIDERATIONS

The WARNINGS and CAUTIONS below must be followed for your protection and to avoid damage to equipment.

WARNING

BE SURE ALL ELECTRICALLY OPERATED EQUIPMENT YOU USE IS PROPERLY GROUNDED.

CAUTION

Be sure to turn electrical power off whenever you are connecting or disconnecting test equipment, installing or removing parts, etc.

3-3. CONTROLS, CONNECTORS, AND INDICATORS

The HP 5364A Controls, Connectors, and Indicators are shown in *Figure 3-1* and *Figure 3-2.*

Primary input/output signal connections are made via front-panel connectors.

The rear-panel MIXER OUTPUT and I.F. AMP INPUT connectors are normally connected together via a semi-rigid coaxial cable. MIXER OUTPUT is the output signal from the Mixer. I.F. AMP. INPUT is the input for the IF path that produces an amplified and filtered signal at the front-panel I.F. OUTPUT connector. (If you do not get a signal at this front-panel connector, check the connection between the rear-panel connectors.)

The HP 5364A has only two operating controls: 1) a 0-50 dB attenuator (in 10-dB steps) and 2) its line POWER switch. Both are located on the front panel.

The only HP 5364A indicator is the front-panel POWER indicator. This indicator should be lighted whenever the unit is connected to an operating power line and the "1" portion of its POWER switch is depressed.

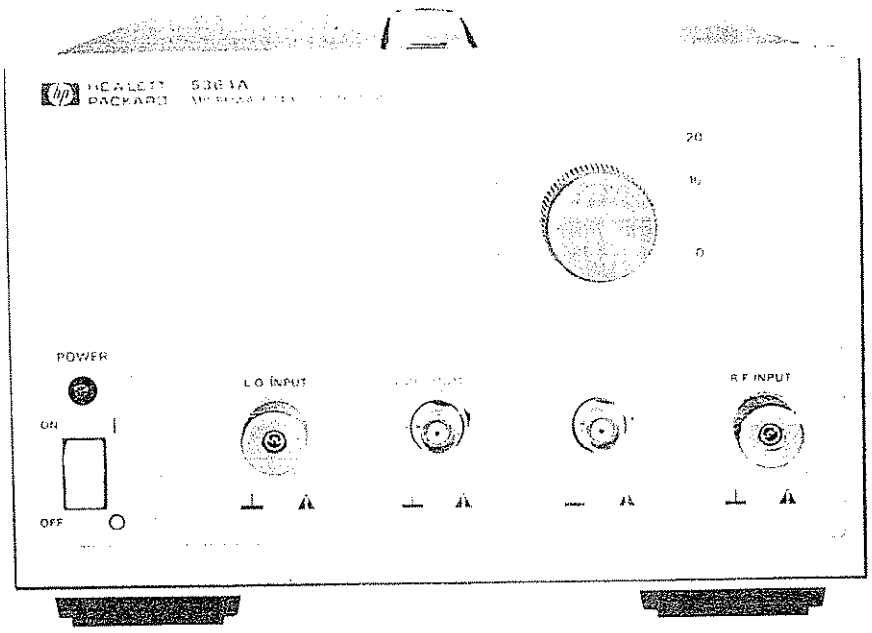


Figure 3-1. Front Panel

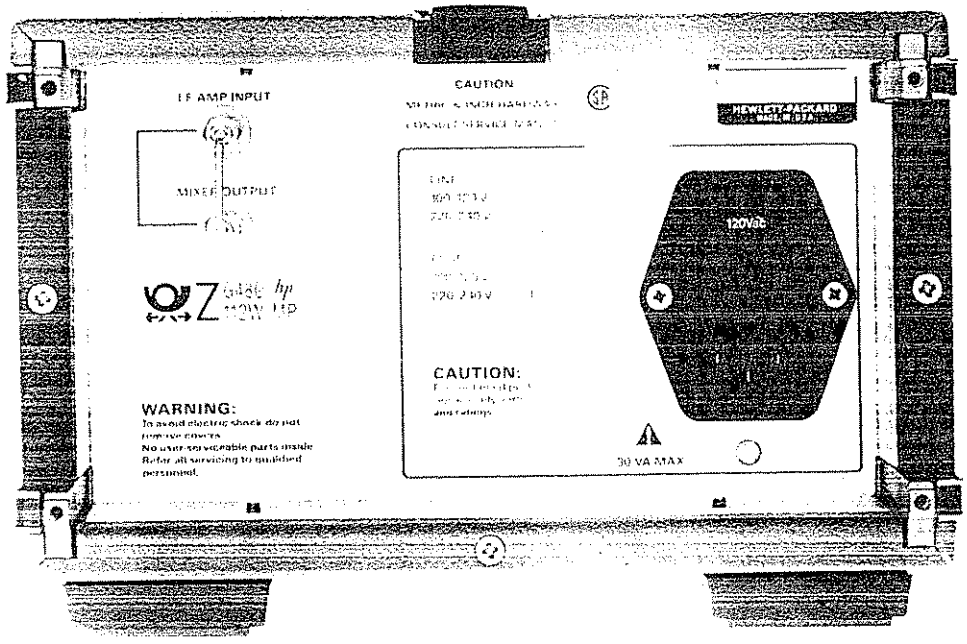


Figure 3-2. Rear Panel

3-4. OPERATOR'S CHECKS

A simple "Operational Verification" procedure is provided at the end of Section 2 of this manual. A more thorough "Performance Test" is provided in Section 5 of this manual.

⚠ 3-5. INPUT SIGNALS

Correct input signal amplitude and frequency are important, both to prevent damage to the HP 5364A and to provide suitable output signals.

Because incorrect signal amplitude can damage the HP 5364A, amplitude information is presented first, below.

3-6. Amplitude

CAUTION

- **DAMAGE LEVEL for the L.O. INPUT is +20 dBm.**
- **DAMAGE LEVEL for the R.F. INPUT has two parts —**

  CW: +30 dBm at all attenuator settings.

  Pulse: +30 dBm at 0 dB setting, +40 dBm at 10 dB, and +50 dBm at 20 dB and above.

3-7. L.O. INPUT

The HP 5364A is specified for operation with a +8 dBm L.O INPUT signal only. HP 5364A performance when the L.O. INPUT signal is not +8 dBm (but is below the +20 dBm DAMAGE level) is not specified or guaranteed to be predictable.

3-8. R.F. INPUT

R.F. INPUT signal levels, and changes in level, are passed through to the I.F. OUTPUT (and VIDEO OUTPUT). *Table 3-1* provides important R.F. INPUT signal amplitude information to help you use the HP 5364A. For example, for an attenuator setting of 0 dB —

- The R.F. INPUT DAMAGE LEVELs are +30 dBm CW or +30 dBm Pulse.
- If you want an I.F. OUTPUT signal only, your R.F. INPUT signal should be between –25 dBm and –2 dBm.
- If you want a VIDEO OUTPUT (detected modulation envelope) signal only, your R.F. INPUT signal should be between –12 dBm and 0 dBm.
- If you want both an I.F. OUTPUT and a VIDEO OUTPUT signal, your R.F. INPUT signal should be between –12 dBm and –1 dBm.

3-9. Frequency

The HP 5364A I.F. OUTPUT signal is a 10-500 MHz signal that is the difference between the R.F. INPUT and L.O. INPUT signals.

In general, you should consider that the L.O. INPUT signal is the "reference" signal against which the "unknown" R.F. INPUT signal is compared.

In general, the L.O. INPUT frequency should be lower than the lowest expected R.F. INPUT frequency, in order that any change in R.F. INPUT frequency will appear directly in the I.F. OUTPUT signal. When the L.O. INPUT frequency is higher than the R.F. INPUT frequency, frequency changes in the R.F. INPUT signal appear inverted in the I.F. OUTPUT signal (an increase in R.F. INPUT frequency will result in a decrease in I.F. OUTPUT frequency).

The low-frequency limit of the L.O. INPUT signal is 2.2 GHz, while that of the R.F. INPUT signal is 2.0 GHz. These limits, combined with the 10-MHz lower-frequency bandwidth limit of the I.F. OUTPUT mean that for any R.F. INPUT signal below 2.21 MHz, the R.F. INPUT frequency must be lower than the L.O. INPUT in order to produce an I.F. OUTPUT signal.

The foregoing is summarized in *Table 3-2*.

In addition, the lower the frequency of the I.F. OUTPUT, the greater the frequency resolution that can be obtained in the measurement in which it is used. (See *Figure 3-3*.)

Table 3-1. INPUT Levels

L.O. INPUT –

DAMAGE LEVEL: +20 dBm

Specified input level: +8 dBm. Use of any other level may result in improper or unpredictable operation.

R.F. INPUT –

Attenuator Setting (dB)	DAMAGE LEVEL (dBm) CW	Pulse	Recommended R.F. INPUT Levels For I.F. OUTPUT only (dBm)	For VIDEO OUTPUT only (dBm)	For both I.F. AND VIDEO OUTPUT (dBm)
0	+30	+30	–25 to –2	–12 to 0	–12 to –1
10	+30	+40	–15 to +8	–1 to +10	–2 to +8
20	+30	+50	–5 to +18	+8 to +20	+8 to +18
30	+30	+50	+5 to +28	+18 to +30	+18 to +28
40	+30	+50	+15 to +38	+28 to +40	+28 to +38
50	+30	+50	+25 to +48	+38 to +50	+38 to +48

Table 3-2. INPUT Frequencies

R.F. INPUT	Recommended or Typical L.O. INPUT	Description
2 GHz to 2.19 GHz	2.2 GHz (Lowest L.O. INPUT frequency)	2.19 GHz is lowest L.O. INPUT (2.2 GHz) minus lowest I.F. OUTPUT (0.01 GHz). **All R.F. INPUT frequency changes will be inverted in I.F. OUTPUT.**
2.19 GHz to < 2.21 GHz	2.2 GHz to 2.22 GHz (R.F. INPUT plus 10 MHz)	2.19 GHz to 2.21 GHz represents lowest L.O. INPUT ± 10 MHz minimum I.F. OUTPUT range. For any R.F. INPUT below 2.21 GHz, L.O. INPUT must be at least 10 MHz higher to produce an I.F. OUTPUT. **All R.F. INPUT frequency changes will be inverted in I.F. OUTPUT.**
2.21 GHz to 18 GHz	2.2 GHz to 17.99 GHz (R.F. INPUT minus 10 MHz to 500 MHz)	2.21 GHz is the lowest R.F. INPUT frequency at which can be higher than the L.O. INPUT and still produce an I.F. OUTPUT signal.

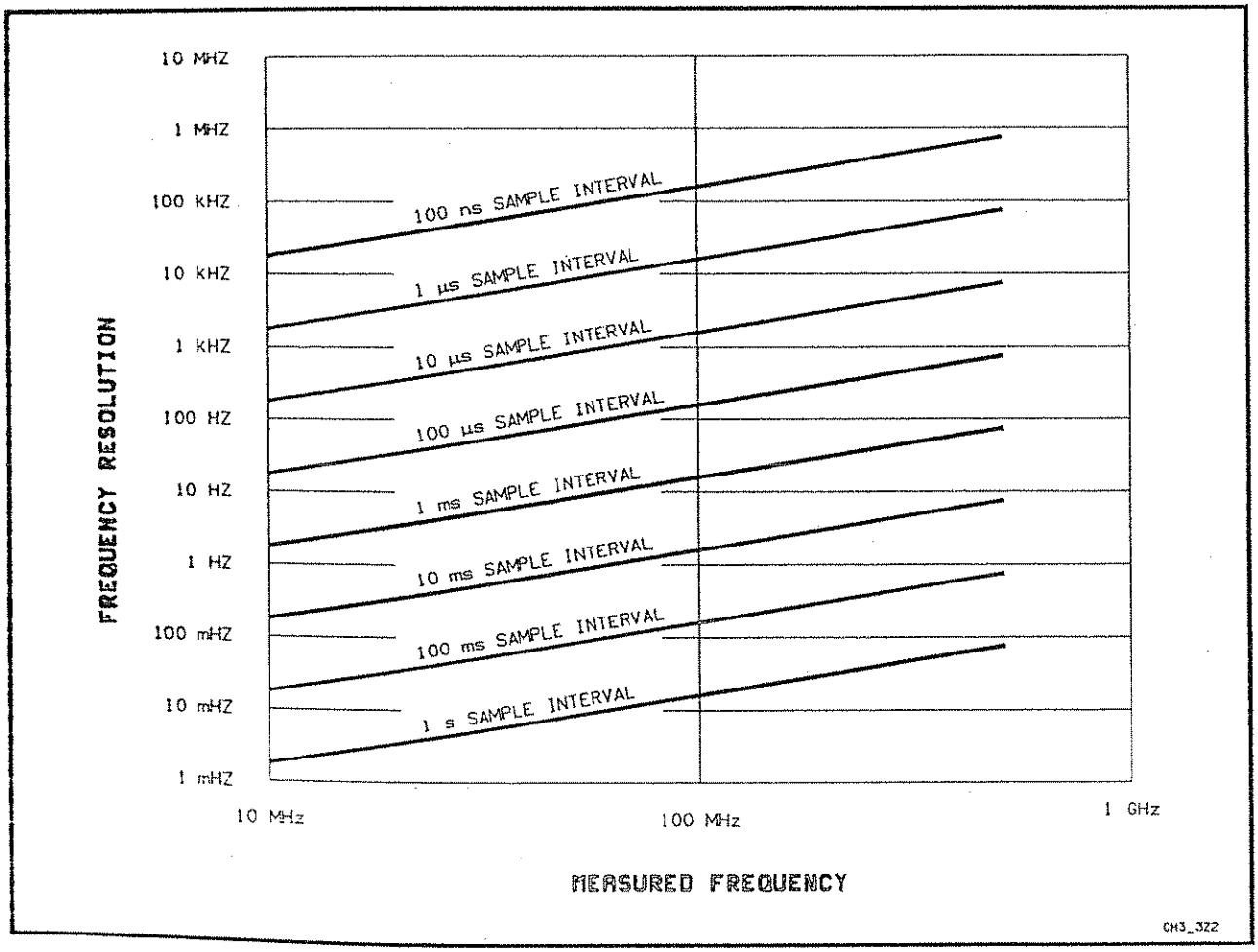


Figure 3-3. Resolution versus Frequency

⚠ 3-10. I.F. OUTPUT

3-11. Frequency

As stated earlier in this manual section, the I.F. OUTPUT signal represents the difference frequency between the R.F. INPUT and L.O. INPUT signals, in the range 10 MHz to 500 MHz (useable to 1000 MHz).

3-12. Amplitude

Conversion gain is greater than 6 dB, typically greater than 10 dB.

⚠ 3-13. VIDEO OUTPUT

The VIDEO OUTPUT signal is the detected R.F. INPUT signal. (See *Figure 3-4.*) It can be used in many ways, such as —

- Measurement trigger or arming signal
- For single-shot or repetitive time measurements of —
  - PRF (Pulse Repetition Frequency) or stagger PRF
  - PRI (Pulse Repetition Interval) or stagger PRI
  - Pulse width or pulse width modulation
  - Rise time
  - Fall time

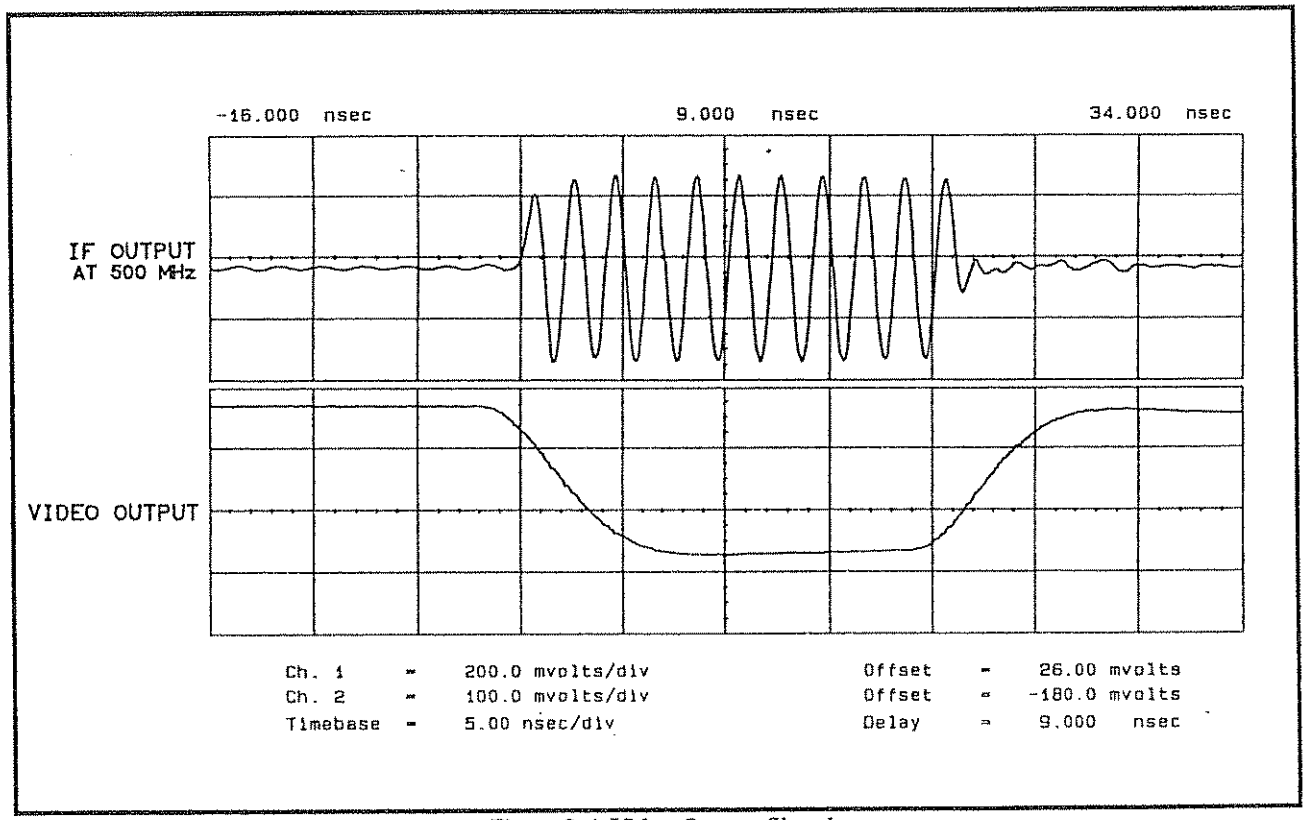


Figure 3-4. Video Output Signal

3-14. Bandwidth

The VIDEO OUTPUT is a dc-coupled negative-polarity signal representing the modulation envelope of the signal at the R.F. INPUT.

The 20%-to-80% rise time of this signal is less than 6 ns; typically it can be as short as 4 ns (for an input pulse with a rise time of less than 1 ns.) Typical VIDEO OUTPUT bandwidth is 120 MHz.

3-15. Amplitude

For a 2-10 GHz R.F. INPUT at –12 dBm, the VIDEO OUTPUT will be greater than 50 mV (p-p); typically, it will be greater than 80 mV.

For a 10-18 GHz R.F.INPUT at –12 dBm, the VIDEO OUTPUT will be greater than 25 mV (p-p); typically, it will be greater than 50 mV.

3-16. Use as a Trigger or Arming Signal

The VIDEO OUTPUT signal can be used to generate a trigger or arming signal which can be used to control measurements of the I.F. OUTPUT or other signal.

The timing relationship of the VIDEO OUTPUT and I.F. OUTPUT is not specified, but these output signals occur at nearly the same time. In a measurement situation, it is the is the relative timing between these signals at the measuring device inputs that is important, and this timing can be adjusted by using different length of cables for the signal paths.

3-17. OPERATOR'S MAINTENANCE

Other than occasional cleaning of the outside of the unit, there are no maintenance procedures to be performed by the operator.

3-18. CALIBRATION

The HP 5364A has no internal adjustments and does not require calibration.

SECTION 4
PRINCIPLES OF OPERATION

4-1. GENERAL

The HP 5364A is a heterodyne down-converter. Its output is a signal in the 10-500 MHz range representing the difference frequency of two signals in the 2-18 GHz range. A secondary output is the detected form of one of the input signals.

The HP 5364A circuit diagram, *Figure 8-3*, can also serve as its block diagram.

The HP 5364A is used as part of a measurement system like that shown in *Figure 4-1*.

Input signals are –

- The RF signal to be examined, in the 2-18 GHz range, connected at the front-panel R.F. INPUT connector.
- A Local Oscillator, 10-500 MHz higher or lower than the R.F INPUT signal, connected at the front-panel L.O. INPUT connector. Note that the L.O. INPUT frequency, from 2.2 GHz to 18 GHz is not as low as the R.F. INPUT range.

Output signals are –

- The difference frequency of the two input signals, available at the front-panel I.F. OUTPUT connector, and –
- The detected envelope of the R.F. INPUT signal, available at the front-panel VIDEO OUTPUT connector.

4-2. RF PATH

The RF Path circuitry includes components from the front-panel L.O. INPUT and R.F. INPUT connectors to the rear-panel MIXER OUTPUT connector. (See *Figure 8-3*.)

The R.F. INPUT signal is applied to 0-50 dB Attenuator AT1 which reduces its amplitude as required (in 10 dB steps) to that which can be handled by Power Divider A1.

Power Divider A1 divides the RF input signal into two output signals of equal power. One signal is fed through 10 dB Attenuator AT2 to the "R" port of Mixer A2; the other output is fed to Detector A4 in the Video Path.

The L.O. INPUT signal is fed directly to the "L" port of Mixer A2. The signal at the Mixer A2 "I" port contains the sum and difference of the signals at the A2 inputs.

This signal is available at the rear-panel MIXER OUTPUT connector. In normal use, semi-rigid coaxial cable W2 connects this signal to the rear-panel IF AMP INPUT connector.

4-3. IF PATH

The HP 5364A IF Path consists of the circuitry between rear-panel IF AMP INPUT connector J6 and front-panel IF OUTPUT connector J3. (See *Figure 8-3*.)

IF Amplifier A3 provides about 32 dB of gain. Its output is fed to Low-pass Filter FL1, which attenuates signal components above 2 GHz by about 40 dB. The amplified and filtered IF signal, in the range from 10 MHz to 500 MHz (useable to 1 GHz), is available at the front-panel I.F. OUTPUT connector.

4-4. VIDEO PATH

The HP 5364A video path consists of those components between the front-panel R.F. INPUT and the front-panel VIDEO OUTPUT. (See *Figure 8-3.*) Note that some of these components are shared with the R.F. Path, described above.

Part of the signal at the front-panel R.F. INPUT is fed, via Power Divider A1 to Detector A4. The output of A4 is a signal that represents the detected envelope of its input. This signal, amplified by Video Amplifier A5, is fed to the front-panel VIDEO OUTPUT connector.

The delay through the Video Path is shorter than the delay through the IF Path, allowing the VIDEO OUTPUT signal to be used to generate a triggering signal for measurements.

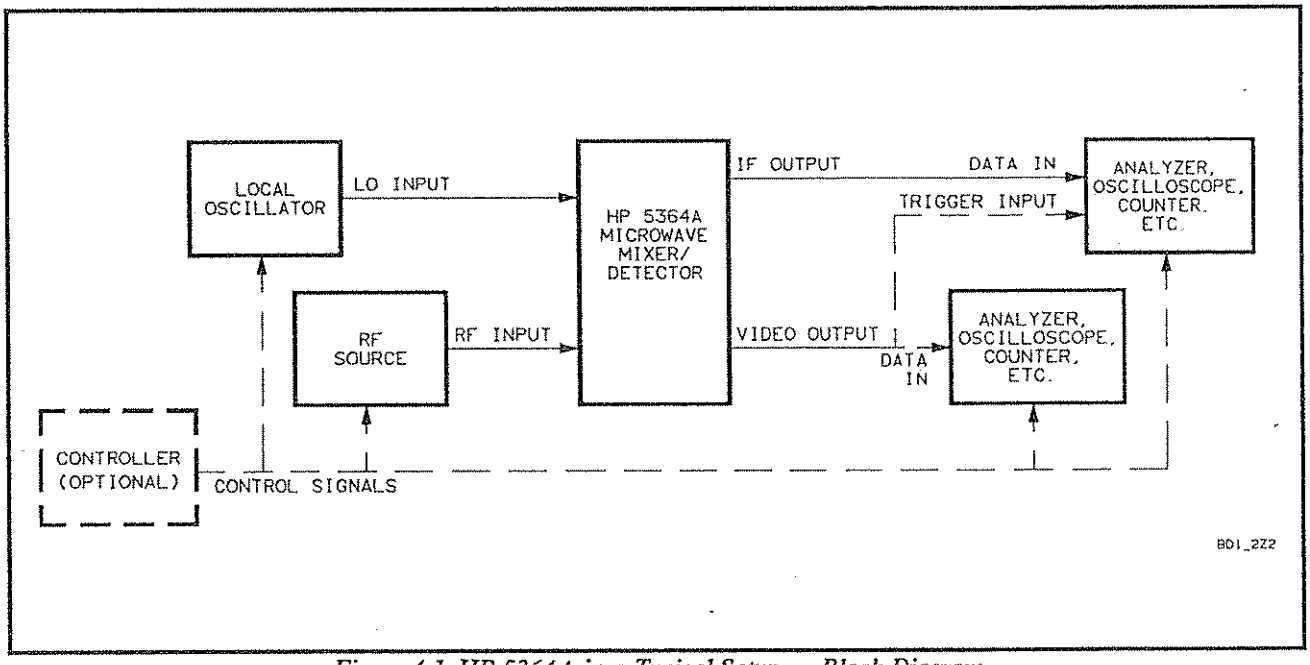


Figure 4-1. HP 5364A in a Typical Setup — Block Diagram

SECTION 5
PERFORMANCE TESTS

5-1. INTRODUCTION

The procedures in this section test the HP 5364A electrical performance, using the specifications listed in *Table 5-1* as the performance standards. Although the entire range of specifications is not tested, proper operation during these tests is a very good indication that the HP 5364A will meet any of its specifications. All tests can be performed without access to the interior of the unit. For an experienced user of the test equipment, the tests will take between one and two hours. A simpler operational test is included in Section 2, under the heading "Operational Verification".

Table 5-1. Specifications Tested

TEST NAME	SPECIFICATION
I.F. Output (for L.O. = 2.2 GHz, 12.4 GHz, and 17.5 GHz)	
Maximum Roll Off (I.F. = 10 to 500 MHz)	< 8 dB
(I.F. = 10 to 90 MHz)	< 3 dB
Conversion Gain	
R.F. INPUT: 2 GHz to < 12.4 GHz; I.F. OUTPUT = 10 MHz	> 4. 5 dB
R.F. INPUT: 12.4 GHz to 18 GHz; I.F. OUTPUT = 10 MHz	> 1.5 dB
Gain Linearity (IF = 80 MHz)	± 1.3 dB
Compression (RF INPUT = –3 dBm, IF = 80 MHz)	< 1 dB
I.F. Group Delay Ripple (I.F. AMP INPUT to I.F. OUTPUT)	< 1.5 ns
VIDEO Output	
Deviation from Square Law (for R.F. INPUT = –12 dBm to +2 dBm)	± 2 dB
Compression (for R.F. INPUT = +2 dBm)	< 1 dB
Output Level (for R.F. INPUT = –12 dBm):	
2 GHz to < 10 GHz	> 50 mVp-p
10 GHz to 18 GHz	> 10mVp-p
Rise Time	> 7.5 ns

5-2. EQUIPMENT REQUIRED

Equipment required for the Performance Tests is listed in *Table 5-2*. Any equipment that satisfies the critical specifications given in the table may be substituted for the recommended model(s).

Table 5-2. Recommended/Required Test Equipment

EQUIPMENT NAME	REQUIRED CHARACTERISTICS	RECOM-MENDED MODEL	USE (See NOTE)
Synthesized Sweeper	CW: 2 GHz to 18 GHz Pulse Modulation: 10 GHz Power Level Range: –20 dBm to +3 dBm Sweep: 2.21 GHz to 2.7 GHz 12.41 GHz to 12.9 GHz 17.51 GHz to 18 GHz	HP 8340A	2, 5, 8
Synthesized Signal Generator	CW: 2 GHz to 18 GHz Power Level: +8 dBm	HP 8672A (or HP 8350B with HP 83592A plug-in)	2, 5, 8
Power Meter	–20 dBm to +3 dBm	HP 436A	2, 5, 8
Pulse/Function Generator	Pulse Function 500 kHz to 1 MHz 100 ns to 1 μs Width TTL Output	HP 8116A	2, 5, 8
Spectrum Analyzer	10 to 500 MHz –20 dBm to +10 dBm	HP 8566B	2, 5, 8
Oscilloscope	Capable of displaying a 500 kHz square wave having a 50% duty cycle.	HP 54111A	2, 5, 8
Network Analyzer	20 MHz to 500 MHz	HP 8753A with HP 85046A (or HP 8510A with HP 8515A)	5a

NOTE:

2 = Operational Verification — see Section 2

5 = Performance Test(s) — see Section 5

5a = Performance Test(s) — see Section 5. OPTIONAL. Required for direct testing of I.F. Group Delay Ripple performance only. HP 8753A/HP 85046A covers full 20-500 MHz range over which I.F. Group Delay Ripple is specified; HP 8510A/HP 8515A covers 45-500 MHz only. An indirect test for I.F. Group Delay Ripple performance, using the Spectrum Analyzer, is also presented in this manual.

8 = Troubleshooting — see Section 8

Table 5-2. Recommended/Required Test Equipment (Continued)

RECOMMENDED ACCESSORIES

EQUIPMENT NAME	QTY	REQUIRED CHARACTERISTICS	RECOMMENDED MODEL (HP Part Number)	USE (See NOTE)
Power Sensor	1	–20 dBm to +10 dBm 2 GHz to 18 GHz	HP 8481A	2, 5, 8
Power Splitter	1	2 GHz to 18 GHz	HP 11667A	5
Mixer	1	2 GHz to 18 GHz <1 ns transition time for pulse modulation	0955-0431 **NOTE** This mixer is the same as the one used in the HP 5364A.	5
Cable	2	2 GHz to 18 GHz APC-3.5(m) to APC-3.5(m)	HP 11500E	2, 5, 8
Adapter	1	N(m) to BNC(f)	1250-0780	2, 5, 8
Adapter	4	N(m) to APC-3.5(f)	1250-0780	2, 5, 8
Adapter	2	APC-3.5(f) to APC-3.5(f)	1250-1749	2, 5, 8
Adapter	1	APC-3.5(f) to N(f)	1250-1745	2, 5, 8
Adapter	1	SMA(m) to BNC(f)	1250-1200	5
Calculator	1	$+ , - , \times , / , \log_{10}$	HP 11C	5

NOTE:

2 = Operational Verification – see Section 2
5 = Performance Test(s) – see Section 5
8 = Troubleshooting – see Section 8

Table 5-3. Tools Required for Maintenance

DESCRIPTION	REQUIRED CHARACTERISTICS
Allen-drive	5/64-inch
Screwdriver	Pozidrive – #1
Screwdriver	Pozidrive – #2
Nutdriver	1/2-inch
Wrench, Open-end	5/16-inch
Wrench, Torque	Open-end, 5/16-inch, 8 in-lb
Wrench, Open-end	5/8-inch

5-3. TEST RECORD

Results of the Performance Tests can be tabulated on the Test Record at the end of the procedures. The Test Record lists all of the tested specifications and their acceptable limits. The results recorded during incoming inspection can be used for comparison in periodic maintenance and troubleshooting, and after repair.

5-4. I.F. OUTPUT TESTS

The HP 5364A I.F. OUTPUT is tested at three different L.O. INPUT frequencies and several different R.F. INPUT levels.

5-5. Setup

5-6. CALIBRATING THE POWER SENSOR-POWER METER COMBINATION

a. Turn on power to Power Meter.

b. Attach Power Sensor output to Power Meter Sensor Input.

c. Press the Power Meter "Sensor Zero" key to zero out the Power Meter display.

d. Set Power Meter MODE to WATT.

e. Set Power Meter CAL FACTOR to 100%.

f. Connect Power Sensor input to Power Meter "Power Ref OUTPUT".

g. Set Power Meter POWER REF to ON.

h. Use tuning wand to adjust Power Meter CAL ADJ for a "1.000 mW" reading on Power Meter display.

i. Disconnect Power Sensor from Power Meter POWER REF Output.

j. Set Power Meter POWER REF to OFF.

k. Note CAL FACTOR % for a 2 GHz frequency measurement as indicated on the Power Sensor. Set the Power Meter CAL FACTOR to this same percentage.

l. Set Power Meter MODE to dBm.

The Power Sensor-Power Meter combination is now calibrated.

5-7. SETTING UP THE SIGNAL GENERATOR AND THE HP 5364A

a. Turn Synthesized Signal Generator power to ON.

b. Set RF Output Frequency to 2.2 GHz.

c. Attach a 2-18 GHz cable to the Synthesized Signal Generator RF Output. (Use adapter as required.)

d. Attach the other end of the 2-18 GHz cable to the Power Sensor. (Use adapter as required.)

e. Rotate the Synthesized Signal Generator OUTPUT LEVEL vernier until the Power Meter reads +8.00 dBm.

f. Disconnect the 2-18 GHz cable from the Power Sensor. Connect the free end of the cable to the HP 5364A L.O. INPUT. (See *Figure 5-1.*) (Use adapter as required.)

g. Turn HP 5364A power ON.

h. Set HP 5364A Attenuator to 0 dB.

5-8. SETTING UP THE SPECTRUM ANALYZER

a. Turn Spectrum Analyzer power to ON.

b. Set CENTER FREQUENCY to 10 MHz (0.01 GHz).

c. Set FREQUENCY SPAN to 1 GHz (or 100 MHz/Div).

d. Set REFERENCE LEVEL to +10 dBm.

e. Set LOG SCALE to 5 dB/Div.

f. Set RESOLUTION BW to 300 kHz.

g. Use BNC cable to connect HP 5364A I.F. OUTPUT to Spectrum Analyzer RF Input. (See *Figure 5-1.*) (Use adapter as required.)

5-9. SETTING UP THE SYNTHESIZED SWEEPER

a. Turn Synthesized Sweeper power ON.

b. Connect Synthesized Sweeper, HP 5364A, Power Meter/Power Sensor, and Power Splitter together as shown in *Figure 5-1.*

NOTE

1. Connect one Power Splitter output to the HP 5364A R.F. INPUT.

2. Connect the Power Sensor input to the second Power Splitter output.

3. Use a 2-18 GHz cable to connect the Synthesized Sweeper RF Output to the Power Splitter input. (Use adapters as required.)

---

c. Select CW FUNCTION on the Synthesized Sweeper, then set a frequency of 2.21 GHz.

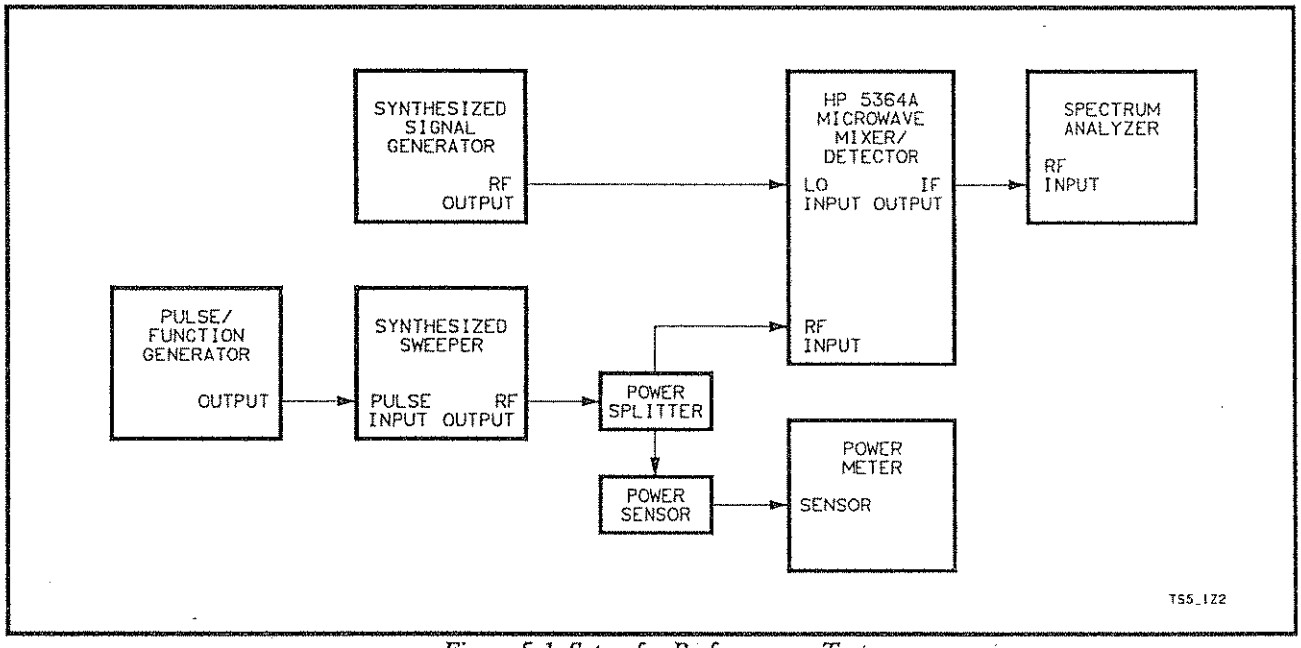


Figure 5-1. Setup for Performance Test

5-10. Test Procedure

a. Perform all portions of SETUP above before performing any of the tests below.

b. Perform the tests below in the order they are given. Do not skip any test to perform a later one.

5-11. 2.2 GHz L.O. INPUT

5-12. Maximum Roll-off.

a. Select the Synthesized Sweeper "POWER LEVEL" FUNCTION, then turn the entry knob until the Power Meter reads –10 dBm.

b. Select the Synthesized Sweeper "SWEEP TIME" FUNCTION, then specify 5 seconds.

c. Press the Synthesized Sweeper "START FREQ" FUNCTION key, then specify 2.21 GHz.

d. Press the Synthesized Sweeper "STOP FREQ" FUNCTION key, then specify 2.7 GHz.

e. The Spectrum Analyzer must show that the HP 5364A I.F. OUTPUT sweeps from 10 MHz to 500 MHz.

   The I.F. OUTPUT power must not vary more than 8 dB during each 5-second sweep. From 10 MHz to 90 MHz, I.F. OUTPUT power must not vary more than 3 dB.

   Record the I.F. OUTPUT power variation as the "Maximum Roll Off" on the Test Record. (For example, if the I.F. OUTPUT power varies between +4 dBm and +7 dBm during each sweep, then the I.F. Roll Off is 3 dB.)

5-13. Conversion Gain.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 2.21 GHz.

b. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –10 dBm.

c. Record the difference between the I.F. OUTPUT Power as indicated on the Spectrum Analyzer and the R.F. INPUT power (–10 dBm, set in step "b") as the 10 MHz "Conversion Gain" on the Test Record.

5-14. Gain Linearity and Compression.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 2.28 GHz.

b. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –20 dBm.

c. Change the Spectrum Analyzer REFERENCE LEVEL to 0 dBm and the LOG SCALE to 2 dB/Div.

d. On the Test Record, record each HP 5364A I.F. OUTPUT power level shown on the Spectrum Analyzer as you increase the power to the HP 5364A R.F. INPUT from –20 dBm to –2 dBm in 1-dB steps.

e. As indicated on the Test Record, calculate and record the Gain Linearity and Compression values.

5-15. 12.4 GHz L.O. INPUT

5-16. Set-up.

a. Disconnect the Power Sensor from the Power Splitter.

b. Note the Cal Factor % for a 12.4 GHz input as indicated on the Power Sensor. Set the Power Meter CAL FACTOR to the same percentage.

c. Disconnect the 2-18 GHz cable from the HP 5364A L.O. INPUT, then connect its free end to the Power Sensor. (Use adapter as required.)

d. Set the Synthesized Signal Generator Frequency to 12.4 GHz.

e. Adjust the Synthesized Signal Generator OUTPUT LEVEL vernier until the Power Meter reads +8.00 dBm.

f. Disconnect the 2-18 GHz cable at the the Power Sensor and reconnect the free end to the HP 5364A L.O. INPUT.

g. Reconnect the Power Sensor to the Power Splitter.

h. Set the Spectrum Analyzer REFERENCE LEVEL to +10 dBm and the LOG SCALE to 5 dB/Div.

i. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 12.41 GHz.

5-17. Maximum Roll-off.

a. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –10 dBm.

b. Press the Synthesized Sweeper "SWEEP TIME" FUNCTION key, then specify 5 seconds.

c. Press the Synthesized Sweeper "START FREQ" FUNCTION key, then specify 12.41 GHz.

d. Press the Synthesized Sweeper "STOP FREQ" FUNCTION key, then specify 12.9 GHz.

e. The Spectrum Analyzer must show that the I.F. OUTPUT sweeps from 10 MHz to 500 MHz.

The HP 5364A I.F. OUTPUT Power must not vary more than 8 dB during each 5-second sweep. From 10 MHz to 90 MHz, I.F. OUTPUT power must not vary more than 3 dB.

Record the variation as the "Maximum Roll Off" on the Test Record.

5-18. Conversion Gain.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 12.41 GHz.

b. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –10 dBm.

c. Record the difference between the I.F. OUTPUT Power shown on the Spectrum Analyzer and the R.F. INPUT Power (–10 dBm, set in step "b") as the 10 MHz "Conversion Gain" on the Test Record.

5-19. Gain Linearity and Compression.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 10.08 GHz.

b. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –20 dBm.

c. Change the Spectrum Analyzer REFERENCE LEVEL to 0 dBm and the LOG SCALE to 2dB/Div.

d. On the Test Record, record the HP 5364A I.F. OUTPUT power level shown on the Spectrum Analyzer as you increase the HP 5364A R.F. INPUT power from –20 dBm to –2 dBm in 1-dB steps.

e. As indicated on the Test Record, calculate and record the Gain Linearity and Compression values.

5-20. 17.5 GHz L.O. INPUT

a. Disconnect the Power Sensor from the Power Splitter.

b. Note the Cal Factor % for a 17.5 GHz input as indicated on the Power Sensor. Set the Power Meter CAL FACTOR to the same percentage.

c. Disconnect the 2-18 GHz cable from the HP 5364A L.O. INPUT, and connect its free end to the Power Sensor.

d. Set the Synthesized Signal Generator Frequency to 17.5 GHz.

e. Adjust the Synthesized Signal Generator OUTPUT LEVEL vernier until the Power Meter reads +8.00 dBm.

f. Disconnect the 2-18 GHz cable at the Power Sensor and connect its free end to the HP 5364A L.O. INPUT.

g. Reconnect the Power Sensor to the Power Splitter.

h. Set the Spectrum Analyzer REFERENCE LEVEL to +10 dBm and the LOG Scale to 5 dB/Div.

i. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 17.51 GHz.

5-21. Maximum Roll-off.

a. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –10 dBm.

b. Press the Synthesized Sweeper "SWEEP TIME" FUNCTION key, then specify 5 seconds.

c. Press the Synthesized Sweeper "START FREQ" FUNCTION key, then specify 17.51 GHz.

d. Press the Synthesized Sweeper "STOP FREQ" FUNCTION key, then specify 18.0 GHz.

e. The Spectrum Analyzer must show that the I.F. OUTPUT sweeps from 10 MHz to 500 MHz.

The HP 5364A I.F. OUTPUT power must not vary more than 8 dB during each 5-second sweep. From 10 MHz to 90 MHz, I.F. OUTPUT power must not vary more than 3 dB.

Record this variation in power as the Maximum Roll Off on the Test Record.

5-22. Conversion Gain.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 17.51 GHz.

b. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –10 dBm.

c. Record the difference between the I.F. OUTPUT Power shown on the Spectrum Analyzer and the HP 5364A R.F. INPUT power (–10 dBm, set in step "b") as the 10 MHz "Conversion Gain" on the Test Record.

5-23. Gain Linearity and Compression.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then enter 17.58 GHz.

b. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –20 dBm.

c. Change the Spectrum Analyzer REFERENCE LEVEL to 0 dBm and the LOG SCALE to 2dB/Div.

d. Record each HP 5364A I.F. OUTPUT power level shown on the Spectrum Analyzer as you increase the HP 5364A R.F. INPUT power from –20 dBm to –2 dBm in 1-dB steps.

e. As indicated on the Test Record, calculate and record the Gain Linearity and Compression values.

5-24. VIDEO OUTPUT TESTS

These tests can be performed independently of the I.F. OUTPUT tests given above.

5-25. Set-up

a. If you did not perform the I.F. OUTPUT tests given above –

1. Calibrate the Power Sensor-Power Meter combination as described in the I.F. OUTPUT set-up information.
2. Set up the Synthesized Sweeper as described in the I.F. OUTPUT information.

b. Turn Pulse/Function Generator power to ON.

c. Set the Pulse/Function Generator front-panel controls as follows –

Function = Pulse (press pulse symbol key)
Pulse Width = 1 μs (select WID, then use RANGE and VERNIER controls)
Pulse Repetition Rate = 2 μs (select FRQ, then use RANGE and VERNIER controls to set 500 kHz)
Output Level = 0 to 5 volts (TTL level) (use LOL, HIL, and RANGE and VERNIER controls to set these levels, respectively)

d. Connect Pulse/Function Generator to Synthesized Sweeper PULSE MODULATION Input. (See *Figure 5-2.*)

e. Disconnect Synthesized Signal Generator from HP 5364A L.O. INPUT.

f. Connect HP 5364A VIDEO OUTPUT to Digitizing Oscilloscope.

g. Note the CAL FACTOR % for a 10 GHz frequency input as indicated on the Power Sensor. Set the Power Meter CAL FACTOR to the same percentage.

h. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 12.4 GHz.

i. Press the Synthesized Sweeper "PULSE" MODULATION key. (LED should light.)

5-26. Test Procedures

5-27. DEVIATION FROM SQUARE LAW, AND COMPRESSION

a. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter display reads –12 dBm.

b. On the Test Record, record the HP 5364A VIDEO OUTPUT voltage (p-p) shown by the Digitizing Oscilloscope.

c. Record each HP 5364A VIDEO OUTPUT voltage peak-to-peak voltage level shown by the Digitizing Oscilloscope as you increase the POWER LEVEL from the Synthesized Sweeper from –12 dBm to +3 dBm in 1-dB steps.

d. As indicated on the Test Record, calculate and record the Deviation from Square Law value, and the Compression value.

5-28. OUTPUT LEVEL (FOR –12 dBm R.F. INPUT)

a. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –12 dBm.

   The VIDEO OUTPUT must be more than 10 mV (p-p), as shown by the Digitizing Oscilloscope. Record this value at the "10 GHz" point on the Test Record.

b. Note the CAL FACTOR % for a 2 GHz frequency input as indicated on the Power Sensor. Set the Power Meter CAL FACTOR to the same percentage.

c. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 2 GHz.

d. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until Power Meter reads –12 dBm.

   The VIDEO OUTPUT must be more than 50 mV (p-p), as shown by the Digitizing Oscilloscope. Record this value at the "2 GHz" point on the Test Record

e. Note the CAL FACTOR % for an 18 GHz frequency input as indicated on the Power Sensor. Set the Power Meter CAL FACTOR to the same percentage.

f. Press the CW key on the Synthesized Sweeper, then enter 18 GHz.

g. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads –12 dBm.

   The VIDEO OUTPUT must be more than 10 mV (p-p), as shown by the Digitizing Oscilloscope. Record this value at the "18 GHz" point on the Test Record.

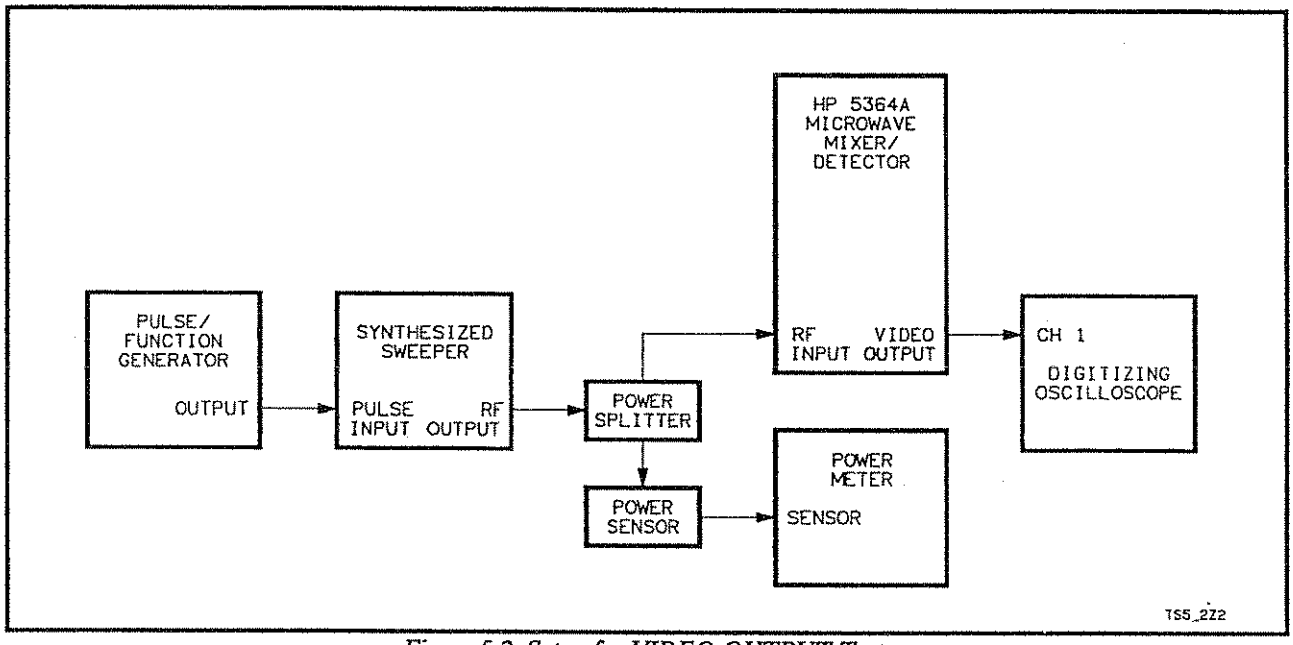


Figure 5-2. Setup for VIDEO OUTPUT Tests

5-29. VIDEO OUTPUT Risetime

5-30. SET-UP

Refer to *Figure 5-3*.

a. Disconnect all inputs to the HP 5364A. Set the HP 5364A Attenuator to 0 dB.

b. Connect the Mixer "R" port directly to the HP 5364A R.F. INPUT.

c. Set the Pulse/Function Generator for –

Function = Pulse (press pulse symbol key)
Pulse Width = 100 ns (select WID, then use RANGE and VERNIER controls)
Pulse Repetition Rate = 1 μs (select FRQ, then use RANGE and VERNIER controls to set 1 MHz)
Output Level = 0 to 0.4 volts (TTL level) (use LOL, HIL, and RANGE and VERNIER controls to set these levels, respectively)

d. Use a BNC-BNC cable to connect the Pulse/Function Generator output to Mixer "I" port. (Use adapters as required.)

e. Set the Synthesized Sweeper for –

FUNCTION = CW, 2 GHz
POWER LEVEL = +10 dBm

f. Use a 2-18 GHz cable to connect the Synthesized Sweeper RF Output to the Mixer "L" port.

5-31. R.F. INPUT = 2 GHZ

5-32. Digitizing Oscilloscope Set-up.

a. Use a BNC-BNC cable to connect the HP 5364A VIDEO OUTPUT to the Digitizing Oscilloscope Channel 1 input.

b. Press the AUTOSCALE hardkey.

c. Press the "Timebase" softkey, then change the Sweep Speed to 2 ns/Div.

d. Press the "Delta V" softkey, then select the "Vmarkers" softkey.

e. Press the "Auto Top-Base" softkey, then make the "20-80%" softkey selection.

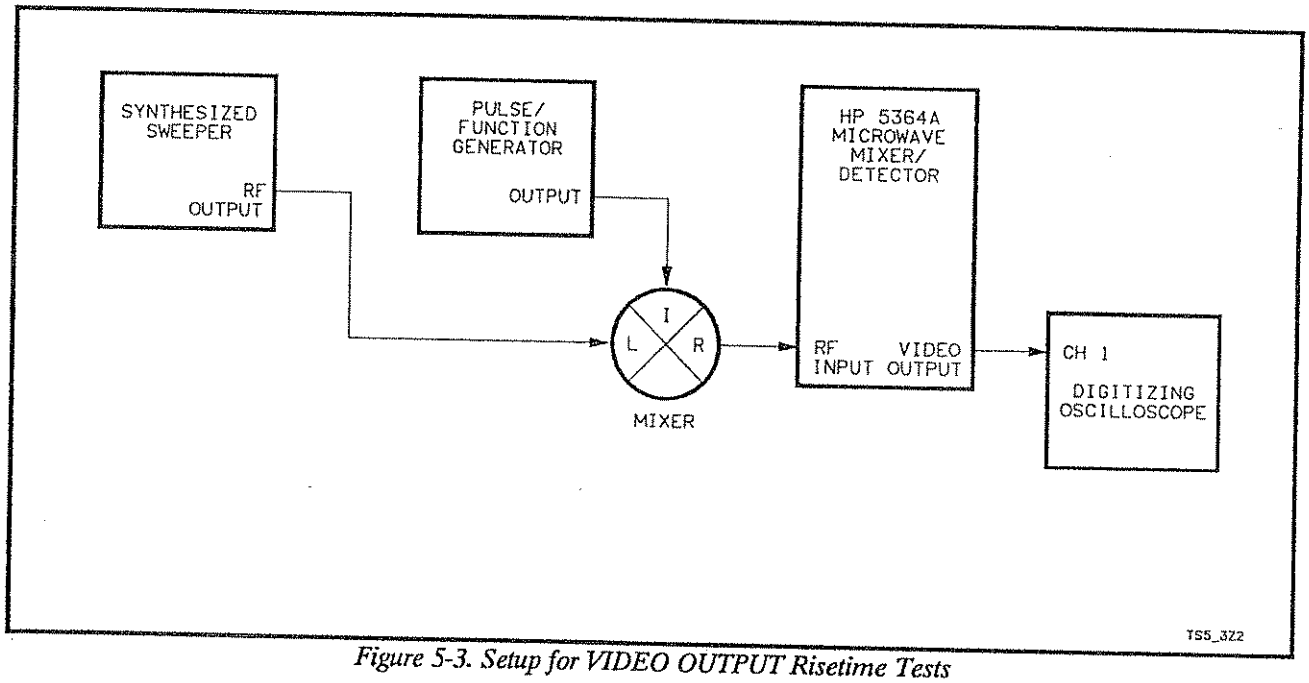


Figure 5-3. Setup for VIDEO OUTPUT Risetime Tests

5-33. 20%-80% Rise-Time Measurement.

a. Press the "Delta t" softkey, then select the "Tmarkers" softkey.

b. Change the "START ON POS EDGE" and "STOP ON POS EDGE" softkeys to "START ON NEG EDGE" and "STOP ON NEG EDGE", respectively. Then press the "Precise Edge Find" softkey.

c. Record the absolute value of the "Delta T" time shown on the oscilloscope as the Risetime on the Test Record. (See *Figure 5-4* for oscilloscope display.)

The 20%-80% Risetime must be less than 7.5 ns.

In AUTOSCALE, the HP 54111A Oscilloscope gives a negative value for the risetime because it makes its measurement from the lower marker (its "20%" marker) to the upper marker (its "80%" marker), regardless

of the slope being measured. To have the oscilloscope display a positive risetime value for a negative slope, you cannot use the AUTOSCALE function, and must set the Delta V markers manually.

5-34. R.F. INPUT = 10 GHZ

5-35. Digitizing Oscilloscope Set-up.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then enter 10 GHz.

b. Press the oscilloscope AUTOSCALE hardkey.

c. Press the "Timebase" softkey, then change the Sweep Speed to 2 ns/Div.

d. Press the "Delta V" softkey, then press the "Vmarkers" softkey.

e. Press the "Auto Top-Base" softkey, then make the "20-80%" softkey selection.

5-36. 20%-80% Risetime Measurement.

f. Press the "Delta t" softkey, then press the "Tmarkers" softkey.

g. Change the "START ON POS EDGE" and "STOP ON POS EDGE" softkeys to "START ON NEG EDGE" and "STOP ON NEG EDGE", respectively. Then press "Precise Edge Find" softkey.

h. Record the absolute value of the "Delta T" time shown on the oscilloscope as the Risetime on the Test Record. (See *Figure 5-4* for oscilloscope display.)

The 20%-80% Risetime must be less than 7.5 ns.

5-37. R.F. INPUT = 18 GHZ

5-38. Digitizing Oscilloscope Set-up.

a. Press the Synthesized Sweeper "CW" FUNCTION key, then enter 18 GHz.

b. Press the oscilloscope AUTOSCALE hardkey.

c. Press the "Timebase" softkey, then change the Sweep Speed to 2 ns/Div.

d. Press the "Delta V" softkey, then select the "Vmarkers" softkey.

e. Press the "Auto Top-Base" softkey, then make the "20-80%" softkey selection.

5-39. 20%-80% Risetime Measurement.

a. Press the "Delta t" softkey, then select the "Tmarkers" softkey.

b. Change the "START ON POS EDGE" and "STOP ON POS EDGE" softkeys to "START ON NEG EDGE" and "STOP ON NEG EDGE", respectively.

c. Record the absolute value of the "Delta T" time shown on the oscilloscope as the Risetime on the Test Record. (See *Figure 5-4* for oscilloscope display.)

The 20%-80% Risetime must be less than 7.5 ns.

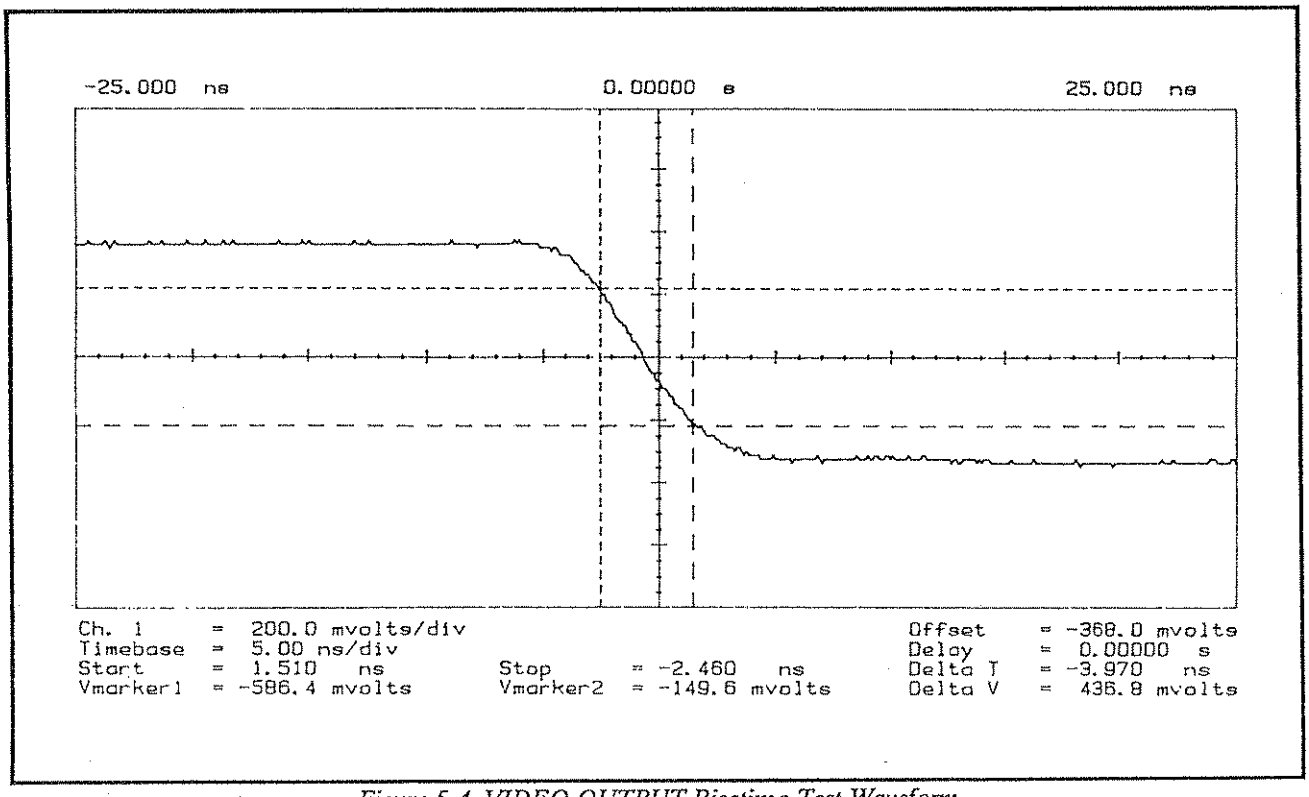


Figure 5-4. VIDEO OUTPUT Risetime Test Waveform

5-40. I.F. GROUP DELAY RIPPLE

"I.F. Group Delay Ripple" describes the flatness of the group delay across the I.F. bandwidth. It is the difference between the maximum group delay and the minimum group delay across the I.F. bandwidth.

I.F. Group Delay Ripple can be measured directly using a Network Analyzer. If a Network Analyzer is not available, an indirect method, using a Synthesized Sweeper and a Spectrum Analyzer can be used.

The preferred method uses an HP 8753A Network Analyzer because it can measure group delay directly across the full frequency range (20-500 MHz) for which it is specified. If an HP 8753A is not available, an HP 8510A/B Network Analyzer can measure the group delay directly between 45 MHz and 500 MHz.

If a Network Analyzer is not available, an indirect method of verifying the group delay can be used. Although the indirect method cannot determine the actual I.F. Group Delay Ripple, it can give a high degree of confidence that the I.F. Group Delay Ripple is within specification. The indirect method uses a Spectrum Analyzer to verify the flatness of the amplitude response across the I.F. bandwidth. If the amplitude response is not flat as indicated in the test procedure provided in section 5-43 below, then the I.F. Group Delay Ripple should be verified directly with a network analyzer.

5-41. 20-500 MHz Test, Using an HP 8753A Network Analyzer

a. Disconnect all inputs to the HP 5364A.

b. Remove semi-rigid coaxial cable W2 between the HP 5364A rear-panel MIXER OUTPUT and IF AMP INPUT connectors.

c. Connect the following HP 8753A outputs to the HP 85046A S-Parameter Test Set –

d. Turn power on to the HP 8753A and the HP 5364A.

HP 8753A OUTPUT	– to –	HP 85046A INPUT
RF OUT		RF IN
R		R
A		A
B		B
(rear-panel) TEST SET INTERCONNECT		(rear-panel) NETWORK ANALYZER INTERCONNECT

e. Set the HP 8753A as follows –

ACTIVE CHANNEL = CHANNEL 1
MEAS RESPONSE = TRANS: FWD S21 (B/R)
FORMAT = DELAY
AVERAGING = ON
AVERAGING FACTOR = 15
SMOOTHING = ON
SMOOTHING APERTURE = 5%
STIMULUS POWER = –10 dBm
ATTENUATOR PORT 1 = 20 dB
STIMULUS START = 20 MHz
STIMULUS STOP = 500 MHz
SWEEP TIME = 100 ms
SCALE REF = AUTO SCALE

f. Attach an N(m)-to-N(m) RF cable to HP 85046A PORT 1 and another to PORT 2.

g. Connect the free end of the PORT 1 cable to the free end of the PORT 2 cable, using adapters as required,

h. Perform a RESPONSE THRU CALIBRATION on the two cables.

1. Press CAL.
2. CALIBRATE MENU.
3. Press RESPONSE,
4. Press THRU.
5. When the "WAIT-MEASURING CAL STANDARD" message disappears, press DONE: RESPONSE.

i. Connect the PORT 1 cable to the HP 5364A rear-panel I.F. AMP INPUT. (Use adapters as required.)

j. Connect the PORT 2 cable to the HP 5364A front-panel I.F. OUTPUT. (See *Figure 5-5.*) (Use adapters as required.)

k. Select AUTOSCALE to rescale the display.

l. Use the MKR and MKR FCTN menus to position Marker 1 at the maximum group delay value and Marker 2 at the minimum group delay value.

Use the MKR SEARCH MAX AND MIN softkeys.

m. Measure the difference between the Marker 1 and Marker 2 position.

Use the Delta Mode Menu, DELTA REF = 1.

The result is given in picoseconds at the upper right-hand corner of the CRT display. (See *Figure 5-6.*) Write this value on the Test Record as "I.F. Group Delay Ripple".

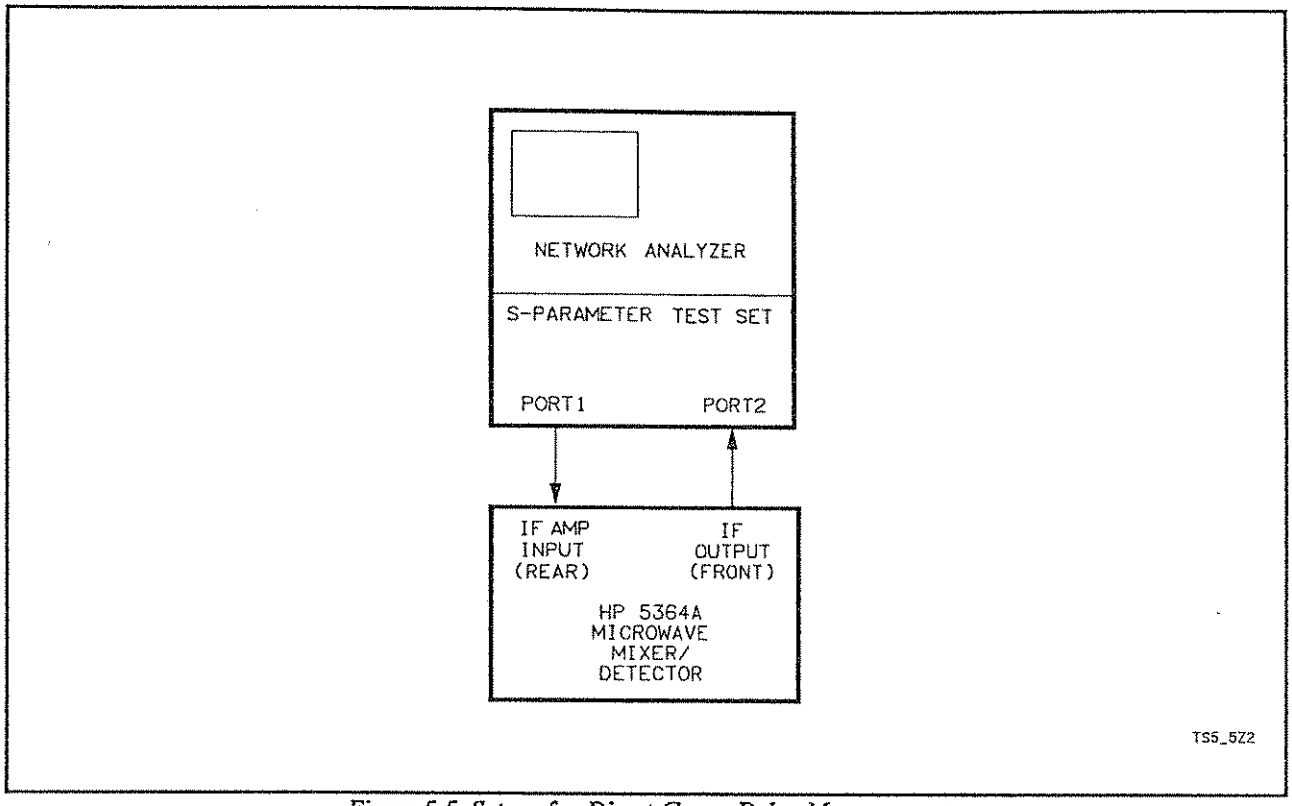


Figure 5-5. Set-up for Direct Group Delay Measurement

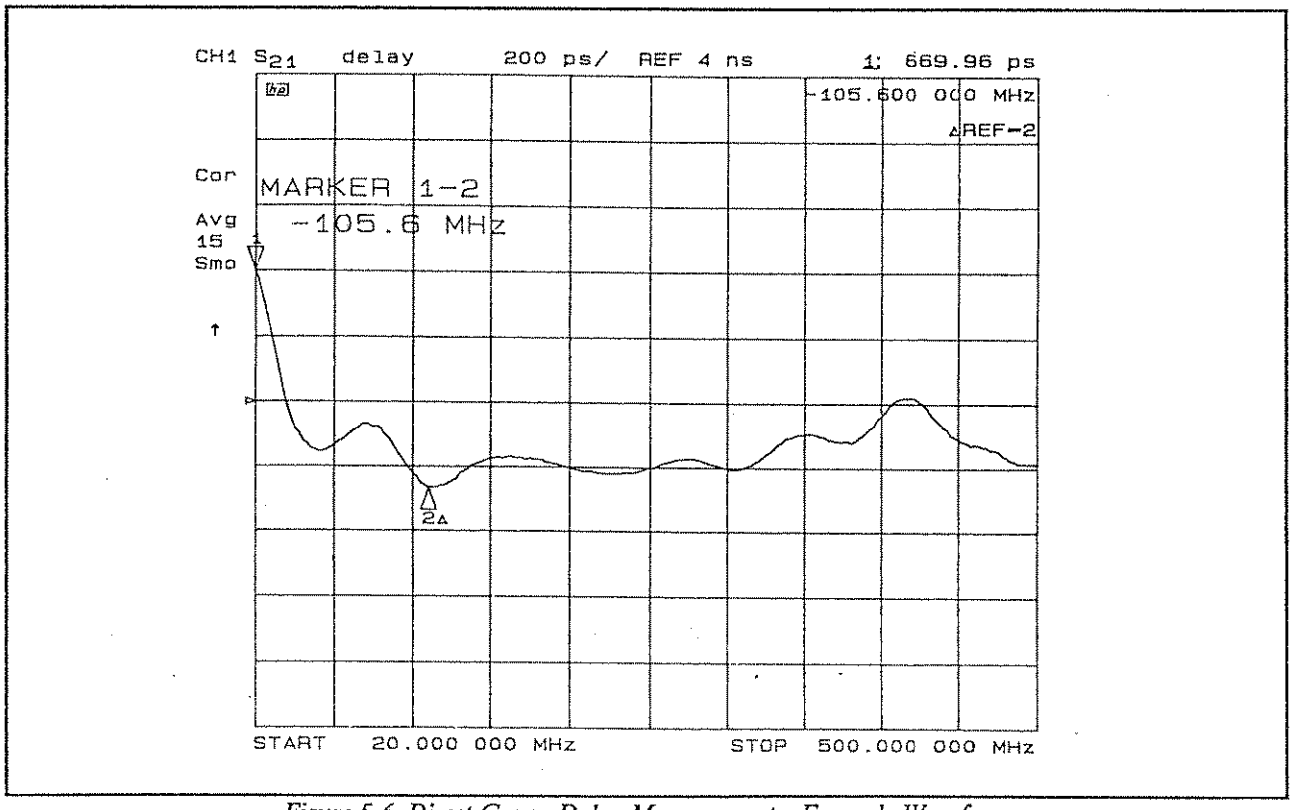


Figure 5-6. Direct Group Delay Measurement—Example Waveform

5-42. 45-500 MHz Test, Using an HP 8510A/B Network Analyzer

a. Disconnect all input signals from the HP 5364A.

b. Remove the semi-rigid coaxial cable W2 between the HP 5364A rear-panel MIXER OUTPUT and IF AMP INPUT.

c. Turn power on to the HP 8510A/B and the HP 5364A.

d. Set the HP 8510A/B as follows –

Select CHANNEL 2
PARAMETER = S21
FORMAT = DELAY
AVERAGING = ON
AVERAGING FACTOR = 15
SMOOTHING = ON
SMOOTHING APERTURE = 5%
STIMULUS POWER SOURCE 1 = –10 dBm
ATTENUATOR PORT 1 = 20 dB
STIMULUS START = 45 MHz
STIMULUS STOP = 500 MHz
SWEEP TIME = 100 ms
Select RESPONSE AUTO (Auto Scale)

e. Attach a cable to PORT 1 and another to PORT 2 of the HP 8515A S-Paramter Test Set.

f. Connect the free end of the PORT 1 cable to the free end of the PORT 2 cable using an adapter as required.

g. Perform a CAL 1 RESPONSE THRU calibration on the two cables.

1. Press CHANNEL 2.
2. Press CAL.
3. Press CAL 1.
4. Press CALIBRATE: RESPONSE.
5. Press THRU.
6. When the "WAIT-MEASURING CAL STANDARD" message disappears, press DONE: RESPONSE.
7. Press CAL SET *2 to save the calibration.

h. Connect PORT 1 to the HP 5364A rear-panel I.F. AMP INPUT.

i. Connect PORT 2 to the HP 5364A front-panel I.F. OUTPUT. (Refer to *Figure 5-5.*)

j. Select the RESPONSE AUTO hardkey to autoscale the CRT display.

k. Use the MARKER menu to position Marker 1 at the maximum group delay value and Marker 2 at the minimum group delay value. (Use the MAXIMUM AND MINIMUM softkey in the MARKER menu.)

l. Measure the difference between the Marker 1 and Marker 2 position. (Use the Delta Mode Menu.)

The result should be given in picoseconds just above the top graticule line of the CRT display. (See Figure 5-6.) Write this value on the Test Record as the "I.F. Group Delay Ripple."

5-43. Indirect Test

a. Disconnect all inputs to the HP 5364A.

b. Remove semi-rigid coaxial cable W2 between the HP 5364A rear-panel MIXER OUTPUT and IF AMP INPUT connectors.

c. Press the Synthesized Sweeper "START FREQ" FUNCTION key, then specify 0.01 GHz (10 MHz).

d. Press the Synthesized Sweeper "STOP FREQ" FUNCTION key, then specify 0.5 GHz (500 MHz).

e. Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then specify –40 dBm.

f. Press the Synthesized Sweeper "SWEEP TIME" FUNCTION key, then specify 5 seconds.

g. Connect the Synthesized Sweeper R.F. OUTPUT to the HP 5364A rear-panel IF AMP INPUT. (Use adapters as required.)

h. Set the SPECTRUM ANALYZER for –

CENTER FREQUENCY = 255 MHz
FREQUENCY SPAN = 500 MHz (50 MHz/Div)
REFERENCE LEVEL = –4 dBm
LOG SCALE = 1 dB/Div
RESOLUTION BW = 300 kHz

i. Connect HP 5364A I.F. OUTPUT to Spectrum Analyzer R.F. INPUT, via a BNC-BNC cable.

The Spectrum Analyzer must show that the HP 5364A I.F. OUTPUT sweeps from 10 MHz to 500 MHz. The I.F. OUTPUT power must not vary more than 3.5 dB during each 5-second sweep, and must have no sharp discontinuities. (See *Figure 5-7.*)

Record the I.F. OUTPUT as "I.F. Group Delay Ripple" on the Test Record.

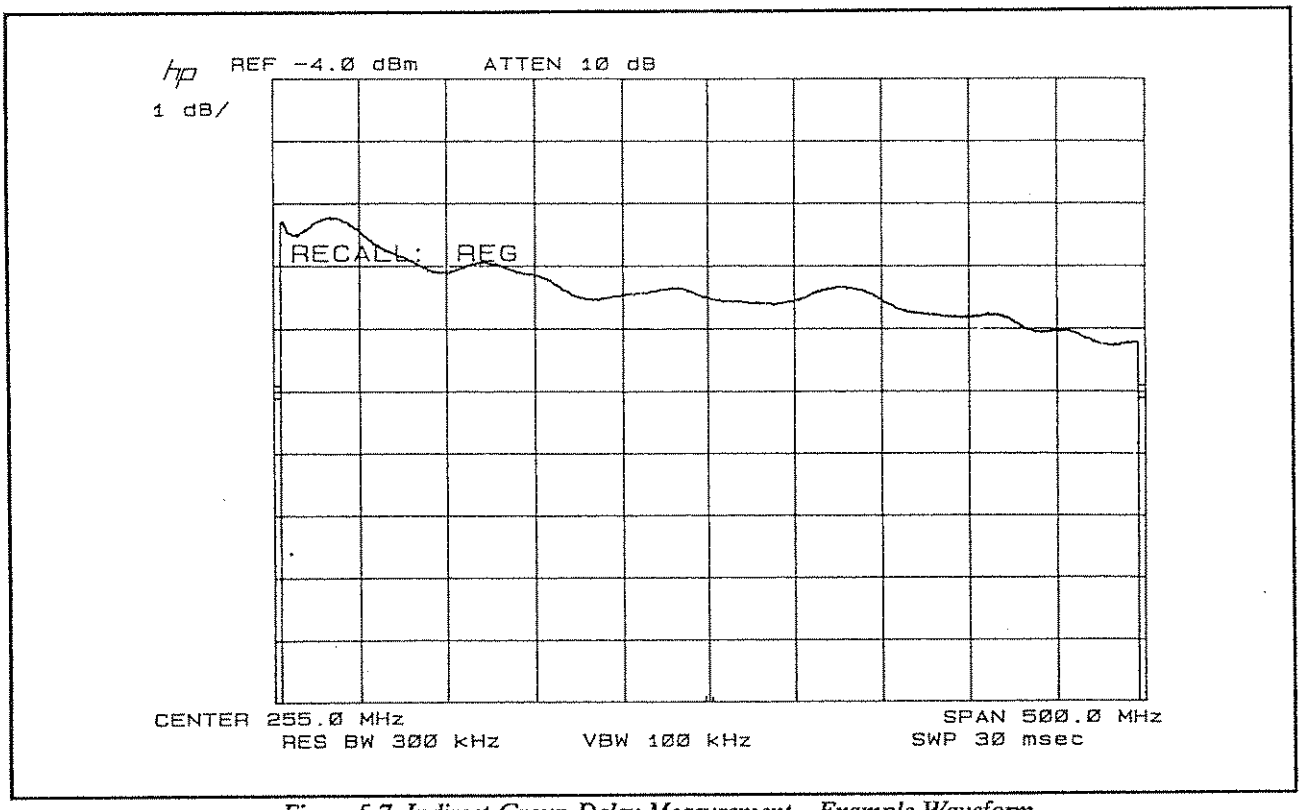


Figure 5-7. Indirect Group Delay Measurement—Example Waveform

HEWLETT-PACKARD MODEL 5364A
MICROWAVE MIXER/DETECTOR

Repair/Work Order No. _____

Serial Number: _____

Temperature: _____

Test Performed By: _____

Relative Humidity: _____

Date: _____

Post Calibration Test: ☐

Notes: _____

Pre Calibration Test: ☐

Step	Test Name	Test Results Min.	Actual	Max.
5-11 thru 5-14	L.O. = 2.2 GHz I.F. OUTPUT			
	Maximum Roll-off (I.F. = 10 MHz to 500 MHz)		_____ dB	<8 dB
	(I.F. = 10 MHz to 90 MHz)		_____ dB	<3 dB
	Conversion Gain: (I.F. = 10 MHz)	>4.5 dB	_____ dB	

Step	Test Name	Test Results Min.	Actual	Max.

Gain Linearity (I.F. = 80 MHz)

Data Record

R.F. INPUT Level	I.F. OUTPUT Level	Reference used for Calculations
-20 dBm	_____ dBm	P_1
-19 dBm	_____ dBm	P_2
-18 dBm	_____ dBm	P_3
-17 dBm	_____ dBm	P_4
-16 dBm	_____ dBm	P_5
-15 dBm	_____ dBm	P_6
-14 dBm	_____ dBm	P_7
-13 dBm	_____ dBm	P_8
-12 dBm	_____ dBm	P_9
-11 dBm	_____ dBm	P_{10}
-10 dBm	_____ dBm	P_{11}
-9 dBm	_____ dBm	P_{12}
-8 dBm	_____ dBm	P_{13}
-7 dBm	_____ dBm	P_{14}
-6 dBm	_____ dBm	P_{15}
-5 dBm	_____ dBm	P_{16}
-4 dBm	_____ dBm	P_{17}
-3 dBm	_____ dBm	P_{18}
-2 dBm	_____ dBm	P_{19}

Step	Test Name	Test Results Min.	Actual		Max.
	Gain Linearity Calculations (results in dB):				
	$2 * (P_2-P_1) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_3-P_2) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_4-P_3) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_5-P_4) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_6-P_5) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_7-P_6) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_8-P_7) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_9-P_8) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{10}-P_9) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{11}-P_{10}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{12}-P_{11}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{13}-P_{12}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{14}-P_{13}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{15}-P_{14}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{16}-P_{15}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{17}-P_{16}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{18}-P_{17}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	Compression: . . . $2 * (P_{19}-P_{18}) - 2$:		_____	dB	<1 dB

Step	Test Name	Test Results Min	Actual	Max.
5-15 thru 5-19	L.O. = 12.4 GHz I.F. OUTPUT			
	Maximum Roll-off (I.F. = 10 MHz to 500 MHz)		_____ dB	<8 dB
	(I.F. = 10 MHz to 90 MHz)		_____ dB	<3 dB
	Conversion Gain: (I.F. = 10 MHz)	>4.5 dB	_____ dB	

Gain Linearity (I.F. = 80 MHz)

Data Record

R.F. INPUT Level	I.F. OUTPUT Level	Reference used for Calculations
-20 dBm	_____ dBm	P_1
-19 dBm	_____ dBm	P_2
-18 dBm	_____ dBm	P_3
-17 dBm	_____ dBm	P_4
-16 dBm	_____ dBm	P_5
-15 dBm	_____ dBm	P_6
-14 dBm	_____ dBm	P_7
-13 dBm	_____ dBm	P_8
-12 dBm	_____ dBm	P_9
-11 dBm	_____ dBm	P_{10}
-10 dBm	_____ dBm	P_{11}
-9 dBm	_____ dBm	P_{12}
-8 dBm	_____ dBm	P_{13}
-7 dBm	_____ dBm	P_{14}
-6 dBm	_____ dBm	P_{15}
-5 dBm	_____ dBm	P_{16}
-4 dBm	_____ dBm	P_{17}
-3 dBm	_____ dBm	P_{18}
-2 dBm	_____ dBm	P_{19}

Step	Test Name	Test Results Min.	Actual		Max.
	Gain Linearity Calculations (results in dB):				
	$2 * (P_2-P_1) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_3-P_2) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_4-P_3) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_5-P_4) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_6-P_5) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_7-P_6) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_8-P_7) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_9-P_8) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{10}-P_9) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{11}-P_{10}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{12}-P_{11}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{13}-P_{12}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{14}-P_{13}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{15}-P_{14}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{16}-P_{15}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{17}-P_{16}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	$2 * (P_{18}-P_{17}) - 2$:	-1.3 dB	_____	dB	+1.3 dB
	Compression: . . . $2 * (P_{19}-P_{18}) - 2$:		_____	dB	<1 dB

Step	Test Name	Test Results Min.	Actual	Max.
5-20 thru 5-23	L.O. = 17.5 GHz I.F. OUTPUT			
	Maximum Roll-off (I.F. = 10 MHz to 500 MHz)		____ ____ dB	<8 dB
	(I.F. = 10 MHz to 90 MHz)		_____ dB	<3 dB
	Conversion Gain: (I.F. = 10 MHz)	>4.5 dB	_____ dB	
	Gain Linearity (I.F. = 80 MHz)			

Data Record

R.F. INPUT Level	I.F. OUTPUT Level	Reference used for Calculations
-20 dBm	_____ dBm	P_1
-19 dBm	_____ dBm	P_2
-18 dBm	_____ dBm	P_3
-17 dBm	_____ dBm	P_4
-16 dBm	_____ dBm	P_5
-15 dBm	_____ dBm	P_6
-14 dBm	_____ dBm	P_7
-13 dBm	_____ dBm	P_8
-12 dBm	_____ dBm	P_9
-11 dBm	_____ dBm	P_{10}
-10 dBm	_____ dBm	P_{11}
-9 dBm	_____ dBm	P_{12}
-8 dBm	_____ dBm	P_{13}
-7 dBm	_____ dBm	P_{14}
-6 dBm	_____ dBm	P_{15}
-5 dBm	_____ dBm	P_{16}
-4 dBm	_____ dBm	P_{17}
-3 dBm	_____ dBm	P_{18}
-2 dBm	_____ dBm	P_{19}

Step	Test Name	Test Results Min.	Actual	Max.
	Gain Linearity Calculations (results in dB):			
	$2 * (P_2-P_1) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_3-P_2) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_4-P_3) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_5-P_4) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_6-P_5) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_7-P_6) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_8-P_7) - 2$:	-1.3 dB	_____ dB	+1 3 dB
	$2 * (P_9-P_8) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{10}-P_9) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{11}-P_{10}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{12}-P_{11}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{13}-P_{12}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{14}-P_{13}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{15}-P_{14}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{16}-P_{15}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{17}-P_{16}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	$2 * (P_{18}-P_{17}) - 2$:	-1.3 dB	_____ dB	+1.3 dB
	Compression: . . . . $2 * (P_{19}-P_{18}) - 2$:		_____ dB	<1 dB

Step	Test Name	Test Results Min.	Actual	Max.
5-26 thru 5-39	VIDEO OUTPUT			

Data Record

R.F. INPUT Level	VIDEO OUTPUT Level	Reference used for Calculations
-12 dBm	_____ mV	V_1
-11 dBm	_____ mV	V_2
-10 dBm	_____ mV	V_3
-9 dBm	_____ mV	V_4
-8 dBm	_____ mV	V_5
-7 dBm	_____ mV	V_6
-6 dBm	_____ mV	V_7
-5 dBm	_____ mV	V_8
-4 dBm	_____ mV	V_9
-3 dBm	_____ mV	V_{10}
-2 dBm	_____ mV	V_{11}
-1 dBm	_____ mV	V_{12}
0 dBm	_____ mV	V_{13}
+1 dBm	_____ mV	V_{14}
+2 dBm	_____ mV	V_{15}
+3 dBm	_____ mV	V_{16}

Calculations of Deviation from Square Law . . . . . (results in dB):

	Min.	Actual	Max.
$20 * \log_{10}(V_2/V_1) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_3/V_2) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_4/V_3) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_5/V_4) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_6/V_5) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_7/V_6) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_8/V_7) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_9/V_8) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_{10}/V_9) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_{11}/V_{10}) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_{12}/V_{11}) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_{13}/V_{12}) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_{14}/V_{13}) - 2$:	-2 dB	_____ dB	+2 dB
$20 * \log_{10}(V_{15}/V_{14}) - 2$:	-2 dB	_____ dB	+2 dB

Step	Test Name	Min.	Test Results Actual	Max.
	Compression: $20 * \log_{10}(V_{16}/V_{15}) - 2$:		_____ dB	<1 dB
	Output Level: . . . . . 10 GHz:	>10 mV p-p	_____ mV	
	2 GHz:	>50 mV p-p	_____ mV	
	18 GHz:	>10 mV p-p	_____ mV	
	Risetime (20-80%) . . . . . 2 GHz		_____ ns	<7.5 ns
	12.4 GHz		_____ ns	<7.5 ns
	18 GHz		_____ ns	<7.5 ns

****

I.F. GROUP DELAY RIPPLE
Indicate test method and results.

5-41	☐ 20-500 MHz Test, Using an HP 8753A Network Analyzer .		_____ ns	<1.5 ns
5-42	☐ 45-500 MHz Test, using an HP 8510A/B Network Analyzer		_____ ns	<1.5 ns
5-43	☐ Indirect Test		_____ dB	<3.5 dB*

* Note that this is an indirect test of I.F. Group Delay Ripple. The "<3.5 dB" maximum value allowed for this test is not an HP 5364A performance specification. Rather, it is the maximum value that can occur with this test and still provide a high degree of confidence that the HP 5364A would meet its "<1.5 ns" specification if a direct method of testing for I.F. Group Delay Ripple were used.

SECTION 6
REPLACEABLE PARTS

6-1. INTRODUCTION

This section contains lists of replaceable parts for the Model 5364A Microwave Mixer/Detector.

For an illustration of the Model 5364A internal parts locations, see *Figure 8-2.*

Component locator and schematic diagrams for the Power Supply board assembly are in *Figure 8-4.*

6-2. PARTS LISTS

Replaceable parts for the HP 5364A and its Power Supply board are listed as follows –

- Parts for the entire HP 5364A are listed in *Table 6-1.*
- Parts for the Power Supply board are listed in *Table 6-2.*

Within each Parts List table below –

a. In alpha-numerical order by reference designation.

b. Some mechanical parts closely related to a specific electrical component may be listed after the component's entry, with or without a separate reference designation

The information given for each part consists of –

a. The Reference Designator ("Ref. Des.") for the part.

b. The Hewlett-Packard part number.

c. A "Check Digit", in the "CD" column.

   The "Check Digit" is based on the HP Part Number, and is used to help reduce part-number problems when parts are ordered.

d. The number of times ("Qty") each part (by HP Part Number) occurs in the list.

   The quantity information for each part is given only once in each list – at the first occurrence of that HP Part Number in that list. Later entries having the same HP Part Number will have no number in the "Qty" column. The "Qty" information in any list is for that list only.

e. The description of the part.

f. A typical manufacturer of the part, in a five-digit code.

   A Manufacturer's-code-to-name conversion list is provided in *Table 6-3.*

g. The manufacturer's number for the part.

6-3. HOW TO ORDER A PART

Hewlett-Packard wants to keep your parts ordering process as simple and efficient as possible. Think of the process as having the following steps –

- Identifying the part and the quantity you want.
- Determining the ordering method to be used and contacting Hewlett-Packard.

6-4. Parts Identification

To identify the part(s) you want, first refer to the Service information in the manual for the product. Use schematic diagrams and component locator diagrams, and parts list descriptions.

When ordering from Hewlett-Packard, the important numbers to note from the Parts List are the HP Part Number and part-number check digit (in the "CD" column), and the quantity of the part you want.

If the part you want is *not* identified in the manual, you can call on Hewlett-Packard for help (see "Contacting Hewlett-Packard" below). Please have the following information at hand when you contact HP for help –

- Instrument Model Number (example "HP 5364A").
- Complete instrument Serial Number (example "1234A56789"). Information about where to find the serial number is given at the front of this manual.
- Description of the part and its use.
- Quantity of the part required.

6-5. Contacting Hewlett-Packard

Depending on where you are in the world, there are one or more ways in which you can get parts or parts information from Hewlett-Packard.

- **Outside the United States,** contact your local HP sales office. HP sales offices are listed at the back of this manual.
- **Within the United States,** we encourage you to order replacement parts or request parts information directly by telephone or mail from the HP Support Materials Organization, using the telephone numbers or address listed below. (You can also contact your local HP sales office. HP sales offices are listed at the back of this manual.)

  By telephone –

  - For Parts Ordering, use our toll-free number, (800) 227-8164, Monday through Friday (except Holidays), 6am to 5pm (Pacific Time).

    If you need a part in a hurry, an extra-cost Hotline phone ordering service is available, 24 hours a day. Use the toll-free number above at the times indicated; at other times, use (415) 968-2347.

  - For Parts Identification Assistance, call us at (916) 783-0804. Our Parts Identification hours are – Monday through Friday, 6am to 5pm (Pacific Time).

  For mail correspondence, use the address below –

  Hewlett-Packard
  Support Materials Roseville
  P.O. Box 1145
  Roseville, CA 95661-1145

Table 6-1. HP 5364A Microwave Mixer/Detector — Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	0955-0018	5	1	POWER DIVIDER: COAX: VSWR=1.25 DC TO	28480	0955-0018
A2	0955-0431	6	1	U-WAVE MIXER 18 GHZ MAX	14482	WJ-M85C
A3	05364-60213	8	1	AMPLIFIER - IF	28480	05364-60213
A4	0955-0442	9	1	PWR MONITOR-18GZ	28480	0955-0442
A5	0955-0438	3	1	U-WAVE AMPLIFIER 170 MHZ MAX	28480	0955-0438
A6	05364-60211	6	1	CBL AY-PWR MDL	28480	05364-60211
A6F1A	2110-0201	0	1	FUSE .25A 250V TD FE UL	11870	60.0025
A6F1B	2110-0318	0	1	FUSE .125A 250V TD FE UL (FOR 220/240V)	16428	MDL 1/8
A7	05364-60001	2	1	BD-AY PWR SUPPLY	28480	05364-60001
A8	05364-60210	5	1	LED ASSY	28480	05364-60210
A9	05364-60212	7	1	CBL AY-PWR SW	28480	05364-60212
AT1	33321B H04	5	1	MNL-STEP ATTN (OPT H04)	28480	33321B H04
AT2	8493B	5	1	COAXIAL ATTEN	28480	8493B
FL1	0955-0435	0	1	U-WAVE FILTER-LOWPASS 500 MHZ MAX	28480	0955-0435
J1A	08971-20030	4	2	ADAPTR CONN APC	28480	08971-20030
J1B	08673-60040	9	2	CONN AY OUTPUT	28480	08673-60040
J2	1250-1696	4	2	ADAPTER-COAX STR F-BNC F-SMA	28480	1250-1696
J3	1250-1696	4		ADAPTER-COAX STR F-BNC F-SMA	28480	1250-1696
J4A	08971-20030	4		ADAPTR CONN APC	28480	08971-20030
J4B	08673-60040	9		CONN AY OUTPUT	28480	08673-60040
J5	1250-1753	4	2	ADAPTER-COAX STR F-SMA F-SMA	28480	1250-1753
J6	1250-1753	4		ADAPTER-COAX STR F-SMA F-SMA	28480	1250-1753
T1	9100-4737	1	1	TRANSFORMER	28480	9100-4737
W1	8120-1378	1	1	CBL AY-PWR CORD (TYPICAL LINE CORD FOR U.S.) (FOR OTHER TYPICAL LINE CORDS, (SEE TABLE 2-2.)	28480	8120-1378
W2	85660-20101	6	1	CBL IF SHORT	28480	85660-20101
W3	05364-60206	9	1	CBL AY-ATTN FPNL	28480	05364-60206
W4	05364-60205	8	1	CBL AY-ATTN DVDR	28480	05364-60205
W5	1250-1811	5	1	ADAPTER-COAX STR F-N F-SMA	06877	34N-SMA-50-2
W6	1250-1250	6	2	ADAPTER-COAX STR M-N F-SMA	28480	1250-1250
W7	1250-1159	4	3	ADAPTER-COAX STR M-SMA M-SMA	28480	1250-1159
W8	05364-60203	6	1	CBL AY-MXR RPNL	28480	05364-60203
W9	05364-60202	5	1	CBL AY-FLTR FPNL	28480	05364-60202
W10	1250-1159	4		ADAPTER-COAX STR M-SMA M-SMA	28480	1250-1159
W11	05364-60204	7	1	CBL AY-IF RPNL	28480	05364-60204
W12	05364-60201	4	1	CBL AY-MXR FPNL	28480	05364-60201
W13	1250-1250	6		ADAPTER-COAX STR M-N F-SMA	28480	1250-1250
W14	1250-1397	2	1	ADAPTER-COAX RTANG M-SMA M-SMA	05876	95-547-99024
W15	1250-1158	3	1	ADAPTER-COAX STR F-SMA F-SMA	28480	1250-1158
W16	1250-1159	4		ADAPTER-COAX STR M-SMA M-SMA	28480	1250-1159
W17	05364-60207	0	1	CBL AY-VAMP FPNL	28480	05364-60207
W18	05364-60209	2	1	CBL AY-IFAMP PWR	28480	05364-60209
W19	05364-60208	1	1	CBL AY-VAMP PWR	28480	05364-60208

Table 6-1. HP 5364A Microwave Mixer/Detector — Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
				CHASSIS AND CABINET PARTS		
	05364-00001	6		PANEL FRONT	28480	05364-00001
	05364-00002	7		SUBPANEL-FRONT	28480	05364-00002
	5021-5815	6	1	FRAME-FRONT	28480	5021-5815
	5040-7203	0	1	TRIM-TOP 1/2	28480	5040-7203
	5001-0439	8	2	TRIM-SIDE FRT	28480	5001-0439
	05364-00003	8		PANEL-REAR	28480	05364-00003
	5021-5816	7	1	FRAME-REAR	28480	5021-5816
	5001-0429	6	1	COVER TOP	28480	5001-0429
	5061-9455	2	2	COVER SIDE	28480	5061-9455
	5060-9802	1	1	STRAP HANDLE AY	28480	5060-9802
	5041-6819	4	1	STRP-HDLE CAP FR	28480	5041-6819
	0515-1132	4		SCREW-MACH M5 X 0.8 10MM-LG	28480	0515-1132
	0535-0081	2		NUT-HEX W/EXT-T-LKWR M5 X 0.8 3.3MM-THK	00000	ORDER BY DESCRIPTION
	5041-6820	7	1	STRP-HDLE CAP R	28480	5041-6820
	5061-9441	6	1	COVER BOTTOM	28480	5061-9441
	5040-7201	8	4	FOOT	28480	5040-7201
	1460-1345	5	2	TILT STAND SST	28480	1460-1345
	5021-5835	0	4	STRUT-CORNER	28480	5021-5835
	05364-00004	9		PAN-FLOOR	28480	05364-00004
	05364-00010	7		BRKT-PWR SPLTR	28480	05364-00010
	05364-00007	2		BRKT-MIXER	28480	05364-00007
	05364-00008	3		BRKT-FILTER	28480	05364-00008
	05364-00009	4		BRKT ATTENUATOR	28480	05364-00009
	05364-00006	1		BRKT-XFMR REAR	28480	05364-00006
				HARDWARE		
	0370-3135	3		KNOB .187SFT GRY	28480	0370-3135
	0380-1322	7		SPACER-SNAP-IN .440 IN LG; .280 IN OD	28480	0380-1322
	0515-0637	2		SCREW-MACH M3.5 X 0.6 35MM-LG PAN-HD	28480	0515-0637
	0515-0845	4		SCREW-MACH M3 X 0.5 18MM-LG PAN-HD	28480	0515-0845
	0515-0887	4		SCREW-MACH M3.5 X 0.6 6MM-LG PAN-HD	28480	0515-0887
	0515-0889	6		SCREW-MACH M3.5 X 0.6 6MM-LG	28480	0515-0889
	0515-0897	6		SCREW-MACH M3 X 0.5 8MM-LG PAN-HD	28480	0515-0897
	0515-1111	9		SCREW-MACH M3 X 0.5 16MM-LG PAN-HD	28480	0515-1111
	0515-1232	5		SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD	28480	0515-1232
	0515-1331	5		SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM	28480	0515-1331
	0515-1430	5		SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD	28480	0515-1430
	0520-0173	2		SCREW-MACH 2-56 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	1400-1231	2	3	CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE	02768	8511-37-00
	2190-0016	3	3	WASHER-LK INTL T 3/8 IN .377-IN-ID	78189	1920-02
	2200-0103	2	5	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2200-0117	8	2	SCREW-MACH 4-40 .875-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2200-0171	4	2	SCREW-MACH 4-40 .75-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
	2950-0001	8	3	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
	2950-0054	1	2	NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
	3050-0962	3	2	WASHER-FL MTLC 1/2 IN .503-IN-ID	28480	3050-0962

Table 6-2. Printed Circuit Board (05364-60001) — Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C1	0180-3280	6	2	CAPACITOR-FXD 1800UF+100-10% 40VDC AL	56289	674D178
C2	0180-3280	6		CAPACITOR-FXD 1800UF+100-10% 40VDC AL	56289	674D178
C5	0160-0576	5	2	CAPACITOR-FXD .1UF +-20% 50VDC CER	06383	FD12X7R1H104M
C6	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	06383	FD12X7R1H104M
CR1	1906-0069	4	1	DIODE-FW BRDG 400V 1A	28480	1906-0069
J1	0360-0124	3	5	CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J2	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J3	1251-4882	8	1	CONN-POST TYPE .156-PIN-SPCG 7-CONT	26742	3100-8-207-22
J4	1251-7776	5	1	CONN-POST TYPE .100-PIN-SPCG 2-CONT	27264	22-11-2022
J5	1251-7775	4	1	CONN-POST TYPE .100-PIN-SPCG 3-CONT	27264	22-11-2032
R1	0757-0816	1	1	RESISTOR 681 1% .5W TF TC=0+-100	K8479	H2
TP1	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
TP2	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
TP3	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
U1A	1826-0607	6	1	IC-REGULATOR 7815A	28480	1826-0607
U1B	1205-0462	5	2	HEAT SINK SGL TO-220-CS	28480	1205-0462
U2A	1826-0214	1	1	IC V RGLTR TO-220	04713	MC7915CT
U2B	1205-0462	5		HEAT SINK SGL TO-220-CS	28480	1205-0462
	05364-20001	8	1	BD-BLANK	28480	05364-20001

Table 6-3. Code List of Manufacturers

Mfr Code	Manufacturer Name	Address		Zip Code
K8479	HOLSWORTHY ELECTRONICS LTD	HOLSWORTHY	EG	
00000	ANY SATISFACTORY SUPPLIER			
02768	ITW FASTEX	DES PLAINES	IL US	60016
04713	MOTOROLA INC	ROSELLE	IL US	60195
05876	U S POLYMERIC INC	STAMFORD	CT	06904
06383	PANDUIT CORP	TINLEY PARK	IL US	60477
06877	UNITRON INSTRUMENTS INC	WOODBURY	NY	11797
11870	MELABS INC	PALO ALTO	CA	94304
14482	WATKINS-JOHNSON CO	PALO ALTO	CA US	94304
16428	COOPER INDUSTRIES INC	HOUSTON	TX US	77210
26742	METHODE ELECTRONICS INC	CHICAGO	IL US	60656
27264	MOLEX INC	LISLE	IL US	60532
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO	CA	94304
56289	SPRAGUE ELECTRIC CO	LEXINGTON	MA US	02173
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF	ELGIN	IL	60126

SECTION 7
MANUAL APPLICABILITY
and
MANUAL CHANGES

7-1. MANUAL APPLICABILITY

This manual describes the Model 5364A Microwave Mixer/Detector. This manual section describes changes between a Model 5364A that was made before this manual was produced and the one whose Serial Number Prefix appears on the title page.

A Model 5364A manufactured after this manual was printed may have a Serial Number Prefix that is not listed on the title page. This unlisted Serial Number Prefix indicates that the instrument may be different from those described in this manual. The manual for this new instruent is accompanied by a "Manual Changes" supplement containing "change" information that explains how to adapt the manual to the newer instrument. For more information about Serial Numbers and this manual, read "ABOUT THIS MANUAL" at the front of this man For information concerning a Serial Number Prefix that is not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

7-2. MANUAL CHANGES FOR OLDER PRODUCTS

To adapt this manual to an earlier Model 5364A, enter the appropriate backdating information (or the change number, if more convenient) into the appropriate places in the manual.

AT THE TIME OF THE FIRST PRINTING OF THIS MANUAL, THERE WERE NO CHANGES TO BE MADE FOR EARLIER VERSIONS OF THE MODEL 5364A.

SECTION 8
SERVICE INFORMATION

8-1. INTRODUCTION

Other than Power Supply board A7, there are no repairable parts in the HP 5364A; instrument repair consists primarily of identifying a defective part and replacing it.

Troubleshooting instructions begin at section 8-8.

Parts removal/installation instructions begin at section 8-14.

8-2. SAFETY AND OTHER CONSIDERATIONS

The WARNINGS and CAUTIONS below must be followed for your protection and to avoid damage to equipment.

WARNING

DISCONNECT THE HP 5364A FROM THE POWER LINE BEFORE YOU REMOVE ANY OF ITS COVERS.

WARNING

BE SURE ALL ELECTRICALLY OPERATED EQUIPMENT YOU USE IS PROPERLY GROUNDED.

CAUTION

Be sure to turn electrical power off whenever you are connecting or disconnecting test equipment, installing or removing parts, etc.

CAUTION

Take care that the semi-rigid coaxial conductors in the HP 5364A are not bent, pinched, dented or otherwise damaged. Damage to these components can impair HP 5364A performance.

8-3. REQUIRED/RECOMMENDED TEST EQUIPMENT AND TOOLS

Test equipment and tools required for service are listed in *Table 8-1.* Any equipment that satisfies critical specifications given there may be substituted for a recommended unit).

Other than the relatively routine maintenance described above, the HP 5364A requires little servicing.

Table 8-1. Required/Recommended Tools

Description
Allen-drive 5/64-inch
Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2
Nutdriver – 1/2 inch
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb
Wrench, Open-end – 5/8-inch

8-4. PARTS LISTS

Replaceable parts for the HP 5364A and its sub-assemblies are listed in Section 6 of this manual.

8-5. ACCESS TO INTERNAL COMPONENTS

WARNING

DISCONNECT THE HP 5364A FROM THE POWER LINE BEFORE YOU REMOVE ANY OF ITS COVERS.

Most HP 5364A internal components can be reached by removing only the top and side covers.

Removal or installation of many of these components is made easier by removing the upper right-hand side rail.

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

8-6. Top Cover

To **remove** the top cover –

a. Remove screw at rear of top cover handle.

b. Slide cover toward rear of instrument and remove.

WARNING

The soft outer part of the top cover handle is not attached to the inner metal strap portion of the handle. To avoid the possibility of injury, you should not pull on the handle to slide the cover off the instrument.

To **install** the top cover –

a. Slide top cover onto instrument, until its front end is under retaining lip portion of front panel.

b. Install handle cap at rear of top cover.

c. Install screw that fastens handle, handle cap, and top cover to rear of instrument.

8-7. Side and Bottom Covers

Each side cover and the bottom cover is held in place by a captive screw at its center rear.

To **remove** any of these covers, turn its screw counterclockwise until the cover can be removed from the instrument.

To **install** any of these covers –

a. Slide cover onto instrument, until its front end is under retaining lip portion of front panel.

b. Turn screw in cover clockwise until it is tight.

8-8. TROUBLESHOOTING

8-9. Initial Steps

a. Make sure rear-panel MIXER OUTPUT and IF AMP INPUT connectors are connected together by semi-rigid coaxial cable W2.

This connects the RF Path output to the IF Path input, and is required for normal HP 5364A operation. In some of the tests below, this coaxial cable is removed to allow the two paths to be checked independently.

b. Before proceeding –
   1) Turn off the HP 5364A power and disconnect its cord from the power line.
   2) Remove the HP 5364A top cover.

Instructions for doing this are given in sections 8-5 and 8-6, above.

NOTE

Be sure to replace the instrument top cover before returning the HP 5364A to regular service. Also, be sure coaxial cable W2 is installed as described in step "a", above.

8-10. Power Supply

The Power Supply includes —

- A6 Line Power Module
- A9 Power Switch Cable Assembly
- T1 Transformer
- A7 Power Supply Board Assembly
- A8 LED-and-cable Assembly
- Power Switch-and-cable Assembly
- W18 IF Amplifier Power Cable Assembly
- W19 Video Amplifier Power Cable Assembly

To check the Power Supply —

a. Connect the HP 5364A to an operating power line.

WARNING

Potentially hazardous voltages may exist inside the HP 5364A. Use appropriate care and take appropriate precautions when the instrument covers are removed.

---

b. Turn HP 5364A Power on.

The front-panel green LED must light.

c. Measure power supply voltages.

- +15V must exist at the Power Supply Board (A7), the IF Amplifier (A3), and the Video Amplifier (A5).
- –15V must exist at the Power Supply Board (A7) and the Video Amplifier (A5).

If a required power supply voltage is missing or incorrect, or if the LED does not light, determine the reason and fix the problem.

8-11. IF Path

The HP 5364A IF Path consists of the circuitry between rear-panel IF AMP INPUT connector J6 and front-panel IF OUTPUT connector J3. (See *Figure 8-3.*)

To check the IF Path –

a. Turn off HP 5364A line power.

b. Disconnect coaxial cable W2 from the rear-panel MIXER OUTPUT and IF AMP INPUT connectors.

c. Set an HP 8340A Synthesized Sweeper as described below and connect its OUTPUT to the HP 5364A rear-panel IF AMP INPUT.

   Amplitude: –40 dBm
   Sweep Time: 5 seconds
   Start Frequency: 10 MHz
   Stop Frequency: 500 MHz

d. Set an HP 8566B Spectrum Analyzer as described below and connect its INPUT to the HP 5364A front-panel IF OUTPUT.

   Center Frequency: 10 MHz
   Frequency Span: 100 MHz/Div
   Frequency Bandwidth: 300 kHz
   Reference Level: 0 dBm
   Amplitude Scale: 5 dB/Div

e. Turn on power to all units.

f. The Spectrum Analyzer display should show –

   - the IF OUTPUT frequency sweeping from 10 MHz to 500 MHz,
   - the IF OUTPUT amplitude being approximately –4 dBm (representing a gain of about 36 dB over the IF AMP INPUT amplitude).

   If the Spectrum Analyzer display does not seem correct, check IF Path components.

8-12. RF Path

The RF Path circuitry includes components from the front-panel L.O. INPUT and R.F. INPUT connectors to the rear-panel MIXER OUTPUT connector. (See *Figure 8-3.*)

To check the RF Path –

a. Turn off HP 5364A line power.

b. Disconnect coaxial cable W2 from the HP 5364A rear-panel MIXER OUTPUT and IF AMP INPUT connectors.

c. Set an HP 8340A Synthesized Sweeper as described below, and connect its OUTPUT to the HP 5364 front-panel R.F. INPUT.

   Amplitude: –15 dBm
   Sweep Time: 5 seconds
   Start Frequency: 10.01 GHz
   Stop Frequency: 10.5 GHz

d. Set an HP 8672A Synthesized Signal Generator (or equivalent) as listed below, and connect its OUTPUT to the HP 5364A front-panel L.O. INPUT.

   Amplitude: +8 dBm
   Frequency: 10 GHz

e. Set an HP 8566B Spectrum Analyzer as listed below, and connect its INPUT to the HP 5364A rear-panel MIXER OUTPUT.

   Center Frequency: 10.01 MHz
   Frequency Span: 100 MHz/Div
   Frequency Bandwidth: 300 kHz
   Reference Level: –30 dBm
   Amplitude Scale: 5 dB/Div

f. Turn on power to all units.

g. The Spectrum Analyzer display should show –

   - the MIXER OUTPUT frequency sweeps from 10.01 MHz to 500 MHz
   - the MIXER OUTPUT amplitude is between –34 dBm and –46 dBm (i.e., 25dB ± 6dB below the –15 dBm R.F. INPUT signal level).

   If the Spectrum Analyzer display is not correct, check the RF path circuitry.

8-13. Video Path

The HP 5364A video path consists of those components between the front-panel R.F. INPUT and the front-panel VIDEO OUTPUT. (See *Figure 8-3.*) Note that some of these components are shared with the R.F. Path, described above.

To check the Video Path –

a. Turn off power to all units to be used.

b. Connect equipment as shown in *Figure 8-1.*

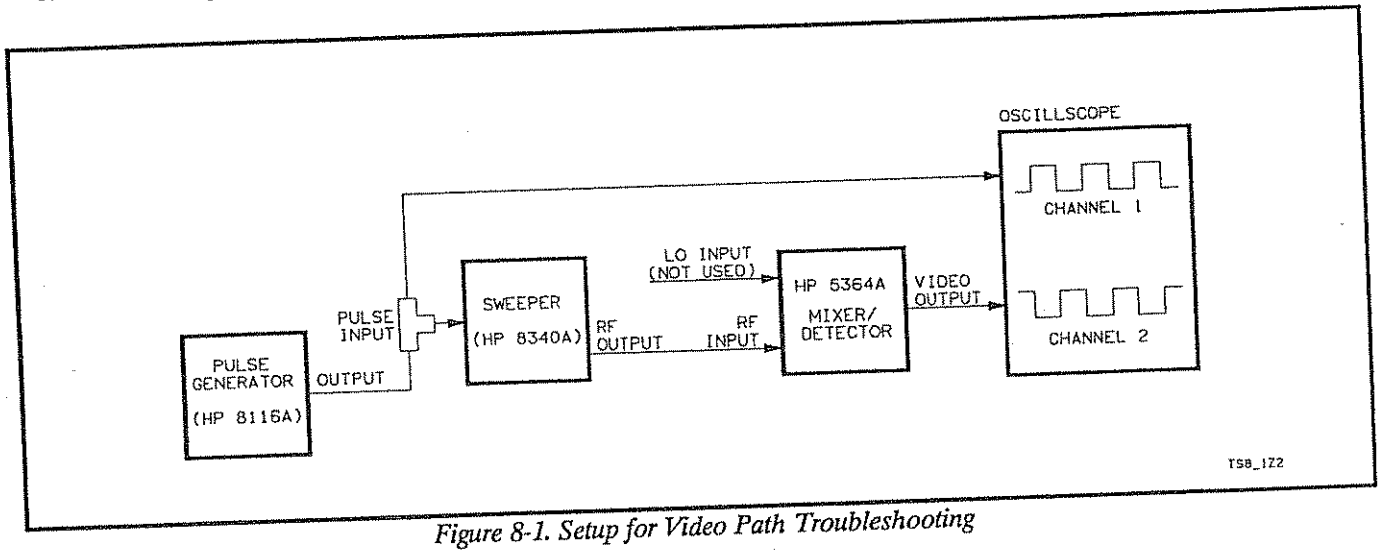


Figure 8-1. Setup for Video Path Troubleshooting

c. Turn on power for all units.

d. Set the HP 8116A Pulse Generator as follows –

Pulse Period: 2 μs
Pulse Width: 1 μs
Output Voltage: High: 5 volts
Low: 0 volts

e. Set the HP 8340A Synthesized Sweeper as follows –

Press INSTR PRESET key.
Press CW key. Enter any frequency between 2 GHz and 18 GHz.
Press PULSE key.
Set POWER LEVEL to –12 dBm.

f. On the HP 54111D Oscilloscope, view Channel 1 (HP 8116A Output) and Channel 2 (HP 5364A VIDEO OUTPUT) simultaneously to compare the two.

The HP 5364A VIDEO OUTPUT must –

- be a negative-going pulse.
- have a pulse width of 1 μs
- have a pulse period of 2 μs
- have an output level of –

  50 mV p-p for R.F. INPUT frequencies between 2 GHz and 10 GHz,
  or >25 mV p-p for R.F. INPUT frequencies between 10 GHz and 18 GHz.

If the oscilloscope display is not correct, further checking and repair of the HP 5364A Video Path is indicated.

*** This marks the end of the HP 5364A Troubleshooting procedures. ***

8-14. REMOVING/INSTALLING COMPONENTS

8-15. General

CAUTION

You should consider that all components (except power supply wiring) are rigid and can be damaged by being bent. This means you should not try to bend any of the semi-rigid coaxial lines during any removal or installation procedure. The one exception – because its length minimizes any bending required – is disconnecting coaxial cable W12 from the front-panel L.O. INPUT connector at the Mixer A2 "L" port.

CAUTION

Insert any coaxial cable connector straight in to its mating connector during installation. Insertion at an angle can result in the center conductor male pin being pushed sideways and shorting to the outer conductor.

Some components are most-easily removed or installed as part of a larger grouping. This is taken into consideration in the Removal and Installation procedures that follow, and which are organized as listed below.

a. Front Panel-and-Deck

b. Front-Panel Attenuator AT1

c. R.F. / Video Path Components – A1, AT2, A2, A4

d. IF Path Components – A3, FL1

e. Power Line Module A6

f. Power Supply Assembly A7

g. LED Assembly A8.

h. Power Switch A9.

8-16. Front Panel-and-Deck Assembly

Depending on the tools available and the component to which access is required, the HP 5364A front panel-and-deck assembly can be removed from the chassis/frame via the procedure below. NOTE THAT THIS PROCEDURE IS OPTIONAL. IT IS NOT NECESSARY TO PERFORM IT IN ORDER TO PERFORM OTHER REMOVAL/INSTALLATION PROCEDURES GIVEN IN THIS MANUAL.

8-17. REQUIRED TOOLS

Screwdriver – Pozidrive, #2
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb

8-18. PREPARATION

Remove top and side covers. DO NOT REMOVE BOTTOM COVER.

8-19. REMOVAL

a. On coaxial cable W8 between rear-panel MIXER OUTPUT connector J6 and Mixer A2 –
   1) Loosen the nut at each end.
   2) Do not remove the coaxial cable, but unscrew the nut at the rear-panel end to allow the line to separate from the rear-panel connector when the Front Panel-and-Deck assembly is removed.

b. On coaxial cable W9 between rear-panel IF AMP INPUT connector J5 and IF Amplifier A3 –
   1) Loosen the nut at each end.
   2) Do not remove the coaxial cable, but unscrew the nut at its rear-panel end to allow the line to separate from the rear-panel connector when the Front Panel-and-Deck assembly is removed.

c. Remove trim strip at top of front frame.

d. Remove four screws (two at top and two at bottom) that fasten the front panel to the front frame.

e. Remove four screws (two at each side) that attach the deck to the lower chassis rails.

f. Disconnect power transformer and front-panel POWER switch from rear-panel Line Module A6.

g. Slide the front panel-and-deck assembly out of the chassis/frame.

CAUTION

Take care to protect coaxial cable W12 on the underside of the deck from damage. Damage to this cable (or any part of the HP 5364A) can impair performance.

Perform any required servicing on removed items or on items accessed by Attenuator removal.

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

a. Install any components (A5 Video Amplifier, A4 Detector, etc.) that should be installed before front panel-and-deck assembly is placed in chassis/frame.

b. Be sure front panel-and-deck assembly is right-side-up with respect to chassis/frame and insert it through opening in front frame.

c. Be sure to align coaxial lines from Mixer A2 and IF Amplifier A3 with their respective rear-panel connectors (MIXER OUTPUT and IF AMP INPUT) as you slide the front panel-and-deck assembly into the chassis/frame. Gently guide the coaxial lines into their mating connectors to prevent damage.

d. Install four screws that fasten deck to side rails.

e. Install four screws that fasten front panel to front frame.

f. Tighten all screws installed in the steps above.

g. Install trim strip at top of front frame.

h. Tighten nuts that fasten coaxial lines to rear-panel connectors, Mixer "I" port, and IF Amplifier input port.

8-21. Front-Panel Attenuator AT1

8-22. REQUIRED TOOLS

Allen-drive – 5/64-inch
Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2
Nutdriver – 1/2-inch
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb

8-23. PREPARATION

Remove top and side covers. DO NOT REMOVE BOTTOM COVER.

8-24. REMOVAL

a. Remove coaxial cable W4 between front-panel Attenuator AT1 and adapter W5 on top of Power Divider A1.

b. At front-panel R.F. INPUT connector, loosen coaxial cable W3 coming from Attenuator.

c. At Attenuator input port, disconnect coaxial cable W3 coming from front-panel R.F.INPUT connector

d. Remove Attenuator knob. (Use allen-drive to loosen two screws that fasten knob to shaft.)

e. Remove nut and lockwasher that fasten Attenuator to front panel.

f. Remove screws that fasten Attenuator bracket to Video Amplifier assembly A5.

Perform any required servicing on removed items or on items accessed by Attenuator removal.

8-25. INSTALLATION

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

---

a. Install any component (A5 Video Amplifier, A4 Detector, etc.) that should be installed before Attenuator is installed.

b. If Attenuator bracket was removed from Attenuator, re-attach it. (See *Figure 8-2*).

   If it was necessary to perform this step, tighten the screw holding these parts together snugly, but not tightly, to allow some movement when aligning holes in the bracket with holes in Video Amplifier A5. Also, remove HP 5364A bottom cover to allow access for tightening this screw after the Attenuator and bracket have been installed.

c. Fasten Attenuator bracket to Video Amplifier. DO NOT TIGHTEN SCREWS AT THIS TIME.

d. Install lockwasher and nut on Attenuator shaft.

e. Insert end of coaxial cable W3 from front-panel R.F. INPUT connector into Attenuator input port. Be sure insertion is made straight-in, not at an angle. Finger-tighten nut holding coaxial cable to Attenuator.

f. Install coaxial cable W4 between Attenuator output port and adapter W5 on top of Power Divider A1.

g. Tighten three Attenuator bracket screws (two are at Video Amplifier, one is on bottom of Attenuator, accessible through hole in deck.)

h. Tighten nuts on coaxial lines.

i. Install Attenuator knob.
   1) Set Attenuator shaft fully counter-clockwise (CCW).
   2) Position knob about 1/64-inch (0.5-mm) away from front panel with indicator aligned with front-panel "50" (dB) line, then tighten screws holding knob to shaft.
   3) Set Attenuator fully clockwise (CW).

      Indicator on knob must be aligned with front-panel "0" line.

8-26. Power Divider A1, Attenuator AT2, Mixer A2

8-27. GENERAL

Power Divider A1, Attenuator AT2, and Mixer A2 are connected together by lengths of semi-rigid coaxial cable. If any one of these needs to be removed, they should first all be removed as a unit.

8-28. REQUIRED TOOLS

Screwdriver – Pozidrive
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb
Wrench, Open-end – 5/8-inch

8-29. PREPARATION

a. Remove top and right-hand side cover.

b. Remove upper-right-hand side rail.

8-30. REMOVAL

a. Remove coaxial cable W4 between front-panel Attenuator AT1 and adapter W5 on top of Power Divider A1.

b. Remove coaxial cable W8 between Mixer A2 and rear-panel MIXER OUTPUT connector J5.

c. Disconnect coaxial from front-panel L.O. INPUT connector at Mixer A2 "L" port.

d. Remove screws holding Power Divider bracket and Mixer bracket to deck.

e. Loosen nut that locks 90-degree adapter W14 to adapter W15, at Detector end of W14. Continue loosening this nut until you can remove A1-AT2-A2 assembly from HP 5364A.

NOTE

If you choose to loosen the nut at the Power Divider end of the 90-degree coaxial adapter, the A1-AT2-A2 assembly will be forced toward the HP 5364A rear panel. Since Mixer A2 is partly in a hole in the deck, you will have to lift it slightly to clear the deck.

Perform any required servicing on removed items, or on items accessed by their removal.

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

a. Assemble Power Divider A1, Attenuator AT2, Mixer A2, related coaxial lines and adapters, and brackets.

b. Place A1-AT2-A2 assembly into HP 5364A.

c. While sliding 90-degree coaxial adapter W14 toward W13 at Detector A4 (below front-panel Attenuator AT1), finger-tighten the nut to draw W14 and W13 together and pull the Power Divider into position.

d. Install screws that fasten Power Divider bracket and Mixer bracket to deck. DO NOT TIGHTEN THESE SCREWS AT THIS TIME.

e. Connect coaxial cable W12 from front panel at "L" port of Mixer A2.

f. Install coaxial cable W8 between rear-panel MIXER OUTPUT connector and "T" port of Mixer A2.

NOTE: Install rear-panel end first, then Mixer end.

g. Tighten all coaxial cable connections to 8 in-lb.

h. Tighten all screws that fasten brackets to deck.

i. Install coaxial cable W4 from adapter W5 on the Power Divider to front-panel Attenuator AT1.

8-32. IF Amplifier A3

8-33. REQUIRED TOOLS

Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb

8-34. PREPARATION

a. Remove top and side covers. DO NOT REMOVE BOTTOM COVER.

b. Remove upper-right-hand side rail.

8-35. REMOVAL

a. Remove coaxial cable W9 between rear-panel IF AMP INPUT connector J5 and IF Amplifier A3.

b. At Power Supply board, disconnect two-wire cable W18 that provides power to IF Amplifier.

c. Loosen nut that locks adapter W10 to either the IF Amplifier A3 or the Low-pass Filter FL1. DO NOT TRY TO COMPLETELY UNSCREW THIS NUT AT THIS TIME.

d. Remove screws that fasten IF Amplifier Bracket to deck.

e. Unscrew the nut loosened in step "c" until Amplifier and Filter can be separated.

Perform any required servicing on removed item(s).

8-36. INSTALLATION

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

a. Assemble IF Amplifier and IF Amplifier Bracket.

b. Place coaxial adapter W10 on either the IF Amplifier A3 or the Low-pass Filter FL1. Finger-tighten the nut.

c. Place IF Amplifier assembly in instrument, with power-cable end toward Filter.

d. Slide IF Amplifier toward Filter and tighten nut on coaxial adapter to draw them together. DO NOT TIGHTEN THIS NUT AT THIS TIME.

e. Loosen screws that fasten Filter bracket to deck. DO NOT REMOVE THESE SCREWS.

f. Fasten IF Amplifier Bracket to instrument deck. DO NOT TIGHTEN SCREWS AT THIS TIME.

g. Tighten all screws and nuts used in this procedure.

h. Install coaxial cable W9 between IF Amplifier and rear-panel IF AMP IN connector J5. Tighten nut at each end of this cable.

i. Connect two-wire power cable W18 from IF Amplifier to Power Supply board assembly A7.

8-37. Low-Pass Filter FL1

8-38. REQUIRED TOOLS

Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb

8-39. PREPARATION

a. Remove top and side covers. DO NOT REMOVE BOTTOM COVER.

b. Remove upper-right-hand side rail.

c. Remove coaxial cable W9 between rear-panel IF AMP INPUT connector J5 and IF Amplifier A3.

d. Remove IF Amplifier assembly A3. (See section 8-32, above.)

8-40. REMOVAL

a. Loosen nut that locks Filter to coaxial cable W11 that connects to front-panel IF OUTPUT connector J3.

b. Remove screws that fasten Filter bracket to instrument deck.

c. Remove Filter from instrument.

Perform any required servicing on removed item(s).

8-41. INSTALLATION

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

a. Assemble Low-pass Filter and Filter bracket.

b. Place Filter assembly in instrument so holes in bracket will line up with mating holes in deck.

c. Slide Filter toward coaxial cable W11 (from front-panel IF OUTPUT connector J3). Finger-tighten nut on coaxial cable to lock cable to Filter.

d. Fasten Filter bracket to instrument deck. DO NOT TIGHTEN SCREWS AT THIS TIME.

e. Install IF Amplifier A3. (See section 8-32 through 8-36, above.)

f. Tighten screws and nuts that were used in this procedure.

g. Install coaxial cable W9 between IF Amplifier and rear-panel IF AMP IN connector J5. Tighten nut at each end of this cable.

8-42. Detector A4

8-43. REQUIRED TOOLS

Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb
Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2

8-44. PREPARATION

NOTE

Removal or installation of Detector A4 requires removal of Power Divider A1 and/or Video Amplifier A5. Refer to the procedure(s) for these items for more information.

8-45. REMOVAL

a. a. Remove Power Divider A1 and/or Video Amplifier A5.

b. b. Remove Detector A4.

8-46. INSTALLATION

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

a. Install Detector A4.

b. Install Video Amplifier A5 and/or Power Divider A1.

8-47. Video Amplifier A5

8-48. REQUIRED TOOLS

Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2
Wrench, Open-end – 5/16-inch
Wrench, Torque – Open-end, 5/16-inch, 8 inch-lb
Wrench, Open-end – 5/8-inch

8-49. PREPARATION

a. Remove all instrument covers.

b. Remove front-panel Attenuator bracket.
   1) Remove two screws that fasten bracket to studs inside Video Amplifier case.
   2) Using #1 Pozidrive screwdriver through hole in deck, remove screw that fastens bracket to Attenuator AT1.

8-50. REMOVAL

a. At Power Supply Assembly A7, disconnect three-wire connector through which power is provided to A5.

b. Remove coaxial cable W17 between Video Amplifier Output and front-panel VIDEO OUTPUT connector.

c. From bottom of deck, remove four screws that fasten Video Amplifier to deck.

d. Loosen connection between adapter A16 and Video Amplifier A5 until Video Amplifier can be removed from HP 5364A.

8-51. INSTALLATION

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed or loosened, replacing them with new screws.

a. Orient Video Amplifier module so its silk-screened (top) cover is up and its power-supply connections are toward left-hand side of HP 5364A, then place module in its position on instrument deck.

b. Slide Video Amplifier so its input port can engage adapter W16 fastened to Detector A4. Finger-tighten the A5-W16 connection to draw the Video Amplifier into position.

c. From bottom of instrument deck, install four screws that fasten Video Amplifier to deck.

d. Install coaxial cable W17 between Video Amplifier Output and front-panel VIDEO OUTPUT connector.

e. Tighten all coaxial connectors used in this procedure.

f. If necessary, remove screws at "V_{CC}"-side of Video Amplifier module top cover, to allow for installation of Attenuator bracket.

g. Using suitable pan-head screws, fasten Attenuator bracket in position on top of Video Amplifier. DO NOT TIGHTEN THESE SCREWS AT THIS TIME.

h. Insert Pozidrive #1 screwdriver through hole in instrument deck, place and hold suitable pan-head screw on driver, and install screw to fasten bracket to bottom of Attenuator AT1.

i. Tighten all screws and nuts associated with Video Amplifier and Power Divider and their interconnecting coaxial lines.

j. Connect A5 power cable to Power Supply A7.

8-52. Line-Power Module A6

8-53. REQUIRED TOOLS

Screwdriver — Pozidrive, #2

8-54. PREPARATION

WARNING

BE SURE TO DISCONNECT HP 5364A FROM OPERATING LINE POWER BEFORE PERFORMING ANY PORTION OF THE PROCEDURE BELOW.

Remove top and bottom covers.

8-55. REMOVAL

a. Disconnect five-conductor cable from power transformer T1.

b. Disconnect two-conductor cable from Power Switch.

c. Unsolder green/yellow wire from rear-panel ground lug.

d. Remove screws that fasten Line Power Module to rear panel.

e. Remove Power Module from instrument.

8-56. INSTALLATION

a. Orient Power Module correctly and insert it into HP 5364A rear-panel opening.

b. Install screws that fasten Power Module to rear panel.

c. Solder green/yellow wire from Power Module ground terminal to rear-panel ground lug.

d. Connect two-conductor cable from Power Switch with mating two-conductor cable of Power Module.

e. Connect five-conductor cable from power transformer to mating cable of Power Module.

f. Be sure line-voltage selection and line fuse are correct and covers are in place before connecting instrument to line. (See Secion 2.)

8-57. Power Supply Assembly A7

8-58. REQUIRED TOOLS

Screwdriver — Pozidrive, #2

8-59. PREPARATION

Remove top and left-hand side covers. DO NOT REMOVE BOTTOM COVER.

8-60. REMOVAL

a. At Power Supply board A7, disconnect —
   1) the six-conductor cable from Power Transformer T1,
   2) three-conductor cable from Video Amplifier A5,
   3) two-conductor cable from IF Amplifier A3, and
   4) red and black wires from front-panel POWER indicator.

   NOTE: Cable from power transformer uses a locking connector. Pull locking tab away from connector body to unlock.

b. Power Supply assembly is held by tabs in its plastic supports. To remove board, find the locking tab in a support and press it as required to allow board to slide slightly up along support. Repeat at each support until you can remove board from all supports.

8-61. INSTALLATION

NOTE

All coaxial connections in the HP 5364A are tightened to 8 in-lb when the unit is assembled at the factory. Any coaxial connection that is disassembled or loosened should be tightened to 8 in-lb when re-assembled.

Most screws in the HP 5364A have a locking compound on their threads. It is considered good practice to discard these screws if they are removed, and use new screws for re-assembly.

---

a. Orient Power Supply board assembly with component side up, seven-pin connector toward rear of instrument, and smaller multi-pin connectors toward front.

b. Set board on supports, then press down at corners to lock it into place via tabs on supports.

c. Connect cables from Power Transformer, Video Amplifier, IF Amplifier, and front-panel POWER indicator to appropriate points on board.

8-62. LED Indicator-and-Cable Assembly A8

8-63. REQUIRED TOOLS

Screwdriver — Pozidrive, #2

8-64. PREPARATION

Remove top cover.

8-65. REMOVAL

a. Disconnect LED leads at Power Supply A7.

b. Carefully push the LED out. Take care not to bend the leads, which can easily be broken.

8-66. INSTALLATION

a. Slide LED leads through front-panel hole.

b. Press LED into place in front panel.

NOTE: Since more force is required to do this than is comfortable bare-handed, take care that any tool you use does not damage the LED, its plastic holder, or instrument front panel. One useful ready-made tool for this is a 3/16-inch nut driver; a suitably-sized washer or nut or similar device may also be used.

c. Connect LED leads to Power Supply A7. Be sure to observe polarity/color-coding of leads.

8-67. Power Switch-and-Cable Assembly A9

8-68. REQUIRED TOOLS

Screwdriver – Pozidrive, #1
Screwdriver – Pozidrive, #2

8-69. PREPARATION

WARNING

BE SURE TO DISCONNECT HP 5364A FROM OPERATING LINE POWER BEFORE PERFORMING ANY PORTION OF THE PROCEDURE BELOW.

Remove top cover.

8-70. REMOVAL

a. Disconnect Power Switch cable from mating Power Module cable.

b. Remove front panel-and-deck assembly from chassis/frame. (See section 8-16, above.)

c. Using Pozidrive #1 screwdriver, remove two screws that fasten power switch in place at back of front panel.

8-71. INSTALLATION

a. Orient the power switch so its un-connected contact is at the top and place switch in its position at the back of the front panel.

b. Install screws that fasten switch in position.

c. Install front-panel and deck assembly in chassis/frame. (See section 8-16 through 8-20, above.)

d. Connect Power Switch cable to mating two-lead cable of Power Module.

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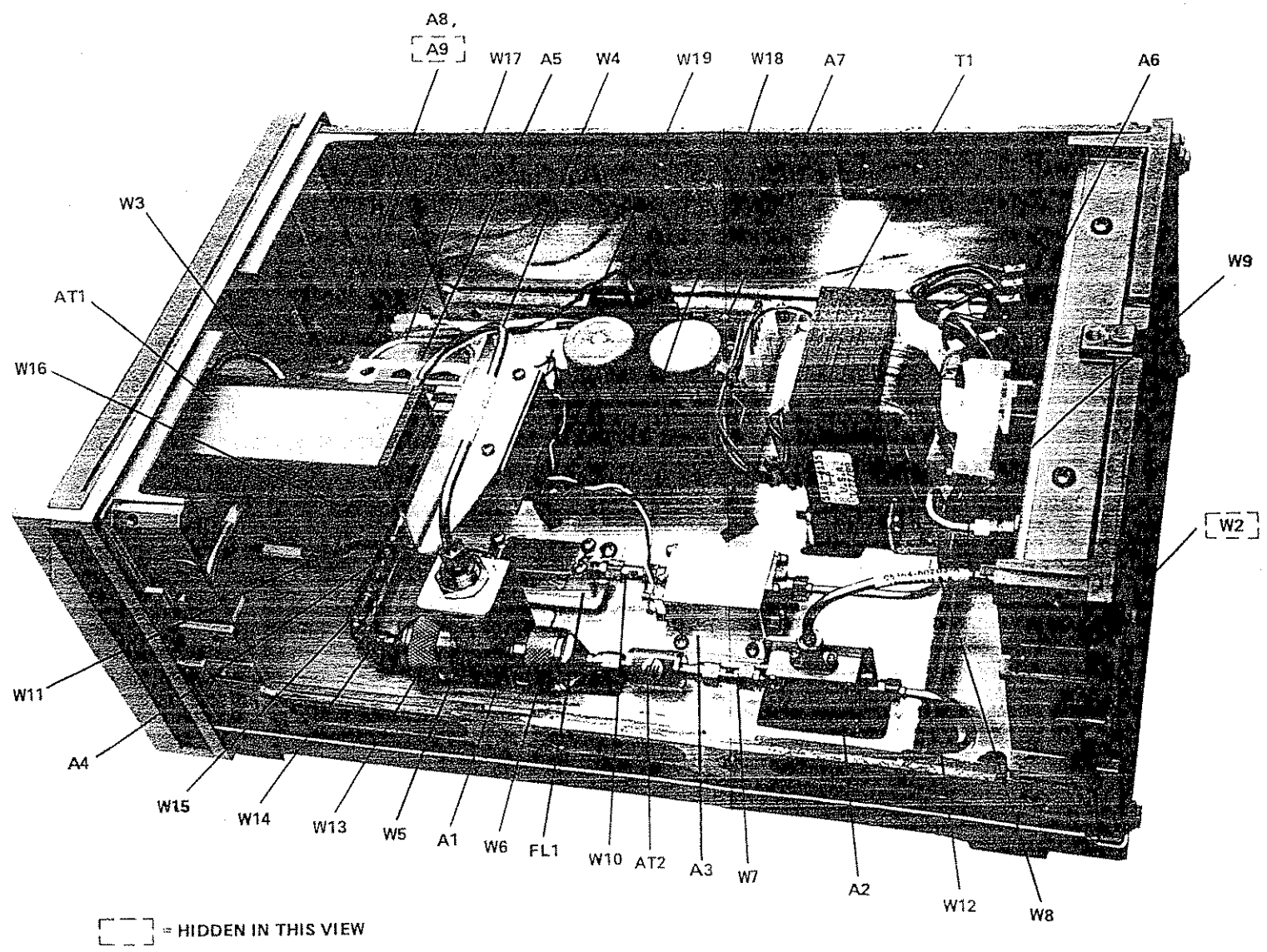


Figure 8-2. HP 5364A — Component Locations

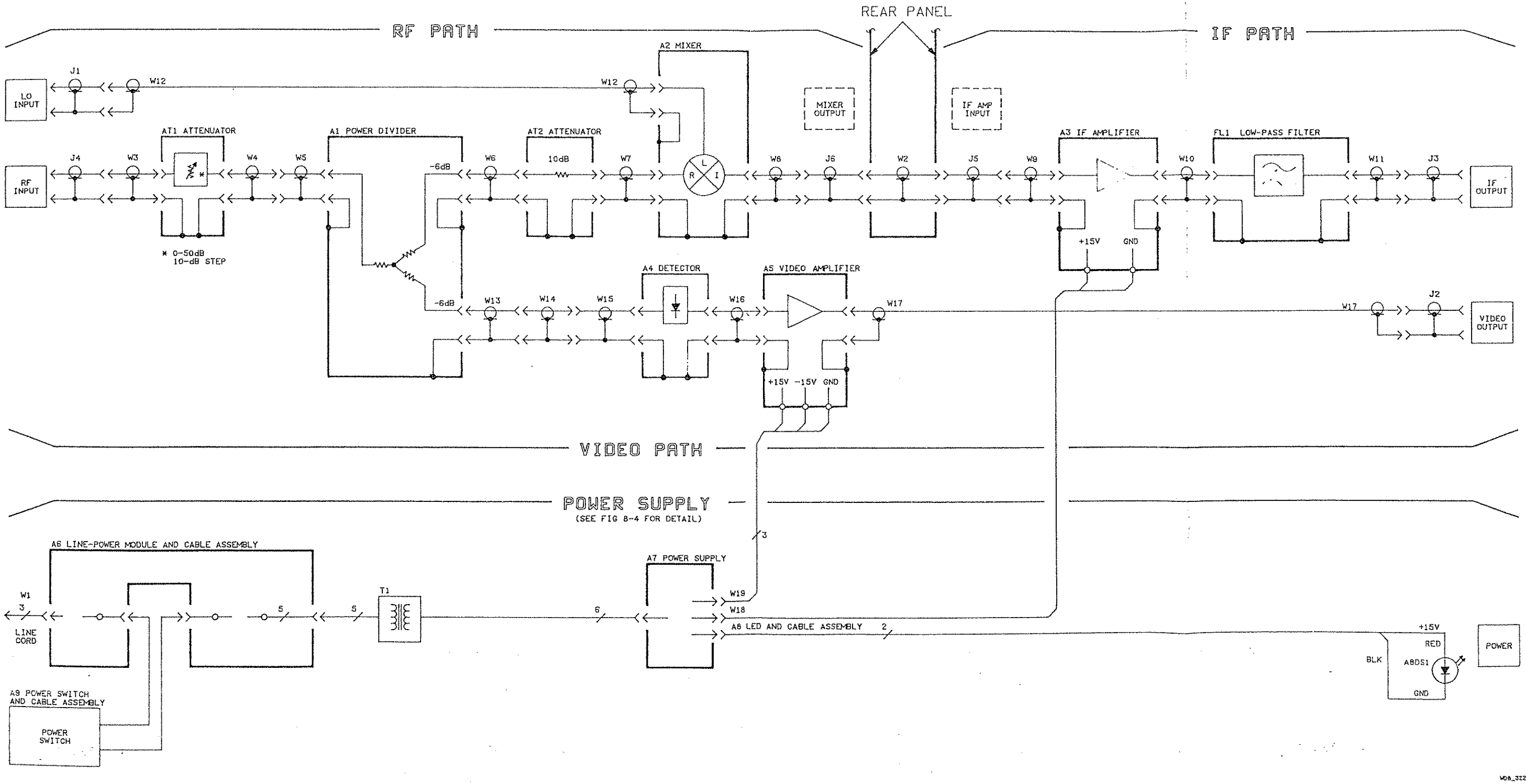
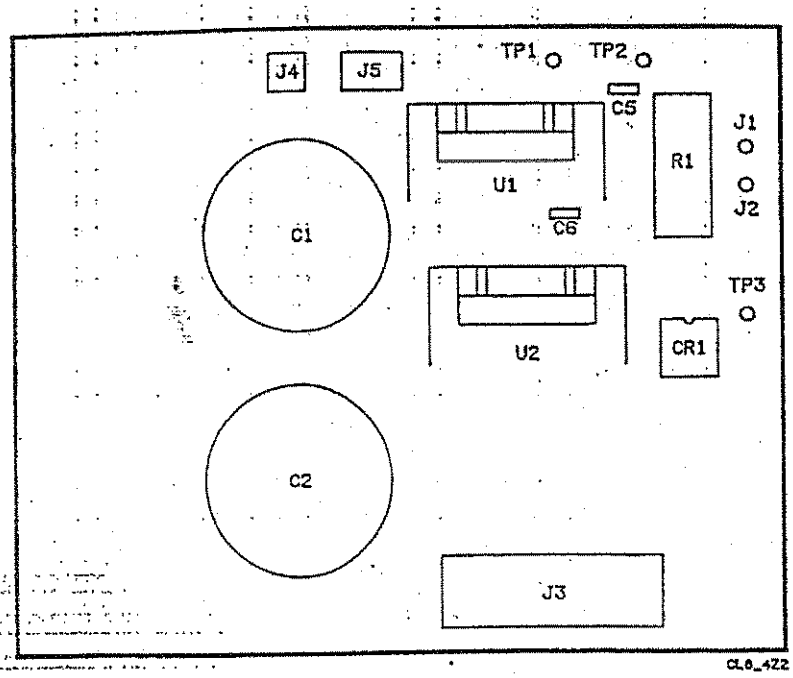
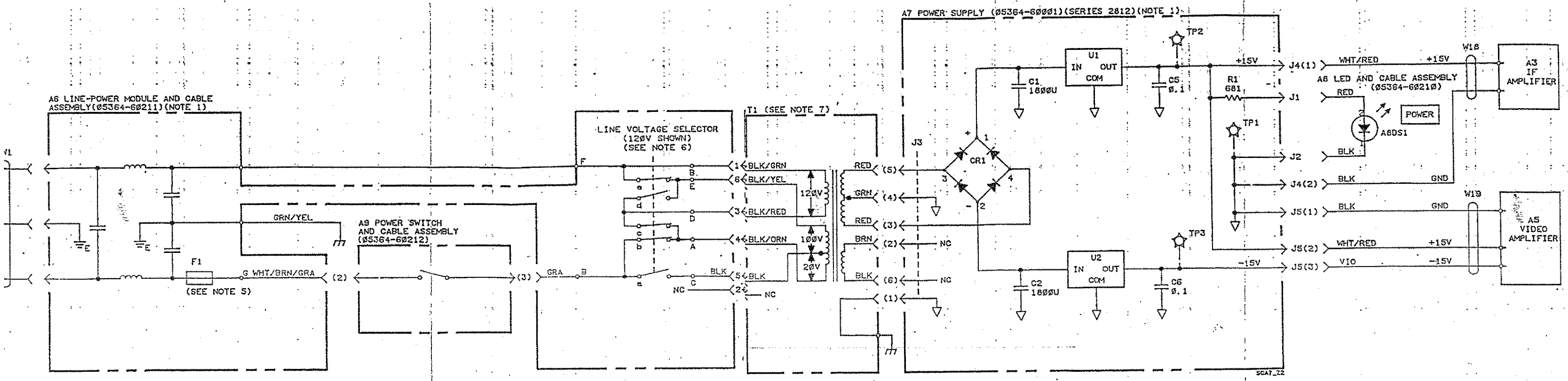


Figure 8-3. HP 5364A — Circuit/Block Diagram


J4
J5
TP1
TP2
C5
J1
R1
J2
U1
C6
C1
TP3
U2
CR1
C2
J3
CL6_422



NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN FARADS; INDUCTANCE IN HENRIES.
3. ASTERISK (*) INDICATES FACTORY SELECTED COMPONENT. AVERAGE VALUE SHOWN.
4. A TILDE ("~") PRECEDING A SIGNAL INDICATES A NEGATIVE-TRUE SIGNAL.

REFERENCE DESIGNATORS

A3	A7J1-5
A5	A7R1
A6	A7U1,2
A6F1	A8
A7	A8DS1
A7C1,2,5,6	T1
A7CR1	

5. LINE FUSE A6F1:

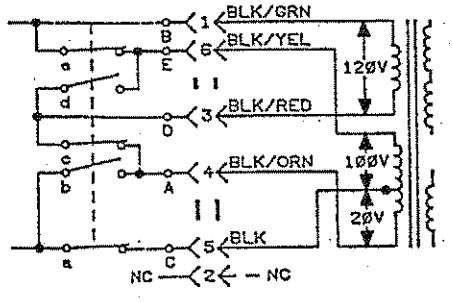
LINE VOLTAGE NOMINAL (RANGE)	FUSE RATING	FUSE HP PART NUMBER
1ØØ (9Ø-11Ø)	Ø.25A SLOW-BLOW	2110-Ø2Ø1
12Ø (1Ø8-132)		
22Ø (198-242)	Ø.125A SLOW-BLOW	2110-Ø318
24Ø (216-264)		

TABLE OF ACTIVE ELEMENTS

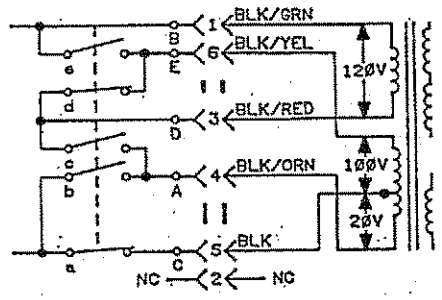
REFERENCE DESIGNATOR	HP PART NO.	MFG PART NO.
A3	Ø5364-6Ø213	Ø5364-6Ø213
A5	Ø955-Ø436	Ø955-Ø436
A7CR1	19Ø6-ØØ69	19Ø6-ØØ69
A7U1	1826-Ø6Ø7	1826-Ø5Ø7
A7U2	1826-Ø214	MC791SCT
A8	Ø5364-6Ø21Ø	Ø5364-6Ø21Ø

6. VOLTAGE SELECTOR SHOWN AT 12ØV SETTING IN MAIN SCHEMATIC, ABOVE. OTHER SETTINGS ARE SHOWN BELOW.

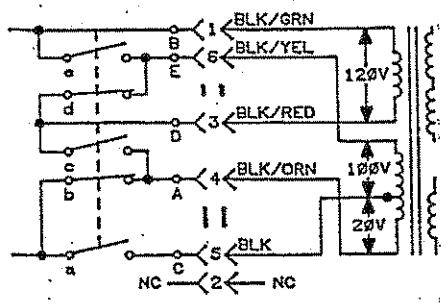
1ØØV:



22ØV:



24ØV:



7. T1-PRIMARY CONNECTOR: (WIRING SIDE OF CONNECTOR)

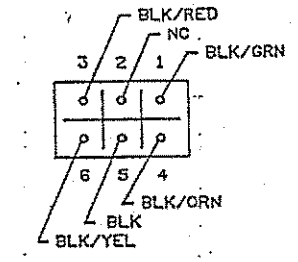


Figure 8-4. Power Supply Board (05364-60001)

PACKAGING FOR STORAGE OR SHIPMENT

9-1. ORIGINAL PACKAGING

Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the HP 5364A is being returned to HP for servicing, attach a tag indicating the type of service required, return address, Model Number, and full Serial Number. Mark the container "FRAGILE" to ensure careful handling. In any correspondence, refer to the product by Model Number and full Serial Number. (The HP 5364A serial number is on a stick-on label on its rear panel.)

9-2. OTHER PACKAGING

The following general instructions should be used for re-packing with commercially available materials —

a. Wrap the unit in heavy paper or plastic. (If shipping to a Hewlett-Packard office or service center, 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-wall carton made of 350-pound test material is adequate.

c. Use a layer of shock-absorbing material 50 to 80 mm (2 to 3 inches) thick around all sides of the unit to provide firm cushioning and prevent movement inside the container.

d. Seal the shipping container securely

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

f. In any correspondence, refer to the unit by Model Number and full Serial Number.

9-3. DESCRIBING REQUIRED SERVICING

If the HP 5364A is being returned to Hewlett-Packard for service, please provide complete information to help us help you. The form at the end of this manual section can be used as a model or copied for use.

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HEWLETT PACKARD

Model 5364A
Microwave Mixer/Detector

Serial Number: _____

Other ID: _____

Person to contact for more information:

Name: _____ **Phone:** _____

SHIPPING INFORMATION:

_____
COMPANY NAME

_____
INDIVIDUAL NAME, INTERNAL MAIL CODE

_____
STREET OR P.O. BOX

_____
CITY, STATE

_____
COUNTRY, POSTAL ZIP CODE

BILLING INFORMATION:

_____
COMPANY NAME

_____
INDIVIDUAL NAME, INTERNAL MAIL CODE

_____
STREET OR P.O. BOX

_____
CITY, STATE

_____
COUNTRY, POSTAL ZIP CODE

P.O. Number: _____

Date: _____

Accessories returned with unit:

☐ None ☐ Power Cable/Line Cord

☐ Other Cable(s): _____ _____ _____ _____

☐ Adapter(s) _____ _____ _____ _____

☐ Other: _____ _____ _____ _____

Over . . .

Service Needed: ☐ Calibration Only ☐ Repair

☐ Other _____

_____

_____

Observed symtoms and/or problems:

FAILURE MODE IS: ☐ Constant ☐ Intermittent

SENSITIVE TO: ☐ Cold ☐ Heat ☐ Vibration

FAILURE SYMPTOMS: _____

_____

_____

_____

If unit is part of an automatic system, list model number(s) of controller and other related system components.

_____

_____

_____

Product Line Sales/Support Key

Key Product Line
A Analytical
CM Components
C Computer Systems
E Electronic Instruments & Measurement Systems
M Medical Products
P Personal Computation Products
* Sales only for specific product line
** Support only for specific product line

IMPORTANT These symbols designate general product line capability. They do not insure sales or support availability for all products within a line, at all locations. Contact your local sales office for information regarding locations where HP support is available for specific products.

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Telex: 76793 HPA HX
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Telex: 84419
P

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Telex: 8550 WAEL BN
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Tel: 276278
Telex: 9015 plans bn
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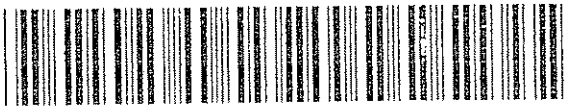

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