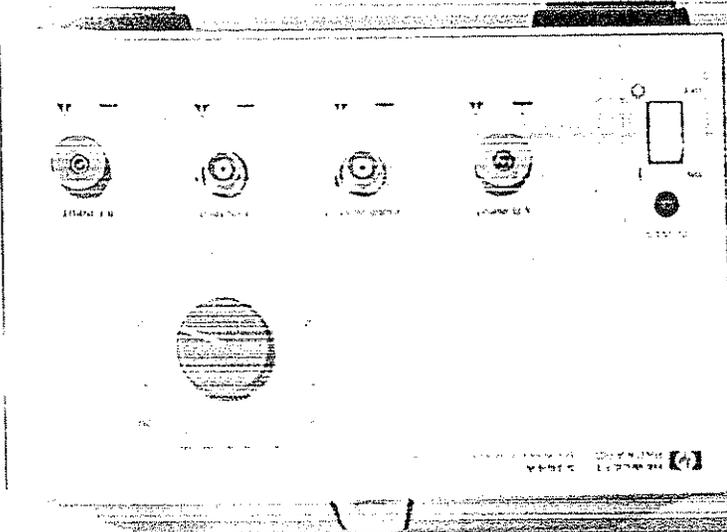


RETURN TO
INSTRUMENT



5364A
Microwave Mixer/Detector

OPERATING AND SERVICE MANUAL

PACIFIC

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.



Printed: JUNE 1988
Printed in U.S.A



MANUAL PART NUMBER 05364-90001

All rights reserved.

© Copyright HEWLETT-PACKARD COMPANY 1988
5301 Stevens Creek Boulevard, Santa Clara, California 95052

Edition 1
E0588

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

SERIAL NUMBERS

**HP 5364A
Microwave Mixer/Detector**

OPERATING AND SERVICE MANUAL

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

SAFETY SYMBOLS

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.

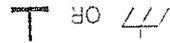
Instruction manual symbol; the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual.



Indicates hazardous voltages.



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



Alternating current.



Direct current.



SAFETY INFORMATION

WARNING

Any interruption of the protective grounding conductor (inside or outside the instrument) or disconnection of 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. Therefore, there may not be a one-to-one correspondence between product updates and manual updates.

Edition 1

June 1988

05364-90001 E0588

TABLE OF CONTENTS

| | | |
|-------------------------------|---|------|
| Section 1 GENERAL INFORMATION | | Page |
| 1-1 | Description | 1-1 |
| 1-2 | Specifications and Supplemental Characteristics | 1-2 |
| 1-3 | Safety and Other Considerations | 1-4 |
| 1-4 | Recommended Test Equipment and Tools | 1-4 |
| 1-5 | Warranty | 1-7 |
| 1-6 | Service Contract | 1-7 |
| 1-7 | About This Manual | 1-7 |
| 1-8 | Manual and Microfiche Part Numbers | 1-7 |
| 1-9 | Instruments Covered by this Manual | 1-7 |
| 1-10 | Manual Changes Supplement | 1-8 |
| 1-11 | Identification | 1-8 |
| 1-12 | Serial Number | 1-8 |
| 1-13 | Series Number | 1-9 |
| 1-14 | Options | 1-9 |
| Section 2 PREPARATION FOR USE | | Page |
| 2-1 | Introduction | 2-1 |
| 2-2 | Unpacking and Inspection | 2-1 |
| 2-3 | Line Voltage, Line Fuse, Line Cord | 2-2 |
| 2-4 | Operational Verification | 2-5 |
| 2-5 | Equipment Set-up | 2-5 |
| 2-6 | I.F. OUTPUT Verification | 2-5 |
| 2-7 | Conversion Gain | 2-7 |
| 2-8 | Attenuator | 2-5 |
| 2-9 | I.F. Flatness | 2-5 |
| 2-10 | VIDEO OUTPUT Verification | 2-6 |
| Section 3 OPERATION | | Page |
| 3-1 | Introduction | 3-1 |
| 3-2 | Safety and Other Considerations | 3-1 |
| 3-3 | Controls, Connectors, and Indicators | 3-1 |
| 3-4 | Operator's Checks | 3-3 |
| 3-5 | Input Signals | 3-3 |
| 3-6 | Amplitude | 3-3 |
| 3-7 | L.O. INPUT | 3-3 |
| 3-8 | R.F. INPUT | 3-3 |
| 3-9 | Frequency | 3-4 |
| 3-10 | I.F. OUTPUT | 3-6 |
| 3-11 | Frequency | 3-6 |
| 3-12 | Amplitude | 3-6 |
| 3-13 | VIDEO OUTPUT | 3-6 |
| 3-14 | Bandwidth | 3-7 |
| 3-15 | Amplitude | 3-7 |
| 3-16 | Use as a Trigger or Arming Signal | 3-7 |
| 3-17 | Operator's Maintenance | 3-7 |
| 3-18 | Calibration | 3-7 |

| | | |
|------|---|------|
| 5-1 | Introduction | 5-1 |
| 5-2 | Equipment Required | 5-2 |
| 5-3 | Test Record | 5-4 |
| 5-4 | IF OUTPUT Tests | 5-4 |
| 5-5 | Setup | 5-5 |
| 5-6 | Calibrating the Power Sensor-Power Meter Combination | 5-4 |
| 5-7 | Setting Up the Signal Generator and the HP 5364A | 5-5 |
| 5-8 | Setting Up the Spectrum Analyzer | 5-5 |
| 5-9 | Setting Up the Synthesized Sweeper | 5-6 |
| 5-10 | Test Procedure | 5-7 |
| 5-11 | 2.2 GHz L.O. INPUT | 5-7 |
| 5-12 | Maximum Roll-off | 5-7 |
| 5-13 | Conversion Gain | 5-7 |
| 5-14 | Gain Linearity and Compression | 5-8 |
| 5-15 | 12.4 GHz L.O. INPUT | 5-8 |
| 5-16 | Set-up | 5-8 |
| 5-17 | Maximum Roll-off | 5-8 |
| 5-18 | Conversion Gain | 5-9 |
| 5-19 | Gain Linearity and Compression | 5-9 |
| 5-20 | 17.5 GHz L.O. INPUT | 5-9 |
| 5-21 | Maximum Roll-off | 5-10 |
| 5-22 | Conversion Gain | 5-10 |
| 5-23 | Gain Linearity and Compression | 5-11 |
| 5-24 | VIDEO OUTPUT Tests | 5-11 |
| 5-25 | Set-up | 5-11 |
| 5-26 | Test Procedures | 5-12 |
| 5-27 | Deviation from Square Law, and Compression | 5-12 |
| 5-28 | Output Level (For -12 dbm R.F. INPUT) | 5-12 |
| 5-29 | VIDEO OUTPUT Risettime | 5-13 |
| 5-30 | SET-UP | 5-13 |
| 5-31 | R.F. INPUT = 2 GHz | 5-14 |
| 5-32 | Digitizing Oscilloscope Set-up | 5-14 |
| 5-33 | 20%-80% Rise-Time Measurement | 5-14 |
| 5-34 | R.F. INPUT = 10 GHz | 5-15 |
| 5-35 | Digitizing Oscilloscope Set-up | 5-15 |
| 5-36 | 20%-80% Risettime Measurement | 5-15 |
| 5-37 | R.F. INPUT = 18 GHz | 5-16 |
| 5-38 | Digitizing Oscilloscope Set-up | 5-16 |
| 5-39 | 20%-80% Risettime Measurement | 5-16 |
| 5-40 | IF Group Delay Ripple | 5-17 |
| 5-41 | 20-500 MHz Test, Using an HP 8753A Network Analyzer | 5-17 |
| 5-42 | 45-500 MHz Test, Using an HP 8510A/B Network Analyzer | 5-20 |
| 5-43 | Indret Test | 5-21 |
| | Performance Test Record | 5-22 |
| | follows | 5-22 |

Section 5 PERFORMANCE TESTS

| | | |
|-----|------------|-----|
| 4-1 | General | 4-1 |
| 4-2 | RF Path | 4-1 |
| 4-3 | IF Path | 4-1 |
| 4-4 | VIDEO Path | 4-2 |

Section 4 PRINCIPLES OF OPERATION

| | | |
|--|---|-------------|
| Section 6 REPLACEABLE PARTS | | Page |
| 6-1 | Introduction | 6-1 |
| 6-2 | Parts Lists | 6-1 |
| 6-3 | How to Order a Part | 6-2 |
| 6-4 | Parts Identification | 6-2 |
| 6-5 | Contacting Hewlett-Packard | 6-2 |
| <hr/> | | |
| Section 7 MANUAL APPLICABILITY AND MANUAL CHANGES | | Page |
| 7-1 | Manual Applicability | 7-1 |
| 7-2 | Manual Changes for Older Products | 7-1 |
| <hr/> | | |
| Section 8 SERVICE INFORMATION | | Page |
| 8-1 | Introduction | 8-1 |
| 8-2 | Safety and Other Considerations | 8-1 |
| 8-3 | Required/recommended Test Equipment and Tools | 8-2 |
| 8-4 | Parts Lists | 8-2 |
| 8-5 | Access to Internal Components | 182 |
| 8-6 | Top Cover | 8-3 |
| 8-7 | Side and Bottom Covers | 8-3 |
| 8-8 | Troubleshooting | 8-4 |
| 8-9 | Initial Steps | 8-4 |
| 8-10 | Power Supply | 8-5 |
| 8-11 | IF Path | 8-6 |
| 8-12 | RF Path | 8-7 |
| 8-13 | Video Path | 8-8 |
| 8-14 | Removing/Installing Components | 8-10 |
| 8-15 | General | 8-10 |
| 8-16 | Front Panel-and-Deck Assembly | 8-11 |
| 8-17 | Required Tools | 8-11 |
| 8-18 | Preparation | 8-11 |
| 8-19 | Removal | 8-11 |
| 8-20 | Installation | 8-12 |
| 8-21 | Front-Panel Attenuator AT1 | 8-13 |
| 8-22 | Required Tools | 8-13 |
| 8-23 | Preparation | 8-13 |
| 8-24 | Removal | 8-13 |
| 8-25 | Installation | 8-13 |
| 8-26 | Power Divider A1, Attenuator AT2, Mixer A2 | 8-15 |
| 8-27 | General | 8-15 |
| 8-28 | Required Tools | 8-15 |
| 8-29 | Preparation | 8-15 |
| 8-30 | Removal | 8-15 |
| 8-31 | Installation | 8-16 |
| 8-32 | IF Amplifier A3 | 8-17 |
| 8-33 | Required Tools | 8-17 |
| 8-34 | Preparation | 8-17 |
| 8-35 | Removal | 8-17 |
| 8-36 | Installation | 8-17 |
| 8-37 | Low-Pass Filter FL1 | 8-19 |
| 8-38 | Required Tools | 8-19 |
| 8-39 | Preparation | 8-19 |

| Page | Section 9 SERVICE INFORMATION (Continued) | Page |
|------|---|------|
| 8-19 | Removal | 8-19 |
| 8-19 | Installation | 8-19 |
| 8-21 | Detector A4 | 8-21 |
| 8-21 | Required Tools | 8-21 |
| 8-21 | Preparation | 8-21 |
| 8-21 | Removal | 8-21 |
| 8-21 | Installation | 8-21 |
| 8-22 | Video Amplifier A5 | 8-22 |
| 8-22 | Required Tools | 8-22 |
| 8-22 | Preparation | 8-22 |
| 8-22 | Removal | 8-22 |
| 8-22 | Installation | 8-22 |
| 8-24 | Line Power Module A6 | 8-24 |
| 8-24 | Required Tools | 8-24 |
| 8-24 | Preparation | 8-24 |
| 8-24 | Removal | 8-24 |
| 8-24 | Installation | 8-24 |
| 8-25 | Power Supply Assembly A7 | 8-25 |
| 8-25 | Required Tools | 8-25 |
| 8-25 | Preparation | 8-25 |
| 8-25 | Removal | 8-25 |
| 8-25 | Installation | 8-25 |
| 8-26 | LED Indicator-and-Cable Assembly A8 | 8-26 |
| 8-26 | Required Tools | 8-26 |
| 8-26 | Preparation | 8-26 |
| 8-26 | Removal | 8-26 |
| 8-26 | Installation | 8-26 |
| 8-27 | Power Switch-and-Cable Assembly A9 | 8-27 |
| 8-27 | Required Tools | 8-27 |
| 8-27 | Preparation | 8-27 |
| 8-27 | Removal | 8-27 |
| 8-27 | Installation | 8-27 |
| 9-1 | Original Packaging | 9-1 |
| 9-1 | Other Packaging | 9-1 |
| 9-3 | Describing Required Servicing | 9-3 |

Section 9 PACKAGING FOR STORAGE AND SHIPMENT

LIST OF TABLES

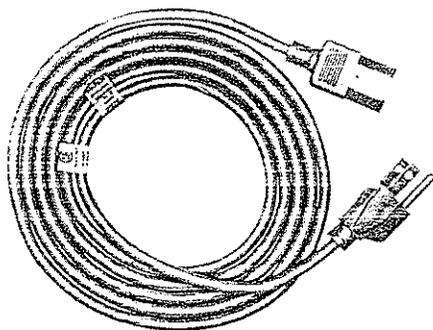
| | | |
|-----------|---|--------------|
| Section 1 | GENERAL INFORMATION | Page |
| Table 1-1 | Specifications and Characteristics | 1-3 |
| Table 1-2 | Recommended/Required Test Equipment | 1-5 |
| Table 1-3 | Tools Required for Maintenance | 1-7 |
| Table 1-4 | Options | 1-9 |
| Section 2 | PREPARATION FOR USE | Page |
| Table 2-1 | Line Fuse Values | 2-3 |
| Table 2-2 | Line Cords Available | 2-4 |
| Section 3 | OPERATION | Page |
| Table 3-1 | INPUT Levels | 3-4 |
| Table 3-2 | INPUT Frequencies | 3-5 |
| Section 4 | PRINCIPLES OF OPERATION | Page |
| Section 5 | PERFORMANCE TESTS | Page |
| Table 5-1 | Specifications Tested | 5-1 |
| Table 5-2 | Recommended/Required Test Equipment | 5-2 |
| Table 5-3 | Tools Required for Maintenance | 5-4 |
| | Performance Test Record | 5-22 follows |
| Section 6 | REPLACABLE PARTS | Page |
| Table 6-1 | HP 5364A Microwave Mixer/Detector – Parts | 6-5 |
| Table 6-2 | Printed Circuit Board (05364-60001) – Parts | 6-6 |
| Table 6-3 | Code List of Manufacturers | 6-6 |
| Section 7 | MANUAL APPLICABILITY AND MANUAL CHANGES | Page |
| Section 8 | SERVICE INFORMATION | Page |
| Table 8-1 | Required/Recommended Tools | 8-2 |
| Section 9 | PACKAGING FOR STORAGE AND SHIPMENT | Page |

LIST OF FIGURES

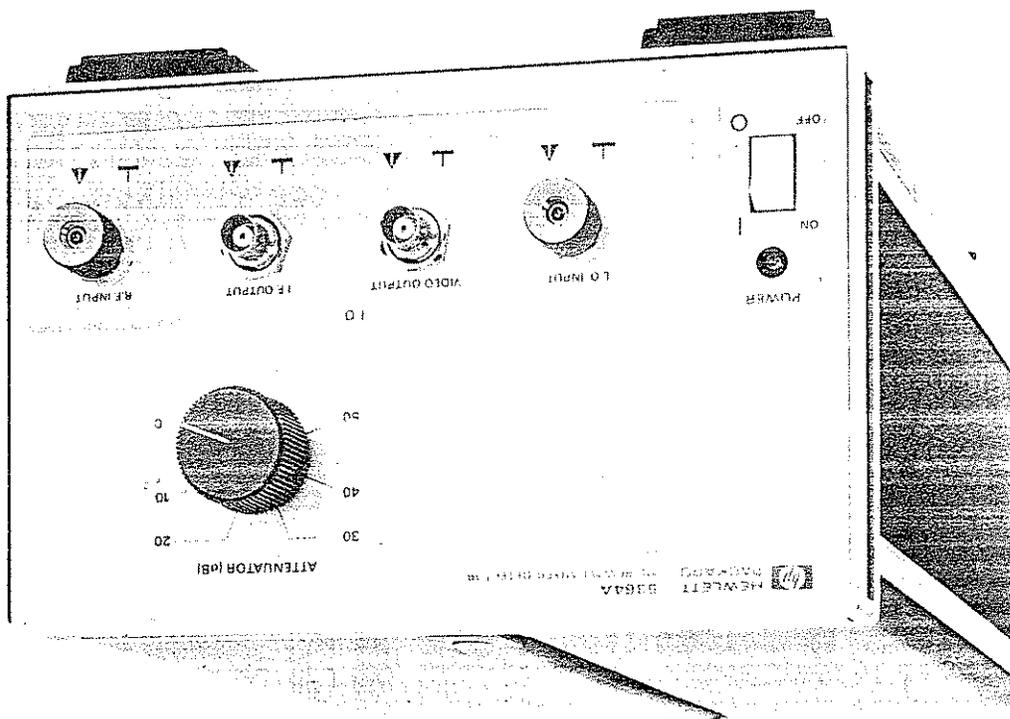
| | | |
|------------|---|------|
| Section 1 | GENERAL INFORMATION | Page |
| Figure 1-1 | HP 5364A Microwave Mixer/Detector | 1-0 |
| Figure 1-2 | Typical Measurement System Including HP 5364A | 1-2 |
| Section 2 | PREPARATION FOR USE | Page |
| Figure 2-1 | Power Line Module | 2-3 |
| Figure 2-2 | Setup for Operational Verification | 2-6 |
| Section 3 | OPERATION | Page |
| Figure 3-1 | Front Panel | 3-2 |
| Figure 3-2 | Rear Panel | 3-2 |
| Figure 3-3 | Resolution versus Frequency | 3-5 |
| Figure 3-4 | Video Output Signal | 3-6 |
| Section 4 | PRINCIPLES OF OPERATION | Page |
| Figure 4-1 | HP 5364A in a Typical Setup — Block Diagram | 4-2 |
| Section 5 | PERFORMANCE TESTS | Page |
| Figure 5-1 | Setup for Performance Test | 5-6 |
| Figure 5-2 | Setup for VIDEO OUTPUT Tests | 5-13 |
| Figure 5-3 | Setup for VIDEO OUTPUT Rise-time Tests | 5-14 |
| Figure 5-4 | VIDEO OUTPUT Rise-time Test Waveform | 5-16 |
| Figure 5-5 | Set-up for Direct Group Delay Measurement | 5-19 |
| Figure 5-6 | Direct Group Delay Measurement — Example Waveform | 5-19 |
| Figure 5-7 | Indirect Group Delay Measurement — Example Waveform | 5-22 |
| Section 6 | REPLACEABLE PARTS | Page |
| Section 7 | MANUAL APPLICABILITY AND MANUAL CHANGES | Page |
| Section 8 | SERVICE INFORMATION | Page |
| Figure 8-1 | Setup for Video Path Troubleshooting | 8-8 |
| Figure 8-2 | HP 5364A — Component Locations | 8-29 |
| Figure 8-3 | HP 5364A — Circuit/Block Diagram | 8-31 |
| Figure 8-4 | Power Supply Board (05364-60001) | 8-33 |
| Section 9 | PACKAGING FOR STORAGE AND SHIPMENT | Page |

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

LINE CORD



HP 5364A



SECTION 1 GENERAL INFORMATION

1-1. DESCRIPTION

The HP Model 5364A Microwave Mixer/Detector is a frequency downconverter consisting of a mixer, an I.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 measurement-triggering 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 —
 - PRRF (pulse repetition frequency) and stagger PRRF,
 - 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.)

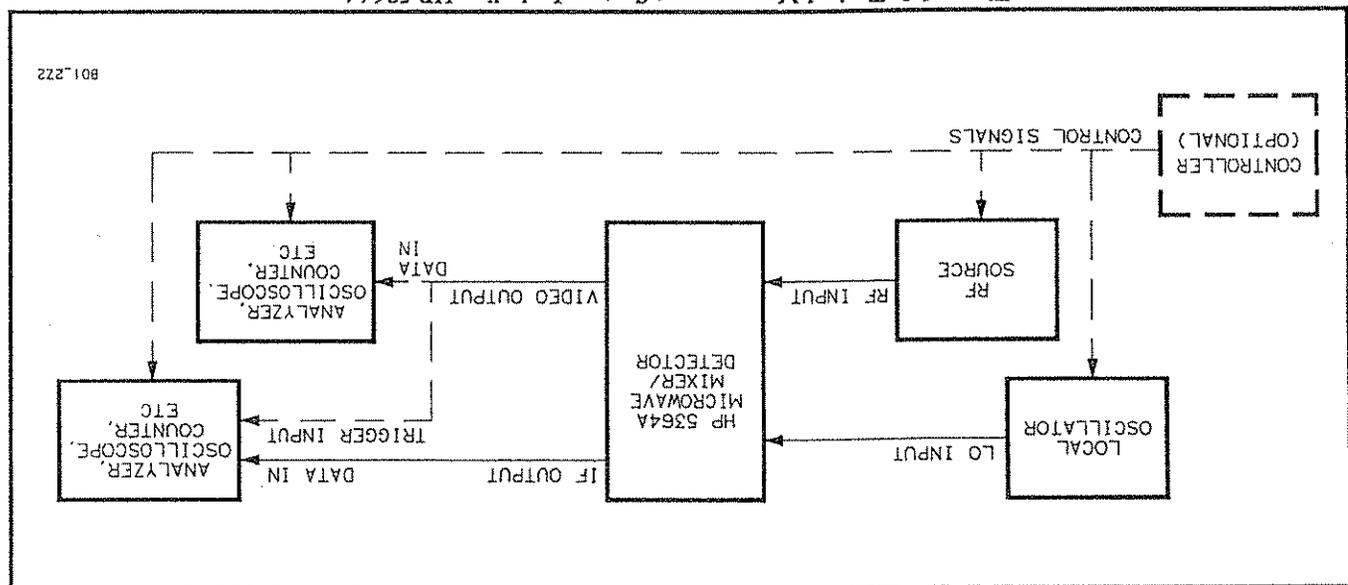
The most-used signal connections are made via front-panel connectors. APC 3.5 connectors are used for R.F. INPUT and L.O. INPUT. BNC connectors are used for I.F. OUTPUT and VIDEO OUTPUT. Hewlett-Packard offers cables and adapters for use with APC 3.5 and BNC connectors; for a listing of available products,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

HP 5364A - Operating and Service Manual
1-2

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.

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



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.

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".

Table 1-1. Specifications and Characteristics

| RF INPUT | LO INPUT | IF OUTPUT | NOTES |
|--|---|---|---|
| <p>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 CW¹ Input Attenuator: 0 to 50 dB in 10 dB steps nominal Connector: APC 3.5 (M)</p> | <p>RF TO IF ISOLATION: > 40 dB nominal</p> | <p>Frequency Range: 10 to 500 MHz Conversion Gain: > 4.5 dB (> 7 dB Typical) 2- < 12.4 GHz RF² > 1.5 dB (> 6 dB Typical) 12.4-18 GHz RF Maximum Roll-off: 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 dB³ Compression @ -3 dBm RF: < 1 dB³ IF Group Delay Ripple: < 1.5 nsec 20 - 500 MHz⁴ (1.0 nsec Typical)</p> | <p>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.</p> |
| <p>Frequency Range: 2 to 18 GHz Impedance: 50 ohms nominal Input Level: + 8 dBm recommended; + 20 dBm Max Connector: APC 3.5 (M)</p> | <p>LO TO RF ISOLATION: > 36 dB nominal</p> | | |
| <p>Frequency Range: 2.2 to 18 GHz Impedance: 50 ohms nominal Input Level: + 8 dBm recommended; + 20 dBm Max Connector: APC 3.5 (M)</p> | | | |
| <p>Operating Temperature: 0 to 50 degrees C</p> | | | |
| <p>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</p> | | | |
| <p>Power Requirements: 100, 120V, 220, or 240 VAC (+10%, -10%) 50-60, 400 Hz; 30 VA maximum</p> | | | |
| <p>GENERAL</p> | | | |
| <p>RF INPUT</p> | | | |
| <p>VIDEO OUTPUT</p> | | | |
| <p>Polarity: Negative Detection Slope: Square Law⁵ 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 dB³ (+/- 1 dB Typical) Compression @ + 2 dBm RF: < 1 dB³ Rise Time 20 to 80% @ -10 dBm RF: < 7.5 nsec (< 5 nsec Typical) Coupling: DC Connector: BNC (F)</p> | | | |

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.

1-4. RECOMMENDED TEST EQUIPMENT AND TOOLS

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

CAUTION

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

WARNING

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

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.

1-3. SAFETY AND OTHER CONSIDERATIONS

| 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 μ s 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 5411A | 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 I-2. Recommended/Required Test Equipment

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

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.

1-9. Instruments Covered by this Manual

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).

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

1-8. Manual and Microfiche Part Numbers

1-7. ABOUT THIS MANUAL

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

1-6. SERVICE CONTRACT

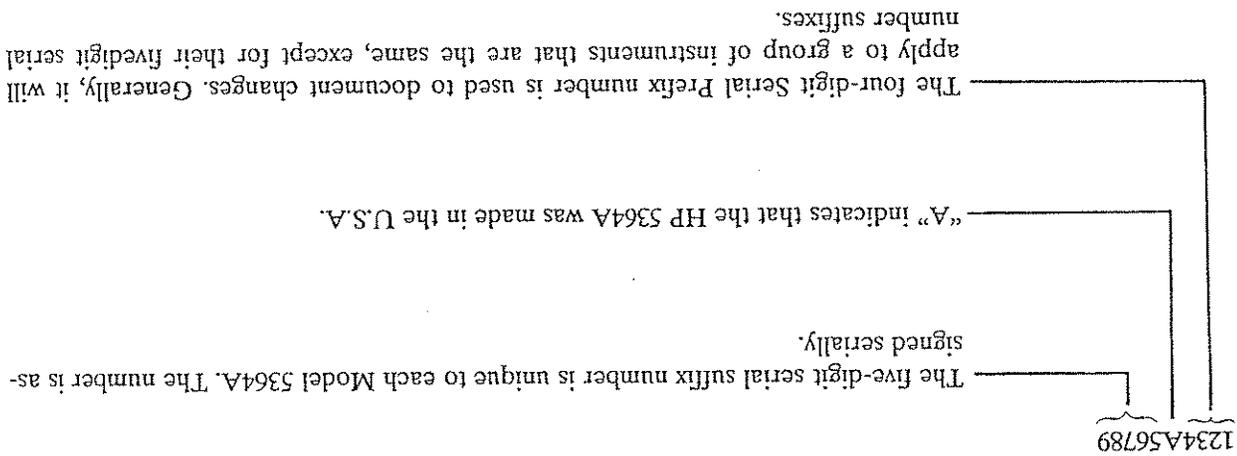
Hewlett-Packard's Warranty for the Model 5364A Microwave Mixer/Detector is printed on the inside front cover of this manual. Please take time to read the Warranty thoroughly at least once before you proceed to read the rest of this manual or to install or use this product.

1-5. WARRANTY

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

Table 1-3. Tools Required for Maintenance

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



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

1-12. Serial Number

1-11. IDENTIFICATION

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.

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.

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.

1-10. Manual Changes Supplement

| 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 |

Table 1-4. Options

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

1-14. OPTIONS

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.

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

1-13. Series Number

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

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.

2-2. UNPACKING AND INSPECTION

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

NOTE

- 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.

Preparing the HP 5364A for use consists of —

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

2-1. INTRODUCTION

SECTION 2 PREPARATION FOR USE

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 --

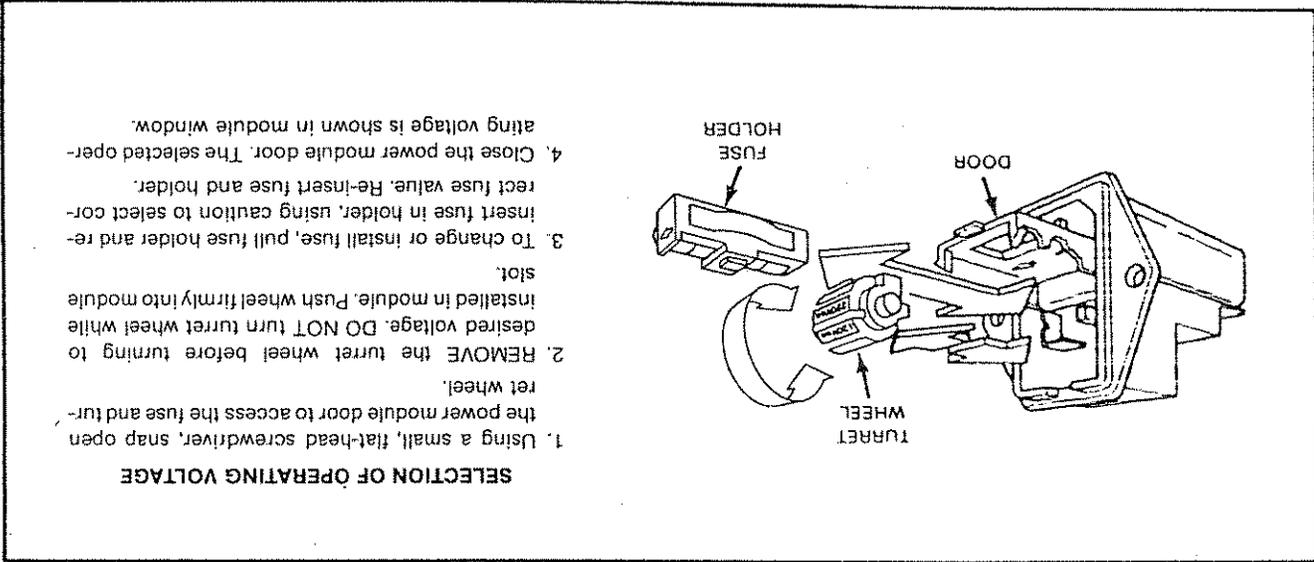
a. Be sure that the correct fuse for the line voltage to be used is installed, and that the line voltage selector is correctly set, as follows --

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.

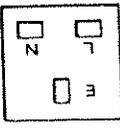
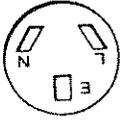
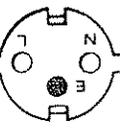
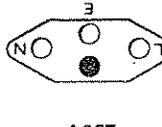
c. Insert the other end of the line cord into the power line receptacle.

Figure 2-1. Power Line Module



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

Table 2-1. Line Fuse Values

| PLUG TYPE | CABLE HP PART NO. | *C D | PLUG DESCRIPTION | CABLE LENGTH (INCHES) | CABLE COLOR | FOR USE IN COUNTRY |
|---|-------------------|------|---------------------------|-----------------------|-------------|---|
|  | 8120-1351 | 0 | Straight **B51363A | 90 | Mint Gray | United Kingdom, Cyprus, Nigeria, Rhodesia, Singapore |
|  | 8120-1369 | 0 | Straight **NZSS198/ASCI12 | 79 | Gray | Australia, New Zealand |
|  | 8120-1689 | 7 | Straight **CEE7-Y11 | 79 | Mint Gray | East and West Europe, Saudi Arabia, Egypt, So Africa, India (Unpolarized in many nations) |
|  | 8120-1348 | 5 | Straight **NEMAS-15P | 80 | Black | United States, Canada, Japan |
| | 8120-1398 | 5 | Straight **NEMAS-15P | 80 | Black | Canada, Japan |
| | 8120-1754 | 7 | Straight **NEMAS-15P | 36 | Black | (100V or 200V), Mexico, Philippines, Taiwan |
| | 8120-1378 | 1 | Straight **NEMAS-15P | 80 | Jade Gray | |
| | 8120-1521 | 6 | 90° | 80 | Jade Gray | |
| | 8120-1676 | 2 | Straight **NEMAS-15P | 30 | Jade Gray | |
|  | 8120-2104 | 3 | Straight **SEV1011 | 79 | Gray | Switzerland |
| | | | 1959-24507 | | | |
| | | | Type 12 | | | |
|  | 8120-0698 | 6 | Straight **NEMA6-15P | | | United States, Canada |
|  | 8120-2956 | 2 | Straight **DHCK 107 | 79 | Gray | Denmark |
| | 8120-2957 | 3 | 90° | | | |

*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

Table 2-2. Line Cords Available

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.

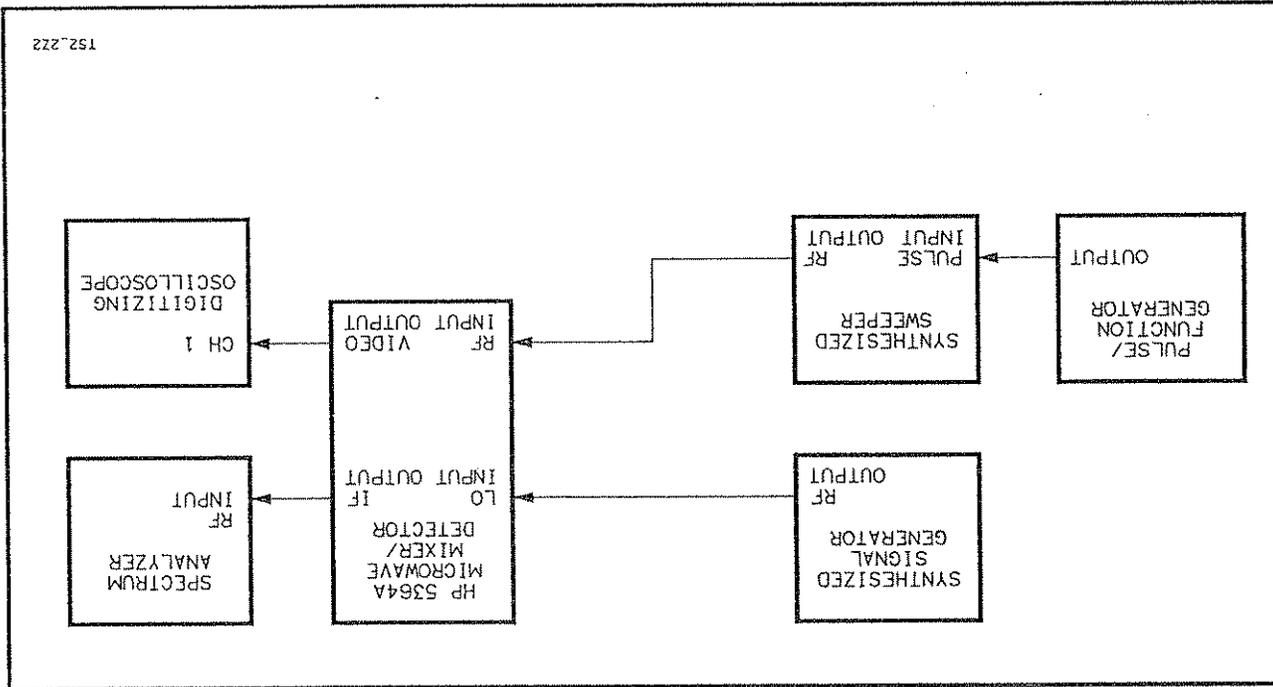
2-9. I.F. Flatness

- 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.

Figure 2-2. Setup for Operational Verification



- a. Turn off or disconnect any signal source at the HP 5364A I.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 μ s (select WID, then use RANGE and VERNIER controls)
 - Pulse Repetition Rate = 2 μ s (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 IN)
 - 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 μ s wide, 2 μ s interval.

2-10. VIDEO OUTPUT Verification

- 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.

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 3-2. Rear Panel

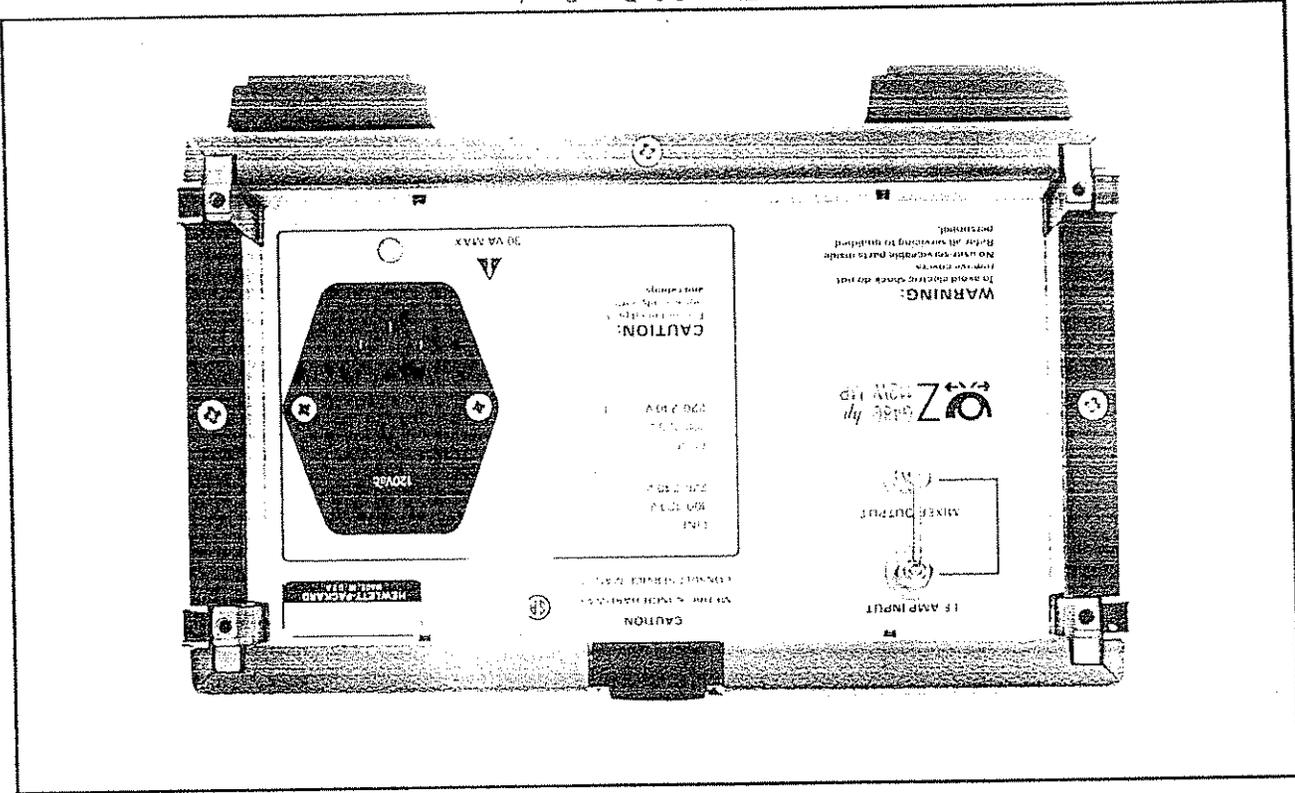
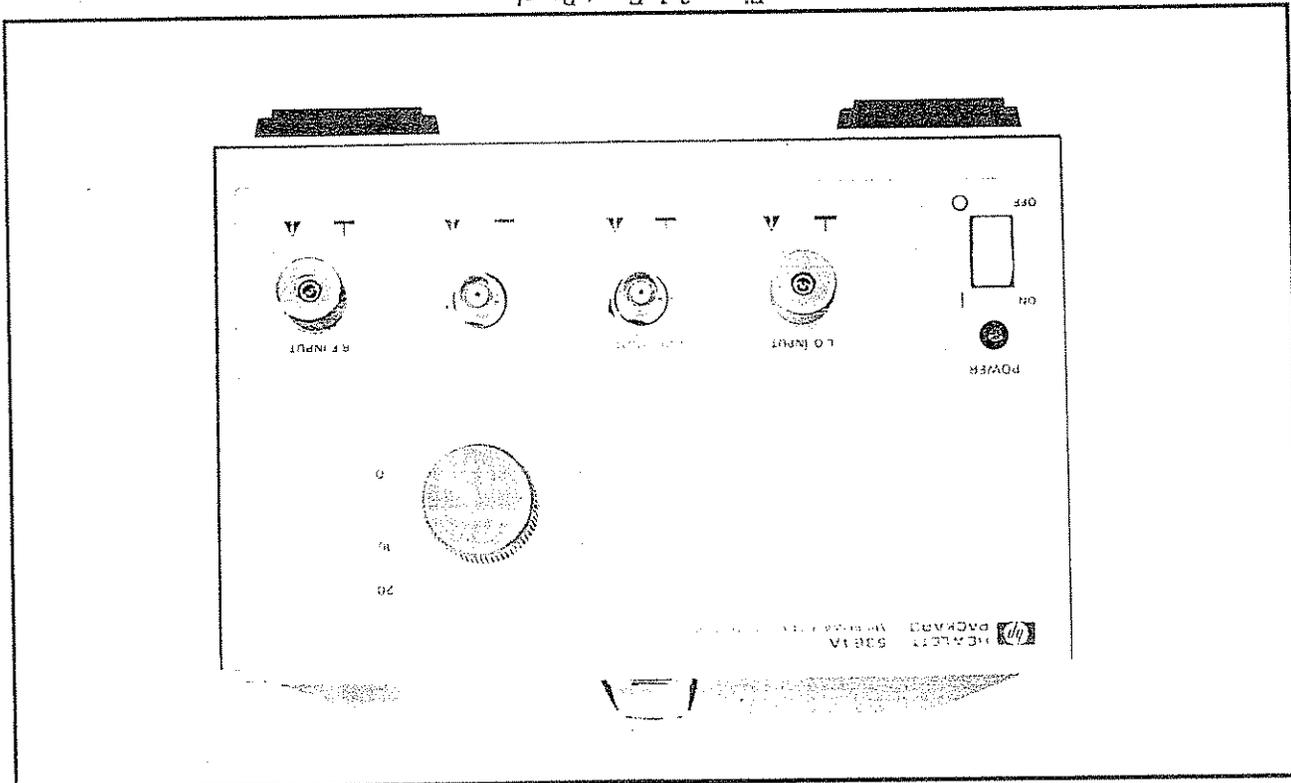


Figure 3-1. Front Panel



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.

| L.O. INPUT — | | R.F. INPUT — | |
|-------------------------|----------|---|----------------------------|
| DAMAGE LEVEL: + 20 dBm | | Specified input level: + 8 dBm. Use of any other level may result in improper or unpredictable operation. | |
| | | Recommended R.F. INPUT Levels | |
| Attenuator Setting (dB) | CW (dBm) | Pulse (dBm) | For I.F. OUTPUT only (dBm) |
| 50 | + 30 | + 30 | -12 to 0 |
| 40 | + 30 | + 50 | + 8 to + 10 |
| 30 | + 30 | + 50 | -1 to + 10 |
| 20 | + 30 | + 50 | + 8 to + 20 |
| 10 | + 30 | + 40 | + 8 to + 18 |
| 0 | + 30 | + 30 | + 8 to + 18 |
| | + 30 | + 50 | + 18 to + 28 |
| | + 30 | + 50 | + 18 to + 30 |
| | + 30 | + 50 | + 28 to + 40 |
| | + 30 | + 50 | + 38 to + 50 |
| | + 30 | + 50 | + 38 to + 48 |
| | + 30 | + 50 | + 38 to + 38 |
| | + 30 | + 50 | + 28 to + 40 |
| | + 30 | + 50 | + 28 to + 38 |
| | + 30 | + 50 | + 15 to + 38 |
| | + 30 | + 50 | + 5 to + 28 |
| | + 30 | + 50 | + 5 to + 18 |
| | + 30 | + 50 | -5 to + 18 |
| | + 30 | + 40 | -15 to + 8 |
| | + 30 | + 30 | -25 to -2 |

Table 3-1. INPUT Levels

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.)

Figure 3-3. Resolution versus Frequency

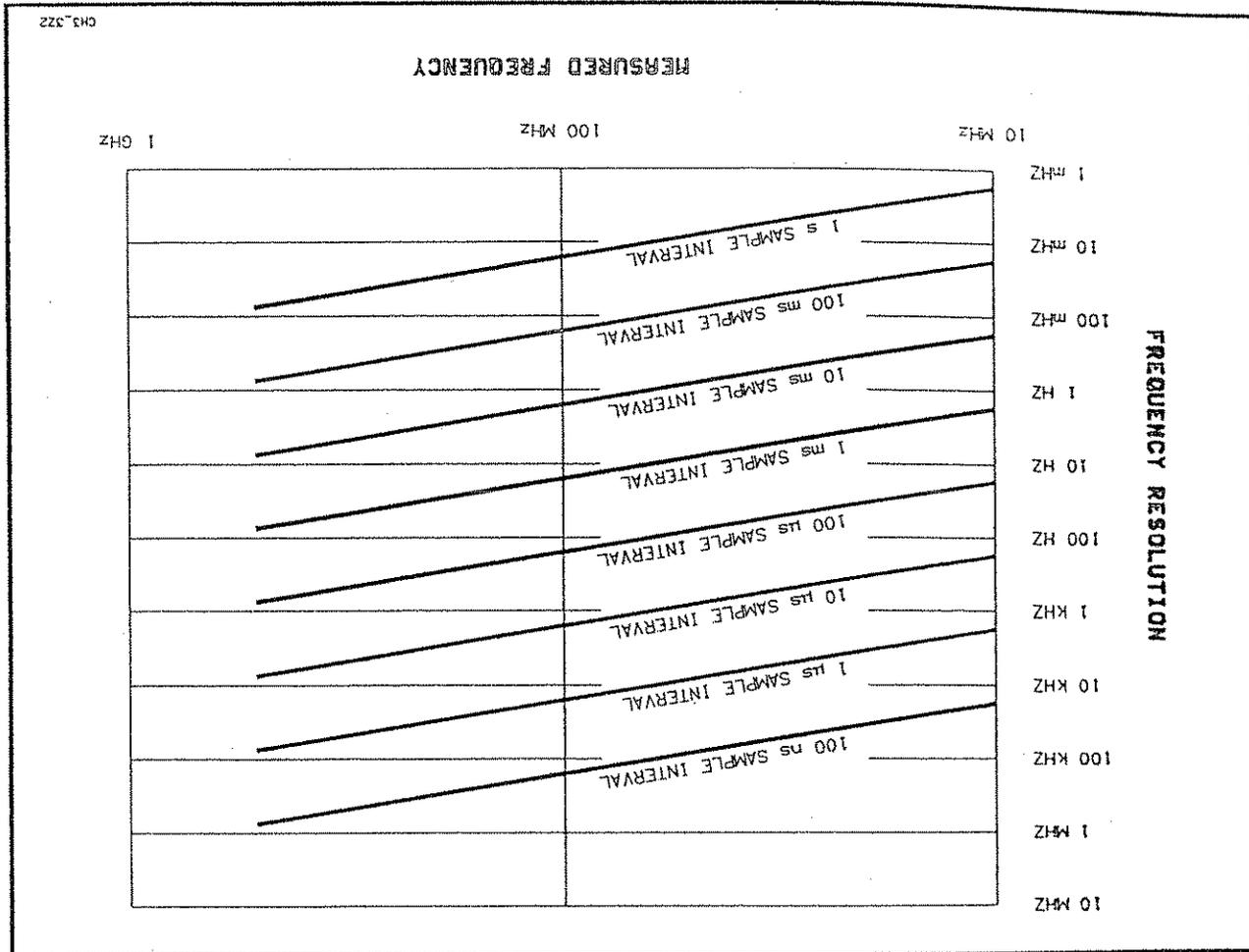
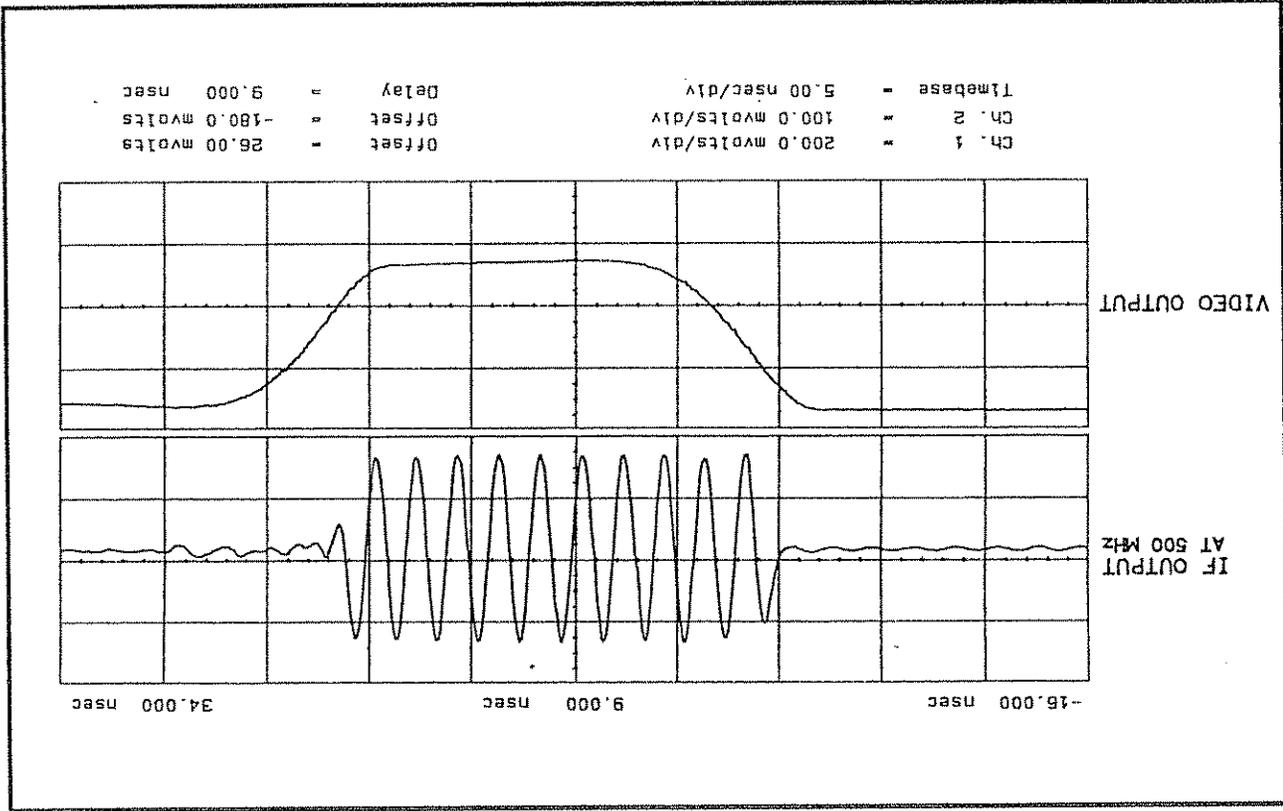


Table 3-2. INPUT Frequencies

| 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 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. |

CHS_332

Figure 3-4. Video Output Signal



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

3-13. VIDEO OUTPUT

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

3-12. Amplitude

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).

3-11. Frequency

3-10. I.F. OUTPUT

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 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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

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 "T" 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.

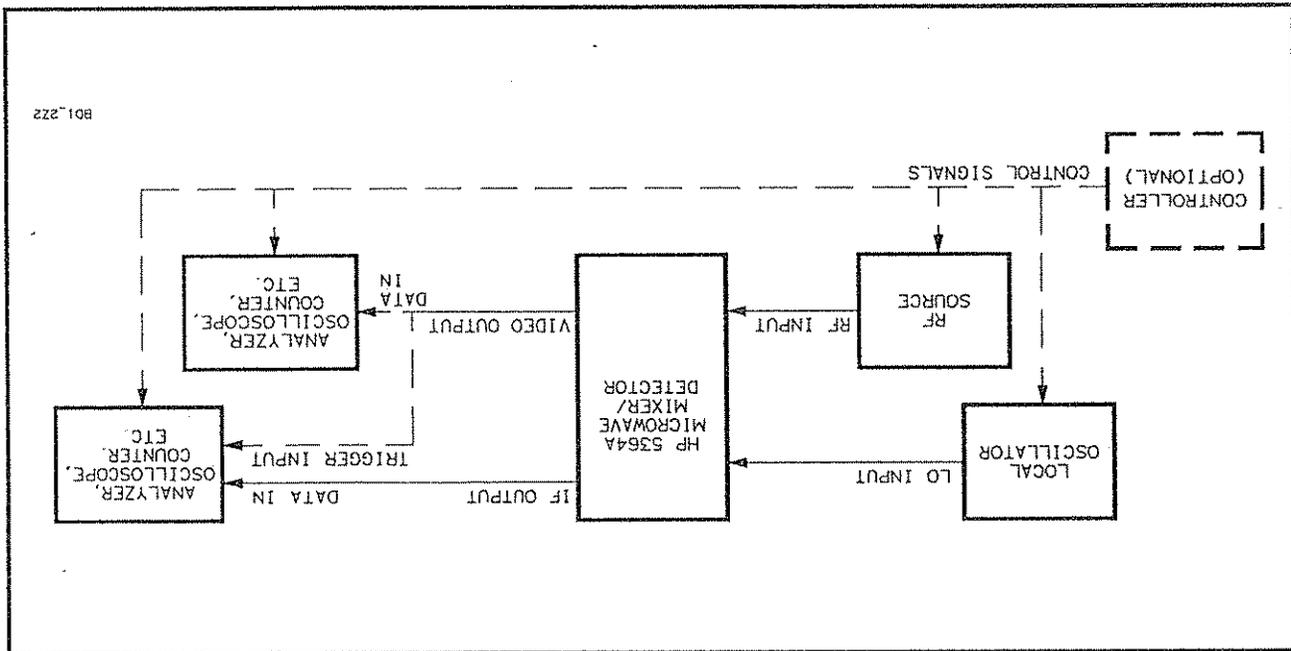


Figure 4-1. HP 5364A in a Typical Setup — Block Diagram

801, zzz

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".

SECTION 5
PERFORMANCE TESTS

Table 5-1. Specifications Tested

| TEST NAME | SPECIFICATION |
|--|---|
| L.F. Output (for L.O. = 2.2 GHz, 12.4 GHz, and 17.5 GHz) | < 8 dB (I.F. = 10 to 500 MHz) |
| Maximum Roll Off (I.F. = 10 to 90 MHz) | < 3 dB (I.F. = 10 to 90 MHz) |
| Conversion Gain | R.F. INPUT: 2 GHz to < 12.4 GHz; I.F. OUTPUT = 10 MHz |
| | R.F. INPUT: 12.4 GHz to 18 GHz; I.F. OUTPUT = 10 MHz |
| Gain Linearity (I.F. = 80 MHz) | ± 1.3 dB |
| Compression (R.F. INPUT = -3 dBm, I.F. = 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 |

| 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 μ s 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 5411A | 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

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).

5-2. EQUIPMENT REQUIRED

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

- 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.

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

5-5. Setup

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

5-4. I.F. OUTPUT TESTS

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 inspection can be used for comparison in periodic maintenance and troubleshooting, and after repair.

5-3. TEST RECORD

| 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 |

Table 5-3. Tools Required for Maintenance

- 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.)

5-8. SETTING UP THE SPECTRUM ANALYZER

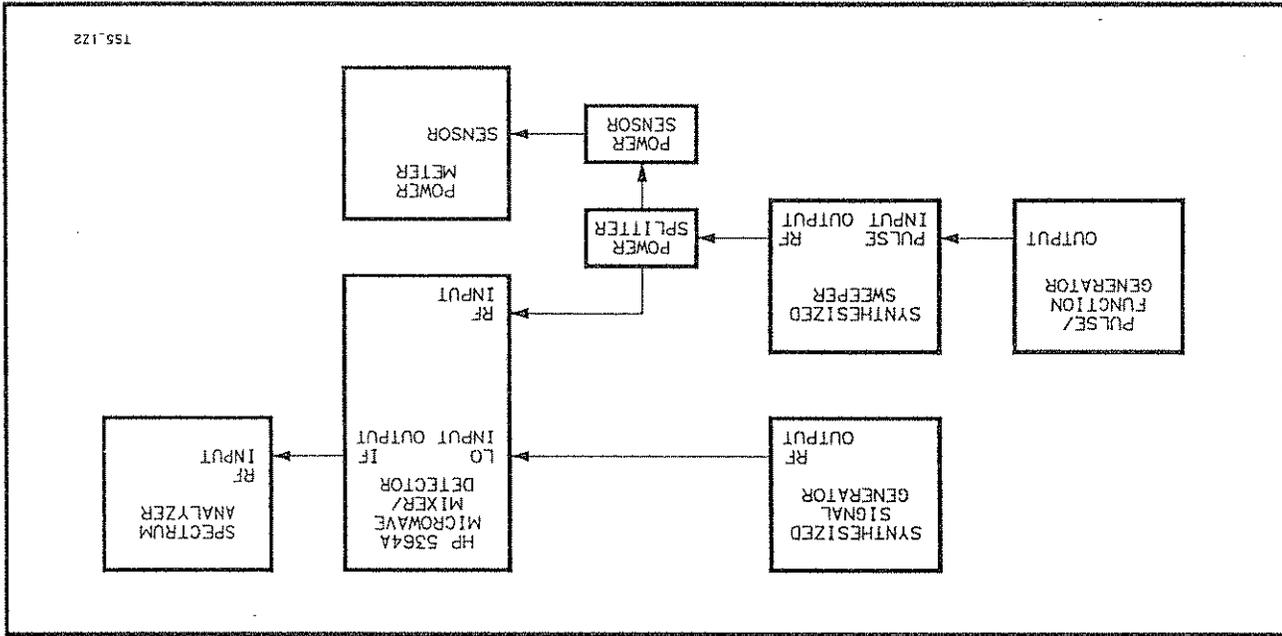
- a. Turn Synthesized Signal Generator power to ON.
- b. Set RF Output Frequency to 2.2 GHz.
- c. Attach a 2-18 GHz cable to the Synthesized Signal Generator RF Output. (Use adapter as required.)
- d. Attach the other end of the 2-18 GHz cable to the Power Sensor. (Use adapter as required.)
- e. Rotate 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 I.O. INPUT. (See *Figure 5-1*.) (Use adapter as required.)
- g. Turn HP 5364A power ON.
- h. Set HP 5364A Attenuator to 0 dB.

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

The Power Sensor-Power Meter combination is now calibrated.

- i. Set Power Meter MODE to dBm.
- 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.

Figure 5-1. Setup for Performance Test



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

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.)

NOTE

- 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.

5-9. SETTING UP THE SYNTHESIZED SWEEPER

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.

- 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.

5-17. Maximum Roll-off.

- 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.

5-16. Set-up.**5-15. 12.4 GHz L.O. INPUT**

- 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 R.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.

5-14. Gain Linearity and Compression.

- 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.

5-20. 17.5 GHz L.O. INPUT

- 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.

5-19. Gain Linearity and Compression.

- 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.

5-18. Conversion Gain.

- a. Record the variation as the "Maximum Roll Off" on the Test Record.
- b. 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.
- c. The Spectrum Analyzer must show that the I.F. OUTPUT sweeps from 10 MHz to 500 MHz.
- d. Press the Synthesized Sweeper "STOP FREQ" FUNCTION key, then specify 12.9 GHz.

- 5-23. Gain Linearity and Compression.**
- Press the Synthesized Sweeper "CW" FUNCTION key, then enter 17.58 GHz.
 - Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads -20 dBm.

- 5-22. Conversion Gain.**
- Press the Synthesized Sweeper "CW" FUNCTION key, then specify 17.51 GHz.
 - Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads -10 dBm.
 - 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.

- 5-21. Maximum Roll-off.**
- Press the Synthesized Sweeper "POWER LEVEL" FUNCTION key, then turn the entry knob until the Power Meter reads -10 dBm.
 - Press the Synthesized Sweeper "SWEEP TIME" FUNCTION key, then specify 5 seconds.
 - Press the Synthesized Sweeper "START FREQ" FUNCTION key, then specify 17.51 GHz.
 - Press the Synthesized Sweeper "STOP FREQ" FUNCTION key, then specify 18.0 GHz.
 - 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.

- Press the Synthesized Sweeper "CW" FUNCTION key, then specify 17.51 GHz.
- Set the Spectrum Analyzer REFERENCE LEVEL to +10 dBm and the LOG Scale to 5 dB/Div.
- Reconnect the Power Sensor to the Power Splitter.
- Disconnect the 2-18 GHz cable at the Power Sensor and connect its free end to the HP 5364A I.O. INPUT.

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

5-27. DEVIATION FROM SQUARE LAW, AND COMPRESSION

5-26. Test Procedures

- i. Press the Synthesized Sweeper "PULSE" MODULATION key. (LED should light.)
- h. Press the Synthesized Sweeper "CW" FUNCTION key, then specify 12.4 GHz.
- 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.
- f. Connect HP 5364A VIDEO OUTPUT to Digitizing Oscilloscope.
- e. Disconnect Synthesized Signal Generator from HP 5364A I.O. INPUT.
- d. Connect Pulse/Function Generator to Synthesized Sweeper PULSE MODULATION Input. (See Figure 5-2.)
- c. Set the Pulse/Function Generator front-panel controls as follows --
 - Function = Pulse (press pulse symbol key)
 - Pulse Width = 1 μ s (select WID, then use RANGE and VERNIER controls)
 - Pulse Repetition Rate = 2 μ s (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)
- b. Turn Pulse/Function Generator power to ON.
2. Set up the Synthesized Sweeper as described in the I.F. OUTPUT information.
1. Calibrate the Power Sensor-Power Meter combination as described in the I.F. OUTPUT set-up information.
- a. If you did not perform the I.F. OUTPUT tests given above --

5-25. Set-up

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

5-24. VIDEO OUTPUT TESTS

- e. As indicated on the Test Record, calculate and record the Gain Linearity and Compression values.
- 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.
- c. Change the Spectrum Analyzer REFERENCE LEVEL to 0 dBm and the LOG SCALE to 2dB/Div.

- 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.

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

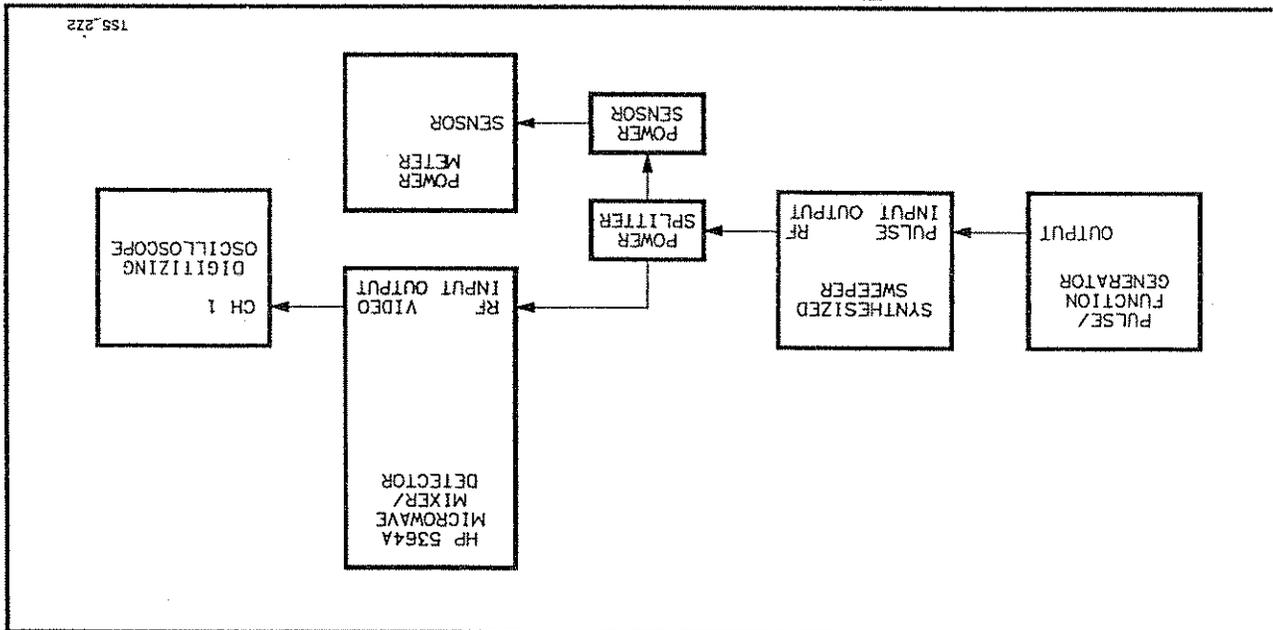
- a. On the Test Record, record the HP 5364A VIDEO OUTPUT voltage (p-p) shown by the Digitizing Oscilloscope.
- b. Record each HP 5364A VIDEO OUTPUT voltage peak-to-peak voltage level shown by the Digitizing Oscilloscope as you increase the POWER LEVEL from the Synthesized Sweeper from -12 dBm to +3 dBm in 1-dB steps.
- c. As indicated on the Test Record, calculate and record the Deviation from Square Law value, and the Com-
precision value.

- 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 μ s (select FRQ, then use RANGE and VERNIER controls to set 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.

Refer to Figure 5-3.

5-29. VIDEO OUTPUT Risetime
5-30. SET-UP

Figure 5-2. Setup for VIDEO OUTPUT Tests

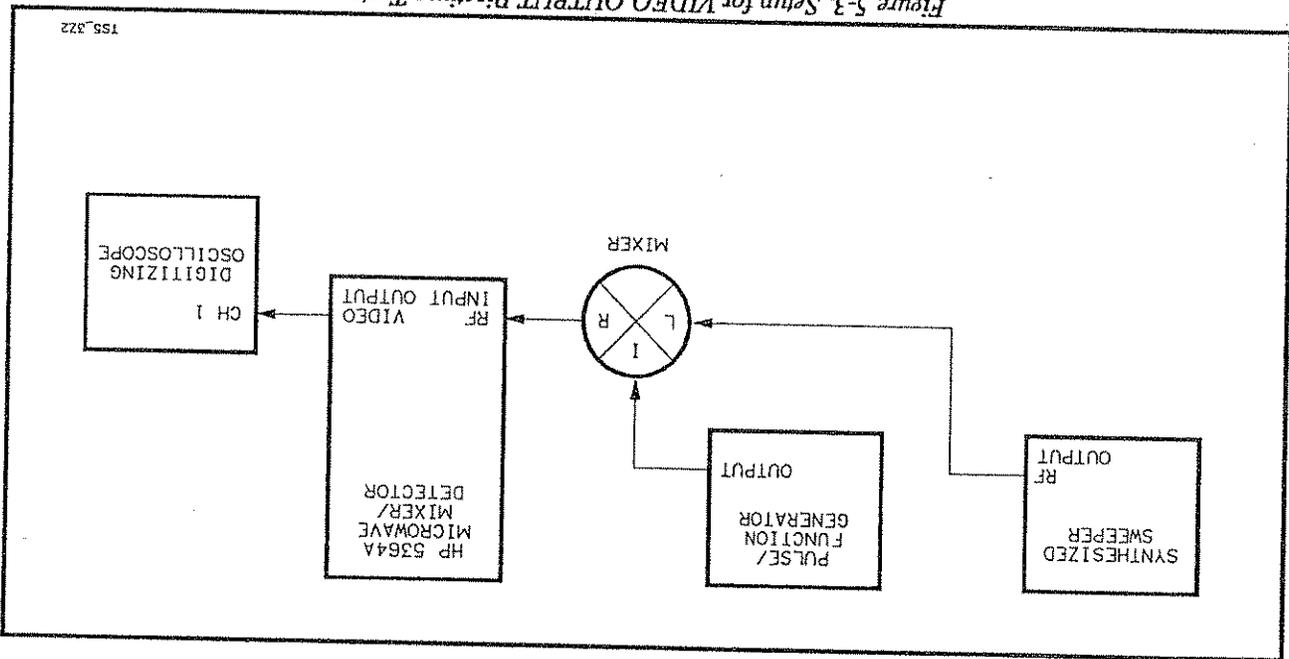


In AUTOSCALE, the HP 54111A Oscilloscope gives a negative value for the risetime because it makes its measurement from the lower marker (its "20%" marker) to the upper marker (its "80%" marker), regardless of the 20%-80% Risetime must be less than 7.5 ns.

- 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.)
- Press the "Delta t" softkey, then select the "Markers" softkey.
- 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.

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

Figure 5-3. Setup for VIDEO OUTPUT Risetime Tests



- Use a BNC-BNC cable to connect the HP 5364A VIDEO OUTPUT to the Digitizing Oscilloscope Channel 1 input.
- Press the AUTOSCALE hardkey.
- Press the "Timebase" softkey, then change the Sweep Speed to 2 ns/Div.
- Press the "Delta V" softkey, then select the "Markers" softkey.
- Press the "Auto Top-Base" softkey, then make the "20-80%" softkey selection.

5-32. Digitizing Oscilloscope Set-up.

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

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.

| | |
|--|--|
| 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 |

- 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.

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

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.

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.

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.

"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.

5-40. I.F. GROUP DELAY RIPPLE

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".

Use the Delta Mode Menu, DELTA REF = 1.

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

Use the MKR SEARCH MAX AND MIN softkeys.

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.

k. Select AUTOSCALE to rescale the display.

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

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

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

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

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

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

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

e. Set the HP 8753A as follows –

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

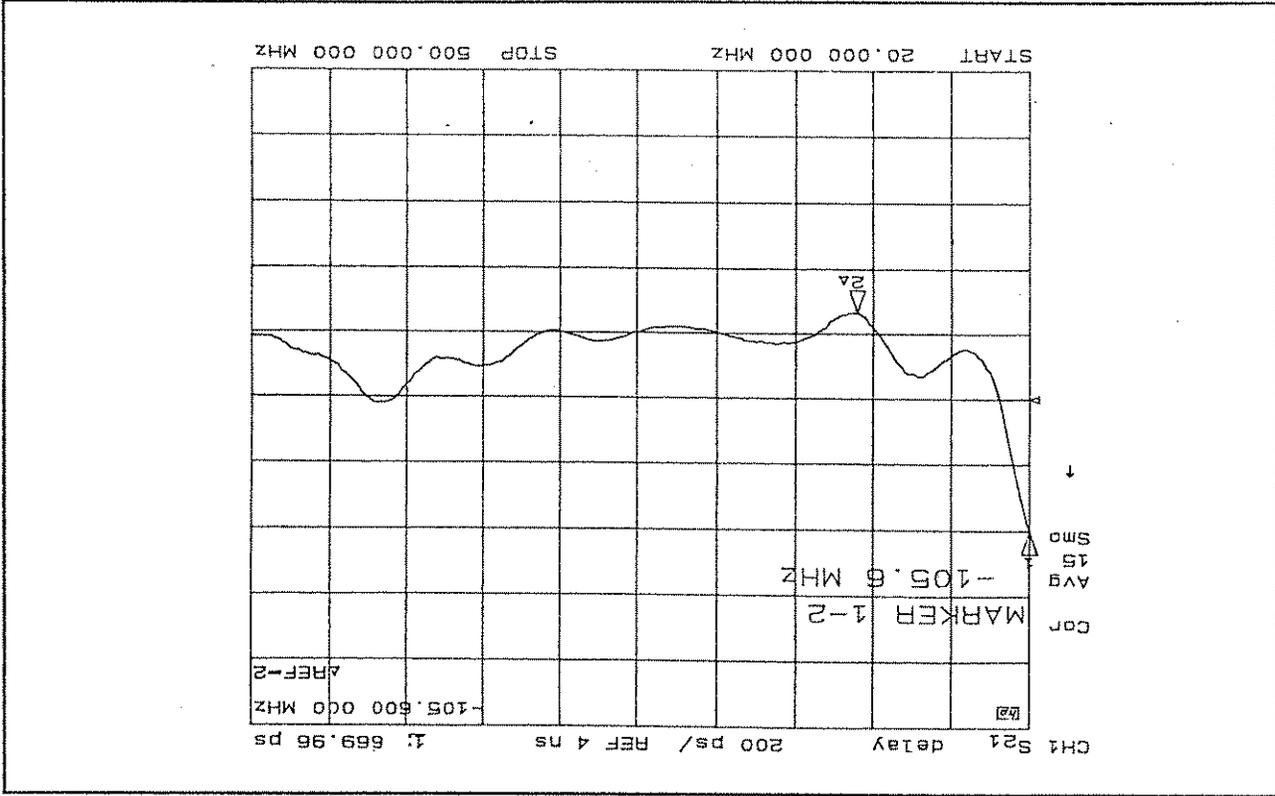
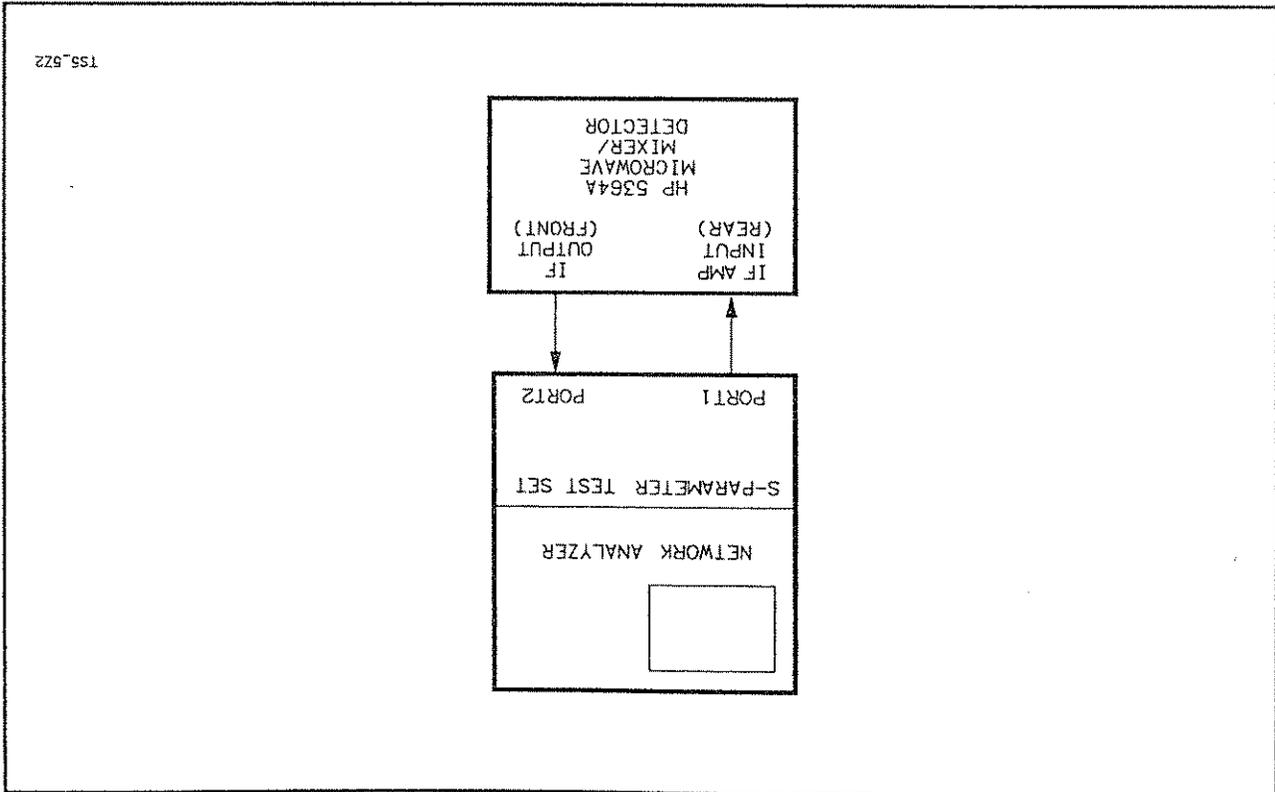


Figure 5-5. Set-up for Direct Group Delay Measurement



155_572

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-Parameter 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.)

1. Measure the difference between the Marker 1 and Marker 2 position. (Use the Delta Mode Menu.)
 - 6.) Write this value on the Test Record as the "I.F. Group Delay Ripple." (See Figure 5-

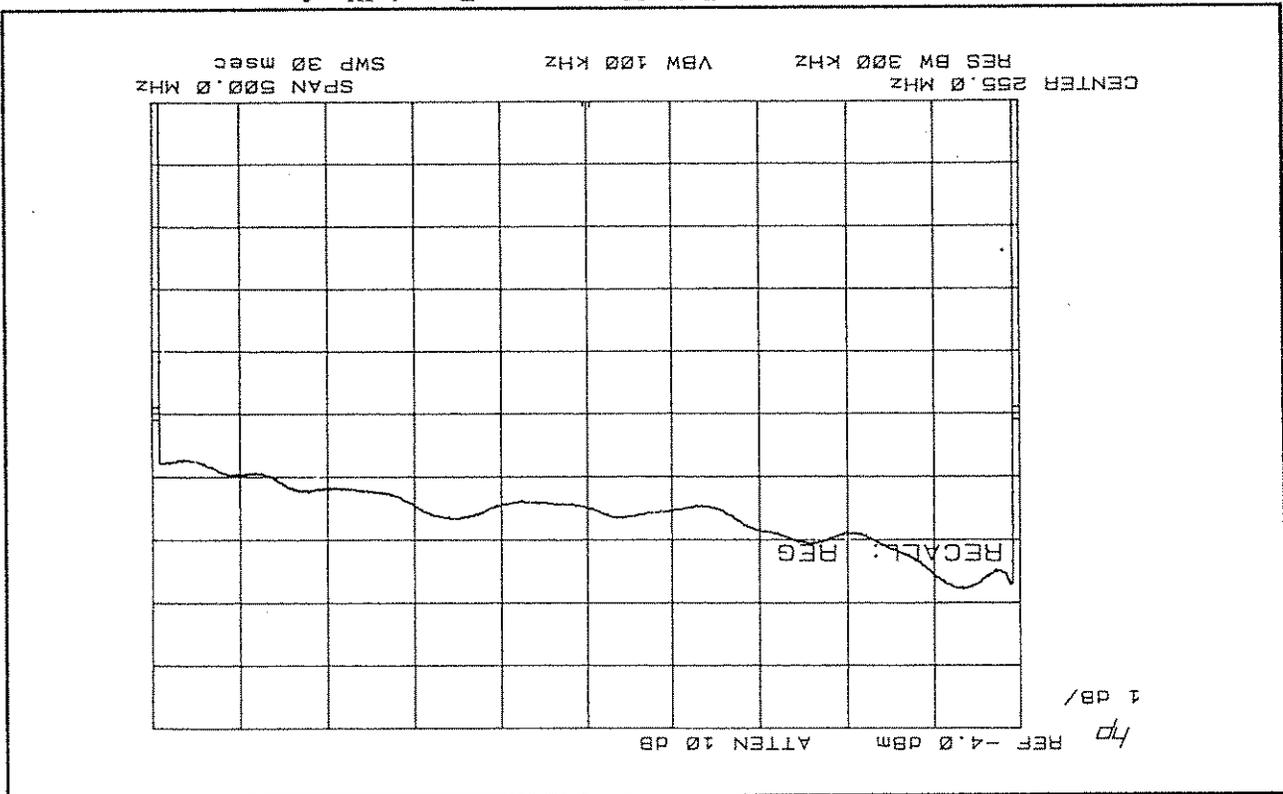
5-43. Indirect Test

- 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 | Min. | Actual | Max. |
|-----------|----------------|------|--------|------|
| 5-11 | L.O. = 2.2 GHz | | | |
| 5-14 thru | 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) _____ DB > 4.5 DB

PERFORMANCE TEST RECORD (Page 2 of 9)

| Step | Test Name | Min. | Actual | Max. |
|--------------|-----------|------|--------|------|
| Test Results | | | | |

Gain Linearity (I.F. = 80 MHz)

Data Record

| R.F. INPUT | I.F. OUTPUT | Reference used for Calculations |
|------------|-------------|---------------------------------|
| -20 dBm | _____ | P1 dbm |
| -19 dBm | _____ | P2 dbm |
| -18 dBm | _____ | P3 dbm |
| -17 dBm | _____ | P4 dbm |
| -16 dBm | _____ | P5 dbm |
| -15 dBm | _____ | P6 dbm |
| -14 dBm | _____ | P7 dbm |
| -13 dBm | _____ | P8 dbm |
| -12 dBm | _____ | P9 dbm |
| -11 dBm | _____ | P10 dbm |
| -10 dBm | _____ | P11 dbm |
| -9 dBm | _____ | P12 dbm |
| -8 dBm | _____ | P13 dbm |
| -7 dBm | _____ | P14 dbm |
| -6 dBm | _____ | P15 dbm |
| -5 dBm | _____ | P16 dbm |
| -4 dBm | _____ | P17 dbm |
| -3 dBm | _____ | P18 dbm |
| -2 dBm | _____ | P19 dbm |

| Step | Test Name | Min. | Actual | Max. |
|------|--|---------|--------|---------|
| | Gain Linearity Calculations (results in dB) | | | |
| | 2 * (P ² -P ¹) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ³ -P ²) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ⁴ -P ³) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ⁵ -P ⁴) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ⁶ -P ⁵) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ⁷ -P ⁶) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ⁸ -P ⁷) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ⁹ -P ⁸) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹⁰ -P ⁹) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹¹ -P ¹⁰) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹² -P ¹¹) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹³ -P ¹²) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹⁴ -P ¹³) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹⁵ -P ¹⁴) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹⁶ -P ¹⁵) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹⁷ -P ¹⁶) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ¹⁸ -P ¹⁷) - 2 : | -1.3 dB | _____ | +1.3 dB |
| | Compression: ... 2 * (P ¹⁹ -P ¹⁸) - 2 : | _____ | _____ | < 1 dB |

PERFORMANCE TEST RECORD (Page 4 of 9)

| Step | Test Name | Min | Actual | Max. |
|-----------|-----------------|-----|--------|------|
| 5-15 | L.O. = 12.4 GHz | | | |
| 5-19 thru | 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) _____ dB > 4.5 dB

Gain Linearity (I.F. = 80 MHz)

Data Record

Reference used for I.F. OUTPUT Calculations

| Level | INPUT | OUTPUT | Level |
|---------|-------|--------|---------------------|
| -20 dbm | _____ | _____ | P ₁ dbm |
| -19 dbm | _____ | _____ | P ₂ dbm |
| -18 dbm | _____ | _____ | P ₃ dbm |
| -17 dbm | _____ | _____ | P ₄ dbm |
| -16 dbm | _____ | _____ | P ₅ dbm |
| -15 dbm | _____ | _____ | P ₆ dbm |
| -14 dbm | _____ | _____ | P ₇ dbm |
| -13 dbm | _____ | _____ | P ₈ dbm |
| -12 dbm | _____ | _____ | P ₉ dbm |
| -11 dbm | _____ | _____ | P ₁₀ dbm |
| -10 dbm | _____ | _____ | P ₁₁ dbm |
| -9 dbm | _____ | _____ | P ₁₂ dbm |
| -8 dbm | _____ | _____ | P ₁₃ dbm |
| -7 dbm | _____ | _____ | P ₁₄ dbm |
| -6 dbm | _____ | _____ | P ₁₅ dbm |
| -5 dbm | _____ | _____ | P ₁₆ dbm |
| -4 dbm | _____ | _____ | P ₁₇ dbm |
| -3 dbm | _____ | _____ | P ₁₈ dbm |
| -2 dbm | _____ | _____ | P ₁₉ dbm |

| Step | Test Name | Min. | Actual | Max. |
|------|---|---------|--------|---------|
| | Gain Linearity Calculations (results in dB): | | | |
| | 2 * (P ₂ -P ₁) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₃ -P ₂) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₄ -P ₃) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₅ -P ₄) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₆ -P ₅) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₇ -P ₆) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₈ -P ₇) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₉ -P ₈) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₀ -P ₉) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₁ -P ₁₀) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₂ -P ₁₁) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₃ -P ₁₂) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₄ -P ₁₃) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₅ -P ₁₄) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₆ -P ₁₅) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₇ -P ₁₆) - 2: | -1.3 dB | _____ | +1.3 dB |
| | 2 * (P ₁₈ -P ₁₇) - 2: | -1.3 dB | _____ | +1.3 dB |
| | Compression: ... 2 * (P ₁₉ -P ₁₈) - 2: | | _____ | < 1 dB |

PERFORMANCE TEST RECORD (Page 6 of 9)

| Step | Test Name | Min. | Actual | Max. |
|------|-----------------|------|--------|------|
| 5-20 | L.O. = 17.5 GHz | | | |
| 5-23 | 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) _____ dB > 4.5 dB

Gain Linearity (I.F. = 80 MHz)

Data Record

Reference used for I.F. OUTPUT Calculations

| Level | INPUT | Level | OUTPUT |
|---------|-------|-------|--------|
| -20 dBm | _____ | P1 | _____ |
| -19 dBm | _____ | P2 | _____ |
| -18 dBm | _____ | P3 | _____ |
| -17 dBm | _____ | P4 | _____ |
| -16 dBm | _____ | P5 | _____ |
| -15 dBm | _____ | P6 | _____ |
| -14 dBm | _____ | P7 | _____ |
| -13 dBm | _____ | P8 | _____ |
| -12 dBm | _____ | P9 | _____ |
| -11 dBm | _____ | P10 | _____ |
| -10 dBm | _____ | P11 | _____ |
| -9 dBm | _____ | P12 | _____ |
| -8 dBm | _____ | P13 | _____ |
| -7 dBm | _____ | P14 | _____ |
| -6 dBm | _____ | P15 | _____ |
| -5 dBm | _____ | P16 | _____ |
| -4 dBm | _____ | P17 | _____ |
| -3 dBm | _____ | P18 | _____ |
| -2 dBm | _____ | P19 | _____ |

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

PERFORMANCE TEST RECORD (Page 8 of 9)

| Step | Test Name | Min. | Actual | Max. |
|------|--------------|------|--------|------|
| 5-26 | VIDEO OUTPUT | | | |
| 5-39 | Data Record | | | |

Reference used for Calculations

R.F. VIDEO OUTPUT Level

INPUT OUTPUT Level

-12 dbm mv V₁

-11 dbm mv V₂

-10 dbm mv V₃

-9 dbm mv V₄

-8 dbm mv V₅

-7 dbm mv V₆

-6 dbm mv V₇

-5 dbm mv V₈

-4 dbm mv V₉

-3 dbm mv V₁₀

-2 dbm mv V₁₁

-1 dbm mv V₁₂

0 dbm mv V₁₃

+1 dbm mv V₁₄

+2 dbm mv V₁₅

+3 dbm mv V₁₆

Calculations of Deviation from

Square Law (results in dB):

| | | | | |
|--|-------|-------|----|-------|
| 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 |

PERFORMANCE TEST RECORD (Page 9 of 9)

| Step | Test Name | Min. | Actual | Max. |
|------|--|------|--------|----------|
| | Compression: $20 * \log_{10}(V_{16}/V_{15}) - 2$ | | _____ | < 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 |
| | 12.4 GHz | | _____ | ns |
| | 18 GHz | | _____ | ns |
| | | | _____ | < 7.5 ns |

I.F. GROUP DELAY RIPPLE

Indicate test method and results.

| | | | | |
|------|--|-------|----|-----------|
| 5-41 | <input type="checkbox"/> 20-500 MHz Test, Using an HP 8753A Network Analyzer | _____ | ns | < 1.5 ns |
| 5-42 | <input type="checkbox"/> 45-500 MHz Test, using an HP 8510A/B Network Analyzer | _____ | ns | < 1.5 ns |
| 5-43 | <input type="checkbox"/> 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.

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

For mail correspondence, use the address below –

- For Parts Ordering, use our toll-free number, (800) 227-8164, Monday through Friday (except Holidays), 6am through Friday, 6am to 5pm (Pacific Time).
 - For Parts Identification Assistance, call us at (916) 783-0804. Our Parts Identification hours are – Monday through Friday, 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.

By telephone –

- 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.)
 - Outside the United States, contact your local HP sales office. HP sales offices are listed at the back of this manual.
- 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.

6-5. Contacting Hewlett-Packard

- 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.
- 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 –

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.

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.

6-4. Parts Identification

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

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

6-3. HOW TO ORDER A PART

| Reference Designation | HP Part Number | D Qty | Description | Mtr Code | Mtr Part Number |
|-----------------------|----------------|-------|--|----------------|--------------------|
| A1 | 0955-0018 | 5 | POWER DIVIDER: COAX: VSWR=1.25 DC TO | 28480 | 0955-0018 |
| A2 | 0955-0431 | 6 | U-WAVE MIXER 18 GHZ MAX | 14482 | WJ-185SC |
| A3 | 05364-60213 | 8 | AMPLIFIER - IF | 28480 | 05364-60213 |
| A4 | 0955-0442 | 9 | PWR MONITOR-18GZ | 28480 | 0955-0442 |
| A5 | 0955-0438 | 3 | U-WAVE AMPLIFIER 170 MHZ MAX | 28480 | 0955-0438 |
| A6 | 05364-60211 | 6 | CBL AY-PWR HDL | 28480 | 05364-60211 |
| A6F1A | 2110-0201 | 0 | FUSE .25A 250V TD FE UL FUSE .125A 250V TD FE UL (FOR 220/240V) | 11870 16428 | 60.0025 MDL 1/8 |
| A7 | 05364-60001 | 2 | BD-AY PWR SUPPLY | 28480 | 05364-60001 |
| A8 | 05364-60210 | 5 | LED ASSY | 28480 | 05364-60210 |
| A9 | 05364-60212 | 7 | CBL AY-PWR SW | 28480 | 05364-60212 |
| A11 | 3321B H04 | 5 | MNL-STEP ATTN (OPT H04) | 28480 | 3321B H04 |
| A12 | 8493B | 5 | COAXIAL ATTN | 28480 | 8493B |
| FL1 | 0955-0435 | 0 | U-WAVE FILTER-LOWPASS 500 MHZ MAX | 28480 | 0955-0435 |
| J1A | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1B | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J1C | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1D | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1E | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1F | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J1G | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1H | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1I | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1J | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J1K | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1L | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1M | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1N | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J1O | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1P | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1Q | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1R | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J1S | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1T | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1U | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1V | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J1W | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1X | 1250-1696 | 4 | ADAPTER-COAX STR F-BNC F-SMA | 28480 | 1250-1696 |
| J1Y | 08971-20030 | 4 | ADAPTR CONN APC | 28480 | 08971-20030 |
| J1Z | 08673-60040 | 9 | CONN AY OUTPUT | 28480 | 08673-60040 |
| J5 | 1250-1753 | 4 | 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 | TRANSFORMER | 28480 | 9100-4737 |
| U1 | 8120-1378 | 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 | CBL IF SHORT | 28480 | 85660-20101 |
| W3 | 05364-60206 | 9 | CBL AY-ATTN FPNL | 28480 | 05364-60206 |
| W4 | 05364-60205 | 8 | CBL AY-ATTN DVDR | 28480 | 05364-60205 |
| W5 | 1250-1811 | 5 | ADAPTER-COAX STR F-N-F-SMA | 28480 | 1250-1811 |
| W6 | 1250-1250 | 6 | ADAPTER-COAX STR M-N-F-SMA | 28480 | 1250-1250 |
| W7 | 1250-1159 | 4 | ADAPTER-COAX STR M-SMA M-SMA | 28480 | 1250-1159 |
| W8 | 05364-60203 | 6 | CBL AY-MXR RPNL | 28480 | 05364-60203 |
| W9 | 05364-60202 | 5 | 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 | CBL AY-IF RPNL | 28480 | 05364-60204 |
| W12 | 05364-60201 | 4 | 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 | ADAPTER-COAX RIANG M-SMA M-SMA | 28480 | 1250-1397 |
| W15 | 1250-1158 | 3 | 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 | CBL AY-VAMP FPNL | 28480 | 05364-60207 |
| W18 | 05364-60209 | 2 | CBL AY-IFAMP PWR | 28480 | 05364-60209 |
| W19 | 05364-60208 | 1 | CBL AY-VAMP PWR | 28480 | 05364-60208 |

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

| Reference Designation | HP Part Number | C | D | Qty | Description | Mtr Code | Mtr Part Number |
|-----------------------|----------------|---|---|-----|---|----------|-----------------|
| | 05364-00001 | 6 | 1 | 1 | PANEL FRONT | 28480 | 05364-00001 |
| | 05364-00002 | 7 | 1 | 1 | SUBPANEL-FRONT | 28480 | 05364-00002 |
| | 5040-7203 | 0 | 1 | 1 | TRIM-TOP 1/2 | 28480 | 5040-7203 |
| | 5001-0439 | 8 | 2 | 2 | TRIM-SIDE FRT | 28480 | 5001-0439 |
| | 05364-00003 | 8 | 1 | 1 | PANEL-REAR | 28480 | 05364-00003 |
| | 5021-5816 | 7 | 1 | 1 | FRAME-REAR | 28480 | 5021-5816 |
| | 5001-0429 | 6 | 1 | 1 | COVER TOP | 28480 | 5001-0429 |
| | 5061-9455 | 2 | 2 | 2 | COVER SIDE | 28480 | 5061-9455 |
| | 5060-9802 | 1 | 1 | 1 | STRAP HANDLE AY | 28480 | 5060-9802 |
| | 5041-6819 | 4 | 1 | 1 | STRP-HDLE CAP FR | 28480 | 5041-6819 |
| | 0515-1132 | 4 | 1 | 1 | SCREW-MACH M5 X 0.8 10MM-LG | 28480 | 0515-1132 |
| | 0535-0081 | 2 | 1 | 1 | NUT-HEX W/EXT-T-LKWR M5 X 0.8 3.0MM-THK | 00000 | 0535-0081 |
| | 5041-6820 | 7 | 1 | 1 | STRP-HDLE CAP R | 28480 | 5041-6820 |
| | 5061-9441 | 6 | 1 | 1 | COVER BOTTOM | 28480 | 5061-9441 |
| | 5040-7201 | 8 | 4 | 4 | FOOT | 28480 | 5040-7201 |
| | 1460-1345 | 5 | 2 | 2 | TILT STAND SST | 28480 | 1460-1345 |
| | 5021-5835 | 0 | 4 | 4 | STRUT-CORNER | 28480 | 5021-5835 |
| | 05364-00004 | 9 | 9 | 9 | PAN-FLOOR | 28480 | 05364-00004 |
| | 05364-00010 | 7 | 7 | 7 | BRKT-PWR SPLTR | 28480 | 05364-00010 |
| | 05364-00007 | 2 | 2 | 2 | BRKT-MIXER | 28480 | 05364-00007 |
| | 05364-00008 | 3 | 3 | 3 | BRKT-FILTER | 28480 | 05364-00008 |
| | 05364-00009 | 4 | 4 | 4 | BRKT ATTENUATOR | 28480 | 05364-00009 |
| | 05364-00006 | 1 | 1 | 1 | BRKT-XFMR REAR | 28480 | 05364-00006 |
| | 0370-3135 | 3 | 3 | 3 | KNOB .1875FT GRV | 28480 | 0370-3135 |
| | 0380-1322 | 7 | 7 | 7 | SPACER-SMAP-IN .440 IN LG; 280 IN OD | 28480 | 0380-1322 |
| | 0515-0637 | 2 | 2 | 2 | SCREW-MACH M3.5 X 0.6 35MM-LG PAN-HD | 28480 | 0515-0637 |
| | 0515-0845 | 4 | 4 | 4 | SCREW-MACH M3 X 0.5 18MM-LG PAN-HD | 28480 | 0515-0845 |
| | 0515-0887 | 4 | 4 | 4 | SCREW-MACH M3.5 X 0.6 6MM-LG PAN-HD | 28480 | 0515-0887 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD | 28480 | 0515-1430 |
| | 0520-0173 | 2 | 2 | 2 | SCREW-MACH 2-56 .188-IN-IN-LG PAN-HD-POZI | 00000 | 0520-0173 |
| | 1400-1231 | 2 | 2 | 2 | CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE | 02768 | 1400-1231 |
| | 2190-0016 | 3 | 3 | 3 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 78189 | 2190-0016 |
| | 2200-0103 | 2 | 5 | 5 | SCREW-MACH 4-40 .25-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0103 |
| | 2200-0117 | 8 | 2 | 2 | SCREW-MACH 4-40 .875-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0117 |
| | 2200-0171 | 4 | 2 | 2 | SCREW-MACH 4-40 .75-IN-LG 82 DEG | 00000 | 2200-0171 |
| | 2950-0001 | 8 | 3 | 3 | NUT-HEX-DBL-CHAM 3/8-IN-LG .094-IN-THK | 00000 | 2950-0001 |
| | 2950-0054 | 1 | 2 | 2 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 00000 | 2950-0054 |
| | 3050-0962 | 3 | 2 | 2 | WASHER-FL MLC 1/2 IN .503-IN-ID | 28480 | 3050-0962 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD | 28480 | 0515-1430 |
| | 0520-0173 | 2 | 2 | 2 | SCREW-MACH 2-56 .188-IN-IN-LG PAN-HD-POZI | 00000 | 0520-0173 |
| | 1400-1231 | 2 | 2 | 2 | CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE | 02768 | 1400-1231 |
| | 2190-0016 | 3 | 3 | 3 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 78189 | 2190-0016 |
| | 2200-0103 | 2 | 5 | 5 | SCREW-MACH 4-40 .25-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0103 |
| | 2200-0117 | 8 | 2 | 2 | SCREW-MACH 4-40 .875-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0117 |
| | 2200-0171 | 4 | 2 | 2 | SCREW-MACH 4-40 .75-IN-LG 82 DEG | 00000 | 2200-0171 |
| | 2950-0001 | 8 | 3 | 3 | NUT-HEX-DBL-CHAM 3/8-IN-LG .094-IN-THK | 00000 | 2950-0001 |
| | 2950-0054 | 1 | 2 | 2 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 00000 | 2950-0054 |
| | 3050-0962 | 3 | 2 | 2 | WASHER-FL MLC 1/2 IN .503-IN-ID | 28480 | 3050-0962 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD | 28480 | 0515-1430 |
| | 0520-0173 | 2 | 2 | 2 | SCREW-MACH 2-56 .188-IN-IN-LG PAN-HD-POZI | 00000 | 0520-0173 |
| | 1400-1231 | 2 | 2 | 2 | CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE | 02768 | 1400-1231 |
| | 2190-0016 | 3 | 3 | 3 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 78189 | 2190-0016 |
| | 2200-0103 | 2 | 5 | 5 | SCREW-MACH 4-40 .25-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0103 |
| | 2200-0117 | 8 | 2 | 2 | SCREW-MACH 4-40 .875-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0117 |
| | 2200-0171 | 4 | 2 | 2 | SCREW-MACH 4-40 .75-IN-LG 82 DEG | 00000 | 2200-0171 |
| | 2950-0001 | 8 | 3 | 3 | NUT-HEX-DBL-CHAM 3/8-IN-LG .094-IN-THK | 00000 | 2950-0001 |
| | 2950-0054 | 1 | 2 | 2 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 00000 | 2950-0054 |
| | 3050-0962 | 3 | 2 | 2 | WASHER-FL MLC 1/2 IN .503-IN-ID | 28480 | 3050-0962 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD | 28480 | 0515-1430 |
| | 0520-0173 | 2 | 2 | 2 | SCREW-MACH 2-56 .188-IN-IN-LG PAN-HD-POZI | 00000 | 0520-0173 |
| | 1400-1231 | 2 | 2 | 2 | CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE | 02768 | 1400-1231 |
| | 2190-0016 | 3 | 3 | 3 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 78189 | 2190-0016 |
| | 2200-0103 | 2 | 5 | 5 | SCREW-MACH 4-40 .25-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0103 |
| | 2200-0117 | 8 | 2 | 2 | SCREW-MACH 4-40 .875-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0117 |
| | 2200-0171 | 4 | 2 | 2 | SCREW-MACH 4-40 .75-IN-LG 82 DEG | 00000 | 2200-0171 |
| | 2950-0001 | 8 | 3 | 3 | NUT-HEX-DBL-CHAM 3/8-IN-LG .094-IN-THK | 00000 | 2950-0001 |
| | 2950-0054 | 1 | 2 | 2 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 00000 | 2950-0054 |
| | 3050-0962 | 3 | 2 | 2 | WASHER-FL MLC 1/2 IN .503-IN-ID | 28480 | 3050-0962 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD | 28480 | 0515-1430 |
| | 0520-0173 | 2 | 2 | 2 | SCREW-MACH 2-56 .188-IN-IN-LG PAN-HD-POZI | 00000 | 0520-0173 |
| | 1400-1231 | 2 | 2 | 2 | CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE | 02768 | 1400-1231 |
| | 2190-0016 | 3 | 3 | 3 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 78189 | 2190-0016 |
| | 2200-0103 | 2 | 5 | 5 | SCREW-MACH 4-40 .25-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0103 |
| | 2200-0117 | 8 | 2 | 2 | SCREW-MACH 4-40 .875-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0117 |
| | 2200-0171 | 4 | 2 | 2 | SCREW-MACH 4-40 .75-IN-LG 82 DEG | 00000 | 2200-0171 |
| | 2950-0001 | 8 | 3 | 3 | NUT-HEX-DBL-CHAM 3/8-IN-LG .094-IN-THK | 00000 | 2950-0001 |
| | 2950-0054 | 1 | 2 | 2 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 00000 | 2950-0054 |
| | 3050-0962 | 3 | 2 | 2 | WASHER-FL MLC 1/2 IN .503-IN-ID | 28480 | 3050-0962 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD | 28480 | 0515-1430 |
| | 0520-0173 | 2 | 2 | 2 | SCREW-MACH 2-56 .188-IN-IN-LG PAN-HD-POZI | 00000 | 0520-0173 |
| | 1400-1231 | 2 | 2 | 2 | CLIP-CORD 1.0 IN BY 0.5 IN; ADHESIVE | 02768 | 1400-1231 |
| | 2190-0016 | 3 | 3 | 3 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 78189 | 2190-0016 |
| | 2200-0103 | 2 | 5 | 5 | SCREW-MACH 4-40 .25-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0103 |
| | 2200-0117 | 8 | 2 | 2 | SCREW-MACH 4-40 .875-IN-IN-LG PAN-HD-POZI | 00000 | 2200-0117 |
| | 2200-0171 | 4 | 2 | 2 | SCREW-MACH 4-40 .75-IN-LG 82 DEG | 00000 | 2200-0171 |
| | 2950-0001 | 8 | 3 | 3 | NUT-HEX-DBL-CHAM 3/8-IN-LG .094-IN-THK | 00000 | 2950-0001 |
| | 2950-0054 | 1 | 2 | 2 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 00000 | 2950-0054 |
| | 3050-0962 | 3 | 2 | 2 | WASHER-FL MLC 1/2 IN .503-IN-ID | 28480 | 3050-0962 |
| | 0515-0889 | 6 | 6 | 6 | SCREW-MACH M3.5 X 0.6 6MM-LG | 28480 | 0515-0889 |
| | 0515-0897 | 6 | 6 | 6 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0897 |
| | 0515-1111 | 9 | 9 | 9 | SCREW-MACH M3 X 0.5 16MM-LG PAN-HD | 28480 | 0515-1111 |
| | 0515-1232 | 5 | 5 | 5 | SCREW-MACH M3.5 X 0.6 8MM-LG PAN-HD | 28480 | 0515-1232 |
| | 0515-1331 | 5 | 5 | 5 | SCREW-METRIC SPECIALTY M4 X 0.7 THD; 7MM | 28480 | 0515-1331 |
| | 0515-1430 | 5 | 5 | 5 | | | |

| Mfr Code | Manufacturer Name | Address | Zip Code |
|----------|------------------------------------|-------------|----------|
| K8479 | HOLSWORTHY ELECTRONICS LTD | HOLSWORTHY | 60016 |
| 00000 | ANY SATISFACTORY SUPPLIER | | 60195 |
| 02768 | ITV FASTEX | | 60694 |
| 04713 | MOTOROLA INC | ROSELLE | 60195 |
| 05876 | U S POLYMERIC INC | STAMFORD | 60195 |
| 06383 | PANDUIT CORP | TINLEY PARK | 60477 |
| 06877 | UNITRON INSTRUMENTS INC | WOODBURY | 11797 |
| 11870 | MELABS INC | PALO ALTO | 94304 |
| 14482 | WATKINS-JOHNSON CO | PALO ALTO | 94304 |
| 16426 | COOPER INDUSTRIES INC | CA | 94304 |
| 26742 | MEIHOPE ELECTRONICS INC | HOUSTON | 77210 |
| 27264 | MOLEX INC | CHICAGO | 60656 |
| 28480 | HEULETT-PACKARD CO CORPORATE HQ | IL US | 60532 |
| 56289 | SPRAGUE ELECTRIC CO | CA | 94304 |
| 78189 | ILLINOIS TOOL WORKS INC SHAKEPROOF | MA US | 02173 |
| | | ELGIN | 60126 |
| | | LEXINGTON | |
| | | PALO ALTO | |
| | | LISLE | |
| | | IL US | |
| | | CHICAGO | |
| | | HOUSTON | |
| | | CA US | |
| | | PALO ALTO | |
| | | CA | |
| | | NY | |
| | | IL US | |
| | | STAMFORD | |
| | | CT | |
| | | IL US | |
| | | ROSELLE | |
| | | IL US | |
| | | DES PLAINES | |
| | | EG | |

Table 6-3. Code List of Manufacturers

| Reference Designation | HP Part Number | C | D | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|---|---|-------|--|----------|-----------------|
| C1 | 0180-3280 | 6 | 2 | 2 | CAPACITOR-FXD 1800UF+100-10% 40VDC AL | 56289 | 674D178 |
| C2 | 0180-3280 | 6 | 2 | 2 | CAPACITOR-FXM: 800UF+100-10% 40VDC AL | 56289 | 674D178 |
| C5 | 0160-0576 | 5 | 2 | 2 | CAPACITOR-FXV: 1UF +20% 50VDC CER | 06383 | FD12X7R1H104M |
| C6 | 0160-0576 | 5 | 2 | 2 | CAPACITOR-FXD: 1UF -20% 50VDC CEK | 06383 | FD12X7R1H104M |
| CR1 | 1906-0069 | 4 | 1 | 1 | DIODE-FW BRD6 400V 1A | 28480 | 1906-0069 |
| J1 | 0360-0124 | 3 | 3 | 5 | CONNECTOR-SGL CONT PIN .04-IN-IN-BSC- SZ RND | 28480 | 0360-0124 |
| J2 | 0360-0124 | 3 | 3 | 28480 | CONNECTOR-SGL CONT PIN .04-IN-IN-BSC- SZ RND | 28480 | 0360-0124 |
| J3 | 1251-4882 | 8 | 1 | 1 | CONN-POST TYPE .156-PIN-SPCG 7-CONT | 26742 | 3100-8-207-22 |
| J4 | 1251-7776 | 5 | 1 | 1 | CONN-POST TYPE .100-PIN-SPCG 2-CONT | 27264 | 22-11-2022 |
| J5 | 1251-7775 | 4 | 1 | 1 | CONN-POST TYPE 100-PIN-SPCG 3-CONT | 27264 | 22-11-2032 |
| R1 | 0757-0816 | 1 | 1 | 1 | RESISTOR 681 1% .5W TF TC=0+-100 | K8479 | H2 |
| TP1 | 0360-0124 | 3 | 3 | 28480 | CONNECTOR-SGL CONT PIN .04-IN-IN-BSC- SZ RND | 28480 | 0360-0124 |
| TP2 | 0360-0124 | 3 | 3 | 28480 | CONNECTOR-SGL CONT PIN .04-IN-IN-BSC- SZ RND | 28480 | 0360-0124 |
| TP3 | 0360-0124 | 3 | 3 | 28480 | CONNECTOR-SGL CONT PIN .04-IN-IN-BSC- SZ RND | 28480 | 0360-0124 |
| U1A | 1826-0607 | 6 | 1 | 1 | IC-REGULATOR 7815A | 28480 | 1826-0607 |
| U1B | 1205-0462 | 5 | 2 | 1 | HEAT SINK SGL TO-220-CS | 28480 | 1205-0462 |
| U2A | 1826-0214 | 1 | 1 | 1 | IC V RGLTR TO-220 | 04713 | HC7915CT |
| U2B | 1205-0462 | 5 | 1 | 1 | HEAT SINK SGL TO-220-CS | 28480 | 1205-0462 |
| | | | | | BD-BLANK | 28480 | 05364-20001 |

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

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 instrument 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 manual. 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.

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.

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

WARNING

8-5. ACCESS TO INTERNAL COMPONENTS

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

8-4. PARTS LISTS

| 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 |

Table 8-1. Required/Recommended Tools

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

8-3. REQUIRED/RECOMMENDED TEST EQUIPMENT AND TOOLS

- b. Turn screw in cover clockwise until it is tight.
- a. Slide cover onto instrument, until its front end is under retaining lip portion of front panel.

To install any of these covers —

To remove any of these covers, turn its screw counterclockwise until the cover can be removed from the instrument.
Each side cover and the bottom cover is held in place by a captive screw at its center rear.

8-7. Side and Bottom Covers

- c. Install screw that fastens handle, handle cap, and top cover to rear of instrument.
- b. Install handle cap at rear of top cover.
- a. Slide top cover onto instrument, until its front end is under retaining lip portion of front panel.

To install the top cover —

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.

WARNING

- b. Slide cover toward rear of instrument and remove.
- a. Remove screw at rear of top cover handle.

To remove the top cover —

8-6. Top Cover

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.

NOTE

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., $25\text{dB} \pm 6\text{dB}$ below the -15 dbm R.F. INPUT signal level).

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

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.

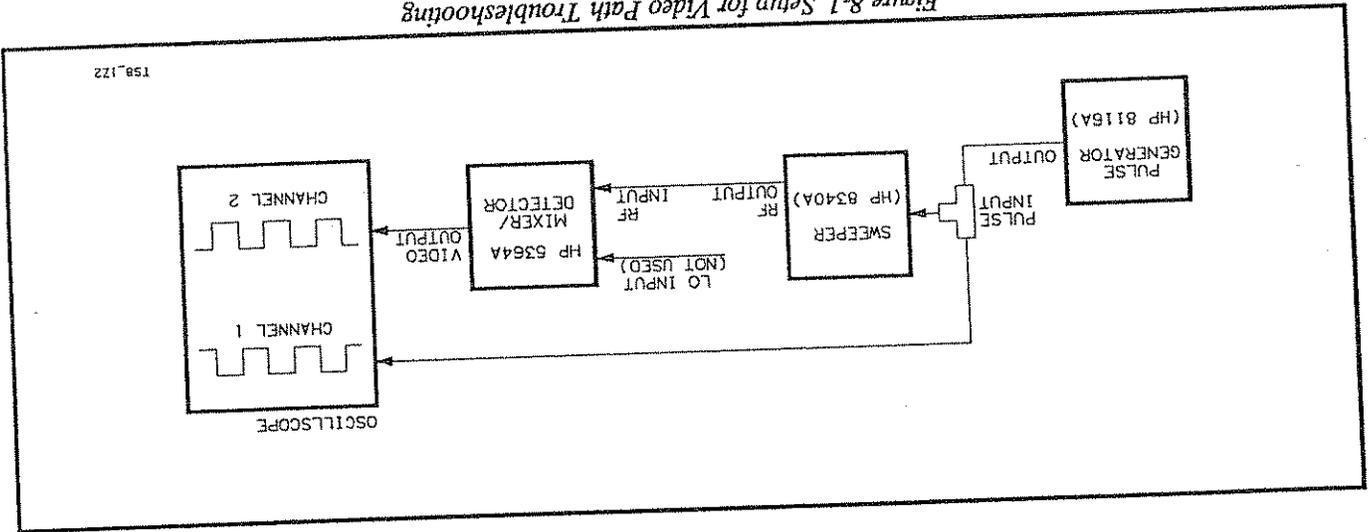
e. Set the HP 8340A Synthesized Sweeper as follows -

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

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

c. Turn on power for all units.

Figure 8-1. Setup for Video Path Troubleshooting



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

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

To check the Video Path -

described above.

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,

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 μ s
- have a pulse period of 2 μ s
- 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

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.

CAUTION

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.

- 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.

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.

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.

NOTE

8-25. INSTALLATION

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

- f. Remove screws that fasten Attenuator bracket to Video Amplifier assembly A5.
- e. Remove nut and lockwasher that fasten Attenuator to front panel.
- d. Remove Attenuator knob. (Use allen-drive to loosen two screws that fasten knob to shaft.)
- c. At Attenuator input port, disconnect coaxial cable W3 coming from front-panel R.F.INP/UT connector
- b. At front-panel R.F. INP/UT connector, loosen coaxial cable W3 coming from Attenuator.
- a. Remove coaxial cable W4 between front-panel Attenuator AT1 and adapter W5 on top of Power Divider AT1.

8-24. REMOVAL

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

8-23. PREPARATION

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

8-22. REQUIRED TOOLS

8-21. Front-Panel Attenuator AT1

- 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. IN/PUT 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.
 - 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.

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

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.

NOTE

- 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.

8-30. REMOVAL

- a. Remove top and right-hand side cover.
- b. Remove upper-right-hand side rail.

8-29. PREPARATION

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

8-28. REQUIRED TOOLS

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.

8-27. GENERAL

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

- 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 "F" 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.

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.

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.

NOTE

8-36. INSTALLATION

Perform any required servicing on removed item(s).

- c. Unscrew the nut loosened in step "c" until Amplifier and Filter can be separated.
- d. Remove screws that fasten IF Amplifier Bracket to deck.
- c. Loosen nut that locks adapter W10 to either the IF Amplifier A3 or the Low-pass Filter F.L. DO NOT TRY TO COMPLETELY UNSCREW THIS NUT AT THIS TIME.
- b. At Power Supply board, disconnect two-wire cable W18 that provides power to IF Amplifier.
- a. Remove coaxial cable W9 between rear-panel IF AMP INPUT connector J5 and IF Amplifier A3.

8-35. REMOVAL

- b. Remove upper-right-hand side rail.
- a. Remove top and side covers. DO NOT REMOVE BOTTOM COVER.

8-34. PREPARATION

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

8-33. REQUIRED TOOLS

8-32. IF Amplifier A3

- 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.

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.

NOTE

8-41. INSTALLATION

Perform any required servicing on removed item(s).

- c. Remove Filter from instrument.
- b. Remove screws that fasten Filter bracket to instrument deck.
- a. Loosen nut that locks Filter to coaxial cable W11 that connects to front-panel IF OUTPUT connector J3.

8-40. REMOVAL

- d. Remove IF Amplifier assembly A3. (See section 8-32, above.)
- c. Remove coaxial cable W9 between rear-panel IF AMP INPUT connector J5 and IF Amplifier A3.
- b. Remove upper-right-hand side rail.
- a. Remove top and side covers. DO NOT REMOVE BOTTOM COVER.

8-39. PREPARATION

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

8-38. REQUIRED TOOLS

8-37. Low-Pass Filter FL1

- 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.

a. Install Detector A4.

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

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.

NOTE

8-46. INSTALLATION

b. Remove Detector A4.

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

8-45. REMOVAL

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.

NOTE

8-44. PREPARATION

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

8-43. REQUIRED TOOLS

8-42. Detector A4

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.

NOTE

8-51. INSTALLATION

- 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.

8-50. REMOVAL

- 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 ATT.

8-49. PREPARATION

- 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

8-48. REQUIRED TOOLS

8-47. Video Amplifier A5

- 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 "VCC"-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 Section 2.)

- 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.

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.

NOTE

8-61. INSTALLATION

- 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.

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

- 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.

8-60. REMOVAL

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

8-59. PREPARATION

Screwdriver -- Pozidrive, #2

8-58. REQUIRED TOOLS

8-57. Power Supply Assembly A7

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

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

WARNING

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.



This page intentionally left blank.

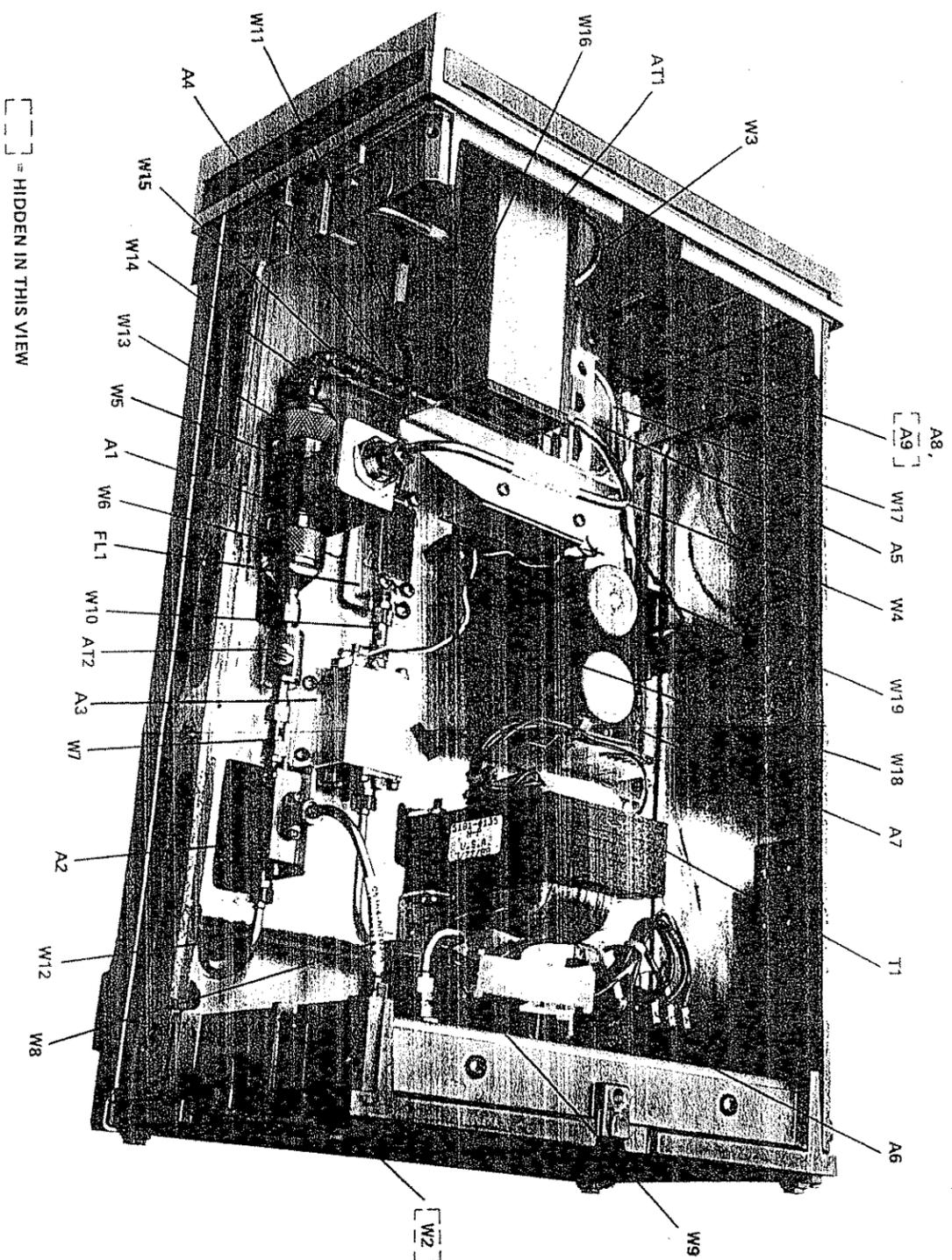


Figure 8-2 HP 5361A — Component Locations
 HP 5361A — Operating and Service Manual
 8-29

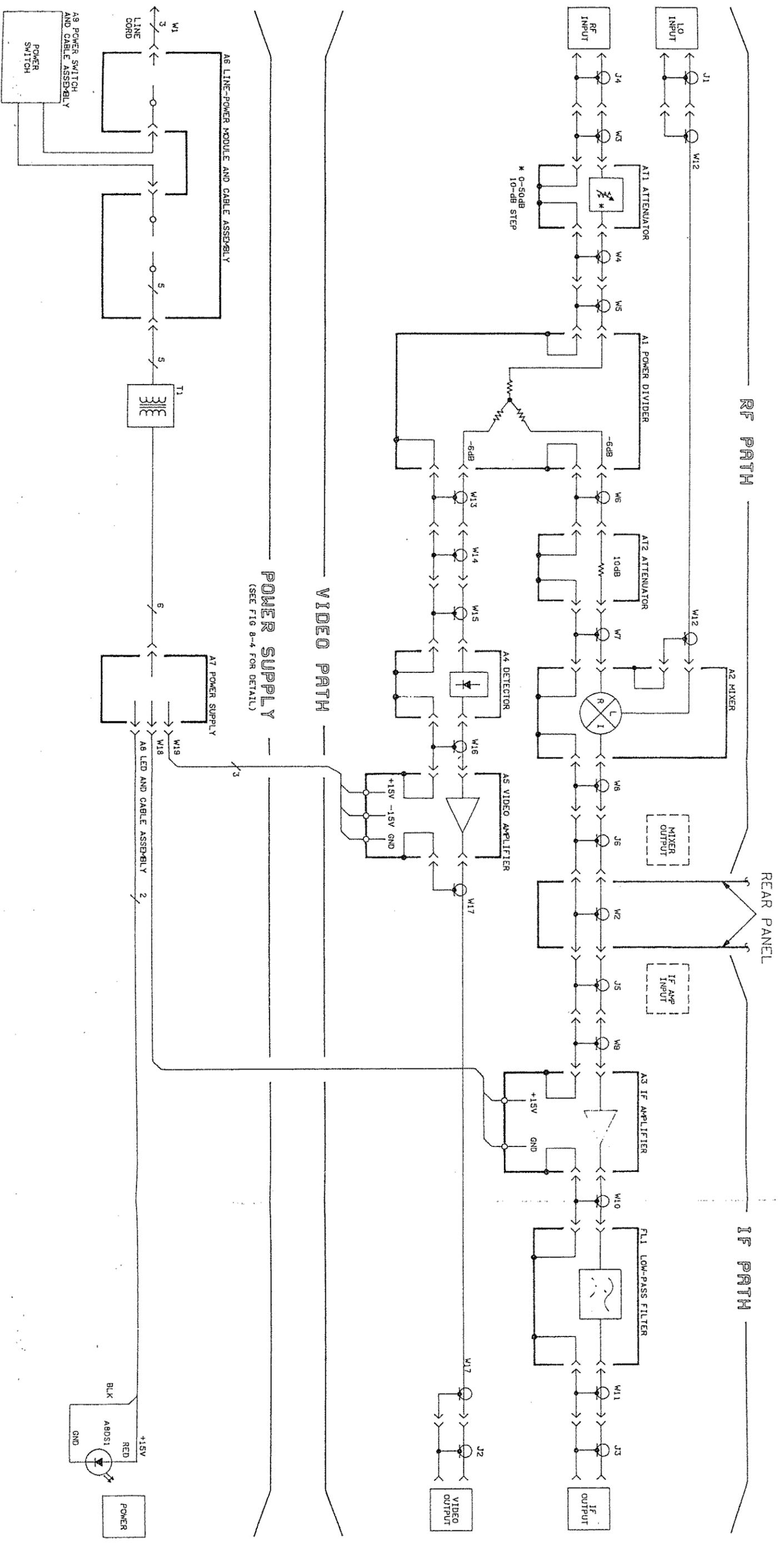
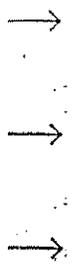
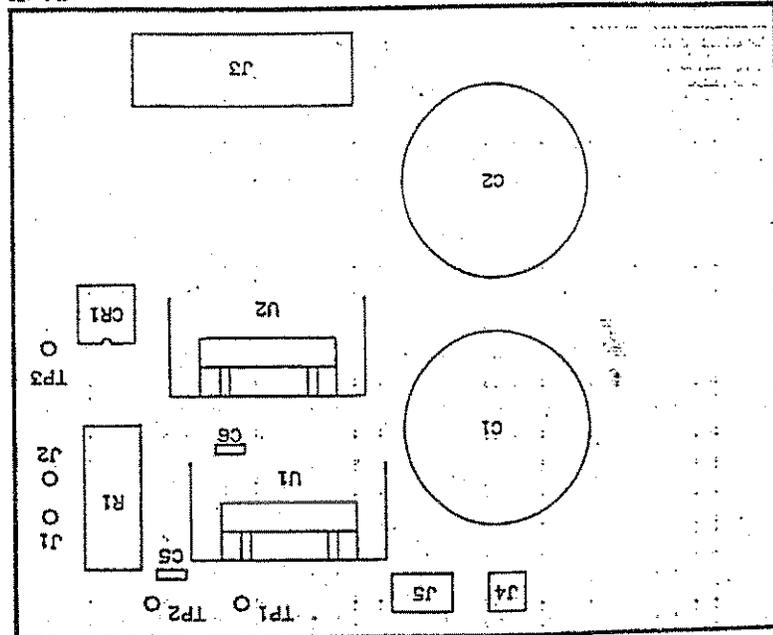
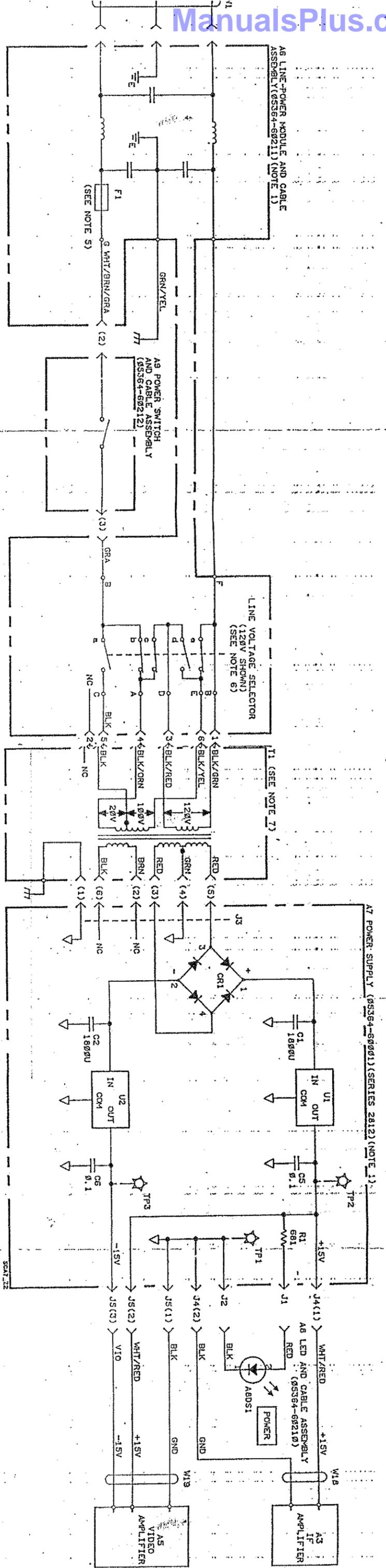


Figure 8-3. HP 5364A — Circuit/Block Diagram
 HP 5364A — Operating and Service Manual
 8-31

40A_312

CL-6-422





NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED, AND 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-S |
| AS | ATU1, 2 |
| A6F1 | AB |
| A7 | ABDS1 |
| ATC1, 2, 5, 6 | T1 |
| ATCR1 | |

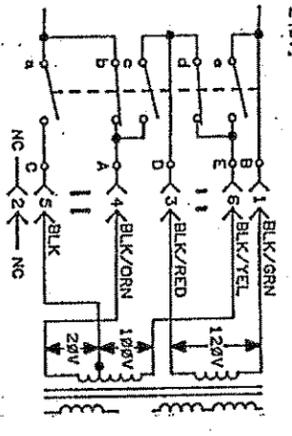
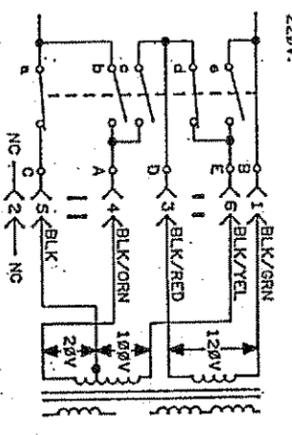
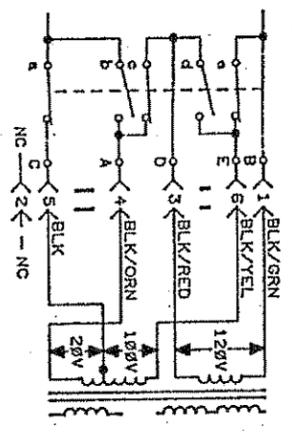
5. LINE FUSE ASF1:

| LINE VOLTAGE (NOMINAL RANGE) | RATING | FUSE HP PART NUMBER |
|------------------------------|------------------|---------------------|
| 100 (90-110) | 0.25A SLOW-BLOW | 2110-0201 |
| 120 (108-132) | 0.125A SLOW-BLOW | 2110-0318 |
| 220 (199-242) | 0.125A SLOW-BLOW | 2110-0318 |
| 240 (216-264) | 0.125A SLOW-BLOW | 2110-0318 |

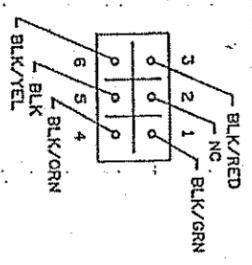
TABLE OF ACTIVE ELEMENTS

| REFERENCE DESIGNATOR | HP PART NO. | MFG PART NO. |
|----------------------|-------------|--------------|
| A3 | 05364-60213 | 05364-60213 |
| AS | 0855-0438 | 0855-0438 |
| ATCR1 | 1906-0069 | 1906-0069 |
| A7U1 | 1826-0607 | 1826-0607 |
| A7U2 | 1826-0214 | MC7191SCT |
| AB | 05364-60210 | 05364-60210 |

6. VOLTAGE SELECTOR SHOWN AT 120V SETTING IN MAIN SCHEMATIC. ABOVE, OTHER SETTINGS ARE SHOWN BELOW.



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



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.

HP 5364A — Service Manual
9-2

This page intentionally left blank.

| | |
|--|---|
| <p>Serial Number: _____</p> <p>Other ID: _____</p> | <p>Model 5364A</p> <p>Microwave Mixer/Detector</p> <p> HEWLETT PACKARD</p> |
| <p>Person to contact for more information:</p> <p>Name: _____ Phone: _____</p> | |
| <p>BILLING INFORMATION:</p> <p>COMPANY NAME _____</p> <p>INDIVIDUAL NAME, INTERNAL MAIL CODE _____</p> <p>STREET OR P.O. BOX _____</p> <p>CITY, STATE _____</p> <p>COUNTRY, POSTAL ZIP CODE _____</p> <p>P.O. Number: _____</p> <p>Date: _____</p> | <p>SHIPPING INFORMATION:</p> <p>COMPANY NAME _____</p> <p>INDIVIDUAL NAME, INTERNAL MAIL CODE _____</p> <p>STREET OR P.O. BOX _____</p> <p>CITY, STATE _____</p> <p>COUNTRY, POSTAL ZIP CODE _____</p> |
| <p>Accessories returned with unit:</p> <p><input type="checkbox"/> Other Cable(s):</p> <p><input type="checkbox"/> Adapter(s)</p> <p><input type="checkbox"/> Other:</p> <p><input type="checkbox"/> Power Cable/Line Cord <input type="checkbox"/> None</p> | |
| <p>Over</p> | |

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

FAILURE SYMPTOMS:

FAILURE MODE IS: Constant Intermittent
SENSITIVE TO: Cold Heat Vibration

Observed symptoms and/or problems:

Service Needed:

Calibration Only Repair

Other

Product Line Sales/Support Key

- EM Product Line
- A Analytical
- C Computer Systems
- E Electronic Instruments & Measurement Systems
- M Medical Products
- P Personal Computer Products
- S Sales only for specific product line
- .. Support only for specific product line

HEADQUARTERS OFFICES
 * These are the main offices listed for your area, contact one of these.
 * Information regarding locations where HP support is available for specific products.
 * Support only for specific product line

DISCLAIMER 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 support only for specific product line

ASIA

Hewlett-Packard Asia Ltd
 Nine Mile Ride
 WOKINGHAM
 Berkshire, RG113LL
 Tel: 0344 773100
 Telex: 848805/848814/848812

UNITED KINGDOM

Hewlett-Packard Ltd
 Customer Information Center
 (800) 752-0900
 6:00 AM to 5:00 PM Pacific Time

EASTERN USA

Hewlett-Packard Co
 4 Choke Cherry Road
 ROCKVILLE, MD 20850
 Tel: (301) 948-6370

MIDWESTERN USA

Hewlett-Packard Co
 5201 Tolview Drive
 ROLLING MEADOWS, IL 60008
 Tel: (312) 255-9800

SOUTHERN USA

Hewlett-Packard Co
 2000 South Park Place
 ATLANTA, GA 30339
 Tel: (404) 955-1500

WESTERN USA

Hewlett-Packard Co
 5161 Lankershim Blvd.
 NORTH HOLLYWOOD, CA 91601
 Tel: (818) 505-5600

INTERNATIONAL AREAS

Hewlett-Packard Co
 Intercontinental Headquarters
 3495 Deer Creek Road
 PALO ALTO, CA 94304
 Tel: (415) 857-1501
 Tel: (034) 8300
 Cable: HEWPACK

MIDDLE EAST AND CENTRAL AFRICA

Hewlett-Packard S.A.
 Middle East Central
 Bureau de Liaison Alger
 Villa des Lions
 9 Hai Galloul
 DZ-BORDJ EL BAHRI
 Tel: 78 03 36
 Telex: 63343 dhon dz

ALGERIA

Hewlett-Packard Trading S.A.
 1428 BUENOS AIRES
 Montañeses 2140/50 5 Piso
 Tel: 781-4030/4039/783-4886
 Telex: 18148 Gcme

AUSTRALIA

Hewlett-Packard Australia Ltd
 150 Greenhill Road
 PARKSIDE, S.A. 5063
 Tel: 61-8-272-5911
 Telex: 82536
 Cable: HEWPARD Adelaide
 A.C.C.M.E.P.

Adelaide, South

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

BAHRAIN

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANGOLA

Teletra Angola LDA
 Empresa Técnica de Equipamentos
 18 rue Cons. Julio de Vilhena
 LUANDA
 Tel: 3531535516
 Telex: 3134

ARGENTINA

Hewlett-Packard Argentina S.A.
 Montañeses 2140/50
 1428 BUENOS AIRES
 Tel: 541-11-1441
 Telex: 22796 HEW PAC-AR

SOUTHERN USA

Hewlett-Packard Co
 2000 South Park Place
 ATLANTA, GA 30339
 Tel: (404) 955-1500

WESTERN USA

Hewlett-Packard Co
 5161 Lankershim Blvd.
 NORTH HOLLYWOOD, CA 91601
 Tel: (818) 505-5600

INTERNATIONAL AREAS

Hewlett-Packard Co
 Intercontinental Headquarters
 3495 Deer Creek Road
 PALO ALTO, CA 94304
 Tel: (415) 857-1501
 Tel: (034) 8300
 Cable: HEWPACK

MIDDLE EAST AND CENTRAL AFRICA

Hewlett-Packard S.A.
 Middle East Central
 Bureau de Liaison Alger
 Villa des Lions
 9 Hai Galloul
 DZ-BORDJ EL BAHRI
 Tel: 78 03 36
 Telex: 63343 dhon dz

ALGERIA

Hewlett-Packard Trading S.A.
 1428 BUENOS AIRES
 Montañeses 2140/50 5 Piso
 Tel: 781-4030/4039/783-4886
 Telex: 18148 Gcme

AUSTRALIA

Hewlett-Packard Australia Ltd
 150 Greenhill Road
 PARKSIDE, S.A. 5063
 Tel: 61-8-272-5911
 Telex: 82536
 Cable: HEWPARD Adelaide
 A.C.C.M.E.P.

Adelaide, South

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

BAHRAIN

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

ANAMARCEI Ltda

Hewlett-Packard Australia Ltd
 Green Salon
 P.O. Box 557
 MANAMA
 Tel: 255500-250950
 Telex: 844 19

BRUNEI
Komputer Wisman Sdn Bhd
G6, Chandrasekaran Cmplx,
Jalan Tulong
P.O. Box 1297,
Bandar Seri Begawan
NEGARA BRUNI DARUSSALAM
Hewlett-Packard (Canada) Ltd.
Tel: 673-2-2000-70/26711
C.E.P.
OTTAWA, Ontario K2B 8K1
Tel: (613) 820-6483
A.C.M.E.M.P.
China Hewlett-Packard Co. Ltd.
A.C.M.E.M.P.
23/F Shanghai Union Building
100 Yan An Rd, East
SHANGHAI
Tel: 265550
Tel: 3371 CHPSB CN
Cable: 3416 Shanghai
A.C.M.E.M.P.
Colombia
Riffighdesvef 32
DK-8240 RISSKOV, Aarhus
Hewlett-Packard A/S
40 General El Arab Street
Mohandessin
CAIRO
Tel: 803844, 805998, 810263
Tel: 20503 SSC UN
M.
EL SALVADOR
IPESA de El Salvador S.A.
29 Avenida Norte 1223
SAN SALVADOR
Tel: 9-011-503-265-658
Tel: 301 20539 IPESA SAL
A.C.M.E.P.
ETHIOPIA
Seric-Ethiopia
CYDE Cia. Ltda
Avenida Eloy Alfaro 1749
y Belgica
Casilla 6423 CCI
OUTO
Tel: 9-011-593-2-450975
Tel: 39322548 CYEDE ED
Medtronics
Valhadoid 524 Madrid
P.O. 9171, OUTO
Carvajal, S.A.
Calle 29 Norte No. 6A-40
Apartado Aereo 46
CALI
Tel: 9-011-57-3-62-1888
Tel: 39655650 CUJCL CO
C.E.P.
CONGO
Tel: 545-250, 545-122
Seric-Congo
B.P. 2105
BRAZZAVILLE
Tel: 815034
Tel: 340866 METLAB CK
A
Olympia (Chile) Ltda
Av. Rodrigo de Araya 1045
Casilla 256-V
SANTIAGO 21
Tel: 225-5044
Tel: 340892 OLYMP
C.P.
China Hewlett-Packard Co. Ltd.
47/F China Resources Bldg
26 Harbour Road
HONG KONG
Tel: 5-8330833
Tel: 76793 HPA HX
Cable: HP ASIA LTD
A.M.

Canada
Hewlett-Packard (Canada) Ltd.
17500 Trans Canada Highway
South Service Road
KIRKLAND, Quebec H9J 2X8
Tel: (514) 697-4232
Tel: 058-21521
A.C.M.E.M.P.
Hewlett-Packard (Canada) Ltd.
1150 rue Claire Fontaine
QUEBEC CITY, Quebec G1R 5G4
Tel: (418) 648-0726
A.C.M.E.M.P.
British Columbia
Hewlett-Packard (Canada) Ltd.
10691 Sheilridge Way
RICHMOND,
British Columbia V6X 2W8
Tel: (604) 270-2277
Tel: 610-922-5059
A.C.M.E.M.P.
Hewlett-Packard (Canada) Ltd.
121 - 3350 Douglas Street
VICTORIA, British Columbia V8Z 3L1
Tel: (604) 381-6616
C
Manitoba
Hewlett-Packard (Canada) Ltd.
1825 Inkster Blvd.
Winnipeg, Manitoba R2X 1R3
Tel: (204) 594-2777
A.C.M.E.M.P.
New Brunswick
Hewlett-Packard (Canada) Ltd.
814 Main Street
Moncton, New Brunswick E1C 1E6
Tel: (506) 855-2841
C
Nova Scotia
Hewlett-Packard (Canada) Ltd.
Suite 111
900 Windmill Road
Dartmouth, Nova Scotia B3B 1P7
Tel: (902) 469-7820
A.C.M.E.M.P.
Ontario
Hewlett-Packard (Canada) Ltd.
3325 N. Service Rd., Unit W03
Burlington, Ontario L7N 3G2
Tel: (416) 335-8644
C.M.P.
Hewlett-Packard (Canada) Ltd.
552 Newbold Street
London, Ontario N6E 2S5
Tel: (519) 686-9181
A.C.M.E.M.P.

CYPRUS
Telerexa Ltd
P.O. Box 1152
Valentine House
8 Stassandrou St
NICOSIA
Tel: 45 628, 62 698
Tel: 5845 Ilrx cy
E.M.P.
Denmark
Sakro Enterprises
70 Mossesdal Street
Dokki, Giza
CAIRO
Tel: 706 440 701 087
Tel: 9337
C
CAIRO
Hewlett-Packard A/S
Kongevæn 25
DK-4460 BIRKEROD
Tel: 45-02-81-6640
Tel: 37409 hpas dk
A.C.M.E.M.P.
Colombia
Instrumentación
H.A. Langbaek & Kier S.A.
Carretera 4A No. 52A-26
Apartado Aereo 6287
BOGOTÁ, D.E.
Tel: 212-1466
Tel: 4400 INST CO
Cable: AARIS Bogota
C.M.E.M.
Netromedicas Ltda
Calle 123 No. 9B-31
Apartado Aereo 100-958
BOGOTÁ D.E., 100-958
Tel: 57-214-4458
Tel: 39654466 MARCO
P
Carvajal, S.A.
Calle 29 Norte No. 6A-40
Apartado Aereo 46
CALI
Tel: 9-011-57-3-62-1888
Tel: 39655650 CUJCL CO
C.E.P.
CONGO
Tel: 545-250, 545-122
Seric-Congo
B.P. 2105
BRAZZAVILLE
Tel: 815034
Tel: 340866 METLAB CK
A
Olympia (Chile) Ltda
Av. Rodrigo de Araya 1045
Casilla 256-V
SANTIAGO 21
Tel: 225-5044
Tel: 340892 OLYMP
C.P.
China Hewlett-Packard Co. Ltd.
47/F China Resources Bldg
26 Harbour Road
HONG KONG
Tel: 5-8330833
Tel: 76793 HPA HX
Cable: HP ASIA LTD
A.M.

EGYPT
Sakro Enterprises
P.O. Box 259
ALEXANDRIA
Tel: 802908 808020, 805302
Tel: 54333
C
Belle Aoutoute
06600 ANTRES
Tel: (93) 74-59-19
C

FINLAND
Hewlett-Packard Finland
Field Oy
Niltiyampokku 10
00520 HELSINKI
Tel: (90) 757-1011
Tel: 122022 Field SF
CM
Hewlett-Packard Oy
Pispankalliontie 17
02200 ESPOO
Tel: (90) 887-21
Tel: 121563 HEWPA SF
A.C.E.M.P.
FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 42
C...

FRANCE
Hewlett-Packard France
Z1 Mecure B
Rue Berthelet
13763 Les Milles Cedex
AIX-EN-PROVENCE
Tel: 33-42-59-4102
Tel: 41070F
A.C.E.M.
Hewlett-Packard France
64, Rue Marchand Salhani
F-61000 ALENCON
Tel: (33) 29 04 4

FRANCE (Cont'd)

Hewlett-Packard France
3, Rue Graham Bell
BP 5149
57074 METZ Cedex
Tel: (87) 36-13-31
Tel: 865602F
C.E.
Tel: (81) 83-16-22
Tel: 361157
C.E.
Hewlett-Packard France
MiniParc-ZIRST
Chemin du Vieux Chêne
38240 MEYLAN (Grenoble)
Tel: (76) 90-38-40
Tel: 980124 HP Grenoble
C
Hewlett-Packard France
Bureau vert du Bois Briand
Chemin des Moulins
Boite Postale 162
69131 ECULLY Cedex (Lyon)
Tel: 33-78-33-8125
Tel: 310817F
A.C.E.M.P.
Hewlett-Packard France
Parc d'activités du Bois Briand
125, Rue du Faudbourg Barnier
F-91040 EVRY Cedex
Tel: 33 11 6077 9660
Tel: 692315F
C
Hewlett-Packard France
Zone Industrielle de Courtabouet
Avenue des Tropiques
91947 LES ULIS Cedex (Orsay)
Tel: 33-6-907 7825
Tel: 600048F
A.C.C.M.E.M.P.
Hewlett-Packard France
15, Avenue de L'Armtral-Brix
Parc d'activité des Prés
75782 PARIS Cedex 16
Tel: 33-15-02-1220
Tel: 613663F
C.P.
Tel: (98) 41-87-90
Hewlett-Packard France
Rue Fernand Forest
Z.A. Kergeradec
29239 GOUENOU
Tel: (98) 41-87-90
C

Hewlett-Packard France
4, Rue de la Faisanderie
67381 LINCOLNSHEIM
(Strasbourg)
Tel: (88) 76-15-00
Tel: 890141F
C.E., M., P.
Hewlett-Packard France
Centre d'Affaires Paris-Nord
Bâtiment Ampère
Rue de la Commune de Paris
93153 LE BLANC-MESNIL
Tel: (1) 865-44-52
Tel: 211032F
C.E.M.
Hewlett-Packard France
Parc d'activités de la Poterie
Rue Louis Keratel-Boitel
35000 RENNES
Tel: 33-99-51-4244
Tel: 740912F
A.C.E.M.P.
Hewlett-Packard France
98 Avenue de Bretagne
76100 ROUEN
Tel: 33-35-63-5766
Tel: 770035F
C.E.
Hewlett-Packard France
4, Rue Thomas-Mann
Boite Postale 56
67033 STRASBOURG Cedex
Tel: (88) 28-56-46
Tel: 880141F
C.E.M.P.
Hewlett-Packard France
Le Patroir III
3, Chemin du Pigeonnier de la Cèpille
31081 TOULOUSE Cedex
Tel: 33-61-40-1112
Tel: 551639F
A.C.E.M.P.
Hewlett-Packard France
Les Cardoulines
Bureau vert du Bois Briand
Chemin de la Garde
-CP 212 212
4085 NANTES Cedex
Tel: (40) 50-32-22
Tel: 711085F
A.C.E.M.P.
Hewlett-Packard France
Parc d'activité de Valbonne
Sophia Antipolis
06560 VALBONNE (Nice)
Tel: (93) 65-39-40
Hewlett-Packard France
9, Rue Baudin
26000 VALENCE
Tel: 33-75-42-7616
C.
Hewlett-Packard France
Reparaturzentrum Frankfurt
Berner Strasse 17
6000 FRANKFURT/MAIN 60
Tel: (69) 50001-0
Tel: 413249 hpflm
A.C.C.M.E.M.P.
Hewlett-Packard France
Vertriebszentrum Nord
Kapselstraße 5
D-2000 HAMBURG 60
Tel: 49-40-63-804-0
Tel: 021 63 032 hphn d
A.C.E.M.P.
Hewlett-Packard France
Heldring 37-39
D-3000 HANNOVER 61
Tel: (051) 5706-0
Tel: 092 3259 hphan
A.C.C.M.E.M.P.
Hewlett-Packard France
Rostslauer Weg 2-4
D-6800 MANNHEIM
Tel: 49-0621-70-05-0
Tel: 721 484
Hewlett-Packard France
51100 REIMS
47, Rue de Châtivesse
Tel: 33-26-88-69-19
C.P.
Hewlett-Packard France
Vertriebszentrum Mitte
D-6380 BAD HOMBURG
Tel: (06172) 400-0
Tel: 410 844 hpbng
A.C.E.M.P.
Hewlett-Packard France
Geschäftsstelle
D-1000 BERLIN 30
Tel: (030) 21 99 04-0
Tel: 018 3405 hpbld d
A.C.E.M.P.

GERMAN FEDERAL REPUBLIC

GABON

VILLEPENTE

Hewlett-Packard Bonn
Verbindungsstelle Bonn
Friedrich-Ebert-Allee 26
D-4030 RATHENAU
Postfach 31 12
Tel: (0228) 234001
Tel: 8869421
Hewlett-Packard GmbH
Vertriebszentrum Südwest
Schickardstrasse 2
D-7030 BÖBLINGEN
Postfach 1427
D-7030 BÖBLINGEN
Tel: (0703) 645-0
Tel: 7265739 hep
Hewlett-Packard GmbH
Schickardstrasse 2
D-7030 BÖBLINGEN
Tel: (0703) 14-0
Tel: 7265739 hep
Hewlett-Packard GmbH
Zentralbereich Mktg
Herrnberger Strasse 130
D-7030 BÖBLINGEN
Ermisallee
7517 WALDRONN 2
Postfach 1251
Tel: (07243) 602-0
Tel: 782 838 hep
A.C.E.
GREAT BRITAIN
See United Kingdom
GREECE
Hewlett-Packard A.E.
178, Kifissias Avenue
6th Floor
Halandri-ATHENS
Tel: 301116473 360, 301116726 090
A.C.C.M.P.
Kostas Karayannis S.A.
8, Omirou Street
ATHENS 133
Tel: 32 30 303, 32 37 371
Tel: 215962 RKKAR GR
A.C.C.M.E.
Impexin
Intelect Div.
209 Mesogion
11525 ATHENS
Tel: 647448172
Tel: 216286
P
Hartl Company
38, Mihalakopoulou
ATHENS 612
Tel: 7236071
Tel: 218767
M.
Hellasco
P.O. Box 87528
18507 PRAEUS
Tel: 4827049
Tel: 241441
A
IPESA DE GUATEMALA
Avenida Reforma 3-48, Zona 9
GUATEMALA CITY
Tel: 316627, 317853, 66471/5
9-011-502-2-316827
Tel: 3055765 IPESA GU
A.C.C.M.E.M.P.

GUATEMALA

PHAEUS

ATHENS



JAPAN (Cont'd)

Yokogawa-Hewlett-Packard Ltd
Chuo Bldg, 5-4-20 Nishi-Nakajima
4-20 Nishinakajima, 5 Chome,

Yodogawa-ku
OSAKA, 532

Tel: (06) 304-6021
C.M.E.M.P.
Tel: (0534) 56-1771

Hamamatsu Motoshiro-Cho Daichi
Hamamatsu Motoshiro-Cho Daichi

Yokogawa-Hewlett-Packard Ltd
Tel: 0427 59-1311

Yokogawa-Hewlett-Packard Ltd
SAGAMIHARA Kanagawa, 229

1-27-15, Yabe
Yokogawa-Hewlett-Packard Ltd

P.O. Box 30070
Nairobi
KENYA

ADCOM Ltd, Inc., Kenya
Tel: 24907, 39907

Yokogawa-Hewlett-Packard Ltd
SAMSUNG HEWLETT-PACKARD CO. LTD
Dongbang Yeouuido Building
12-16th Floors
36-1 Yeouuido-Dong

SHIZUOKA, 430
Tel: (0534) 56-1771

Yokogawa-Hewlett-Packard Ltd
Youngdeungpo-ku
SECUL

784-4666, 784-2666
Tel: 784-4666, 784-2666

C.M.E.M.P.
Tel: 25166 SAMSAN K

Shinjuku Tokyohin Bldg
2-7-1, Nishi Shinjuku

Shinjuku Tokyohin Bldg
Tokyo 168
Sugami-ku TOKYO 168

Tel: (03) 331-6111
Tel: 232-2024 YHP TOK

C.M.E.M.P.
Yokogawa Hokushin Electric Corporation

Shinjuku-ku
Tokyo, 163

Shinjuku-NS Bldg, 10F
4-1 Nishi-Shinjuku 2-Chome

Shinjuku-ku
Tokyo, 163

Tel: (03) 349-1859
Tel: J27584

Yokogawa Hokushin Electric Corp
9-32 Nokacho 2 Chome

Musashino-shi
Tokyo, 180

Tel: (0422) 54-1111
Tel: 02822-421 YEW MTK J

Yokogawa-Hewlett-Packard Ltd
Mifflin-Semai

Utsunomiya Odori Building
1-5 Odori 2 Chome

UTSUNOMIYA, Tochigi 320
Tel: (0286) 33-1153

C.E.
Yokogawa-Hewlett-Packard Ltd

W J Towell Computer Services
P.O. Box 5897
SAFAT

Tel: 2445111
Tel: 22247 MATIN K1

Cable: MATIN KUWAIT
P

Photo & Cine Equipment
P.O. Box 270
SAFAT

Tel: 447 47, 455 66, 4915 25
Tel: Media MW 649

E.M.P.
MAURITIUS

Bianche Birger Co Ltd
18, Jules Koenig Street
PORT LOUIS

Tel: 20828
Tel: 4296

Cable: 30336 TOWELL K1
C

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

JORDAN

Scientific and Medical Supplies Co
P.O. Box 1387

AMMAN
Tel: 24907, 39907

BERLURT
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

LEBANON

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

Computer Information Systems S A L
Charmas Building
Berlurt
Dora

MOROCCO

Hewlett-Packard de Mexico,
S.A. de C.V.

COL DEL PRADO - 76030 Oro
Condominio Kadereya
81 rue Karachi

CASABLANCA
B.P. 11133

2, rue Agadir
Boite Postale 156

GUADALAJARA, Jalisco
Fraccionamiento Loma Bonita 45060

Monti Morelos No. 299
P.O. Box 4509

Unichemicals Inc
P.O. Box 4509

MONROVIA
Tel: 224282

TEL: 224282
Tel: 4509

E
LUXEMBOURG

Hewlett-Packard Belgium S.A./N.V.
Bvd de la Woluwe, 100

Woluwedal
B-1200 BRUSSELS

12, rue de Nice
P.O. Box 1227

101 ANTMANARVO
Tel: 22090

UNITED STATES

Hewlett-Packard Co
Customer Information Center
106-118 Station Road
REDFILL, Surrey RH1 1PS
Tel: (800) 752-0900
Hours: 6:00 AM to 5:00 PM
Pacific Time

Alabama

Hewlett-Packard Co.
2100 Riverchase Center
Building 100 - Suite 118
BIRMINGHAM, AL 35244
Tel: (205) 988-0547
A.C.E.M.P.

Alaska

Hewlett-Packard Co.
420 Wynn Drive
HUNTSVILLE, AL 35805
Tel: (205) 830-2000
C.O.M.E.M.P.

Arizona

Hewlett-Packard Co.
8080 Pointe Parkway West
PHOENIX, AZ 85044
Tel: (602) 273-8000
A.C.O.M.E.M.P.

California

Hewlett-Packard Co.
99 South Hill Dr.
BRISBANE, CA 94005
Tel: (415) 330-2500
C.O.M.E.M.P.

Colorado

Hewlett-Packard Co.
1907 North Galway Blvd.
FRESHO, CA 93727
Tel: (209) 252-9552
C.M.

Florida

Hewlett-Packard Co.
7408 Hollister Ave. #A
GOLTA, CA 93117
Tel: (805) 685-6100
C.O.M.E.M.P.

Georgia

Hewlett-Packard Co.
2525 Grand Avenue
LONG BEACH, CA 90815
Tel: (213) 498-1111
C

Illinois

Hewlett-Packard Co.
5651 West Manchester Ave
LOS ANGELES, CA 90045
Tel: (213) 337-8000
Hewlett-Packard Co
3155 Porter Drive
PALO ALTO, CA 94304
Tel: (415) 857-8000
C.E.

Indiana

Hewlett-Packard Co.
Pontract Road
NORMANTON, West Yorkshire WF6 1RN
Tel: 44/924/895 566
Tel: 557355
C.P.

Ireland

Hewlett-Packard Ltd.
Oakhfield House, Oakfield Grove
Cilton BRISTOL, Avon BS8 2BN
Tel: 44-272-736 806
Tel: 44-01-583-6565
C.P.

Japan

Socite Africaine De Promotion
Immeuble Sageb
Rue d'Alakpame
P.O. Box 4150
LOME
Tel: 41-57-31-2111
Tel: 53933 hpag ch
Cable: HPAG CH
A.C.O.M.E.M.P.

SWITZERLAND (Cont'd)

Hewlett-Packard (Schweiz) AG
Schwamendingenstrasse 10
CH-8050 ZÜRICH
Tel: 41-1-315-8181
Tel: 823 537 HPAG CH
C.P.

Syria

General Electronic Inc
Nurt Basma Ahmad Ebn Kays Street
P.O. Box 5781
DAMASCUS
Tel: 33-24-87
Tel: 41-19-88
Cable: ELECTROBOR DAMASCUS
E

Taiwan

Hewlett-Packard Taiwan Ltd
2, Huan Nan Road
CHUNG LI, Taoyuan
Tel: (034) 929-666
C

Taiwan

Hewlett-Packard Taiwan Ltd
Kaoshung Office
11/F, 456, Chung Hsiao 1st Road
KAOHSUNG
Tel: (07) 2412318
C.E.

Taiwan

Hewlett-Packard Taiwan Ltd
8th Floor, Hewlett-Packard Building
337 Fu Hsing North Road
TAIPEI
Tel: (02) 712-0404
Tel: 24439 HEWPACK
Cable: HEWPACK Taipei
A.C.O.M.E.M.P.

Taiwan

Ing Lib Trading Co
3rd Floor, No. 7, Sect. 2
Jen Ai Road
TAIPEI 100
Tel: (02) 394-8191
A

Thailand

Umnesa Co Ltd
30 Patpong Ave., Surinwong
BANGKOK 5
Tel: 235-5727, 234-099/1/3
Tel: 84439 Simonco TH
Cable: UNIMESA Bangkok
A.C.E.M

Thailand

Bangkok Business Equipment Ltd
5/7, 6 Dejo Road
BANGKOK
Tel: 234-8670, 234-8671
Cable: BUSQUIPT Bangkok
P

Togo

Socite Africaine De Promotion
Immeuble Sageb
Rue d'Alakpame
P.O. Box 4150
LOME
Tel: 41-57-31-2111
Tel: 53933 hpag ch
Cable: HPAG CH
A.C.O.M.E.M.P.

Trinidad & Tobago

Caribbean Telecoms Ltd
Corner McAllister Street &
Eastern Main Road, Laventille
P.O. Box 732
PORT-OF-SPAIN
Tel: 624-4213
Tel: 22561 CARTEL WG
Cable: CARTEL, PORT OF SPAIN
C.M.E.M.P.

Tunisia

Tunisie Electronique S.A.R.L.
94, Av. Jugurtha, Mutuelleville
1002 TUNIS-BELVEDERE
Tel: 280144
Tel: 280144
C.E.P.

Turkey

Medina Eldem Sokak No. 4/16
Venisohir
ANKARA
Tel: 319175
Tel: 4221 KTX TR
Cable: EMATRADE ANKARA
M

United Kingdom

Hewlett-Packard Ltd
Miller House
The Ring, BRACKNELL
Borehamwood, Herts WD6 1SG
Tel: 207 6000
Tel: 9527 16
C.E.

United Kingdom

Hewlett-Packard Ltd
Oakhfield House, Oakfield Grove
Cilton BRISTOL, Avon BS8 2BN
Tel: 44-272-736 806
Tel: 44-01-583-6565
C.P.

United Kingdom

Hewlett-Packard Ltd
94, Av. Jugurtha, Mutuelleville
1002 TUNIS-BELVEDERE
Tel: 280144
Tel: 280144
C.E.P.

United Kingdom

Hewlett-Packard Ltd
8th Floor, Hewlett-Packard Building
337 Fu Hsing North Road
TAIPEI
Tel: (02) 712-0404
Tel: 24439 HEWPACK
Cable: HEWPACK Taipei
A.C.O.M.E.M.P.

United Kingdom

Ing Lib Trading Co
3rd Floor, No. 7, Sect. 2
Jen Ai Road
TAIPEI 100
Tel: (02) 394-8191
A

United Kingdom

Umnesa Co Ltd
30 Patpong Ave., Surinwong
BANGKOK 5
Tel: 235-5727, 234-099/1/3
Tel: 84439 Simonco TH
Cable: UNIMESA Bangkok
A.C.E.M

United Kingdom

Bangkok Business Equipment Ltd
5/7, 6 Dejo Road
BANGKOK
Tel: 234-8670, 234-8671
Cable: BUSQUIPT Bangkok
P

United Kingdom

Hewlett-Packard Ltd
Oakhfield House, Oakfield Grove
Cilton BRISTOL, Avon BS8 2BN
Tel: 44-272-736 806
Tel: 44-01-583-6565
C.P.

United Kingdom

Hewlett-Packard Ltd
94, Av. Jugurtha, Mutuelleville
1002 TUNIS-BELVEDERE
Tel: 280144
Tel: 280144
C.E.P.

United Kingdom

Hewlett-Packard Ltd
8th Floor, Hewlett-Packard Building
337 Fu Hsing North Road
TAIPEI
Tel: (02) 712-0404
Tel: 24439 HEWPACK
Cable: HEWPACK Taipei
A.C.O.M.E.M.P.

United Kingdom

Medina Eldem Sokak No. 4/16
Venisohir
ANKARA
Tel: 319175
Tel: 4221 KTX TR
Cable: EMATRADE ANKARA
M

United Kingdom

Socite Africaine De Promotion
Immeuble Sageb
Rue d'Alakpame
P.O. Box 4150
LOME
Tel: 41-57-31-2111
Tel: 53933 hpag ch
Cable: HPAG CH
A.C.O.M.E.M.P.

USALES & SUPPORT OFFICES



Hewlett-Packard Co
5725 W. Las Positas Blvd
PLEASANTON, CA 94566
Tel: (415) 460-0282
C

Hewlett-Packard Co
4244 So. Market Court, Suite A
SACRAMENTO, CA 95834
Tel: (916) 929-7222
A.C.E.M.

Hewlett-Packard Co
9606 Aero Drive
SAN DIEGO, CA 92123
Tel: (619) 279-3200
C.O.M.E.M.

Hewlett-Packard Co
2015 South Park Place
ATLANTA, GA 30339
Tel: (404) 955-1500
C.O.M.E.M.

Hewlett-Packard Co
3003 Scott Boulevard
SANTA CLARA, CA 95054
Tel: (408) 988-7000
Tel: (408) 910-338-0566
A.C.C.M.E.

Hewlett-Packard Co
2150 W. Hillcrest Dr.
THOUSAND OAKS, CA 91320
(805) 373-7000
C.O.M.E.

Colorado
Hewlett-Packard Co.
2945 Center Green Court South
Suite A
BOULDER, CO 80301
Tel: (303) 499-6655
A.C.E.

Hewlett-Packard Co
11309 Chinden Blvd.
BOISE, ID 83714
Tel: (208) 323-2700
C

Illinois
Hewlett-Packard Co.
2205 E. Empire St.
P.O. Box 1607
BLOOMINGTON, IL 61702-1607
Tel: (309) 662-9411
A.C.E.M.

Hewlett-Packard Co
525 W. Monroe, #1308
CHICAGO, IL 60606
Tel: (312) 930-0010
C

Hewlett-Packard Co
1700 East Diani Road
MAPERVILLE, IL 60566
Tel: (312) 357-8800
C

Hewlett-Packard Co
5201 Tolliver Drive
ROLLING MEADOWS, IL 60008
Tel: (312) 255-9800
Tel: (312) 910-687-1066
A.C.C.M.E.M.

Indiana
Hewlett-Packard Co.
11911 N. Meridian St.
CARMEL, IN 46032
Tel: (317) 844-4100
A.C.C.M.E.M.

Hewlett-Packard Co
111 E. Ludwig Road
FT. WAYNE, IN 46825
Tel: (219) 482-4283
C.E.

Iowa
Hewlett-Packard Co.
4700 Bayou Blvd.
Building 5
PEHSACOLA, FL 32503
Tel: (904) 476-8422
A.C.M.

Hewlett-Packard Co
4201 Corporate Dr.
WEST DES MOINES, IA 50265
Tel: (515) 224-1435
A.C.M.

Kansas
Hewlett-Packard Co.
North Rock Business Park
3450 N. Rock Rd.
WICHITA, KS 67226
Tel: (316) 884-8491
C.E.

Kentucky
Hewlett-Packard Co.
305 N. Hursbourne Lane,
Suite 300
NORCROSS, GA 30092
Tel: (404) 448-1894
C.E.P.

Hawaii
Hewlett-Packard Co.
Pacific Tower
1001 Bishop St.
HONOLULU, HI 96813
Tel: (808) 526-1555
A.C.E.M.

Idaho
A.C.E.M.P.
Tel: (504) 467-4100
KENNER, LA 70063
P.O. Box 1449
ST. ROSE, LA 70087
Suite 2400
HONOLULU, HI 96813
Tel: (201) 562-6100
A.C.C.M.E.

New Mexico
Hewlett-Packard Co.
120 Century Road
PARMUS, NJ 07652
Tel: (201) 265-5000
A.C.C.M.E.M.

New Jersey
Hewlett-Packard Co.
120 Century Road
PARMUS, NJ 07652
Tel: (201) 265-5000
A.C.C.M.E.M.

20 New England Av. West
PISCATAWAY, NJ 08854
Tel: (201) 562-6100
A.C.C.M.E.P.

Maryland
Hewlett-Packard Co.
3701 Koppers Street
BALTIMORE, MD 21227
Tel: (301) 644-5800
Tel: (301) 710-662-1943
A.C.C.M.E.M.

Hewlett-Packard Co
2 Choke Cherry Road
ROCKVILLE, MD 20850
Tel: (301) 948-6370
A.C.C.M.E.M.

Massachusetts
Hewlett-Packard Co.
1775 Minuteman Road
ANDOVER, MA 01810
Tel: (617) 682-1500
A.C.C.M.E.M.P.

Hewlett-Packard Co
29 Burlington Mall Rd
BURLINGTON, MA 01803-4514
Tel: (617) 270-7000
C.E.

Michigan
Hewlett-Packard Co.
200 Cross Keys Office Park
4326 Cascade Road S E
GRAND RAPIDS, MI 49506
Tel: (616) 957-1970
C.M.

Hewlett-Packard Co
3955 Orchard Hill Place Drive
NOVI, MI 48050
Tel: (313) 349-9200
A.C.C.M.E.M.

Hewlett-Packard Co
560 Kirts Rd.
TROY, MI 48064
Tel: (313) 362-5180
C

Minnesota
Hewlett-Packard Co.
2025 W. Larpentier Ave
ST. PAUL, MN 55113
Tel: (612) 644-1100
A.C.C.M.E.M.

Missouri
Hewlett-Packard Co.
1001 E. 101st Terrace Suite 120
KANSAS CITY, MO 64131-3368
Tel: (816) 941-0411
A.C.C.M.E.M.

Hewlett-Packard Co
3 Crossways Park West
WOODBURY, NY 11797
Tel: (516) 682-7800
A.C.C.M.E.M.

North Carolina
Hewlett-Packard Co.
305 Gregson Dr.
CARY, NC 27511
Tel: (919) 467-6600
C.O.M.E.M.P.

North Carolina
Hewlett-Packard Co.
5605 Roanne Way
GREENSBORO, NC 27420
Tel: (919) 852-1800
A.C.C.M.E.M.P.

Ohio
Hewlett-Packard Co.
2717 S. Arlington Road
AKRON, OH 44312
Tel: (216) 644-2270
C.E.

Hewlett-Packard Co
4501 Erskine Road
CINCINNATI, OH 45242
Tel: (513) 891-9870
C.M.

New York
Hewlett-Packard Co.
15885 Sprague Road
CLEVELAND, OH 44136
Tel: (216) 243-7300
A.C.C.M.E.M.

Hewlett-Packard Co
9080 Springboro Pike
MAHONING, OH 45342
Tel: (513) 433-2223
A.C.C.M.E.M.

Hewlett-Packard Co
720 Water Street
TOLEDO, OH 43604
Tel: (419) 242-2200
C.

Hewlett-Packard Co
675 Brookledge Blvd
WESTERVILLE, OH 43081
Tel: (614) 891-3344
C.O.M.E.

Oklahoma
Hewlett-Packard Co.
3525 N.W. 56th St.
Suite C-100
OKLAHOMA CITY, OK 73112
Tel: (405) 946-9499
C.E.M.

Oklahoma
Hewlett-Packard Co.
No 1 Pennsylvania Plaza
55th Floor
Suite 101
TROY, MI 48064
Tel: (313) 362-5180
C

Wisconsin
Hewlett-Packard Co.
2025 W. Larpentier Ave
ST. PAUL, MN 55113
Tel: (612) 644-1100
A.C.C.M.E.M.

Missouri
Hewlett-Packard Co.
1001 E. 101st Terrace Suite 120
KANSAS CITY, MO 64131-3368
Tel: (816) 941-0411
A.C.C.M.E.M.

North Carolina
Hewlett-Packard Co.
305 Gregson Dr.
CARY, NC 27511
Tel: (919) 467-6600
C.O.M.E.M.P.

North Carolina
Hewlett-Packard Co.
5605 Roanne Way
GREENSBORO, NC 27420
Tel: (919) 852-1800
A.C.C.M.E.M.P.

Ohio
Hewlett-Packard Co.
2717 S. Arlington Road
AKRON, OH 44312
Tel: (216) 644-2270
C.E.

New York
Hewlett-Packard Co.
15885 Sprague Road
CLEVELAND, OH 44136
Tel: (216) 243-7300
A.C.C.M.E.M.

Hewlett-Packard Co
9080 Springboro Pike
MAHONING, OH 45342
Tel: (513) 433-2223
A.C.C.M.E.M.

Hewlett-Packard Co
720 Water Street
TOLEDO, OH 43604
Tel: (419) 242-2200
C.

Hewlett-Packard Co
675 Brookledge Blvd
WESTERVILLE, OH 43081
Tel: (614) 891-3344
C.O.M.E.

Oklahoma
Hewlett-Packard Co.
3525 N.W. 56th St.
Suite C-100
OKLAHOMA CITY, OK 73112
Tel: (405) 946-9499
C.E.M.

Hewlett-Packard de Venezuela, C.A.
Centro Ciudad Comercial Tamanao
Colovska 73
YU-61000 LJUBLJANA
Tel: (061) 553 170
A.C.E.M.P.
Tel: 3 1583
Eletkrotihana
Tirova 51
YU-61000 LJUBLJANA
Do Hermes
C.M.
Aparatado 81025
CARACAS 1080A
YU-71000 SARAJEVO
Tel: (071) 35 859
Tel: 41634
C.P.
Tecnologica Medica del Caribe, C.A.
Multicentro Empresarial del Este
Ave. Libertador
Edif. Libertador
Nucleo "C" - Oficina 51-52
CARACAS
Tel: 339867/333780
M
Hewlett-Packard de Venezuela, C.A.
Residencias Tia Betty Local 1
Avenida 3 y con Calle 75
MARCAARBO, Estado Zulia
R.U. Tibury (Zambia) Ltd.
P.O. Box 32792
LUSAKA
Tel: 215590
Tel: 40128
E
ZIMBABWE
Field Technical Sales (Private) Limited
45, Kelvin Road North
SALESBURY
P.O. Box 3458
Tel: 705 231
Tel: 4-122 RH
E.P.
September 1987

Hewlett-Packard de Venezuela, C.A.
Centro Ciudad Comercial Tamanao
Colovska 73
YU-61000 LJUBLJANA
Tel: (061) 553 170
A.C.E.M.P.
Tel: 3 1583
Eletkrotihana
Tirova 51
YU-61000 LJUBLJANA
Do Hermes
C.M.
Aparatado 81025
CARACAS 1080A
YU-71000 SARAJEVO
Tel: (071) 35 859
Tel: 41634
C.P.
Tecnologica Medica del Caribe, C.A.
Multicentro Empresarial del Este
Ave. Libertador
Edif. Libertador
Nucleo "C" - Oficina 51-52
CARACAS
Tel: 339867/333780
M
Hewlett-Packard de Venezuela, C.A.
Residencias Tia Betty Local 1
Avenida 3 y con Calle 75
MARCAARBO, Estado Zulia
R.U. Tibury (Zambia) Ltd.
P.O. Box 32792
LUSAKA
Tel: 215590
Tel: 40128
E
ZIMBABWE
Field Technical Sales (Private) Limited
45, Kelvin Road North
SALESBURY
P.O. Box 3458
Tel: 705 231
Tel: 4-122 RH
E.P.
September 1987

Hewlett-Packard Co
Tanglewood West Bldg
Suite 240
3959 Electric Road
ROANOKE, VA 24018
Tel: (703) 774-3444
C.E.P.
Hewlett-Packard Co
5700 Cromo Dr
EL PASO, TX 79912
Tel: (915) 833-4400
C.E.M.P.
Hewlett-Packard Co
3952 Sandshell Drive
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A.C.E.M.
Hewlett-Packard Co
9255 S W Pioneer Court
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A.C.E.M.
Hewlett-Packard Co
Route 22
50 Dorchester Rd
HAINESBURG, PA 17112-2799
Tel: (717) 657-5900
C
Hewlett-Packard Co
3301 West Royal Lane
IRVING, TX 75063
Tel: (214) 869-3377
C.E.
Hewlett-Packard Co
109 E. Toronto, Suite 100
MCALLEN, TX 78501
Tel: (512) 630-3030
C
Hewlett-Packard Co
930 E. Campbell Rd.
RICHARDSON, TX 75081
Tel: (214) 231-6101
A.C.M.E.M.P.
Hewlett-Packard Co
1020 Central Parkway South
SAN ANTONIO, TX 78232
Tel: (512) 494-9386
A.C.E.M.P.
Hewlett-Packard Co
545 N. Pfingstburg Dr
GREENVILLE, SC 29607
Tel: (803) 232-8002
C
Hewlett-Packard Co
One Energy Center, Suite 200
MEMPHIS, TN 38131
Tel: (615) 966-4747
A.C.E.M.P.
Hewlett-Packard Co
3070 Directors Row
Directors Square
MEMPHIS, TN 38131
Tel: (901) 346-8370
A.C.E.M.
Hewlett-Packard Co
44 Vanlage Way,
Suite 160
NASHVILLE, TN 37228
Tel: (615) 255-1271
A.C.E.M.P.

Hewlett-Packard Co
Tanglewood West Bldg
Suite 240
3959 Electric Road
ROANOKE, VA 24018
Tel: (703) 774-3444
C.E.P.
Hewlett-Packard Co
5700 Cromo Dr
EL PASO, TX 79912
Tel: (915) 833-4400
C.E.M.P.
Hewlett-Packard Co
3952 Sandshell Drive
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A.C.E.M.
Hewlett-Packard Co
9255 S W Pioneer Court
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A.C.E.M.
Hewlett-Packard Co
Route 22
50 Dorchester Rd
HAINESBURG, PA 17112-2799
Tel: (717) 657-5900
C
Hewlett-Packard Co
3301 West Royal Lane
IRVING, TX 75063
Tel: (214) 869-3377
C.E.
Hewlett-Packard Co
109 E. Toronto, Suite 100
MCALLEN, TX 78501
Tel: (512) 630-3030
C
Hewlett-Packard Co
930 E. Campbell Rd.
RICHARDSON, TX 75081
Tel: (214) 231-6101
A.C.M.E.M.P.
Hewlett-Packard Co
1020 Central Parkway South
SAN ANTONIO, TX 78232
Tel: (512) 494-9386
A.C.E.M.P.
Hewlett-Packard Co
545 N. Pfingstburg Dr
GREENVILLE, SC 29607
Tel: (803) 232-8002
C
Hewlett-Packard Co
One Energy Center, Suite 200
MEMPHIS, TN 38131
Tel: (615) 966-4747
A.C.E.M.P.
Hewlett-Packard Co
3070 Directors Row
Directors Square
MEMPHIS, TN 38131
Tel: (901) 346-8370
A.C.E.M.
Hewlett-Packard Co
44 Vanlage Way,
Suite 160
NASHVILLE, TN 37228
Tel: (615) 255-1271
A.C.E.M.P.

Hewlett-Packard Co
Tanglewood West Bldg
Suite 240
3959 Electric Road
ROANOKE, VA 24018
Tel: (703) 774-3444
C.E.P.
Hewlett-Packard Co
5700 Cromo Dr
EL PASO, TX 79912
Tel: (915) 833-4400
C.E.M.P.
Hewlett-Packard Co
3952 Sandshell Drive
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A.C.E.M.
Hewlett-Packard Co
9255 S W Pioneer Court
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A.C.E.M.
Hewlett-Packard Co
Route 22
50 Dorchester Rd
HAINESBURG, PA 17112-2799
Tel: (717) 657-5900
C
Hewlett-Packard Co
3301 West Royal Lane
IRVING, TX 75063
Tel: (214) 869-3377
C.E.
Hewlett-Packard Co
109 E. Toronto, Suite 100
MCALLEN, TX 78501
Tel: (512) 630-3030
C
Hewlett-Packard Co
930 E. Campbell Rd.
RICHARDSON, TX 75081
Tel: (214) 231-6101
A.C.M.E.M.P.
Hewlett-Packard Co
1020 Central Parkway South
SAN ANTONIO, TX 78232
Tel: (512) 494-9386
A.C.E.M.P.
Hewlett-Packard Co
545 N. Pfingstburg Dr
GREENVILLE, SC 29607
Tel: (803) 232-8002
C
Hewlett-Packard Co
One Energy Center, Suite 200
MEMPHIS, TN 38131
Tel: (615) 966-4747
A.C.E.M.P.
Hewlett-Packard Co
3070 Directors Row
Directors Square
MEMPHIS, TN 38131
Tel: (901) 346-8370
A.C.E.M.
Hewlett-Packard Co
44 Vanlage Way,
Suite 160
NASHVILLE, TN 37228
Tel: (615) 255-1271
A.C.E.M.P.

