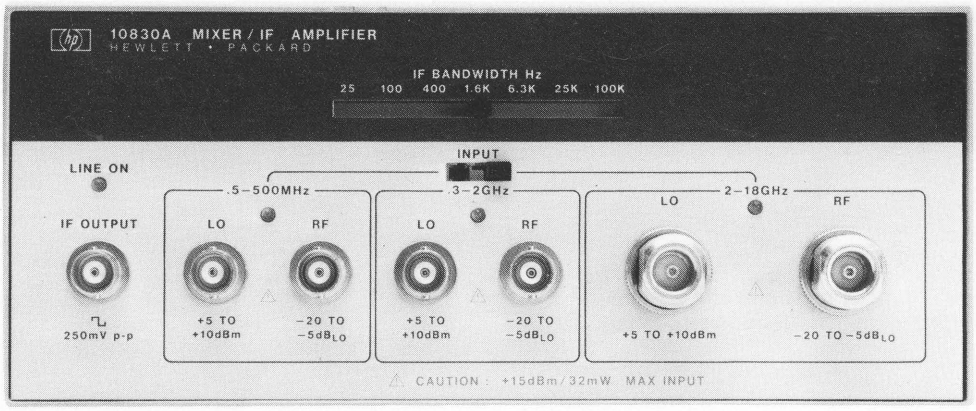
OPERATING AND SERVICE MANUAL

MIXER IF AMPLIFIER

10830A



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CERTIFICATION

Hewlett-Packard Company certifies that this instrument met its published specifications at the time of shipment from the factory. Hewlett-Packard Company 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 AND ASSISTANCE

This Hewlett-Packard product is warranted against defects in materials and workmanship for a period of one year from the date of shipment except that in the case of mixer components the warranty shall be for the first two (2) mixer failures to occur within the warranty year. Hewlett-Packard will, at its option, repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard, and provided the preventive maintenance procedures in this manual are followed. Repairs necessitated by misuse of the product are not warranted. NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HEWLETT-PACKARD IS NOT LIABLE FOR CONSEQUENTIAL DAMAGES.

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10830A
MIXER/IF AMPLIFIER

OPERATING AND SERVICE MANUAL

SERIAL PREFIX 1708A

This manual applies to instruments with Serial Prefix 1708A unless accompanied by a Manual Change Sheet indicating otherwise.

For instruments with Serial Prefix lower than 1708A, refer to Section VII of this manual.

5301 STEVENS CREEK BLVD., SANTA CLARA, CALIF. 95050

MANUAL PART NUMBER 10830-90002 **Printed: MAR 1977**

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SAFETY CONSIDERATIONS

GENERAL

This is a Safety Class I instrument. This instrument has been designed and tested according to IEC Publication 348, "Safety Requirements for Electronic Measuring Apparatus".

OPERATION

BEFORE APPLYING POWER verify that the power transformer primary is matched to the available line voltage and the correct fuse is installed (see Section II). Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

SERVICE

Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operation and to retain the instrument in safe condition. Service and adjustments should be performed only by qualified service personnel.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved.

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

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

⚠ ATTENTION ⚠

This symbol: ⚠ , when it appears on an instrument means: Read the instruction manual before operating the instrument. The first three sections of the manual are particularly important. If the instrument is operated without reading the instructions, the instrument may not operate correctly.

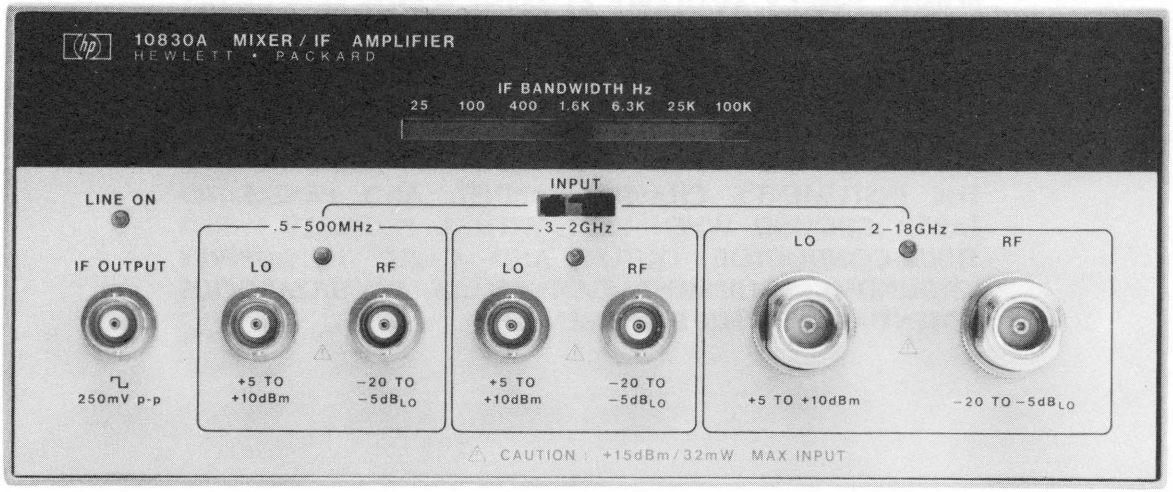
WARNING

100—240 VOLTS AC ARE USED IN THIS INSTRUMENT. MAINTENANCE AND SERVICING SHOULD BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY. LINE VOLTAGE IS ALWAYS PRESENT ON SOME TERMINALS INCLUDING THE POWER INPUT CONNECTOR, FUSE HOLDER, AND OTHER POINTS. ENERGY AVAILABLE AT MANY POINTS MAY RESULT IN PERSONAL INJURY OR DEATH WHEN CONTACTED.

TO PROTECT OPERATING AND SERVICING PERSONNEL, THIS INSTRUMENT IS SUPPLIED WITH A THREE-PIN POWER RECEPTACLE. THE CENTER PIN OF THE RECEPTACLE CONNECTS THE INSTUMENT'S CHASSIS, CABINET, AND PANELS TO EARTH GROUND WHEN USED WITH A PROPERLY WIRED THREE-CONDUCTOR OUTLET AND CABLE. IMPROPERLY GROUNDED EQUIPMENT CAN RESULT IN HAZARDOUS POTENTIALS BETWEEN EQUIPMENT.

CAUTION

Do not apply voltages greater than +15 dBm/32 mW to input connectors. Higher levels will damage the mixer circuit.



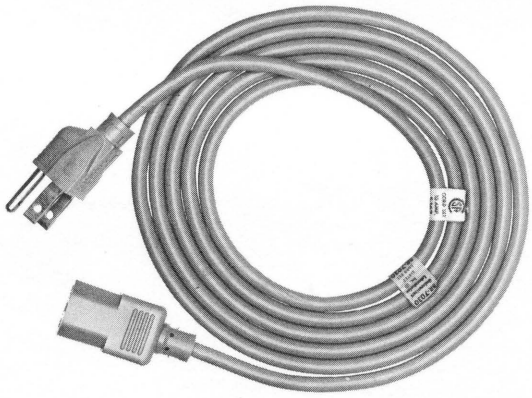


Figure 1-1. HP10830A Mixer/IF Amplifier

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SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This manual provides information pertaining to the installation, operation, testing, adjustment and maintenance of the HP Model 10830A Mixer/IF Amplifier.

1-3. Figure 1-1 shows the HP10830A with accessories supplied.

1-4. SPECIFICATIONS

1-5. Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument may be tested.

1-6. INSTRUMENTS COVERED BY MANUAL

1-7. This instrument has a two-part serial number. The first four digits and the letter comprise the serial number prefix. The last five digits form the sequential suffix that is unique to each instrument. The contents of this manual apply directly to instruments having the same serial number prefix(es) as listed under SERIAL PREFIX on the title page.

1-8. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for this instrument is supplied with a yellow Manual Changes supplement that contains change information that documents the differences.

1-9. 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 poosible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is keyed to the manual's print date and part number, both of which appear on the title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-10. For information concerning a serial number prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

Table 1-1. Specifications

MIXER/IF AMPLIFIER FUNCTION. Performs input signal conditioning and creates IF signal for 5345A Counter.
INPUTS

BAND	PORT	FREQUENCY RANGE	OPERATING LEVEL	VSWR (TYP)	CONNECTOR
RF	RF	0.5 to 500 MHz	-20 to -5 dB_{LO}	<2.0:1	BNC
	LO	0.5 to 500 MHz	+5 to +10 dBm	<1.5:1	BNC
UHF	RF	0.3 to 2 GHz	-20 to -5 dB_{LO}	<3.0:1	BNC
	LO	0.3 to 2 GHz	+5 to +10 dBm	<2.0:1	BNC
μW	RF	2 to 18 GHz	-20 to -5 dB_{LO}	<3.0:1	TYPE N
	LO	2 to 18 GHz	+5 to +10 dBm	<2.5:1	TYPE N
(rear input)	EXT IF	10 Hz to 100 kHz	-15 to 0 dBm	<1.5:1	BNC

Input levels should be kept below +15 dBm/32 mW or damage to mixers may occur.

IF OUTPUT
Waveform: Square wave output
Frequency: 10 Hz to 100 kHz
Level: 200 to 300 mV peak-to-peak centered about zero volts
Impedance: Typically 50Ω
Rise Time: <20 ns
Fall Time: <20 ns
EXT FILTER INPUT/OUTPUT: Rear panel connectors provide for the insertion of an external filter.
Operating Temperature: 0°C to 50°C
Power Requirements: 100/120/200/240 (+5% -10%) 48—66 Hz, 5 VA.

1-11. DESCRIPTION

1-12. The HP 10830A is a 0.5 MHz to 18 GHz mixer and low-noise amplifier assembly. The instrument accepts two input frequencies in any one of three bands, RF(0.5-500 MHz), UHF(0.3-2 GHz), or microwave (2.0-18 GHz) and conditions the signals to produce a square-wave IF in the range of 10 Hz - 100 kHz. Front panel switches select the input band and the IF bandwidth. An external IF source applied to a rear panel connector can be selected and conditioned for the output.

1-13. WARRANTY

1-14. A special warrantly applies to the mixers used in the 10830A as described in the warranty statement at the front of this manual. A defective mixer must be returned to the factory to obtain a replacement.

1-15. OPTIONS

1-16. There are no options for the HP 10830A.

1-17. EQUIPMENT SUPPLIED

1-18. The only equipment supplied with the HP 10830A is the type of power cable described in *Table 2-1*.

1-19. RECOMMENDED TEST EQUIPMENT

1-20. *Table 1-2* lists test equipment recommended for the performance tests in Section II. Equivalent equipment may be substituted.

Table 1-2. Recommended Test Equipment

Instrument Type	Critical Specifications	Recommended Type
Oscilloscope	50 MHz Bandwidth	HP180A
Vertical Plug-in	10 mV/div to 250 MHz	HP1830A
Time Base Plug-in	1 ns/div sweep	HP1840A
Signal Generator	1 to 1300 MHz	HP8660B
RF Section	Calibrated Output	HP86602A
Sweep Oscillator	CW Operation	HP8620A
RF Plug-in	2-18 GHz	HP86290A
Electronic Counter	20 mV Sensitivity to 500 MHz	HP5345A
Test Oscillator	10 Hz to 10 MHz	HP651B
RMS Voltmeter	10 Hz to 10 MHz, ±5%	HP3400A
Power Meter	100 kHz to 18 GHz	HP435A
RF Millivoltmeter	10 mV to 10 V, 500 kHz to 1 GHz	HP411A
Tone Generator	+7 dBm at 10 kHz	HP10831A
Power Meter	-20 dBm to +10 dBm	HP432A
Accessories		
VHF Attenuator, 0-12 dB		HP355C
Fixed Attenuator, 6 dB, DC-12.4 GHz		HP8491A
50Ω Termination, DC-4 GHz		HP908A
Thermistor Mount		HP8478B
Power Sensor		HP8481A
Double-balanced mixer, 0.3-2 GHz (MIJ)		0960-0455
Double-balanced mixer, 2-18 GHz (M28C)		0960-0454
Directional Coupler		1130-0501
Power Splitter		11652-60009
1:1 Divider Probe		10007B
10:1 Divider Probe		10001A

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SECTION II
INSTALLATION

2-1. INTRODUCTION

2-2. This section contains information for unpacking, inspection, storage, and installation.

2-3. UNPACKING AND INSPECTION

2-4. If the shipping carton is damaged, inspect the instrument for visible damage (scratches, dents, etc.). If the instrument is damaged, notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately (offices are listed at the back of this manual). Keep the shipping carton and packing material for the carrier's inspection. The Hewlett-Packard Sales and Service Office will arrange for repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

2-5. INSTALLATION REQUIREMENTS

CAUTION

BEFORE CONNECTING THE INSTRUMENT TO AC POWER LINES, BE SURE THAT THE VOLTAGE SELECTOR IS PROPERLY POSITION AS DESCRIBED BELOW.

2-6. LINE VOLTAGE REQUIREMENTS. The instrument is equipped with a power module that contains a printed-circuit line voltage selector to select 100, 120, or 240-volt ac operation. Before applying power, the pc selector must be set to the correct position and the correct fuse must be installed as described below.

2-7. Power line connections are selected by the position of the plug-in circuit card in the module. When the card is plugged into the module, the only visible markings on the card indicate the line voltage to be used. The correct value of line fuse, with a 250 volt rating, must be installed after the card is inserted. This instrument uses a .032A fuse (HP Part No. 2110-0337) for 100/120 volt operation; a .062A fuse (HP Part No. 2110-0311) for 220/240 volt operation.

2-8. To convert from one line voltage to another, the power cord must be disconnected from the power module before the sliding window covering the fuse and card compartment can be moved to expose the fuse and circuit card.

2-9. Pull on the fuse lever to remove the fuse and then pull the card out of the module. The fuse lever must be held to one side to extract and insert the card. Insert the card so the marking that agrees with the line voltage to be used is visible.

2-10. Return fuse lever to normal position, insert correct fuse, slide plastic window over the compartment, and connect the power cord to complete the conversion.

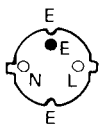
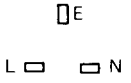
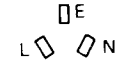
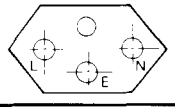
2-11. POWER CABLES

WARNING

TO PROTECT OPERATING AND SERVICE PERSONNEL, THIS INSTRUMENT IS EQUIPPED WITH A THREE-PIN POWER RECEPTACLE. THE CENTER PIN OF THIS RECEPTACLE CONNECTS THE INSTRUMENT CHASSIS AND PANELS TO EARTH GROUND WHEN USED WITH A PROPERLY WIRED THREE-CONDUCTOR OUTLET AND POWER CABLE. IMPROPERLY GROUNDED EQUIPMENT CAN RESULT IN HAZARDOUS POTENTIALS ON THE INSTRUMENT.

2-12. To accommodate the different power receptacles throughout the world, one of the power cable terminators (shown in *Table 2-1*) is provided with the instrument. The cable supplied for use in the United States meets the specifications established by the International Electrotechnical Commission (IEC). The male connector of this cable is a NEMA type, and the female connector is a CEE-22 type, both recognized by the Underwriter's Laboratory. Connect the power cable to a power source receptacle that has a grounded third conductor. If the power receptacle is a two-pin type, use a two-to-three pin adapter (HP Part No. 1251-0048 for USA applications) and connect the green lead of the adapter to earth.

Table 2-1. Power Cables

HP Part Number	Plug Configuration (view of plug face)	Product Rating		Plug Rating and Ref. Spec.	For Use In:
		Voltage Nominal	Current Maximum		
8120-1689		220V	10.0A	1ϕ, 250V, 10/16A CEE 7-V11	East and West Europe, Saudi Arabia, United Arab Republic (unpolarized in many nations)
8120-1351		240V	10.4A	1ϕ, 250V, 13A BS 1363A	Great Britain, Cyprus, Nigeria, Rhodesia, Singapore, So. Africa, India
8120-1369		240V	10.0A	1ϕ, 250V 10A N.7.S.S. 198 AS C112	Australia, New Zealand
8120-1378		120V	12.0A	1ϕ, 125V, 15A NEMA 5-15P	United States, Canada
8120-2104		220V	10.0A	1ϕ, 250V, 10A, SEV 1011.1959 24507, type 12	Switzerland

2-13. CABINET INSTALLATION

2-14. Refer to the system operating and service manual for procedures on cabinet installation or removal.

2-15. REPACKING FOR SHIPMENT

2-16. If it becomes necessary to reship the instrument, good commercial packing should be used. Contract packaging companies in many cities can provide dependable custom packaging on short notice. Instruments should be packed securely in a strong corrugated container with suitable filler pads between the instrument and container. Before returning instruments to Hewlett-Packard, contact the nearest Hewlett-Packard Sales and Service Office for instructions.

2-17. ENVIRONMENT DURING STORAGE AND SHIPMENT

2-18. Conditions during storage and shipment should normally be limited as follows:

a. Maximum altitude: 7620 metres (25,000 feet)

b. Minimum temperature: -40°F (-40°C)

c. Maximum temperature: +167°F (+75°C)

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SECTION III
OPERATION

3-1. INTRODUCTION

3-2. This section describes the HP 10830A operating characteristics, front and rear panel features, operating instructions and operator maintenance.

3-3. OPERATING CHARACTERISTICS

3-4. The HP 10830A is designed to operate as a signal conditioning device in a system such as the HP 5390A, connected to a system test tone generator such as the HP10831A. The normal system configuration is as shown in the test setup in *Table 4-1,* In-Cabinet Performance Test.

3-5. The 10830A accepts signals from two sources in any one of three frequency bands and produces a squarewave IF output. The frequency bands are RF (0.5-500 MHz), UHF (0.3-2 GHz) and Microwave (2-18 GHz). The IF output is between 10 Hz and 100 KHz, depending upon the input frequencies. The band is selected by the front panel INPUT switch and selection is indicated by front panel LED's. The amplifier bandwidth is controlled by the front panel IF BANDWIDTH Hz switch.

3-6. The 10830A can accept an external IF signal at a rear panel connector, condition the signal and supply a squarewave IF at the front panel IF OUTPUT connector. To accomplish this, the EXT/INT rear panel switch must be in EXT or, as an alternative, the REMOTE EXT INPUT connector must be shorted. (The REMOTE EXT INPUT is a floating ground-closure control in parallel with the EXT/INT switch.)

3-7. The function of the 10830A is to provide low-noise amplification of the zero crossings of the IF signal so that very fine resolution measurement can be made by the system counter.

3-8. PANEL FEATURES

3-9. The function of all front and rear panel controls, connectors and indicators is described in *Figure 3-1.*

3-10. OPERATING INSTRUCTIONS

3-11. The 10830A operates in a system with two signal sources connected to the front panel inputs. For testing the system, the 10831A Test Tone Generator (or equivalent) is used. When the 10831A OFF switch is pressed in, the 10830A front panel signals are processed and the resultant IF signal is outputted. When the 10831A OFF switch is in the out position (on), the 10830A will ignore the signals connected to the front panel and pass the signal connected to the EXT IF connector at the rear panel (which is usually the test tone from the 10831A).

3-12. When operating the 10830A with front panel connected sources (normal operation), check the following:

a. INPUT switch is set to appropriate band.

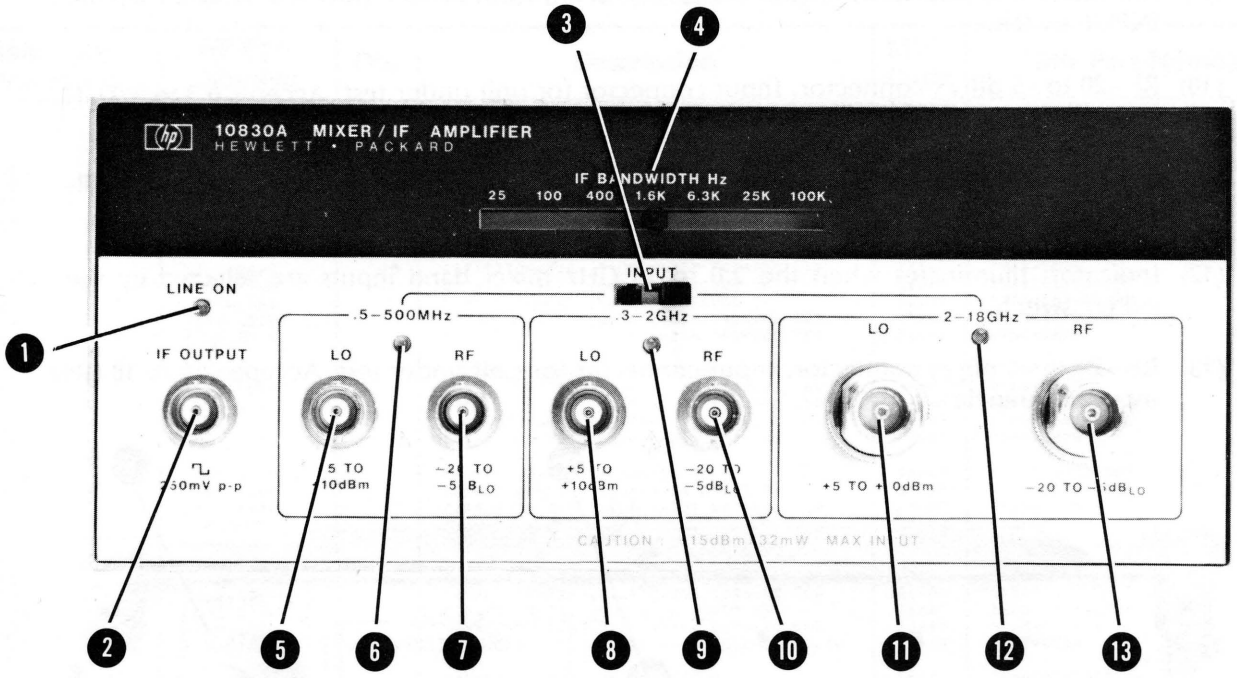
b. IF BANDWIDTH Hz switch is set to desired bandwidth.

c. EXT/INT (RMT) switch on rear panel is set to INT (RMT)
(EXT IF SELECTED indicator is off).

d. For details on controls, connectors and indicators, refer to *Figure 3-1.*

3-13. OPERATORS MAINTENANCE

3-14. Operators maintenance consists of replacing the fuse or setting the pc voltage selector to the correct position in the power module on the rear panel. Refer to paragraph 2-6 for detailed instructions.



FRONT PANEL FEATURES

(1) LINE ON Indicator. When illuminated, indicates instrument has primary power applied.

(2) IF OUTPUT connector. Provides a squarewave output at a frequency of 10 Hz to 100 KHz (depending upon INPUT frequencies).

(3) INPUT switch. Slide switch that selects one of three mixer band dual inputs, 0.5 to 500 MHz, 0.3 to 2.0 GHz or 2.0 to 18 GHz.

CAUTION

Do not apply voltages greater than +15 dBm/32 mW to input connectors. Higher levels will damage the mixer circuit.

(4) IF BANDWIDTH Hz switch. Slide switch that selects 25, 100, 400, 1.6K, 6.3K, 25K or 100K(Hz) IF amplifier bandwidth.

(5) LO +5 to +10dBm connector. Input connector for external reference source (local oscillator). Accepts 0.5 to 500 MHz input frequencies.

(6) Indicator. Illuminates when the 0.5 to 500 MHz mixer band inputs are selected by the INPUT switch.

(7) RF –20 to –5 dB_{LO} connector. Input connector for unit under test. Accepts 0.5 to 500 MHz input frequencies.

(8) LO +5 to +10dBm connector. Input connector for external reference source (local oscillator). Accepts 0.3 to 2.0 GHz input frequencies.

Figure 3-1. Front and Rear Panel Controls, Connectors and Indicators

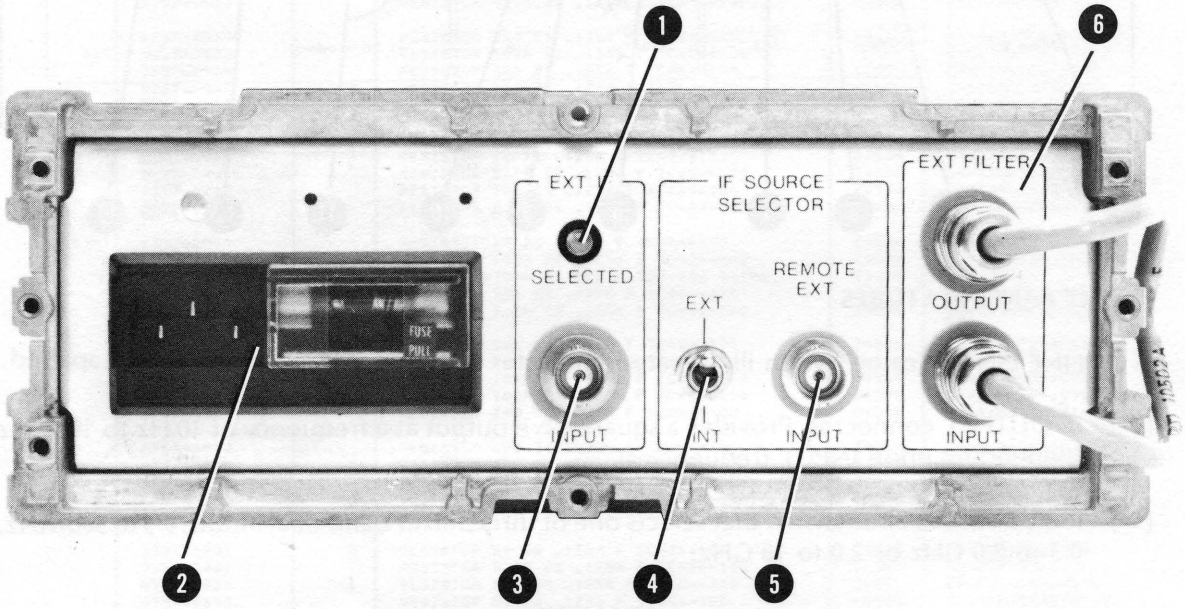
(9) Indicator. Illuminates when the 0.3 to 2.0 GHz mixer band inputs are selected by the INPUT switch.

(10) RF –20 to –5 dB_{LO} connector. Input connector for unit under test. Accepts 0.3 to 2.0 GHz input frequencies.

(11) LO +5 to +10 dBm connector. Input connector for external reference source (local oscillator). Accepts 2.0 to 18 GHz input frequencies.

(12) Indicator. Illuminates when the 2.0 to 18 GHz mixer band inputs are selected by the INPUT switch.

(13) RF –20 to –5 dB_{LO} connector. Input connector for unit under test. Accepts 2.0 to 18 GHz input frequencies.



REAR PANEL FEATURES

(1) EXT IF SELECTED indicator. Illuminates when external IF mode is selected either by the adjacent EXT/INT switch or by a ground closure of the REMOTE EXT INPUT connector.

(2) AC POWER MODULE. Input power module consisting of an IEC approved connector, a fuse (.0062A for 100/120 volt operation, .032A for 220/240 volt operation) and a pc card line voltage selector (refer to paragraph 2–5 for voltage selection).

(3) EXT IF INPUT connector. Accepts an IF signal from an external source.

(4) EXT/INT switch (IF source selector). Selects external or internal mode of operation. (INT position can be overriden by a ground closure of the REMOTE EXT INPUT connector, which will force the 10830A into the external mode.)

(5) REMOTE EXT INPUT connector. Forces the 10830A into the external mode when shorted by an external device.

(6) EXT FILTER INPUT/OUTPUT connectors. Provides for the insertion of an external filter.

Figure 3-1. Front and Rear Panel Controls, Connectors and Indicators (Continued)

SECTION IV
PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. The procedures in this section test the performance of the 10830A using the specifications in *Table 1-1* as a standard. The In-Cabinet Performance Test, *Table 4-1* can be performed without access to the interior of the instrument. The Gain and Bandwidth Test and the RF, UHF and Microwave tests that follow are more detailed and extensive tests that require access to the instrument in a bench test setup configuration.

4-3. EQUIPMENT REQUIRED

4-4. Equipment required for the performance tests is listed in the Recommended Test Equipment table in Section I. Any equipment that satisfies the critical specifications given in the table may be substituted for the equipment listed.

4-5. TEST RECORD

4-6. Results of the performance tests may be recorded on the test record at the end of this section. The results recorded at incoming inspection can be used for comparison in periodic maintenance and troubleshooting or after repairs.

4-7. TESTS

4-8. To quickly check the performance of the 10830A without removing from the system cabinet, perform the In-Cabinet Performance Test in *Table 4-1*. To verify the specifications of the 10830A (*Table 1-1*) the following tests are provided:

a. Amplifier Gain and Bandwidth Test, paragraph 4-9.

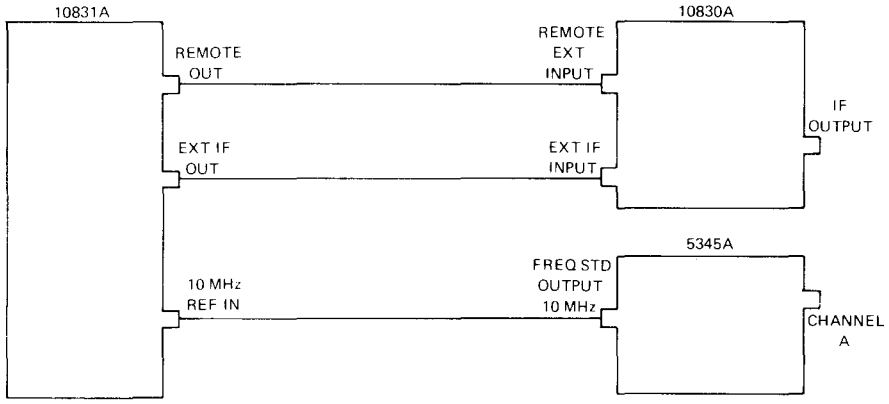
b. RF Band Test, paragraph 4-11.

c. UHF Band Test, paragraph 4-13.

d. Microwave Band Test, paragraph 4-15.

Table 4-1. In-Cabinet Performance Test

1. Connect the equipment as shown below (normal system configuration) and proceed to next step.



2. Connect a BNC cable (10503A) from HP180A oscilloscope (through 50Ω termination) to IF OUTPUT on front panel of 10830A.
3. On 10831A, press OFF switch in.
4. On 10830A, set rear panel EXT/INT switch to EXT and connect power to equipment. The EXT IF SELECTED indicator (LED) on rear panel should light. The power indicator (above IF OUTPUT on front panel) should light.
5. Set EXT/INT switch to INT. Rear panel indicator on 10830A should go off. On 10831A, press AUX switch. Rear panel indicator on 10830A should light.
6. On 10831A, press OFF switch in. On 10830A, set INPUT switch to each band position in turn and observe that the associated LED lights. Oscilloscope connected to IF OUTPUT should indicate no signal output.
7. On 10831A press TEST switch in. Rear panel indicator on 10830A should light. Oscilloscope connected to IF OUTPUT should indicate 10 kHz squarewave at approximately 250mVp-p.
8. Disconnect scope from IF OUTPUT and connect to AUX IF OUTPUT on rear panel. Oscilloscope should indicate 10 kHz squarewave between 150 mV and 200 mV p-p.

4-9. Amplifier Gain and Bandwidth Test

4-10. This performance test requires that the 10830A be removed from the system cabinet with the top cover off and power applied.

WARNING

IN PERFORMING THE FOLLOWING PROCEDURE, DO NOT CONTACT THE PINS ON THE A3 POWER MODULE. THE LINE INPUT VOLTAGES ARE PRESENT AT THESE POINTS AND CONTACT COULD RESULT IN PERSONAL INJURY OR DEATH.

a. Set the IF BANDWIDTH Hz switch on the 10830A to 100 kHz and set the EXT/INT (RMT) switch on rear panel to INT.

b. Connect the HP 180A Oscilloscope via a 1:1 probe to TP1 on the 10830A. The scope (set to AC) should indicate less than 5mVac.

c. Set scope to DC and adjust variable resistor A1R23 for 50(±10)mV dc at TP1. (A 34702A Multimeter/34740A Display may be used for convenience in making this adjustment. Set 34702A to DCV and 1V/KΩ.)

d. Disconnect the probe from the 180A scope and connect the probe from TP1 to an HP 3400A RMS Voltmeter.

e. Connect the 10830A EXT IF INPUT to an HP 651B Test Oscillator 50Ω output. Set the EXT/INT switch on 10830A rear panel to EXT.

f. Set the HP 651B to 1 kHz at 0.5mV rms. The HP 3400A should indicate a gain of approximately 150(±30)mV rms.

g. Set the HP 651B frequency to 100 kHz and observe indication on HP 3400A. The indication should drop by between 2 to 6 dB.

h. Repeat step g for each position of the IF BANDWIDTH Hz switch with the HP 651B set to the corresponding frequency. The indication should be between -1 and -5 dB at the frequency corresponding to the setting of the bandwidth switch for each switch position.

i. Set the 10830A IF BANDWIDTH Hz switch to 1.6K and set the HP 651B to 1.0 kHz.

j. Connect the HP 180A via 1:1 probe to TP4 of 10830A and observe a clamped sinewave with a zero-crossing slope of >0.1V/μs, approximately 1.5V p-p.

k. Disconnect scope probe from TP4. Connect to TP2 and observe a rounded squarewave with a zero-crossing slope of >1V/0.2 μs, approximately 4V p-p.

l. Connect the scope through a 50-ohm termination to the IF OUTPUT of the 10830A. Observe a squarewave approximately 250mV p-p, rise time <50ns (10-90%).

m. Set HP 651B level to -20 dBm and observe rise time on scope of <30ns.

4-11. RF Band Test

4-12. Connect the 10830A in the test setup shown in Figure 4-1 and proceed as follows:

a. On 10830A set:

(1) IF BANDWIDTH Hz switch to 25K

(2) INPUT switch to .5-500 MHz

(3) EXT/INT switch to INT

b. On 5345A set;

(1) FUNCTION switch to FREQ A

(2) GATE TIME To 1s

(3) DISPLAY POSITION to 1ms

(4) CHANNEL A switches to:

LEVEL	PRESET
SLOPE	+
50Ω/1MΩ	50Ω
X1/X20	X1
AC/DC	DC
CHK/COM A/SEP	SEP

c. Verify 5345A FREQ STD OUTPUT (5 to 25 dBm) by measuring with HP 411A. Adjust HP 355C to provide output between 5 and 15 dBm.

d. Set 8660B frequency to 10.010000 MHz (external modulation section MODE to off).

e. Set 86602A level to -10 dBm.

f. Observe 5345A display for center frequency of 10.000XX kHz (slight adjustment of 8660B frequency may be necessary) with jitter $\leq \pm 0.00002$ kHz for a 3 reading average.

g. Vary the 86602A level from -20 to 0 dBm. Observe that the 5345A display is the same as in step f.

4-13. UHF Band Test

4-14. Connect the 10830A in the test setup shown in *Figure 4-2* and proceed as follows:

NOTE

Due to the single signal source used and the dc coupled circuits of the 10830A, signal nulls will occur as the source frequency is varied. A slight variation in the frequency or in the LO or RF line length should restore the signal.

a. On 10830A set switches same as in paragraph 4-12a except set INPUT switch to .3-2 GHz.

b. On 5345A set switches same as in paragraph 4-12b.

c. On 10831A press TEST switch in and press and release TONE switch to out position (on).

d. Set 8660B frequency to 1 GHz (modulation section MODE to off).

e. Set 86602 level to +13 dBm.

f. Observe 5345A display for center frequency of 10.00000 kHz with jitter $\leq \pm 0.00002$ kHz for a 3 reading average.

g. Vary the 8660B frequency from 300 MHz to 2 GHz. Observe that the display is the same as in step f.

4-15. Microwave Band Test

4-16. Refer to the test setup in Figure 4-3 and proceed as follows:

a. Set 8620A/86290A frequency to 4 GHz (cw).

b. Set 86290A output level to +10 dBm. (Verify level by measuring with HP 432A Power Meter using 8478B Thermistor Mount or HP 435A Power Meter using 8481A Power Sensor.)

c. Connect the 10830A in the test setup shown in Figure 4-3.

d. On 10830A set:

(1) IF BANDWIDTH Hz switch to 25K

(2) INPUT switch to 2-18 GHz

(3) EXT/INT switch to INT

e. On 5345A set:

(1) FUNCTION switch to FREQ A

(2) GATE TIME to 1s

(3) DISPLAY POSITION to 1ms

(4) CHANNEL A switches to:

LEVEL	PRESET
SLOPE	+
50Ω/1MΩ	50Ω
X1/X20	X1
AC/DC	DC
CHK/COM A/SEP	SEP

f. On 10831A press TEST switch in and press and release TONE switch to out position (on).

g. Observe 5345A display for center frequency of 10.00000 kHz with jitter $\leq \pm 0.00002$ kHz for a 3 reading average.

h. Vary the 8620A frequency from 2 to 18 GHz. Observe that the display is the same as in step g.

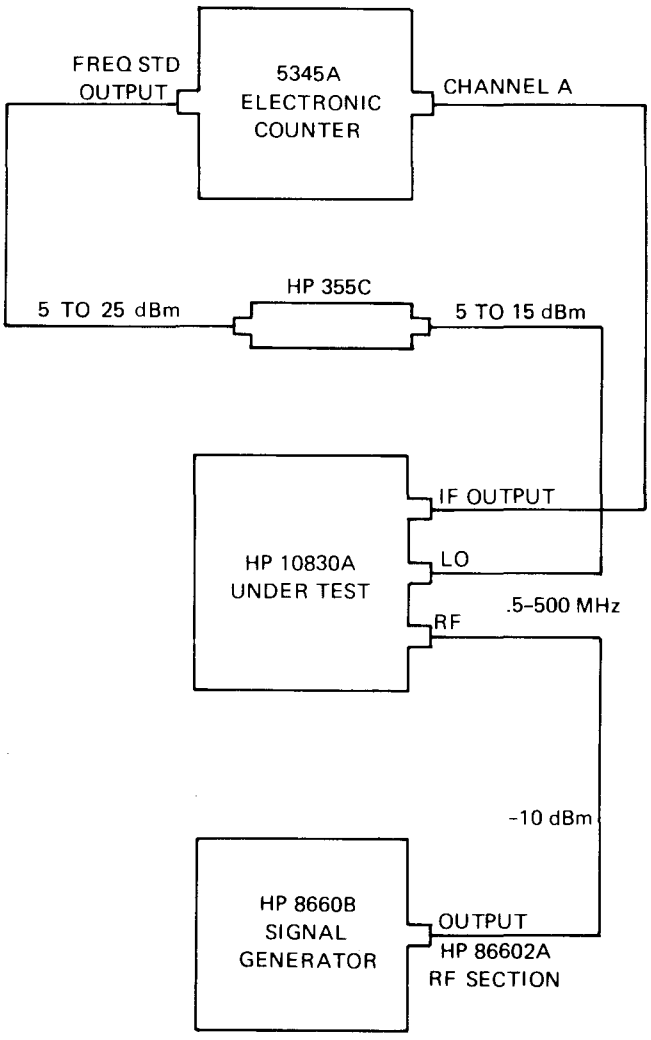


Figure 4-1. RF Band Test Setup

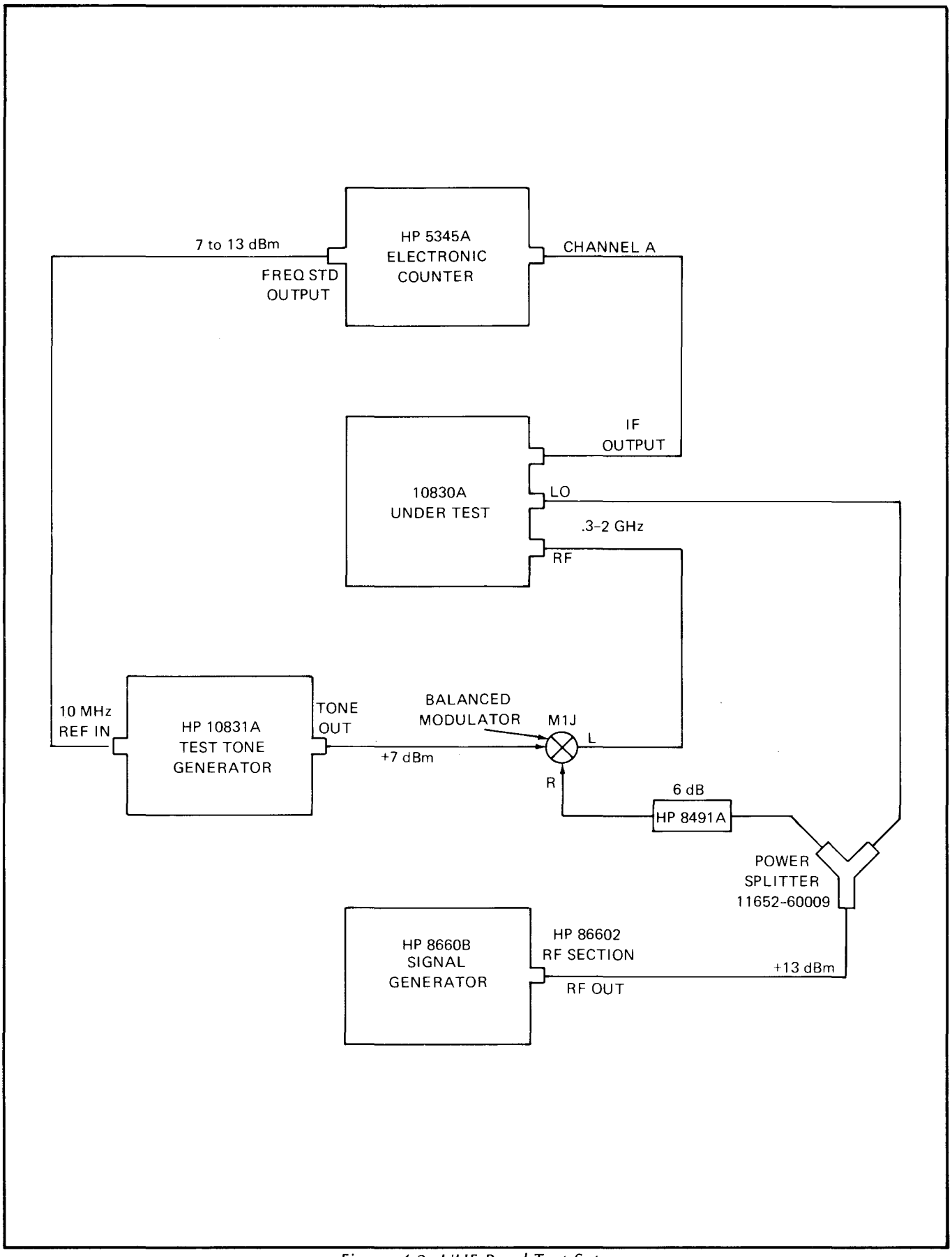


Figure 4-2. UHF Band Test Setup

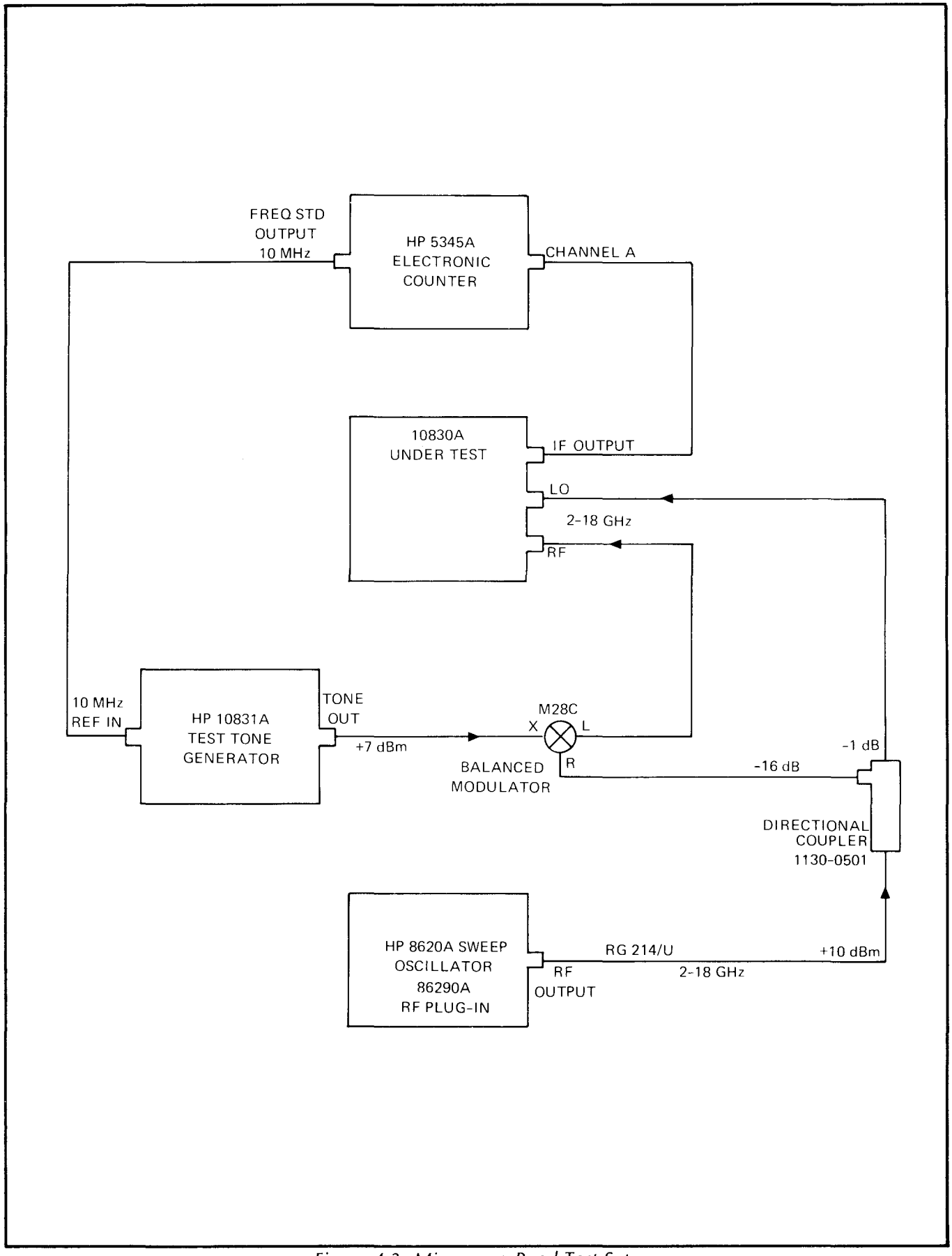


Figure 4-3. Microwave Band Test Setup

Table 4-2. Performance Test Record

Hewlett-Packard Co. Tested by _____

Model 10830A Date _____

Para. or Table No.	Test	Results
Table 4-1	In-Cabinet Performance	Indicators
Steps 4, 5, 6 and 7		go on and off as listed?
Step 6	In-Cabinet Performance	Scope indicates no output?
Step 7		Scope indicates 10 kHz @ 250 mV p-p at at IF OUTPUT?
Step 8		10 kHz @ 150–200 mV p-p at AUX IF OUTPUT?
Para. 4-10		
Step c	Gain and Bandwidth	A1R23 adjusted for 50 (±10) mV at TP1?
Step f	Gain and Bandwidth	150 (±30) mV rms at TP1?
Step g and h		Cutoff at each bandwidth setting?
Step j	Gain and Bandwidth	Zero-crossing slope >0.1 V/μS ≈ 1.5 V p-p at TP4?
Step k	Gain and Bandwidth	Zero-crossing slope >1 V/0.2 μS ≈ 4 V p-p at TP2?
Step l	Gain and Bandwidth	Squarewave ≈ 250 mV p-p rise time <50 ns at IF OUTPUT?
Step m	Gain and Bandwidth	Rise time <30 ns?
4-12		
Step f	RF Band	Center frequency of 10.00000 kHz, jitter ≤ ±0.00002 kHz?
Step g		Same display at –20 to 0 dBm?
4-14		
Step f	UHF Band	Same display as RF band?
Step g		Same display at 300 MHz to 2 GHz?
4-16		
Step g	Microwave Band	Same display as RF band?
Step h		Same display at 2 to 18 GHz?

SECTION V
ADJUSTMENTS

5-1. INTRODUCTION

5-2. The only circuit adjustment in the 10830A is variable resistor AIR23. This adjustment is performed as part of the amplifier Gain and Bandwidth Test in Section IV.

SECTION VI
REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering replacement parts. *Table 6-1* lists parts in alphanumerical order of their reference designators and indicates the description and HP Part Number of each part, together with any applicable notes. The table includes the following information.

a. Description of part (see abbreviations below).

b. Typical manufacturer of the part in a five-digit code; see list of manufacturers in *Table 6-2.*

c. Manufacturer's part number.

d. Total quantity used in the instrument (Qty column).

REFERENCE DESIGNATIONS

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

ABBREVIATIONS

A	= ampere
ac	= alternating current
ACCESS	= accessory
ADJ	= adjustment
A/D	= analog-to-digital
AF	= audio frequency
AFC	= automatic frequency control
AGC	= automatic gain control
AL	= aluminum
ALC	= automatic level control
AM	= amplitude modulation
AMPL	= amplifier
APC	= automatic phase control
ASSY	= assembly
AUX	= auxiliary
avg	= average
AWG	= american wire gauge
BAL	= balance
BCD	= binary coded decimal
BD	= board
BE CU	= beryllium copper
BFO	= beat frequency oscillator
BH	= binder head
BKDN	= breakdown
BP	= bandpass
BPF	= bandpass filter
BRS	= brass
BWO	= backward-wave oscillator
CAL	= calibrate
ccw	= counterclockwise
CER	= ceramic
CHAN	= channel
cm	= centimeter
CMO	= coaxial
COEF	= coefficient
COM	= common
COMP	= composition
COMPL	= complete
CONN	= connector
CP	= cadmium plate
CRT	= cathode-ray tube
CTL	= complementary transistor logic
CW	= continuous wave
cw	= clockwise
D/A	= digital-to-analog
dB	= decibel
dBm	= decibel referred to 1 mW
dc	= direct current
deg	= degree (temperature interval or difference)
...°	= degree (plane angle)
°C	= degree Celsius (centrigrade)
°F	= degree Fahrenheit
°K	= degree Kelvin
DEPC	= deposited carbon
DET	= detector
diam	= diameter
DIA	= diameter (used in parts list)
DIFF AMPL	= differential amplifier
div	= division
DPDT	= double-pole, double-throw
DR	= drive
DSB	= double sideband
DTL	= diode transistor logic
DVM	= digital voltmeter
ECL	= emitter coupled logic
EMF	= electromotive force
EDP	= electronic data processing
ELECT	= electrolytic

ABBREVIATIONS (CONTINUED)

ENCAP	= encapsulated
EXT	= external
F	= farad
FET	= field-effect transistor
F/F	= flip-flop
FH	= flat head
FOL H	= fillister head
FM	= frequency modulation
FP	= front panel
FREQ	= frequency
FXD	= fixed
g	= gram
GE	= germanium
GHz	= gigahertz
GL	= glass
GND	= ground(ed)
H	= henry
h	= hour
HET	= heterodyne
HEX	= hexagonal
HD	= head
HDW	= hardware
HF	= high frequency
HG	= mercury
HI	= high
HP	= Hewlett-Packard
HPF	= high pass filter
HR	= hour (used in parts list)
HV	= high voltage
Hz	= Hertz
IC	= integrated circuit
ID	= inside diameter
IF	= intermediate frequency
IMPG	= impregnated
in	= inch
INCD	= incandescent
INCL	= include(s)
INP	= input
INS	= insulation
INT	= internal
kg	= kilogram
kHz	= kilohertz
kΩ	= kilohm
kV	= kilovolt
lb	= pound
LC	= inductance-capacitance
LED	= light-emitting diode
LF	= low frequency
LG	= long
LH	= left hand
LIM	= limit
LIN	= linear taper (used in parts list)
lin	= linear
LK WASH	= lockwasher
LO	= low; local oscillator
LOG	= logarithmic taper (used in parts list)
log	= logarithm(ic)
LPF	= low pass filter
LV	= low voltage
m	= meter (distance)
mA	= milliampere
MAX	= maximum
MΩ	= megohm
MEG	= meg (10^6) (used in parts list)
MET FLM	= metal film
MET OX	= metal oxide
MF	= medium frequency; microfared (used in parts list)
MFR	= manufacturer
mg	= milligram
MHz	= megahertz
mH	= millihenry
mho	= mho
MIN	= minimum
min	= minute (time)
′	= minute (plane angle)
MINAT	= miniature
mm	= millimeter
MOD	= modulator
MOM	= momentary
MOS	= metal-oxide semi-conductor
ms	= millisecond
MTG	= mounting
MTR	= meter (indicating device)
mV	= millivolt
mVac	= millivolt, ac
mVdc	= millivolt, dc
mVpk	= millivolt, peak
mVp-p	= millivolt, peak-to-peak
mVrms	= millivolt, rms
mW	= milliwatt
MUX	= multiplex
MY	= mylar
μA	= microampere
μF	= microfarad
μH	= microhenry
μmho	= micromho
μs	= microsecond
μV	= microvolt
μVac	= microvolt, ac
μVdc	= microvolt, dc
μVpk	= microvolt, peak
μVp-p	= microvolt, peak-to-peak
μVrms	= microvolt, rms
μW	= microwatt
nA	= nanoampere
NC	= no connection
N/C	= normally closed
NE	= neon
NEG	= negative
nF	= nanofarad
NI PL	= nickel plate
N/O	= normally open
NOM	= nominal
NORM	= normal
NPN	= negative-positive-negative
NPO	= negative-positive zero (zero temperature coefficient)
NRFR	= not recommended for field replacement
NSR	= not separately replaceable
ns	= nanosecond
nW	= nanowatt
OBD	= order by description
OD	= outside diameter
OH	= oval head
OP AMPL	= operational amplifier
OPT	= option
OSC	= oscillator
OX	= oxide
oz	= ounce
Ω	= ohm
P	= peak (used in parts list)
PAM	= pulse-amplitude modulation
PC	= printed circuit
PCM	= pulse-code moudulation; pulse-count modulation
PDM	= pulse-duration modulation
pF	= picofarad
PH BRZ	= phosphor bronze
PHL	= Phillips
PIN	= positive-instrinsic-negative
PIV	= peak inverse voltage
pk	= peak
PL	= phase lock
PLO	= phase lock oscillator
PM	= phase modulation
PNP	= positive-negative-positive
P/O	= part of
POLY	= polystyrene
PORC	= porcelain
POS	= positive; position(s) (used in parts list)
POSN	= position
POT	= potentiometer
p-p	= peak-to-peak
PP	= peak-to-peak (used in parts list)
PPM	= pulse-position modulation
PREAMPL	= preamplifier
PRF	= pulse-repetition frequency
PRR	= pulse repetition rate
ps	= picosecond
PT	= point
PTM	= pulse-time modulation
PWM	= pulse-width modulation
PWV	= peak working voltage
RC	= resistance capacitance
RECT	= rectifier
REF	= reference
REG	= regulated
REPL	= replaceable
RF	= radio frequency
RFI	= radio frequency interference
RH	= round head; right hand
RLC	= resistance-inductance-capacitance
RMO	= rack mount only
rms	= root-mean-square
RND	= round
ROM	= read-only memory
R&P	= rack and panel
RWV	= reverse working voltage
S	= scattering parameter
s	= second (time)
″	= second (plane angle)
S B	= slow blow (fuse (used in parts list)
SCR	= silicon controlled rectifier screw
SE	= selenium
SECT	= sections
SEMICON	= semiconductor
SHF	= superhigh frequency
SI	= silicon
SIL	= silver
SL	= slide
SNR	= signal-to-noise ratio
SPDT	= single-pole, double-throw
SPG	= spring
SR	= split ring
SPST	= single-pole, single-throw
SSB	= single sideband
SST	= stainless steel
STL	= steel
SQ	= square
SWR	= standing-wave ratio
SYNC	= synchronize
T	= timed (slow-blow fuse)
TA	= tantalum
TC	= temperature compensating
TD	= time delay
TERM	= terminal
TFT	= thin-film transistor
TGL	= toggle
THD	= thread
THRU	= through
TI	= titanium
TOL	= tolerance
TRIM	= trimmer
TSTR	= transistor
TTL	= transistor-transistor logic
TV	= television
TVI	= television interference
TWT	= traveling wave tube
U	= micro (10^{-6}) (used in parts list)
UF	= microfarad (used in parts list)
UHF	= ultrahigh frequency
UNREG	= unregulated
V	= volt
VA	= voltampere
Vac	= volts ac
VAR	= variable
VCO	= voltage-controlled oscillator
Vdc	= volts dc
VDCW	= volts dc, working (used in parts list)
V(F)	= volts, filtered
VFO	= variable-frequency oscillator
VHF	= very-high frequency
Vpk	= volts peak
Vp-p	= Volts peak-to-peak
Vrms	= volts rms
VSWR	= voltage standing wave ratio
VTO	= voltage-tuned oscillator
VTVM	= vacuum-tube voltmeter
V(X)	= volts, switched
W	= watt
W/	= with
WIV	= working inverse voltage
WW	= wirewound
W/O	= without
YIG	= yttrium-iron-garnet
Zo	= characteristic impedance

NOTE

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

MULTIPLIERS

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

6-3. ORDERING INFORMATION

6-4. To obtain replacement parts, address order of inquiry to your local Hewlett-Packard Sales and Service Office (see lists at rear of this manual for addresses). Identify parts by their Hewlett-Packard part numbers.

a. Instrument model number.

b. Instrument serial number.

c. Description of the part.

d. Function and location of the part.

6-5. HP PART NUMBER ORGANIZATION

6-6. Following is a general description of the HP part number system.

6-7. COMPONENT PARTS AND MATERIALS

6-8. Generally, the prefix of HP part numbers identifies the type of device. Eight digit part numbers are used, where the four digit prefix identifies the type of component, part, or material and the four digit suffix indicates the specific type. Following is a list of some of the more commonly used prefixes for component parts. The list includes HP manufactured parts and purchased parts.

Prefix	Component/Part/Material
0121-	Capacitors, Variable (mechanical)
0122-	Capacitors, Voltage Variable (semiconductor)
0140-	Capacitors, Fixed }
0150-	Capacitors, Fixed } Non-Electrolytic
0160-	Capacitors, Fixed }
0180-	Capacitors, Fixed Electrolytic
0330-	Insulating Materials
0340-	Insulators, Formed
0370-	Knobs, Control
0380-	Spacers and Standoffs
0410-	Crystals
0470-	Adhesives
0490-	Relays
0510-	Fasteners
0674- thru 0778-	Resistors, Fixed (non wire wound)
0811- thru 0831-	Resistors (wire wound)
1200-	Sockets for components
1205-	Heat Sinks
1250-	Connectors (RF and related parts)
1251-	Connectors (non RF and related parts)
1410-	Bearings and Bushings
1420-	Batteries
1820-	Monolithic Digital Integrated Circuits
1826-	Monolithic Linear Integrated Circuits
1850-	Transistors, Germanium PNP
1851-	Transistors, Germanium NPN
1853-	Transistors, Silicon PNP
1854-	Transistors, Silicon NPN

Prefix	Component/Part/Material
1855-	Field-Effect-Transistors
1900- thru 1912-	Diodes
1920- thru 1952-	Vacuum Tubes
1990-	Semiconductor Photosensitive and Light-Emitting Diodes
3100- thru 3106-	Switches
8120-	Cables
9100-	Transformers, Coils, Chokes, Inductors, and Filters

6-9. For example, 1854-0037, 1854-0221, and 1851-0192 are all NPN transistors. The first two are silicon and the last is germanium.

6-10. GENERAL USAGE PARTS

6-11. The following list gives the prefixes for HP manufactured parts used in several instruments, e.g., side frames, feet, top and bottom covers, etc. These are eight-digit part numbers with the four-digit prefix identifying the type of parts as shown below:

Type of Part	Prefix
Sheet Metal	5000- to 5019-
Machined	5020- to 5039-
Molded	5040- to 5059-
Assemblies	5060- to 5079-
Components	5080- to 5099-

6-12. SPECIFIC INSTRUMENT PARTS

6-13. These are HP manufactured parts for use in individual instruments or series of instruments. For these parts, the prefix indicates the instrument and the suffix indicates the type of part. For example, 10830-60001 is an assembly used in the 10830A. Following is a list of suffixes commonly used.

Type of Part	P/N Suffix
Sheet Metal	-00000 to -00499
Machined	-20000 to -20499
Molded	-40000 to -40499
Assembly	-60000 to -60499
Component	-80000 to -80299
Documentation	-90000 to -90249

Table 6-1. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	10830-60001	1	MAIN ASSEMBLY	28480	10830-60001
A1C1	0180-0230	6	CAPACITOR-FXD 1UF+-20% 50VDC TA	56289	150D105X0050A2
A1C2	0180-0098	2	CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	150D107X0020S2
A1C3	0160-3877	2	CAPACITOR-FXD 100PF +-20% 200WVDC CER	28480	0160-3877
A1C4	0180-1746	5	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C5	0180-0230		CAPACITOR-FXD 1UF+-20% 50VDC TA	56289	150D105X0050A2
A1C6	0160-3879	13	CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C7	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C8	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C9	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C10	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C11	0180-0197	2	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A1C12	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C13	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C14	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A1C15	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C16	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C17	0180-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	150D107X0020S2
A1C18	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C19	0160-3874	2	CAPACITOR-FXD 10 PF +-.5 200WVDC CER	28480	0160-3874
A1C20	0160-3874		CAPACITOR-FXD 10 PF +-.5 200WVDC CER	28480	0160-3874
A1C21	0160-2307	1	CAPACITOR-FXD 47PF +-5% 300WVDC MICA	28480	0160-2307
A1C22	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C23	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C24	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C25	0170-0094	6	CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0170-0094
A1C26	0180-0230		CAPACITOR-FXD 1UF+-20% 50VDC TA	56289	150D105X0050A2
A1C27	0170-0094		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0170-0094
A1C28	0180-0230		CAPACITOR-FXD 1UF+-20% 50VDC TA	56289	150D105X0050A2
A1C29	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C30	0180-0230		CAPACITOR-FXD 1UF+-20% 50VDC TA	56289	150D105X0050A2
A1C31	0180-2382	2	CAPACITOR-FXD 1500UF+75-10% 30VDC AL	28480	0180-2382
A1C32	0170-0094		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0170-0094
A1C33	0180-0230		CAPACITOR-FXD 1UF+-20% 50VDC TA	56289	150D105X0050A2
A1C34	0170-0094		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0170-0094
A1C35	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C36	0180-2382		CAPACITOR-FXD 1500UF+75-10% 30VDC AL	28480	0180-2382
A1C37	0170-0094		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0170-0094
A1C38	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A1C39	0170-0094		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0170-0094
A1CR1	1901-0040	15	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR2	1902-0049	1	DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	28480	1902-0049
A1CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR7	1901-0535	1	DIODE-SCHOTTKY	28480	1901-0535
A1CR9	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR10	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR12	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR13	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR14	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR15	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR16	1906-0028	1	DIODE-FW BRDG 100V 1.8A	04713	MDA922-3
A1CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR18	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR19	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1K1	0490-0508	3	RELAY 2C 12VDC-COIL .5A 28VDC	28480	0490-0508
A1K2	0490-0508		RELAY 2C 12VDC-COIL .5A 28VDC	28480	0490-0508
A1K3	0490-0508		RELAY 2C 12VDC-COIL .5A 28VDC	28480	0490-0508
A1L1	9100-1788	6	COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/4B
A1L2	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/4B
A1L3	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/4B
A1L4	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/4B
A1L5	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/4B
A1L6	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/4B
A1L7	9140-0238	3	COIL-MLD 82UH 5% Q=50 .155DX.375LG	24226	15/822
A1L8	9140-0238		COIL-MLD 82UH 5% Q=50 .155DX.375LG	24226	15/822
A1L9	9140-0238		COIL-MLD 82UH 5% Q=50 .155DX.375LG	24226	15/822
A1Q1	1854-0583	4	TRANSISTOR NPN SI TO-92 PD=310MW	04713	MPS-A18
A1Q2	1854-0210	3	TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	04713	2N2222
A1Q3	1854-0221	2	TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A1Q4	1854-0583		TRANSISTOR NPN SI TO-92 PD=310MW	04713	MPS-A18
A1Q5	1853-0316	2	TRANSISTOR-DUAL PNPPD=500MW	28480	1853-0316

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1Q6	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	04713	2N2222
A1Q7	1854-0583		TRANSISTOR NPN SI TO-92 PD=310MW	04713	MPS-A18
A1Q8	1853-0316		TRANSISTOR-DUAL PNPPD=500MW	28480	1853-0316
A1Q9	1854-0221		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A1Q10	1854-0583		TRANSISTOR NPN SI TO-92 PD=310MW	04713	MPS-A18
A1Q11	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	04713	2N2222
A1R1	0757-0900	9	RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R2	0757-0958	2	RESISTOR 27K 2% .125W F TC=0+-100	24546	C4-1/8-T0-2702-G
A1R3	0757-0909	4	RESISTOR 240 2% .125W F TC=0+-100	24546	C4-1/8-T0-241-G
A1R4	0757-0933	3	RESISTOR 2.4K 2% .125W F TC=0+-100	24546	C4-1/8-T0-2401-G
A1R5	0757-0941	5	RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-TO-5101-G
A1R6	0757-0972	6	RESISTOR 100K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A1R7	0757-0936	2	RESISTOR 3.3K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3301-G
A1R8	0757-0958		RESISTOR 27K 2% .125W F TC=0+-100	24546	C4-1/8-T0-2702-G
A1R9	0757-0947	3	RESISTOR 9.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-9101-G
A1R10	0757-0947		RESISTOR 9.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-9101-G
A1R11	0757-0909		RESISTOR 240 2% .125W F TC=0+-100	24546	C4-1/8-T0-241-G
A1R12	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A1R13	0757-0909		RESISTOR 240 2% .125W F TC=0+-100	24546	C4-1/8-T0-241-G
A1R14	0757-0959	4	RESISTOR 30K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3002-G
A1R15	0757-0947		RESISTOR 9.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-9101-G
A1R16	0757-0959		RESISTOR 30K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3002-G
A1R17	0757-0924	3	RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A1R18	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-5101-G
A1R19	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R20	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	24546	C4-1/8-T0-2401-G
A1R21	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A1R22	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A1R23	2100-2060	1	RESISTOR-TRMR 50 20% C TOP-ADJ 1-TRN	73138	62-202-1
A1R24	0757-0959		RESISTOR 30K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3002-G
A1R25	0757-0936		RESISTOR 3.3K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3301-G
A1R26	0757-0959		RESISTOR 30K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3002-G
A1R27	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R28	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A1R29	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A1R30	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R31	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R32	0757-0962	1	RESISTOR 39K 2% .125W F TC=0+-100	24546	C4-1/8-T0-3902-G
A1R33	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A1R34	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	24546	C4-1/8-T0-2401-G
A1R35	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R36	0757-0893	6	RESISTOR 51 2% .125W F TC=0+-100	24546	C4-1/8-T0-51R0-G
A1R37	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-5101-G
A1R38	0757-0920	1	RESISTOR 680 2% .125W F TC=0+-100	24546	C4-1/8-T0-681-G
A1R39	0757-0893		RESISTOR 51 2% .125W F TC=0+-100	24546	C4-1/8-T0-51R0-G
A1R40	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R41	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A1R42	0757-0893		RESISTOR 51 2% .125W F TC=0+-100	24546	C4-1/8-T0-51R0-G
A1R43	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-5101-G
A1R44	0757-0893		RESISTOR 51 2% .125W F TC=0+-100	24546	C4-1/8-T0-51R0-G
A1R45	0757-0893		RESISTOR 51 2% .125W F TC=0+-100	24546	C4-1/8-TO-51R0-G
A1R46	0757-0893		RESISTOR 51 2% .125W F TC=0+-100	24546	C4-1/8-TO-51R0-G
A1R47	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-TO-101-G
A1R48	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-TO-1001-G
A1R49	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-TO-5101-G
A1TP1	0360-0124	6	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
A1TP2	0360-0124		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
A1TP3	0360-0124		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
A1TP4	0360-0124		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
A1TP5	0360-0124		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
A1TP6	0360-0124		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
A1U1	0955-0076	1	MIXER, DOUBLE BALANCE .5 TO 500 MHz	28480	0955-0076
A1U2	1826-0207	1	IC LM 318 OP AMP	27014	LM318N
A1U3	1826-0214	1	IC 7915C V RGLTR	04713	MC7915CP
A1U4	1826-0106	1	IC 7815C V RGLTR	07263	7815UC
A1U5	0960-0455	1	MIXER, .3-2 GHz	28480	0960-0455
A1U6	0960-0454	1	MIXER, 2-18 GHZ	28480	0960-0454
A1U7	9135-0041	1	FILTER, LO-PASS	0061K	3L50-0.1-P
	0380-0305	2	STANDOFF-RVT-ON .125LG 6-32THD .2500 BRS	71279	1246-9
A2	10830-60002	1	SWITCH/DISPLAY ASSEMBLY	28480	10830-60002
A2C1	0160-3815	1	CAPACITOR-FXD .15UF +-2% 50WVDC MET	28480	0160-3815
A2C2	0160-3706	1	CAPACITOR-FXD .039UF +-5% 50WVDC MET	28480	0160-3706
A2C3	0160-0207	1	CAPACITOR-FXD .01UF +-5% 200WVDC POLYE	56289	292P10352
A2C4	0160-0147	1	CAPACITOR-FXD 2500PF +-2% 300WVDC MICA	28480	0160-0147
A2C5	0140-0208	1	CAPACITOR-FXD 680PF +-5% 300WVDC MICA	72136	DM15F681J0300WV1CR

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2C6	0140-0197	1	CAPACITOR-FXD 180PF +-5% 300WVDC MICA	72136	DM15F181J0300WV1CR
A2C7	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A2DS1	1990-0487	4	LED-VISIBLE LUM-INT=1MCD IF=20MA-MAX	28480	1990-0487
A2DS2	1990-0487		LED-VISIBLE LUM-INT=1MCD IF=20MA-MAX	28480	1990-0487
A2DS3	1990-0487		LED-VISIBLE LUM-INT=1MCD IF=20MA-MAX	28480	1990-0487
A2DS4	1990-0487		LED-VISIBLE LUM-INT=1MCD IF=20MA-MAX	28480	1990-0487
A2R1	0683-6815	2	RESISTOR 680 5% .25W FC TC=-400/+600	01121	CB6815
A2R2	0683-6815		RESISTOR 680 5% .25W FC TC=-400/+600	01121	CB6815
A2S1	3101-1601	1	SWITCH-SL DP3T-NS MINTR .5A 125VAC/DC PC	28480	3101-1601
			A2 MISCELLANEOUS		
	5020-3440	1	SPRING:DETENT	28480	5020-3440
	05000-20017	4	SPACER, LED SINGLE	28480	05000-20017
	05340-20013	1	GUIDE, SWITCH	28480	05340-20013
	05340-20017	1	GUIDE, SWITCH	28480	05340-20017
	05340-60045	1	SLIDE ASSEMBLY	28480	05340-60045
A3	0960-0443	1	POWER MODULE, FILTERED	28480	0960-0443
			CHASSIS PARTS		
DS1	1990-0534	1	LED-VISIBLE LUM-INT=2.2MCD IF=20MA-MAX	28480	1990-0534
F1	2110-0311	1	FUSE .062A 250V SLO-BLO 1.25X.25 UL IEC	75915	313.062S
	2110-0337	1	FUSE .032A 250V SLO-BLO 1.25X.25 UL IEC	75915	313.031S
J8	1250-0118	2	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	24931	28JR128-1
J10	1250-0118		CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	24931	28JR128-1
SW1	3101-0163	1	SWITCH-TGL SUBMIN SPDT NS 5A 115VAC	09353	Z-11
T1	9100-3058	1	TRANSFORMER	28480	9100-3058
			CABLE ASSEMBLIES		
W1	10830-60103	4	CABLE ASSEMBLY, BNC/PC	28480	10830-60103
W2	10830-60103		CABLE ASSEMBLY, BNC/PC	28480	10830-60103
W3	10830-60103		CABLE ASSEMBLY, BNC/PC	28480	10830-60103
W4	10830-60101	2	CABLE ASSEMBLY, BNC/SMA	28480	10830-60101
W5	10830-60101		CABLE ASSEMBLY, BNC/SMA	28480	10830-60101
W6	8120-2313	2	CABLE, SEMI-RIGID	28480	8120-2313
W7	8120-2313		CABLE, SEMI-RIGID	28480	8120-2313
W8	10830-60102	2	CABLE ASSEMBLY, SMA/DC	28480	10830-60102
W9	10830-60102		CABLE ASSEMBLY, SMA/DC	28480	10830-60102
W10	10830-60103	2	CABLE ASSEMBLY, BNC/PC	28480	10830-60103
W11			NOT ASSIGNED		
W12	10830-60106		CABLE, SHIELDED	28480	10830-60106
W13	10830-60107		CABLE ASSEMBLY, BNC/PC	28480	10830-60107
W14	10830-60107		CABLE ASSEMBLY, BNC/PC	28480	10830-60107
W15	10502-6001		CABLE ASSEMBLY, BNC/PC	28480	10502-6001
			MISCELLANEOUS PARTS		
	1400-0560	1	CLIP SET-LED MTG FOR PNL MTG HP LED	28480	1400-0561
MP1	5020-8813	1	FRAME, FRONT	28480	5020-8813
MP2	5020-8814	1	FRAME, REAR	28480	5020-8814
MP3	5020-8829	2	STRUT, SIDE	28480	5020-8829
MP4	5040-0345	4	INSULATOR, CONNECTOR	28480	5040-0345
MP5	5060-9817	1	COVER, TOP	28480	5060-9817
MP6	5060-9962	1	COVER, BOTTOM	28480	5060-9962
MP7	10830-00001	1	PANEL, FRONT	28480	10830-00001
MP8	10830-00002	1	PANEL, SUB	28480	10830-00002
MP9	10830-00003	1	PANEL, REAR	28480	10830-00003
	10830-60106	1	CABLE, SHIELDED,	28480	10830-60106
	8120-1378	1	CABLE ASSEMBLY 18 AWG 3-CNDCT (POWER CORD)	28480	8120-1378

Table 6-2. Manufacturers Code List

MFR NO	MANUFACTURER NAME ADDRESS ZIP CODE
0061K	K&L MICROWAVE, SALISBURY, MD 21801
01121	ALLEN-BRADLEY CO. MILWAUKEE, WI. 53212
02114	FERROXCUBE CORP. SAUGERTIES, NY 12477
04713	MOTOROLA SEMICONDUCTOR PRODUCTS PHOENIS AZ 85008
07263	FAIRCHILD SEMICONDUCTOR DIV. MOUNTAIN VIEW CA 94040
09353	C AND K COMPONENTS INC. WATERTOWN, MA 02172
24226	GOWANDA ELECTRONICS CORP. GOWANDA, NY 14070
24546	CORNING GLASS WORKS (BRADFORD), BRADFORD, PA 16701
24931	SPECIALTY CONNECTOR CO. INC. INDIANAPOLIS, IN 46227
27014	NATIONAL SEMICONDUCTOR CORP. SANTA CLARA, CA 95051
28480	HEWLETT-PACKARD CO CORPORATE HQ. PALO ALTO, CA 94304
71279	CAMBRIDGE THERMIONIC CORP. CAMBRIDGE, MA 02138
72136	ELECTRO MOTIVE CORP SUB IEC, WILLIMANTIC, CT 06226
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV. FULLERTON, CA 92634
75915	LITTELFUSE INC. DES PLAINES, IL 60016

SECTION VII

MANUAL CHANGES

7-1. INTRODUCTION

7-2. This section contains information necessary to adapt this manual to apply to older instruments.

7-3. MANUAL CHANGES

7-4. This manual applies directly to Model 10830A Mixer/IF Amplifiers with serial number prefix 1708A.

7-5. Newer Instruments

7-6. As engineering changes are made, newer instruments may have serial prefix numbers higher than those listed on the title page of this manual. The manuals for these instruments will be supplied with "manual changes" sheets containing the required information. Replace affected pages or modify existing manual information as directed in the "manual changes" pages. Contact the nearest Hewlett-Packard Sales and Service Office if the change information is missing.

7-7. Older instruments

7-8. To adapt this manual to instruments having serial prefixes below 1708A, refer to the following paragraphs.

CHANGE 1 (Instruments with Serial Prefix 1620A or 1640A)

Table 6-1, Replaceable Parts:

Change A1C19 from "0160-3874, Capacitor-Fxd 10 pF" to "0160-3875, Capacitor-Fxd 22 pF +-5% 200WVDC CER, 28480, 0160-3875."

Change A1C20 from "0160-3874, Capacitor-Fxd 10 pF" to "0160-3877, Capacitor-Fxd 100 pF +-20% 200WVDC CER, 28480, 0160-3877."

Change A1R5 from "0757-0941, 5, Resistor 5.1K" to "0757-0909, Resistor 240 2% .125W F TC=0+-100, 24546, C4-1/8-TO-241-G."

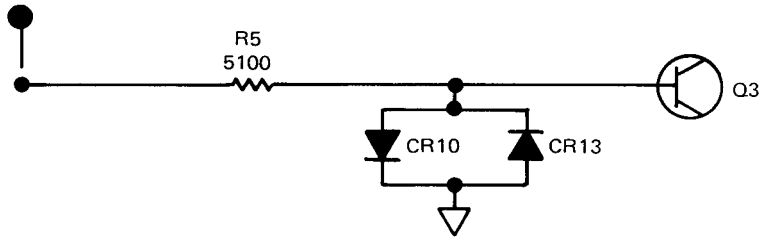
Delete A1R48 and A1R49.

Under "CHASSIS PARTS" change cable assembly numbers "W14 10830-60107" to read "W10 10830-60105" and change "W13 10830-60107" to read "W11 10830-60104." Delete cable "W10, 10830-60103 and delete the words "W11, NOT ASSIGNED." Delete cable "W15 10502-6001."

Figure 8-4, 10830A Schematic Diagram:

Changes as follows: Connect a line (at top of schematic) from the junction of resistors R48 and R49 to the collector of transistor Q6. Delete resistors R48 and R49 from the circuit. At the rear panel (on the schematic) delete cables W14 and W15 and change "W13" to "W11." Delete connector J11 on the rear panel and delete J9 on the board. Delete the line from J9 to resistor R5. Change connector "J8" on the board to "J7." Change rear panel label "EXT FILTER OUTPUT" to read "AUX IF OUTPUT" and delete "INPUT."

Delete diodes CR10 and CR13 as shown connected across resistor R32. Draw a line (at center of schematic) from test point TP1 to resistor R5, change the value of R5 from 240 to 5.1K ohms and add CR10 and CR11 from the junction of R5 and transistor Q3 to ground as shown below:



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SECTION VIII
SERVICE

8-1. INTRODUCTION

8-2. This section contains theory of operation and a schematic diagram with part locator. The part locator shows the location by reference designator.

8-3. SCHEMATIC DIAGRAM SYMBOLS AND REFERENCE DESIGNATORS

8-4. *Figure 8-1* shows the symbols used on the schematic diagram. At the bottom of *Figure 8-1,* the system for reference designators, assemblies, and subassemblies is shown.

8-5. REFERENCE DESIGNATIONS

8-6. Assemblies such as printed-circuit boards are assigned numbers in sequence, A1, A2, etc. As shown in *Figure 8-1,* subassemblies within an assembly are given a subordinate A number. For example, rectifier subassembly A1 has the complete designator of A25A1. For individual components, the complete designator is determined by adding the assembly number and subassembly number if any. For example, CR1 on the rectifier assembly is designated A25A1CR1.

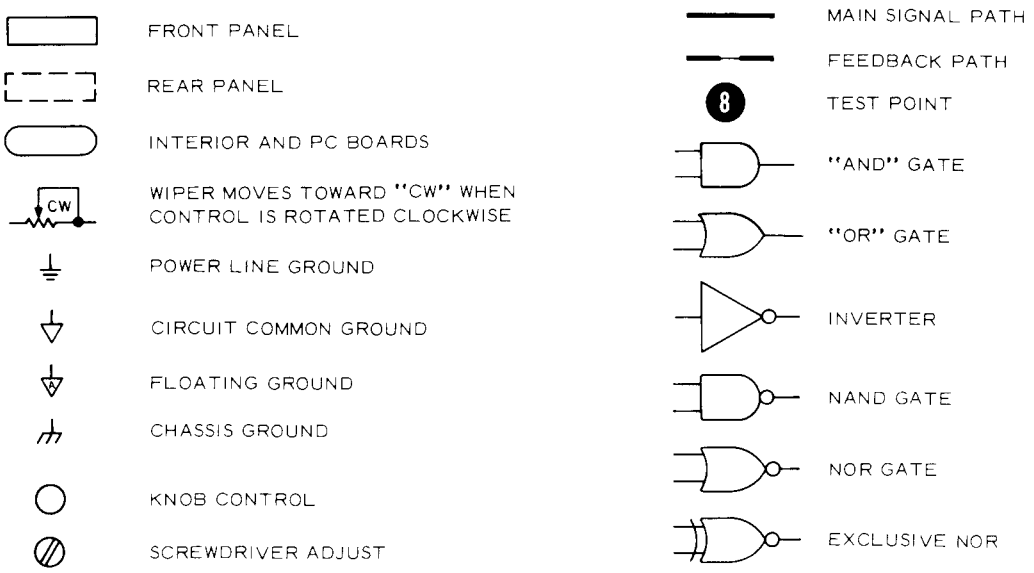
8-7. IDENTIFICATION MARKINGS ON PRINTED-CIRCUIT BOARDS

8-8. HP printed-circuit boards (see *Figure 8-1*) have four identification numbers: an assembly part number, a series number, a revision letter, and a production code.

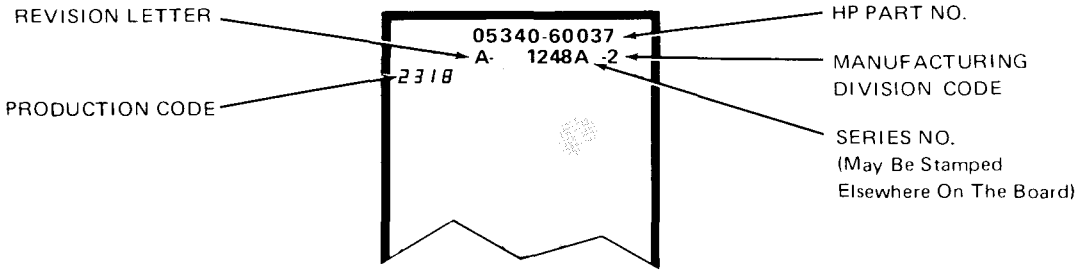
8-9. The assembly part number has 10 digits (such as 10830-60001) and is the primary identification. All assemblies with the same part number are interchangeable. When a production change is made on an assembly that makes it incompatible with previous assemblies, a change in part number is required. The series number (such as 1640) is used to document minor electrical changes. As changes are made, the series number is incremented. When replacement boards are ordered, you may receive a replacement with a different series number. If there is a difference between the series number marked on the board and the schematic in this manual, a minor electrical difference exists. If the number on the printed-circuit board is lower than that on the schematic, refer to Section VII for backdating information. If it is higher, refer to the loose leaf manual change sheets for this manual. If the manual change sheets are missing, contact your local Hewlett-Packard Sales and Service Office. See the listing on the back cover of this manual.

8-10. Revision letters (A, B, etc.) denote changes in printed-circuit layout. For example, if a capacitor type is changed (electrical value may remain the same) and requires different spacing for its leads, the printed-circuit board layout is changed and the revision letter is incremented to the next letter. When a revision letter changes, the series number is also usually changed. The production code is the four-digit seven-segment number used for production purposes.

SYMBOLS



PRINTED CIRCUIT BOARD IDENTIFICATION



REFERENCE DESIGNATIONS

REFERENCE DESIGNATIONS WITHIN ASSEMBLIES ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION. JACKS ARE THE STATIONARY CONNECTORS AND PLUGS ARE THE MORE MOVEABLE OF TWO CONNECTORS.

ASSEMBLY	ABBREVIATION	COMPLETE DESCRIPTION
A25	C1	A25C1
A25A1	CR1	A25A1CR1
NO PREFIX	J3	J3

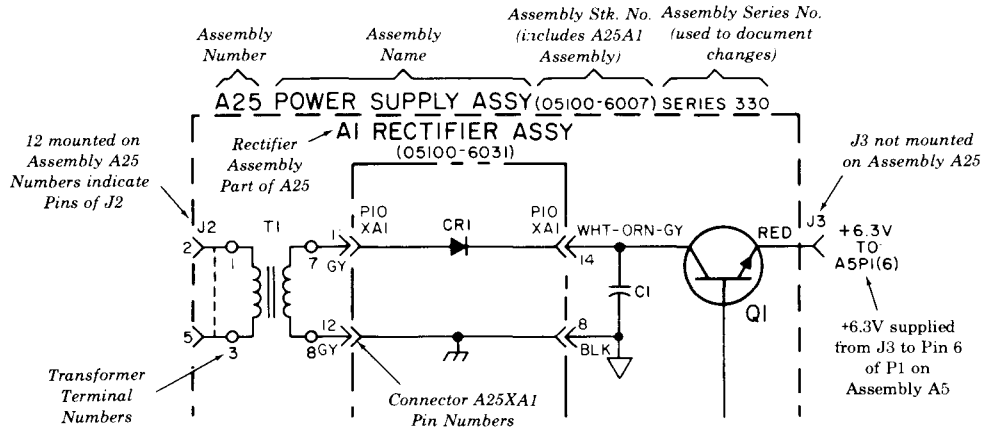


Figure 8-1. Schematic Diagrams Notes

8-11. THEORY OF OPERATION

8-12. The 10830A is a mixer/amplifier assembly that produces an IF output from two applied signal input frequencies within any one of three bands: RF, UHF or microwave. It also accepts an external IF input in which case the internal mixer circuits are by-passed and the amplifier section simply amplifies a signal applied to the rear panel EXT IF connector. In either case, the signal is output at the front panel IF OUTPUT connector as a square wave. The external mode allows use of an external device to supply a signal that can be conditioned by the high-gain, low-noise 10830A circuits to supply the IF output. The 10830A's main purpose in a system is to magnify the zero crossings of the mixer output signal (down converted signal) so that very fine resolution time measurement (frequency measurement) can be made by counters such as the 5345A.

8-13. Block Diagram

8-14. As shown in the block diagram, *Figure 8-2,* the external mode is selected by rear panel switch S1 (or by a ground closure to the REMOTE EXT INPUT connector) which controls VHF relay K3 to switch the external IF input to low-pass filter U7, a sharp 7-pole filter that cuts off at 100 KHz. The filter eliminates spurious mixer responses, etc. Relay K3 switches either the EXT IF INPUT or one of the three mixer outputs (U1, U5 or U6) to filter U7. Switch S1 (rear panel) in the INT position connects front panel INPUT switch A2S1 to energize relay K1 or K2 as selected by switch A2S1. This provides selection of one of the three mixer outputs which allows operation in one of three frequency bands, RF (0.5 to 500 MHz), UHF (0.3 to 2.0 GHz), or microwave (2.0 to 18.0 GHz). To repeat, selection of the desired band is accomplished by energizing relay K1 or K2 by the position of INPUT switch A2S1. In the INT (internal) mode, relay K3 is de-energized to pass the selected mixer output to filter U7.

8-15. Each of the doubled-balanced mixer circuits operates in the same manner within its own frequency band. The input frequencies to each mixer (through the front panel ports) should be within 100 kHz to develop an IF of 100 kHz or lower. The 100 kHz IF is selected as an upper limit to ensure a minimum amount of mixer generated noise in the IF amplifier.

8-16. Circuit Theory

8-17. As shown in the schematic diagram, *Figure 8-4,* the output of each mixer (U1, U5 or U6) feeds through a separate 3-pole low-pass filter designed to operate at 110 kHz in each case. These filters ensure good roll-off at frequencies of 100 kHz to 10 MHz. The higher frequencies are filtered to prevent feed-through to the IF OUT connector which would cause false triggering of counters such as the 5345A. Filter U7 is a precision, 7-pole, low-pass filter which provides additional filtering of the output of the mixer (up to 500 MHz to cover the input bandwidth of the counter).

8–18. Since each of the three mixers operates in the same manner, only the RF band will be described. One of the input ports is labeled LO (local oscillator) and is used for the external reference source. The other port is labeled RF and is used for the unit under test. It is conventional that the RF and LO port be powered by signals that are at least 10 dB apart for good mixer performance. The LO port is usually kept at least 10 dB above the RF signal. The input level to the LO port should be from +5 to +10 dBm and the input level to the RF port should be from -20 to -5 dB_{LO} (reference LO port). These levels ensure that the proper signal-to-noise ratio is maintained and that the system sensitivity remains at the proper level. Caution: If an input level exceeds +15 dBm/32 mW the mixer diodes can be stressed and damaged.

8-19. The output of mixer U1 is a spectrum IF output made up of any combination of the sum and difference of the input frequencies. This signal is filtered through a 3-pole filter (C25, L7, C27) which attenuates frequencies above 110 kHz. The signal is sent through relay K1 (energized)

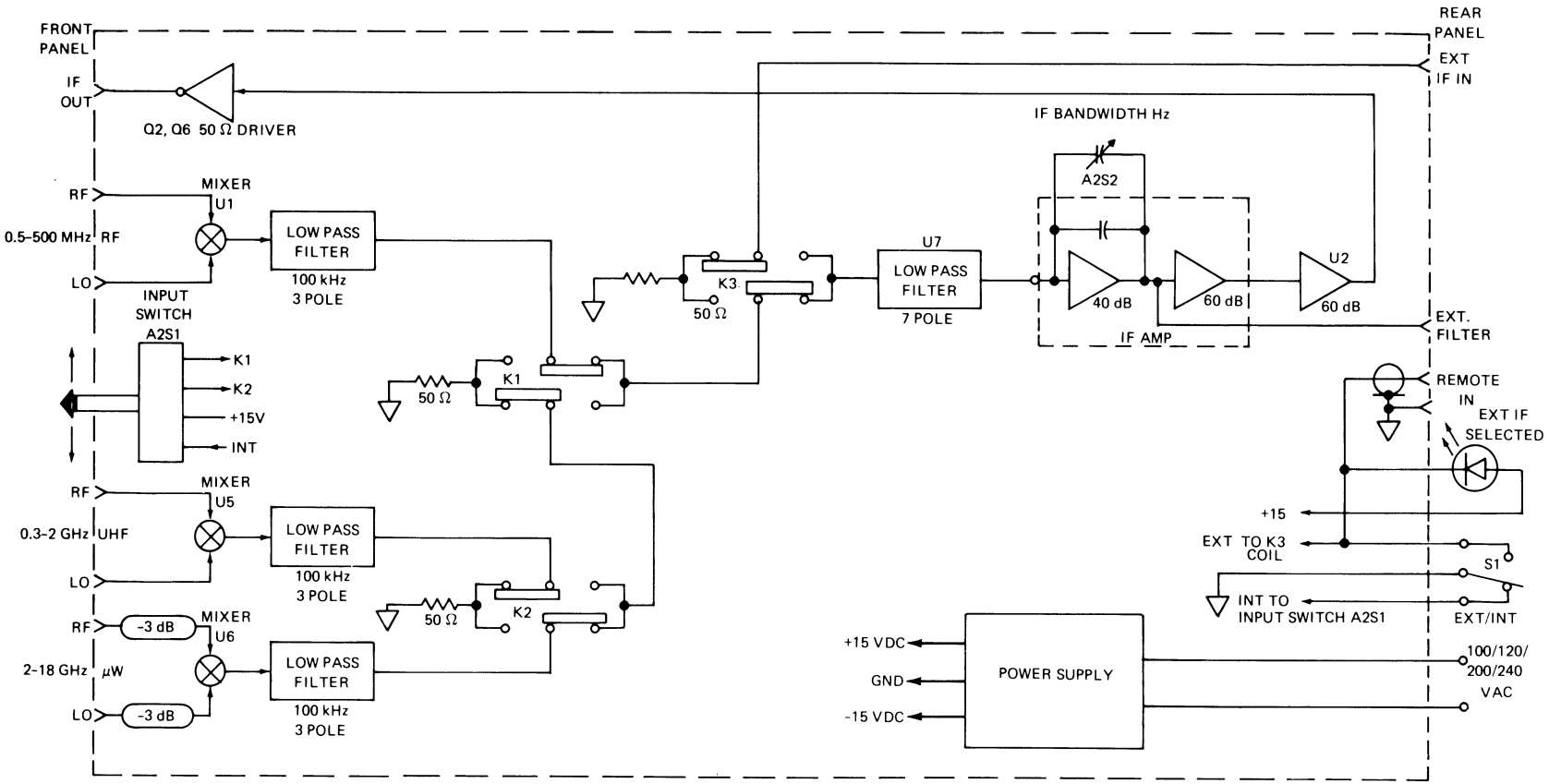


Figure 8-2. Block Diagram

and relay K3 (de-energized) to filter U7. The filter improves the low-frequency roll off as a very sharp filter (42 dB per octave roll off) of the mixer output.

8-20. Amplifier Circuits

8-21. Capacitor C24 provides high frequency roll-off at the input to the first amplifier stage. This stage is a dc operational amplifier made up of transistors Q5 and Q9. Since the first and second amplifier stages are identical, only the first stage will be described. The stage is made up of discrete components (transistors Q5, Q9) to form a low-noise dc operational amplifier. Transistor Q7 is an emitter-follower output buffer.

8-22. Transistor Q1 is a current source that controls the current to transistor Q9. The stage operates at 100 microamps (for noise and gain considerations) through each emitter of Q9 to require a total of 200 microamps from Q1. Variable resistor R23 is connected to Q9 to provide zero offset balancing of the amplifier. Zener diode CR2 sets the current supplied by current sources Q1 and Q4. Diode CR2 provides a regulated 6.2 volt drop at the base of Q1 and Q4. Resistor R23 is adjusted to balance the current through the two sides of Q9. Capacitors C1 and C5 reduce CR2's noise bandwidth.

8-23. The 100 microamp current through each side of Q9 causes a 10-volt drop across resistors R29 and R33. The signal from Q9 goes to transistor Q5 (a PNP version of Q9) which creates the level shifting required for balanced output of the stage. Zero volts in at TP3 should result in zero volts out at TP1. Transistor Q5 operates at 0.5 milliamps through each collector or 1 milliamp through resistor R10, the current source (controlled also by diode CR2 through transistor Q1). The first (Q5, Q9) stage is an inverting operational amplifier. The second (Q3, Q8) and third (U2) stages are not inverting amplifiers.

8-24. Capacitors C1-C6 on the A2 board are selected by IF BANDWIDTH switch A2S1 to control the bandwidth of the first stage.

8-25. The second stage is identical in operation to the first stage except for the higher gain. Diodes CR10 and CR13 act to clip overload signals at the input to transistor Q3, to insure that the input to the second stage is not overdriven. The third stage is a high-gain, high slew rate operational amplifier (non-inverting) integrated circuit U2. The input to the third stage is pin 3 to U2. The output has a slew rate greater than 10 volts/microsecond for any frequency between 10 Hz and 100 kHz and within the amplitude specified at TP2. Output driver Q2, Q6 is a 50-ohm line for the IF output connector. The output signal is approximately 250 millivolts, peak-to-peak (square wave). The output of transistor Q2 is supplied to J1 (IF OUTPUT).

8-26. Diodes CR17 and CR19 act to clip overload signals at the EXT IF INPUT, to ensure that the input to the first stage is not overdriven. Transistor Q11 acts as a logic switch, an OR circuit for controlling the INPUT selector switch A2S1 and relay K3. A remote ground closure may be applied at the rear panel REMOTE EXT INPUT connector J10 to energize relay K3 and force the 10830A into EXT IF INPUT operation. The same result is obtained by switching the rear panel EXT INT switch to EXT.

8-27. Power Supply

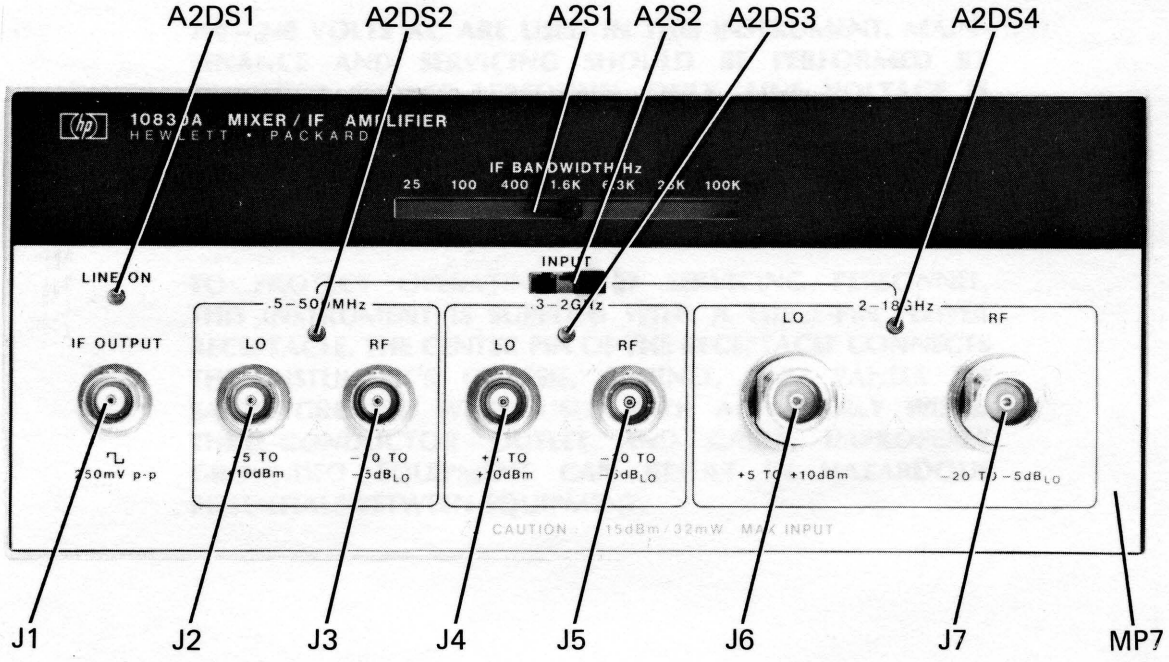
8-28. The power supply receives the input voltages through a power module. Transformer T1 and full-wave rectifier CR16 supply voltage to IC 15-volt regulators U3 and U4. Capacitor C26, C28, C30 and C33 are stabilizing capacitors for U4 and U3. The power supply output is additionally filtered by inductors L1, L3, L4, L5 and capacitors C4, C6 thru C9, C12, C21 and C23 to supply low-noise operating voltage to the amplifier circuits.

8-29. Indicators

8-30. Front panel indicator A2DS1 is energized by +15V from the power supply to indicate that power is applied. Indicators A2DS2, A2DS3 and A2DS4 indicate bandwidth selection by switch A2S1 for RF, UHF and microwave bands, respectively. Rear panel indicator DS1 indicates that the EXT IF INPUT is connected to the IF amplifier by energized relay K3.

8-31. TROUBLESHOOTING

8-32. Trouble isolation can best be accomplished by obtaining all possible information from the controls and indicators on the 10830A. This information should then be analyzed by conducting the In-Cabinet Performance Test, *Table 4-1,* to aid in determining symptoms of the trouble. If the trouble persists, perform the Amplifier Gain and Bandwidth Test and the RF, UHF and Microwave Band tests, in turn, and refer to the schematic diagram.



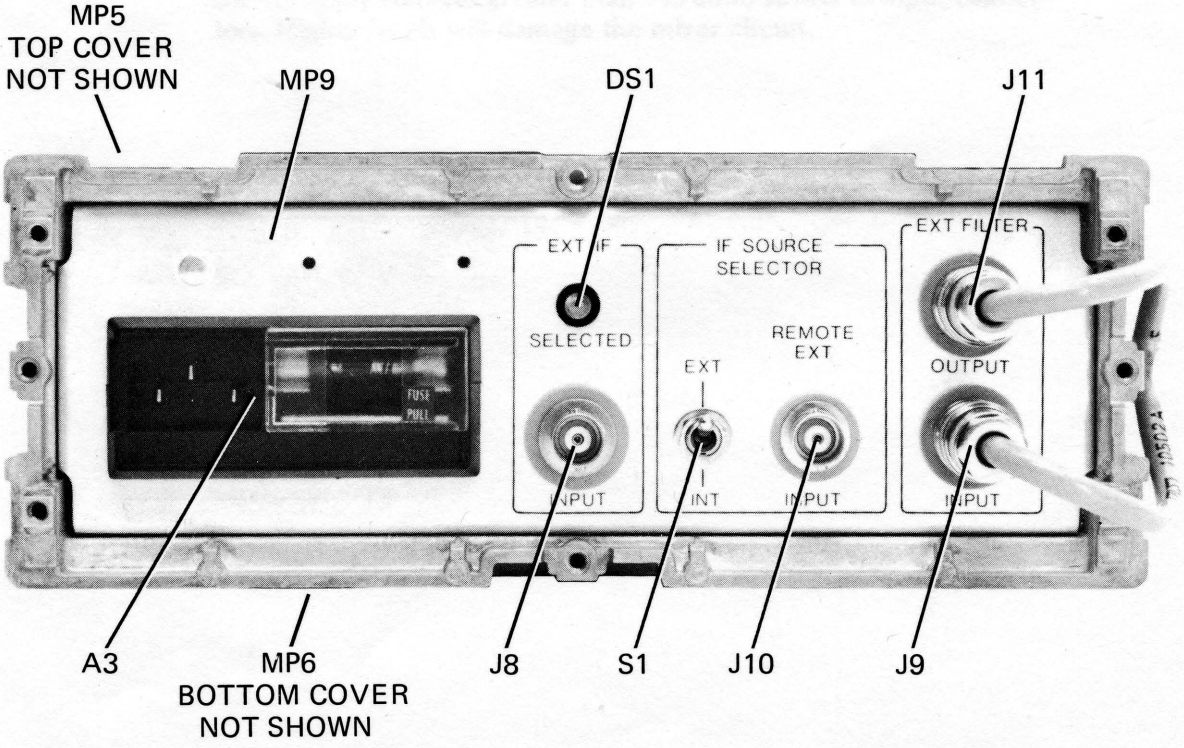
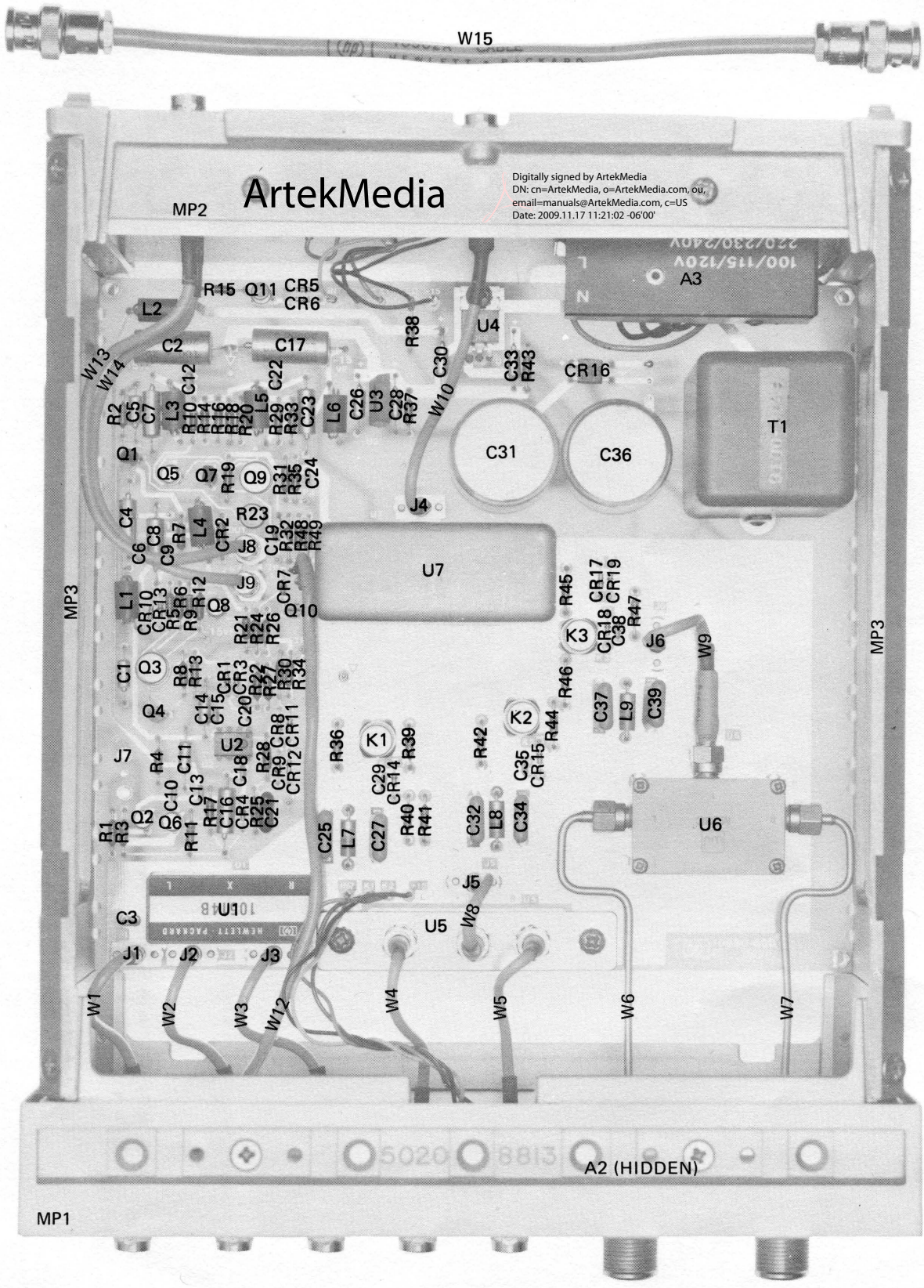


Figure 8-3. Front and Rear Panel Reference Designations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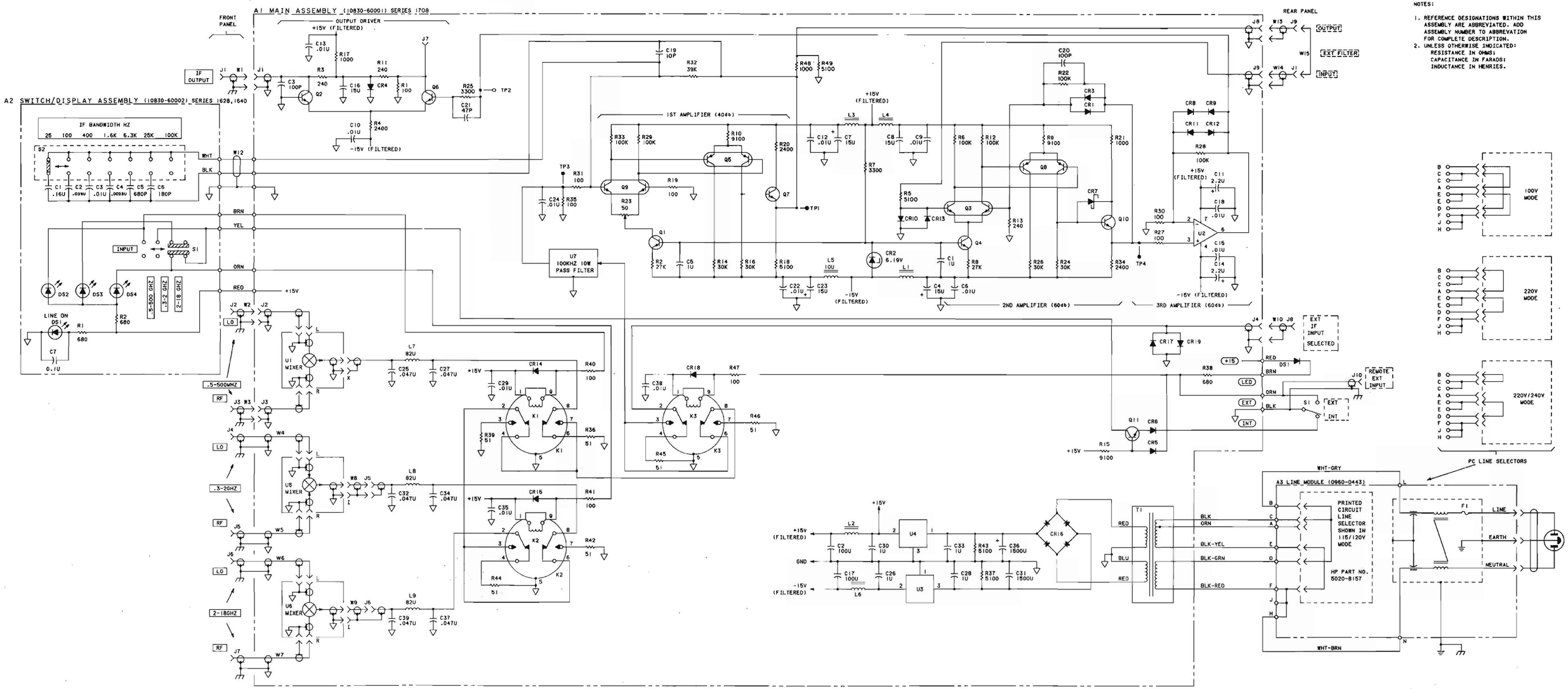

NOTES:

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS;
   CAPACITANCE IN FARADS;
   INDUCTANCE IN HENRIES.

Figure 8-4. A1 Main Assembly, A2 Switch Display Assembly

MANUAL PART NUMBER 10830-90002

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