HEWLETT PACKARD

OPERATION AND SERVICE MANUAL

8557A
SPECTRUM ANALYZER
.01—350 MHz

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 2203A.

With modifications described in Section VII, this manual also applies to instruments with serial number prefixes lower (i.e., earlier) than prefix 2203A.

For additional information about serial numbers, see INSTRUMENTS COVERED BY MANUAL in Section I.

1400 FOUNTAIN GROVE PARKWAY, SANTA ROSA, CALIFORNIA 95404, U.S.A.

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Safety Symbols

The following safety symbols are used throughout this manual and in the instrument. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

Instruction manual symbol: the apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.

Indicates dangerous voltages.

CAUTION

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

WARNING

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

Operation

WARNING

BEFORE THIS INSTRUMENT IS SWITCHED ON, the oscilloscope mainframe protective earth terminal must be connected through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact. Failure to ground the instrument can result in personal injury.

WARNING

The 8557A Spectrum Analyzer should not be operated without protective covers (out of the mainframe). Adjustments, performance tests, and service procedures which require operation of the 8557A out of the mainframe should be performed only by trained service personnel.

CAUTION

BEFORE THIS INSTRUMENT IS SWITCHED ON, make sure that the oscilloscope mainframe is set to the voltage of the ac power source. Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

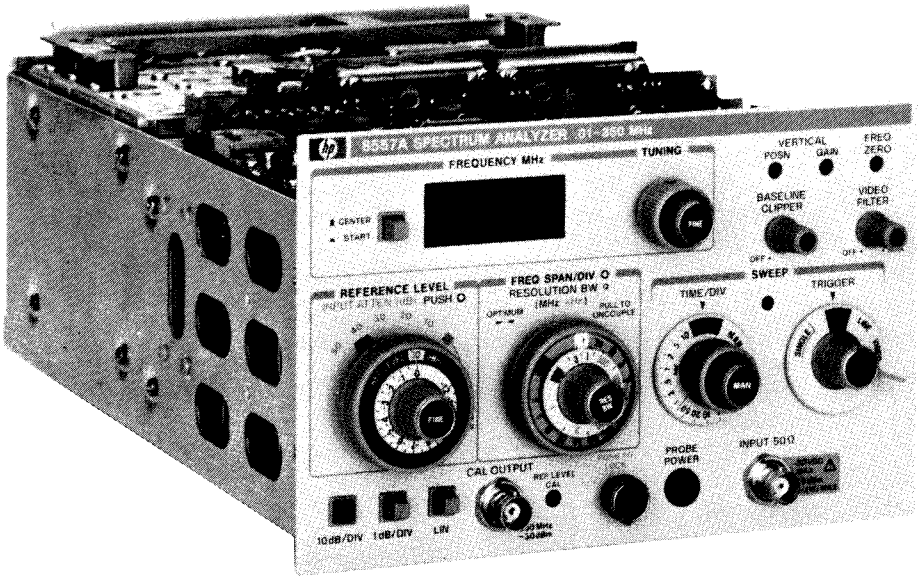
Service and Adjustments

WARNING

There are voltages at many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Service and adjustments should be performed only by trained service personnel.

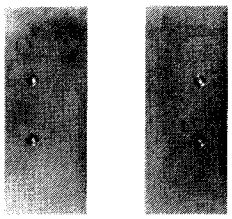
WARNING

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal may cause personal injury.



8557A

SIDE STOP KIT
08858-60131



SPECTRUM ANALYZER OVERLAY KIT
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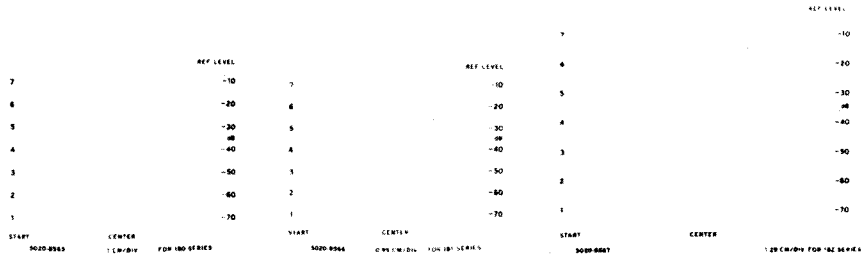


5020-8565 **5020-8566** **5020-8567**

Figure 1-1. HP Model 8557A Spectrum Analyzer with Accessories Supplied

SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This Operation and Service manual contains information required to install, operate, test, adjust, and service the Hewlett-Packard Model 8557A Spectrum Analyzer. Figure 1-1 shows the standard instrument and accessories supplied. This section covers instrument identification, description, options, accessories, specifications, and other basic information.

1-3. DESCRIPTION

1-4. The HP 8557A displays the amplitude and frequency of each component of an input signal on a CRT. This display gives quantitative information not available from a conventional oscilloscope. The HP 8557A is capable of measuring signal levels from −117 dBm to +20 dBm over a frequency range of 10 kHz to 350 MHz.

001: −110 dBm to +20 dBm
002: −63 dBmV to +70 dBmV

1-5. The complete measuring system includes the HP 8557A Spectrum Analyzer plugged into a compatible Hewlett-Packard display mainframe.

1-6. MANUAL ORGANIZATION

1-7. This manual is divided into eight sections as follows:

SECTION I, GENERAL INFORMATION, contains the instrument description and specifications, explains accessories and options, and lists recommended test equipment.

SECTION II, INSTALLATION AND OPERATION VERIFICATION, contains information concerning initial mechanical inspection, preparation for use, operating environment, packaging and shipping, and operation verification.

SECTION III, OPERATION, contains detailed instructions for operation of the instrument.

SECTION IV, PERFORMANCE TESTS, contains the necessary tests to verify that the electrical operation of the instrument is in accordance with published specifications.

SECTION V, ADJUSTMENTS, contains the necessary adjustment procedures to properly adjust the instrument after repair.

SECTION VI, REPLACEABLE PARTS, contains the information necessary to order parts and/or assemblies for the instrument.

SECTION VII, MANUAL BACKDATING CHANGES, contains backdating information to make this manual compatible with earlier equipment configurations.

SECTION VIII, SERVICE, contains schematic diagrams, block diagrams, component location illustrations, circuit descriptions, and troubleshooting information to aid in repair of the instrument.

1-8. On the title page of this manual, below the manual part number, is a microfiche part number. This number may be used to order 4- by 6-inch microfilm transparencies of the manual. Each microfiche contains up to 60 photo-duplicates of the manual pages. The microfiche package also includes the latest Manual Changes supplement.

1-9. Where text changes are required to reflect Options 001 and 002, these changes are shown in bold type immediately following applicable text. Notes are also included in tables and illustrations where users of Options 001 and 002 need to be informed of differences from the standard instrument. Users of the standard instrument should ignore references to Options 001 and 002.

1-10. SPECIFICATIONS

1-11. Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument is tested. Table 1-2 lists supplemental characteristics. Supplemental characteristics are not specifications but are typical characteristics included as additional information for the user.

NOTE

To ensure that the HP Model 8557A meets the specifications listed in Table 1-1, performance tests (Section IV) should be performed every six months.

1-12. SAFETY CONSIDERATIONS

1-13. Before operating this instrument, you should familiarize yourself with the safety markings on the instrument and safety instructions in this manual. This instrument has been manufactured and tested according to international safety standards. However, to ensure safe operation of the instrument and personal safety of the user and service personnel, the cautions and warnings in this manual must be followed. Refer to the safety considerations at the front of the manual. Refer also to individual sections of this manual for detailed safety notation concerning the use of the instrument as described in those individual sections.

1-14. INSTRUMENTS COVERED BY MANUAL

1-15. Serial Numbers

1-16. Attached to the rear of your instrument is a mylar serial number label. The serial number is in two parts. The first four digits and letter are the serial number prefix; the last five digits are the suffix (see Figure 1-2). The prefix is the same for all identical instruments; it changes only when a change is made to the instrument. The suffix, however, is assigned sequentially and is different for each instrument. The contents of this manual apply to instruments with the serial number prefix(es) listed under SERIAL NUMBERS on the title page.

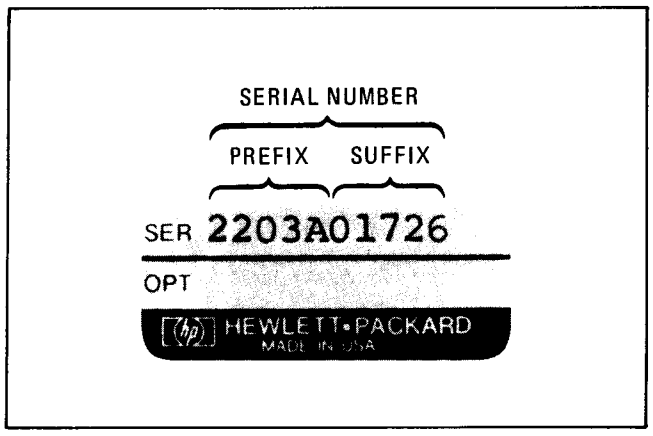


Figure 1-2. Typical Serial Number Label

1-17. Manual Changes Supplement

1-18. An instrument manufactured after the printing of this manual might have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates that the instrument is different from those described in this manual. The manual for this newer instrument is accompanied by a yellow Manual Changes supplement. This supplement contains change information that explains how to adapt the manual to the newer instrument.

1-19. 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 carries a manual identification block that includes the model number, print date of the manual, and manual part number. Complimentary copies of the supplement are available from Hewlett-Packard. Addresses of Hewlett-Packard offices are located at the back of this manual.

1-20. Manual Backdating Changes

1-21. Instruments manufactured before the printing of this manual have been assigned serial number prefixes other than those for which this manual was written directly. Manual backdating information is provided in Section VII to adapt this manual to any such earlier assigned serial number prefix.

1-22. This information should not be confused with information contained in the yellow Manual Changes supplement, which is intended to adapt this manual to instrument changes that are accomplished after its printing.

1-23. OPTIONS

CAUTION

The 75-ohm BNC connectors on Option 001 and Option 002 instruments are not compatible with 50-ohm BNC connectors unless an adapter is used. Direct use of 50-ohm BNC connectors with these instruments might damage the input and calibration-output connectors.

Table 1-1. HP Model 8557A Specifications (1 of 3)

FREQUENCY SPECIFICATIONS

FREQUENCY RANGE
10 kHz to 350 MHz

FREQUENCY SPANS
Per Division (MHz/Div, kHz/Div)
12 frequency scale calibrations in 1-2-5 sequence from 5 kHz/div to 20 MHz/div. Start or center frequency is set with the TUNING control and indicated by the FREQUENCY MHz readout.
Zero Span (0)
Analyzer functions as a manually tuned receiver, at the frequency indicated by the FREQUENCY MHz readout, for time-domain display of signal modulation.

FREQUENCY ACCURACY
Tuning Accuracy
Frequency MHz readout (start, center, or marker frequency), after zeroing on the LO feedthrough: ±(3 MHz +10% of frequency span per division)
Frequency Readout Resolution
0–195 MHz: 100 kHz
195–350 MHz: 1 MHz
Frequency Span Accuracy
±10% of displayed frequency separation

SPECTRAL RESOLUTION AND STABILITY
Resolution Bandwidths
Eight selectable resolution (3-dB bandwidths in 1-3 sequence from 1 kHz to 3 MHz. Bandwidth may be selected independently or coupled with frequency span. Optimum ratio of frequency span to resolution bandwidth is indicated by alignment of markers (> <) on the two controls.
Resolution Bandwidth Accuracy:
Individual resolution bandwidth 3-dB points: ±20% (+10°C to +40°C)
Selectivity:
60-dB: 3-dB resolution bandwidth ratio: <15:1
Stability
Residual FM:
<1 kHz p-p in 0.1 second
Noise Sidebands:
≥75 dB down, >50 kHz from center of CW signal with 1 kHz resolution bandwidth and full video filtering.
Video Filter
Post-detection low-pass filter averages displayed noise for a smooth trace. The MAX (detent) position selects a video filter bandwidth of approximately 1.5 Hz for noise level measurement.

AMPLITUDE SPECIFICATIONS

AMPLITUDE RANGE
–117 dBm to +20 dBm
001: –110 dBm to +25 dBm
002: –63 dBmV to +74 dBmV
Maximum Input (Damage) Levels
Total Power:
+20 dBm (100 mW, 2.24 Vrms)
001: +25 dBm (316 mW, 3.98 Vrms)
002: +74 dBmV (316 mW, 3.98 Vrms)
dc or ac (<100 Hz):
±30V
Average Noise Level
The displayed average noise level determines sensitivity (minimum discernible signal). Signals at this input level peak approximately 3 dB above the displayed noise.
Maximum average noise level with 10 kHz resolution bandwidth, 0 dB input attenuation, and maximum (MAX) video filtering:
<–107 dBm (1–350 MHz)
001: <–100 dBm (1–350 MHz)
002: <–53 dBmV (1–350 MHz)
Calibrated Display Range
Log (from Reference Level):
70 dB with 10 dB/DIV Amplitude Scale
8 dB with 1 dB/DIV Amplitude Scale
Linear:
8 divisions with LIN Amplitude Scale

AMPLITUDE ACCURACY
With AUTO sweep time selected, amplitude accuracy is determined by one or more of the following factors, depending on the measurement technique.
Calibrator Output
–30 dBm ±1 dB (into 50Ω)
250 MHz ±50 kHz
001: –30 dBm +1 dB (into 75Ω)
002: +20 dBmV +1 dB (into 75Ω)

Table 1-1. HP Model 8557A Specifications (2 of 3)

Reference Level
10-dB steps and a 12-dB vernier for calibrated Reference Level adjustment from −112 dBm to +40 dBm.
(002: −62 dBmV to +90 dBmV)[1]

Step Accuracy:
Steps referenced with 0 dB input attenuation.
−10 dBm to −80 dBm: ±0.5 dB
−10 dBm to −100 dBm: ±1.0 dB

Vernier Accuracy
±0.5 dB

Frequency Response
Frequency response includes input attenuator and mixer flatness:
≤±0.75 dB with 10 dB input attenuation

Input Attenuator
0 dB to 50 dB of input attenuation selectable in 10-dB steps

Step Accuracy:
0 dB to 50 dB: <±0.5 dB per 10-dB step

Maximum Cumulative Error:
0 dB to 50 dB: <±1.0 dB

Bandwidth Switching (Amplitude Variation)
Bandwidths 3 MHz to 300 kHz: <±0.5 dB[2]
Bandwidths 3 MHz to 1 kHz: <±1.0 dB[2]

Display Fidelity
CRT linearity and log or linear fidelity affect amplitude accuracy at levels other than Reference Level.

Log Incremental Accuracy:
±0.1 dB per dB from Reference Level

Log Maximum Cumulative Error:
≤±1.5 dB over entire 70-dB range

Linear Accuracy:
±3% of Reference Level

SPURIOUS RESPONSES

Second Harmonic Distortion:
>70 dB below a −40 dBm input signal (1−350 MHz) with 0 dB input attenuation.
001: −35 dBm input signal
002: +15 dBmV input signal

Third Order Intermodulation Distortion:
>70 dB[3] below two −40 dBm input signals, separated by ≥50 kHz, with 0 dB input attenuation.
001: two −35 dBm input signals
002: two +15 dBmV input signals

Image and Multiple Responses:
>70 dB[4] below a −40 dBm input level (1−350 MHz) with 0 dB input attenuation.
>60 dB below a −40 dBm input level (20 kHz to 1 MHz) with 0 dB input attenuation.
001: −35 dBm input level
002: +15 dBmV input level

RESIDUAL RESPONSES
<−100 dBm (0.1−350 MHz) with 0 dB input attenuation and no signal present at input.
001: <−95 dBm (0.1−350 MHz)
002: <−50 dBmV (0.1−350 MHz)

SWEEP SPECIFICATIONS

SWEEP TIME

Automatic (AUTO):
Sweep time adjusted automatically to maintain absolute amplitude calibration for any combination of frequency span, resolution bandwidth, and video filter bandwidth.

Calibrated Sweep Times (sec/Div, mSec/Div):
16 selectable sweep times in 1-2-5 sequence from 0.1 msec/div to 10 sec/div, provided primarily for time-domain calibration in zero span (0).

GENERAL SPECIFICATIONS

TEMPERATURE RANGE
Operating: 0°C to +55°C.
Storage: −40°C to +75°C.

HUMIDITY RANGE
Type-tested from 50% to 95% relative humidity (≤+40°C) per requirements of MIL-STD-810C, Method 507.1, Procedure IV.

EMI
Conducted and radiated interference is in compliance with MIL-STD 461A, Methods CE03 and RE02, CISPR Publication 11 (1975) and Messempfaenger Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/Funkschutzzeichen).

[1] Input level not to exceed +20 dBm *(001: +25 dBm; 002: +74 dBmV)* damage level.
[2] +10°C to +40°C, <90% relative humidity.
[3] >60 dB for 10 kHz to 1 MHz input signals.
[4] >60 dB below input level at 261 MHz ±2 MHz.

Table 1-1. HP Model 8557A Specifications (3 of 3)

POWER REQUIREMENTS

HP Model 182T/180TR Display with HP Model 8557A Spectrum Analyzer:
48-440 Hz, 115 or 230 volts (±10%), 200VA maximum, convection cooled.

HP Model 181T/181TR Display with HP Model 8557A Spectrum Analyzer:
48-440 Hz, 115 or 230 volts (±10%), 225 VA maximum, convection cooled.

WEIGHT

HP Model 8557A Spectrum Analyzer:
Net: 5.0 kg (10 lbs)
Shipping: 8.5 kg (18 lbs)

HP Model 182T Display:
Net: 12.5 kg (27 lbs)
Shipping: 16.5 kg (36 lbs)

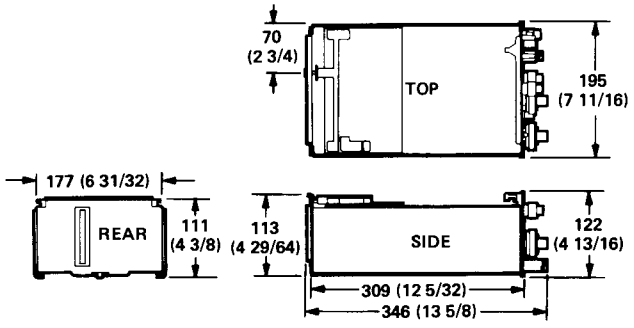
HP Model 181T Display:
Net: 11.0 kg (24 lbs)
Shipping: 15.5 kg (34 lbs)

HP Model 181TR Display:
Net: 12.0 kg (26 lbs)
Shipping: 17.5 kg (38 lbs)

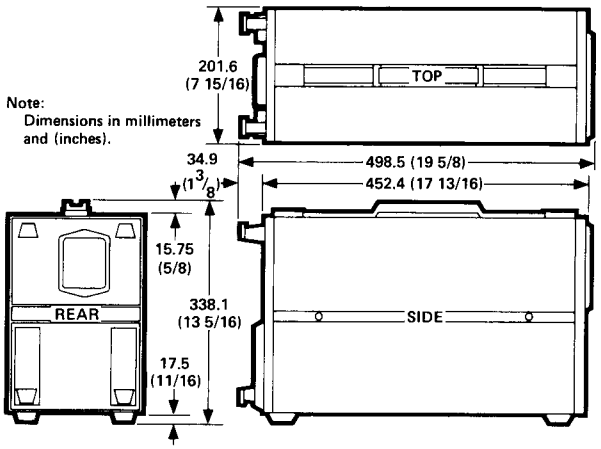
HP Model 180TR Display:
Net: 12.0 kg (26 lbs)
Shipping: 17.5 kg (38 lbs)

DIMENSIONS

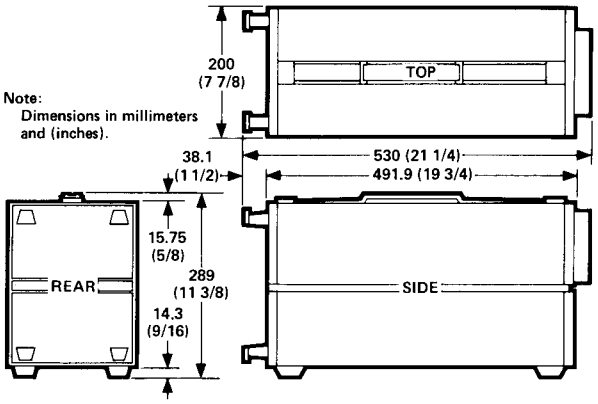
HP Model 8557A Spectrum Analyzer:



HP Model 182T Display:



HP Model 181T Display:



HP Model 180TR/181TR Display:

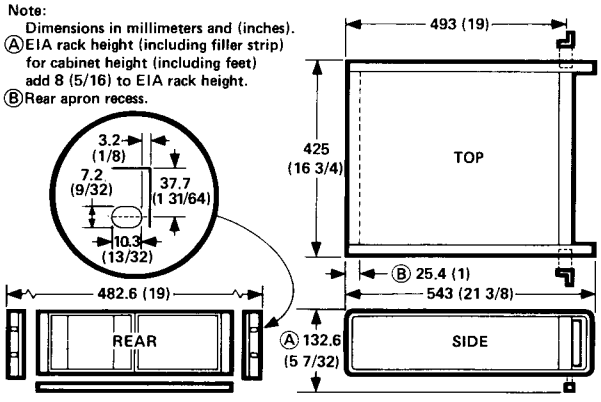


Table 1-2. Model 8557A/180-Series Supplemental Characteristics (1 of 3)

SUPPLEMENTAL CHARACTERISTICS

NOTE: Values in this table are not specifications. They are typical characteristics included for user information.

FREQUENCY CHARACTERISTICS

FREQUENCY ACCURACY

FREQUENCY ZERO

Adjusts digital FREQUENCY MHz readout. FREQUENCY ZERO control may be used to calibrate the frequency readout on a known signal or on the LO feedthrough.

FREQUENCY RANGE

OUT-OF-RANGE BLANKING

The CRT trace is automatically blanked whenever the spectrum analyzer is swept or tuned beyond its frequency range (approximately −10 MHz and 360 MHz).

SPECTRAL RESOLUTION AND STABILITY

FREQUENCY DRIFT

At fixed start/center frequency, after 2-hour warmup: <20 kHz in 10 minutes.

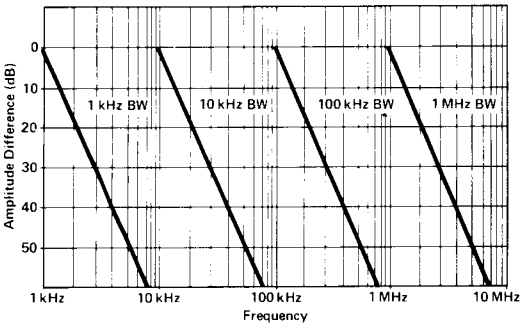
With temperature changes: <50 kHz/°C.

RESOLUTION BANDWIDTH SHAPE

Approximately gaussian (synchronously-tuned, 4-pole filter).

SPECTRAL RESOLUTION

The following graph shows typical spectrum analyzer resolution for different resolution bandwidths.



Signal Resolution vs. Frequency Separation

AMPLITUDE CHARACTERISTICS

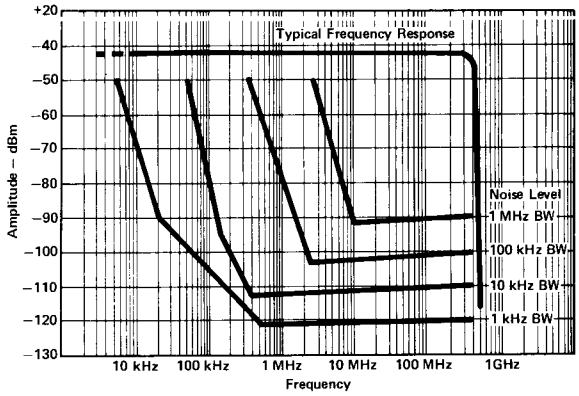
AMPLITUDE RANGE AND ACCURACY

DYNAMIC RANGE

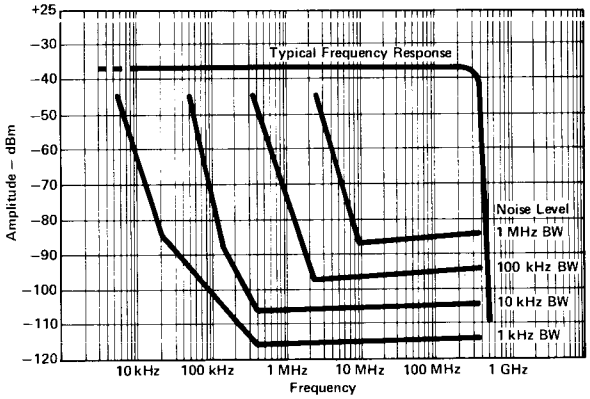
Maximum power ratio of two signals simultaneously present at the input that may be measured within the limits of specified accuracy, sensitivity, and distortion (i.e. spurious responses): >70 dB.

FREQUENCY RESPONSE AND AVERAGE NOISE LEVEL

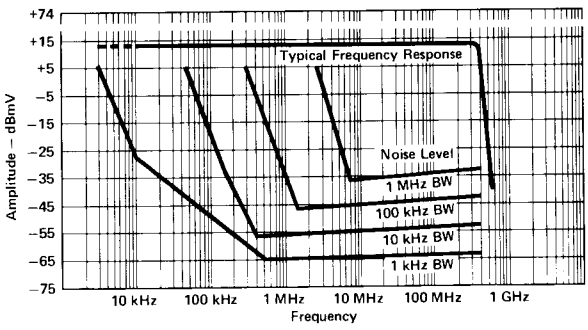
The following graphs show typical frequency response and average noise level versus frequency.



(Standard HP 8557A)



(Option 001)



(Option 002)

Table 1-2. Model 8557A/180-Series Supplemental Characteristics (2 of 3)

SUPPLEMENTAL CHARACTERISTICS

NOTE: Values in this table are not specifications. They are typical characteristics included for user information.

GAIN COMPRESSION

Gain compression is typically less than 1 dB for a −10 dBm input level with 0 dB input attenuation.

001: −5 dBm input level

002: +45 dBmV input level

AMPLITUDE SCALE SWITCHING

Reference Level variation is typically less than ±1 dB for any change in Amplitude Scale.

SPURIOUS RESPONSES

SECOND HARMONIC AND THIRD ORDER INTERMODULATION DISTORTION

The graphs below illustrate typical second harmonic and third order intermodulation distortion.

SWEEP CHARACTERISTICS

SWEEP TIME

CALIBRATED SWEEP TIME ACCURACY (Sec/DIV, mSec/DIV)

Sweep times are typically ±10% of indicated value.

MANUAL

Spectrum analyzer may be swept manually, in either direction, with front panel control.

SWEEP TRIGGER

FREE RUN

End of each sweep triggers new sweep.

LINE

Sweep triggered at ac line frequency.

VIDEO

Sweep triggered on post-detection video waveform. One-half major division of vertical deflection required to trigger sweep.

SINGLE

Single sweep started or reset by turning SWEEP TRIGGER clockwise momentarily.

FRONT PANEL INPUT AND OUTPUT CHARACTERISTICS

SIGNAL INPUT

INPUT IMPEDANCE

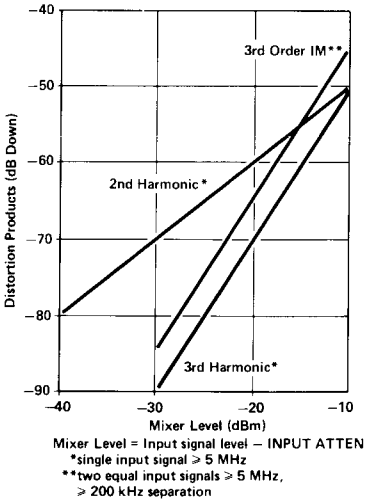
50 ohms nominal; 50-ohm BNC female connector.

001 and 002: 75 ohms nominal; 75-ohm BNC female connector.

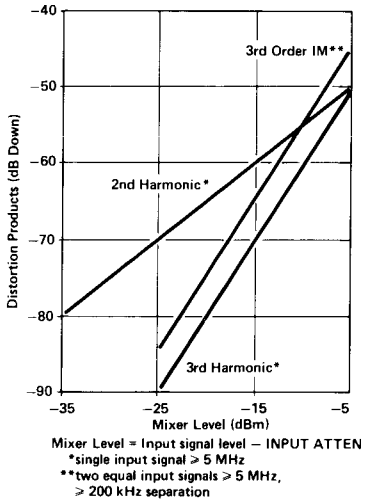
INPUT SWR

<1.5 SWR with ≥10 dB input attenuation.

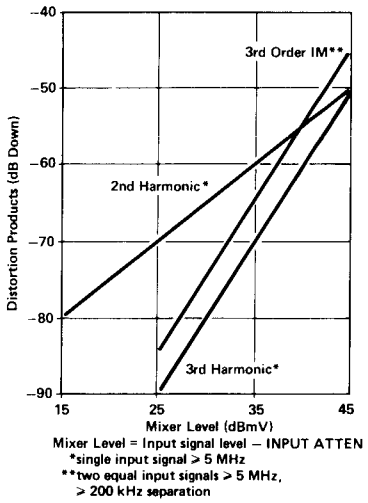
001 and 002: <1.5 SWR



(Standard HP 8557A)



(Option 001)



(Option 002)

Distortion vs. Mixer Level

Table 1-2. Model 8557A/180-Series Supplemental Characteristics (3 of 3)

SUPPLEMENTAL CHARACTERISTICS

NOTE: Values in this table are not specifications. They are typical characteristics included for user information.

CAL OUTPUT

–30 dBm at 250 MHz into 50 ohms.
001: –30 dBm at 250 MHz into 75 ohms
002: +20 dBmV at 250 MHz into 75 ohms

PROBE POWER

+15V, –12.6V, and GND (150 mA maximum) for use with HP High-Impedance Probes (i.e. HP 1120A, 1121A, 1123A, 1124A). The HP 1121A is recommended for its low noise characteristics.[1]

REAR PANEL OUTPUT CHARACTERISTICS[2]

VERTICAL, PENLIFT/BLANKING, AND HORIZONTAL OUTPUTS (AUX A, B, D)

These outputs are compatible with and may be used to drive HP X-Y Recorders (using positive pencoils or TTL penlift input) and CRT monitors.

[1] See Section II for details regarding use with 001 and 002 75-ohm inputs.

[2] Rear panel outputs refer to 180T-series display mainframes and other 180-series mainframes with Option 807 installed. Horizontal, vertical, and blanking outputs, attenuated and shifted in dc level, are available on other 180-series mainframes at the MAIN SWEEP, MAIN GATE, and DELAYED GATE outputs, respectively. DO NOT connect an X-Y recorder to the DELAYED GATE OUTPUT, the recorder will be damaged.

AUX A VERTICAL OUTPUT

BNC output provides detected video signal from a 50-ohm output impedance. Typical 0–800 mV range corresponds to full 8-division CRT vertical deflection.

AUX B PENLIFT/BLANKING OUTPUT

BNC output provides a +15V penlift/blanking signal from a 10K-ohm output impedance when CRT trace is blanked. Otherwise, output is low at 0V (low impedance, 150 mA max.) for an unblanked trace.

AUX C 21.4 MHz IF OUTPUT

BNC output provides 21.4 MHz IF signal (linearly related to spectrum analyzer RF input) from a 50-ohm output impedance. Output bandwidth controlled by spectrum analyzer RESOLUTION BW setting; output amplitude controlled by INPUT ATTEN, REFERENCE LEVEL FINE, and first six REFERENCE LEVEL positions (i.e. –10 through –60 dBm with 0 dB input attenuation). Output level is approximately –10 dBm into 50 ohms with a signal displayed at Reference Level. *002: (i.e. +40 to –10 dBmV with 0 dB input attenuation).*

AUX D HORIZONTAL OUTPUT

BNC output provides horizontal sweep voltage from a 5K-ohm output impedance. –5V to +5V range corresponds to full 10-division CRT horizontal deflection.

1-24. Option 001

1-25. Option 001 provides direct-measurement capability in a 75-ohm system. The BNC input and calibration-output connectors have 75Ω impedance (nominal). Option 001 is calibrated in dBm, providing a measurement range of −110 dBm to +20 dBm. Throughout the manual, differences between the standard instrument and Option 001 are given in boldface type following applicable text references and as necessary in tables and illustrations.

1-26. Option 002

1-27. Option 002 provides direct-measurement capability in a 75-ohm system. The BNC input and calibration-output connectors have 75Ω impedance (nominal). Option 002 is calibrated in dBmV, providing a measurement range of −63 dBmV to +70 dBmV. Throughout the manual, differences between the standard instrument and Option 002 are given in boldface type following applicable text references and as necessary in tables and illustrations.

1-28. Option 910

1-29. One additional Operation and Service manual is provided for each Option 910 ordered. To obtain additional manuals after initial shipment, order by the manual part number, which appears on the title page and on the back cover.

1-30. ACCESSORIES SUPPLIED

1-31. The following accessories, supplied with the instrument, are shown in Figure 1-1:

- Side stop kit
- Graticule overlays

1-32. Side Stop Kit

1-33. A side stop kit, HP part number 08558-60131, is supplied to prevent the spectrum analyzer from sliding out of the mainframe. When the side stops are installed, the plug-in cannot be removed from the mainframe. Refer to Section II for installation or removal of the side stops.

1-34. Graticule Overlays

Three graticule overlays provide the operator with reference-level labels for the CRT. HP Part Number 5020-8565 is the overlay for 180-series display mainframes. HP Part Number 5020-8566 is the overlay for 181-series display mainframes. HP Part Number 5020-8567 is the overlay for 182-series display mainframes. For proper installation of the graticule overlay, refer to Section II.

1-35. EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-36. Display Mainframe

1-37. A 180T-series display mainframe (180TR, 181T, 181TR, or 182T) is recommended for use with the HP Model 8557A. In the 180T-series mainframe, the rear-panel auxiliary output connectors (AUX A, AUX B, AUX C, and AUX D) provide, respectively, Vertical Output, Pen Lift Output, 21.4 MHz IF Output, and Horizontal Output. Other 180-series display mainframes provide these outputs only if Option 807 is installed.

1-38. If a 180-series display mainframe (other than 180T-series) does not have Option 807 installed, only the horizontal, vertical, and blanking outputs are available at the rear panel of the mainframe. These outputs are attenuated and shifted in dc level. (Refer to Table 1-2, Supplemental Performance Characteristics.)

1-39. Extender Cable Assembly

1-40. An Extender Cable Assembly (Figure 1-3), HP Part Number 5060-0303, allows operation of the HP 8557A outside the display mainframe. This provides access to the HP 8557A for necessary adjustments and some performance tests. This cable is also useful for troubleshooting.

1-41. MEASUREMENT ACCESSORIES

1-42. AC Probe

1-43. The HP Model 8557A Spectrum Analyzer has a front-panel PROBE POWER connector for the use of high-impedance active probes such as the HP 1120A, HP 1121A, HP 1123A, and HP 1124A. High-impedance probes permit testing of high-frequency circuits without significant loading effects. The HP Model 1121A AC Probe is preferred for use with the HP 8557A because of its low-noise characteristic.

CAUTION

The 75-ohm BNC input connector on Option 001 and 002 instruments is

not compatible with 50-ohm BNC connectors unless an adapter is used. Direct connection of an AC probe might damage the input connector.

001 and 002: The AC probes have 50Ω output impedance. Direct connection of a probe to the 75Ω input of a calibrated HP 8557A, Option 001 or 002, introduces a +1.58 dB error in displayed signal levels.

1-44. Modification Kit (Option 807 Connections)

1-45. A modification kit, HP part number 00180-69503, provides the materials and information necessary to modify a standard HP 180-series display. The modification provides installation of Option 807 rear-panel connections on the standard HP 180-series display. Refer to Table 1-3 for a description of parts, with HP part numbers, included in the modification kit.

1-46. Oscilloscope Camera

1-47. The HP Model 197B, Option 002, General Purpose Camera is recommended for use with 180- and 181-series display mainframes to make a permanent record of measurements. The HP 10367A adapter allows the camera to be used with 182-series mainframes.

1-48. SERVICE ACCESSORIES

1-49. Service accessories are shown in Figure 1-3.

1-50. RECOMMENDED TEST EQUIPMENT

1-51. Equipment required for operation verification, performance tests, adjustments, and troubleshooting of the HP Model 8557A is listed in Table 1-4. Other equipment may be substituted if it meets or exceeds the critical specifications listed in the table.

Table 1-3. Parts Included in Modification Kit 00180-69503

Quantity	Description	HP Part Number
1	Output Amplifier Assembly (Auxiliary Output Board)	00180-66551
1	Label	7120-3116
2	3/4 inch pieces of shrink tubing	0890-0720
1	Service Note	180A/AR-10, 180C/D-2, 181A/AR8, 182A/C-1, or 184/B-1 (modification is similar for all instruments listed)

Table 1-4. Recommended Test Equipment (1 of 3)

Equipment	Critical Specifications	Recommended Model	Use*
Display Mainframe	HP 180T Series with variable persistence	HP 181T/TR	P,A,T
Oscilloscope	Time Base: 1 ms/cm to 10 ms/cm Vertical Sensitivity: 1 mV/cm to 20 V/cm	HP 1741A	A,T
Timer/Counter	Time base: 10 μs	HP 5308A	P,A,T
Digital Voltmeter	Accuracy: ±(.05% Rdg ±1 digit)	HP 3455A	A,T
Power Meter	Power Range: −20 dBm to +10 dBm	HP 435A/B	P,A,T
Power Sensor	Frequency Range: 100 kHz to 1.5 GHz Maximum SWR: 1.1, 0.1 to 1 GHz	HP 8482A	P,A,T
Amplifier	Frequency Range: 200 MHz to 300 MHz Gain: >20 dB Impedance: 50Ω	HP 8447A	P,A,T
Signal Generator (2 required)	Frequency Range: 4 MHz to 305 MHz Drift: Less than 50 ppm (or 5 Hz, whichever is greater) Harmonic Distortion: >30 dB below fundamental Noise Sidebands: >80 dB down, 50 kHz away, 1 kHz BW	HP 8640B	P,A,T
Synthesizer/Level Generator	Frequency Range: 10 kHz to 80 MHz Power: −6 dBm	HP 3335A	P,T
Sweep Oscillator	Manual Sweep	HP 8350A	A
RF Plug-In	Frequency Range: 10 MHz to 1.5 GHz Flatness (external leveling): <±0.1 dB	HP 83522A	A
Spectrum Analyzer	Frequency Range: 100 kHz to 1.5 GHz	HP 182T/8558B	T
Comb Generator	Accuracy: 0.01%	HP 8406A	P,A,T
Function Generator	Frequency Range: 5 kHz to 5 MHz	HP 3310A	P,T
Crystal Detector	Frequency Range: 10 MHz to 1.5 GHz Frequency Response: ±0.2 dB/octave to 2 GHz; ±0.5 dB overall	HP 423B	A,T
50 MHz LPF	Rejection: >50 dB for signals above 50 MHz	Cir Q Tel FLT/2-50-5/50-3A/3B	P,A,T

*P = Performance Test; A = Adjustment; T = Troubleshooting

Table 1-4. Recommended Test Equipment (2 of 3)

Equipment	Critical Specifications	Recommended Model	Use*
300 MHz LPF	Rejection: >50 dB for signals above 300 MHz	Telonic TPL 300-4AB	P,A,T
Power Splitter	Frequency Range: 10 kHz to 350 MHz Input SWR: ≤1.15	HP 11667A	P,A
Directional Bridge	Frequency Range: 900 kHz to 30 MHz	HP 8721A	P
10-dB Attenuator	Frequency Range: 100 kHz to 1.5 GHz Accuracy: ±0.5 dB	HP 8491A Opt. 010	P,A
Step Attenuator	Frequency Range: 20 MHz to 305 MHz Attenuation: 12 dB in 1-dB steps Accuracy: ±0.25 dB	HP 355C	P,A,T
Step Attenuator	Frequency Range: 20 MHz to 305 MHz Attenuation: 80 dB in 10-dB steps Accuracy: ±0.03 dB	HP 355D	P,A,T
Termination	Impedance: 50Ω	HP 908A/11583A	P,A
Type N Cable	50Ω coaxial cable with Type N (m) connectors on both ends	HP 11500A	P,A
BNC Cable, 20 cm (9 in)	50Ω coaxial cable with BNC (m) connectors on both ends	HP 10502A	P,A,T
BNC Cable, 120 cm (48 in) (2 required)	50Ω coaxial cable with BNC (m) connectors on both ends	HP 10503A	P,A,T
Cable	SMC (f) to BNC (m)	HP 11592-60001	P,A,T
Cable	Banana Plug to Alligator Clips	HP 11002A	A
Adapter	Type N (m) to BNC (f) (3 required)	HP 1250-0780	P,A
Adapter	BNC Tee	HP 1250-0781	P,A
Adapter	N (f) to BNC (m)	HP 1250-0077	P,A
Adapter	Type N (m) to SMC (m)	HP 1250-1023	A,T
Adapter	BNC (f) to Alligator Clips	HP 8120-1292	A,T
Adapter	Type N (f) to Type N (f)	HP 1250-0777	A,T
Adapter	Type N (m) to BNC (m)	HP 1250-0082	P,T

*P = Performance Test; A = Adjustment; T = Troubleshooting

Table 1-4. Recommended Test Equipment (3 of 3)

Equipment	Critical Specifications	Recommended Model	Use*
Extender Board	6 pin, 12 contacts with 51.1Ω resistor from pin 1 to pin 5	HP 08505-60109 HP 0757-0394	A,T
	NOTE **The following equipment is required for Option 001 and Option 002.**		
Termination	*Impedance: 75Ω*	*HP 11652-60010*	*P*
Adapter	*75Ω BNC (m) to 75Ω Type N (f)*	*HP 1250-1534*	*T*
Minimum Loss Adapter	*75Ω BNC (f) to 50Ω SMA (m) 5.72 dB attenuation*	*HP 08558-60031*	*P,A,T*
Adapter	*BNC (f) to SMA (m)*	*HP 1250-1200*	*P,T*
Adapter	*SMA (f) to SMA (f)*	*HP 1250-1158*	*P,T*
Cable	*BNC, 30 cm (12 in), 75Ω*	*HP 11652-60012*	*P,A,T*
Cable	*BNC, 60 cm (24 in), 75Ω*	*HP 11652-60013*	*P,A,T*
Cable	*BNC, 90 cm (37 in), 75Ω*	*HP 11652-60014*	*P,A,T*
Adapter	*BNC (m) to BNC (m)*	*HP 1250-1288*	*P,T*
Adapter	*Type N (m) to SMA (f)*	*HP 1250-1250*	*P,A,T*
Adapter	*BNC (m) to BNC (m)*	*HP 1250-0216*	*P,T*

*P = Performance Test; A = Adjustment; T = Troubleshooting

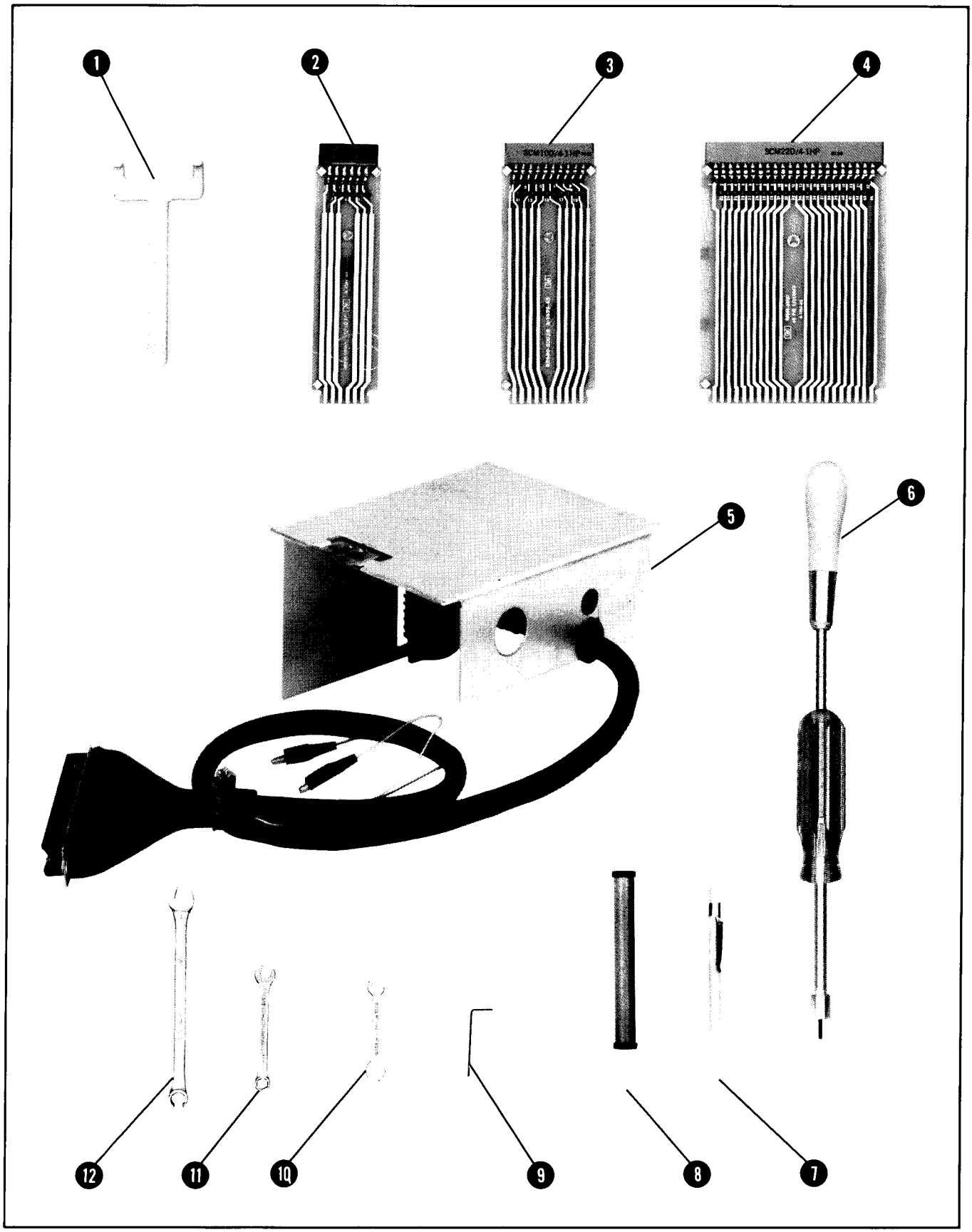


Figure 1-3. Service Accessories (1 of 2)

Item	Description	CD	HP Part Number
1	Board Puller, 2 prongs to lift PC boards	1	03950-4001
2	Extender Board, 6 pin, 12 contacts	2	08505-60109
3	Extender Board, 10 pin, 20 contacts	2	85680-60028
4	Extender Board, 22 pin, 44 contacts	8	08565-60107
5	Extender Cable Assembly, for plug-in operation out of display mainframe	9	5060-0303
6	Tuning Tool, modified 5/16 inch nut driver with modified No. 10 Allen driver	6	08555-60107
7	Alignment tool, metal tip in plastic	7	8710-0630
8	Alignment tool, non-metallic	4	8710-0033
9	Wrench, No. 2 Bristol	0	8710-0055
10	Wrench, 15/64 inch, combination	8	8710-0946
11	Wrench, 1/4 inch, open end	2	8720-0014
12	Wrench, 5/16 inch, slotted box end/open end	9	08555-20097

Figure 1-3. Service Accessories (2 of 2)

SECTION II
INSTALLATION

2-1. INTRODUCTION

2-2. This section includes information on initial inspection, preparation for use, and storage and shipping requirements for the HP Model 8557A.

2-3. INITIAL INSPECTION

2-4. Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. The contents of the shipment should be as shown in Figure 1-1. The electrical performance is checked with the procedures in Section IV. If the contents are incomplete, if there is mechanical damage or defect, or if the instrument does not pass the Performance Test procedures, notify the nearest Hewlett-Packard office. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping materials for inspection by the carrier. The Hewlett-Packard office will arrange for repair or replacement without waiting for a claim settlement.

2-5. PREPARATION FOR USE

2-6. Installation

2-7. When properly installed, the spectrum analyzer obtains all necessary power from the display mainframe. The rear panel connector provides the interface.

CAUTION

BEFORE SWITCHING ON THIS INSTRUMENT, make sure it is adapted to the voltage of the ac power source to be used and the proper fuse is installed. Failure to set the ac power input of the instrument for the correct voltage level could cause damage to the instrument when plugged in. Refer to the display mainframe Operation and Service Manual for line voltage and fuse selection.

2-8. To install the spectrum analyzer in the mainframe:

1. Set display mainframe LINE switch to OFF.
2. Pull out lock knob and slide plug-in toward rear of compartment until it is seated firmly in place.
3. Push in lock knob to secure spectrum analyzer in mainframe.

2-9. Side Stop Kit

2-10. Installation of a Side Stop Kit, HP part number 08558-60131, prevents the removal of the analyzer from the 180-series mainframe without the use of hand tools. This kit contains two side stops, mounting hardware, label, and installation instructions. (Refer to Table 2-1 for part numbers of individual items.)

Table 2-1. Side Stop Kit (08558-60131)

Qty	Description	HP Part Number	C D
2	SIDE STOP	08558-00094	7
4	MACHINE SCREW, 4-40 .438-IN-LG 82 DEG FLATHEAD	2200-0168	9
1	LABEL, FRONT-PANEL	7120-8131	7
1	LABEL, INSTRUCTIONS	7120-8215	8

2-11. To install side stops:

WARNING

Before removing covers from the display mainframe, disconnect line power by removing the ac power cord.

1. Remove side covers from bottom section of display mainframe. (Remove only right side

cover if mainframe is a rack-mounted model.)

2. Use flathead machine screws to install side stops as shown in Figure 2-1.

3. Reinstall side covers on mainframe.

4. Place caution label on front panel of spectrum analyzer (upper right-hand corner) to indicate that plug-in is secured with side stops.

2-12. To remove side stops:

WARNING

Before removing covers from the display mainframe, disconnect line power by removing the ac power cord.

1. Remove side covers from bottom section of display mainframe. (Remove only right side cover if mainframe is a rack-mounted model.)

2. Remove side stops. (See Figure 2-1.)

3. Reinstall side covers on display mainframe.

2-13. Graticule Overlays

2-14. To install a graticule overlay:

1. Select proper overlay. HP part number 5020-8565 is for 180TR display mainframes, HP part number 5020-8566, for 181T/TR display mainframes, and HP part number 5020-8567, for 182T display mainframes.

2. For 180TR and 181T/TR mainframes, remove CRT bezel and metallic-mesh con-

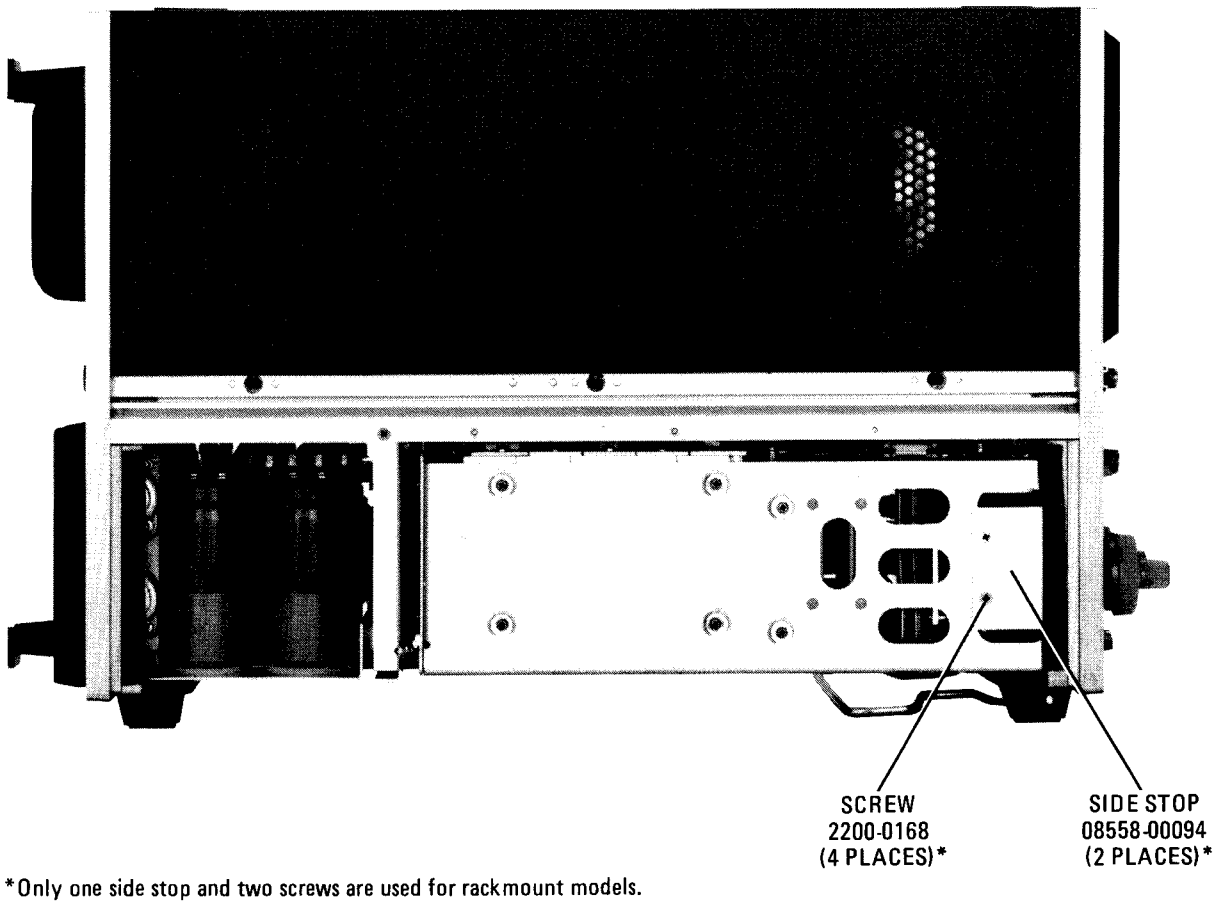


Figure 2-1. Location of Side Stops

trast filter. Insert proper overlay and replace contrast filter and CRT bezel.

3. For 182T mainframes, grasp top portion of CRT bezel and pull straight up. Remove metallic-mesh contrast filter and insert proper overlay and contrast filter. (Either the metallic-mesh contrast filter or a light blue contrast filter may be used.)
4. Slide CRT bezel back into place to retain overlay and filter.

2-15. Mainframe Interconnections

2-16. When the HP 8557A is properly installed in the display mainframe, the interconnections are as listed in Table 2-2.

2-17. Operating Environment

2-18. Temperature. The instrument may be operated in temperatures from 0°C to +55°C.

2-19. Humidity. The instrument may be operated in environments with relative humidity from 5 percent to 95 percent, 0°C to +40°C. The recommended long-term operating environment is 5 percent to 80 percent relative humidity. The instrument should also be protected from abrupt temperature changes that cause internal condensation.

2-20. Altitude. The instrument may be operated in altitudes up to 4572 meters (15,000 feet).

2-21. Modifications

2-22. A Modification Kit, HP part number 00180-69503, provides materials and information necessary to add Option 807 rear-panel connections to the standard HP 180-series display. Refer to Table 1-3 in Section I. Option 807 is factory-installed in 180TR, 181T, 181TR, and 182T mainframes. The modification kit is required for use with other mainframes if all four rear-panel outputs are needed.

2-23. STORAGE AND SHIPMENT

2-24. Environment

2-25. The instrument may be stored or shipped in environments within the following limits:

Temperature: −40°C to +75°C
Humidity: 5% to 95% (0°C to +40°C)
Altitude: Up to 15240 meters (50,000 feet)

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

Table 2-2. HP Model 8557A Mainframe Interconnections

Pin on P1	Signal or Voltage	Pin on P1	Signal or Voltage
1	CRT HORIZ (adjusted horizontal signal)	17	BLANKING
2	GROUND from mainframe (jumpered to pin 8)	18	NC
3	NC	19	GROUND from mainframe (jumpered in pin 24)
4	L NORM		
5	Y NORM	20	AUTO SWP
6	NC	21	BEAM FINDER
7	SING SWP	22	NC
8	GROUND from mainframe (jumpered to pin 2)	23	NC
		24	GROUND from mainframe (jumpered to pin 19)
9	MAN SWP		
10	NC	25	NC
11	AUX D Horizontal Output (to mainframe rear panel)	26	NC
		27	NC
12	AUX C 21.4 MHz IF Output (to mainframe rear panel)	28	−12.6 VDC from mainframe
		29	+15 VDC from mainframe
13	AUX B Penlift/Blanking Output (to mainframe rear panel)	30	+100 VDC from mainframe
		31	30V p-p from mainframe (for LINE TRIGGER)
14	AUX A Vertical Output (to mainframe rear panel)	32	NC
15	GROUND	W10P3 (2 contacts)	+ VERT (top contact, yellow wire)
16	NC		−VERT (bottom contact, orange wire)

2-26. Packaging

2-27. Original Packaging. Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. A supply of these tags is provided at the end of this section. Mark the container FRAGILE to assure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

2-28. Other Packaging. The following general instructions should be used for repackaging with commercially available materials:

1. Wrap instrument in heavy paper or plastic. If shipment is to a Hewlett-Packard office or service center, attach a tag indicating type of service required, return address, model number, and full serial number. A supply of these tags is provided at end of this section.
2. Use a strong shipping container. A double-wall carton made of 350-pound test material is adequate.
3. Use enough shock-absorbing material (3- to 4-inch layer) around all sides of the instrument to provide firm cushion and prevent movement inside container. Protect control panel with cardboard.
4. Seal shipping container securely.
5. Mark shipping container FRAGILE to assure careful handling.

SECTION III
OPERATION

3-1. INTRODUCTION

3-2. This section provides operating information for the Model 8557A Spectrum Analyzer. It also provides a brief description of display mainframe controls. For a detailed description of the display mainframe, refer to its manual.

3-3. CONTROLS, INDICATORS, AND CONNECTORS

3-4. The spectrum analyzer is used with one of the 180-series display mainframes. The 180T-series display mainframes, or the 180-series mainframes with Option 807, have the correct rear-panel connections for spectrum analyzer horizontal, vertical, penlift, and IF outputs. Figure 3-1 shows the front-panel features of the HP 8557A Spectrum Analyzer and the display mainframe. Figure 3-2 shows the rear-panel features of the HP 8557A. The rear panels of all 180T-series mainframes, and 180-series mainframes with Option 807, are basically the same.

3-5. Control Grouping

3-6. The spectrum analyzer and display mainframe front-panel controls fall into three general groups: those that deal with the display, those that deal with frequency, and those that deal with amplitude.

3-7. Display. The display group consists of:

SWEEP TIME/DIV
SWEEP TRIGGER
VERTICAL POSN
VERTICAL GAIN
MAN SWEEP
HORIZ GAIN (rear panel of 8557A)
VIDEO FILTER
BASELINE CLIPPER
HORIZONTAL POSITION
INTENSITY
FOCUS
TRACE ALIGN
ASTIG

3-8. The display group enables the operator to calibrate the display and to select a variety of scan and display conditions. The controls are explained in Figures 3-1 and 3-2. However, when the SWEEP TIME/DIV control is placed in the AUTO position, sweep time is controlled by the RESOLUTION BW, FREQ SPAN/DIV, and VIDEO FILTER controls.

3-9. Frequency. The frequency group consists of:

TUNING
RESOLUTION BW
FREQ SPAN/DIV

3-10. The frequency group enables the operator to control how the spectrum analyzer displays the frequency domain. The RESOLUTION BW and FREQ SPAN/DIV controls when pushed in are coupled together, and moving either control moves the other. When the SWEEP TIME/DIV control is in the AUTO position, varying the RESOLUTION BW or the FREQ SPAN/DIV (coupled or uncoupled) will change the sweep time to maintain calibration. With the two controls coupled together in the OPTIMUM position, RESOLUTION BW's of 3 MHz to 1 kHz will be automatically selected as the FREQ SPAN/DIV is narrowed from 100 MHz to 0. TUNING controls coarse and fine (coarse is larger knob) set the center frequency of the displayed spectrum. RESOLUTION BW control determines the resolution of the signals on the CRT.

3-11. Amplitude. The amplitude group consists of:

REFERENCE LEVEL
INPUT ATTEN
REF LEVEL FINE
REF LEVEL CAL
10 dB/DIV – 1 dB/DIV – LIN (Amplitude Scale)

3-12. The amplitude group enables the operator to measure signal amplitude in units of either voltage or dBm.

3-13. Variable Persistence and Storage Functions

3-14. With the 181T/TR Display Mainframe, the operator can set trace persistence for a bright, steady trace that does not flicker, even on the slow sweeps required for narrow band analysis. The variable persistence also permits the display of low repetition rate pulses without flickering; and using the longest persistence, intermittent signals can be captured and displayed. The storage capability allows side-by-side comparison of changing signals.

3-15. Persistence and Intensity

CAUTION

Excessive INTENSITY may damage the CRT storage mesh.

3-16. These controls determine the appearance of the CRT trace. Specifically, PERSISTENCE controls the rate at which a trace is erased, and INTENSITY controls the trace brightness. With a given PERSISTENCE setting, a bright trace will persist longer than a dim trace.

3-17. Storage. These controls select the storage mode in which the CRT functions. In ERASE mode, STORE, WRITE, and MAX WRITE are disconnected and all written signals are removed from the CRT. The STORE selector disconnects the WRITE, MAX WRITE, and ERASE functions and implements signal retention at reduced intensity. In the STORE mode, PERSISTENCE and INTENSITY have no function.

3-18. Writing Speed. In the MAX WRITE mode, the CRT storage surface is primed to allow much faster writing on the storage surface. Since the erasing rate is decreased, the entire screen becomes illuminated more rapidly and the display is obscured. The effective persistence and storage times are thus considerably reduced. For this reason, MAX WRITE is not normally used with a spectrum analyzer plug-in.

3-19. Photographic Techniques

3-20. The HP Model 197A Oscilloscope Camera attaches directly to the spectrum analyzer's CRT bezel without adapters. Flood guns in the CRT provide background lighting of the display. When photography of stored traces (181T/TR) is required, a double exposure is needed. (Flood guns are turned off when STORE is pressed.) See Application Note AN 150-5 for full details.

OPERATING PRECAUTIONS

The spectrum analyzer is a sensitive measuring instrument. To avoid damage to the instrument, do not exceed the following Absolute Maximum Inputs:

Total Power: +20 dBm (100 mW, 2.24 Vrms)
Option 001: +25 dBm (316 mW, 3.98 Vrms)
Option 002: +74 dBmV (316 mV, 3.98 Vrms)

Overloading the input with too much power, peak voltages, or dc voltages will damage the input circuit and require expensive repairs.

CAUTION

While the analyzer's reference level may be set for power levels up to +60 dBm, the total input power must not exceed the absolute maximum limits listed.

FRONT PANEL ADJUSTMENT PROCEDURE

Whenever an HP 8557A Spectrum Analyzer plug-in is reinstalled in a different mainframe, the spectrum analyzer should be calibrated to ensure proper correlation between plug-in and display. It is good practice to execute this adjustment procedure periodically (recommended daily) to correct for changes in calibration which may occur over a period of time. These adjustments are also an excellent way for the new user to become acquainted with the spectrum analyzer. For reference, a front panel view appears in Figure 3-1.

If an HP 181 Variable Persistence Display is being used, begin by setting the PERSISTENCE maximum counterclockwise and pushing in the

WRITE button. Make the following spectrum analyzer settings.

Function	Setting
INPUT ATTEN (push knob to engage)	10 dB
REFERENCE LEVEL	0 dBm *002: +50 dBmV*
REF LEVEL FINE	0
Amplitude Scale	LIN
FREQ SPAN/DIV (uncoupled)	10 MHz
RESOLUTION BW (uncoupled)	1 MHz
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
START–CENTER	CENTER
TUNING	>60 MHz
BASELINE CLIPPER	OFF
VIDEO FILTER	OFF
180-series mainframes:	
DISPLAY	INT (out)
MAGNIFIER	X1 (out)
SCALE (180TR, 182T)	OFF
PERSISTENCE (181T/TR)	MIN (ccw)
Display Mode (181T/TR)	WRITE)

DISPLAY ADJUSTMENTS

1. With an adjustment tool, adjust VERTICAL POSN to place the CRT trace on a horizontal graticule line near center of CRT.

2. Reduce the INTENSITY and set the SWEEP TIME/DIV control to MAN. Adjust the MAN SWEEP knob to bring dot to center of CRT.

CAUTION

Leaving a dot on the CRT for prolonged periods at high intensity may burn the phosphor.

3. Adjust the FOCUS and ASTIG controls for the smallest round dot possible.

4. Reset the SWEEP TIME/DIV control to AUTO and increase the INTENSITY for an optimum CRT trace. Center the trace horizontally with the HORIZONTAL POSITION control. If the horizontal deflection is not exactly 10 divisions, adjust the HORIZ GAIN control (located on the spectrum analyzer rear panel) for a 10 division (wide) horizontal deflection.

NOTE

The analyzer must be removed from the mainframe to adjust the HORIZ GAIN control.

5. Adjust the TRACE ALIGN so that the CRT trace is parallel with the horizontal graticule lines.

6. Adjust the VERTICAL POSN until the trace aligns with the bottom graticule line.

FREQUENCY ADJUSTMENTS

7. Center the LO feedthrough – the 'signal' at 0 MHz – on the CRT with the TUNING control.

8. Narrow the FREQ SPAN/DIV to 200 kHz. Adjust the REFERENCE LEVEL and the REF LEVEL FINE controls as necessary to position the signal peak near the top CRT graticule line.

9. Re-center the LO feedthrough, if necessary, and adjust FREQ ZERO to calibrate the FREQUENCY MHz readout at 00.0 MHz.

AMPLITUDE ADJUSTMENTS

10. Set the FREQ SPAN/DIV control to 1 MHz and the REF LEVEL FINE control to 0. Adjust the TUNING control for a FREQUENCY MHz readout of approximately 250 MHz.

11. Press the 10dB/DIV Amplitude Scale pushbutton, and set the REFERENCE LEVEL control to −20 dBm (+30 dBmV for Option 002).

CAUTION

The HP 8557A Options 001 and 002 feature 75-ohm (female) INPUT and CAL OUTPUT connectors. Standard 50-ohm BNC cables and adapters should not be used with these connectors since damage might result.

12. Connect the 250 MHz CAL OUTPUT to the spectrum analyzer input and center the signal on the CRT with the TUNING control. The FREQUENCY MHz readout will indicate 250 MHz ±3 MHz.

13. Press the LIN Amplitude Scale pushbutton. Adjust the REF LEVEL FINE control to place the signal peak at the top CRT graticule line.

14. Press the 10 dB/DIV Amplitude Scale pushbutton. Adjust VERTICAL GAIN to place the signal peak at the top CRT graticule line.

15. Repeat steps 13 and 14 until the signal peak remains at the top CRT graticule line when the Amplitude Scale is alternated between 10 dB/DIV and LIN.

16. Set the REF LEVEL FINE control to 0 and the REFERENCE LEVEL control to −30 dBm (+20 dBmV for Option 002).

17. Press the LIN Amplitude Scale pushbutton and adjust REF LEVEL CAL to place the signal peak at the top CRT graticule line.

Once the Front Panel Adjustment Procedure is completed, the spectrum analyzer is calibrated for absolute amplitude and frequency measurements.

FRONT PANEL FEATURES

1. VERTICAL POSN: Adjusts vertical position of CRT trace.

2. VERTICAL GAIN: Adjusts deflection circuit gain for amplitude scale calibration of CRT display.

3. FREQ ZERO: Adjusts FREQUENCY MHz (18) readout for calibration on LO feedthrough.

4. BASELINE CLIPPER: Blanks lower portion of CRT display. Prevents CRT blooming with a variable persistence storage display mainframe (i.e. 181T/TR).

5. VIDEO FILTER: Post-detection low-pass filter smooths CRT trace by averaging random noise. Filter bandwidth scaled by resolution bandwidth (13) setting. MAX (detent) position selects 1.5 Hz bandwidth for maximum noise averaging and noise level measurements. MAX VIDEO FILTER should **not** be used for CW signal analysis.

6. SWEEP Indicator: Remains lit during each sweep.

7. SWEEP TRIGGER: Selects sweep trigger mode.

   VIDEO: Sweep triggered on internal post-detection video waveform. One-half major division of vertical deflection (noise, AM signal, etc.) required to trigger sweep. Normally used with 0 (zero) frequency span for time-domain analysis.

   LINE: Sweep triggered at ac line frequency.

   FREE RUN: End of each sweep triggers new sweep.

   SINGLE: Single sweep triggered or reset by turning SWEEP TRIGGER clockwise momentarily.

8. INPUT 50Ω: Precision type N (female) signal input connector with 50-ohm input impedance.
   Options 001 and 002: INPUT 75Ω-75-ohm BNC (female) signal input connector.

   CAUTION

   50-ohm BNC connectors might cause damage if used directly with Option 001 and 002 75-ohm BNC INPUT and CAL OUTPUT connectors.

9. PROBE POWER: Provides power for high-impedance active probes such as the HP 1121A. (See Section I of HP 8557A Operation and Service Manual for details regarding use with Options 001 and 002.)

10. SWEEP TIME/DIV: Selects time required to sweep one major horizontal division on CRT.

    AUTO: Automatically selects fastest allowable sweep time as a function of FREQ SPAN/DIV(11), RESOLUTION BW (13), and VIDEO FILTER (5) settings to maintain display amplitude calibration. AUTO operation retained with FREQ SPAN/DIV and RESOLUTION BW controls uncoupled.

    TIME/DIV: Selects calibrated sweep time; used primarily with 0 (Zero) frequency span for time-domain analysis of modulation waveforms. Display amplitude calibration not automatically guaranteed for other frequency spans.

    MAN: Enables manual frequency scan using MAN SWEEP knob.

11. FREQ SPAN/DIV: Selects CRT horizontal axis frequency calibration.

    MHz/DIV
    kHz/DIV: Selects desired frequency span. Alignment of OPTIMUM markings (><) selects optimum resolution bandwidth (13).

    0 (Zero Span): Spectrum analyzer operates as a manually-tuned receiver, at frequency indicated by FREQUENCY MHz readout, for time-domain display of signal modulation. 16 calibrated sweep times selectable with SWEEP TIME/DIV control (10).

12. REF LEVEL CAL: Adjusts spectrum analyzer RF gain to calibrate top CRT graticule line for absolute amplitude measurements.

13. RESOLUTION BW: Selects spectrum analyzer 3-dB bandwidth. Alignment of OPTIMUM markings (><) automatically selects optimum resolution bandwidth for any frequency span. Control pushes in to couple mechanically with FREQ SPAN/DIV.

14. CAL OUTPUT: BNC output provides 250 MHz, −30 dBm calibration signal from 50Ω output impedance.
    Option 001: 250 MHz, −30 dBm calibration signal from 75Ω output impedance.
    Option 002: 250 MHz, +20 dBmV calibration signal from 75Ω output impedance.

    CAUTION

    50-ohm BNC connectors might cause damage if used directly with Option 001 and 002 75-ohm BNC INPUT and CAL OUTPUT connectors.

15. 10 dB/DIV – 1dB/DIV – LIN (Amplitude Scale): Selects CRT vertical axis amplitude calibration (logarithmic or linear scale). Reference Level remains constant at top CRT graticule line.

16. REFERENCE LEVEL: Adjusts power level (in dBm or dBmV) represented by top CRT graticule line. Large outer knob provides adjustment in calibrated 10-dB steps; FINE vernier provides 12 dB of continuous adjustment.

17. INPUT ATTEN: Selects desired RF input attenuation, indicated by blue numbers (push and turn).

18. FREQUENCY MHz: Displays spectrum analyzer start or center frequency. Automatically ranges at approximately 195 MHz for increased resolution at lower frequencies.

19. START-CENTER: Selects mode of FREQUENCY MHz (18) readout.

20. TUNING: Adjusts spectrum analyzer start or center frequency. Coarse tuning is provided by large knob; smaller knob provides FINE tuning.

180-Series Display Mainframes

21. CALIBRATOR (180TR, 182T): Provides 1 kHz square wave at two amplitudes: 250 mV and 10V p-p (not used with spectrum analyzer).

22. Ground Connection (180TR, 182T): Provides chassis ground connection point.

23. SCALE (180TR, 182T): Adjusts CRT graticule illumination.

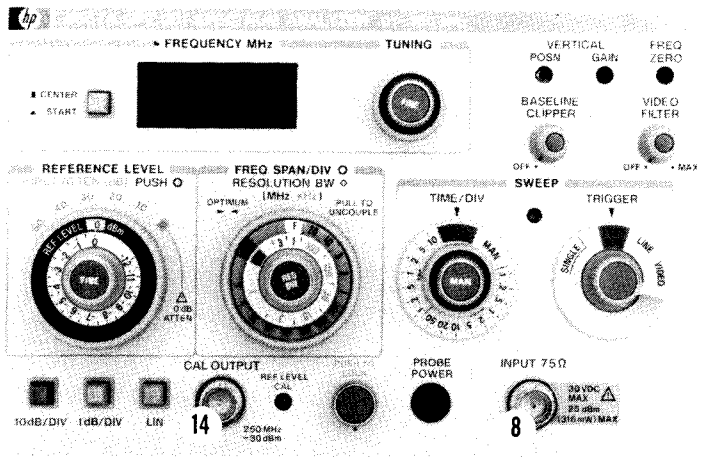
24. TRACE ALIGN: Adjusts CRT trace alignment with horizontal graticule lines.

25. FOCUS: Adjusts CRT trace sharpness.

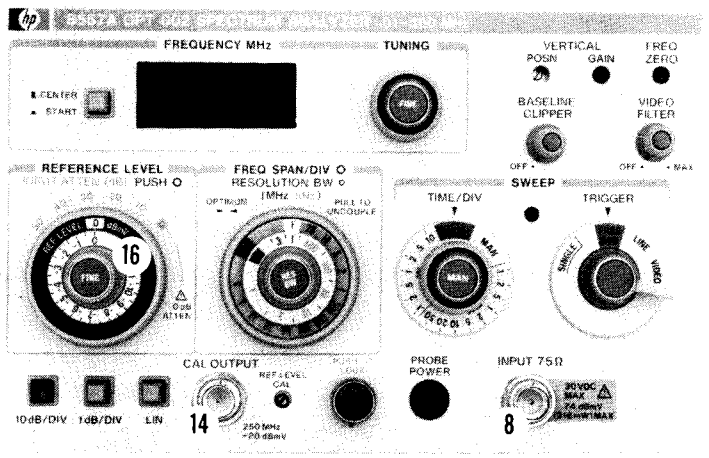
26. ASTIG: Adjusts CRT spot shape.

27. INTENSITY: Adjusts CRT trace intensity.

28. FIND BEAM: Intensifies trace and forces on-screen display (normally not used with spectrum analyzer).



HP 8557A Front Panel, Option 001



HP 8557A Front Panel, Option 002

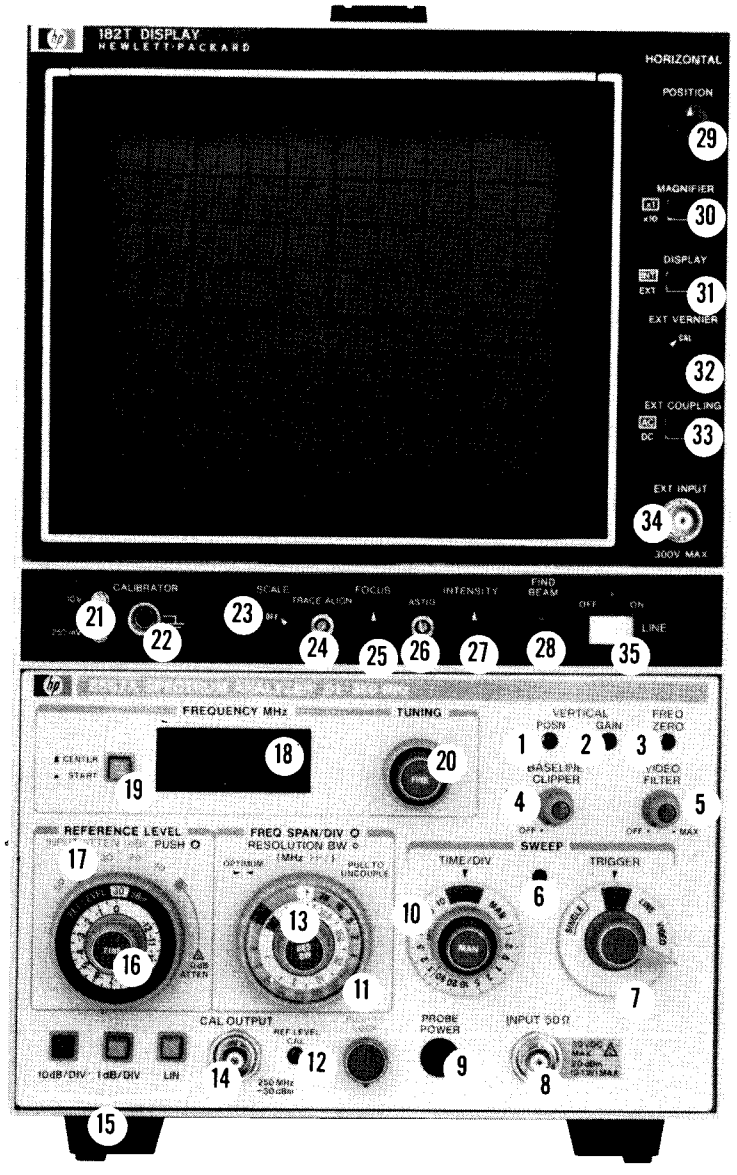


Figure 3-1. HP 8557A Front Panel Features

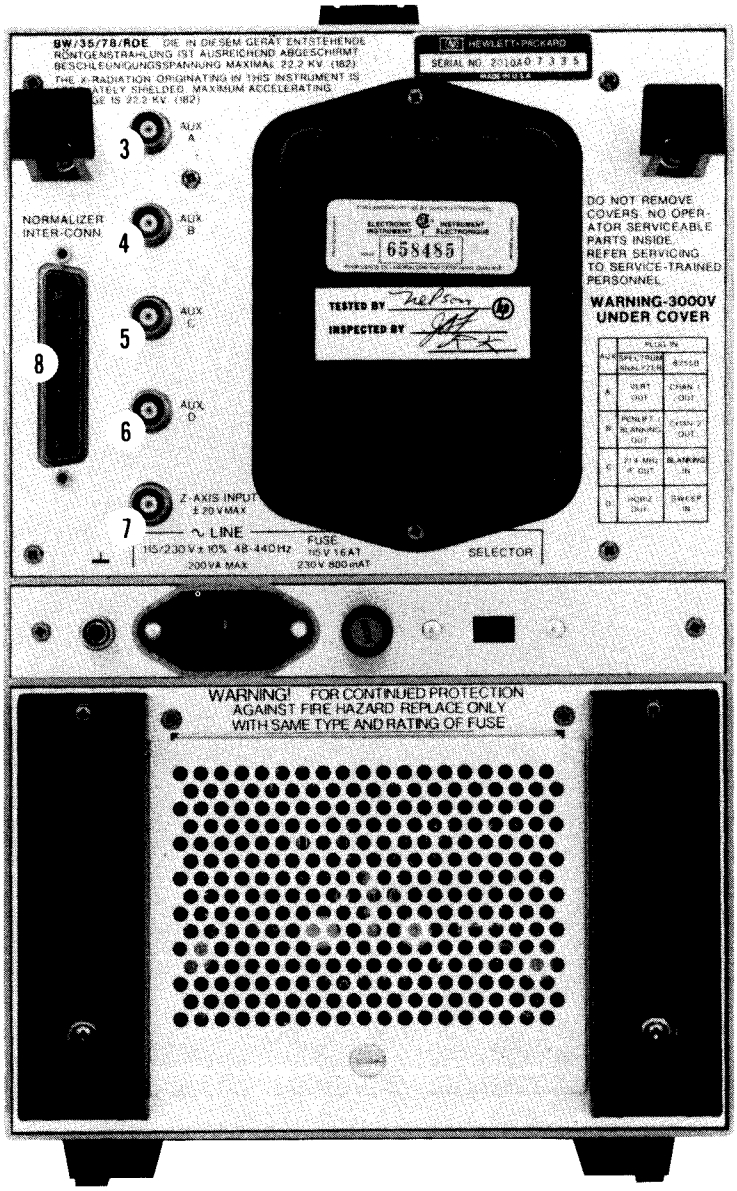


Figure 3-2. Rear Panel Controls and Connectors (2 of 2)

SECTION IV
PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. The procedures in this section test the electrical performance of the instrument against the specifications in Section I. The performance tests included in this section are listed in Table 4-1. Most of the tests can be performed without access to the interior of the instrument. If a test measurement is marginal, perform the appropriate adjustment procedures in Section V.

Table 4-1. Performance Tests

Paragraph	Test
4-11	Frequency Span Accuracy
4-12	Tuning Accuracy
4-13	Residual FM
4-14	Noise Sidebands
4-15	Resolution Bandwidth Accuracy
4-16	Resolution Bandwidth Selectivity
4-17	Average Noise Level
4-18	Spurious Responses
4-19	Residual Response
4-20	Frequency Response
4-21	Amplitude Variation with Bandwidth
4-22	Input Attenuator Accuracy
4-23	Reference Level Accuracy
4-24	Amplitude Log Display
4-25	Calibrator Accuracy

4-3. INSTRUMENTS TESTED

4-4. Since a 180-series Display mainframe is required for operation of the HP Model 8557A Spectrum Analyzer plug-in, the specifications listed in Table 1-1 apply when both instruments are functioning together. Consequently, the performance tests in this section verify the proper operation of both the HP 8557A and the particular 180-series Display mainframe used.

4-5. EQUIPMENT REQUIRED

4-6. The equipment required for the performance tests is listed under Recommended Test Equipment in Section I. Any equipment that satisfies the critical specifications given in the table may be substituted for the recommended model.

4-7. TEST RECORD

4-8. Results of the performance tests may be tabulated in the Performance Test Record at the end of this section. The test record lists test specifications and acceptable limits.

4-9. CALIBRATION CYCLE

4-10. This instrument requires periodic calibration. Calibration should be verified every six months by means of the performance tests.

PERFORMANCE TESTS

NOTE

Perform Front Panel Adjustment Procedure in Section III before proceeding with Performance Tests. Allow at least 30 minutes warm-up time.

4-11. FREQUENCY SPAN ACCURACY TEST

SPECIFICATION:

There are twelve calibrated spans from 20 MHz/div to 5 kHz/div in a 1, 2, 5 sequence. In 'F' or full span the analyzer displays the full 10 kHz to 350 MHz spectrum. In '0' the analyzer is a fixed-tuned receiver. Frequency error between any two points on the display is less than ±10% of the indicated frequency separation.

DESCRIPTION:

Wide span widths are checked by using the 100 MHz, 10 MHz and 1 MHz outputs from a comb generator. Narrow span widths are checked by using the output from a comb generator modulated by a function generator. Since the comb generator produces frequency components separated by a precisely determined frequency interval, the resultant spectral lines displayed on the CRT are evenly spaced when no span error exists in the instrument. Thus, span error is the cumulative variance of distance among the spectral line intervals displayed across the CRT. The amount of span error is determined by comparing the distance of the first eight graticule divisions to the display distance of the corresponding spectral line intervals.

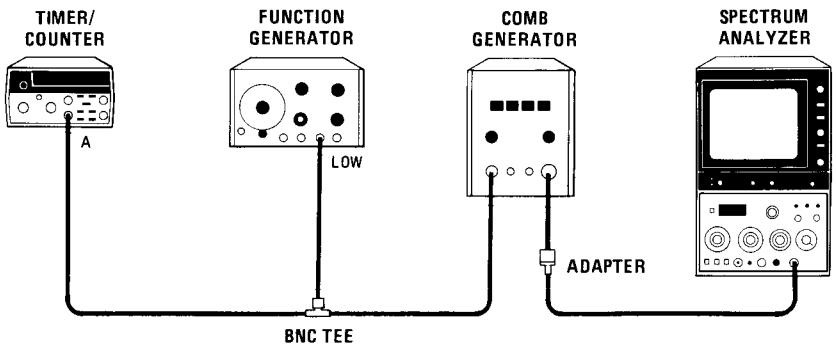


Figure 4-1. Frequency Span Accuracy Test Setup

EQUIPMENT:

Comb Generator	HP 8406A
Timer/Counter	HP 5308
Function Generator	HP 3310A
BNC Cable, 120 cm (48 in) (3 required)	HP 10503A
BNC Tee	HP 1250-0781

PERFORMANCE TESTS

4-11. FREQUENCY SPAN ACCURACY TEST (Cont'd)

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

   START – CENTER ..... CENTER
   TUNING ..... 175 MHz
   FREQ SPAN/DIV ..... F
   RESOLUTION BW ..... OPTIMUM coupled (pushed in)
   INPUT ATTEN ..... 0 dB
   REFERENCE LEVEL ..... –20 dBm
   002: +30 dBmV
   Amplitude Scale ..... 10 dB/DIV
   SWEEP TIME/DIV ..... AUTO
   SWEEP TRIGGER ..... FREE RUN
   BASELINE CLIPPER ..... OFF
   VIDEO FILTER ..... OFF

   Comb Generator:

   COMB FREQUENCY – MHz ..... 100 MC
   INTERPOLATION AMPLITUDE – 1 MHz ..... OFF
   OUTPUT AMPLITUDE ..... Fully clockwise

   Function Generator:

   RANGE 10K
   FUNCTION ..... SQ
   DC OFFSET 0

   Timer/Counter:

   FUNCTION ..... FREQ A
   TIME BASE 1s

2. Connect equipment as shown in Figure 4-1, but do not connect function generator to comb generator.

3. The display should appear as shown in Figure 4-2, indicating correct full span operation. Note presence of tuning marker at center screen.

4. Set spectrum analyzer FREQ SPAN/DIV to 20 MHz, RESOLUTION BW to OPTIMUM, and comb generator to 10 MHz comb frequency. Adjust spectrum analyzer TUNING control to position one spectral line (from comb generator) at the first graticule line (far left) of display. Measure error between seventeenth spectral line and ninth graticule line. Error should be ±0.8 division, maximum. (See Figure 4-3.)

   _____div

4-11. FREQUENCY SPAN ACCURACY TEST (Cont'd)

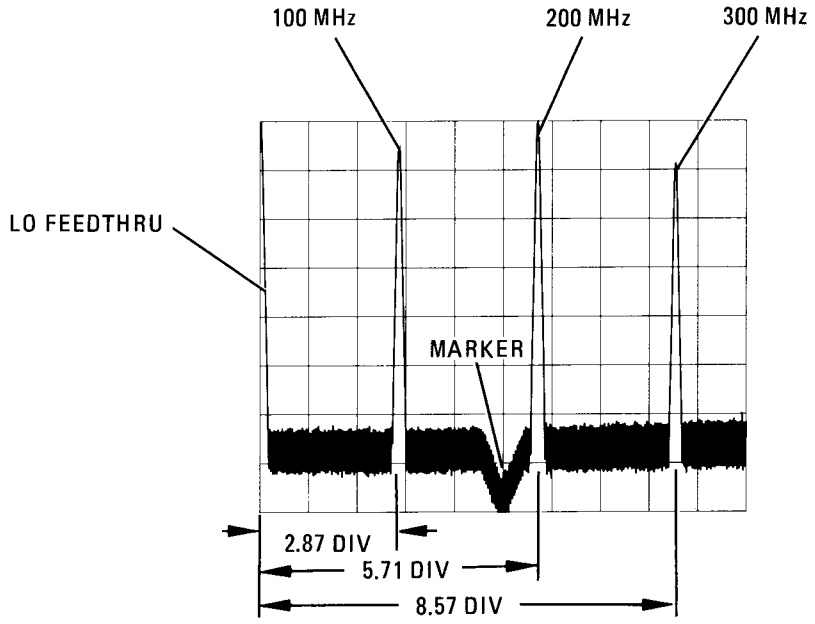


Figure 4-2. Full Span Display

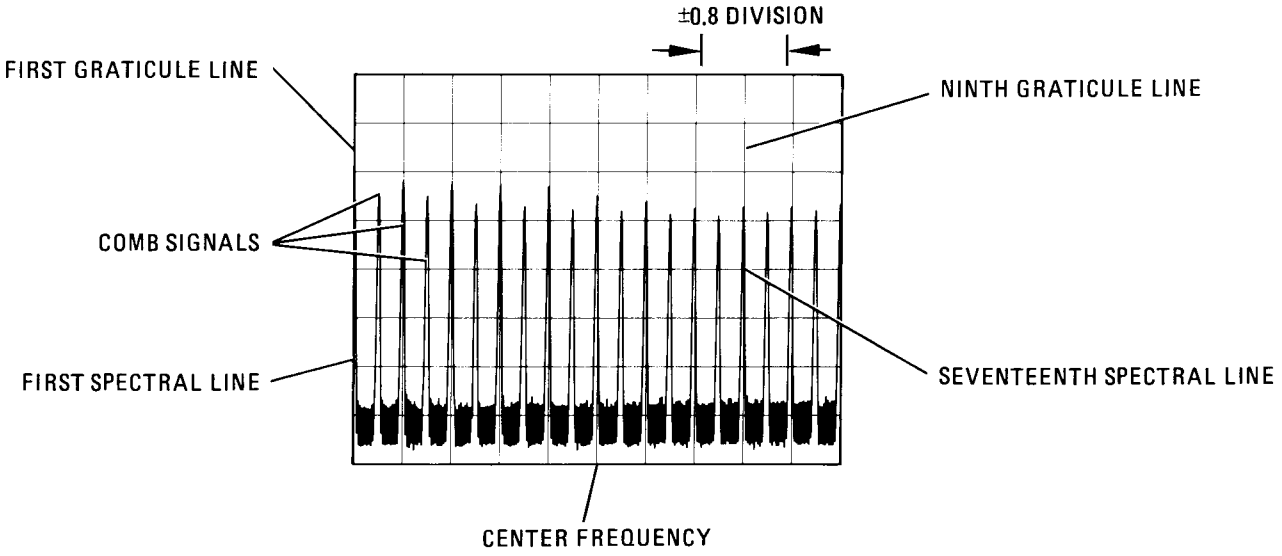


Figure 4-3. Frequency Span Accuracy Measurement for Seventeenth Spectral Line

4-11. FREQUENCY SPAN ACCURACY TEST (Cont'd)

5. Set FREQ SPAN/DIV to 10 MHz and RESOLUTION BW to OPTIMUM. Adjust TUNING control to position one spectral line (from comb generator) at the first graticule line (far left) of display. Measure error between ninth spectral line and ninth graticule line. Error should be ±0.8 division, maximum. (See Figure 4-4.)

_____ div

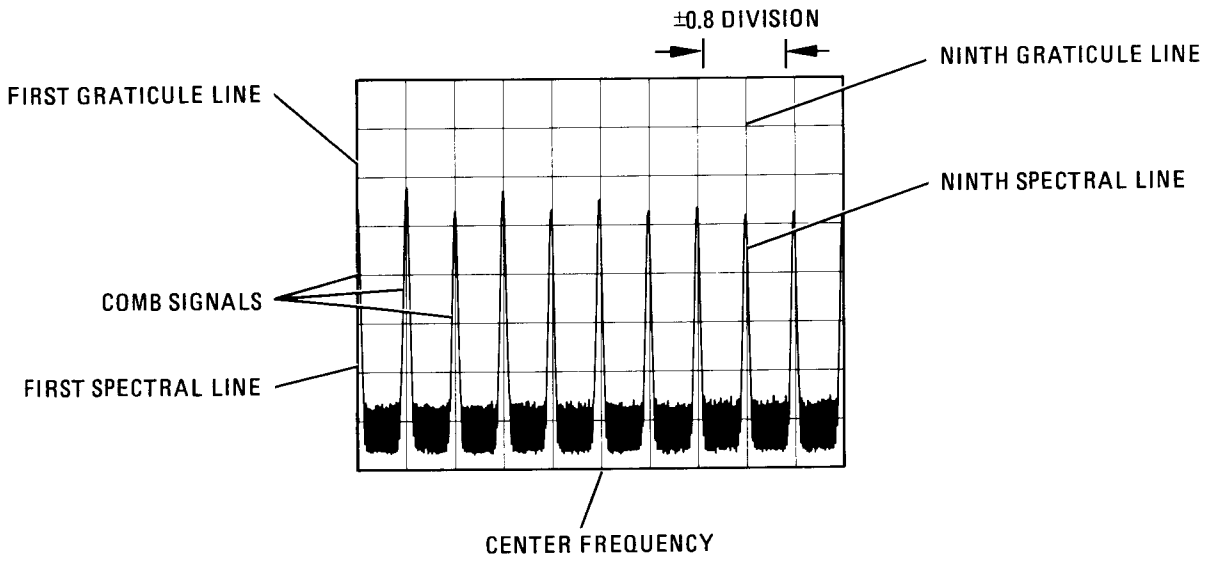


Figure 4-4. Frequency Span Accuracy Measurement for Ninth Spectral Line

6. Set FREQ SPAN/DIV to 5 MHz and RESOLUTION BW to OPTIMUM. Adjust TUNING control to position one spectral line at first graticule line. Measure error between fifth spectral line and ninth graticule line. Error should be ±0.8 division, maximum.

_____ div

7. Set comb generator comb frequency for 1 MHz comb. Set spectrum analyzer FREQ SPAN/DIV to 2 MHz and RESOLUTION BW to OPTIMUM. Adjust TUNING control to position one spectral line at first graticule line. Measure error between seventeenth spectral line and ninth graticule line. Error should be ±0.8 division, maximum.

_____ div

8. Set FREQ SPAN/DIV to 1 MHz and RESOLUTION BW to OPTIMUM. Adjust TUNING control to position one spectral line at first graticule line. Measure error between ninth spectral line and ninth graticule line. Error should be ±0.8 division, maximum.

_____ div

PERFORMANCE TESTS

4-11. FREQUENCY SPAN ACCURACY TEST (Cont'd)

9. Set FREQ SPAN/DIV to 500 kHz and RESOLUTION BW to OPTIMUM. Adjust TUNING control to position one spectral line at first graticule line. Measure error between fifth spectral line and ninth graticule line. Error should be ±0.8 division, maximum.

_____div

10. Set comb generator comb frequency for 10 MHz comb and adjust spectrum analyzer TUNING control to position a 10 MHz spectral line at first graticule line. Connect function generator LOW output, set at 200 kHz, to the comb generator MODULATION input. Set function generator OUTPUT LEVEL control for a clean 200 kHz comb on the 8557A display (approximately mid-position).

NOTE

It may be necessary to readjust function generator OUTPUT LEVEL control, comb generator OUTPUT AMPITUDE control, and spectrum analyzer TUNING control to obtain desired presentation of comb.

Set spectrum analyzer FREQ SPAN/DIV to 200 kHz and RESOLUTION BW to OPTIMUM. Adjust TUNING control to position one spectral line at first graticule line. Measure error between ninth spectral line and ninth graticule line. Error should be ±0.8 division, maximum.

_____div

11. Using procedure of step 10, vary spectrum analyzer FREQ SPAN/DIV and function generator output frequency in accordance with Table 4-2. Adjust spectrum analyzer TUNING control to position one spectral line at first graticule line. Measure the span error between the ninth spectral line and the ninth graticule line.

Table 4-2. Narrow Span Width Error Measurement

Spectrum Analyzer		Function Generator Output Frequency[1]	Allowable Error (Max.)
FREQ SPAN/DIV	RESOLUTION BW		
100 kHz	OPTIMUM	100 kHz	±0.8 division
50 kHz	OPTIMUM	50 kHz	±0.8 division
20 kHz	OPTIMUM	20 kHz	±0.8 division
10 kHz	OPTIMUM	10 kHz	±0.8 division
5 kHz	OPTIMUM	5 kHz	±0.8 division

[1] Check Function Generator output frequency using a frequency counter. Frequency readout should be within ±0.5% of desired frequency.

PERFORMANCE TESTS

4-12. TUNING ACCURACY TEST

SPECIFICATION:

±3 MHz plus 10% of FREQ SPAN/DIV setting

DESCRIPTION:

A comb generator is used to provide 1, 10, or 100 MHz frequency components that produce spectral lines on the CRT at 1, 10, or 100 MHz intervals, respectively. The spectrum analyzer TUNING control is adjusted until the desired test frequency is shown on the digital frequency readout. The comb tooth for that particular frequency is then set to the center graticule line. The error is read on the FREQUENCY MHz readout.

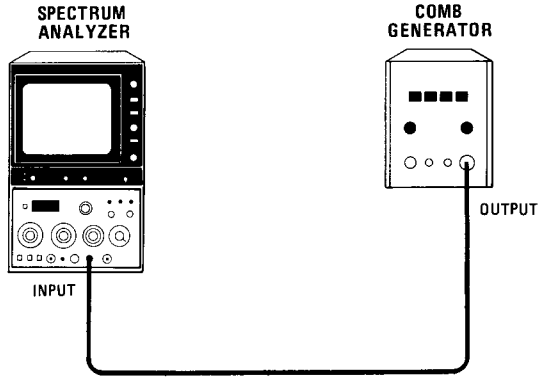


Figure 4-5. Tuning Accuracy Test Setup

EQUIPMENT:

Comb Generator	HP 8406A
BNC Cable, 120 cm (48 in)	HP 10503A

PROCEDURE:

1. Set spectrum analyzer controls as follows:

START – CENTER	CENTER
FREQ SPAN/DIV	1 MHz
RESOLUTION BW	OPTIMUM coupled (pushed in)
INPUT ATTEN	0 dB
REFERENCE LEVEL	–20 dBm
002: +30 dBmV	
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
BASELINE CLIPPER	OFF
VIDEO FILTER	OFF
TUNING	0 MHz

4-12. TUNING ACCURACY TEST (Cont'd)

2. Adjust spectrum analyzer TUNING control to position LO feed-through signal at center graticule line. Adjust FREQUENCY ZERO control for zero indication on FREQUENCY MHz readout.

3. Connect equipment as shown in Figure 4-5.

4. Set comb generator control as follows:

COMB FREQUENCY – MHz ..... 10 MC
INTERPOLATION AMPLITUDE – 1 MHz ..... OFF
OUTPUT AMPLITUDE ..... Fully clockwise

5. Adjust spectrum analyzer TUNING control until digital frequency readout indicates 10.0 MHz. Set 10 MHz comb tooth, displayed on CRT, to center graticule line. FREQUENCY MHz readout should indicate 10.0 ±3.1 MHz.

Min.	Actual	Max.
6.9 MHz	_____	13.1 MHz

6. Using procedure of step 5, set spectrum analyzer TUNING control in accordance with Table 4-3 to measure tuning accuracy at settings listed.

Table 4-3. Tuning Accuracy Measurement

Initial FREQUENCY MHz Setting	SPECIFICATION (Comb tooth set to center graticule line) (MHz)		
	Min.	Actual	Max.
20.0	16.9	_____	23.1
40.0	36.9	_____	43.1
60.0	56.9	_____	63.1
80.0	76.9	_____	83.1
100.0	96.9	_____	103.1
120.0	116.9	_____	123.1
140.0	136.9	_____	143.1
160.0	156.9	_____	163.1
180.0	176.9	_____	183.1
200	197	_____	203
220	217	_____	223
240	237	_____	243
260	257	_____	263
280	277	_____	283
300	297	_____	303
320	317	_____	323
340	337	_____	343
350	347	_____	353

4-13. RESIDUAL FM TEST

SPECIFICATION:

Less than 1 kHz peak-to-peak for time ≤0.1 sec (VIDEO FILTER control fully clockwise but not in MAX detent)

DESCRIPTION:

This test measures the inherent short-term instability (residual FM) of the LO system in the spectrum analyzer. A stable signal applied to the input of the spectrum analyzer is slope-detected on the linear portion of the 10 kHz bandwidth filter in zero span (fixed-tuned receiver). (See Figure 4-6a.) Instability in the LO system is transferred to the IF signal in the mixing process. As the IF signal moves in relation to the center of the IF filter, the attenuation of the signal changes in accordance with the skirt characteristics of the filter. If the signal stays on the linear portion of the IF filter skirt, the amplitude of the IF signal applied to the final detector (and thus the level on the display) is linearly related to the frequency of the IF signal. (See Figure 4-6b.) Therefore, any variations in level seen on the display are linearly related to variations in LO frequency.

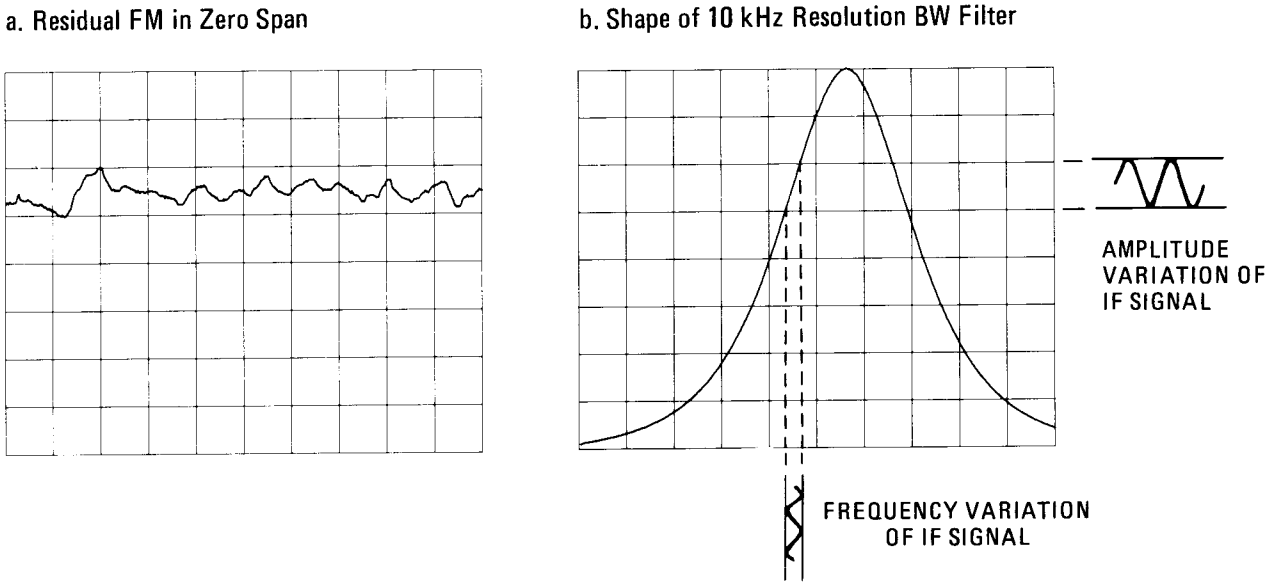


Figure 4-6. Description of Residual FM

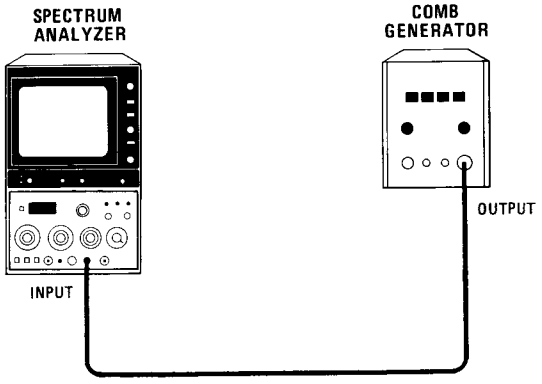


Figure 4-7. Residual FM Test Setup

PERFORMANCE TESTS

4-13. RESIDUAL FM TEST (Cont'd)

EQUIPMENT:

Comb Generator	HP 8406A
BNC Cable, 120 cm (48 in)	HP 10503A

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

START – CENTER	CENTER
FREQ SPAN/DIV	200 kHz
RESOLUTION BW	10 kHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	–20 dBm
002: +30 dBmV	
Amplitude Scale	LIN
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
BASELINE CLIPPER	OFF
VIDEO FILTER	OFF

   Comb Generator:

COMB FREQUENCY – MHz	100 MC
INTERPOLATION AMPLITUDE – 1 MHz	OFF
OUTPUT AMPLITUDE	Fully clockwise

2. Connect OUTPUT of comb generator to spectrum analyzer INPUT as shown in Figure 4-7.

3. Adjust spectrum analyzer TUNING control to locate on CRT display the 300 MHz signal produced by comb generator output. Adjust REFERENCE LEVEL and REF LEVEL FINE controls to bring the signal to the top graticule line.

4. While keeping 300 MHz signal centered on CRT display, reduce FREQ SPAN/DIV to zero.

5. Set RESOLUTION BW to 10 kHz, and SWEEP TIME/DIV to .1 sec.

6. Slightly readjust spectrum analyzer fine TUNING control until trace appears between fourth and seventh graticule from the bottom on CRT. Peak-to-peak variation of trace should not exceed one division vertical for each horizontal division. (See Figure 4-6a.)

_____div

PERFORMANCE TESTS

4-14. NOISE SIDEBANDS TEST

SPECIFICATION:

More than 75 dB below CW signal, 50 kHz or more away from signal with a 1 kHz resolution bandwidth and full video filter.

DESCRIPTION:

A stable 300 MHz signal is applied to the spectrum analyzer and displayed on the CRT. The amplitudes of noise-associated sidebands and unwanted responses near the signal are measured.

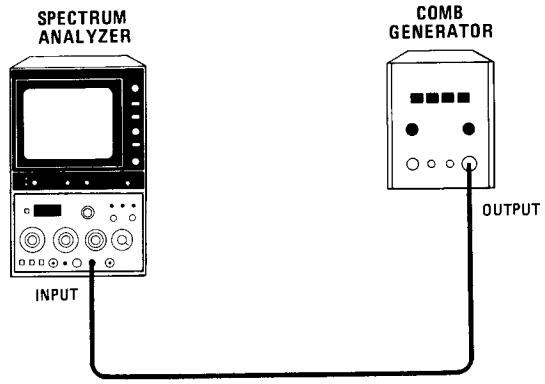


Figure 4-8. Noise Sidebands Test Setup

EQUIPMENT:

Comb Generator	HP 8406A
BNC Cable, 120 cm (48 in)	HP 10503A

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

START – CENTER	CENTER
TUNING	300 MHz
FREQ SPAN/DIV	1 MHz
RESOLUTION BW	30 kHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	–20 dBm
002: +30 dBmV	
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
BASELINE CLIPPER	OFF
VIDEO FILTER	OFF

4-14. NOISE SIDEBANDS TEST (Cont'd)

Comb Generator:

COMB FREQUENCY – MHz ..... 100 MHz
INTERPOLATION AMPLITUDE – 1 MHz ..... OFF
OUTPUT AMPLITUDE ..... Fully clockwise

2. Connect equipment as shown in Figure 4-8.

3. Adjust TUNING control as required to locate 300 MHz comb tooth on CRT.

4. Adjust REFERENCE LEVEL and REF LEVEL FINE controls as required to position top of 300 MHz signal on top graticule line; then increase REFERENCE LEVEL control by 10 dB (signal then 10 dBm off screen),

5. Decrease FREQ SPAN/DIV and RESOLUTION BW controls until FREQ SPAN/DIV is 20 kHz and RESOLUTION BW is 1 kHz.

6. Position signal at center of display. Set VIDEO FILTER control as required between center and fully clockwise position (not in MAX detent). Measure noise sidebands existing more than 2.5 divisions (50 kHz) from 300 MHz signal. Noise sidebands should be greater than 65 dB down from top graticule line (6.5 divisions), or 75 dB down from 300 MHz signal.

PERFORMANCE TESTS

4-15. RESOLUTION BANDWIDTH ACCURACY TEST

SPECIFICATION:

Individual resolution bandwidth 3 dB points calibrated to ±20% (10°C – 40°C).

DESCRIPTION:

Resolution bandwidth accuracy is measured in the linear mode to eliminate log amplifier errors. Since half power is represented by a voltage ratio of 0.707:1, 5 divisions on the spectrum analyzer display represents half power (3 dB) points for a 7.1 division display.

$$0.707 \text{ (voltage ratio)} = \text{x div}/7.1 \text{ div}$$

$$\text{x div} = (7.1)(0.707)$$

$$= 5 \text{ div}$$

In the 1, 10, and 30 kHz bandwidths, a 21.4 MHz signal is injected into Preamplifier A6 to provide the stability required for measurement of the narrow resolution bandwidths.

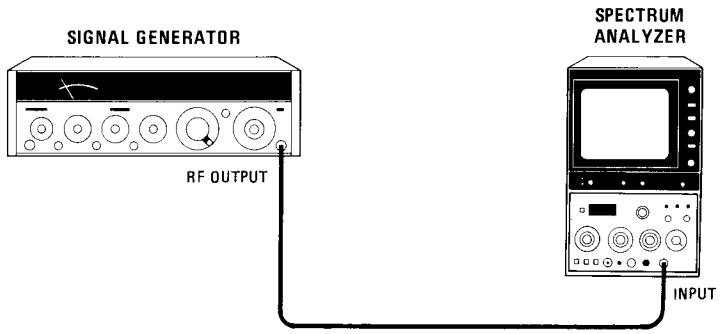


Figure 4-9. Resolution Bandwidth Accuracy Test Setup, 100 kHz to 3 MHz

EQUIPMENT:

Signal Generator	HP 8640B
Extender Cable Assembly	HP 5060-0303
Test Cable, SMC (f) to BNC (m)	HP 11592-60001

4-15. RESOLUTION BANDWIDTH ACCURACY TEST (Cont'd)

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

   START – CENTER ..... CENTER
   TUNING ..... 10 MHz
   FREQ SPAN/DIV 0
   RESOLUTION BW ..... 3 MHz
   INPUT ATTEN ..... 20 dB
   REFERENCE LEVEL ..... 0 dBm
   002: +50 dBmV
   Amplitude Scale ..... LIN
   SWEEP TIME/DIV ..... 5 mSEC
   SWEEP TRIGGER ..... FREE RUN
   BASELINE CLIPPER ..... OFF
   VIDEO FILTER ..... OFF

   Signal Generator:

   COUNTER MODE ..... INT, EXPAND X10
   AM ..... OFF
   FM ..... OFF
   FREQUENCY TUNE ..... 10 MHz
   OUTPUT LEVEL ..... 0 dBm

2. Connect equipment as shown in Figure 4-9.

3. Adjust spectrum analyzer TUNING control to locate peak of 10 MHz signal on CRT. Reduce signal generator output if necessary.

4. Adjust signal generator output level to position trace at 7.1 divisions above graticule baseline.

5. Tune signal generator frequency until trace drops to 5 divisions above graticule baseline. Record the frequency displayed on the 8640B.

   _____MHz

6. Tune signal generator frequency in opposite direction of step 5 until trace peaks (7.1 divisions above graticule baseline) and then drops to 5 divisions above graticule baseline. Record frequency displayed on the 8640B.

   _____MHz

7. The difference between results of steps 5 and 6 is the measured resolution bandwidth at 3 dB points.

Min.	Actual	Max.
2.40 MHz	_____	3.60 MHz

4-15. RESOLUTION BANDWIDTH ACCURACY TEST (Cont'd)

8. Set RESOLUTION BW control to 1 MHz, leaving FREQ SPAN/DIV control set to 0. Set signal generator to 10 MHz and repeat steps 3 through 7.

Min.	Actual	Max.
800 kHz	_____	1.20 MHz

9. Set RESOLUTION BW control to 300 kHz, leaving FREQ SPAN/DIV control set to 0. Set signal generator to 10 MHz and repeat steps 3 through 7.

Min.	Actual	Max.
240 kHz	_____	360 kHz

10. Set RESOLUTION BW control to 100 kHz, leaving FREQ SPAN/DIV control set to 0. Set signal generator to 10 MHz and repeat steps 3 through 7.

Min.	Actual	Max.
80 kHz	_____	120 kHz

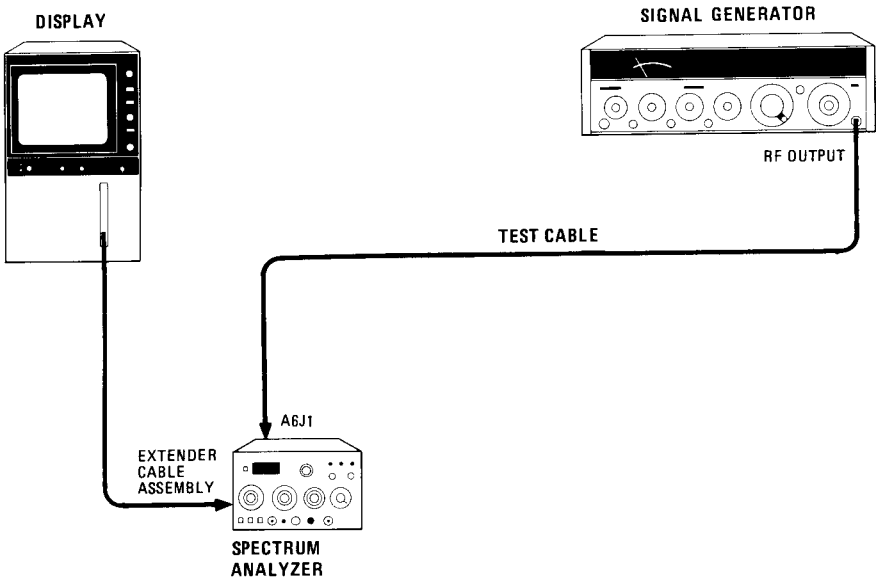


Figure 4-10. Resolution Bandwidth Accuracy Test Setup, 1 kHz to 30 kHz

PERFORMANCE TESTS

4-15. RESOLUTION BANDWIDTH ACCURACY TEST (Cont'd)

WARNING

The following performance test requires the HP 8557A to be removed from the display mainframe and connected through the extender cable assembly. Be very careful; the energy at some points in the instrument might, if contacted, cause personal injury. This test should be performed only by a skilled person who knows the hazard involved.

11. Set signal generator output level to approximately −32 dBm. Set frequency for a readout of 21.4 MHz.

12. Set RESOLUTION BW control to 30 kHz. FREQ SPAN/DIV should remain at 0.

13. Connect equipment as shown in Figure 4-9. Remove W3P2 from A6J1. Connect signal generator through test cable to A6J1 (21.4 MHz Preamp input).

14. Adjust signal generator frequency until spectrum analyzer trace is at peak. Set signal generator output level to position trace at 7.1 divisions above graticule baseline.

15. Tune signal generator frequency until trace drops to 5 divisions above graticule baseline. Record frequency displayed on the 8640B.

_____ MHz

16. Tune signal generator frequency in opposite direction of step 15 until trace peaks and then drops to 5 divisions above graticule baseline. Record frequency displayed on the 8640B.

_____ MHz

17. The difference between results of steps 15 and 16 is the measured resolution bandwidth at 3 dB points.

Min.	Actual	Max.
24 kHz	_____	36 kHz

18. Set RESOLUTION BW control to 10 kHz, leaving FREQ SPAN/DIV controls to 0. Repeat steps 14 through 17.

Min.	Actual	Max.
8 kHz	_____	12 kHz

4-15. RESOLUTION BANDWIDTH ACCURACY TEST (Cont'd)

19. Set RESOLUTION BW control to 3 kHz, leaving FREQ SPAN/DIV control set to 0. Repeat steps 14 through 17.

Min.	Actual	Max.
2.4 kHz	_____	3.6 kHz

20. Set RESOLUTION BW control to 1 kHz, leaving FREQ SPAN/DIV control set to 0. Repeat steps 14 through 17.

Min.	Actual	Max.
0.8 kHz	_____	1.2 kHz

21. Reconnect W3P2 to A6J1 unless continuing with next performance test.

PERFORMANCE TESTS

4-16. RESOLUTION BANDWIDTH SELECTIVITY TEST

SPECIFICATION:

60 dB/3 dB resolution bandwidth ratio < 15:1

DESCRIPTION:

The 60 dB bandwidth is measured for all RESOLUTION BW control settings. The 60 dB to 3 dB resolution bandwidth ratio is then computed by dividing the 3 dB bandwidth values from the RESOLUTION BANDWIDTH ACCURACY TEST into the 60 dB bandwidth values of this test for each RESOLUTION BW control setting.

In the 1, 10, and 30 kHz bandwidths, a 21.4 MHz signal is injected into Preamplifier A6 to provide the stability required for measurement of the narrow resolution bandwidths.

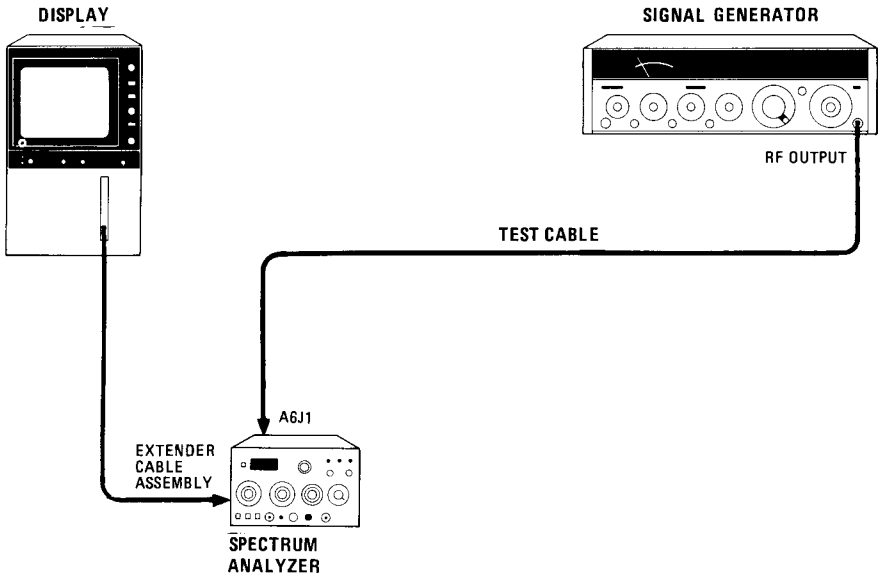


Figure 4-11. Resolution Bandwidth Selectivity Test Setup, 1 kHz to 30 kHz

WARNING

The following performance test requires the HP 8557A to be removed from the display mainframe and connected through the extender cable assembly. Be very careful; the energy at some points in the instrument might, if contacted, cause personal injury. This test should be performed only by a skilled person who knows the hazard involved.

EQUIPMENT:

Signal Generator	HP 8640B
Extender Cable Assembly	HP 5060-0303
Test Cable, SMC (f) to BNC (m)	HP 11592-60001

PERFORMANCE TESTS

4-16. RESOLUTION BANDWIDTH SELECTIVITY TEST (Cont'd)

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

   START – CENTER ..... CENTER
   TUNING ..... 50 MHz
   FREQ SPAN/DIV 0
   RESOLUTION BW ..... 1 kHz
   INPUT ATTEN ..... 0 dB
   REFERENCE LEVEL ..... –10 dBm
   002: +40 dBmV
   Amplitude Scale ..... 10 dB/DIV
   SWEEP TIME/DIV ..... 5 mSEC
   SWEEP TRIGGER ..... FREE RUN
   BASELINE CLIPPER ..... OFF
   VIDEO FILTER ..... Midrange

   Signal Generator:

   COUNTER MODE ..... INT, EXPAND X10
   AM ..... OFF
   FM ..... OFF
   FREQUENCY TUNE ..... 21.4 MHz
   OUTPUT LEVEL ..... –22 dBm

2. Connect equipment as shown in Figure 4-11.

3. Adjust signal generator frequency until spectrum analyzer trace is at peak. Set signal generator output level to postion trace at top graticule line.

4. Tune signal generator frequency until trace drops to two divisions above graticule baseline. Record the frequency displayed on the 8640B.

   _____MHz

5. Tune signal generator frequency in opposite direction of step 4 until trace peaks and then drops to 2 divisions above graticule baseline. Record the frequency displayed on the 8640B.

   _____MHz

6. The difference between results of steps 4 and 5 is the measured bandwidth at 60 dB points.

   _____ kHz

PERFORMANCE TESTS

4-16. RESOLUTION BANDWIDTH SELECTIVITY TEST (Cont'd)

7. Set RESOLUTION BW control to 3 kHz, leaving FREQ SPAN/DIV control set to 0. Repeat steps 3 through 6.

_____kHz

8. Set RESOLUTION BW control to 10 kHz, leaving FREQ SPAN/DIV control set to 0. Repeat steps 3 through 6.

_____kHz

9. Set RESOLUTION BW control to 30 kHz, leaving FREQ SPAN/DIV control set to 0. Repeat steps 3 through 6.

_____kHz

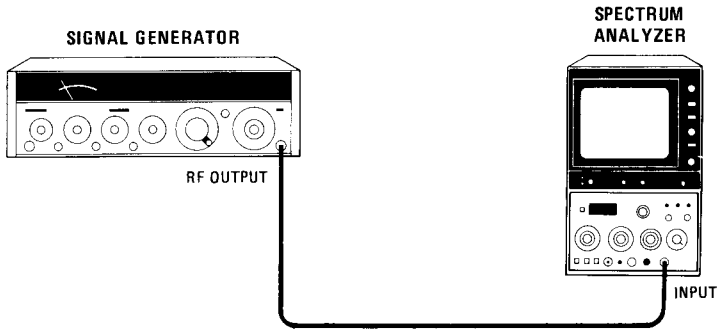


Figure 4-12. Resolution Bandwidth Selectivity Test Setup, 100 kHz to 3 MHz

10. Reconnect W3P2 to A6J1. Set oscilloscope line power to OFF and remove extender cable assembly. Plug HP 8557A into mainframe and set line power to ON. Set signal generator OUTPUT LEVEL to −10 dBm.

11. Set the spectrum analyzer INPUT ATTEN control to 0 and REFERENCE LEVEL control to −10 dBm. Set RESOLUTION BW control to 100 kHz. FREQ SPAN/DIV should remain at 0.

12. Connect equipment as shown in Figure 4-12.

13. Set signal generator FREQUENCY TUNE control for readout of 50 MHz. Adjust spectrum analyzer TUNING control to locate peak of 50 MHz signal on CRT.

14. Adjust signal generator OUTPUT LEVEL to position trace at top graticule line.

15. Tune signal generator frequency until trace drops to 2 divisions above graticule baseline. Record frequency displayed on the 8640B.

_____MHz

4-16. RESOLUTION BANDWIDTH SELECTIVITY TEST (Cont'd)

16. Tune signal generator frequency in opposite direction of step 15 until trace peaks and then drops to 2 divisions above graticule baseline. Record frequency displayed on the 8640B.

_____MHz

17. The difference between steps 15 and 16 is the measured bandwith at 60 dB point.

_____kHz

18. Set RESOLUTION BW control to 300 kHz leaving FREQ SPAN/DIV control set to 0. Repeat steps 13 through 17.

_____kHz

19. Set RESOLUTION BW control to 1 MHz leaving FREQ SPAN/DIV control set to 0. Repeat steps 13 through 17.

_____MHz

20. Set RESOLUTION BW control to 3 MHz leaving FREQ SPAN/DIV control set to 0. Repeat steps 13 through 17.

_____MHz

21. Record the measured 3 dB bandwidths from paragraph 4-15, steps 7 through 10 and steps 17 through 20 in Table 4-4.

22. Record the measured 60 dB bandwidths from paragraph 4-16, steps 6 through 9 and steps 17 through 20 in Table 4-4.

Table 4-4. Resolution Bandwidth Selectivity

RESOLUTION BW Setting	MEASURED 3 dB BW	MEASURED 60 dB BW	Resolution Bandwidth Ratio (60 dB BW:3 dB BW)
3 MHz			
1 MHz			
300 kHz			
100 kHz			
30 kHz			
10 kHz			
3 kHz			
1 kHz			

23. Compute Resolution Bandwidth Ratio for each RESOLUTION BW setting, dividing the measured 60 dB bandwidth by the measured 3 dB bandwidth for each setting. All ratios should be less than 15:1.

PERFORMANCE TESTS

4-17. AVERAGE NOISE LEVEL TEST

SPECIFICATION:

Maximum average noise level with 10 kHz resolution bandwidth, 0 dB input attenuation, and maximum (MAX) video filtering: < −107 dBm (1 − 350 MHz).

001: Less than −100 dBm (1 − 350 MHz)
002: Less than −53 dBmV (1 − 350 MHz)

DESCRIPTION:

Spectrum analyzer average noise level is checked by observing the average noise power level displayed on the CRT when no input signal is applied to the instrument. The test is performed using a 10 kHz resolution bandwidth setting.

PROCEDURE:

1. Set spectrum analyzer controls as follows:

START − CENTER	CENTER
FREQ SPAN/DIV	200 kHz
RESOLUTION BW	10 kHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	−60 dBm
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
BASELINE CLIPPER	OFF
VIDEO FILTER	Midrange

2. Tune down in frequency to the LO feedthrough; center the LO feedthrough on the lefthand graticule line (center frequency is now 1 MHz). Without retuning, set FREQ SPAN/DIV to 10 kHz, VIDEO FILTER to MAX (not in detent). Observe the average noise level displayed on the CRT. The noise level should be less than −107 dBm. (See Figure 4-12.)

   001: Change '−107 dBm' to '−100 dBm' throughout procedure and in Figure 4-13.
   002: Change '−107 dBm' to '−53 dBmV throughout procedure and in Figure 4-13.

4-17. AVERAGE NOISE LEVEL TEST (Cont'd)

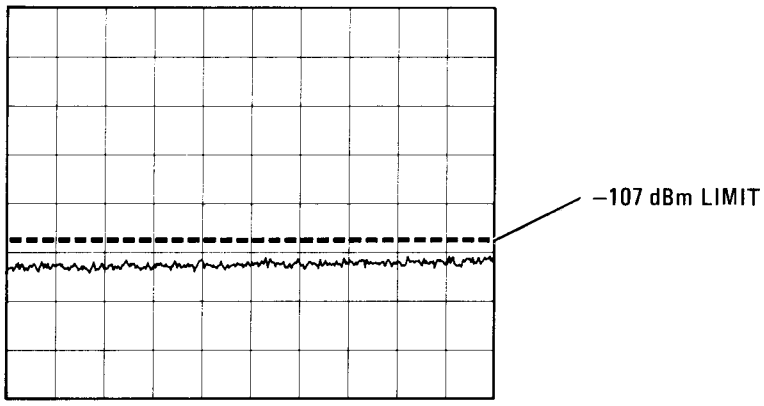


Figure 4-13. Average Noise Level Measurement

3. Slowly tune the spectrum analyzer to 350 MHz. The noise level should be less than −107 dBm at any frequency.

_____ < −107 dBm

PERFORMANCE TESTS

4-18. SPURIOUS RESPONSES TEST

SPECIFICATION:

Second Harmonic Distortion:

>70 dB below a −40 dBm signal with 0 dB input attenuation, 1 to 350 MHz.
>60 dB below a −40 dBm signal with 0 dB input attenuation, 20 kHz to 1 MHz.

001: −35 dBm input signal
002: +15 dBmV input signal

Third Order Intermodulation Distortion:

>70 dB below two −40 dBm input signals separated by ≥50 kHz, with 0 dB input attenuation, for signals greater than 1 MHz.
>60 dB below two −40 dBm input signals separated by ≥50 kHz, with 0 dB input attenuation, for signals 10 kHz to 1 MHz.

001: two −35 dBm input signals
002: two +15 dBmV input signals

Image and Multiple Responses:

>70 dB below a −40 dBm input level with 0 dB input attenuation, 1 to 350 MHz.
>60 dB below a −40 dBm input level with 0 dB input attenuation, 20 kHz to 1 MHz.
>60 dB below a −40 dBm input level with 0 dB input attenuation, at 261 ±2MHz.

001: −35 dBm input level
002: +15 dBmV input level

DESCRIPTION:

Harmonic distortion is measured using a signal source with a lowpass filter (LPF). The LPF is required to ensure that the signals measured are due to harmonic distortion in the spectrum analyzer, not the harmonic content of the signal generator.

Spurious responses due to image frequencies, out-of-band responses, and intermodulation distortion are measured by applying signals from two separate sources to the HP 8557A INPUT connector.

4-18. SPURIOUS RESPONSES TEST (Cont'd)

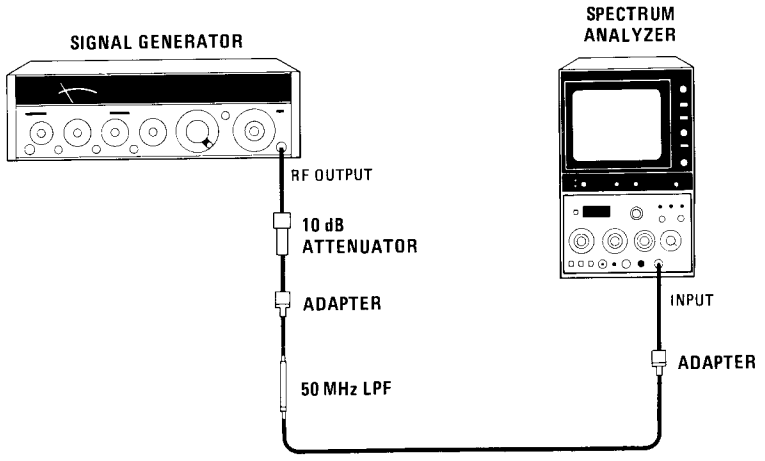


Figure 4-14. Harmonic Distortion Test Setup

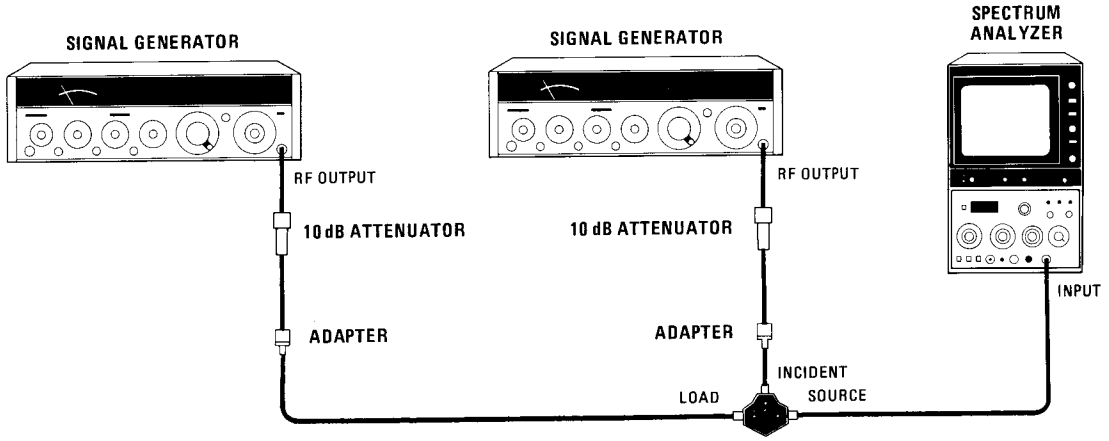


Figure 4-15. Intermodulation Distortion Test Setup

EQUIPMENT:

Signal Generator (2 required)	HP 8640B
10 dB Attenuator (2 required)	HP 8491A Option 010
50 MHz LPF	Cir Q Tel FLT/2 – 50 – 5/50 – 3A/3B
Adapter, Type N Male to BNC Female (2 required)	HP 1250-0780
Directional Bridge	HP 8721A

4-18. SPURIOUS RESPONSES TEST (Cont'd)

PROCEDURE:

Harmonic Distortion

1. Set equipment as follows:

   Spectrum Analyzer:

   START – CENTER ..... CENTER
   TUNING ..... 50 MHz
   FREQ SPAN/DIV ..... 500 kHz
   RESOLUTION BW ..... 30 kHz
   INPUT ATTEN ..... 0 dB
   REFERENCE LEVEL ..... –40 dBm
   001: –30 dBm
   002: +20 dBm
   REF LEVEL FINE 0
   001: –5
   002: –5
   Ampliude Scale ..... 10 dB/DIV
   SWEEP TIME/DIV ..... AUTO
   SWEEP TRIGGER ..... FREE RUN
   BASELINE CLIPPER ..... OFF
   VIDEO FILTER ..... Midrange

   Signal Generator:

   COUNTER MODE ..... INT
   AM ..... OFF
   FM ..... OFF
   FREQUENCY TUNE ..... 50 MHz
   OUTPUT LEVEL ..... –30 dBm

2. Connect equipment as shown in Figure 4-14.

3. Set signal generator frequency to 50 MHz and set OUTPUT LEVEL to –30 dBm.

4. Tune signal generator frequency to center signal on spectrum analyzer display.

5. Adjust the signal generator OUTPUT LEVEL for –40 dBm as displayed on the spectrum analyzer (top graticule line).

   001: –35 dBm
   002: +15 dBmV

6. Increase signal generator OUTPUT LEVEL by 20 dB.

7. Set HP 8557A TUNING control to approximately 100 MHz and identify second harmonic.

4-18. SPURIOUS RESPONSES TEST (Cont'd)

8. Center signal on the spectrum analyzer display and reduce spectrum analyzer RESOLUTION BW to 3 kHz and FREQ SPAN/DIV to 20 kHz keeping signal centered on display.

9. Reduce signal generator output level by 20 dB. Harmonics should be more than 70 dB below input signal (below first graticule line from bottom). (It might be necessary to increase video filtering slightly to make this measurement.)

_____dB

10. Set HP 8557A RESOLUTION BW control to 30 kHz, and repeat step 6.

11. Set HP 8557A TUNING control to approximately 150 MHz and identify third harmonic.

12. Repeat steps 8 and 9.

Intermodulation Distortion

13. Connect equipment as shown in Figure 4-15 and repeat step 1, setting TUNING control to 30 MHz, rather than 50 MHz.

14. Set both signal generators for approximately 30 MHz output at −25 dBm.

15. Tune the signal generators until signals are 2 divisions (1 MHz) apart and centered on the display.

16. Adjust the output levels of both signal generators for −40 dBm, as displayed on the spectrum analyzer.

    001: −35 dBm
    002: +15 dBmV

17. Reduce spectrum analyzer RESOLUTION BW control to 3 kHz and check for third order intermodulation distortion products at approximately 3 divisions from center graticule line (see NOTE below). They should be more than 70 dB below both input signals (−110 dBm on spectrum analyzer display). (See Figure 4-16.)

_____dB

NOTE

If unable to locate intermodulation distortion product, increase the output level of both signal generators by 10 dB. Be sure to return the output level of each generator to its previous setting before making the actual measurement.

PERFORMANCE TESTS

4-18. SPURIOUS RESPONSES TEST (Cont'd)

18. Set HP 8557A TUNING control to approximately 1 MHz and tune second order intermodulation distortion product $f_2 - f_1$) at 1 MHz to center screen. (See NOTE above.) Reduce the outputs of both signal generators by 3 dB. Second order intermodulation distortion product should be more than 70 dB below the total applied signal (− 110 dBm on the spectrum analyzer display). (See Figure 4-16.)

_____ dB

19. Set HP 8557A TUNING control to 60 MHz.

20. Check for second order intermodulation distortion product ($f_1 + f_2$) near center of display (between $2f_1$ and $2f_2$ signals). See Figure 4-16. Signal should be more than 70 dB below the total applied signal (− 110 dBm on spectrum analyzer display).

001: − 105 dBm on spectrum analyzer display
002: − 55 dBmV on spectrum analyzer display

_____ dB

NOTE

If unable to locate intermodulation distortion product, increase the output level of both signal generators by 10 dB. Be sure to return the output level of each generator to its previous setting before making the actual measurement.

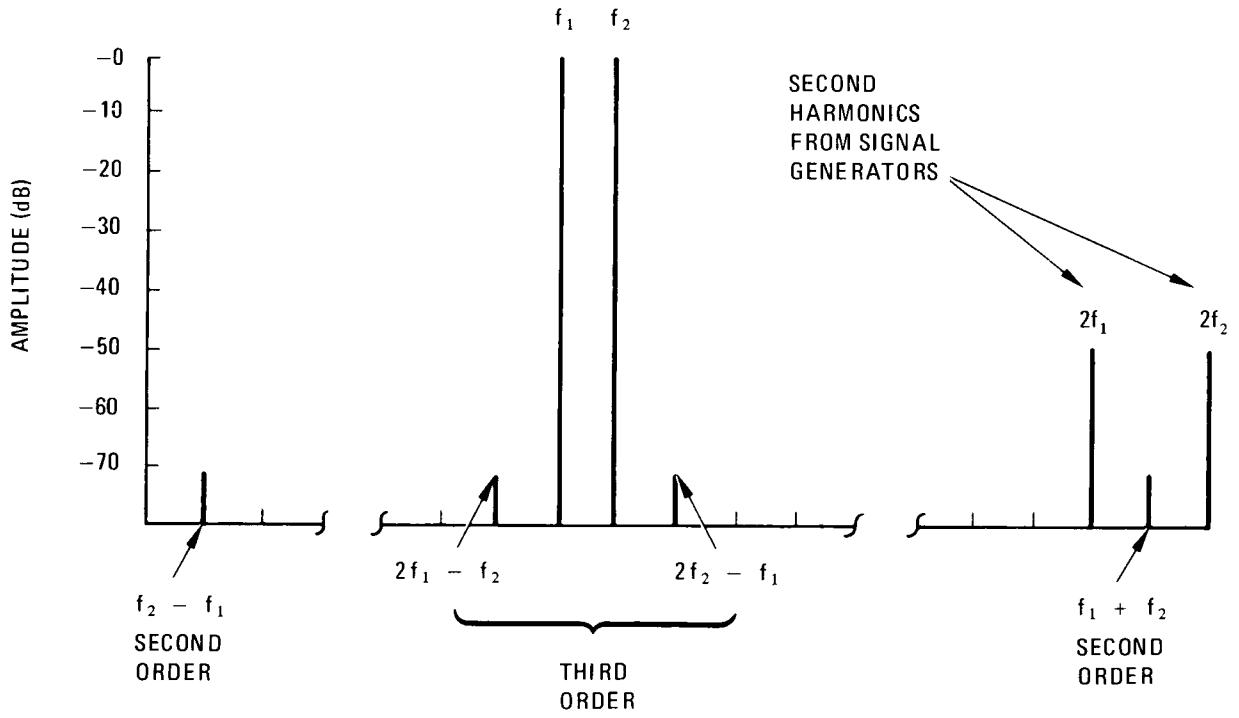


Figure 4-16. Intermodulation Distortion Products

4-18. SPURIOUS RESPONSES TEST (Cont'd)

21. Set HP 8557A TUNING to 30 MHz, RESOLUTION BW to 1 kHz, INPUT ATTEN to 0 dB, REFERENCE LEVEL to −40 dBm, and FREQ SPAN/DIV to 20 kHz. Tune the two signal generators until signals are 2.5 divisions apart (50 kHz separation), centered on the display.

    001: −35 dBm
    002: +15 dBmV

22. Adjust the output levels of both signal generators for −40 dBm displayed on the spectrum analyzer. Third order intermodulation products should be more than 70 dB below input signals. (−110 dBm on signal generator display.) (See Figure 4-16.)

    001: −35 dBm; −105 dBm on spectrum analyzer display
    002: +15 dBmV; −55 dBmV on spectrum analyzer display

23. Set spectrum analyzer controls as follows:

    TUNING ..... 0.9 MHz
    FREQ SPAN/DIV ..... 20 kHz
    RESOLUTION BW ..... 1 kHz

24. Tune the signal generators to approximately 900 kHz; continue tuning until the two signals are 2.5 divisions apart, centered on the display. Adjust output levels of both generators to place signals at top graticule line.

25. Reduce signal generator outputs by 3 dB each. Tune the HP 8557A to 50 kHz (2.5 divisions above LO feedthru). Check for second order intermodulation distortion product ($f_2 - f_1$) at 50 kHz. Signal should be more than 60 dB below total applied signal (−100 dBm on spectrum analyzer display). See Figure 4-16. It might be necessary to adjust VIDEO FILTER to observe the signal.

    001: −95 dBm on spectrum analyzer display
    002: −45 dBmV on spectrum analyzer display

26. Set HP 8557A TUNING control to 1.8 MHz and check for second order intermodulation distortion product ($f_1 + f_2$) near center of display (betwen $2f_1$ and $2f_2$ signals). See Figure 4-16. Signal should be more than 60 dB below total applied signal (−100 dBm on spectrum analyzer display).

    001: −95 dBm on spectrum analyzer display
    002: −45 dBmV on spectrum analyzer display

NOTE

If unable to locate intermodulation distortion product, increase the output level of both signal generators by 10 dB. Be sure to return the output level of each generator to its previous setting before making the actual measurement.

PERFORMANCE TESTS

4-19. RESIDUAL RESPONSE TEST

SPECIFICATION:

< −100 dBm (0.1 − 350 MHz) with 0 dB input attenuation and no signal present at input.

001: < −95 dBm
002: < −50 dBmV

DESCRIPTION:

The spectrum analyzer is tested for residual responses with no signal applied to the INPUT 50Ω connector. The input attenuation is set to 0 dB.

001 and 002: INPUT 75Ω.

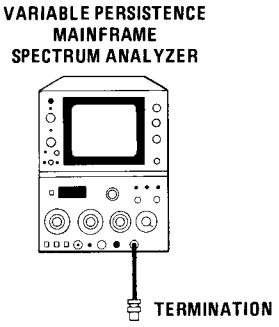


Figure 4-17. Residual Response Test Setup

EQUIPMENT:

Variable Persistence/Storage Display	HP 181T
50 Ohm Termination	HP 11593A
001 and 002: 75-ohm Termination, HP 11652-60010	

PROCEDURE:

1. Set the spectrum analyzer controls as follows:

START − CENTER	CENTER
FREQ SPAN/DIV	F
RESOLUTION BW	30 kHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	−50 dBm
002: 0 dBmV	
REF LEVEL FINE	0
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	Fully clockwise (not in MAX detent)

4-19. RESIDUAL RESPONSE TEST (Cont'd)

2. Terminate the HP 8557A INPUT 50Ω connector with a 50 ohm coaxial termination.
   001 and 002: 75Ω; 75 ohm.

3. With variable persistence display in NORM mode, set TUNING control fully counterclockwise (to move marker off screen). Set BASELINE CLIPPER control fully clockwise.

4. Set variable persistence display to WRITE mode. Set PERSISTENCE control to MAX and INTENSITY control to approximately midrange.

5. Set HP 8557A SWEEP TRIGGER control to SINGLE sweep mode and set RESOLUTION BW control to 30 kHz. Momentarily depress ERASE.

NOTE

When ERASE button is depressed, the HP 8557A sweep may be triggered. To stop the sweep, turn SWEEP TRIGGER control clockwise.

6. Turn SWEEP TRIGGER control clockwise to initiate the sweep.

7. Slowly turn BASELINE CLIPPER control until peaks of trace begin to appear on display. It might be necessary to increase baseline clipping slightly near end of sweep to reduce blooming. It might also be necessary to adjust the INTENSITY control to prevent blooming.

8. Trigger the sweep at least one more time and check for residual responses from 0.1 to 350 MHz. Note horizontal position of residual response with greatest amplitude.

9. Set variable persistence display to NORM mode. Set HP 8557A BASELINE CLIPPER control OFF, SWEEP TRIGGER control to FREE RUN, and VIDEO FILTER to midrange.

10. Set HP 8557A TUNING control marker to position noted in step 8. Set FREQ SPAN/DIV to 20 kHz. Center signal on CRT and record the frequency.

    _____MHz

11. Narrow the FREQ SPAN/DIV and RESOLUTION BW, keeping signal centered with TUNING control. Reduce sweep speed, using SWEEP TIME/DIV control until signal level does not rise when sweep speed is further reduced. Residual response must be less than −100 dBm.

    001: −95 dBm
    002: −50 dBmV

PERFORMANCE TESTS

4-20. FREQUENCY RESPONSE TEST

SPECIFICATION:

≤ ±0.75 dB (1.5 dB p-p Flatness) with 10 dB input attenuation

DESCRIPTION:

Signals from 10 kHz to 350 MHz are applied to the input of the spectrum analyzer. Since the signal amplitudes are equal, variations in amplitude on the display represent the frequency response of the spectrum analyzer. This test is performed in two segments: 10 kHz to 80 MHz, and 80 MHz to 350 MHz.

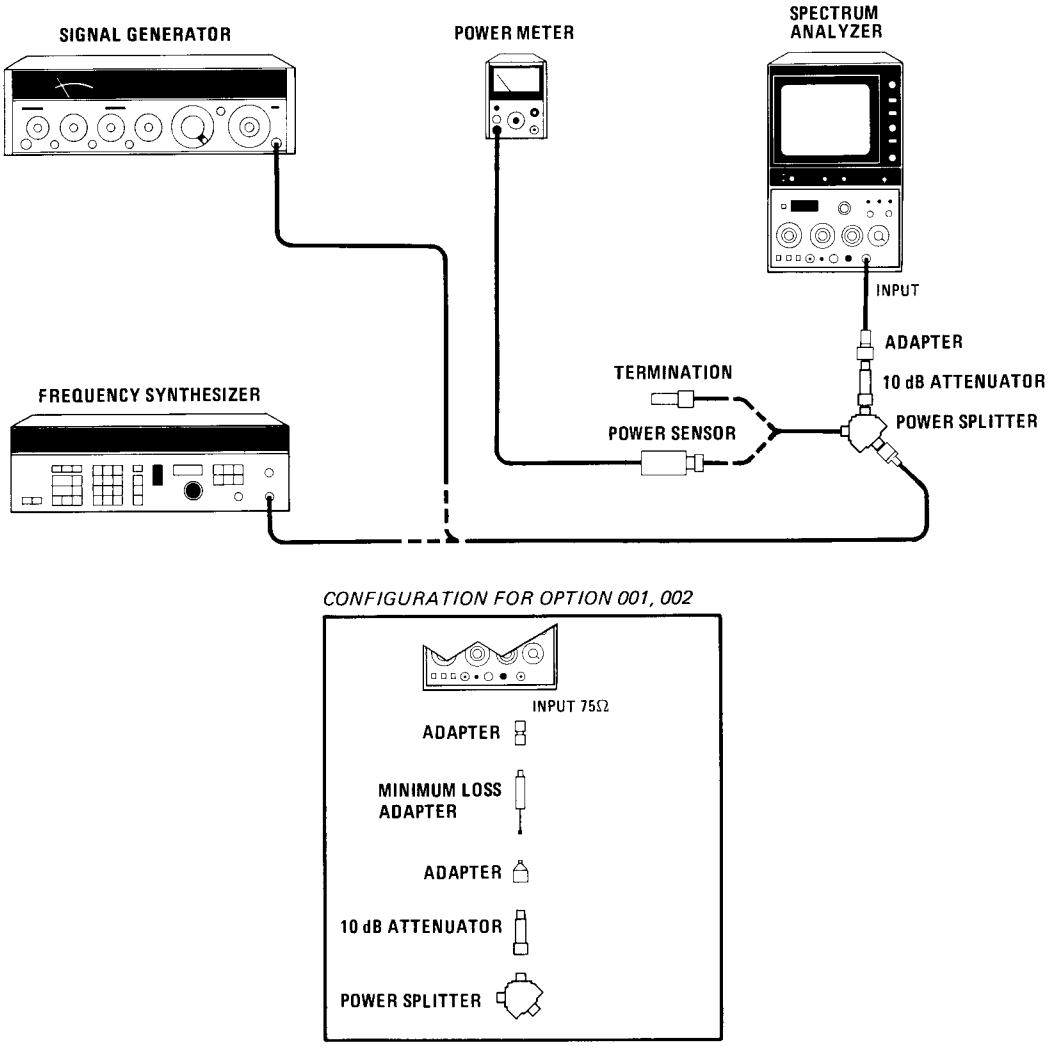


Figure 4-18. Frequency Response Test Setup

PERFORMANCE TESTS

4-20. FREQUENCY RESPONSE TEST (Cont'd)

EQUIPMENT:

Signal Generator	HP 8640B
Synthesizer/Level Generator	HP 3335A
Power Meter	HP 435B
Power Sensor	HP 8482A
Power Splitter	HP 11667A
10 dB Attenuator	HP 8491A OPT 010
BNC Cable, 120 cm (48 in.)	HP 10503A
Adapter, Type N (m) to BNC (f) (2 required)	HP 1250-0780
Adapter, Type N (m) to BNC (m)	HP 1250-0082
Termination, Type N	HP 908A

Additional Equipment, Options 001, 002:

BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*
Minimum Loss Adapter, 75Ω to 50Ω	*HP 08558-60031*
Adapter, Type N (m) to SMA (f)	*HP 1250-1250*

PROCEDURE:

1. Set equipment as follows:

Spectrum Analyzer:

START – CENTER	CENTER
FREQ SPAN/DIV	F
RESOLUTION BW	1 MHz
INPUT ATTEN	10 dB
REFERENCE LEVEL	−10 dBm
002: +40 dBmV	
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
BASELINE CLIPPER	OFF
VIDEO FILTER	OFF

Signal Generator:

OUTPUT LEVEL	0 dBm
FREQUENCY	250 MHz
AM	OFF
FM	OFF
RF	ON
COUNTER MODE	INT

4-20. FREQUENCY RESPONSE TEST (Cont'd)

2. Connect equipment as shown in Figure 17. Set power meter range to −10 dBm. Adjust signal generator OUTPUT LEVEL for −11 dBm reading on power meter.

3. Set HP 8557A Amplitude Scale to 1 dB/DIV. Adjust REF LEVEL FINE to bring 250 MHz signal to fourth graticule line from bottom. Set signal generator FREQUENCY to 350 MHz.

4. Use signal generator FREQUENCY and RANGE MHz controls to tune signal from 350 MHz down to 80 MHz in 10-MHz increments. At each new frequency setting, perform the following steps:

   a. Set power meter CAL FACTOR according to chart on power sensor.

   b. Adjust signal generator OUTPUT LEVEL for −11 dBm on power meter.

   c. Record deviation from fourth graticule line in Table 4-5.

Table 4-5. Deviation from Fourth Graticule Line (80 to 350 MHz)

Frequency (MHz)	Deviation from 4th Graticule Line (dB)	Frequency (MHz)	Deviation from 4th Graticule Line (dB)	Frequency (MHz)	Deviation from 4th Graticule Line (dB)
350	_____	250	_____	150	_____
340	_____	240	_____	140	_____
330	_____	230	_____	130	_____
320	_____	220	_____	120	_____
310	_____	210	_____	110	_____
300	_____	200	_____	100	_____
290	_____	190	_____	90	_____
280	_____	180	_____	80	_____
270	_____	170	_____		
260	_____	160	_____		

Record the maximum and minimum displayed amplitudes between 80 MHz and 350 MHz, relative to the fourth graticule line.

_____Max. displayed amplitude (80 to 350 MHz)

_____Min. displayed amplitude (80 to 350 MHz)

5. Set equipment as follows:

   Spectrum Analyzer:

   TUNING ..... 80 MHz
   FREQ SPAN/DIV ..... 1 MHz
   RESOLUTION BW ..... 300 kHz

   Signal Generator:

   FREQUENCY ..... 80 MHz

PERFORMANCE TESTS

4-20. FREQUENCY RESPONSE TEST (Cont'd)

6. Connect signal generator RF OUTPUT to power splitter input. Adjust signal generator OUTPUT LEVEL for −11 dBm on power meter. Adjust spectrum analyzer REF LEVEL FINE to set signal peak to amplitude recorded for 80 MHz in Table 4-5.

7. Set synthesizer/level generator as follows:

POWER	ON
AMPLITUDE	−6 dBm
FREQUENCY	80 MHz
MANUAL TUNE	ON
OUTPUT	50Ω
AMPTD INCR	0.1 dBm

8. Connect synthesizer/level generator 50Ω to power splitter input. Press synthesizer/level generator AMPLITUDE. Using INCR arrow buttons, set amplitude for −11 dBm on power meter. Fine adjust with AMPTD INCR of 0.01 dBm. Replace power sensor with 50Ω load.

NOTE

Do not readjust synthesizer/level generator AMPLITUDE.

9. Set synthesizer/level generator FREQUENCY to 1 MHz and MANUAL TUNE DIGIT for a flashing '1'. Set spectrum analyzer TUNING to 6 MHz and place 1 MHz signal near left-hand graticule line.

10. Adjust synthesizer/level generator MANUAL TUNE knob for frequencies from 1 MHz to 10 MHz (in 1 MHz steps). Record maximum and minimum displayed amplitude, relative to the fourth graticule line.

_____Max. displayed amplitude (1 to 10 MHz)

_____ Min. displayed amplitude (1 to 10 MHz)

11. Set spectrum analyzer FREQ SPAN/DIV to 100 kHz, RESOLUTION BW to 30 kHz, and TUNING to 80 MHz.

12. Set synthesizer/level generator FREQUENCY to 80 MHz and adjust spectrum analyzer REF LEVEL FINE to set signal peak to amplitude recorded for 80 MHz in Table 4-5.

13. Set synthesizer/level generator as follows:

FREQUENCY	100 kHz
MANUAL TUNE	ON
DIGIT	Flashing '1'

14. Adjust spectrum analyzer TUNING to 0.6 MHz and place 100 kHz signal near left-hand graticule line.

PERFORMANCE TESTS

4-20. FREQUENCY RESPONSE TEST (Cont'd)

15. Adjust synthesizer/level generator MANUAL TUNE knob for frequencies from 100 kHz to 1 MHz (in 100 kHz steps). Record maximum and minimum displayed amplitudes, relative to the fourth graticule line.

Max._____dB (100 kHz to 1 MHz)

Min._____dB (100 kHz to 1 MHz)

16. Set spectrum analyzer FREQ SPAN/DIV to 10 kHz, RESOLUTION BW to 3 kHz, and TUNING to 80 MHz. Repeat step 12.

17. Set synthesizer/level generator as follows:

FREQ ..... 10 kHz
MANUAL TUNE ..... ON
DIGIT ..... Flashing '1'

18. Adjust spectrum analyzer TUNING to 0 MHz and place 10 kHz signal near left-hand graticule line.

19. Adjust synthesizer/level generator MANUAL TUNE knob for frequencies from 10 kHz to 100 kHz. Record maximum and minimum displayed amplitudes, relative to the fourth graticule line.

Max._____dB (10 kHz to 100 kHz)

Min._____dB (10 kHz to 100 kHz)

20. Record highest maximum and lowest minimum amplitudes from steps 4, 10, 15, and 19.

_____dB max. amplitude (10 kHz to 350 MHz)

_____dB min. amplitude (10 kHz to 350 MHz)

Subtract the minimum amplitde (10 kHz to 350 MHz) from the maximum amplitude (10 kHz to 350 MHz). Result should be less than 1.5 dB (± .75 dB).

_____dB

4-21. BANDWIDTH SWITCHING (AMPLITUDE VARIATION) TEST

SPECIFICATION:

(At +10° to +40° C, <90% relative humidity)

3 MHz to 300 kHz: < ±0.5 dB
3 MHz to 1 kHz: < ±1.0 dB

DESCRIPTION:

The spectrum analyzer 250 MHz CAL OUTPUT signal is applied to the INPUT connector and displayed on the CRT. The peak of the displayed 250 MHz signal is centered on the CRT and adjusted for a vertical deflection of seven divisions. The amplitude variation of the 250 MHz signal is measured for each RESOLUTION BW control setting. The overall variation between RESOLUTION BW settings of 3 MHz to 300 kHz should be less than 1 dB (±0.5 dB). The overall variation between RESOLUTION BW settings of 3 MHz to 1 kHz should be less than 2 dB (±1.0 dB).

EQUIPMENT:

BNC Cable, 20 cm (9 in)	HP 10502A
Adapter, Type N (m) to BNC (f)	HP 1250-0780
BNC Cable, 30 cm (12 in), 75Ω	HP 11652-60012

PROCEDURE:

1. Set spectrum analyzer controls as follows:

START–CENTER	CENTER
TUNING	250 MHz
FREQ SPAN/DIV	1 MHz
RESOLUTION BW	3 MHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	−20 dBm
002: +30 dBmV	
REF LEVEL FINE	−10
Amplitude Scale	1 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	OFF
BASELINE CLIPPER	OFF

2. Connect spectrum analyzer CAL OUTPUT signal to INPUT 50Ω connector.

   001 and 002: INPUT 75Ω

3. Set TUNING control, as required, to center 250 MHz signal on CRT.

4. Set REF LEVEL FINE control to position peak of 250 MHz signal seven divisions above graticule baseline.

4-21. BANDWIDTH SWITCHING (AMPLITUDE VARIATION) TEST (Cont'd)

5. Vary the RESOLUTION BW and FREQ SPAN/DIV controls in accordance with Table 4-6. Record the change in amplitude for each RESOLUTION BW setting. Changes in amplitude above reference level set in step 4 are positive (+). Changes below reference level are negative (−).

Table 4-6. Bandwidth Switching (Amplitude Variation)

RESOLUTION BW Setting	FREQ SPAN/DIV Setting	Change in Amplitude (dB)	Overall Variation Between 3 MHz and 300 kHz RESOLUTION BW Settings	Overall Variation Between 3 MHz and 1 kHz RESOLUTION BW Settings
2 MHz	1 MHz	0 (Ref.)		
1 MHz	500 kHz	_____	_____	_____
300 kHz	100 kHz	_____		
100 kHz	50 kHz	_____		
30 kHz	10 kHz	_____		
10 kHz	5 kHz	_____		
3 kHz	5 kHz	_____		
1 kHz	5 kHz	_____		

6. To find the overall variation in Table 4-6, algebraically subtract the greatest negative change in amplitude from the greatest positive change in amplitude. If all changes in amplitude are of the same sign, the overall variation is the largest positive or largest negative change in amplitude. The overall variation between 3 MHz and 300 kHz RESOLUTION BW settings should be <1.0 dB (± 0.5 dB). The overall variation between 3 MHz and 1 kHz RESOLUTION BW settings should be <2.0 dB (± 1.0 dB).

4-22. INPUT ATTENUATOR ACCURACY TEST

SPECIFICATION:

Step Accuracy:
0 dB to 50 dB: < ±0.5 dB per 10-dB step.

Maximum Cumulative Error:
0 dB to 50 dB: < ±1.0 dB.

DESCRIPTION:

The input attenuator accuracy is tested over its full 50 dB range using an RF substitution method. A step attenuator that has been calibrated by a Standards Laboratory at 30 MHz is used for substitution. The known error of the calibrated attenuator is taken into account when computing the HP 8557A input attenuator accuracy.

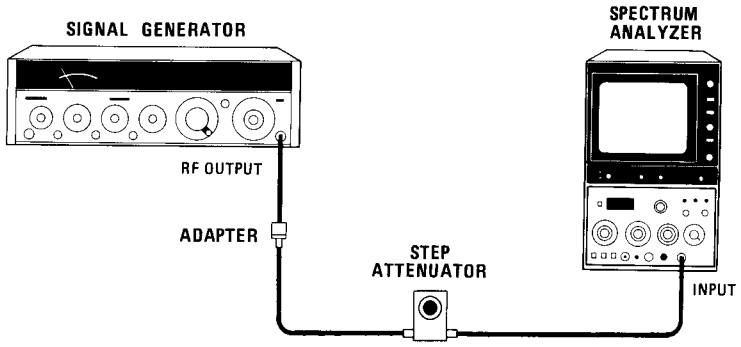


Figure 4-19. Input Attenuator Accuracy Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
Step Attenuator	HP 355D
Adapter, Type N (m) to BNC (f)	HP 1250-0780

Additional Equipment, Options 001 and 002:

Minimum Loss Adapter, 75Ω to 50Ω	*HP 08558-60031*
Adapter, BNC (m) to BNC (m)	*HP 1250-0216*
Adapter, BNC (f) to SMA (m)	*HP 1250-1200*
Adapter, SMA (f) to SMA (f)	*HP 1250-1158*
BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*

4-22. INPUT ATTENUATOR ACCURACY TEST (Cont'd)

PROCEDURE:

1. Set equipment as follows:

Spectrum Analyzer:

START – CENTER	CENTER
TUNING	30 MHz
FREQ SPAN/DIV	200 kHz
RESOLUTION BW	30 kHz
INPUT ATTEN	50 dB
REFERENCE LEVEL	0 dBm
002: +50 dBmV	
REF LEVEL FINE	0
Amplitude Scale	1 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	Midrange
BASELINE CLIPPER	OFF

Signal Generator:

OUTPUT LEVEL	0 dBm
FREQUENCY	30.0 MHz
AM	OFF
FM	OFF
RF	ON
COUNTER MODE	INT

2. Connect equipment as shown in Figure 4-19 with step attenuator set at 0 dB. Locate signal on CRT and adjust signal generator OUTPUT LEVEL until trace is 6 divisions above graticule baseline.

3. Set the HP 8557A INPUT ATTEN control and step attenuator to settings indicated in Table 4-7. Record the deviation from the sixth division reference set in step 2 for each setting.

Table 4-7. Input Attenuator Accuracy

INPUT ATTEN Setting (dB)	Step Attenuator Setting (dB)	Deviation from 6th Division (dB)	Step Attenuator Error (Calibration)* (dB)	Corrected Deviation (dB)
50	0	0 (Ref.)	Ref.	0 (Ref.)
40	10	_____	_____	_____
30	20	_____	_____	_____
20	30	_____	_____	_____
10	40	_____	_____	_____
0	50	_____	_____	_____

*Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (–). For example, a 99.9 dB calibration for a 10 dB attenuator setting represents an error of –0.01 dB.

4-22. INPUT ATTENUATOR ACCURACY TEST (Cont'd)

4. To compute the Corrected Deviation, add the Step Attenuator Error to the Deviation from 6th Division for each setting. The Corrected Deviation should not exceed ±0.5 dB between any two adjacent settings of the input attenuator.

5. Record the maximum positive and the maximum negative corrected deviation values. The difference between these two values (total deviation) should not exceed 2.0 dB (±1.0 dB).

_____ dB Max. Positive Corrected Deviation

_____ dB Max. Negative Corrected Deviation

_____ dB Total Corrected Deviation

4-23. REFERENCE LEVEL ACCURACY TEST

SPECIFICATION:

Step Accuracy:
Steps referenced with 0 dB input attenuation:
−10 dBm to −80 dBm: ±0.5 dB
−10 dBm to −100 dBm: ±1.0 dB

Vernier Accuracy:
±0.5 dB

DESCRIPTION:

The reference level accuracy is tested over the range of −10 dBm to −100 dBm by checking the IF gain steps in 1 dB/DIV (Log) and in LIN. The resulting maximum deviation in each case must be less than 1.0 dB (±0.5 dB) from −10 dBm to −80 dBm and less than 2.0 dB (±1.0 dB) from −10 dBm to −100 dBm.

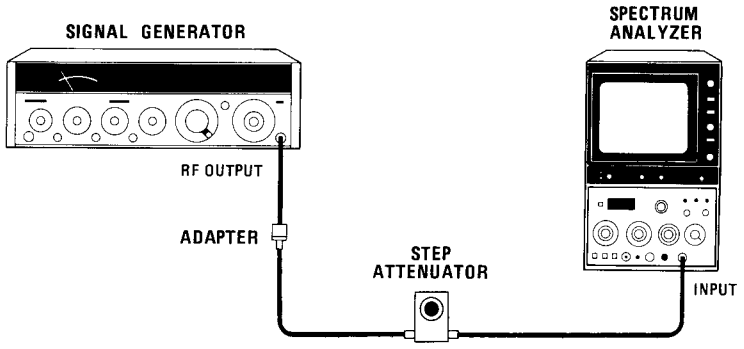


Figure 4-20. Reference Level Accuracy Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
1-dB Step Attenuator	HP 355C
10-dB Step Attenuator	HP 355D
Adapter, Type N (m) to BNC (f)	HP 1250-0780
BNC Cable, 120 cm (48 in) (2 required)	HP 10503A

Additional Equipment, Options 001 and 002:

BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*
Minimum Loss Adapter, 75Ω to 50Ω	*HP 08558-60031*
Adapter, SMA (f) to SMA (f)	*HP 1250-1158*
Adapter, BNC (f) to SMA (m)	*HP 1250-1200*

4-23. REFERENCE LEVEL ACCURACY TEST (Cont'd)

PROCEDURE:

IF Gain Accuracy in Log Mode

1. Set equipment as follows:

   Spectrum Analyzer:

START–CENTER	CENTER
TUNING	30 MHz
FREQ SPAN/DIV	5 kHz
RESOLUTION BW	3 kHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	–10 dBm
Amplitude Scale	1 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	Midrange
BASELINE CLIPPER	OFF

   Signal Generator:

OUTPUT LEVEL	–10 dBm
FREQUENCY	30.0 MHz
AM	OFF
FM	OFF
RF	ON
COUNTER MODE	INT

2. Connect equipment as shown in Figure 4-20 with step attenuator set at 0 dB. Locate signal on CRT.

   NOTE

   If signal is difficult to locate, press RESOLUTION BW control to couple with FREQ SPAN/DIV control and turn the coupled controls clockwise until signal appears on display. Center the signal using TUNING control. Return controls to positions called out in step 1, adjusting TUNING control as necessary to keep signal centered.

3. Adjust signal generator OUTPUT LEVEL until trace is 6 divisions above graticule baseline. Set the HP 8557A REFERENCE LEVEL control and step attenuator to settings indicated in Table 4-8. Adjust VIDEO FILTER to reduce displayed noise. Record the Deviation from 6th Division (reference set in step 2) for each setting.

4. To compute the Corrected Deviation, add the Step Attenuator Error to the Deviation from 6th Division for each setting.

4-23. REFERENCE LEVEL ACCURACY TEST (Cont'd)

Table 4-8. IF Gain Accuracy in Log Mode

REFERENCE LEVEL dBm	Step Attenuator Setting (dB)	Deviation from 6th Division (dB)	Step Attenuator (Calibration)* (dB)	Corrected Deviation (dB)
–10	0	0 (Ref.)	Ref.	0 (Ref.)
–20	10			
–30	20			
–40	30			
–50	40			
–60	50			
–70	60			
–80	70			
–90	80			
–100	90			

*Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (–). For example, 99.9 dB calibration for a 10 dB attenuator setting represents an error of –0.01 dB.

IF Gain Accuracy in Linear Mode

5. Set the spectrum analyzer Amplitude Scale switch to LIN. Set REFERENCE LEVEL control to –10 dBm and set step attenuator to 0 dB. Adjust the signal generator OUTPUT LEVEL until trace is six divisions above graticule baseline.

   002: +40 dBmV

6. Set the HP 8557A REFERENCE LEVEL control and step attenuator to settings indicated in Table 4-9. Adjust VIDEO FILTER to reduce displayed noise. Record the Deviation from the 6th Division in Linear Mode (reference set in step 5) for each setting.

Table 4-9. IF Gain Accuracy in Linear Mode

REFERENCE LEVEL dBm	Step Attenuator Setting (dB)	Deviation from 6th Division in Linear Mode (div.)	Deviation from 6th Division (dB*)	Step Attenuator Error (Calibration)** (dB)	Corrected Deviation (dB)
–10	0	0 (Ref.)	0 (Ref.)	Ref.	0 (Ref.)
–20	10				
–30	20				
–40	30				
–50	40				
–60	50				
–70	60				
–80	70				
–90	80				
–100	90				

*Use Table 4-10 to convert deviation in linear mode to deviation in dB.
**Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (–).

4-23. REFERENCE LEVEL ACCURACY TEST (Cont'd)

7. Using Table 4-10, convert Deviation from 6th Division in Linear Mode to Equivalent dB and record as Deviation from 6th Division for each setting.

8. To compute the Corrected Deviation, add the Step Attenuator Error to the Deviation from 6th Division in dB.

Table 4-10. Conversion Table, Deviation in Linear Mode

POSITIVE DEVIATIONS (Above 6th division from graticule baseline)		NEGATIVE DEVIATIONS (Below 6th division from graticule baseline)	
Divisions (Linear)	Equivalent dB	Divisions (Linear)	Equivalent dB
0	0	0	0
+.1	+0.14	–.1	–0.15
+.2	+0.28	–.2	–0.29
+.3	+0.42	–.3	–0.45
+.4	+0.56	–.4	–0.60
+.5	+0.70	–.5	–0.76
+.6	+0.82	–.6	–0.92
+.7	+0.96	–.7	–1.08
+.8	+1.09	–.8	–1.24
+.9	+1.21	–.9	–1.41
+1.0	+1.34	–1.0	–1.58
+1.1	+1.46	–1.1	–1.76
+1.2	+1.58	–1.2	–1.94
+1.3	+1.70		
+1.4	+1.82		
+1.5	+1.94		

Vernier Accuracy

9. Replace 10-dB step attenuator with 1-dB step attenuator. Set spectrum analyzer as follows:

FREQ SPAN/DIV ..... 50 kHz
RESOLUTION BW ..... 300 kHz
REFERENCE LEVEL ..... –10 dBm
002: +40 dBmV
REF LEVEL FINE 0
Amplitude Scale ..... 1 dB/DIV

4-23. REFERENCE LEVEL ACCURACY TEST (Cont'd)

10. Center the signal on the CRT and adjust signal generator OUTPUT LEVEL until trace is 6 divisions above graticule baseline. Set step attenuator and spectrum analyzer REF LEVEL FINE to settings indicated in Table 4-11. Record Deviation from 6th Division for each setting.

11. To compute Corrected Deviation, add Step Attenuator Error to Deviation from 6th Division for each setting. Corrected Deviation should not exceed +0.5 dB or −0.5 dB for each setting.

Table 4-11. Vernier Accuracy

Step Attenuator Setting (dB)	REFERENCE LEVEL FINE Setting	Deviation from 6th Division (dB)	Step Attenuator Error (Calibration)* (dB)	Corrected Deviation (dB)
0	0	0 (Ref.)	Ref.	0 (Ref.)
1	–1			
2	–2			
3	–3			
4	–4			
5	–5			
6	–6			
7	–7			
8	–8			
9	–9			
10	–10			
11	–11			
12	–12			

*Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (–).

4-24. DISPLAY FIDELITY TEST

SPECIFICATION:

Log Incremental Accuracy:
±0.1 dB per dB from Reference Level

Log Maximum Cumulative Error:
≤ ±1.5 dB over entire 70 dB range

Linear Accuracy:
±3% of Reference Level

DESCRIPTION:

The amplitude log display amplifier is tested by connecting a DVM to the rear-panel AUX A connector (vertical output) of the mainframe. A wide bandwidth is selected so the signal appears as a straight horizontal line on the CRT display. The DVM is used to provide good resolution when checking for ±1 dB per 10 dB step (0.1 dB/dB).

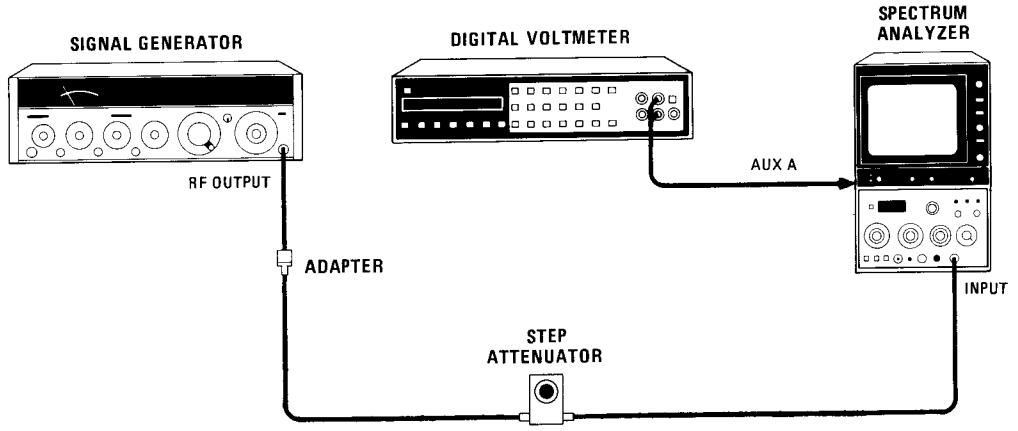


Figure 4-21. Amplitude Log Display Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
Digital Voltmeter	HP 3455A
10 dB Step Attenuator	HP 355D
Adapter, Type N (m) to BNC (f) (2 required)	HP 1250-0780
Cable, BNC to Banana Plug	HP 11001A

Additonal Equipment, Options 001 and 002:

BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*
Minimum Loss Adapter, 75Ω to 50Ω	*HP 08558-60031*
Adapter, SMA (f) to SMA (f)	*HP 1250-1158*
Adapter, BNC (f) to SMA (m)	*HP 1250-1200*

4-24. DISPLAY FIDELITY TEST (Cont'd)

PROCEDURE:

Log Display Accuracy

1. Set equipment as follows:

   Spectrum Analyzer:

   START – CENTER ..... CENTER
   TUNING ..... 30 MHz
   FREQ SPAN/DIV ..... 500 kHz
   RESOLUTION BW ..... 300 kHz
   INPUT ATTEN ..... 10 dB
   REFERENCE LEVEL ..... 0 dBm
   002: +50 dBmV
   Amplitude Scale ..... LIN
   SWEEP TIME/DIV ..... AUTO
   SWEEP TRIGGER ..... FREE RUN
   VIDEO FILTER ..... OFF
   BASELINE CLIPPER ..... OFF

   Digital Voltmeter:

   RANGE 100
   FUNCTION ..... DC Volts
   AUTO CAL ..... ON
   TRIGGER ..... INTERVAL
   MATH ..... OFF

   Signal Generator:

   OUTPUT LEVEL ..... 0 dBm
   FREQUENCY ..... 30 MHz
   AM ..... OFF
   FM ..... OFF
   RF ..... ON
   COUNTER MODE ..... INT

2. With no signal at INPUT, measure and record the vertical output (AUX A) offset of the spectrum analyzer.

   _____mV

3. Connect equipment as shown in Figure 4-21. Tune signal generator to 30 MHz and set power output for approximately 0 dBm. Set step attenuator to 0 dB.

4. Set spectrum analyzer TUNING control to center the signal on CRT display.

4-24. DISPLAY FIDELITY TEST (Cont'd)

5. Set the FREQ SPAN/DIV control to zero (0) and RESOLUTION BW control to 100 kHz. Tune the signal generator frequency for maximum reading on DVM.

6. Set the signal generator OUTPUT LEVEL so the DVM reads +800 mV plus the offset (step 2) ±0.5 mV. The trace should be approximately at the top graticule line.

Table 4-12. Amplitude Log Display Accuracy

Attenuator Setting (dB)	DVM Reading (mV)	Corrected DVM Reading* (mV)	AUX A Theoretical Reading (mV)	AUX A Theoretical Reading Subtracted From Corrected DVM Reading (mV)	Difference Between Adjacent Readings (mV)
0		+800 (Ref.)	+800	0	
10	_____	_____	+700	_____	_____
20	_____	_____	+600	_____	_____
30	_____	_____	+500	_____	_____
40	_____	_____	+400	_____	_____
50	_____	_____	+300	_____	_____
60	_____	_____	+200	_____	_____
70	_____	_____	+100	_____	_____

*DVM Reading minus offset recorded in step 2.

Example (+5 mV offset):

Table 4-13. Sample Computations of Amplitude Log Display Accuracy

Attenuator Setting (dB)	DVM Reading (mV)	AUX A Theoretical Reading (mV)	AUX A Theoretical Reading Subtracted from DVM Reading (mV)	Difference Between Adjacent Readings (mV)
0	+800	+800	0	
10	+703	+700	+3	–3
20	+594	+600	–6	+9
30	+492	+500	–8	+2
40	+401	+400	+1	–9

7. Increase the step attenuator setting in 10-dB steps, and record the DVM Reading for each step in Table 4-12.

4-24. DISPLAY FIDELITY TEST (Cont'd)

8. Having recorded the DVM readings for all of the attenuator settings from 0 to 70 dB, subtract the AUX A Theoretical Reading from the Corrected DVM Reading (DVM reading minus offset) in each case and record results in Table 4-12. Theoretical Reading Subtracted From Corrected DVM Reading should not exceed ± 15 mV (± 1.5 dB).

9. Subtract each converted reading (AUX A Theoretical Reading Subtracted From Corrected DVM Reading) from the previous converted reading. This subtraction must be performed algebraically. Record results in Table 4-12 (see Table 4-13).

10. The difference between adjacent readings (Table 4-12) should not exceed ± 10 mV (± 0.1 dB/dB).

Linear Display Accuracy

11. Replace 10-dB step attenuator with 1-dB step attenuator. Set step attenuator to 0 dB.

12. Set spectrum analyzer Amplitude Scale to LIN and RESOLUTION BW control to 1 MHz.

13. Peak the signal on the CRT display using the TUNING control. Set the signal generator OUTPUT LEVEL to place the trace at the top of the graticule line.

14. Set the step attenuator to 6 dB. Trace should be at 4th division above graticule baseline (center horizontal graticule line) ± 1.2 minor divisions (± .24 major division).

_____div

15. Set the step attenuator to 12 dB. Trace should be at 2nd division above graticule baseline ± 1.2 minor divisions (± .24 major division).

_____div

4-25. CALIBRATOR ACCURACY TEST

SPECIFICATION:

Amplitude: −30 dBm ±1 dB (into 50Ω)
002: +20 dBmV ±1 dB (into 75Ω)
001: −30 dBm ± 1 dB (into 75Ω).
Frequency: 250 MHz ±50 kHz, Crystal Controlled

DESCRIPTION:

The amplitude accuracy and frequency accuracy of the CAL OUTPUT signal are checked for −30 dBm ±1 dB and 250 MHz ±50 kHz, respectively.

002: +20 dBmV ±1 dB

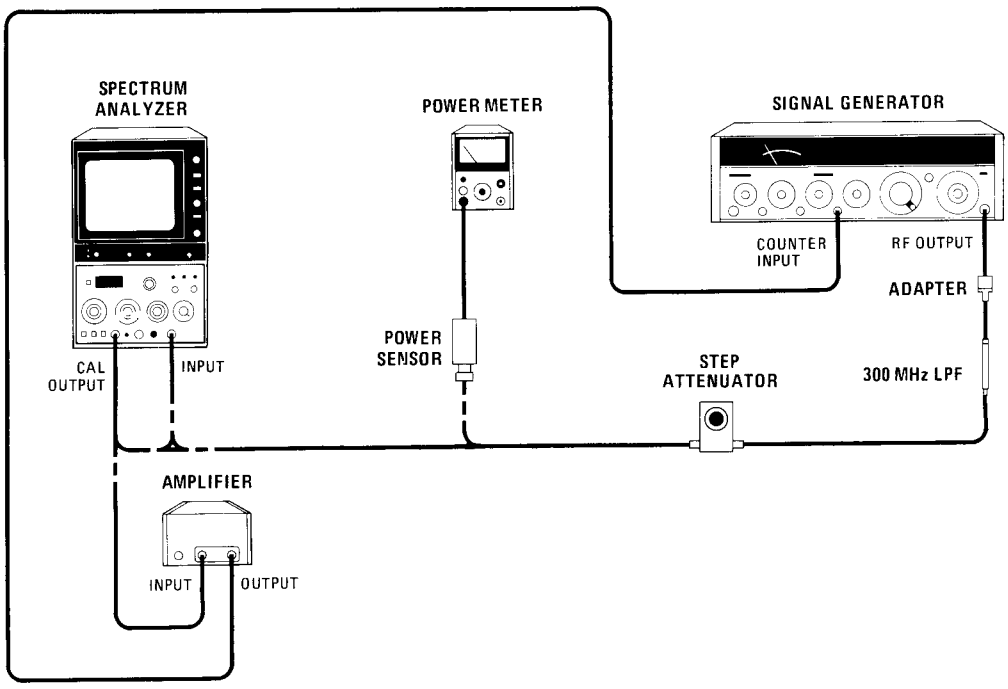


Figure 4-22. Calibrator Accuracy Test Setup

EQUIPMENT:

Amplifier	HP 8447A
Signal Generator	HP 8640B
10-dB Step Attenuator	HP 355D
Power Meter	HP 435B
Power Sensor	HP 8482A
300 MHz LPF	TELONIC TLP 300-4AB
Adapter, Type N (m) to BNC (f)	HP 1250-0780
Adapter, Type N (f) to BNC (m)	HP 1250-0077
BNC Cable, 120 cm (48 in)	HP 10503A

4-25. CALIBRATOR ACCURACY TEST (Cont'd)

Additional Equipment for Options 001 and 002:

Powe Sensor, 75Ω HP 8483A
Adapter, GR Type 874 to BNC (m), 75Ω ..... *General Radio 0874-9754*
Adapter, GR Type 874 to N (f), 75Ω ..... *General Radio 0874-9751*
Minimum Loss Adapter, 75Ω to 50Ω ..... *HP 08558-60031*
Adapter, BNC (m) to BNC (m) ..... *HP 1250-0216*
Adapter, SMA (f) to SMA (f) ..... *HP 1250-1158*
Adapter, BNC (f) to SMA (m) ..... *HP 1250-1200*
BNC Cable 30 cm (12 in), 75Ω ..... *HP 11652-60012*

PROCEDURE:

1. Set equipment as follows:

Spectrum Analyzer:

START – CENTER ..... CENTER
TUNING ..... 250 MHz
FREQ SPAN/DIV ..... 1 MHz
RESOLUTION BW ..... 1 MHz
INPUT ATTEN ..... 10 dB
REFERENCE LEVEL ..... –20 dBm
002: +30 dBmV
Amplitude Scale ..... 10 dB/DIV
SWEEP TIME/DIV ..... AUTO
SWEEP TRIGGER ..... FREE RUN
VIDEO FILTER ..... OFF
BASELINE CLIPPER ..... OFF

Signal Generator:

OUTPUT LEVEL ..... +10 dBm
FREQUENCY ..... 250 MHz
AM ..... OFF
FM ..... OFF
RF ..... ON
COUNTER MODE ..... EXT, 0-550, EXPAND-X10

2. Connect CAL OUTPUT to HP 8640B COUNTER INPUT through amplifier, as shown in Figure 4-22. Frequency counter should indicate 250 MHz ±50 kHz. (If frequency counter indicates 500 MHz, insert 300 MHz LPF between spectrum analyzer CAL OUTPUT and amplifier INPUT.)

3. Set the signal generator COUNTER MODE to INT and set frequency to 250 MHz. Connect the output of the generator to the calibrated step attenuator, through 300 MHz LPF.

4. Set the step attenuator to 10 dB and connect the power sensor and power meter to the attenuator as shown in Figure 4-22.

5. Set signal generator output power for a 0 dBm full scale reading on the power meter. Leave signal generator set at this level.

4-25. CALIBRATOR ACCURACY TEST (Cont'd)

6. Set the step attenuator to 40 dB and connect the −30 dBm reference (from signal generator through the step attenuator) to the HP 8557A INPUT 50Ω connector.

7. With the Amplitude Scale switch set to 10 dB/DIV, set TUNING control so signal is centered on CRT display. The peak amplitude of the reference signal should be one division down from the top graticule line.

8. Set the Amplitude Scale switch to 1 dB/DIV and adjust the REF LEVEL FINE control so peak amplitude of the reference signal is on the seventh graticule line (one division down from top).

9. Disconnect the reference signal and connect the HP 8557A CAL OUTPUT to the INPUT 50Ω connector. Signal amplitude should be one division down from the top graticule line ±1 division.

−31 dBm_____−29 dBm

PROCEDURE FOR OPTIONS 001 AND 002:

1. *Set spectrum analyzer controls as indicated above.*

2. *Connect CAL OUTPUT to 8640B counter input connector through amplifier. Frequency counter should indicate 250 MHz ±50 kHz. (Use EXPAND X10 COUNTER MODE, EXT 0-550.)*

3. *Set signal generator COUNTER MODE to INT and set frequency to 250 MHz. Connect output of signal generator through 300 MHz LPF and calibrated step attenuator to 75-ohm minimum loss adapter (approximately 5.7 dB attenuation). Set signal generator OUTPUT LEVEL to −5 dBm.*

4. *Set the step attenuator to 0 dB. Connect minimum loss adapter through power sensor to power meter.*

5. *Set signal generator OUTPUT LEVEL for a −10 dBm (Option 001) or −8.75 dBm (Option 002) reading on power meter. Leave the signal generator set at this level.*

6. *Set step attenuator to 20 dB and connect −30 dBm (+20 dBmV) reference signal (from signal generator through step attenuator, minimum loss adapter, and 75-ohm cable) to HP 8557A INPUT 75Ω connector.*

7. *With Amplitude Scale switch set to 10 dB/DIV, adjust TUNING control to center signal on CRT display. Peak amplitude of reference signal should be one division down from the top graticule line.*

8. *Set Amplitude Scale switch to 1 dB/DIV and adjust REF LEVEL FINE control so peak amplitude of reference signal is on 7th graticule line (one division down from top).*

9. *Disconnect the reference signal and connect HP 8557A CAL OUTPUT through 75-ohm cable to INPUT 75Ω connector. Signal peak amplitude should be one division down from top, plus or minus one division.*

001: −31 dBm_____29 dBm

002: +19 dBmV_____+21 dBmV

Table 4-12. Performance Test Record (1 of 5)

Hewlett-Packard
Model 8557A
Spectrum Analyzer 10 kHz–350 MHz

Tested By_____

Serial No._____

Date_____

Paragraph Number	Test Description	Results		
		Min.	Actual	Max.
4-11.	**Frequency Span Accuracy Test**			
	4. 20 MHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	5. 10 MHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	6. 5 MHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	7. 2 MHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	8. 1 MHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	9. 500 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	10. 200 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	11. 100 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	50 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	20 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	10 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
	5 kHz FREQ SPAN/DIV	–0.8 div	_____	+0.8 div
4-12.	**TUNING Accuracy Test**			
	5. 10.0 MHz	6.9 MHz	_____	13.1 MHz
	6. 20.0 MHz	16.9 MHz	_____	23.1 MHz
	40.0 MHz	36.9 MHz	_____	43.1 MHz
	60.0 MHz	56.9 MHz	_____	63.1 MHz
	80.0 MHz	76.9 MHz	_____	83.1 MHz
	100.0 MHz	96.9 MHz	_____	103.1 MHz
	120.0 MHz	116.9 MHz	_____	123.1 MHz
	140.0 MHz	136.9 MHz	_____	143.1 MHz
	160.0 MHz	156.9 MHz	_____	163.1 MHz
	180.0 MHz	176.9 MHz	_____	183.1 MHz
	200 MHz	197 MHz	_____	203 MHz

Table 4-12. Performance Test Record (2 of 5)

Paragraph Number	Test Description		Results	
		Min.	Actual	Max.
	TUNING Accuracy Test (Cont'd)			
	220 MHz	217 MHz	_____	223 MHz
	240 MHz	237 MHz	_____	243 MHz
	260 MHz	257 MHz	_____	263 MHz
	280 MHz	277 MHz	_____	283 MHz
	300 MHz	297 MHz	_____	303 MHz
	320 MHz	317 MHz	_____	323 MHz
	340 MHz	337 MHz	_____	343 MHz
	350 MHz	347 MHz	_____	353 MHz
4-13.	**Residual FM Test**			
	6. Peak-to-Peak Variation of Trace		_____	1 div (1 kHz/0.1 sec)
4-14.	**Noise Sidebands Test**			
	6. Noise Sidebands		_____	6.5 div down (–75 dB)
4-15	**Resolution Bandwidth Accuracy Test**			
	7. 3 MHz REsolution BW	2.40 MHz	_____	3.60 MHz
	8. 1 MHz Resolution BW	800 kHz	_____	1.20 MHz
	9. 300 kHz Resolution BW	240 kHz	_____	360 kHz
	10. 100 kHz Resolution BW	80 kHz	_____	120 kHz
	17. 30 kHz Resolution BW	24 kHz	_____	36 kHz
	18. 10 kHz Resolution BW	8 kHz	_____	12 kHz
	19. 3 kHz Resolution BW	2.4 kHz	_____	3.6 kHz
	20. 1 kHz Resolution BW	0.8 kHz	_____	1.2 kHz

Table 4-12. Performance Test Record (3 of 5)

Paragraph Number	Test Description		Results	
		Min.	Actual	Max.
4-16.	**Resolution Bandwidth Selectivity Test**			
	23. 3 MHz Resolution BW Selectivity		_____	15:1
	1 MHz Resolution BW Selectivity		_____	15:1
	300 kHz Resolution BW Selectivity		_____	15:1
	100 kHz Resolution BW Selectivity		_____	15:1
	30 kHz Resolution BW Selectivity		_____	15:1
	10 kHz Resolution BW Selectivity		_____	15:1
	3 kHz Resolution BW Selectivity		_____	15:1
	1 kHz Resolution BW Selectivity		_____	15:1
4-17.	**Average Noise Level Test**			
	2. Average Noise Level, 1 MHz		_____	−107 dBm
	3. Average Noise Level, 350 MHz		_____	−107 dBm
4-18.	**Spurious Responses Test**			
	9. Harmonic Distortion			
	2nd harmonic	−70 dB	_____	
	3rd harmonic	−70 dB	_____	
	17. Third Order Intermodulation Distortion, 30 MHz input signals	−70 dB	_____	
	18. Second Order Intermodulation Distortion, 30 MHz input signals ($f_2 - f_1$)	−70 dB	_____	
	20. Second Order Intermodulation Distortion, 3 MHz input signals ($f_1 + f_2$)	−70 dB	_____	
	22. Third Order Intermodulation Distortion, 30 MHz input signals	−70 dB	_____	
	25. Second Order Intermodulation Distortion, 0.9 MHz input signals ($f_2 - f_1$)	−60 dB	_____	
	26. Second Order Intermodulation Distortion, 0.9 MHz input signals ($f_2 + f_1$)	−60 dB	_____	
4-19.	**Residual Responses Test**			
	11. Residual Responses .1 to 350 MHz		_____	−100 dBm

Table 4-12. Performance Test Record (4 of 5)

Paragraph Number	Test Description	Results		
		Min.	Actual	Max.
4-20.	**Frequency Response Test**			
	20. Frequency Response 10 kHz to 350 MHz		_____	1.5 dB p-p.
4-21.	**Bandwidth Switching (Amplitude Variation) Test**			
	6. 3 MHz to 300 kHz (overall variation)	−0.5 dB	_____	+0.5 dB
	3 MHz to 1 kHz (overall variation)	−1.0 dB	_____	+1.0 dB
4-22.	**Input Attenuator Accuracy Test**			
	4. Error Between Adjacent Settings		_____	±0.5 dB
	5. Error Over Full 50 dB Range		_____	±1.0 dB (2.0 dB p-p.)
4-23.	**Reference Level Accuracy Test**			
	4. IF Gain Accuracy in Log −10 dBm to −80 dBm		_____	±0.5 dB (1.0 dB)
	−10 dBm to −100 dBm		_____	±1.0 dB (2.0 dB)
	002: +40 dBmV to −30 dBmV *+40 dBmV to −50 dBmV*			
	8. IF Gain Accuracy in LIN −10 dBm to −80 dBm		_____	±0.5 dB (1.0 dB)
	−10 dBm to −100 dBm		_____	±1.0 dB (2.0 dB)
	002: +40 dBmV to −30 dBmV *+40 dBmV to −50 dBmV*			
	11. Vernier Accuracy REF LEVEL FINE:			
	−1	−0.5 dB	_____	+0.5 dB
	−2	−0.5 dB	_____	+0.5 dB
	−3	−0.5 dB	_____	+0.5 dB
	−4	−0.5 dB	_____	+0.5 dB
	−5	−0.5 dB	_____	+0.5 dB
	−6	−0.5 dB	_____	+0.5 dB
	−7	−0.5 dB	_____	+0.5 dB
	−8	−0.5 dB	_____	+0.5 dB
	−9	−0.5 dB	_____	+0.5 dB
	−10	−0.5 dB	_____	+0.5 dB
	−11	−0.5 dB	_____	+0.5 dB
	−12	−0.5 dB	_____	+0.5 dB

Table 4-12. Performance Test Record (5 of 5)

Paragraph Number	Test Description		Results	
		Min.	Actual	Max.
4-24.	**Display Fidelity Test**			
	Log Display Accuracy			
	8. Maximum Error Over Full 70 dB Display Range		_____	±1.5 dB (±15 mV)
	10. Error Between Adjacent Readings		_____	±1.0 dB (±10 mV)
	Linear Display Accuracy			
	14. Error at 4th division	3.76 div	_____	4.24 div
	15. Error at 2nd division	1.76 div	_____	2.24 div
4-25.	**Calibrator Accuracy Test**			
	2. CAL OUTPUT Frequency	249.950 MHz	_____	250.050 MHz
	9. CAL OUTPUT Amplitude	–31 dBm	_____	–29 dBm
	002: Min. is +19 dBmV, Max. is +21 dBmV			

SECTION V
ADJUSTMENTS

5-1. INTRODUCTION

5-2. The adjustments in this section are required to optimize spectrum analyzer performance after repair. Table 5-1 lists adjustable components by adjustment name, reference designation, adjustment paragraph, and description.

5-3. Data taken during adjustment should be recorded in the spaces provided. Comparison of initial data with data taken during periodic adjustments is useful for preventive maintenance and troubleshooting.

WARNING

The adjustments in this section require the spectrum analyzer to be removed from the display mainframe and connected through an extender cable assembly. Be very careful; the energy at some points in the instrument might, if contacted, cause personal injury. The adjustments in this section should be performed only by a skilled person who knows the hazard involved.

NOTE

Before performing any adjustments, allow 1 hour warmup time.

5-4. EQUIPMENT REQUIRED

5-5. The table of Recommended Test Equipment in Section I lists the test equipment and test accessories required in the adjustment procedures. In addition, the table lists the required minimum specifications and suggested manufacturers' model numbers.

5-6. Required service accessories, with part numbers, are illustrated in Section I.

5-7. Adjustment Tools

5-8. For adjustments requiring a non-metallic tuning tool, use fiber tuning tool, HP Part Number 8170-0033. Never try to force an adjustment control in the analyzer. This is especially critical when tuning slug-tuned inductors and variable capacitors.

5-9. Extender Cable Installation

WARNING

Disconnect mainframe line cord before installing extender cable assembly.

5-10. Pull out the lock knob and slide the spectrum analyzer out of the display mainframe. If side stops are installed, refer to Section II for removal.

5-11. Carefully slide the extender cable assembly, HP part number 5060-0303, into the display mainframe, aligning the metal guide plate with the slotted side rails of the mainframe. Firmly seat the extender cable assembly to ensure good contact.

5-12. Connect the opposite end of the cable to the spectrum analyzer. The plug is keyed so it will go on correctly and will not make contact upside down. Remove the orange and the yellow leads from pins 3 and 4 on the A15 board at the rear of the spectrum analyzer. Connect the corresponding leads from the extender cable assembly to these pins by means of the insulated alligator clips.

5-13. RELATED ADJUSTMENTS

5-14. These adjustments should be performed whenever troubleshooting information in Section VIII indicates that an adjustable circuit is not operating properly. Perform the adjustments after repair or replacement of the circuit. The troubleshooting procedures and Table 5-2 specify the required adjustments.

5-15. FACTORY-SELECTED COMPONENTS

5-16. Table 5-3 provides a list of factory-selected components by reference designation, selection procedure paragraph number, range of values, and basis of selection. Factory-selected components are designated by an asterisk (*) on the schematic diagrams in Section VIII and in the table of Replaceable Parts, Section VI. Part numbers for standard-value components can be found in Table 5-4.

Table 5-1. Adjustable Components (1 of 4)

Adjustment Name	Reference Designator	Adjustment Paragraph	Description
L1, L2, L3, L4, L5	A2L1 thru A2L5	5-19	Adjust high frequency flatness and cutoff frequency of input lowpass filter.
1K BW	A3R1	5-21	Adjusts bandwidth between 3 dB points for RESOLUTION BW setting of 1 kHz.
30K BW	A3R2	5-21	Adjusts bandwidth between 3 dB points for RESOLUTION BW setting of 30 kHz.
100K BW	A3R3	5-21	Adjusts bandwidth between 3 dB points for RESOLUTION BW setting of 100 kHz.
1M BW	A3R4	5-21	Adjusts bandwidth between 3 dB points for RESOLUTION BW setting of 1 MHz.
2 MS	A3R5	5-25	Adjusts sweep ramp to calibrate 2 ms per division sweep time.
1 MS	A3R6	5-25	Adjusts sweep ramp to calibrate 1 ms per division sweep time.
+10V	A3R7	5-25	Adjusts +10 volt supply. This adjustment must be performed while spectrum analyzer is still cold, during first five minutes after turn on.
+14	A4R6	5-17	Adjusts 14 volt supply to 14 volts.
350 MHz	A4R13	5-17	Adjusts display to 350 MHz when digital readout reads 350 MHz.
350 BLANK	A4R41	5-17	Adjusts oversweep blanking for 10 MHz at 350 MHz.
0 BLANK	A4R42	5-17	Adjusts oversweep blanking for 10 MHz at 0 MHz.
OFFSET	A4R47	5-17	Adjusts offset current in shaping network.
0/40	A4R60	5-17	Adjusts shaping from 0 to 40 MHz.
40/80	A4R63	5-17	Adjusts shaping from 40 to 80 MHz.
80/120	A4R69	5-17	Adjusts shaping from 80 to 120 MHz.
120/160	A4R75	5-17	Adjusts shaping from 120 to 160 MHz.
160/200	A4R79	5-17	Adjusts shaping from 160 to 200 MHz.
200/240	A4R83	5-17	Adjusts shaping from 200 to 240 MHz.

Table 5-1. Adjustable Components (2 of 4)

Adjustment Name	Reference Designator	Adjustment Paragraph	Description
240/280	A4R86	5-17	Adjusts shaping from 240 to 280 MHz.
280/320	A4R89	5-17	Adjusts shaping from 280 to 320 MHz.
320/350	A4R92	5-17	Adjusts shaping from 320 to 350 MHz.
BP1 BP2	A5C4 A5C6	5-18	Adjusts center frequency of 500 MHz bandpass filter for second LO.
BP3 BP4 BP5 BP6	A5C7 A5C5 A5C3 A5C2	5-18	Adjusts center frequency of 521.4 MHz bandpass filter for first IF.
FREQ ADJ	A5A1L3	5-18	Adjusts frequency of 250 MHz oscillator.
L6	A5A1L6	5-18	Adjusts center frequency of 500 MHz doubler.
CAL ADJ	A5A1R11	5-18	Adjusts amplitude of –30 dBm CAL OUTPUT signal.
SLOPE LO	A6R15	5-19	Compensates for input mixer frequency response 0–120 MHz.
SLOPE MID	A6R16	5-19	Compensates for input mixer frequency response 120–240 MHz.
SLOPE HI	A6R17	5-19	Compensates for input mixer frequency response 240–350 MHz.
CTR CTR	A7A2L1 A7A2L2	5-19	Adjusts center frequency of first IF bandpass, which slightly affects flatness between 0 and 120 MHz.
LC CNTR	A8C1	5-20	Adjusts centering of LC bandwidth filter to coincide with center of crystal bandwidth filter.
XTL SYM	A8C2	5-20	Adjusts symmetry of crystal bandwidth filter (in 30 kHz BW).
XTL CNTR	A8C3	5-20	Adjust centering and amplitude of crystal bandwidth filter (in 30 kHz BW). Affects adjustment of LC CNTR.
LC CNTR	A8C4	5-20	Adjusts centering of LC bandwidth filter to coincide with center of crystal bandwidth filter.
XTL SYM	A8C5	5-20	Adjusts symmetry of crystal bandwidth filter (in 30 kHz BW).

Table 5-1. Adjustable Components (3 of 4)

Adjustment Name	Reference Designator	Adjustment Paragraph	Description
XTL CNTR	A8C3	5-20	Adjust centering and amplitude of crystal bandwidth filter (in 30 kHz BW). Affects adjustment of LC CNTR.
LC	A8R1	5-20	Adjusts feedback in LC circuit of bandpass filter.
XTL	A8R2	5-20, 5-21	Adjusts feedback in crystal circuit of bandpass filter.
40 dB	A9R1	5-23	Adjusts 40 dB step gain.
20 dB	A9R2	5-23	Adjusts 20 dB step gain.
10 dB	A9R3	5-23	Adjusts 10 dB step gain.
GAIN	A9R4	5-22	Adjusts overall gain of Step Gain Assembly.
0 dB	A9R5	5-23	Adjusts to calibrate 0 dB position of REF LEVEL FINE control.
−12 dB	A9R6	5-23	Adjusts to calibrate −12 dB position of REF LEVEL FINE control.
LC CNTR	A10C1	5-20	Adjusts centering of LC bandwidth filter to coincide with center of crystal bandwidth filter.
XTL SYM	A10C2	5-20	Adjusts symmetry of crystal bandwidth filter (in 30 kHz BW).
XTL CNTR	A10C3	5-20	Adjust centering and amplitude of crystal bandwidth filter (in 30 kHz BW). Affects adjustment of LC CNTR.
LC CNTR	A10C4	5-20	Adjusts centering of LC bandwidth filter to coincide with center of crystal bandwidth filter.
XTL SYM	A10C5	5-20	Adjusts symmetry of crystal bandwidth filter (in 30 kHz BW).
XTL CNTR	A10C6	5-20	Adjust centering and amplitude of crystal bandwidth filter (in 30 kHz BW). Affects adjustment of LC CNTR.
LC	A10R1	5-20	Adjusts feedback in LC circuit of bandpass filter.
XTL	A10R2	5-20, 5-21	Adjusts feedback in crystal circuit of bandpass filter.
OFFSET	A11R10	5-24	Adjusts −8V temperature compensated supply.

Table 5-1. Adjustable Components (4 of 4)

Adjustment Name	Reference Designator	Adjustment Paragraph	Description
TC	A11R21	5-24	Adjusts gain of +1V supply to provide temperature compensation for log mode temperature controlled variable gain amplifier. (Factory adjustable only.)
SLOPE	A11R23	5-24	Adjusts gain of log mode temperature controlled gain amplifier.
G6	A11R27	5-24	Adjusts combined gain of 2nd and 3rd stages in linear mode.
G5	A11R30	5-24	Adjusts gain of 4th stage in linear mode.
G4	A11R33	5-24	Adjusts gain of 5th stage in linear mode.
LIN	A11R34	5-24	Adjusts combined gain of 6th and 7th stages in linear mode.
−10 dB	A11R39	5-24	Adjusts shape of log fidelity curve at −10 dB.
−30 dB	A11R69	5-24	Adjusts shape of log fidelity curve at −30 dB.
1 VT	A11R88	5-24	Adjusts voltage at A14TP1 for approximately +1V. (Factory adjustable only.)
LOG GAIN	A11R121	5-24	Adjusts dc offset circuitry at output of A14 Log Amplifier Assembly for 10 dB steps in log mode.
1 dB OFFSET	A12R1	5-26	Adjusts for equal amplitude displayed in 10 dB/DIV and 1 dB/DIV for a given input.

Table 5-2. Related Adjustments

Assembly Changed or Repaired		Perform the Following Related Adjustments	Paragraph Number
A1A1	DPM Driver	A1A1R6, A1A1R8, A1A1R19	5-17
A1A2	Front Panel	A9R5, A9R6	5-23
A1A3	Input Attenuator	A2L1, A2L2, A2L3, A2L4, A2L5, A6R15, A6R16, A6R17	5-19
A2	Input Low-Pass Filter	A2L1, A2L2, A2L3, A2L4, A2L5, A6R15, A6R16, A6R17	5-19
A3	Sweep Generator	A3R1, A3R2, A3R3, A3R4, A3R5, A3R6, A3R7	5-21, 5-25
A4	Frequency Control	A4R6, A4R13, A4R41, A4R42, A4R47, A4R60, A4R63, A3R69, A4R75, A4R79, A4R83, A4R86, A4R89, A4R92	5-17
A5	Second Converter	A5BP1, A5BP2, A5BP3, A5BP4, A5BP5, A5BP6, A5A1L2, A5A1L5, A5A1R11	5-18
A6	21.4 MHz Preamp	A6R15, A6R16, A6R17	5-19
A7A1	First LO	A2L1, A2L2, A2L3, A2L4, A3L5, A4R6, A4R13, A4R41, A4R42, A4R47, A4R60, A4R63, A4R69, A4R75, A4R79, A4R83, A4R86, A4R89, A4R92, A6R15, A6R16, A6R17, A7A1L1, A7A1L2	5-17, 5-19
A7A2	First Mixer	A2L1, A2L2, A2L3, A2L4, A2L5, A6R15, A6R16, A6R17, A7A1L1, A7A1L2	5-19
A8, A10*	Bandwidth	A8C1, A8C2, A8C3, A8C4, A8C5, A8C6, A8R1, A8R2, A10C1, A10C2, A10C3, A10C4, A10C5, A10C6, A10R1, A10R2 A3R1, A3R2, A3R3, A3R4	5-20, 5-21
A9	Step Gain	A9R1, A9R2, A9R3, A9R4, A9R5, A9R6	5-22, 5-23
A11	Log Amplifier	A11R23, A11R27, A11R30, A11R33, A11R34, A11R39, A11R121, A12R1	5-24, 5-26
A12	Vertical Driver and Blanking	A12R1	5-26
A13	Motherboard	No related adjustments.	

*Bandwidth Filter Assemblies A8 and A10 contain a matched set of crystals. These four crystals must all be replaced when replacement is necessary.

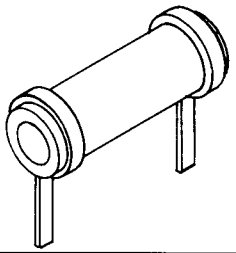
Table 5-3. Factory Selected Components in Alpha-Numerical Order

Reference Designator	Selection Procedure Paragraph Number	Basis of Selection
A3R55		Selected to properly set low end of sweep ramp (–5 volts).
A3R58		Selected to properly set high end of sweep ramp (+5 volts).
A3R74		Selected for 0 volts at A3TP8 with START–CENTER switch in START, 100 MHz/DIV, single scan mode (no sweep).
A3R110		Selected to optimize 300 kHz bandwidth.
A3R115		Selected to optimize 1 MHz bandwidth.
A3R116		Selected for optimum automatic sweep time with VIDEO FILTER on (but not in detent).
A4R46	5-17	Selected to properly set offset current in shaping network for first LO.
A4R61	5-17	Selected for first LO shaping from 0 to 40 MHz.
A4R64	5-17	Selected for first LO shaping from 40 to 80 MHz.
A4R67	5-17	Selected for first LO shaping from 0 to 40 MHz.
A4R70	5-17	Selected for first LO shaping from 80 to 120 MHz.
A4R73	5-17	Selected for first LO shaping from 40 to 80 MHz.
A4R76	5-17	Selected for first LO shaping from 120 to 160 MHz.
A4R77	5-17	Selected for first LO shaping from 80 to 120 MHz.
A4R80	5-17	Selected for first LO shaping from 120 to 160 MHz.
A4R81	5-17	Selected for first LO shaping from 160 to 200 MHz.
A4R84	5-17	Selected for first LO shaping from 200 to 240 MHz.
A4R87	5-17	Selected for first LO shaping from 240 to 280 MHz.
A4R90	5-17	Selected for first LO shaping from 280 to 320 MHz.
A4R93	5-17	Selected for first LO shaping from 320 to 350 MHz.
A4R97	5-17	Selected for first LO shaping close to 350 MHz.
A5A4C1		Selected for minimum conversion loss and distortion products.
A6R2		Selected for proper location of break points in slope compensation network.
A6C4		Selected to improve stability of 21.4 MHz preamp.
A6R5		Selected to set overall gain of RF front end.
A7A1C10		Selected for optimum stability of first LO.
A7A1R11		Selected to optimize input flatness and minimize third-order intermodulation distortion.
A7A1R14		Selected to optimize input flatness and minimize third-order intermodulation distortion.
A8R49		Selected to optimize 100 kHz bandwidth amplitude in second pole of A8 Bandwidth Filter.
A9C25		Selected to center the bandpass of the Step Gain Assembly around 21.4 MHz.
A10R49		Selected to optimize 100 kHz bandwidth amplitude in second pole of A10 Bandwidth Filter.
A11R93	5-24	Selected to shift adjustment range of A11R34.
A11R101	5-24	Selected to shift adjustment range of A11R34.
A11R107	5-24	Selected to shift adjustment range of A11R23.

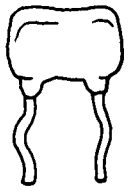
Table 5-4. HP Part Numbers of Standard Value Replacement Components (1 of 3)

CAPACITORS

RANGE: 1 to 24 pF
TYPE: Tubular
TOLERANCE:
1 to 9.1 pF = ±.25 pF
10 to 24 pF = ±5%



RANGE: 27 to 680 pF
TYPE: Dipped Mica
TOLERANCE: ±5%



Value (pF)	HP Part Number	C D
1.0	0160-2236	8
1.2	0160-2237	9
1.5	0150-0091	8
1.8	0160-2239	1
2.0	0160-2240	4
2.2	0160-2241	5
2.4	0160-2242	6
2.7	0160-2243	7
3.0	0160-2244	8
3.3	0150-0059	8
3.6	0160-2246	0
3.9	0160-2247	1
4.3	0160-2248	2
4.7	0160-2249	3
5.1	0160-2250	6
5.6	0160-2251	7
6.2	0160-2252	8
6.8	0160-2253	9
7.5	0160-2254	0
8.2	0160-2255	1
9.1	0160-2256	2
10.0	0160-2257	3
11.0	0160-2258	4
12.0	0160-2259	5
13.0	0160-2260	8
15.0	0160-2261	9
16.0	0160-2262	0
18.0	0160-2263	1
20.0	0160-2264	2
22.0	0160-2265	3
24.0	0160-2266	4

Value (pF)	HP Part Number	C D
27	0160-2306	3
30	0160-2199	2
33	0160-2150	5
36	0160-2308	5
39	0140-0190	7
43	0160-2200	6
47	0160-2307	4
51	0160-2201	7
56	0140-0191	8
62	0140-0205	5
68	0140-0192	9
75	0160-2202	8
82	0140-0193	0
91	0160-2203	9
100	0160-2204	0
110	0140-0194	1
120	0160-2205	1
130	0140-0195	2
150	0140-0196	3
160	0160-2206	2
180	0140-0197	4
200	0140-0198	5
220	0160-0134	1
240	0140-0199	6
270	0140-0210	2
300	0160-2207	3
330	0160-2208	4
360	0160-2209	5
390	0140-0200	0
430	0160-0939	4
470	0160-3533	0
510	0160-3534	1
560	0160-3535	2
620	0160-3536	3
680	0160-3537	4

Table 5-4. HP Part Numbers of Standard Value Replacement Components (2 of 3)

RESISTORS

RANGE: 10 to 464K Ohms
TYPE: Fixed-Film
WATTAGE: .125 at 125°C
TOLERANCE: ±1.0%

Value (Ω)	HP Part Number	CD	Value (Ω)	HP Part Number	CD	Value (Ω)	HP Part Number	CD
10.0	0757-0346	2	464	0698-0082	7	21.5K	0757-0199	3
11.0	0757-0378	0	511	0757-0416	7	23.7K	0698-3158	4
12.1	0757-0379	1	562	0757-0417	8	26.1K	0698-3159	5
13.3	0698-3427	0	619	0757-0418	9	28.7K	0698-3449	6
14.7	0698-3428	1	681	0757-0419	0	31.6K	0698-3160	8
16.2	0757-0382	6	750	0757-0420	3	34.8K	0757-0123	3
17.8	0757-0294	9	825	0757-0421	4	38.3K	0698-3161	9
19.6	0698-3429	2	909	0757-0422	5	42.2K	0698-3450	9
21.5	0698-3430	5	1.0K	0757-0280	3	46.4K	0698-3162	0
23.7	0698-3431	6	1.1K	0757-0424	7	51.1K	0757-0458	7
26.1	0698-3432	7	1.21K	0757-0274	5	56.2K	0757-0459	8
28.7	0698-3433	8	1 33K	0757-0317	7	61.9K	0757-0460	1
31.6	0757-0180	2	1.47K	0757-1094	9	68.1K	0757-0461	2
34.8	0698-3434	9	1.62K	0757-0428	1	75.0K	0757-0462	3
38.3	0698-3435	0	1.78K	0757-0278	9	82.5K	0757-0463	4
42.2	0757-0316	6	1.96K	0698-0083	8	90.9K	0757-0464	5
46.4	0698-4037	0	2.15K	0698-0084	9	100K	0757-0465	6
51.1	0757-0394	0	2.37K	0698-3150	6	110K	0757-0466	7
56.2	0757-0395	1	2.61K	0698-0085	0	121K	0757-0467	8
61.9	0757-0276	7	2.87K	0698-3151	7	133K	0698-3451	0
68.1	0757-0397	3	3.16K	0757-0279	0	147K	0698-3452	1
75.0	0757-0398	4	3.48K	0698-3152	8	162K	0757-0470	3
82.5	0757-0399	5	3.83K	0698-3153	9	178K	0698-3243	8
90.9	0757-0400	9	4.22K	0698-3154	0	196K	0698-3453	2
100	0757-0401	0	4.64K	0698-3155	1	215K	0698-3454	3
110	0757-0402	1	5.11K	0757-0438	3	237K	0698-3266	5
121	0757-0403	2	5.62K	0757-0200	7	261K	0698-3455	4
133	0698-3437	2	6.19K	0757-0290	5	287K	0698-3456	5
147	0698-3438	3	6.81K	0757-0439	4	316K	0698-3457	6
162	0757-0405	4	7.50K	0757-0440	7	348K	0698-3458	7
178	0698-3439	4	8.25K	0757-0441	8	383K	0698-3459	8
196	0698-3440	7	9.09K	0757-0288	1	422K	0698-3460	1
215	0698-3441	8	10.0K	0757-0442	9	464K	0698-3260	9
237	0698-3442	9	11.0K	0757-0443	0			
261	0698-3132	4	12.1K	0757-0444	1			
287	0698-3443	0	13.3K	0757-0289	2			
316	0698-3444	1	14.7K	0698-3156	2			
348	0698-3445	2	16.2K	0757-0447	4			
383	0698-3446	3	17.8K	0698-3136	8			
422	0698-3447	4	19.6K	0698-3157	3			

Table 5-4. HP Part Numbers of Standard Value Replacement Components (3 of 3)

RESISTORS

RANGE: 10 to 1.47M Ohms
TYPE: Fixed-Film
WATTAGE: .5 at 125°C
TOLERANCE: ±1%

Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D
10.0	0757-0984	4	215	0698-3401	0	4.64K	0698-3348	4	110K	0757-0859	2
11.0	0575-0985	5	237	0698-3102	8	5.11K	0757-0833	2	121K	0757-0860	5
12.1	0757-0986	6	261	0757-1090	5	5.62K	0757-0834	3	133K	0757-0310	0
13.3	0757-0001	6	287	0757-1092	7	6.19K	0757-0196	0	147K	0698-3175	5
14.7	0698-3388	2	316	0698-3402	1	6.81K	0757-0835	4	162K	0757-0130	2
16.2	0757-0989	9	348	0698-3403	2	7.50K	0757-0836	5	178K	0757-0129	9
17.8	0698-3389	3	383	0698-3404	3	8.25K	0757-0837	6	196K	0757-0063	0
19.6	0698-3390	6	422	0698-3405	4	9.09K	0757-0838	7	215K	0757-0127	7
21.5	0698-3391	7	464	0698-0090	7	10.0K	0757-0839	8	237K	0698-3424	7
23.7	0698-3392	8	511	0757-0814	9	12.1K	0757-0841	2	261K	0757-0064	1
26.1	0757-0003	8	562	0757-0815	0	13.3K	0698-3413	4	287K	0757-0154	0
28.7	0698-3393	9	619	0757-0158	4	14.7K	0698-3414	5	316K	0698-3425	8
31.6	0698-3394	0	681	0757-0816	1	16.2K	0757-0844	5	348K	0757-0195	9
34.8	0698-3395	1	750	0757-0817	2	17.8K	0698-0025	8	383K	0757-0133	5
38.3	0698-3396	2	825	0757-0818	3	19.6K	0698-3415	6	422K	0757-0134	6
42.2	0698-3397	3	909	0757-0819	4	21.5K	0698-3416	7	464K	0698-3426	9
46.4	0698-3398	4	1.00K	0757-0159	5	23.7K	0698-3417	8	511K	0757-0135	7
51.1	0757-1000	7	1.10K	0757-0820	7	26.1K	0698-3418	9	562K	0757-0868	3
56.2	0757-1001	8	1.21K	0757-0821	8	28.7K	0698-3103	9	619K	0757-0136	8
61.9	0757-1002	9	1.33K	0698-3406	5	31.6K	0698-3419	0	681K	0757-0869	4
68.1	0757-0794	4	1.47K	0757-1078	9	34.8K	0698-3420	3	750K	0757-0137	9
75.0	0757-0795	5	1.62K	0757-0873	0	38.3K	0698-3421	4	825K	0757-0870	7
82.5	0757-0796	6	1.78K	0698-0089	4	42.2K	0698-3422	5	909K	0757-0138	0
90.0	0757-0797	7	1.96K	0698-3407	6	46.4K	0698-3423	6	1M	0757-0059	4
100	0757-0198	2	2.15K	0698-3408	7	51.1K	0757-0853	6	1.1M	0757-0139	1
110	0757-0798	8	2.37K	0698-3409	8	56.2K	0757-0854	7	1.21M	0757-0871	8
121	0757-0799	9	2.61K	0698-0024	7	61.9K	0757-0309	7	1.33M	0757-0194	8
133	0698-3399	5	2.87K	0698-3101	7	68.1K	0757-0855	8	1.47M	0698-3464	5
147	0698-3400	9	3.16K	0698-3410	1	75.0K	0757-0856	9			
162	0757-0802	5	3.48K	0698-3411	2	82.5K	0757-0857	0			
178	0698-3334	8	3.83K	0698-3412	3	90.9K	0757-0858	1			
196	0757-1060	9	4.22K	0698-3346	2	100K	0757-0367	7			

ADJUSTMENTS

5-17. FREQUENCY CONTROL ADJUSTMENTS

REFERENCE:

A4 Schematic

DESCRIPTION:

The + 14.0 Vdc supply is adjusted and the − 11.5 Vdc supply is checked. The shaping network for the First LO is adjusted to give the correct frequency readout. Oversweep blanking is adjusted.

EQUIPMENT:

Digital Voltmeter	HP 3455A
Comb Generator	HP 8406A
Test Cable, Dual Banana Plugs to Alligator Clips	HP 11002A
Extender Cable Assembly	HP 5060-0303

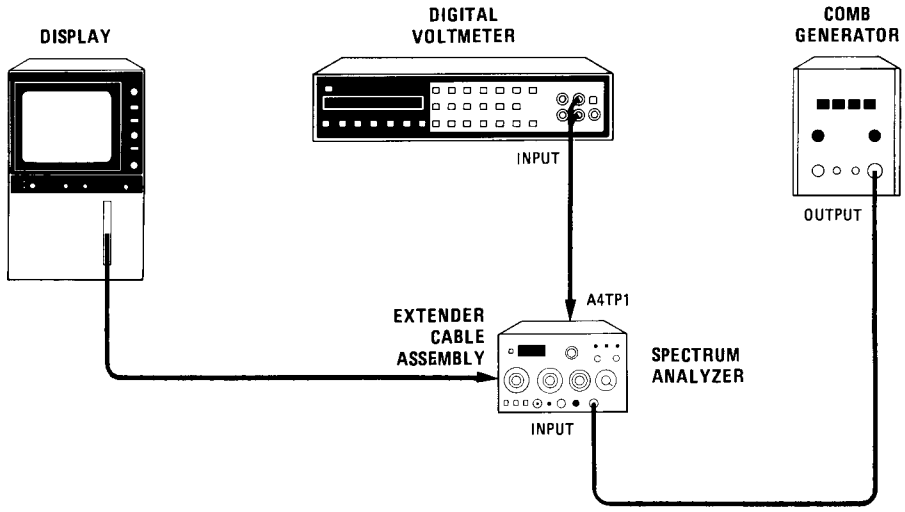


Figure 5-1. Frequency Control Adjustment Test Setup

PROCEDURE:

1. Connect equipment as shown in Figure 5-1. Connect digital voltmeter to A4TP1, and set controls as follows:

   Digital Voltmeter:

RANGE	AUTO
FUNCTION	DC Volts
TRIGGER	INTERNAL
AUTO CAL	On
MATH	OFF

5-17. FREQUENCY CONTROL ADJUSTMENTS (Cont'd)

2. Adjust +14 control A4R6 (if necessary) for digital voltmeter reading of +14.000 ±.010 Vdc.

3. Connect digital voltmeter to A4TP4.

4. Set controls as follows:

Comb Generator:

COMB FREQUENCY – MHz	100 MC
INTERPOLATION AMPLITUDE – 1 MHz	OFF
OUTPUT AMPLITUDE	Full clockwise

Spectrum Analyzer:

START – CENTER	CENTER
FREQ SPAN/DIV	0
RESOLUTION BW	1 kHz (OPTIMUM)
INPUT ATTEN	10 dB
REFERENCE LEVEL	0 dBm
002: +50 dBmV	
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	OFF

5. Adjust HP 8557A TUNING control for digital voltmeter reading of 0.100 ±.010 Vdc. Ensure that spectrum analyzer trace is exactly 10 divisions wide (if not, adjust HP 8557A rear panel HORIZ GAIN control). Adjust mainframe HORIZONTAL POSITION control to center trace on display.

6. Without changing TUNING controls, set FREQ SPAN/DIV control to 5 MHz and RESOLUTION BW control to 100 kHz.

7. Adjust OFFSET control A4R47 to align 200 MHz comb tooth with tenth graticule line (from left side). (See Figure 4-4.) It might be necessary to start with a larger frequency span to bring comb tooth on screen. The 200 MHz tooth can be identified by its amplitude in full span position. Do not adjust TUNING controls.

NOTE

If range of OFFSET control A4R47 is insufficient, select new value of A4R46* as follows:

If OFFSET control A4R47 is fully clockwise, increase A4R46* by 10%.

If OFFSET control A4R47 is fully counterclockwise, decrease A4R46* by 10%.

Continue this process until 200 MHz comb is on tenth graticule line. (See Figure 4-4.)

5-17. FREQUENCY CONTROL ADJUSTMENTS (Cont'd)

8. Set comb generator COMB FREQUENCY – MHz to 10 MC. Adjust 160/200 control A4R79 to give eight division spacing between 160 MHz tooth and 200 MHz tooth. Use OFFSET control A4R47 to keep 200 MHz tooth on tenth division. The fine TUNING control can be used to align 200 MHz tooth exactly on tenth division after A4R47 has it within 0.05 division. If comb teeth are too far apart to be properly adjusted, decrease value of A4R81* by 30%. If comb teeth are too close, increase value of A4R81* by 30%. Continue this process until there is an eight division spacing between 160 MHz tooth and 200 MHz tooth.

9. Adjust HP 8557A TUNING control to set 200 MHz comb tooth on second graticule line. Adjust 200/240 control A4R83 to set 240 MHz tooth on tenth graticule line. If comb teeth are too close together to be properly adjusted, increase value of A4R84* as necessary. If correct spacing cannot be obtained with value of A4R84* at 464K or less, remove A4R84* from board.

10. Using Table 5-5 as a guide, repeat steps 8 and 9, increasing frequency by 40 MHz at each step. Then return to 160 MHz on tenth graticule line, and adjust 120/160 control A4R75 to set 120 MHz comb tooth on second graticule line. Decrease frequency in 40 MHz steps, continuing as above, with following addition: if comb teeth are too close together to be properly adjusted, increase value of appropriate primary resistor listed in Table 5-5 until it equals 196K. If even more compensation is needed, decrease value of secondary resistor called out for that purpose in Table 5-5. At least one resistor of each pair (e.g. A4R76* and A4R80*) should be 196K. If secondary resistor is decreased, it will be necessary to return to the beginning (step 7) and make slight readjustments.

NOTE

350 MHz comb tooth is set on eighth graticule line; if necessary, A4R97* can be changed to improve linearity between 320 MHz and 350 MHz.

Table 5-5. Linearity Adjustment

Frequency of Comb Tooth on 2nd Graticule Line	Frequency of Comb Tooth on 10th Graticule Line	Linearity Adjustment	Primary Linearity Adjustment Range	Secondary Linearity Adjustment Range
160 MHz	200 MHz	160/200 (A4R79)	A4R81*	
200 MHz	240 MHz	200/240 (A4R83)	A4R84*	
240 MHz	280 MHz	240/280 (A4R86)	A4R87*	
280 MHz	320 MHz	280/320 (A4R89)	A4R90*	
320 MHz	350 MHz	320/350 (A4R92)	A4R93*	
120 MHz	160 MHz	120/160 (A4R75)	A4R76*	A4R80*
80 MHz	120 MHz	80/120 (A4R69)	A4R70*	A4R77*
40 MHz	80 MHz	40/80 (A4R63)	A4R64*	A4R73*
LO Feedthrough	40 MHz	0/40 (A4R60)	A4R61*	A4R67*

ADJUSTMENTS

5-17. FREQUENCY CONTROL ADJUSTMENTS (Cont'd)

11. Repeat above procedure from step 4 through step 10, until no adjustments are required.

12. Set HP 8557A FREQ SPAN/DIV control to 1 MHz. Adjust TUNING control to position LO feedthrough at center of screen. Adjust HP 8557A front panel FREQUENCY ZERO control for FREQUENCY MHz readout of 00.0 MHz.en, ±0.5 MHz.

13. Set HP 8557A FREQ SPAN/DIV control to 5 MHz. Adjust 0 BLANK control A4R42 to blank the first three divisions (from left) of the display, leaving 2 divisions (10 MHz) of unblanked baseline to left of LO feedthrough.

14. Adjust HP 8557A TUNING control to center 190 MHz comb tooth on CRT. Set FREQ SPAN/DIV control to 200 kHz and RESOLUTION BW control to 30 kHz. Re-center 190 MHz comb tooth with TUNING control as necessary and adjust GAIN 1 control A1A1R8 for FREQUENCY MHz readout of 190.0 MHz.

15. Adjust HP 8557A TUNING control for FREQUENCY MHz readout of 199 (or 199.0) MHz, and adjust RANGE control A1A1R20 as necessary until four digits are displayed on DPM. Readjust TUNING control for FREQUENCY MHz readout of 198.6 MHz, and carefully readjust RANGE control A1A1R20 until DPM just ranges to three-digit resolution.

16. Adjust HP 8557A TUNING control to center 350 MHz comb tooth on CRT, and adjust GAIN 2 control A1A1R8 for FREQUENCY MHz readout of 350 MHz.

17. Set HP 8557A FREQ SPAN/DIV control to 5 MHz and RESOLUTION BW to 300 kHz. Adjust 350 BLANK control A4R41 to blank the last three (from right) divisions of the display, leavig 2 divisions (10 MHz) of unblanked baseline above te 350 MHz comb tooth.

18. Adjust HP 8557A coarse and fine TUNING controls fully clockwise. Adjust 367 MHz control A4R13 for FREQUENCY MHz readout of 367 MHz.

19. Set HP 8557A FREQ SPAN/DIV control to 500 kHz and RESOLUTION BW control to 30 kHz. Adjust TUNING control for a FREQUENCY MHz readout of 00.0 MHz and check centering of the LO feedthrough signal. If it is not within ±0.5 MHz of CRT center, repeat steps 12 – 18 until no further adjustment is necessary.

ADJUSTMENTS

5-18. SECOND CONVERTER LO, CAL OUTPUT, AND BANDPASS ADJUSTMENT

REFERENCE:

A5 and A6 Schematics

DESCRIPTION:

The second converter 250 MHz oscillator is adjusted for maximum output, and CAL OUTPUT power is adjusted for −30 dBm ±1.0 dB. The CAL OUTPUT frequency is checked for 250 MHz ±50 kHz. The second converter bandpass is adjusted for proper symmetry and amplitude with minimum spurious signals.

002: +20 dBmV ±1.0 dB

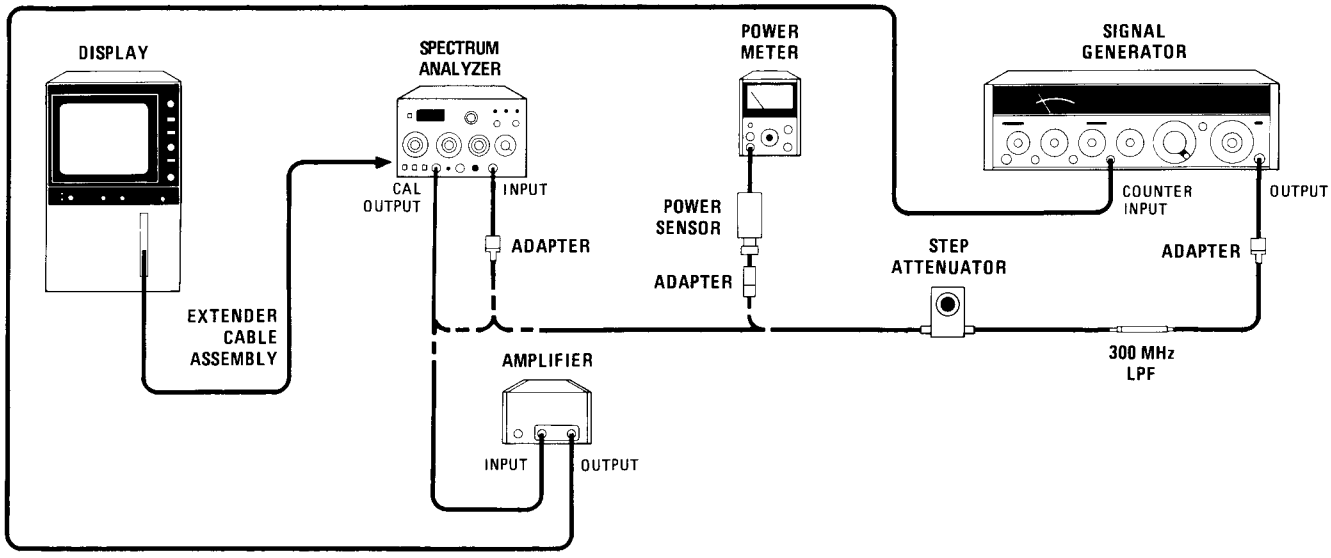


Figure 5-2. Second Converter Adjustment Test Setup

EQUIPMENT:

Amplifier	HP 8447A
Power Meter	HP 435B
Power Sensor	HP 8482A
Signal Generator	HP 8640B
10-dB Step Attenuator	HP 355D
300 MHz LPF	Telonic TLP 300-4AB
Adapter, Type N (m) to BNC (f)	HP 1250-0780
Adapter, Type N (f) to BNC (m)	HP 1250-0077
Extender Cable Assembly	HP 5060-0303

Additional Equipment, Options 001 and 002:

BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*
Minimum Loss Adapter, 75Ω to 50Ω	*HP 08558−60031*
Adapter, N (m) to SMA (f)	*HP 1250-1250*

ADJUSTMENTS

5-18. SECOND CONVERTER LO, CAL OUTPUT, AND BANDPASS ADJUSTMENT (Cont'd)

PROCEDURE:

NOTE

Once started, the following procedure must be performed completely, and in the order shown.

1. Set equipment as follows:

   Spectrum Analyzer:

   START – CENTER ..... CENTER
   TUNING ..... 250 MHz
   FREQ SPAN/DIV ..... 1 MHz
   RESOLUTION BW ..... 300 kHz
   INPUT ATTEN ..... 10 dB
   REFERENCE LEVEL dBm ..... –20
   002: +30 dBmV
   REF LEVEL FINE ..... –7 dB
   Amplitude Scale ..... 1 dB/DIV
   SWEEP TIME/DIV ..... AUTO
   SWEEP TRIGGER ..... FREE RUN
   VIDEO FILTER ..... OFF
   BASELINE CLIPPER ..... OFF

   Signal Generator:

   OUTPUT LEVEL ..... +10 dBm
   FREQUENCY ..... 250 MHz
   AM ..... OFF
   FM ..... OFF
   RF ..... ON
   COUNTER MODE ..... INT

2. Connect HP 8557A CAL OUTPUT to INPUT 50Ω connector. Adjust TUNING control to center 250 MHz signal on CRT display. Adjust REF LEVEL FINE control for a mid-screen signal.

   001 and 002: INPUT 75Ω connector, using a 75Ω BNC cable.

3. Using a non-metallic adjustment tool, adjust FREQ ADJ control A5A1L3 (bottom of A5 second Converter) for maximum display amplitude. Do not readjust this control without performing steps 4 through 12.

4. Connect equipment as shown in Figure 5-2, using an adapter to connect power sensor to step attenuator. Set step attenuator to 10 dB, and tune signal generator for 250 MHz output signal.

5. Adjust signal generator OUTPUT LEVEL for 0 dBm full scale reading on power meter. Leave signal generator set at this level.

   001: +5.7 dBm
   002: +7.0 dBm

5-18. SECOND CONVERTER LO, CAL OUTPUT, AND BANDPASS ADJUSTMENT (Cont'd)

6. Set step attenuator to 40 dB and connect reference signal (output of signal generator through step attenuator) to HP 8557A INPUT 50Ω connector.

   001 and 002: INPUT 75Ω connector using Minimum Loss Adapter, 75Ω BNC Cable, and N (m) to SMA (f) Adapter.

7. Adjust spectrum analyzer REF LEVEL FINE control to place reference signal at 7th graticule line.

8. Disconnect Minimum Loss Adapter and connect CAL OUTPUT to INPUT. Using a non-metallic adjustment tool, adjust CAL ADJ control A5A1R11 (bottom of Second Converter A5) to place signal at 7th graticule line ±0.1 division.

NOTE

CAL ADJ control A5A1R11 has no interaction and can be adjusted any time.

9. Adjust A5A1L6 (top side of second converter) for maximum amplitude on display.

10. Connect CAL OUTPUT to amplifier input and connect amplifier output to COUNTER INPUT on signal generator. Set signal generator COUNTER MODE to EXT, EXPAND X10. The CAL OUTPUT signal should read 250 MHz ± 50 kHz. If it does not, repeat steps 3 through 9.

11. Set HP 8557A controls as follows:

REFERENCE LEVEL	0 dBm
REF LEVEL FINE	0
Amplitude Scale	10 dB/DIV
FREQ SPAN/DIV	5 MHz
RESOLUTION BW	3 MHz

12. Connect signal generator through step attenuator to HP 8557A INPUT. Set step attenuator to 0 dB.

13. Adjust BP1 control C4 and BP2 control C6 (Second Converter LO Bandpass Filter) and BP3 control C7, BP4 control C5, BP5 control C3, and BP6 control C2 (Second Converter IF Bandpass Filter) for maximum amplitude and symmetry of 3 MHz bandwidth filter as seen on CRT display. Repeat adjustments as necessary for optimum response. Tighten locknuts when adjustments are completed.

CAUTION

BP1 – BP6 controls are long hex-drive set screws on top of Second Converter A5. DO NOT loosen or adjust six smaller set screws adjacent to BP1 – P6 – these are soldered internally to coils A5L1 – A5L6, which are easily broken off.

ADJUSTMENTS

5-18. SECOND CONVERTER LO, CAL OUTPUT, AND BANDPASS ADJUSTMENT (Cont'd)

14. Turn VIDEO FILTER control to maximum clockwise without being in MAX detent position. Observe any spurious signals at 10.7 MHz (2.14 divisions) below main signal. If a spurious signal is present, slightly adjust BP2 control C6 for minimum spurious amplitude. Spurious signal amplitude must be at least 70 dB below the main signal, taking care not to sacrifice 3 MHz bandwidth symmetry more than necessary.

NOTE

Tighten locknuts securely when finished.

ADJUSTMENTS

5-19. FLATNESS ADJUSTMENT, INCLUDING SLOPE COMPENSATION, INPUT LOW PASS FILTER, AND FIRST CONVERTER BANDPASS

REFERENCE:

A2, A5, A6, and A7 Schematics

DESCRIPTION:

Slope compensation adjusts for changes in first converter conversion loss as a function of frequency. Input low pass filter adjustments affect flatness above 250 MHz. First converter bandpass affects flatness below 100 MHz.

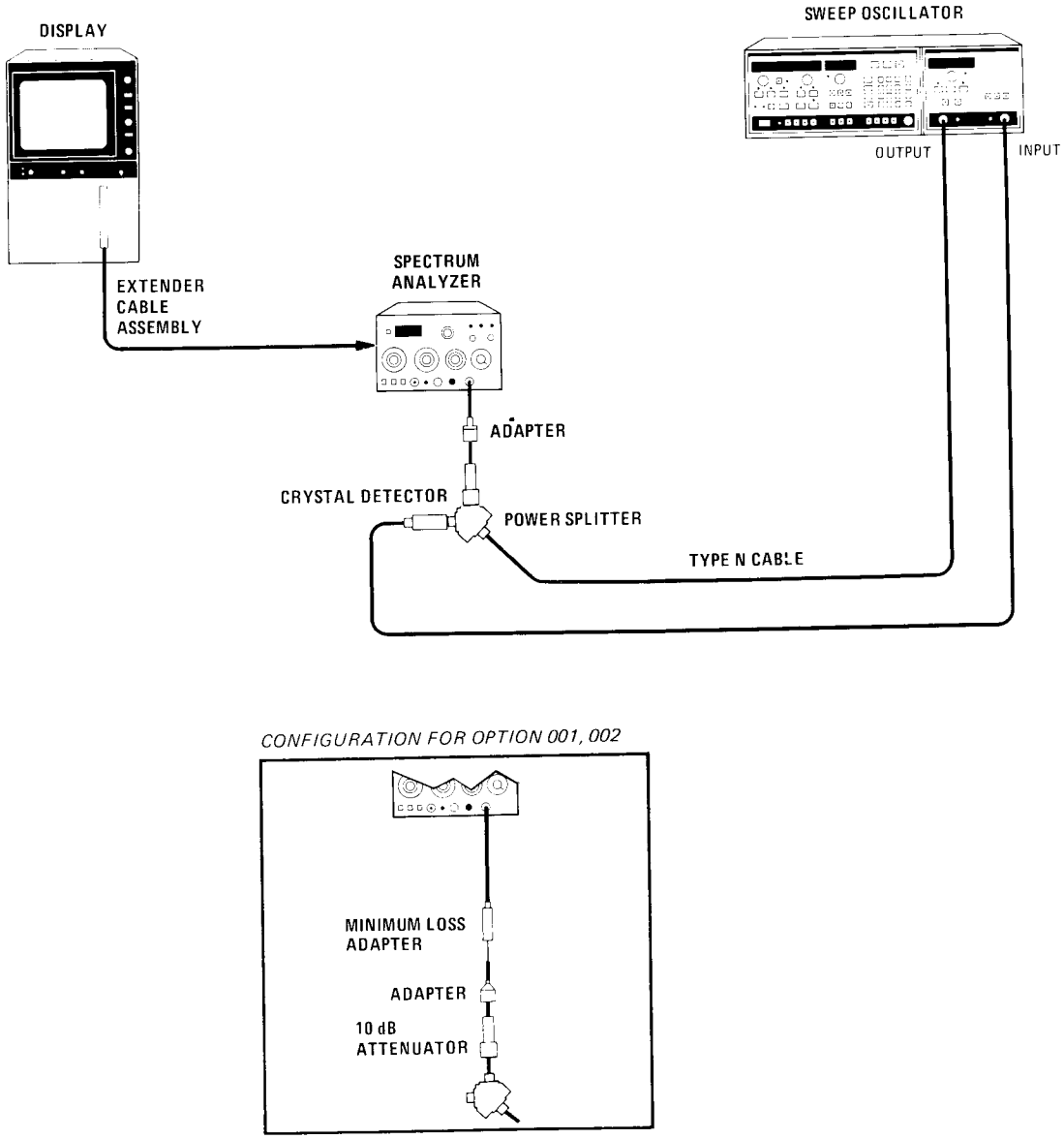


Figure 5-3. Flatness Adjustment Test Setup

ADJUSTMENTS

5-19. FLATNESS ADJUSTMENT, INCLUDING SLOPE COMPENSATION, INPUT LOW PASS FILTER, AND FIRST CONVERTER BANDPASS (Cont'd)

EQUIPMENT:

Sweep Oscillator*	HP 8350A
RF Plug-In*	HP 83522A
Power Splitter	HP 11667A
Crystal Detector	HP 423B
10-dB Attenuator	HP 8491B, Opt. 010
Adapter, Type N (m) to BNC (f)	HP 1250-0780
BNC Cable, 120 cm (48 in)	HP 10503A
Type N Cable	HP 11500A
Extender Cable Assembly	HP 5060–0303

*8620C/86222A may be substituted

Additional Equipment, Options 001 and 002:

BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*
Minimum Loss Adapter, 75Ω to 50Ω	*HP 08558–60031*
Adapter, Type N (m) to SMA (f)	*HP 1250-1250*

PROCEDURE:

1. Set equipment as follows:

Spectrum Analyzer:

START–CENTER	CENTER
TUNING	Fully counterclockwise
FREQ SPAN/DIV	F
RESOLUTION BW	3 MHz
INPUT ATTEN	10 dB
REFERENCE LEVEL	–10 dBm
002: +40 dBmV	
REF LEVEL FINE	0
Amplitude Scale	1 dB/DIV
SWEEP TIME/DIV	AUTO
BASELINE CLIPPER	OFF
VIDEO FILTER	Fully clockwise (not in MAX detent)

Sweep Oscillator:

START	10 MHz
STOP	350 MHz
SWEEP	MAN
POWER LEVEL	0 dBm
ALC MODE	EXT
FREQUENCY/TIME	50 MHz

5-19. FLATNESS ADJUSTMENT, INCLUDING SLOPE COMPENSATION, INPUT LOW PASS FILTER, AND FIRST CONVERTER BANDPASS (Cont'd)

2. Connect equipment as shown in Figure 5-3.

3. Adjust spectrum analyzer REF LEVEL FINE to bring signal peak on display.

4. Manually tune sweep oscillator for output frequencies from 10 MHz to 350 MHz to locate highest displayed amplitude. Adjust spectrum analyzer REF LEVEL FINE to bring highest displayed amplitude to fifth CRT graticule line from bottom.

5. Set sweep oscillator to automatic sweep mode (TIME sweep) and set sweep speed low enough to easily follow signal on CRT. Sweep full range from 10 MHz to 350 MHz.

6. Adjust A6 SLOPE compensation controls (LO, MID, HI) for best overall flatness. SLOPE LO control A6R15 affects the lowest frequencies, SLOPE MID control A6R16 affects the middle range, and SLOPE HI control A6R17 affects the high frequencies.

7. If the flatness of the low frequency portion of the band is still unsatisfactory, remove hole plugs on the side of First Converter Assembly A7 and adjust Bandpass Filter adjustments A7A2L1 and A7A2L2, using a non-metallic adjustment tool. A7A2L1 and A7A2L2 should be alternately adjusted for maximum signal level across the band, then slightly readjusted to improve flatness as required at the low frequency end of the band. The hole plugs must be replaced to prevent RFI leakage into the first converter.

8. If the flatness of the high frequency portion of the band is still unsatisfactory, adjust Input Low-Pass Filter adjustments A2L1, A2L2, A2L3, A2L4, and A2L5, accessible through the side panel. Use a non-metallic adjustment tool, and do not overadjust – this drives the brass tuning slugs out of the coil forms. Iterate these five adjustments and A5R17 SLOPE HI control to achieve optimum flatness at the high frequency end of the band.

9. Repeat steps 6, 7, and 8 until peak-to-peak flatness variation is less than 1.5 dB.

10. If the Input Low-Pass Filter or A6R17 SLOPE HI controls are adjusted, check average noise level at 350 MHz, as described in paragraph 4-17, step 3. If it is out of specifications, make further adjustments on Input Low-Pass Filter and A6R17 SLOPE HI control to bring it into specification, maintaining an overall peak-to-peak flatness of 1.5 dB.

ADJUSTMENTS

5-20. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS

REFERENCE:

A8 and A10 Schematics

DESCRIPTION:

The LC and crystal bandwidth filter circuits are adjusted for symmetry, centering, and peak. Three-dB bandwidths are adjusted on Sweep Generator Assembly A3 (paragraph 5-21).

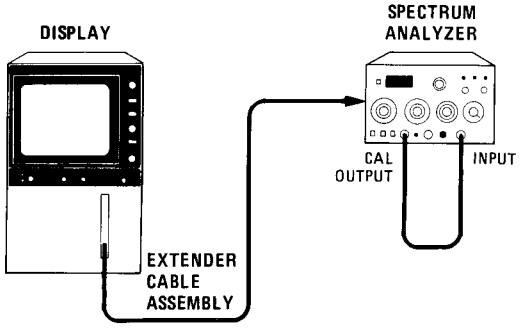


Figure 5-4. LC and Crystal Bandwidth Filter Adjustments Test Setup

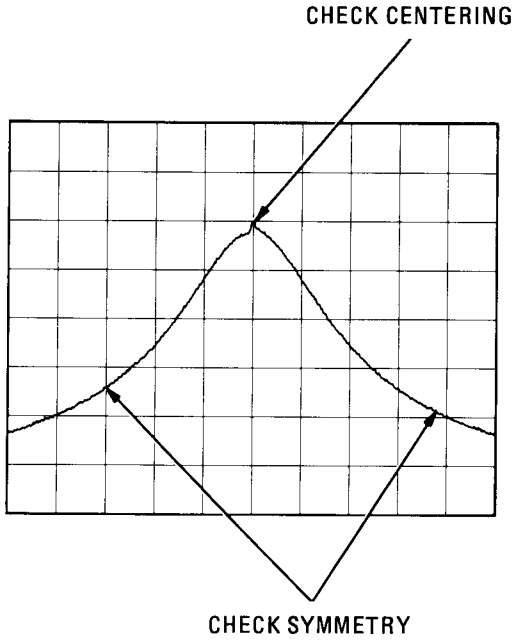


Figure 5-5. Crystal Symmetry and Crystal Centering Display

5-20. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

EQUIPMENT:

BNC Cable, 20 cm (9 inch)	HP 10502A
Extender Cable Assembly	HP 5060-0303

PROCEDURE:

1. Set spectrum analyzer controls as follows:

START – CENTER	CENTER
TUNING	250 MHz
FREQ SPAN/DIV	20 kHz
RESOLUTION BW	30 kHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	–20 dBm
002: +30 dBmV	
Amplitude Scale	LIN
SWEEP TIME/DIV	5 msec
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	OFF
BASELINE CLIPPER	OFF

2. Connect equipment as shown in Figure 5-4. Center signal with TUNING control. Using REF LEVEL FINE control, set signal near top graticule line.

NOTE

A non-metallic tuning tool is required for all adjustments except R1 and R2 on A8 and A10 bandwidth filter assemblies.

3. Short to ground A8TP3, A8TP12, and A10TP3 through holes in assembly covers. Test points can be shorted to covers using midget copper alligator clips (HP Part Number 1400-0483).

4. Adjust A10C5 XTL SYM and A10C6 XTL CNTR controls for best symmetry and centering. Crystal center control A10C6 is adjusted for minimum signal amplitude. (See Figure 5-5.)

5. Remove short from A10TP3 and apply to A10TP12.

6. Adjust A10C2 XTL SYM and A10C3 XTL CNTR adjustments for best symmetry and centering. Crystal center adjustment A10C3 is adjusted for minimum signal amplitude. (See Figure 5-5.)

7. Remove short from A8TP12 and apply to A10TP3.

8. Adjust A8C5 XTL SYM and A8C6 XTL CNTR adjustments for best symmetry and centering. Crystal center adjustment A8C6 is adjusted for minimum signal amplitude. (See Figure 5-5.)

9. Remove short from A8TP3 and apply to A8TP12.

10. Adjust A8C2 XTL SYM and A8C3 XTL CNTR adjustments for best symmetry and centering. Crystal center adjustment A8C3 is adjusted for minimum signal amplitude. (See Figure 5-5.)

5-20. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

11. Change RESOLUTION BW to 100 kHz and FREQ SPAN/DIV to 200 kHz. Leave A8TP12, A10TP3 and A10TP12 shorted and adjust A8C1 LC CNTR adjustment to center signal to same center of display as for crystal centering. Switch RESOLUTION BW control back and forth several times between 30 kHz and 100 kHz settings while adjusting LC CNTR adjustment. This assures that the signal is in the same position on the display for the two different settings of the RESOLUTION BW control.

12. Remove short from A8TP12 and apply to A8TP3.

13. Adjust A8C4 LC CNTR adjustment to center signal to same center of display as crystal centering.

14. Remove short from A10TP3 and apply to A8TP12.

15. Adjust A10C1 LC CNTR adjustment to center signal to same center of display as crystal centering.

16. Remove short from A10TP12 and apply to A10TP3.

17. Adjust A10C4 LC CNTR adjustment to center signal to same center of display as crystal centering.

18. Set RESOLUTION BW to 3 MHz. Remove shorts from A8 assembly and short A10TP3 and A10TP12. Set signal level with REF LEVEL FINE for a maximum amplitude of seven divisions, one division below top graticule line.

19. Set RESOLUTION BW to 100 kHz and adjust A8R1 LC adjustment to position signal one division down from top graticule line.

20. Set RESOLUTION BW to 3 MHz and remove shorts from A10 assembly. Adjust signal level one division down from top graticule line.

21. Set RESOLUTION BW to 100 kHz and adjust A10R1 LC adjustment to position signal one division down from top graticule line.

22. Set FREQ SPAN/DIV to 5 kHz and RESOLUTION BW to 1 kHz. Set SWEEP TIME/DIV to 50 msec.

23. Short A8TP3 and A8TP12, and adjust A10R2 XTL adjustment to position signal one division down from top graticule line.

24. Remove shorts from A8 assembly.

25. Adjust A8R2 XTL adjustment to position signal one division down from top graticule line.

26. Set Amplitude Scale switch to 1 dB/DIV. Set SWEEP TIME/DIV to 5 msec, and set RESOLUTION BW to 3 MHz. Using REF LEVEL FINE control, set signal ampitude at seventh division, one division below top graticule line.

27. Step through RESOLUTION BW settings from 3 MHz to 1 kHz, keeping signal centered with TUNING control. Signal amplitude should not differ more than ± 0.5 dB from 3 MHz reference to 300 kHz and ± 1.0 dB from 3 MHz to 1 kHz.

ADJUSTMENTS

5-21. 3-dB BANDWIDTH ADJUSTMENT

REFERENCE:

A3 Schematic

DESCRIPION:

3-dB bandwidths for 30 kHz, 100 kHz, and 1 MHz RESOLUTION BW settings are adjusted using an external signal or CAL OUTPUT. The 3-dB bandwidth for 1 kHz RESOLUTION BW is adjusted by injecting a stable 21.4 MHz signal into the spectrum analyzer 21.4 MHz preamplifier. (The HP 8557A FREQ SPAN/DIV control is not narrow enough to accurately adjust the 1 kHz RESOLUTION BW.)

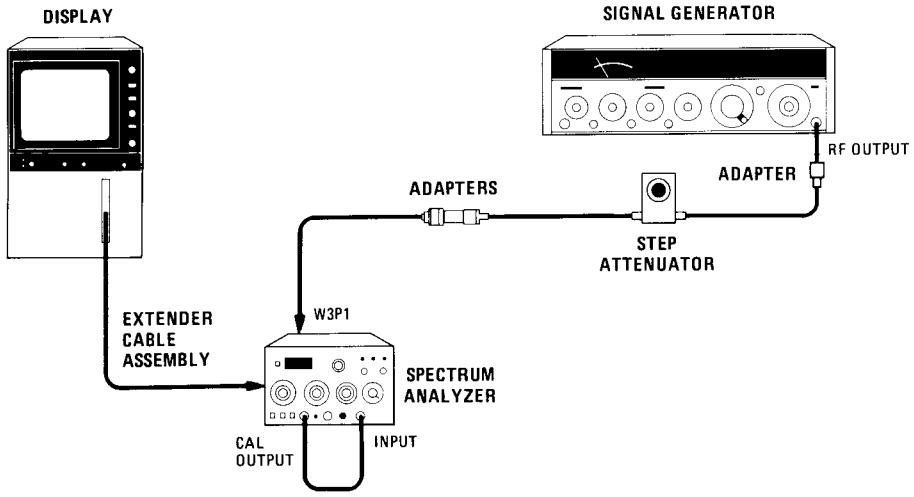


Figure 5-6. 3-dB Bandwidth Adjustment Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
Step Attenuator	HP 355D
BNC Cable, 20 cm (9 in)	HP 10502A
Adapter, Type N (f) to Type N (f)	HP 1250-0777
Adapter, Type N (m) to BNC (f) (2 required)	HP 1250-0780
Adapter, Type N (m) to SMC (m)	HP 1250-1023
Extender Cable Assemby	HP 5060-0303

ADJUSTMENTS

5-21. 3-dB BANDWIDTH ADJUSTMENT (Cont'd)

PROCEDURE:

1. Set spectrum analyzer controls as follows:

START – CENTER	CENTER
TUNING	250 MHz
FREQ SPAN/DIV	200 kHz
RESOLUTION BW	1 MHz
INPUT ATTEN	0 dB
REFERENCE LEVEL	–20 dBm
002: +30 dBmV	
Amplitude Scale	LIN
SWEEP TIME/DIV	1 msec
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	OFF
BASELINE CLIPPER	OFF

2. Connect CAL OUTPUT to spectrum analyzer INPUT.

3. Set a 7.1 division signal level on display with REF LEVEL FINE control. Signal will be 0.9 division from top graticule line.

4. Adjust A3R4 1M BW control for a 5 division wide signal at fifth graticule line.

5. Change RESOLUTION BW to 100 kHz and FREQ SPAN/DIV to 20 kHz. With REF LEVEL FINE control, set signal level to 7.1 divisions.

6. Adjust A3R3 100K BW control for a 5 division wide signal at fifth graticule line.

7. Change RESOLUTION BW to 30 kHz and FREQ SPAN/DIV to 5 kHz. With REF LEVEL FINE control, set signal level at 7.1 divisions.

8. Adjust A3R2 30K BW control for a 6 division wide signal at fifth graticule line.

9. Set signal generator controls as follows:

FREQUENCY TUNE	21.40 MHz
COUNTER MODE	INT
AM	OFF
FM	OFF
RF	ON
OUTPUT LEVEL	–40 dBm

10. Remove W3P1 from A5J2. Connect signal generator through adapter to W3P1.

11. Set HP 8557A RESOLUTION BW to 1 MHz. Tune signal generator to peak signal on display. Adjust the output level for a 7.1 division signal.

12. Set HP 8557A RESOLUTION BW to 1 kHz. Tune signal generator to peak signal on display.

5-21. 3-dB BANDWIDTH ADJUSTMENT (Cont'd)

13. If necessary, adjust A8R2 and A10R2 XTL controls (crystal feedback adjustments) equally for a 7.1 division signal.

14. Record frequency (displayed on signal generator) and tune signal generator 500 Hz below center frequency recorded.

15. Adjust A3R1 1K BW adjustment to bring signal level to the fifth graticule line (3 divisions from the top graticule line).

16. Repeat steps 12 through 15 until the frequency change from center frequency (at 7.1 divisions) to the 3 dB point (at the fifth graticule line) is 500 Hz ± 50 Hz.

ADJUSTMENTS

5-22. STEP GAIN ASSEMBLY RF GAIN ADJUSTMENT

REFERENCE:

A9 Schematic

DESCRIPTION:

The RF gain (sensitivity) of the step gain assembly is adjusted by injecting a 21.4 MHz signal at A13XA6. The 21.4 MHz Preamplifier Assembly A6 is removed and replaced with a special extender board for applying the 21.4 MHz signal from the signal generator.

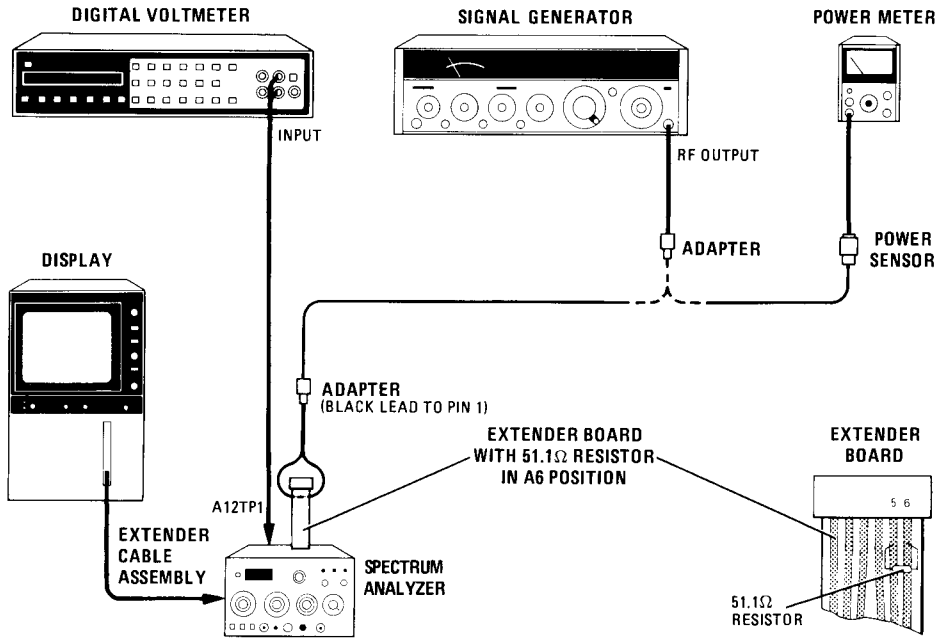


Figure 5-7. RF Gain Adjustment Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
Digital Voltmeter	HP 3455A
Power Meter	HP 435B
Power Sensor	HP 8482A
Adapter, BNC (f) to Alligator Clips	HP 8120-1292
Special Extender Board with 51.1 ohm resistor	HP 08505-60109/0757-0394

NOTE

To make special extender board, solder 51.1 ohm resistor from pin 6 to pin 5 of standard extender board, HP Part Number 08505-60109. Leave resistor leads long for easy connection of clip leads.

5-22. STEP GAIN ASSEMBLY RF GAIN ADJUSTMENT (Cont'd)

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

FREQ SPAN/DIV	1 MHz
RESOLUTION BW	1 MHz
INPUT ATTEN	10 dB
REFERENCE LEVEL	0 dBm
002: +50 dBmV	
REF LEVEL FINE	0
Amplitude Scale	LIN
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	OFF
BASELINE CLIPPER	OFF

   Digital Voltmeter:

RANGE	AUTO
FUNCTION	DC Volts
TRIGGER	INTERNAL
MATH	OFF
AUTO CAL	ON

   Signal Generator:

FREQUENCY TUNE	21.40 MHz
COUNTER MODE	INT
AM	OFF
FM	OFF
RF	ON
OUTPUT LEVEL	approx. −5 dBm

2. Connect equipment as shown in Figure 5-7.

3. Connect output of signal generator across 51.1 ohm resistor on special extender board using BNC to clip-lead adapter. The red lead (center conductor) should be connected to pin 5 of extender board.

4. Set signal generator frequency for peak amplitude on CRT display. Connect output of signal generator to power meter through power sensor and adjust OUTPUT LEVEL for −3 dBm reading. Reconnect signal generator output to clip-lead adapter.

   001: −7 dBm
   002: −6 dBm

ADJUSTMENTS

5-22. STEP GAIN ASSEMBLY RF GAIN ADJUSTMENT (Cont'd)

5. Adjust A9R4 GAIN adjustment for signal one division from top graticule line. DVM should indicate +700 mV ±30 mV. Remove special extender board and replace 21.4 MHz Preamplifier Assembly A6.

NOTE

Front panel VERTICAL GAIN and VERTICAL POSN control settings can affect the voltage measured at A12TP1. Vertical calibration should be checked after adjusting A9R4 for 700 mV.

5-23. STEP AMPLIFIER GAIN ADJUSTMENTS

REFERENCE:

A9 Schematic

DESCRIPTION:

REF LEVEL FINE, 0 dB, and −12 dB adjustments are properly set and step gains of 10 dB, 20 dB, and 40 dB are adjusted.

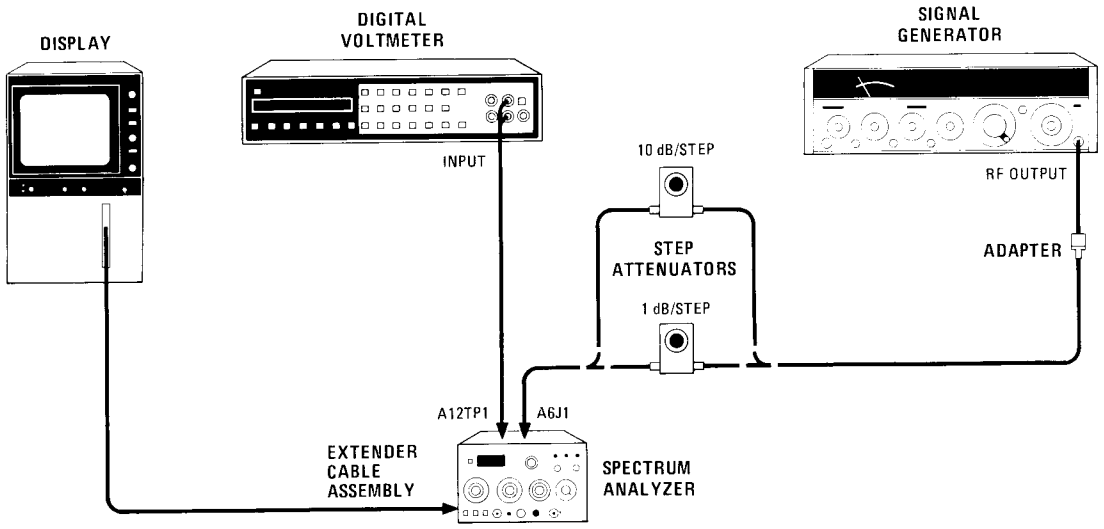


Figure 5-8. Step Amplifier Gain Adjustment Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
1-dB Step Attenuator	HP 355C
10-dB Step Attenuator	HP 355D
Digital Voltmeter	HP 3455A
Test Cable, SMC (f) to BNC (m)	HP 11592-60001
BNC Cable, 120 cm (48 in)	HP 10503A
Adapter, Type N (m) to BNC (f)	HP 1250-0780
Extender Cable Assembly	HP 5060-0303

5-23. STEP AMPLIFIER GAIN ADJUSTMENTS (Cont'd)

PROCEDURE:

1. Set equipment as follows:

   Spectrum Analyzer:

   FREQ SPAN/DIV ..... 1 MHz
   RESOLUTION BW ..... 1 MHz
   INPUT ATTEN ..... −30 dB
   REFERENCE LEVEL ..... 0 dBm
   002: +50 dBmV
   Amplitude Scale ..... 1 dB/DIV
   SWEEP TIME/DIV ..... AUTO
   SWEEP TRIGGER ..... FREE RUN
   VIDEO FILTER ..... OFF

   Signal Generator:

   FREQUENCY TUNE ..... 21.4 MHz
   COUNTER MODE ..... INT
   RF ..... ON
   AM ..... OFF
   FM ..... OFF
   OUTPUT LEVEL ..... approx. −25 dBm

   Digital Voltmeter:

   RANGE 10
   FUNCTION ..... DC Volts
   TRIGGER ..... INTERNAL
   MATH ..... OFF
   AUTO CAL ..... ON

2. Connect equipment as shown in Figure 5-8. Connect signal generator output to 1-dB step attenuator, which in turn is connected to A6J1 with test cable (disconnect orange cable W3). Tune signal generator frequency for peak amplitude on display.

3. Set step attenuator to 12 dB and REF LEVEL FINE to −12. Adjust signal generator OUTPUT LEVEL for a signal one division down from top graticule line on display.

4. Adjust −12 dB A9R6 adjustment control until signal stops rising on display, then adjust A9R6 counterclockwise until signal drops approximately one-half division.

5. Adjust signal generator OUTPUT LEVEL for a signal one division down from top graticule line on display.

6. Set 1-dB step attenuator to 0 dB and REF LEVEL FINE to 0.

7. Adjust 0 dB control A9R5 for a signal one division down from top graticule line on display.

5-23. STEP AMPLIFIER GAIN ADJUSTMENTS (Cont'd)

8. Set step attenuator to 12 dB and REF LEVEL FINE to −12. Signal level on display should be one division down from top graticule line ±0.1 division. Repeat steps 3 through 8 as necessary until signal level is within limits.

9. Check REF LEVEL FINE control from 0 to −12 dBm, as shown in Table 5-5. Verify correct operation on display, or measure voltage at A12TP1 with digital voltmeter.

Figure 5-6. REF LEVEL FINE Control Check

REF LEVEL FINE Setting	Step Attenuator Setting (dB)	Deviation From Reference
0	0	Reference _____ mV (Ref.)
− 1	1	±0.3 Div ±30 mV
− 2	2	±0.3 Div ±30 mV
− 3	3	±0.3 Div ±30 mV
− 4	4	±0.3 Div ±30 mV
− 5	5	±0.3 Div ±30 mV
− 6	6	±0.3 Div ±30 mV
− 7	7	±0.3 Div ±30 mV
− 8	8	±0.3 Div ±30 mV
− 9	9	±0.3 Div ±30 mV
−10	10	±0.3 Div ±30 mV
−11	11	±0.3 Div ±30 mV
−12	12	±0.3 Div ±30 mV

NOTE

Be sure all covers in the IF section are secured by at least six screws before proceding. If covers are left off or not secured by at least six screws, leakage between assemblies may occur. This leakage causes erroneous adjustment.

10. Replace 1-dB step attenuator with 10-dB step attenuator set to 0 dB. Set REF LEVEL FINE control to 0.

11. Connect 10-dB step attenuator to A6J1 using test cable.

12. Tune signal generator frequency for peak amplitude on display (near 21.4 MHz). Adjust signal generator OUTPUT LEVEL for a signal one division from top graticule line.

14. Set step attenuator to 10 dB and REFERENCE LEVEL to −10 dBm.

002: +40 dBmV

ADJUSTMENTS

5-23. STEP AMPLIFIER GAIN ADJUSTMENTS (Cont'd)

14. Adjust A9R3 10 dB adjustment for signal level one division from top graticule line.

15. Set step attenuator to 20 dB and REFERENCE LEVEL to −20 dBm.

    002: +30 dBmV

16. Adjust A9R2 20 dBm adjustment for signal level one division from top graticule line.

17. Set attenuator to 40 dB and REFERENCE LEVEL to −40 dBm.

    002: +10 dBmV

NOTE

Some video filtering might help to reduce noise. Set VIDEO FILTER control so noise is reduced, but the signal amplitude remains unchanged.

18. Adjust A9R1 40 dBm adjustment for signal level one divison from top graticule line.

19. Check REFERENCE LEVEL control from 0 to −50 dBm as shown in Table 5-7. Verify correct operation on display, or measure voltage at A12TP1 with digital voltmeter.

    002: +50 dBmV to 0 dBmV. REFERENCE LEVEL dBmV settings in Table 5-7 are, from top to bottom, +50, +40, +30, +20, +10, 0.

Table 5-7. REFERENCE LEVEL Control Check

Reference Level (dBm)	Step Attenuator Setting (dB)	Deviation From Reference	
0	0	Reference	mV (Ref.)
−10	10	±0.2 Div	±20 mV
−20	20	±0.2 Div	±20 mV
−30	30	±0.2 Div	±20 mV
−40	40	±0.2 Div	±20 mV
−50	50	±0.2 Div	±20 mV

20. Reconnect W3P1 to A6J1.

5-24. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT

REFERENCE:

A11 Schematic

DESCRIPTION:

Step attenuators are used to change, in calibrated steps, the input signal level of the spectrum analyzer. The output of Vertical Driver and Blanking Assembly A12 is monitored, and adjustments are performed to calibrate Log Amplifier Assembly A11.

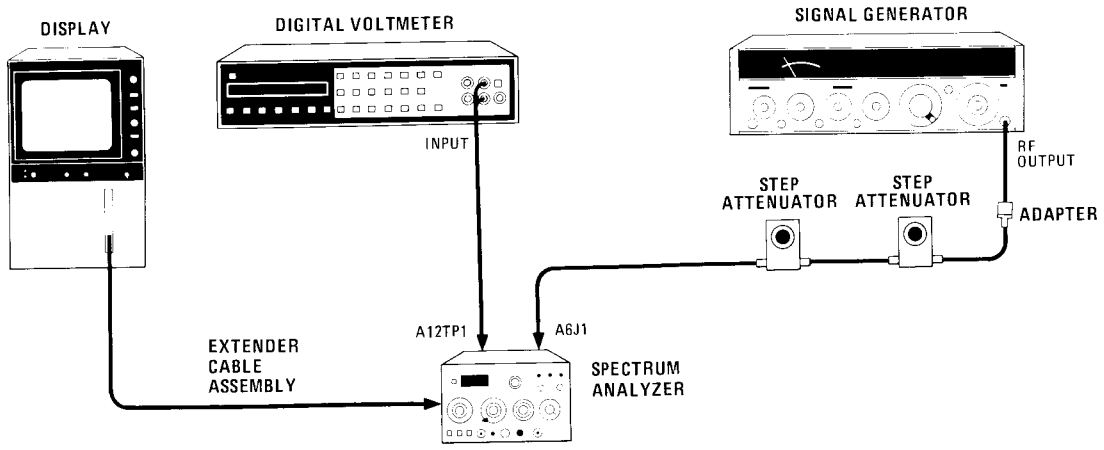


Figure 5-9. Log Amplifier Log and Linear Adjustments Test Setup

EQUIPMENT:

Signal Generator	HP 8640B
Digital Voltmeter	HP 3455A
10-dB Step Attenuator	HP 355D
1-dB Step Attenuator	HP 355C
Adapter, Type N (m) to BNC (f)	HP 1250-0780
BNC Cable, 20 cm (9 in)	HP 10502A
BNC Cable, 120 cm (48 in)	HP 10503A
Cable Assembly, Banana Plug to Alligator Clip	HP 11002A
Test Cable, SMC (f) to BNC (m)	HP 11592-60001
Extender Cable Assembly	HP 5060-0303

5-24. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

PROCEDURE:

1. Set equipment as follows:

Spectrum Analyzer:

FREQ SPAN/DIV	0
RESOLUTION BW	300 kHz
INPUT ATTEN	10 dB
REFERENCE LEVEL	−50 dBm
002: 0 dBmV	
Amplitude Scale	LIN
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN
VIDEO FILTER	OFF
BASELINE CLIPPER	OFF

Digital Voltmeter:

RANGE	10
FUNCTION	DC Volts
TRIGGER	INTERNAL
MATH	OFF
AUTO CAL	ON

Signal Generator:

OUTPUT LEVEL	approx. −23 dBm
FREQUENCY	21.4 MHz
AM	OFF
FM	OFF
RF	ON
COUNTER MODE	INT

2. Set 1-dB step attenuator to 10 dB and 10-dB step attenuator to 0 dB. Remove W3P1 (orange cable) from A6J1 and connect equipment as shown in Figure 5-9, using test cable to connect step attenuator to A6J1.

NOTE

The HP 355C 10 dB attenuation is included to compensate for 10 dB of gain on Step Gain Assembly A9 with the TEST-NORM switch in TEST.

3. Set the TEST-NORM switch on Step Gain Assembly A9 to the TEST position. Tune signal generator frequency for maximum signal amplitude on display with 10-dB step attenuator set to 0 dB. (It may be necessary to reduce signal generator OUTPUT LEVEL to bring signal on-screen).

4. Disconnect signal generator output from step attenuator. Measure offset at A12TP1 and record.

_____ mV

5-24. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

5. Connect signal generator to step attenuator and adjust signal generator FINE TUNE control to peak signal on CRT display.

6. Adjust signal generator OUTPUT LEVEL for DVM reading (±1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

7. Set Amplitude Scale to 10 dB/DIV.

8. Set 10-dB step attenuator to 0 dB and adjust SLOPE control A11R23 for DVM reading (±1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

9. Set 10-dB step attenuator to 60 dB and adjust OFFSET control A11R10 for DVM reading (±1 mV) of 200 mV plus offset recorded in step 4, as measured at A12TP1.

10. Repeat steps 8 and 9 until no further adjustment is necessary.

11. Set 10-dB step attenuator to 30 dB and adjust SLOPE control A11R23 for DVM reading (±1 mV) of 500 mV plus offset recorded in step 4, as measured at A12TP1.

12. Set 10-dB attenuator to 0 dB and adjust −30 dB control A11R69 for DVM (±1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

13. Repeat steps 11 and 12 until no further adjustment is necessary.

14. Set 10-dB step attenuator to 10 dB and adjust SLOPE control A11R23 for DVM reading (±1 mV) of 700 mV plus offset recorded in step 4, as measured at A12TP1.

15. Set 10-dB step attenuator to 0 dB and adjust −10 dB control A11R39 for DVM reading (±1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

16. Repeat steps 14 and 15 until no further adjustment is necessary.

17. Repeat steps 8 through 16 until limits in Table 5-8 are met.

Table 5-8. Log Fidelity Check

Step Attenuator Setting (dB)	DVM Reading*
0	Ref: 800 ±1 mV
10	700 ±3 mV
20	600 ±4 mV
30	500 ±4 mV
40	400 ±5 mV
50	300 ±6 mV
60	200 ±7 mV
70	100 ±8 mV

*Plus Offset

5-24. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

Linear Output and Linear Step Gain

18. Set spectrum analyzer controls as follows:

REFERENCE LEVEL ..... −50 dBm
002: 0 dBmV
Amplitude Scale ..... LIN

19. Set 10-dB step attenuator to 0 dB and adjust LIN control A11R34 for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

20. Make adjustments indicated in Table 5-9.

002: Reference Level (dBmV) settings in Table 5-9 are, from top to bottom, 0, −10, −20, −30, −40.

Table 5-9. Linear Gain Adjustments

Adjustment	Step Attenuator	Reference Level (dBm)	DVM Reading*
A11R34	0	−50	Ref: 800 ±1 mV
A11R33	10	−60	800 ±5 mV
A11R30	20	−70	800 ±5 mV
A11R27	30	−80	800 ±5 mV
No Adjustment	40	−90	800 ±20 mV

*Plus offset

Log Gain

21. Set spectrum analyzer control as follows:

REFERENCE LEVEL ..... −50 dBm
002: 0 dBmV
Amplitude Scale ..... 1 dB/DIV

22. Set 10-dB step attenuator to 0 dB. Adjust signal generator for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

23. Set 10-dB step attenuator to 40 dB. Set REFERENCE LEVEL to −90 dBm and adjust LOG GAIN control A11R121 for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1.

002: −40 dBmV

5-24. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

24. Check log gain steps according to Table 5-10.

002: Reference Level (dBmV) settings in Table 5-10 are, from top to bottom, 0, −10, −20, −30, −40.

Table 5-10. Log Gain Adjustment Limits

Step Attenuator	Reference Level (dBm)	DVM Reading*
0	−50	Ref: 800 ±1 mV
10	−60	800 ±30 mV
20	−70	800 ±30 mV
30	−80	800 ±30 mV
40	−90	800 ±30 mV
*Plus offset		

25. Set spectrum analyzer controls as follows:

REFERENCE LEVEL ..... −50 dBm
002: 0 dBmV
Amplitude Scale ..... 1 dB/DIV

26. Set both ste attenuators to 0 dB. Reduce signal generator OUTPUT LEVEL until signal appears at top of display. Adjust signal generator FINE TUNE to peak trace on display and adjust OUTPUT LEVEL for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A12TP1. Increase attenuation in 1-dB steps as shown in Table 5-11 and take DVM readings to check log amplifier output.

Table 5-11. Log Amplifier Output Limits

Step Attenuator	DVM Reading*
0	Ref: 800 ±1 mV
1	700 ±10 mV
2	600 ±20 mV
3	500 ±30 mV
4	400 ±30 mV
5	300 ±30 mV
6	200 ±30 mV
7	100 ±30 mV
*Plus offset	

27. Return TEST-NORM switch A9S1 to NORM. Remove test cable and reconnect orange cable W3 to A6J1.

ADJUSTMENTS

5-25. SWEEP TIME PER DIVISION ADJUSTMENT

REFERENCE:

A3 Schematic

DESCRIPTION:

Sweep time per division is adjusted for proper sweep time and 'dead time.'

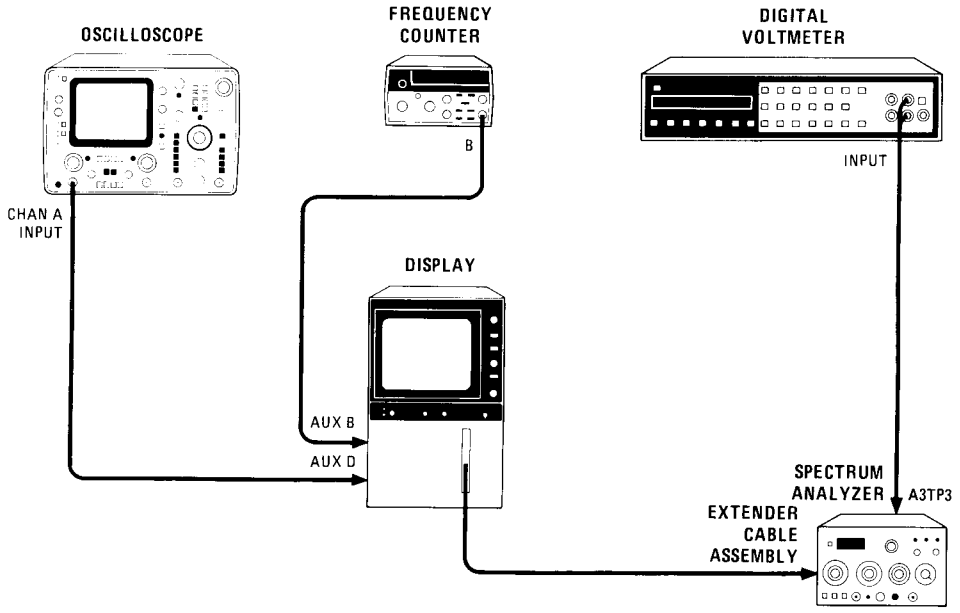


Figure 5-10. Sweep Time Per Division Adjustment Test Setup

EQUIPMENT:

Oscilloscope	HP 1741A
Digital Voltmeter	HP 3455A
Timer/Counter	HP 5308A
BNC Cable, 120 cm (48 in)	HP 10503A
Cable, Banana Plug to Alligator Clips, 150 cm (60 in)	HP 11002A
Extender Cable Assembly	HP 5060-0303

5-25. SWEEP TIME PER DIVISION ADJUSTMENT (Cont'd)

PROCEDURE:

1. Set equipment as follows:

   Oscilloscope:

   DISPLAY ..... A
   TRIGGER ..... A
   CHAN A ..... 2 VOLTS/DIV
   AC-GND-DC ..... DC
   WRITE ..... ON
   TIME/DIV ..... 2 mSEC
   MAG X5 ..... OFF
   EXT TRIGGER ..... INT
   MODE ..... MAIN

   Digital Voltmeter:

   RANGE ..... AUTO
   FUNCTION ..... DC Volts
   AUTO CAL ..... ON
   TRIGGER ..... INTERNAL
   MATH ..... OFF

   Time Counter:

   TIME BASE ..... 10 μs
   FUNCTION ..... PER B

2. Connect equipment as shown in Figure 5-10. Connect oscilloscope to AUX D HORIZONTAL OUTPUT (rear display of mainframe), or to A3TP5 of HP 8557A. Connect digital voltmeter to A3TP3 (located to the left and below control A3TP4).

3. Adjust +10V control A3R7 for 10V ±0.02V.

NOTE

The +10V must be adjusted while analyzer is still cold, during first five minutes after turn-on. If instrument has been operating, turn off mainframe and remove A3 Sweep Generator assembly. Let A3 assembly cool on bench for 15 minutes. Replace A3 and proceed with adjustment of A3R7 during the first five minutes after turn on.

4. Set spectrum analyzer controls as follows:

   SWEEP TIME/DIV ..... 1 ms
   SWEEP TRIGGER ..... FREE RUN

5. Check oscilloscope trace (horizontal sweep output) for approximately a −5V to +5V ramp.

ADJUSTMENTS

5-25. SWEEP TIME PER DIVISION ADJUSTMENT (Cont'd)

6. Adjust 1 ms control A3R6 for a 10 ms ramp time. Measure dead time of ramp.

Min.	Actual	Max.
0.25 ms	_____	0.40 ms

7. Set spectrum analyzer SWEEP TIME/DIV to 2 mSEC. Adjust 2 ms control A3R5 for a 20 ms ramp time. Measure dead time of ramp.

Min.	Actual	Max.
6.0 ms	_____	9.0 ms

8. Set SWEEP TIME/DIV to 1 mSEC. Frequency counter should indicate sweep time plus dead time (10 ms + dead time ±0.05 ms). Adjust A3R6 if necessary to obtain an indication of 10 ms + dead time ±0.05 ms.

9. Set SWEEP TIME/DIV to 2 mSEC. Frequency counter should read sweep time plus dead time (20 ms + dead time ±0.10 ms). Adjust A3R5 if necessary to obtain an indication of 20 ms + dead time ±0.10 ms.

10. Repeat steps 8 and 9 until the sweep time plus dead time (dt) for the 1 ms and 2 ms sweeps are within limits.

Min.	Actual	Max.
10 ms + dt + 0.05 ms	_____	10 ms + dt − 0.05 ms
20 ms + dt + 0.10 ms	_____	20 ms + dt − 0.10 ms

ADJUSTMENTS

5-26. 1-dB OFFSET ADJUSTMENT

REFERENCE:

A12 Schematic

DESCRIPTION:

Reference is set in the 10 dB/DIV and 1-dB offset is adjusted in 1 dB/DIV for the same full display reference as in 10 dB/DIV.

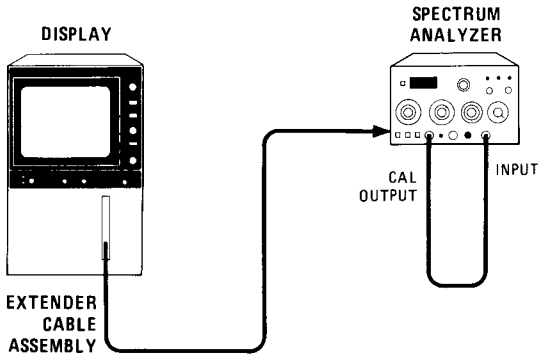


Figure 5-11. 1-dB Offset Adjustment Test Setup

EQUIPMENT:

BNC Cable, 20 cm (9 in)	HP 10502A
Adapter, Type N (m) to BNC (f)	HP 1250-0780
Extender Cable Assembly	HP 5060-0303

Additional Equipment, Options 001 and 002:

BNC Cable, 30 cm (12 in), 75Ω	*HP 11652-60012*

PROCEDURE:

1. Set spectrum analyzer controls as follows:

START – CENTER	CENTER
TUNING	250 MHz
FREQ SPAN/DIV	1 MHz
RESOLUTION BW	1 MHz
INPUT ATTEN	10 dB
REFERENCE LEVEL	–20 dBm
002: +30 dBmV	
REF LEVEL FINE	approx. –10
Amplitude Scale	10 dB/DIV
SWEEP TIME/DIV	AUTO
SWEEP TRIGGER	FREE RUN

ADJUSTMENTS

5-26. 1-dB OFFSET ADJUSTMENT (Cont'd)

2. Connect equipment as shown in Figure 5-11.

3. Adjust TUNING control to center the trace on the display. Set Amplitude Scale switch to LIN. Set REF LEVEL FINE for a full-screen trace (signal at top graticule line).

4. Set Amplitude Scale switch to 10 dB/DIV. Adjust VERTICAL GAIN if necessary for full screen trace.

5. Repeat steps 3 and 4 until the trace is full screen in both LIN and 10 dB/DIV.

NOTE

1 dB/DIV will read approximately 0.5 dB (0.5 division) low when using extender cable assembly. Adjusting A12R1 1 dB OFFSET for a trace 0.5 division down from top graticule line should place signal at top graticule line when 8557A is properly installed in 180-series mainframe.

6. Set Amplitude Scale switch to 1 dB/DIV. Adjust 1 dB OFFSET control A12R1 for a trace 0.5 division down from top graticule line.

SECTION VI
REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering replacement parts. Table 6-1 includes a list of reference designations and a list of abbreviations used in the parts list. Table 6-2 lists names and addresses that correspond to the manufacturer code numbers in the parts list. Table 6-3 lists all replaceable parts in alpha-numerical order by reference designation.

6-3. REPLACEABLE PARTS LIST

6-4. Table 6-3, the list of replaceable parts, is organized as follows:

1. Electrical assemblies and their components in alpha-numerical order by reference designation
2. Miscellaneous parts, with appropriate electrical assembly
3. Chassis-mounted electrical parts, in alpha-numerical order by reference designation
4. Mechanical chassis parts, at end of parts list

6-5. The following information is listed for each part:

1. The Hewlett-Packard part number
2. The part number check digit (CD)
3. The total quantity (Qty) in the instrument. This quantity is given only once, at the first apppearance of the part in the list.
4. The description of the part
5. A five-digit code indicating a typical manufacturer of the part
6. The manufacturer's part number

6-6. ORDERING INFORMATION

6-7. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number (with check digit), indicate the quantity required, and address the order to the nearest Hewlett-Packard office. The check digit will ensure accurate and timely processing of your order.

6-8. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

Table 6-1. Reference Designations and Abbreviations (1 of 3)

REFERENCE DESIGNATIONS

A ..... Assembly
AT ..... Attenuator, Isolator, Limiter, Termination
B ..... Fan, Motor
BT ..... Battery
C ..... Capacitor
CP ..... Coupler
CR ..... Diode, Diode Thyristor, Step Recovery Diode (SCR), Varactor
DC ..... Directional Coupler
DL ..... Delay Line
DS ..... Annunciator, Lamp, Light Emitting Diode (LED), Signaling Device (Audible or Visible)
E ..... Miscellaneous Electrical Part
F ..... Fuse
FL ..... Filter
H ..... Hardware
HY ..... Circulator
J ..... Electrical Connector (Stationary Portion), Jack
K ..... Relay
L ..... Coil, Inductor
M ..... Meter
MP ..... Miscellaneous Mechanical Part
P ..... Electrical Connector (Movable Portion), Plug
Q ..... Silicon Controlled Rectifier (SCR), Transistor, 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 ..... Breakdown Diode (Zener), Voltage Regulator
W ..... Cable, Transmission Path, Wire
X ..... Socket
Y ..... Crystal Unit (Piezoelectric, Quartz)
Z ..... Tuned Cavity, Tuned Circuit

ABBREVIATIONS

A

A ..... Across Flats, Acrylic, Air (Dry Method), Ampere
ADJ ..... Adjust, Adjustment
ANSI ..... American National Standards Institute (formerly USASI-ASA)
ASSY ..... Assembly
AWG ..... American Wire Gage

B

BCD ..... Binary Coded Decimal
BD ..... Board, Bundle
BE-CU ..... Beryllium Copper
BNC ..... Type of Connector
BRG ..... Bearing, Boring
BRS ..... Brass
BSC ..... Basic
BTN ..... Button

C

C ..... Capacitance, Capacitor, Center Tapped, Centistoke, Cermet, Circular Mil Foot, Closed Cup, Cold, Compression
CCP ..... Carbon Composition Plastic
CD ..... Cadmium, Card, Cold-Drawn, Cord
CER ..... Ceramic
CHAM ..... Chamfer
CHAR ..... Character, Characteristic, Charcoal
CMOS ..... Complementary Metal Oxide Semiconductor
CNDCT ..... Conducting, Conductive, Conductivity, Conductor
CONT ..... Contact, Continuous, Control, Controller
CONV ..... Converter
CPRSN ..... Compression
CUP-PT ..... Cup Point
CW ..... Clockwise, Continuous Wave

D

D ..... Deep, Depletion, Depth, Diameter, Direct Current
DA ..... Darlington
DAP-GL ..... Diallyl Phthalate Glass
DBL ..... Double
DCDR ..... Decoder
DEG ..... Degree
D-HOLE ..... D-Shaped Hole
DIA ..... Diameter
DIP ..... Dual In-Line Package
DIP-SLDR ..... Dip Solder
D-MODE ..... Depletion Mode
DO ..... Package Type Designation
DP ..... Deep, Depth, Diametric Pitch, Dip
DP3TMINTR ..... Double Pole Three Throw, Miniature
DPDTMINTR ..... Double Pole Double Throw, Miniature
DWL ..... Dowel

E

E-R ..... E-Ring
EXT ..... Extended, Extension, External, Extinguish

F

F ..... Fahrenheit, Farad, Female, Film (Resistor), Fixed, Flange, Flint, Fluorine, Frequency
FC ..... Carbon Film / Composition, Edge of Cutoff Frequency, Face
FDTHRU ..... Feed Through
FEM ..... Female
FIL-HD ..... Fillister Head
FL ..... Flash, Flat, Fluid
FLAT-PT ..... Flat Point
FR ..... Front
FREQ ..... Frequency
FT ..... Current Gain Bandwidth Product (Transition Frequency); Feet, Foot
FXD ..... Fixed

G

GEN ..... General, Generator
GND ..... Ground
GP ..... General Purpose, Group

H

H ..... Henry, Hermaphrodite, High, Hole Diameter, Hot, Hub Inside Diameter, Hydrogen
HDW ..... Hardware
HEX ..... Hexadecimal, Hexagon, Hexagonal
HLCL ..... Helical
HP ..... Hewlett-Packard Company, High Pass, Horsepower

I

IC ..... Collector Current, Integrated Circuit
ID ..... Identification, Inside Diameter
IF ..... Forward Current, Intermediate Frequency
IN ..... Inch, Indium
INCL ..... Including
INT ..... Integral, Intensity, Internal
INTL ..... Internal, International

J

J-FET ..... Junction Field Effect Transistor
JFET ..... Junction Field Effect Transistor

K

K ..... Kelvin, Key, Kilo, Potassium
KNRLD ..... Knurled
KVDC ..... Kilovolts Direct Current

Table 6-1. Reference Designations and Abbreviations (2 of 3)

L

LED . . . . . Light Emitting Diode
LG . . . . . Length, Long
LIN. . . . Linear, Linear Taper, Linearity
LK . . . . . Link, Lock
LKG . . . . . Leakage, Locking
LOGO . . . . . Logotype
LUM . . . . . Luminous

M

M . . . . . Male, Maximum, Mega, Mil, Milli, Mode, Momentary, Mounting Hole Centers, Mounting Hole Diameter
MA . . . . . Milliampere
MACH . . . . . Machined
MAX . . . . . Maximum
MC . . . . . Hot Molded Carbon Composition, Megacycle, Microcircuit, Molded Carbon Composition
MET . . . . . Metal, Metallic, Metallized, Metallurgical
MHZ . . . . . Megahertz
MIT . . . . . Miter
MLD . . . . . Mold, Molded
MM . . . . . Magnetized Material (Restricted Articles Code); Millimeter
MOM . . . . . Momentary
MTG . . . . . Mounting
MTLC . . . . . Metallic
MUW . . . . . Music Wire
MW . . . . . Milliwatt

N

N . . . . . Fan Out, Intrinsic Stand Off Ratio, Nano, Nanosecond, Nitrogen, None
N-CHAN . . . . . N-Channel
NH . . . . . Nanohenry
NM . . . . . Nanometer, Nonmetallic
NO . . . . . Normally Open, Number
NOM . . . . . Nominal
NPN . . . . . Negative Positive Negative (Transistor)
NS. . . Nanosecond, Non-Shorting, Nose
NUM . . . . . Numeric, Numerical
NYL . . . . . Nylon (Polyamide)

O

OA . . . . . Other Restricted Articles, Group A (Restricted Articles Code); Over-All
OD . . . . . Olive Drab, Outside Diameter
OP AMP . . . . . Operational Amplifier
OPT . . . . . Optical, Option, Optional

P

PA . . . . . Picoampere, Power Amplifier, Pressure Angle, Protactinium
PAN-HD . . . . . Pan Head
PAR . . . . . Parallel, Parity
PB . . . . . Lead (Metal), Push Button
PC . . . . . Picocoulomb, Piece, Printed Circuit
PCB . . . . . Printed Circuit Board
P-CHAN . . . . . P-Channel
PD . . . . . Pad, Palladium, Pitch Diameter, Power Dissipation
PF . . . . . Picofarad; Pipe, Female Connection; Power Factor
PKG . . . . . Package
PLSTC . . . . . Plastic
PNL . . . . . Panel
PNP . . . . . Positive Negative Positive (Transistor)
POLYC . . . . . Polycarbonate
POLYE . . . . . Polyester
POT . . . . . Potentiometer
POZI . . . . . Pozidriv Recess
PREC . . . . . Precision
PRP . . . . . Purple, Purpose
PSTN . . . . . Piston
PT . . . . . Part, Pint, Platinum, Point, Pulse Time
PW . . . Power Wirewound, Pulse Width

Q

Q . . . . . Figure of Merit

R

R . . . . . Range, Red, Resistance, Resistor, Right, Ring, Rosin, Rubber-Resin, Run Torque
REF . . . . . Reference
RES . . . . Research, Resistance, Resistor
RF . . . . . Radio Frequency
RGD . . . . . Rigid
RND . . . . . Round
RR . . . . . Rear
RVT . . . . . Rivet, Riveted

S

SEG . . . . . Segment
SGL . . . . . Single
SI . . . . . Silicon, Square Inch
SL . . . . . Slide, Slow
SLT . . . . . Slate, Slot, Slotted
SMA . . . . . Subminiature, A Type (Threaded Connector)
SMC . . . . . Subminiature, C Type (Threaded Connector)
SPCG . . . . . Spacing
SPDTSUBMIN . . . . Single Pole Double Throw, Subminiature
SPST . . . . . Single Pole Single Throw
SQ . . . . . Square
SST . . . . . Stainless Steel
STL . . . . . Steel
SZ . . . . . Size

T

T . . . . . Tab Width, Taper, Teeth, Temperature, Tera, Tesla, Thermoplastic (Insulation), Thickness, Time, Timed, Tooth, Turns Ratio, Typical
TA . . . . . Ambient Temperature, Tantalum
TC . . . . . Thermoplastic
THD . . . . . Thread, Threaded
THK . . . . . Thick
TO . . . . . Package Type Designation, Troy Ounce
TPG . . . . . Tapping
TR-HD . . . . . Truss Head
TRMR . . . . . Trimmer
TRN . . . . . Turn, Turns
TRSN . . . . . Torsion

U

UCD . . . . . Microcandela
UF . . . . . Microfarad
UH . . . . . Microhenry
UL . . . . . Microliter, Underwriters' Laboratories, Inc.
UNHDND . . . . . Unhardened

V

V . . . . . Vanadium, Variable, Violet, Volt, Voltage
VAC . . . . . Vacuum; Volts, Alternating Current
VAC/DC . . . . . Volts, Alternating and Direct Current
VAR . . . . . Variable
VDC . . . . . Volts, Direct Current

W

W . . . . . Watt, Wattage, White, Wide, Width, Wire
W/CP . . . . . Wire / Conductive Plastic
W/SW . . . . . With Switch
WW . . . . . Wire Wound

X

X . . . . . By (Used With Dimensions), Reactance
XSTR . . . . . Transistor

Y

YIG . . . . . Yttrium-Iron-Garnet

Z

ZNR . . . . . Zener

Table 6-1. Reference Designations and Abbreviations (3 of 3)

MULTIPLIERS

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

Table 6-2. Manufacturers Code List

Mfr. No.	Manufacturer Name	Address	Zip Code
00000	ANY SATISFACTORY SUPPLIER		
01121	ALLEN-BRADLEY CO	MILWAUKEE, WI	53204
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS, TX	75222
01419	ANDERTON DARBY INC	CLIFTON, NJ	
02111	SPECTROL ELECTRONICS CORP	CITY OF IND, CA	91745
02114	FERROXCUBE CORP	SAUGERTIES, NY	12477
02660	BUNKER RAMO CORP AMPHENOL CONN DIV	BROADVILLE, IL	60153
03888	K D I PYROFILM CORP	WHIPPANY, NJ	07981
04395	STOCK DRIVE PRODUCTS	HYDE PARK, NY	
04426	ASSOCIATED SPRING CORP	BRISTOL, CT	
04559	ELASTIC STOP NUT DIV OF AMERACE	UNION, NJ	
04604	FEDERAL SCREW PRODUCTS CO	CHICAGO, IL	
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX, AZ	85008
04757	OAK IND INC SW DIV	CRYSTAL LAKE, IL	
04805	ILLINOIS TOOL WORKS INC SHAKEPROOF	ELGIN, IL	
04833	TEK BEARING CO INC	NEW YORK, NY	
05191	LEE SPRING CO	BROOKLYN, NY	
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW, CA	94042
11236	CTS OF BERNE INC	BERNE, IN	46711
13606	SPRAGUE ELECT CO SEMICONDUCTOR DIV	CONCORD, NJ	03301
19701	MEPCO/ELECTRA CORP	MINERAL WELLS, TX	76067
20932	EMCON DIV ITW	SAN DIEGO, CA	92129
24046	TRANSITRON ELECTRONIC CORP	WAKEFIELD, MA	01880
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD, PA	16701
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO, CA	94304
3L585	RCA CORP SOLID STATE DIV	SOMERVILLE, NJ	
30161	AAVID ENGINEERING INC	LACONIA, NJ	03246
30983	MEPCO/ELECTRA CORP	SAN DIEGO, CA	92121
33095	SPECTRUM CONTROL INC	FAIRVIEW, PA	16415
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS, MA	01247
72136	ELECTRO MOTIVE CORP	FLORENCE, SC	06226
72982	ERIE TECHNOLOGICAL PRODUCTS INC	ERIE, PA	16512
74970	JOHNSON E F CO	WASECA, MN	56093

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	08557-60067	9	1	FRONT PANEL ASSEMBLY (STANDARD) NOTE: INCLUDES SWITCH ASSY A1A2 (SEE FIGURE 6-3); ALL KNOBS, & PROBE POWER INPUT. DOES NOT INCLUDE A1A1 & A1A3.	28480	08557-60067
A1	08557-60074	8	1	FRONT PANEL ASSEMBLY (OPTION 001)	28480	08557-60074
A1	08557-60075	9	1	FRONT PANEL ASSEMBLY (OPTION 002)	28480	08557-60075
A1A1	08557-60063	5	1	DPM DRIVER ASSEMBLY NOTE: A1A1 IS NOT INCL IN FRONT PANEL ASSY A1	28480	08557-60063
A1A1C1	0160-4084	8	10	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A1A1C2	0180-0197	8	14	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A1A1C3	0180-2207	5	1	CAPACITOR-FXD 100UF+-10% 10VDC TA	56289	150D107X9010R2
A1A1C4	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A1A1C5	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A1A1C6	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A1A1C7	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A1A1C8	0160-0168	1	1	CAPACITOR-FXD .1UF +-10% 200VDC POLYE	28480	0160-0168
A1A1CR1	1901-0050	3	17	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1A1CR2	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1A1CR3	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1A1J1	1251-4797	4	1	CONNECTOR 10-PIN M POST TYPE	28480	1251-4797
A1A1J2	1200-0508	0	1	SOCKET-IC 14-CONT DIP-SLDR	28480	1200-0508
A1A1L1	9140-0129	1	1	INDUCTOR RF-CH-MLD 220UH 5% .166DX.385LG	28480	9140-0129
A1A1L2	9140-0179	1	12	INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A1A1L3	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A1A1MP1	1205-0095	0	1	HEAT SINK SGL TO-5/TO-39-CS	30161	32258
A1A1MP2	1200-0173	5	1	INSULATOR-XSTR DAP-GL	28480	1200-0173
A1A1Q1	1855-0420	2	1	TRANSISTOR J-FET 2N4391 N-CHAN D-MODE	01295	2N4391
A1A1Q2	1853-0007	7	22	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A1A1Q3	1854-0404	0	6	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1A1R1	0698-3161	9		RESISTOR 38.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3832-F
A1A1R2	0698-3450	9		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A1A1R3	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1A1R4	0757-0438	3	9	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1A1R5	0757-0465	6	29	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1A1R6	2100-3056	8	2	RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	02111	43P502
A1A1R7	0757-0288	1	3	RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A1A1R8	2100-3161	6	1	RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	02111	43P203
A1A1R9	0757-0464	5	3	RESISTOR 90.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-9092-F
A1A1R10	0757-0458	7	6	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A1A1R11	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A1A1R12	0757-0274	5	4	RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1211-F
A1A1R13	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A1A1R14	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1A1R15	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1A1R16	0698-3450	9		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A1A1R17	0698-3266	5	1	RESISTOR 237K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2373-F
A1A1R18	0698-3452	1		RESISTOR 147K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1473-F
A1A1R19	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1A1R20	2100-3103	6	6	RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	02111	43P103
A1A1R21	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1A1R22	0683-6855	3	1	RESISTOR 6.8M 5% .25W FC TC=-900/+1100	01121	CB6855
A1A1R23	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1A1R24	0698-3439	4	7	RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1A1R25	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1A1R26	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A1A1R27	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A1A1R28	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1A1TP1	0360-0535	0	15	TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A1A1TP2	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A1A1TP3	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A1A1TP4	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A1A1TP5	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A1A1U1	1826-0785	1	1	IC OP AMP LOW-BIAS-H-IMPD DUAL 8-DIP-C	01295	TL072ACJG
A1A1U2	1826-0261	8	9	IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A1A1U3	1826-0431	4	1	IC CONV 24-DIP-C PKG	04713	MC14433L
A1A1U4	1820-1413	2	1	IC DCDR CMOS BCD-TO-7-SEG 4-TO-7-LINE	3L585	CD4511BE
A1A1U5	1810-0346	7	1	NETWORK-RES 16-DIP180.0 OHM X 8	11236	761-3-R180

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1A1U6	1858-0047	5	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	13606	ULN-2003A
A1A1U7	1826-0367	5	1	IC 78M05C V RGLTR TO-39	04713	MC78M05CG
A1A1VR1	1902-0064	1	2	DIODE-ZNR 7.5V 5% DO-35 PD=.4W TC=+.05%	28480	1902-0064
A1A1VR2	1902-0625	0	1	DIODE-ZNR 1N829 6.2V 5% DO-7 PD=.25W	04713	1N829
A1A1VR3	1902-1286	1	1	DIODE-ZNR 1N5342B 6.8V 5% PD=5W TC=+200%	04713	1N5342B
A1A2	**08557-60064**	**6**	**1**	**SWITCH ASSEMBLY**	**28480**	**08557-60064**
A1A2R1	2100-3593	8	1	RESISTOR-VAR PREC W/CP 10-TRN 5K 10%	28480	2100-3593
A1A2R2	2100-3452	8	1	RESISTOR-VAR PREC W/CP 10-TRN 10K 10%	28480	2100-3452
A1A2R3				P/O A1A2S1		
A1A2R4				P/O A1A2S1		
A1A2R5	2100-0542	1	1	RESISTOR-VAR CONTROL WW 10K 5% LIN	28480	2100-0542
A1A2S1	2100-3973	8	1	SWITCH-RESISTOR ASSY;50K/50K;VIDEO FIL	28480	2100-3973
A1A2A1	**08557-60065**	**7**	**1**	**SWITCH BOARD ASSEMBLY**	**28480**	**08557-60065**
A1A2A1CR1	1901-0025	2	1	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A1A2A1DS1	1990-0619	7	4	DISPLAY-NUM-SEG 1-CHAR .3-H	28480	5082-7613
A1A2A1DS2	1990-0619	7		DISPLAY-NUM-SEG 1-CHAR .3-H	28480	5082-7613
A1A2A1DS3	1990-0619	7		DISPLAY-NUM-SEG 1-CHAR .3-H	28480	5082-7613
A1A2A1DS4	1990-0619	7		DISPLAY-NUM-SEG 1-CHAR .3-H	28480	5082-7613
A1A2A1DS5	1990-0485	5	1	LED-LAMP LUM-INT=800UCD IF=30MA-MAX	28480	5082-4984
A1A2A1J1	1200-0507	9	1	SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A1A2A1R1	0757-0447	4	4	RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A1A2A1R2	2100-3340	3	1	RESISTOR-VAR CONTROL CCP 1K 20% LIN	28480	2100-3340
A1A2A1R3	2100-2681	3	2	RESISTOR-TRMR 5K 10% CCP TOP-ADJ 1-TRN	28480	2100-2681
A1A2A1R4	2100-3332	3	1	RESISTOR-TRMR 10K 20% CC TOP-ADJ 1-TRN	28480	2100-3332
A1A2A1R5	0757-0444	1	11	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A1A2A1R6	2100-1412	6	1	RESISTOR-TRMR 500 20% CCP TOP-ADJ 1-TRN	28480	2100-1412
A1A2A1R7	2100-3331	2	23	RESISTOR-TRMR 10K 20% MC TOP-ADJ 1-TRN	28480	2100-3331
A1A2A1R8	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1A2A1R9	2100-2681	3		RESISTOR-TRMR 5K 10% CCP TOP-ADJ 1-TRN	28480	2100-2681
A1A2A1R10				NOT ASSIGNED		
A1A2A1R11				NOT ASSIGNED		
A1A2A1R12				NOT ASSIGNED		
A1A2A1R13	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1A2A1S1	3101-2124	2	1	SWITCH DPDT;REF LEVEL & ATTEN, GANGED	28480	3101-2124
A1A2A1S2	3101-2213	0	1	SWITCH DPDT;AMPLITUDE SCALE	28480	3101-2213
A1A2A1S3	08558-20059	6	2	ROTOR/SHAFT,DOUBLE CONTACT;SWEEP	28480	08558-20059
A1A2A1S4	08558-20059	6		ROTOR/SHAFT,DOUBLE CONTACT;TRIGGER	28480	08558-20059
A1A2A1S5	08558-40004	3	1	ROTOR,SINGLE CONTACT;RESOLUTION BW	28480	08558-40004
A1A2A1S6	08558-20066	5	1	ROTOR,DOUBLE CONTACT;FREQ SPAN NOTE: A1A2A1S3-S6 ARE NOT INCLUDED IN A1A2A1 & ONLY INCL THE SWITCH ROTOR & CONTACTS.	28480	08558-20066
A1A2A1S7	3101-1274	1	1	SWITCH;START CENTER	28480	3101-1274
A1A2A1VR1	1902-0064	1		DIODE-ZNR 7.5V 5% DO-35 PD=.4W TC=+.05%	28480	1902-0064
A1A2A1W1	08557-60032	8	1	CABLE ASSY;FRONT AND REAR SWITCH BOARDS	28480	08557-60032
A1A2A1W2	08557-60033	9	1	CABLE ASSY;FRONT SWITCH BOARD	28480	08557-60033
A1A2A1W3	08557-60057	7	1	CABLE ASSY: FREQ DISPLAY	28480	08557-60057
A1A2A1XD1	1200-0971	1	4	SOCKET-DSPL 14-CONT DIP DIP-SLDR	28480	1200-0971
A1A2A1XD2	1200-0971	1		SOCKET-DSPL 14-CONT DIP DIP-SLDR	28480	1200-0971
A1A2A1XD3	1200-0971	1		SOCKET-DSPL 14-CONT DIP DIP-SLDR	28480	1200-0971
A1A2A1XD4	1200-0971	1		SOCKET-DSPL 14-CONT DIP DIP-SLDR	28480	1200-0971
A1A2A1XD5	1200-0010	9	1	SOCKET-TUBE 2-CONT	28480	1200-0010
A1A3	**08557-60025**	**9**	**1**	**INPUT ATTENUATOR ASSEMBLY** **NOTE:** **A1A3 IS NOT INCL IN FRONT PANEL ASSY A1.**	**28480**	**08557-60025**
A1A3C1	0160-3490	8	1	CAPACITOR-FXD 1UF +-20% 50VDC CER	28480	0160-3490
A1A3R1	0698-5192	0	2	RESISTOR 61.11 .25% .125W F TC=0+-100	03888	PME55-1/8-T0-61R11-C
A1A3R2	0698-5196	4	2	RESISTOR 96.25 .25% .125W F TC=0+-100	03888	PME55-1/8-T0-96R25-C
A1A3R3	0727-0062	6	1	RESISTOR 247.5 .5% .25W CF TC=0-500	28480	0727-0062
A1A3R4	0698-5194	2	1	RESISTOR 71.15 .25% .125W F TC=0+-100	03888	PME55-1/8-T0-71R15-C
A1A3R5	0698-5192	0		RESISTOR 61.11 .25% .125W F TC=0+-100	03888	PME55-1/8-T0-61R11-C
A1A3R6	0698-5196	4		RESISTOR 96.25 .25% .125W F TC=0+-100	03888	PME55-1/8-T0-96R25-C
A1A3R7	0698-6668	7	2	RESISTOR 53.3 .25% .125W F TC=0+-100	28480	0698-6668
A1A3R8	0727-0091	1	1	RESISTOR 790 .5% .25W CF TC=0-500	28480	0727-0091
A1A3R9	0698-6668	7		RESISTOR 53.3 .25% .125W F TC=0+-100	28480	0698-6668
A2	**08557-60001**	**1**	**1**	**INPUT LOW-PASS FILTER ASSEMBLY**	**28480**	**08557-60001**

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2C1	0160-3872	0		CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER	28480	0160-3872
A2C2	0160-3873	1	6	CAPACITOR-FXD 4.7PF +-.5PF 200VDC CER	28480	0160-3873
A2C3	0160-2260	8	2	CAPACITOR-FXD 13PF +-5% 500VDC CER 0+-30	28480	0160-2260
A2C4	0160-3873	1		CAPACITOR-FXD 4.7PF +-.5PF 200VDC CER	28480	0160-3873
A2C5	0160-3874	2	2	CAPACITOR-FXD 10PF +-.5PF 200VDC CER	28480	0160-3874
A2C6	0160-3874	2		CAPACITOR-FXD 10PF +-.5PF 200VDC CER	28480	0160-3874
A2C7	0160-3873	1		CAPACITOR-FXD 4.7PF +-.5PF 200VDC CER	28480	0160-3873
A2C8	0160-2260	8		CAPACITOR-FXD 13PF +-5% 500VDC CER 0+-30	28480	0160-2260
A2C9	0160-3873	1		CAPACITOR-FXD 4.7PF +-.5PF 200VDC CER	28480	0160-3873
A2C10	0160-3872	0		CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER	28480	0160-3872
A2J1	1250-1220	0	2	CONNECTOR-RF SMC M PC 50-OHM	28480	1250-1220
A2J2	1250-1220	0		CONNECTOR-RF SMC M PC 50-OHM	28480	1250-1220
A2L1	08557-80003	5	5	COIL-INPUT FILTER	28480	08557-80003
A2L2	08557-80003	5		COIL-INPUT FILTER	28480	08557-80003
A2L3	08557-80003	5		COIL-INPUT FILTER	28480	08557-80003
A2L4	08557-80003	5		COIL-INPUT FILTER	28480	08557-80003
A2L5	08557-80003	5		COIL-INPUT FILTER	28480	08557-80003
A3	**08557-60073**	**7**	**1**	**SWEEP GENERATOR BOARD ASSEMBLY**	**28480**	**08557-60073**
A3C1	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3C2	0160-3009	5	1	CAPACITOR-FXD 982PF +-1% 100VDC MICA	28480	0160-3009
A3C3	0160-3402	2	1	CAPACITOR-FXD 1UF +-5% 50VDC MET-POLYC	28480	0160-3402
A3C4	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A3C5	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3C6	0160-3466	8	2	CAPACITOR-FXD 100PF +-10% 1KVDC CER	28480	0160-3466
A3C7	0160-2150	5	1	CAPACITOR-FXD 33PF +-5% 300VDC MICA	28480	0160-2150
A3C8	0160-3466	8		CAPACITOR-FXD 100PF +-10% 1KVDC CER	28480	0160-3466
A3C9	0160-2257	3	1	CAPACITOR-FXD 10PF +-5% 500VDC CER 0+-60	28480	0160-2257
A3C10	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3C11	0160-3456	6	3	CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A3C12	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A3C13	0170-0066	9	1	CAPACITOR-FXD .027UF +-10% 200VDC POLYE	28480	0170-0066
A3C14	0160-3459	9	13	CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A3C15	0140-0192	9	1	CAPACITOR-FXD 68PF +-5% 300VDC MICA	72136	DM15E680J0300WV1CR
A3C16	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A3C17	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A3C18	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3C19	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A3C20	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A3C21	0180-2205	3	1	CAPACITOR-FXD .33UF+-10% 35VDC TA	56289	150D334X9035A2
A3C22	0180-1743	2	1	CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A3C23	0160-0163	6	1	CAPACITOR-FXD .033UF +-10% 200VDC POLYE	28480	0160-0163
A3C24	0160-0161	4	3	CAPACITOR-FXD .01UF +-10% 200VDC POLYE	28480	0160-0161
A3C25	0160-0155	6	1	CAPACITOR-FXD 3300PF +-10% 200VDC POLYE	28480	0160-0155
A3C26	0160-0945	2	1	CAPACITOR-FXD 910PF +-5% 100VDC MICA	28480	0160-0945
A3C27	0160-0134	1	1	CAPACITOR-FXD 220PF +-5% 300VDC MICA	28480	0160-0134
A3C28	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3CR1	1901-0040	1	69	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR2	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR3	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A3CR4	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR5	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR6	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR7	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR8				NOT ASSIGNED		
A3CR9	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR10	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR11	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR12	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR13	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR14	1910-0016	0	2	DIODE-GE 60V 60MA 1US DO-7	28480	1910-0016
A3CR15	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR16	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR17	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR18	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR19	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR20	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR21	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR22	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR23	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR24	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR25	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR26	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR27	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR28	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR29	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR30	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3CR31	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR32	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR33	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3Q1	1854-0071	7	34	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q2	1855-0082	2	9	TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q3	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q4	1853-0020	4	9	TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A3Q5	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A3Q6	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q7	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A3Q8	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q9	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q10	1854-0404	0		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3Q11	1855-0417	7	3	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0417
A3Q12	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A3Q13	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q14	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q15	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q16	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q17	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q18	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q19	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q20	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q21	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q22	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q23	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q24	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q25	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q26	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q27	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q28	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q29	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A3Q30	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q31	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q32	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q33	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q34	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q35	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q36	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A3Q37	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q38	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q39	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q40	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q41	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q42	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q43	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q44	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A3Q45	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q46	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A3Q47	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q48	1855-0417	7		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0417
A3Q49	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A3Q50	1855-0414	4	1	TRANSISTOR J-FET 2N4393 N-CHAN D-MODE	04713	2N4393
A3R1	2100-3103	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	02111	43P103
A3R2	2100-3162	7	4	RESISTOR-TRMR 200K 10% C SIDE-ADJ 17-TRN	02111	43P204
A3R3	2100-3165	0	1	RESISTOR-TRMR 2M 20% C SIDE-ADJ 17-TRN	02111	43P205
A3R4	2100-3103	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	02111	43P103
A3R5	2100-3052	4	2	RESISTOR-TRMR 50 10% C SIDE-ADJ 17-TRN	02111	43P500
A3R6	2100-3109	2	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	02111	43P202
A3R7	2100-3154	7	1	RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	02111	43P102
A3R8	0757-0346	2	21	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R9	0698-3161	9		RESISTOR 38.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3832-F
A3R10	0757-0279	0	17	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A3R11	0698-3152	8	3	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A3R12	0757-0459	8	3	RESISTOR 56.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5622-F
A3R13	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R14	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R15	0698-3451	0	1	RESISTOR 133K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1333-F
A3R16	0757-0459	8		RESISTOR 56.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5622-F
A3R17	0698-7421	2	3	RESISTOR 40K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-4002-C
A3R18	0698-3194	8	3	RESISTOR 20K .25% .125W F TC=0+-50	03888	PME55-1/8-T2-2002-C
A3R19	0698-7794	2	8	RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R20	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A3R21	0698-3457	6	4	RESISTOR 316K 1% .125W F TC=0+-100	28480	0698-3457
A3R22	0698-3442	9	2	RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A3R23	0698-3446	3	3	RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A3R24	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A3R25	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3R26	0757-0289	2	8	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A3R27	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R28	0757-0419	0	9	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A3R29	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A3R30	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R31	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R32	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A3R33	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R34	0757-0464	5		RESISTOR 90.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-9092-F
A3R35	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R36	0698-3444	1	20	RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A3R37	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R38	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A3R39	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R40	0698-6501	7	1	RESISTOR 42.2K .25% .125W F TC=0+-50	28480	0698-6501
A3R41	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R42	0757-0439	4	5	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A3R43	0683-3355	2		RESISTOR 3.3M 5% .25W FC TC=-900/+1100	01121	CB3355
A3R44	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A3R45	0757-0460	1	2	RESISTOR 61.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A3R46	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R47	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R48	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R49	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A3R50	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R51	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A3R52	0698-3260	9	5	RESISTOR 464K 1% .125W F TC=0+-100	28480	0698-3260
A3R53	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R54	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A3R55*	0698-3155	1	13	RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A3R56	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A3R57	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R58*	0757-0401	0	15	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R59	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R60	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R61	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R62	0683-6845	1	1	RESISTOR 680K 5% .25W FC TC=-800/+900	01121	CB6845
A3R63	0698-3457	6		RESISTOR 316K 1% .125W F TC=0+-100	28480	0698-3457
A3R64	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R65	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R66	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R67	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R68	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R69	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R70	0757-0459	8		RESISTOR 56.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5622-F
A3R71	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R72	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R73	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A3R74*	0698-3452	1	3	RESISTOR 147K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1473-F
A3R75	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A3R76*	0698-3243	8	1	RESISTOR 178K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1783-F
A3R77	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R78	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A3R79	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R80	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R81	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R82	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R83*	0757-0123	3	2	RESISTOR 34.8K 1% .125W F TC=0+-100	28480	0757-0123
A3R84	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R85	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R86	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R87	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R88*	0698-3454	3	2	RESISTOR 215K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2153-F
A3R89	0698-3454	3		RESISTOR 215K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2153-F
A3R90	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R91	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R92	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R93	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R94	0757-0461	2		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A3R95	0698-6502	8	1	RESISTOR 3.32K .25% .125W F TC=0+-50	28480	0698-6502
A3R96	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A3R97	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A3R98	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R99	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R100	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A3R101	0698-6727	9	1	RESISTOR 1.13K .25% .125W F TC=0+-100	28480	0698-6727
A3R102				NOT ASSIGNED		
A3R103	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A3R104	0698-7794	2		RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A3R105	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R106	0683-1055	5	3	RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R107	0698-7421	2		RESISTOR 40K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-4002-C
A3R108				NOT ASSIGNED		
A3R109	0698-3457	6		RESISTOR 316K 1% .125W F TC=0+-100	28480	0698-3457
A3R110*	0698-3460	1	2	RESISTOR 422K 1% .125W F TC=0+-100	28480	0698-3460
A3R111	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R112	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R113	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R114	0698-3194	8		RESISTOR 20K .25% .125W F TC=0+-50	03888	PME55-1/8-T2-2002-C
A3R115*	0757-0462	3	3	RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A3R116*	0698-3161	9	3	RESISTOR 38.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3832-F
A3R117	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R118	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R119	0698-7421	2		RESISTOR 40K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-4002-C
A3R120	0698-7412	1	1	RESISTOR 13.3K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-C
A3R121	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R122	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R123	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R124	0698-3194	8		RESISTOR 20K .25% .125W F TC=0+-50	03888	PME55-1/8-T2-2002-C
A3R125	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R126	0683-3355	2		RESISTOR 3.3M 5% .25W FC TC=-900/+1100	01121	CB3355
A3R127	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A3R128	0757-0470	3	1	RESISTOR 162K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1623-F
A3R129	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R130	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A3R131*	0683-3355	2	3	RESISTOR 3.3M 5% .25W FC TC=-900/+1100	01121	CB3355
A3R132	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A3R133	0683-1055	5		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3U1	1820-0223	0	1	IC OP AMP GP TO-99 PKG	3L585	CA301AT
A3U2	1826-0092	3	6	IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A3U3	1826-0092	3		IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A3U4	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A3VR1	1902-0025	4	3	DIODE-ZNR 10V 5% DO-35 PD=.4W TC=+.06%	28480	1902-0025
A3VR2	1902-0041	4	1	DIODE-ZNR 5.11V 5% DO-35 PD=.4W	28480	1902-0041
A4	**08557-60068**	**0**	**1**	**FREQUENCY CONTROL BOARD ASSEMBLY**	**28480**	**08557-60068**
A4C1	0180-1746	5	7	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A4C2	0160-3876	4	4	CAPACITOR-FXD 47PF +-20% 200VDC CER	28480	0160-3876
A4C3	0160-3876	4		CAPACITOR-FXD 47PF +-20% 200VDC CER	28480	0160-3876
A4C4	0160-3876	4		CAPACITOR-FXD 47PF +-20% 200VDC CER	28480	0160-3876
A4C5	0160-0161	4		CAPACITOR-FXD .01UF +-10% 200VDC POLYE	28480	0160-0161
A4C6	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A4C7				NOT ASSIGNED		
A4C8	0160-0161	4		CAPACITOR-FXD .01UF +-10% 200VDC POLYE	28480	0160-0161
A4C9	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A4C10	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A4C11	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A4C12	0160-3454	4	1	CAPACITOR-FXD 220PF +-10% 1KVDC CER	28480	0160-3454
A4C13	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A4C14	0180-0269	5	1	CAPACITOR-FXD 1UF+50-10% 150VDC AL	56289	30D105G150BA2
A4C15	0170-0040	9	1	CAPACITOR-FXD .047UF +-10% 200VDC POLYE	56289	292P47392
A4C16	0180-0291	3	2	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A4C17	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A4C18	0180-0116	1	2	CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X9035B2
A4C19	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A4CR1	1901-0743	1	6	DIODE-PWR RECT 1N4004 400V 1A DO-41	01295	1N4004
A4CR2	1901-0743	1		DIODE-PWR RECT 1N4004 400V 1A DO-41	01295	1N4004
A4CR3	1901-0743	1		DIODE-PWR RECT 1N4004 400V 1A DO-41	01295	1N4004
A4CR4	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR5	1901-0743	1		DIODE-PWR RECT 1N4004 400V 1A DO-41	01295	1N4004
A4CR6	1901-0743	1		DIODE-PWR RECT 1N4004 400V 1A DO-41	01295	1N4004
A4CR7	1901-0743	1		DIODE-PWR RECT 1N4004 400V 1A DO-41	01295	1N4004
A4CR8	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR9	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR10	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR11	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR12	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR13	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR14	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR15	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4CR16	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR17	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR18	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR19	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR20	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR21	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR22	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR23	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR24	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR25	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR26	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR27	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR28	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR29	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR30	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR31	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR32	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR33	1901-0535	9	2	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A4CR34	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4L1	08558-80011	6	2	FILTER-COIL (BLUE)	28480	08558-80011
A4L2	08558-80011	6		FILTER-COIL (BLUE)	28480	08558-80011
A4Q1	1854-0475	5	4	TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0475
A4Q2	1854-0475	5		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0475
A4Q3	1854-0404	0		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A4Q4	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A4Q5	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A4Q6	1855-0052	6	1	TRANSISTOR J-FET P-CHAN D-MODE TO-92 SI	07263	2N4360
A4Q7	1853-0322	9	1	TRANSISTOR PNP 2N2946A SI TO-46 PD=400MW	01295	2N2946A
A4Q8	1855-0082	2		TRANSISTOR J-FET P-CHAN D-MODE SI	28480	1855-0082
A4Q9	1854-0182	1	1	TRANSISTOR-NPN SI	28480	1854-0182
A4Q10	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A4Q11	1854-0039	7	2	TRANSISTOR NPN 2N3053S SI TO-39 PD=1W	3L585	2N3053S
A4Q12	1853-0012	4	1	TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	01295	2N2904A
A4Q13	1854-0882	8	7	TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A4Q14	1854-0882	8		TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A4Q15	1854-0557	4	1	TRANSISTOR NPN 2N2432A SI TO-18 PD=300MW	01295	2N2432A
A4Q16	1854-0882	8		TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A4R1	0698-3449	6	2	RESISTOR 28.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2872-F
A4R2	0698-3460	1		RESISTOR 422K 1% .125W F TC=0+-100	28480	0698-3460
A4R3	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4R4	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A4R5	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A4R6	2100-2852	0	3	RESISTOR-TRMR 1K 10% WW SIDE-ADJ 20-TRN	02660	3810P-102
A4R7	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R8	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R9	0698-3193	7	1	RESISTOR 10K .25% .125W F TC=0+-50	28480	0698-3193
A4R10	0698-6503	9	1	RESISTOR 101 .25% .125W F TC=0+-50	28480	0698-6503
A4R11	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A4R12	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A4R13	2100-2852	0		RESISTOR-TRMR 1K 10% WW SIDE-ADJ 20-TRN	02660	3810P-102
A4R14	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4R15	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A4R16	0698-3447	4	2	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A4R17	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4R18	0698-7568	8	1	RESISTOR 6.19K .5% .125W F TC=0+-50	19701	MF4C1/8-T2-6191-D
A4R19	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R20	0698-7796	4	1	RESISTOR 14.7K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1472-C
A4R21	0757-0290	5	4	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A4R22	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A4R23	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R24	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4R25	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A4R26	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R27	0698-0085	0	6	RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A4R28	0757-0441	8	1	RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A4R29	0698-0085	0		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A4R30	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A4R31	0698-8025	4	1	RESISTOR 1.91K .25% .125W F TC=0+-50	19701	MF4C1/8-T2-1911-C
A4R32	0698-3249	4	1	RESISTOR 2.53K .25% .125W F TC=0+-50	28480	0698-3249
A4R33	0698-8038	9	2	RESISTOR 5.9K .25% .125W F TC=0+-50	19701	MF4C1/8-T2-5901-C
A4R34	0698-6780	4	1	RESISTOR 5.62K .25% .125W F TC=0+-50	28480	0698-6780
A4R35	0698-3453	2		RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A4R36	0698-8038	9		RESISTOR 5.9K .25% .125W F TC=0+-50	19701	MF4C1/8-T2-5901-C
A4R37	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R38	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R39	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R40	0698-3449	6		RESISTOR 28.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2872-F

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4R41	2100-1972	3	4	RESISTOR-TRMR 20K 10% WW SIDE-ADJ 20-TRN	02660	3810P-203
A4R42	2100-1972	3		RESISTOR-TRMR 20K 10% WW SIDE-ADJ 20-TRN	02660	3810P-203
A4R43	0698-3413	4	2	RESISTOR 13.3K 1% .5W F TC=0+-100	28480	0698-3413
A4R44	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A4R45	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R46*	0698-3154	0	2	RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A4R47	2100-2852	0		RESISTOR-TRMR 1K 10% WW SIDE-ADJ 20-TRN	02660	3810P-102
A4R48	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R49	0698-3413	4		RESISTOR 13.3K 1% .5W F TC=0+-100	28480	0698-3413
A4R50	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R51	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A4R52	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A4R53	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R54	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R55	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R56	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R57	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R58	0757-0424	7	5	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A4R59	0757-0278	9	1	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A4R60	2100-3162	7		RESISTOR-TRMR 200K 10% C SIDE-ADJ 17-TRN	02111	43P204
A4R61*	0698-3160	8	13	RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A4R62	0757-0405	4	9	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R63	2100-3162	7		RESISTOR-TRMR 200K 10% C SIDE-ADJ 17-TRN	02111	43P204
A4R64*	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A4R65	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R66	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R67*	0698-3453	2	5	RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A4R68	0757-0398	4	1	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A4R69	2100-3094	4	4	RESISTOR-TRMR 100K 10% C SIDE-ADJ 17-TRN	02111	43P104
A4R70*	0698-3156	2	22	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R71	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R72	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A4R73*	0698-3453	2		RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A4R74	0698-3152	8		RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A4R75	2100-3094	4		RESISTOR-TRMR 100K 10% C SIDE-ADJ 17-TRN	02111	43P104
A4R76*	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R77*	0698-3453	2		RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A4R78	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R79	2100-1972	3		RESISTOR-TRMR 20K 10% WW SIDE-ADJ 20-TRN	02660	3810P-203
A4R80	0698-3453	2		RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A4R81*	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A4R82	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R83	2100-3162	7		RESISTOR-TRMR 200K 10% C SIDE-ADJ 17-TRN	02111	43P204
A4R84*	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A4R85	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R86	2100-3094	4		RESISTOR-TRMR 100K 10% C SIDE-ADJ 17-TRN	02111	43P104
A4R87*	0757-0461	2	3	RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A4R88	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A4R89	2100-3054	6	2	RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	02111	43P503
A4R90*	0698-3450	9	4	RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A4R91	0698-3438	3	4	RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A4R92	2100-1972	3		RESISTOR-TRMR 20K 10% WW SIDE-ADJ 20-TRN	02660	3810P-203
A4R93*	0757-0442	9	52	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R94	0757-0424	7		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A4R95	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R96	0757-0428	1		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A4R97*	0757-0199	3	18	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A4R98	0757-0461	2		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A4R99	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4U1	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U2	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U3	1826-0092	3		IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A4U4	1826-0092	3		IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A4U5	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U6	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U7	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U8	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U9	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4VR1	1902-0680	7	1	DIODE-ZNR 1N827 6.2V 5% DO-7 PD=.4W	24046	1N827
A4VR2	1902-0025	4		DIODE-ZNR 10V 5% DO-35 PD=.4W TC=+.06%	28480	1902-0025
A5	**08557-60005**	5	**1**	**SECOND CONVERTER ASSEMBLY**	**28480**	**08557-60005**
A5C1	0160-2437	1	1	CAPACITOR-FDTHRU 5000PF +80 -20% 200V	28480	0160-2437
A5C2				PART OF A5, NOT SEPARATELY REPLACEABLE		
A5C3				PART OF A5, NOT SEPARATELY REPLACEABLE		
A5C4				PART OF A5, NOT SEPARATELY REPLACEABLE		
A5C5				PART OF A5, NOT SEPARATELY REPLACEABLE		

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5C6				PART OF A5, NOT SEPARATELY REPLACEABLE		
A5C7				PART OF A5, NOT SEPARATELY REPLACEABLE		
A5C8	0160-3877	5	4	CAPACITOR-FXD 100PF +-20% 200VDC CER	28480	0160-3877
A5CR1	1901-1085	6	18	DIODE-SM SIG SCHOTTKY	28480	1901-1085
A5FL1	9135-0002	8	1	FILTER-LOW PASS SOLDER-TERMS	33095	51-744-018
A5L1	08557-80006	8	4	COIL-IF RESON	28480	08557-80006
A5L2	08557-80007	9	2	COIL-LO RESON	28480	08557-80007
A5L3	08557-80006	8		COIL-IF RESON	28480	08557-80006
A5L4	08557-80006	8		COIL-IF RESON	28480	08557-80006
A5L5	08557-80007	9		COIL-LO RESON	28480	08557-80007
A5L6	08557-80006	8		COIL-IF RESON	28480	08557-80006
A5A1	**08557-60021**	**5**	**1**	**500 MHZ LO BOARD ASSEMBLY**	**28480**	**08557-60021**
A5A1C1	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A5A1C2	0160-2252	8	1	CAPACITOR-FXD 6.2PF +-.25PF 500VDC CER	28480	0160-2252
A5A1C3	0160-2249	3	1	CAPACITOR-FXD 4.7PF +-.25PF 500VDC CER	28480	0160-2249
A5A1C4	0160-3876	4		CAPACITOR-FXD 47PF +-20% 200VDC CER	28480	0160-3876
A5A1C5	0160-3877	5		CAPACITOR-FXD 100PF +-20% 200VDC CER	28480	0160-3877
A5A1C6	0160-0570	9	2	CAPACITOR-FXD 220PF +-20% 100VDC CER	20932	5024EM100RD221M
A5A1C7	0160-0570	9		CAPACITOR-FXD 220PF +-20% 100VDC CER	20932	5024EM100RD221M
A5A1C8	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A5A1C9	0160-3877	5		CAPACITOR-FXD 100PF +-20% 200VDC CER	28480	0160-3877
A5A1C10				NOT ASSIGNED		
A5A1C11	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A5A1C12	0160-2236	8	3	CAPACITOR-FXD 1PF +-.25PF 500VDC CER	28480	0160-2236
A5A1E1	9170-0029	3	9	CORE-SHIELDING BEAD	28480	9170-0029
A5A1E2	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A5A1L1	08557-80008	0	1	COIL-.075 UH	28480	08557-80008
A5A1L2	9100-2250	9	3	INDUCTOR RF-CH-MLD 180NH 10% .105DX.26LG	28480	9100-2250
A5A1L3	08557-80004	6	1	COIL-VARIABLE .055 UH	28480	08557-80004
A5A1L4	9100-2255	4	2	INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG	28480	9100-2255
A5A1L5	9100-2250	9		INDUCTOR RF-CH-MLD 180NH 10% .105DX.26LG	28480	9100-2250
A5A1L6	08557-80005	7	1	COIL-VARIABLE .035 UH	28480	08557-80005
A5A1Q1	1854-0546	1	3	TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0546
A5A1Q2	1854-0546	1		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0546
A5A1Q3	1854-0546	1		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0546
A5A1R1	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A5A1R2	0698-7188	8	1	RESISTOR 10 1% .05W F TC=0+-100	24546	C3-1/8-T0-10R-F
A5A1R3*	0757-0428	1	3	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A5A1R4	0757-0403	2	3	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A5A1R5	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A5A1R6	0757-0424	7		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A5A1R7	0757-0420	3	7	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A5A1R8	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A5A1R9	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A5A1R10*	0698-3435	0	2	RESISTOR 38.3 1% .125W F TC=0+-100	24546	C4-1/8-T0-38R3-F
A5A1R11	2100-3123	0	2	RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	02111	43P501
A5A1R12	0757-0379	1	4	RESISTOR 12.1 1% .125W F TC=0+-100	19701	MF4C1/8-T0-12R1-F
A5A1R13	0698-3132	4	4	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A5A1R14	0698-3435	0		RESISTOR 38.3 1% .125W F TC=0+-100	24546	C4-1/8-T0-38R3-F
A5A1R15	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5A1R16	0698-3441	8	1	RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A5A1VR1	1902-3104	6	1	DIODE-ZNR 5.62V 5% DO-35 PD=.4W	28480	1902-3104
A5A1VR2	1902-3171	7	1	DIODE-ZNR 11V 5% DO-35 PD=.4W TC=+.062%	28480	1902-3171
A5A1Y1	0410-0664	3	1	CRYSTAL- 250 MHZ	28480	0410-0664
A5A2	**08557-60020**	**4**	**1**	**IF FILTER BOARD ASSEMBLY**	**28480**	**08557-60020**
A5A2C1	0160-3877	5		CAPACITOR-FXD 100PF +-20% 200VDC CER	28480	0160-3877
A5A2L1	9100-2250	9		INDUCTOR RF-CH-MLD 180NH 10% .105DX.26LG	28480	9100-2250
A5A2L2	9100-0368	6	1	INDUCTOR RF-CH-MLD 330NH 10% .105DX.26LG	28480	9100-0368
A5A2L3	9100-2255	4		INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG	28480	9100-2255
A5A3	**08557-60019**	**1**	**1**	**LOW PASS FILTER BOARD ASSEMBLY**	**28480**	**08557-60019**
A5A3C1	0160-4237	3	2	CAPACITOR-FDTHRU 6.2PF 10% 250V MICA	72982	2930-000-6.2PF+-10
A5A3C2	0160-4238	4	4	CAPACITOR-FDTHRU 10PF 10% 250V MICA	72982	2930-000-10PF+-10
A5A3C3	0160-4238	4		CAPACITOR-FDTHRU 10PF 10% 250V MICA	72982	2930-000-10PF+-10
A5A3C4	0160-4238	4		CAPACITOR-FDTHRU 10PF 10% 250V MICA	72982	2930-000-10PF+-10
A5A3C5	0160-4238	4		CAPACITOR-FDTHRU 10PF 10% 250V MICA	72982	2930-000-10PF+-10

See introduction to this section for ordering information
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Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5A3C6	0160-4237	3		CAPACITOR-FDTHRU 6.2PF 10% 250V MICA	72982	2930-000-6.2PF+-10
A5A4	**08557-60018**	**0**	**1**	**521.4 MHZ AMP BOARD ASSEMBLY**	**28480**	**08557-60018**
A5A4C1*	0160-2265	3	1	CAPACITOR-FXD 22PF +-5% 500VDC CER 0+-30	28480	0160-2265
A5A4C2	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A5A4C3	0160-0571	0	2	CAPACITOR-FXD 470PF +-20% 100VDC CER	28480	0160-0571
A5A4C4	0160-2246	0	1	CAPACITOR-FXD 3.6PF +-.25PF 500VDC CER	28480	0160-2246
A5A4C5	0160-0571	0		CAPACITOR-FXD 470PF +-20% 100VDC CER	28480	0160-0571
A5A4Q1	1854-0686	0	1	TRANSISTOR NPN SI TO-72 PD=200MW FT=4GHZ	28480	1854-0686
A5A4Q2	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A5A4R1	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A5A4R2	0698-3443	0	2	RESISTOR 287 1% .125W F TC=0+-100	24546	C4-1/8-T0-287R-F
A5A4R3	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A5A4R4	0757-0443	0	2	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A6	**08557-60039**	**5**	**1**	**21.4 MHZ PREAMP BOARD ASSEMBLY**	**28480**	**08557-60039**
A6C1	0160-2055	9	51	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C2	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A6C3	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C4*	0160-3536	3	1	CAPACITOR-FXD 620PF +-5% 100VDC MICA	28480	0160-3536
A6C5	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C6	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A6C7	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C8	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C9	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C10	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6C11	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A6CR1	1901-0033	2	5	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A6CR2	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A6CR3	1901-0639	4	2	DIODE-PIN	28480	5082-3080
A6CR4	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A6CR5	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A6CR6	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A6CR7	1901-0639	4		DIODE-PIN	28480	5082-3080
A6E1	9170-0847	3	1	CORE-SHIELDING BEAD	02114	56-590-65/3B PARYLENE COATED
A6L1	9140-0096	1	2	INDUCTOR RF-CH-MLD 1UH 10% .166DX.385LG	28480	9140-0096
A6L2	9140-0112	2	2	INDUCTOR RF-CH-MLD 4.7UH 10%	28480	9140-0112
A6L3	9140-0178	0	2	INDUCTOR RF-CH-MLD 12UH 10% .166DX.385LG	28480	9140-0178
A6L4	9140-0178	0		INDUCTOR RF-CH-MLD 12UH 10% .166DX.385LG	28480	9140-0178
A6L5	9140-0096	1		INDUCTOR RF-CH-MLD 1UH 10% .166DX.385LG	28480	9140-0096
A6Q1	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A6Q2	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A6Q3	1853-0020	4		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A6Q4	1854-0247	9	1	TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0247
A6Q5	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A6Q6	1854-0071	7		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A6Q7	1854-0019	3	17	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6R1	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A6R2*	0757-0462	3		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A6R3	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A6R4	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A6R5*	0757-0416	7	8	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A6R6	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A6R7	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A6R8	0698-3438	3		RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A6R9	0683-0475	1	2	RESISTOR 4.7 5% .25W FC TC=-400/+500	01121	CB47G5
A6R10	0698-3446	3		RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A6R11	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A6R12	0698-0085	0		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A6R13	0698-0085	0		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A6R14	0698-0085	0		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A6R15	2100-2517	4	3	RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TRN	30983	ET50X503
A6R16	2100-2517	4		RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TRN	30983	ET50X503
A6R17	2100-2517	4		RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TRN	30983	ET50X503
A6R18	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A6R19	0698-3443	0		RESISTOR 287 1% .125W F TC=0+-100	24546	C4-1/8-T0-287R-F
A6R20	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A6R21	0698-3438	3		RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A6R22	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A6R23	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A6R24	0698-3152	8		RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A6R25	0698-3157	3	3	RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1962-F

See introduction to this section for ordering information
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Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A6R26	0698-3157	3		RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1962-F
A6R27	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A6R28	0698-3158	4	1	RESISTOR 23.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2372-F
A6R29	0757-0428	1		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A6R30	0698-3157	3		RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1962-F
A6R31	0757-0418	9	3	RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-T0-619R-F
A6VR1	1902-0025	4		DIODE-ZNR 10V 5% DO-35 PD=.4W TC=+.06%	28480	1902-0025
A6VR2	1902-3059	0	1	DIODE-ZNR 3.83V 5% DO-35 PD=.4W	28480	1902-3059
A7	08557-60007	7	1	FIRST CONVERTER ASSEMBLY	28480	08557-60007
A7C1	0160-2604	4	4	CAPACITOR-FDTHRU 1000PF GMV 300V CER	28480	0160-2604
A7C2	0160-2604	4		CAPACITOR-FDTHRU 1000PF GMV 300V CER	28480	0160-2604
A7C3	0160-2604	4		CAPACITOR-FDTHRU 1000PF GMV 300V CER	28480	0160-2604
A7C4	0160-2604	4		CAPACITOR-FDTHRU 1000PF GMV 300V CER	28480	0160-2604
A7C5	0180-1735	2	1	CAPACITOR-FXD .22UF+-10% 35VDC TA	56289	150D224X9035A2
A7MP1	08557-00021	9	1	GASKET-SILVER IMPREG SILICON	28480	08557-00021
A7A1	08557-60046	4	1	FIRST LO BOARD ASSEMBLY	28480	08557-60046
A7A1C1	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C2	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C3	0160-2204	0	2	CAPACITOR-FXD 100PF +-5% 300VDC MICA	28480	0160-2204
A7A1C4	0160-2204	0		CAPACITOR-FXD 100PF +-5% 300VDC MICA	28480	0160-2204
A7A1C5	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C6	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C7	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C8	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C9	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C10*	0160-3878	6	14	CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C11	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C12	0160-3878	6		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A7A1C13*	0160-3872	0	6	CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER LOADING IS OPTIONAL	28480	0160-3872
A7A1CR1	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A7A1CR2	0122-0078	2	1	DIODE-VVC BVR=30V Q=225-MIN	28480	0122-0078
A7A1CR3	1901-1068	5	2	DIODE-SM SIG SCHOTTKY	28480	1901-1068
A7A1CR4	1901-1068	5		DIODE-SM SIG SCHOTTKY	28480	1901-1068
A7A1L1	9140-0210	1	1	INDUCTOR RF-CH-MLD 100UH 5% .166DX.385LG	28480	9140-0210
A7A1L2	9100-1610	3	2	INDUCTOR RF-CH-MLD 150NH 20%	28480	9100-1610
A7A1L3	9100-2247	4	2	INDUCTOR RF-CH-MLD 100NH 10% .105DX.26LG	28480	9100-2247
A7A1L4	08557-00013	9	1	COIL-FXD .003 UH	28480	08557-00013
A7A1L5	08557-20038	0	1	COIL-FXD .02 UH	28480	08557-20038
A7A1L6				NOT ASSIGNED		
A7A1L7	9100-2247	4		INDUCTOR RF-CH-MLD 100NH 10% .105DX.26LG	28480	9100-2247
A7A1L8	9100-1610	3		INDUCTOR RF-CH-MLD 150NH 20%	28480	9100-1610
A7A1MP1	08557-20048	2	1	SHIELD-METAL CAN	28480	08557-20048
A7A1Q1	5086-4218	7	2	TRANSISTOR-HP-21 TO-72 PKG.	28480	5086-4218
A7A1Q2	5086-4218	7		TRANSISTOR-HP-21 TO-72 PKG.	28480	5086-4218
A7A1Q3	1853-0034	0	1	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A7A1R1	0757-0462	3		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A7A1R2	0698-3150	6	7	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A7A1R3	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A7A1R4	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A7A1R5	0757-0394	0	3	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A7A1R6	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A7A1R7	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A7A1R8	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A7A1R9	0698-3437	2	1	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A7A1R10	0698-3405	4	1	RESISTOR 422 1% .5W F TC=0+-100	28480	0698-3405
A7A1R11	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A7A1R12	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A7A1R13	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A7A1R14*	0698-7205	0	1	RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A7A1R15	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A7A2	08557-60047	5	1	FIRST MIXER BOARD ASSEMBLY	28480	08557-60047
A7A2C1	0160-3873	1		CAPACITOR-FXD 4.7PF +-.5PF 200VDC CER	28480	0160-3873
A7A2C2	0160-3872	0		CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER	28480	0160-3872
A7A2C3	0150-0021	4	1	CAPACITOR-FXD .47PF +-5% 500VDC TI DIOX	28480	0150-0021
A7A2C4	0160-3872	0		CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER	28480	0160-3872
A7A2C5	0160-3873	1		CAPACITOR-FXD 4.7PF +-.5PF 200VDC CER	28480	0160-3873
A7A2CR1	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A7A2CR2	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A7A2L1	08557-80001	3	2	COIL-INDUCTOR	28480	08557-80001
A7A2L2	08557-80001	3		COIL-INDUCTOR	28480	08557-80001
A7A2MP1	08557-20047	1	1	SHIELD-METAL CAN	28480	08557-20047
A7A2R1	0698-7227	6	2	RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-TO-422R-F
A7A2R2	0698-7190	2	1	RESISTOR 12.1 1% .05W F TC=0+-100	24546	C3-1/8-TO-12R1-F
A7A2R3	0698-7227	6		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-TO-422R-F
A7A2R4	0698-7224	3	2	RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-TO-316R-F
A7A2R5	0698-7194	6	1	RESISTOR 17.8 1% .05W F TC=0+-100	24546	C3-1/8-TO-17R8-F
A7A2R6	0698-7224	3		RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-TO-316R-F
A7A2U1	0955-0062	9	1	MIXER- 1500 MHZ	28480	0955-0062
A8	08558-60011	4	1	BANDWIDTH FILTER BOARD ASSEMBLY	28480	08558-60011
A8C1	0121-0479	5	4	CAPACITOR-V TRMR-AIR 1.7-11PF 175V	74970	187-0306-125
A8C2	0121-0453	5	2	CAPACITOR-V TRMR-AIR 1.3-5.4PF 175V	74970	187-0303-125
A8C3	0121-0479	5		CAPACITOR-V TRMR-AIR 1.7-11PF 175V	74970	187-0306-125
A8C4	0121-0479	5		CAPACITOR-V TRMR-AIR 1.7-11PF 175V	74970	187-0306-125
A8C5	0121-0453	5		CAPACITOR-V TRMR-AIR 1.3-5.4PF 175V	74970	187-0303-125
A8C6	0121-0479	5		CAPACITOR-V TRMR-AIR 1.7-11PF 175V	74970	187-0306-125
A8C7	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C8	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C9	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C10	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C11	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C12	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C13	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C14	0160-2255	1	7	CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C15	0160-2255	1		CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C16	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C17	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C18	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C19	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C20	0160-2208	4	2	CAPACITOR-FXD 330PF +-5% 300VDC MICA	28480	0160-2208
A8C21	0160-3467	9	2	CAPACITOR-FXD 100PF +-10% 1KVDC CER	28480	0160-3467
A8C22	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C23	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C24	0160-2236	8		CAPACITOR-FXD 1PF +-.25PF 500VDC CER	28480	0160-2236
A8C25	0160-3157	4	2	CAPACITOR-FXD 12PF +-5% 500VDC CER	28480	0160-3157
A8C26	0160-2253	9	2	CAPACITOR-FXD 6.8PF +-.25PF 500VDC CER	28480	0160-2253
A8C27	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C28	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C29	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C30	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C31	0160-2255	1		CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C32	0160-2255	1		CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C33	0160-2255	1		CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C34	0160-2255	1		CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C35	0160-3467	9		CAPACITOR-FXD 100PF +-10% 1KVDC CER	28480	0160-3467
A8C36	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C37	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C38	0160-2208	4		CAPACITOR-FXD 330PF +-5% 300VDC MICA	28480	0160-2208
A8C39	0160-2236	8		CAPACITOR-FXD 1PF +-.25PF 500VDC CER	28480	0160-2236
A8C40	0160-3157	4		CAPACITOR-FXD 12PF +-5% 500VDC CER	28480	0160-3157
A8C41	0160-2253	9		CAPACITOR-FXD 6.8PF +-.25PF 500VDC CER	28480	0160-2253
A8C42	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C43	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C44	0160-3459	9		CAPACITOR-FXD .02UF +-20% 100VDC CER	28480	0160-3459
A8C45	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C46	0160-2255	1		CAPACITOR-FXD 8.2PF +-.25PF 500VDC CER	28480	0160-2255
A8C47	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C48	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8C49	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A8CR1	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR2	1901-0047	8	4	DIODE-SWITCHING 20V 75MA 10NS	28480	1901-0047
A8CR3	1901-0047	8		DIODE-SWITCHING 20V 75MA 10NS	28480	1901-0047
A8CR4	1901-1070	9	16	DIODE-PIN 110V	28480	1901-1070
A8CR5	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR6	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A8CR7	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A8CR8	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR9	1901-0047	8		DIODE-SWITCHING 20V 75MA 10NS	28480	1901-0047
A8CR10	1901-0047	8		DIODE-SWITCHING 20V 75MA 10NS	28480	1901-0047

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A8CR11	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A8CR12	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8CR13	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A8E1	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A8E2	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A8E3	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A8L1	9100-1623	8	3	INDUCTOR RF-CH-MLD 27UH 5% .166DX.385LG	28480	9100-1623
A8L2	9100-1619	2	7	INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A8L3	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A8L4	9100-1623	8		INDUCTOR RF-CH-MLD 27UH 5% .166DX.385LG	28480	9100-1623
A8L5	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A8L6	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A8L7	9100-1623	8		INDUCTOR RF-CH-MLD 27UH 5% .166DX.385LG	28480	9100-1623
A8L8	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A8Q1	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q2	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A8Q3	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q4	1854-0345	8	4	TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A8Q5	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q6	1855-0081	1	2	TRANSISTOR J-FET N-CHAN D-MODE SI	28480	1855-0081
A8Q7	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q8	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A8Q9	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q10	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q11	1855-0081	1		TRANSISTOR J-FET N-CHAN D-MODE SI	28480	1855-0081
A8Q12	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A8Q13	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A8R1	2100-3094	4		RESISTOR-TRMR 100K 10% C SIDE-ADJ 17-TRN	02111	43P104
A8R2	2100-3052	4		RESISTOR-TRMR 50 10% C SIDE-ADJ 17-TRN	02111	43P500
A8R3	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A8R4	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A8R5	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A8R6	0757-0440	7	14	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A8R7	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A8R8	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A8R9	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A8R10	0698-3432	7	1	RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F
A8R11	0757-0379	1		RESISTOR 12.1 1% .125W F TC=0+-100	19701	MF4C1/8-T0-12R1-F
A8R12	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A8R13	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A8R14	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A8R15	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A8R16	0757-0180	2	5	RESISTOR 31.6 1% .125W F TC=0+-100	28480	0757-0180
A8R17	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A8R18	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A8R19	0757-0417	8	4	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A8R20	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A8R21	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A8R22	0698-0084	9	4	RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A8R23	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A8R24	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A8R25	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A8R26	0757-0180	2		RESISTOR 31.6 1% .125W F TC=0+-100	28480	0757-0180
A8R27	0698-3260	9		RESISTOR 464K 1% .125W F TC=0+-100	28480	0698-3260
A8R28	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A8R29	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A8R30	0757-0379	1		RESISTOR 12.1 1% .125W F TC=0+-100	19701	MF4C1/8-T0-12R1-F
A8R31	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A8R32	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A8R33	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A8R34	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A8R35	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A8R36	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A8R37	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A8R38	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A8R39	0757-0180	2		RESISTOR 31.6 1% .125W F TC=0+-100	28480	0757-0180
A8R40	0757-0417	8		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A8R41	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A8R42	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A8R43	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A8R44	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A8R45	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A8R46	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A8R47	0757-0180	2		RESISTOR 31.6 1% .125W F TC=0+-100	28480	0757-0180
A8R48	0757-0379	1		RESISTOR 12.1 1% .125W F TC=0+-100	19701	MF4C1/8-T0-12R1-F
A8R49*	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A8R50	0698-3260	9		RESISTOR 464K 1% .125W F TC=0+-100	28480	0698-3260

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A8R51	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A8R52	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A8R53	0757-0419	0		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A8R54	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A8R55	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A8R56	0698-3160	8		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A8T1	08558-80008	1	2	TRANSFORMER	28480	08558-80008
A8T2	08558-80008	1		TRANSFORMER	28480	08558-80008
A8Y1	0410-0450	5	1	CRYSTAL-MATCHED SET OF FOUR, 21.4 MHZ (MATCHED SET OF FOUR,INCL A10Y1,A10Y2). (PART OF A8Y1)	28480	0410-0450
A9	08557-60009	9	1	STEP GAIN BOARD ASSEMBLY	28480	08557-60009
A9C1	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C2	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C3	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C4	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C5	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C6	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C7	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C8	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C9	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C10	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C11	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C12	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A9C13	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C14	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C15	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C16	0160-3457	7	3	CAPACITOR-FXD 2000PF +-10% 250VDC CER	28480	0160-3457
A9C17	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C18	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C19	0160-3457	7		CAPACITOR-FXD 2000PF +-10% 250VDC CER	28480	0160-3457
A9C20	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C21	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C22	0160-3457	7		CAPACITOR-FXD 2000PF +-10% 250VDC CER	28480	0160-3457
A9C23	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A9C24	0160-2199	2	1	CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A9C25*	0160-2307	4	1	CAPACITOR-FXD 47PF +-5% 300VDC MICA	28480	0160-2307
A9CR1	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A9CR2	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A9CR3	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A9CR4	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A9CR5	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A9CR6	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A9E1	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A9E2	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A9E3	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A9L1	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L2	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L3	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L4	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L5	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L6	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L7	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L8	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A9L9	9100-2260	1	1	INDUCTOR RF-CH-MLD 1.8UH 10% .105DX.26LG	28480	9100-2260
A9L10	9140-0158	6	1	INDUCTOR RF-CH-MLD 10H 10% .105DX.26LG	28480	9140-0158
A9Q1	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A9Q2	1854-0345	8		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A9Q3	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A9Q4	1854-0345	8		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A9Q5	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A9Q6	1854-0345	8		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A9Q7	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A9Q8	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A9Q9	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A9R1	2100-3103	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	02111	43P103
A9R2	2100-3103	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	02111	43P103
A9R3	2100-3054	6		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	02111	43P503
A9R4	2100-3061	5	1	RESISTOR-TRMR 500K 10% C SIDE-ADJ 17-TRN	02111	43P504
A9R5	2100-3103	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	02111	43P103

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A9R6	2100-3056	8		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	02111	43P502
A9R7				NOT ASSIGNED		
A9R8	0757-0288	1		RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A9R9	0698-3457	6		RESISTOR 316K 1% .125W F TC=0+-100	28480	0698-3457
A9R10	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A9R11	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A9R12	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A9R13	0757-0288	1		RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A9R14	0757-0395	1	5	RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A9R15	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A9R16	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A9R17	0757-0290	5		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A9R18	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A9R19	0757-0290	5		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A9R20	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A9R21	0698-3162	0	3	RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A9R22	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A9R23	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A9R24	0757-0395	1		RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A9R25	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9R26	0757-0417	8		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A9R27	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9R28	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A9R29	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A9R30	0757-0395	1		RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A9R31	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9R32	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A9R33	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9R34	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A9R35	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A9R36	0757-0395	1		RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A9R37	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9R38	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A9R39	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9R40	0698-3440	7	6	RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A9R41	0698-3162	0		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A9R42	0698-3162	0		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A9S1	3101-0973	5	1	SWITCH-SL DPDT MINTR .5A 125VAC/DC PC	28480	3101-0973
A10				SAME AS A8, USE PREFIX A10		
A11	5061-5411	2	1	LOG AMPLIFIER BOARD ASSEMBLY	28480	5061-5411
A11C1	0160-4554	7	59	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C2	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A11C3	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C4	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A11C5	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A11C6	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C7	0160-3879	7	1	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A11C8	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C9	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C10	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C11	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C12	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C13				NOT ASSIGNED		
A11C34	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C35				NOT ASSIGNED		
A11C69	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C70	0160-4519	4	1	CAPACITOR-FXD 9.1PF +-.5PF 200VDC CER	28480	0160-4519
A11C71	0140-0195	2	1	CAPACITOR-FXD 130PF +-5% 300VDC MICA	72136	DM15F131J0300WV1CR
A11C72	0160-4386	3	1	CAPACITOR-FXD 33PF +-5% 200VDC CER 0+-30	28480	0160-4386
A11C73	0160-3872	0		CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER	28480	0160-3872
A11C74	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C75	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C76	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11C77	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A11CR1	1910-0016	0		DIODE-GE 60V 60MA 1US DO-7	28480	1910-0016
A11CR2	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A11CR3				NOT ASSIGNED		
A11CR4	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A11CR5				NOT ASSIGNED		

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A11CR6	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR7	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR8	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR9	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR10	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR11	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR12	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR13	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR14	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR15	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR16	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR17	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR18	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR19	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR20	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR21	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR22	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR23	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR24	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR25	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR26	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR27	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR28	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR29	1901-1070	9		DIODE-PIN 110V	28480	1901-1070
A11CR30	1901-1085	6		DIODE-SM SIG SCHOTTKY	28480	1901-1085
A11CR31	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A11CR32	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A11CR33	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A11E1	9170-0029	3		CORE-SHIELDING BEAD	28480	9170-0029
A11L1	9100-1618	1	1	INDUCTOR RF-CH-MLD 5.6UH 10%	28480	9100-1618
A11L2	9140-0144	0	1	INDUCTOR RF-CH-MLD 4.7UH 10% .105DX.26LG	28480	9140-0144
A11L3	9140-0105	3	2	INDUCTOR RF-CH-MLD 8.2UH 10%	28480	9140-0105
A11L4	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A11L5	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A11L6	9140-0114	4	3	INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG	28480	9140-0114
A11L7	9140-0114	4		INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG	28480	9140-0114
A11L8	9140-0114	4		INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG	28480	9140-0114
A11L9	9140-0112	2		INDUCTOR RF-CH-MLD 4.7UH 10%	28480	9140-0112
A11L10	9140-0105	3		INDUCTOR RF-CH-MLD 8.2UH 10%	28480	9140-0105
A11L11	9100-1627	2	1	INDUCTOR RF-CH-MLD 39UH 5% .166DX.385LG	28480	9100-1627
A11L12	9100-1629	4	1	INDUCTOR RF-CH-MLD 47UH 5% .166DX.385LG	28480	9100-1629
A11L13	9100-1622	7	1	INDUCTOR RF-CH-MLD 24UH 5% .166DX.385LG	28480	9100-1622
A11L14	9100-2257	6	1	INDUCTOR RF-CH-MLD 820NH 10% .105DX.26LG	28480	9100-2257
A11Q1	1854-0637	1	1	TRANSISTOR NPN 2N2219A SI TO-5 PD=800MW	01295	2N2219A
A11Q2	1853-0281	9	3	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A11Q3	1853-0281	9		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A11Q4	1853-0015	7	5	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A11Q5	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A11Q6	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A11Q7	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q8	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A11Q9	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q10	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A11Q11	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q12	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A11Q13	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q14	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q15	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q16	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q17	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q18	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q19	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q20	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11Q21	1854-0475	5		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0475
A11Q22	1854-0404	0		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A11Q23	1853-0281	9		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A11Q24	1854-0404	0		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A11Q25	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A11R1	0757-0317	7	1	RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A11R2	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R3	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A11R4	0698-3430	5	1	RESISTOR 21.5 1% .125W F TC=0+-100	03888	PME55-1/8-T0-21R5-F
A11R5	0757-0443	0		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A11R6	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A11R7	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A11R8	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A11R9	0698-3450	9		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A11R10	2100-2633	5	2	RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A11R11	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A11R12	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A11R13	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R14	0757-0460	1		RESISTOR 61.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A11R15	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A11R16	0757-0180	2		RESISTOR-31.6 1% .125W F TC=0+100	28480	0757-0180
A11R17	0757-0464	5		RESISTOR 90.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-9092-F
A11R18	0698-3136	8	2	RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A11R19	0757-0123	3		RESISTOR 34.8K 1% .125W F TC=0+-100	28480	0757-0123
A11R20	0698-0083	8	2	RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A11R21	2100-2489	9	2	RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN	30983	ET50X502
A11R22	0698-3452	1		RESISTOR 147K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1473-F
A11R23	2100-2514	1	1	RESISTOR-TRMR 20K 10% C SIDE-ADJ 1-TRN	30983	ET50W203
A11R24	0757-0274	5		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1211-F
A11R25	0757-0274	5		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1211-F
A11R26	0757-0274	5		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1211-F
A11R27	2100-2489	9		RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN	30983	ET50X502
A11R28	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R29	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R30	2100-2522	1	3	RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN	30983	ET50X103
A11R31	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R32	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R33	2100-2522	1		RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN	30983	ET50X103
A11R34	2100-2521	0	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	30983	ET50X202
A11R35	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R36	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R37	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A11R38	0698-3151	7	1	RESISTOR 2.87K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2871-F
A11R39	2100-2520	9	1	RESISTOR-TRMR 50 20% C SIDE-ADJ 1-TRN	30983	ET50X500
A11R40	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A11R41	0757-0290	5		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A11R42	0757-0200	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A11R43	0757-0447	4		RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A11R44	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A11R45	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R46	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A11R47	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R48	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A11R49	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A11R50	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A11R51	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R52	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R53	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A11R54	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A11R55	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R56	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R57	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R58	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R59	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A11R60	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R61	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R62	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A11R63	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A11R64	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R65	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R66	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R67	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R68	0698-8958	2	1	RESISTOR 511K 1% .125W F TC=0+-100	28480	0698-8958
A11R69	2100-2692	6	1	RESISTOR-TRMR 1M 20% C SIDE-ADJ 1-TRN	30983	ET50X105
A11R70	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R71	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A11R72	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A11R73	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A11R74	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R75	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R76	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R77	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R78	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A11R79	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R80	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A11R81	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A11R82	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R83	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R84	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R85	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A11R86	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R87	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R88	2100-2522	1		RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN	30983	ET50X103
A11R89	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R90	0757-0403	2		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A11R91	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A11R92	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A11R93*	0698-3153	9	7	RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A11R94	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A11R95	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R96	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R97	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A11R98	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A11R99	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R100	0757-0403	2		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A11R101*	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A11R102	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R103	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R104	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R105	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A11R106	0757-0417	8		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A11R107*	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A11R108	0698-3434	9	1	RESISTOR 34.8 1% .125W F TC=0+-100	24546	C4-1/8-T0-34R8-F
A11R109	0757-0400	9	1	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A11R110	0757-0418	9		RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-T0-619R-F
A11R111	0698-3440	7		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A11R112	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R113	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R114	0698-3136	8		RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A11R115	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R116	0757-0418	9		RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-T0-619R-F
A11R117	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R118	0698-0085	0		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A11R119	0698-3438	3		RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A11R120	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A11R121	2100-2633	5		RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A11R122	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A11R123	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A11R124	0757-0447	4		RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A11R125	0757-0447	4		RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A11R126	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A11R127	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A11R128	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A11R129	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A11R130	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A11R131	0757-0402	1	1	RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A11R132	0757-1438	5	1	RESISTOR-FXD 5.11K 1% .125W	28480	0757-1438
A11R133	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A11R134	0698-7212	9		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A11TP1	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP2	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP3	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP4	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP5	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP6	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP7	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP8	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP9	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11TP10	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A11U1	1826-0092	3		IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A11U2	1826-0092	3		IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A11VR1	1902-0901	5	1	DIODE-ZNR 5.4V 1% DO-35 PD=.4W TC=+.046%	28480	1902-0901
A12	**08557-60058**	**8**	**1**	**VERTICAL DRIVE BOARD ASSEMBLY**	**28480**	**08557-60058**
A12C1	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A12C2	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A12C3	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A12C4	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A12C5	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A12C6	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A12CR1	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR2	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR3	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR4	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A12CR5	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR6	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR7	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR8	1901-0040	1		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A12CR9	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A12CR10	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A12CR11	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A12CR12	1901-0518	8	1	DIODE-SM SIG SCHOTTKY	28480	1901-0518
A12L1	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A12L2	9140-0179	1		INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG	28480	9140-0179
A12MP1	0380-0111	0	1	STANDOFF-RVT-ON .25-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
A12Q1	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A12Q2	1854-0234	4	4	TRANSISTOR NPN 2N3440 SI TO-5 PD=1W	3L585	2N3440
A12Q3	1854-0234	4		TRANSISTOR NPN 2N3440 SI TO-5 PD=1W	3L585	2N3440
A12Q4	1854-0009	1	1	TRANSISTOR NPN SI PD=300MW FT=600MHZ	04713	2N709
A12Q5	1854-0404	0		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A12Q6	1854-0234	4		TRANSISTOR NPN 2N3440 SI TO-5 PD=1W	3L585	2N3440
A12Q7	1854-0234	4		TRANSISTOR NPN 2N3440 SI TO-5 PD=1W	3L585	2N3440
A12Q8	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A12Q9	1854-0019	3		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A12Q10	1854-0039	7		TRANSISTOR NPN 2N3053S SI TO-39 PD=1W	3L585	2N3053S
A12Q11	1853-0451	5	2	TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW	01295	2N3799
A12Q12	1853-0451	5		TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW	01295	2N3799
A12Q13	1854-0882	8		TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A12Q14	1854-0475	5		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0475
A12Q15	1854-0882	8		TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A12Q16	1853-0007	7		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A12Q17	1855-0049	1	1	TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	28480	1855-0049
A12Q18	1854-0882	8		TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A12Q19	1855-0417	7		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0417
A12Q20	1854-0882	8		TRANSISTOR NPN PD=300MW FT=200MHZ	28480	1854-0882
A12Q21	1855-0020	8	1	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A12R1	2100-3123	0		RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	02111	43P501
A12R2	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A12R3	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A12R4	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A12R5	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A12R6				NOT ASSIGNED		
A12R7				NOT ASSIGNED		
A12R8				NOT ASSIGNED		
A12R9	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A12R10	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A12R11	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A12R12	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A12R13	0683-0475	1		RESISTOR 4.7 5% .25W FC TC=-400/+500	01121	CB4705
A12R14	0757-0424	7		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A12R15				NOT ASSIGNED		
A12R16	0698-3446	3		RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A12R17	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A12R18	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A12R19	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A12R20	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A12R21	0683-1055	5		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A12R22	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A12R23	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A12R24	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A12R25	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A12R26	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A12R27	0698-3440	7		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A12R28	0698-3440	7		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A12R29	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A12R30	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A12R31	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A12R32	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A12R33	0757-0424	7		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A12R34	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A12R35	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

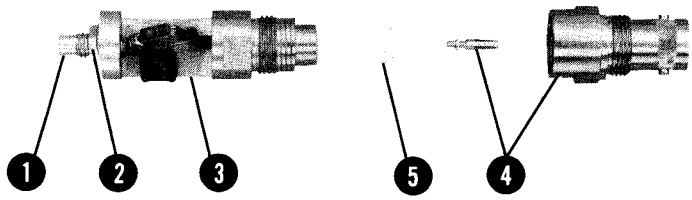
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A12R36	0757-0200	7		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A12R37	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A12R38	0757-0199	3		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A12R39	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A12R40	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A12R41	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A12R42	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A12R43	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A12R44	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A12R45	0757-0837	6	2	RESISTOR 8.25K 1% .5W F TC=0+-100	28480	0757-0837
A12R46	0757-0844	5	2	RESISTOR 16.2K 1% .5W F TC=0+-100	28480	0757-0844
A12R47	0698-3440	7		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A12R48	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A12R49	0757-0844	5		RESISTOR 16.2K 1% .5W F TC=0+-100	28480	0757-0844
A12R50	0698-3440	7		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A12R51	0757-0837	6		RESISTOR 8.25K 1% .5W F TC=0+-100	28480	0757-0837
A12R52	0698-3444	1		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A12R53	0698-3260	9		RESISTOR 464K 1% .125W F TC=0+-100	28480	0698-3260
A12R54	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A12R55	0698-7284	5	1	RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1003-F
A12U1	1858-0032	8	1	TRANSISTOR ARRAY 14-PIN PLSTC DIP	3L585	CA3146E
A12VR1	1902-0033	4	1	DIODE-ZNR 1N823 6.2V 5% DO-7 PD=.4W	24046	1N823
A12VR2	1902-0202	9	1	DIODE-ZNR 15V 5% PD=1W IR=5UA	28480	1902-0202
A12VR3	1902-0556	6	1	DIODE-ZNR 20V 5% PD=1W IR=5UA	28480	1902-0556
A13	**08557-60066**	8	1	**MOTHER BOARD ASSEMBLY**	**28480**	**08557-60066**
A13C1	0160-4084	8		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A13C2	0180-0116	1		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X9035B2
A13C3	0180-0374	3	1	CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X9020B2
A13C4	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A13C5	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A13C6	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A13C7	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A13C8	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A13C9	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A13CR1	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A13CR2	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A13J1	1251-0541	8	2	CONNECTOR 34-PIN M RECTANGULAR	28480	1251-0541
A13J2	1251-0541	8		CONNECTOR 34-PIN M RECTANGULAR	28480	1251-0541
A13R1	0757-0395	1		RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A13R2	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A13R3	0698-5368	2	1	RESISTOR 3.74K .25% .125W F TC=0+-50	28480	0698-5368
A13R4	2100-1757	2	1	RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN	28480	2100-1757
A13R5	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A13R6	0698-3442	9		RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A13R7	0757-1000	7	2	RESISTOR 51.1 1% .5W F TC=0+-100	28480	0757-1000
A13R8	0757-1000	7		RESISTOR 51.1 1% .5W F TC=0+-100	28480	0757-1000
A13R9	0698-3260	9		RESISTOR 464K 1% .125W F TC=0+-100	28480	0698-3260
A13VR1	1902-0632	9	1	DIODE-ZNR 1N5354B 17V 5% PD=5W TC=+75%	04713	1N5354B
A13VR2	1902-0631	8	1	DIODE-ZNR 1N5351B 14V 5% PD=5W TC=+75%	04713	1N5351B
A13VR3	1902-3182	0	1	DIODE-ZNR 12.1V 5% DO-35 PD=.4W	28480	1902-3182
A13XA1				NOT ASSIGNED		
A13XA2				NOT ASSIGNED		
A13XA3	1251-1365	6	6	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A13XA4	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A13XA5				NOT ASSIGNED		
A13XA6	1251-0472	4	1	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	28480	1251-0472
A13XA7	1251-2034	8	2	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	28480	1251-2034
A13XA8	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A13XA9	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A13XA10	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A13XA11	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A13XA12	1251-2034	8		CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	28480	1251-2034
P1	1251-0136	7	1	CONNECTOR 32-PIN M BLUE RIBBON	28480	1251-0136
W1	08557-60016	8	1	CABLE ASSEMBLY-LPF (BROWN)	28480	08557-60016
W2	08557-20054	0	1	CABLE ASSEMBLY-1ST CONVERTER(SEMIRIGID)	28480	08557-20054
W3	08557-60022	6	1	CABLE ASSEMBLY-2ND CONVERTER(ORANGE)	28480	08557-60022
W4	08557-60023	7	1	CABLE ASSEMBLY-CAL OUT(YELLOW)	28480	08557-60023
W5	08557-60024	8	1	CABLE ASSEMBLY-RF IN (GREEN)	28480	08557-60024
W5	08557-60051	1	1	CABLE ASSEMBLY-RF IN (OPT. 001, 002)	28480	08557-60051
	0757-0704	6	1	RESISTOR 43.2 1% .25W F TC=0+-100	24546	C5-1/4-T0-43R2-F
	0698-4398	6	1	RESISTOR 86.6 1% .125W F TC=0+-100	24546	C4-1/8-T0-86R6-F
	0160-3508	9	1	CAPACITOR-FXD 1UF +80-20% 50VDC CER	28480	0160-3508

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W6	08557-60044	2	1	CABLE ASSEMBLY-ATTEN (BLUE)	28480	08557-60044
W7	08557-60045	3	1	CABLE ASSEMBLY-CONN VERT	28480	08557-60045

See introduction to this section for ordering information
*Indicates factory selected value



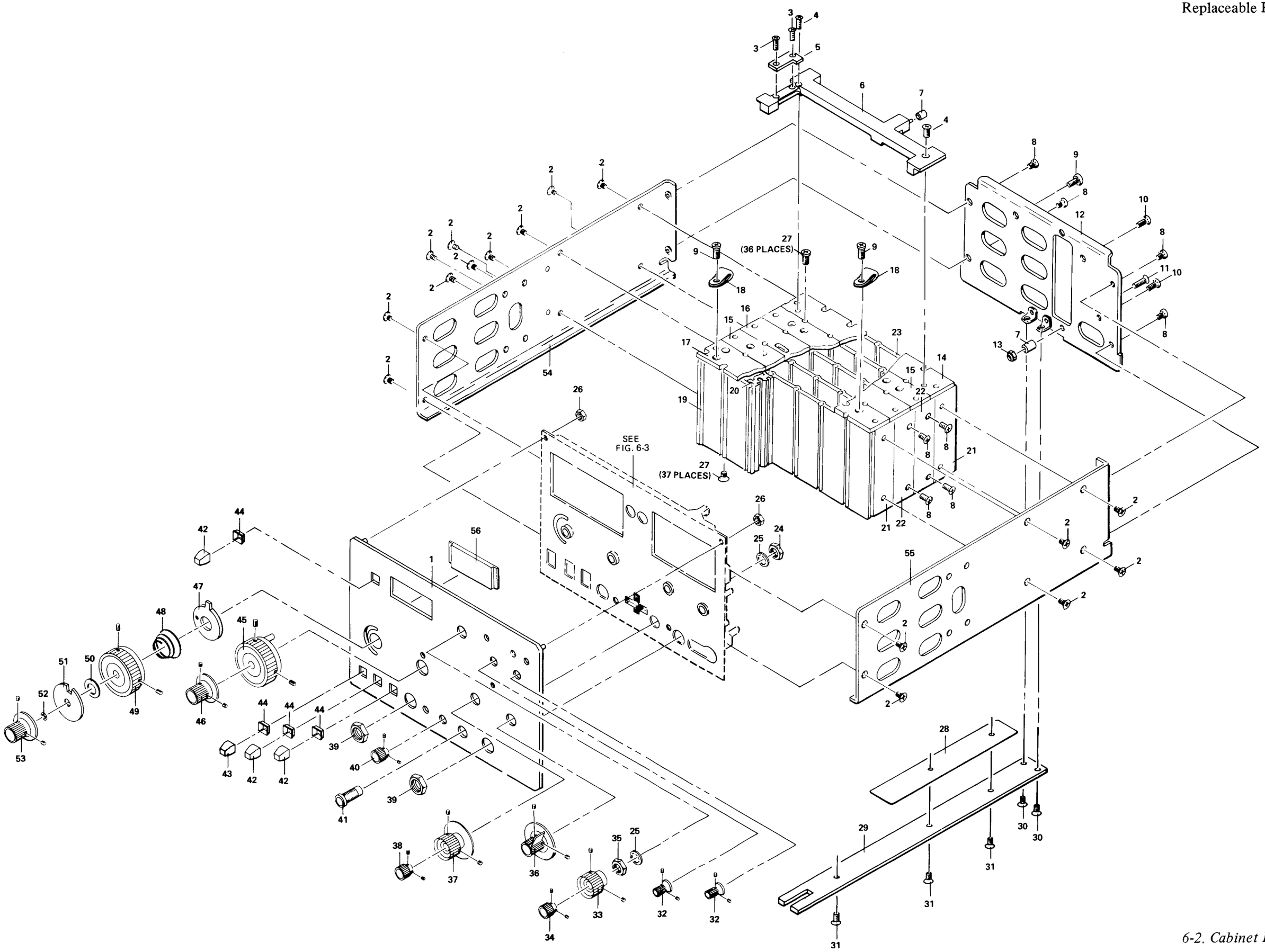
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	1250-0829	3	1	CONNECTOR, RF MALE SMC	28480	1250-0829
2	2190-0124	4	1	WASHER, LOCK .195 ID10	28480	2190-0124
3	08557-20055	1	1	BODY, BLOCK CAP	28480	08557-20055
4	1250-0505	2	1	CONNECTOR, 75 OHM	28480	1250-0505
5	08557-20056	2	1	DIELECTRIC	28480	08557-20056
	08557-00026	4	1	BLOCK CAP COVER (NOT SHOWN)	28480	08557-00026
	08557-20057	3	1	CLAMP (NOT SHOWN)	28480	08557-20057
	0520-0127	6	3	SCREWS, SM 256 (NOT SHOWN)	28480	0520-0127

Figure 6-1. RF IN Cable Assembly W5 (08557-60051) Replaceable Parts, Options 001 and 002

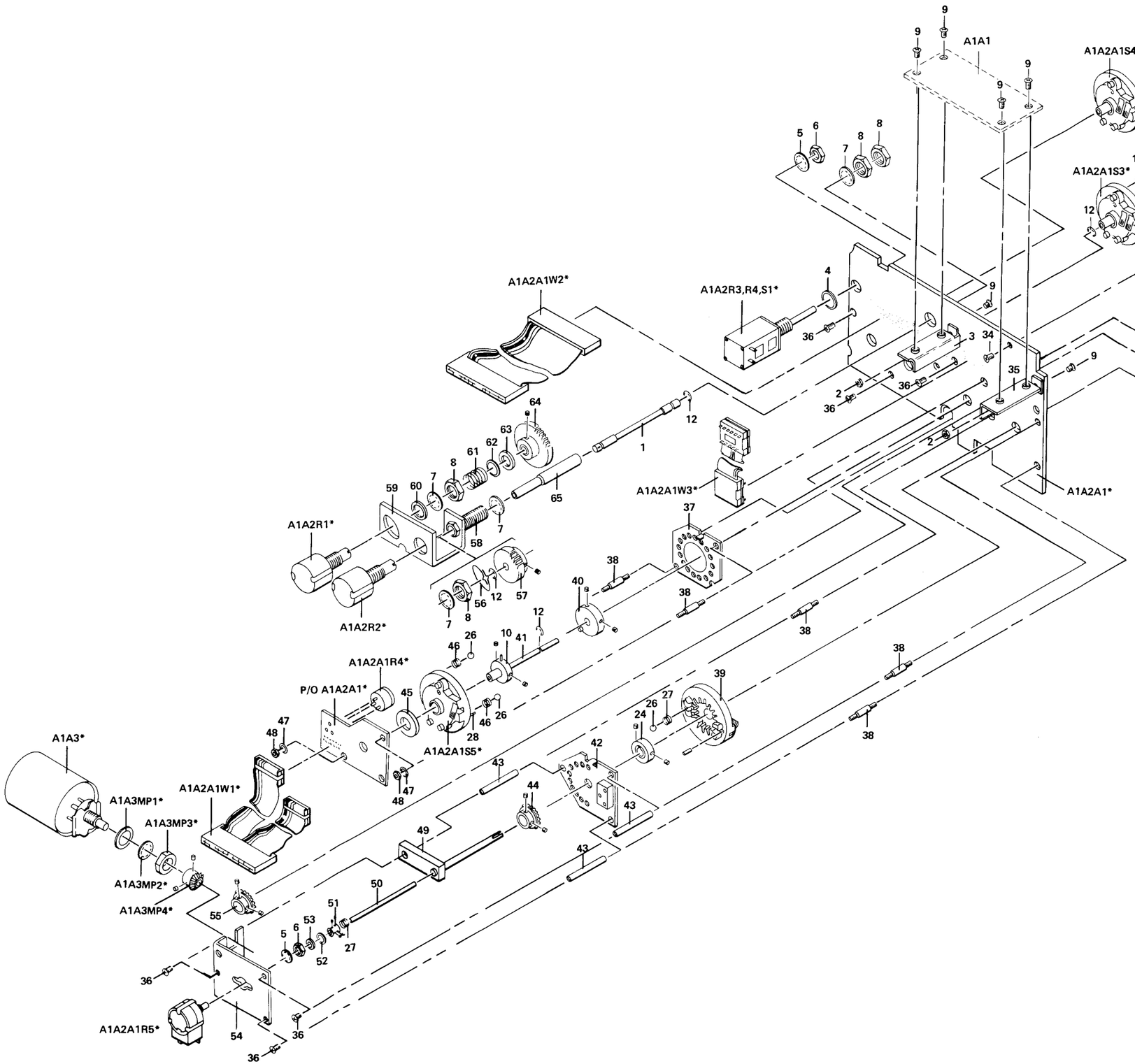
Ref. Desig.	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr. Part Number
1	08557-00041	3	1	PANEL-FRONT (STD.)	28480	08557-60067
1	08557-00048	0	1	PANEL-FRONT (OPT. 001)	28480	08557-00048
1	08557-00049	1	1	PANEL-FRONT (OPT. 002)	28480	08557-00049
2	2200-0104	3	16	SCREW-MACH 4-40 82 DEG FL HD POZI REC	28480	2200-0104
3	2200-0165	6	2	SCREW-MACH 4-40 .25-IN-LG 82 DEG	28480	2200-0165
4	2360-0201	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	28480	2360-0201
5	08557-60045	3	1	BOARD: VERTICAL OUTPUT (CABLE ASSY:W10)	28480	08557-60045
6	08557-60053	3	1	GUIDE RAIL (TOP)	28480	08557-60053
7	0380-0005	1	2	SPACER-RND .312-IN-LG .18-IN-ID	28480	0380-0005
8	2200-0103	2	8	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	28480	2200-0103
9	2360-0115	4	3	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	28480	2360-0115
10	2200-0105	4	2	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
11	2200-0170	3	1	SCREW-MACH 4-40 .625-IN-LG 82 DEG	28480	2200-0170
12	08558-00003	8	1	PANEL (REAR)	28480	08558-00003
13	2260-0003	7	1	NUT-HEX-PLSTC LKG 4-40-THD .141-IN-THK	28480	2260-0003
14	08557-00038	8	1	COVER-LOG AMPLIFIER	28480	08557-00038
15	08557-00015	1	2	COVER-BANDWIDTH FILTER	28480	08557-00015
16	08557-00014	0	1	COVER-STEP GAIN	28480	08557-00014
17	08557-00006	0	1	COVER-21.4 MHz PREAMPLIFIER	28480	08557-00006
18	1400-0082	9	2	CLAMP-CABLE .125-IDIA .375-WD NYL	28480	1400-0082
19	08557-20053	9	8	EXTRUSION, CIRCUIT ENCLOSURE, SHORT	28480	08557-20053
20	08558-20038	1	1	EXTRUSION, ENCLOSURE DIVIDER	28480	08558-20038
21	08558-20036	9	4	EXTRUSION, CIRCUIT ENCLOSURE, TAPPED	28480	08558-20036
22	08558-20087	0	2	EXTRUSION, CIRCUIT ENCLOSURE	28480	08558-20087
23	08558-20037	0	1	EXTRUSION, END PLATE ENCLOSURE	28480	08558-20037
24	2950-0043	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	28480	2950-0043
25	2190-0016	3	2	WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
26	2420-0001	5	2	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	28480	2420-0001
27	0624-0099	1	73	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
28	08557-00019	5	1	INSULATOR-GUIDE RAIL (BOTTOM)	28480	08557-00019
29	08558-20164	4	1	GUIDE RAIL (BOTTOM)	28480	08558-20164
30	2200-0164	5	2	SCREW-MACH 4-40 .188-IN-LG UNCT 82 DEG	28480	2200-0164
31	2200-0168	9	3	SCREW-MACH 4-40 .438-IN-LG 82 DEG	28480	2200-0168
32	08565-60170	5	2	KNOB-BASELINE CLIP/VIDEO FILTER	28480	08565-60170
33	0370-3004	5	1	KNOB ASSY-COARSE TUNE	28480	0370-3004
34	0370-3006	7	1	KNOB ASSY-FINE TUNE	28480	0370-3006
35	2950-0001	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	28480	2950-0001
36	08559-20050	8	1	KNOB ASSY-SWEEP TRIGGER	28480	08559-20050
37	08558-20163	3	1	KNOB ASSY-SWEEP TIME/DIV	28480	08558-20163
38	0370-3021	6	1	KNOB ASSY-MANUAL SWEEP	28480	0370-3021
39	0590-1251	6	2	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	28480	0590-1251
40	0370-1121	3	1	KNOB-LOCK	28480	0370-1121
41	08558-60170	6	1	CABLE ASSY-PROBE POWER (W16)	28480	08558-60170
42	5040-8817	4	3	PUSHBUTTON-SQUARE; JADE GRAY	28480	5040-8817
43	5040-8819	6	1	PUSHBUTTON-SQUARE; WILLOW GREEN	28480	5040-8819
44	0370-0606	7	4	BEZEL-PB .330-IN-SQ; JADE GRAY	28480	0370-0606
45	08557-60054	4	1	KNOB ASSY, FREQ SPAN/DIV	28480	08557-60054
46	08557-60055	5	1	KNOB ASSY, RESOLUTION BW	28480	08557-60055
47	08565-40011	1	1	POINTER-INPUT ATTENUATOR	28480	08565-40011
48	1460-0532	0	1	SPRING-CONICAL	28480	1460-0532
49	08558-60166	0	1	KNOB ASSY-REFERENCE LEVEL (OPT. 002)	28480	08558-60166
49	08558-60167	1	1	KNOB ASSY-REFERENCE LEVEL (STD. OPT. 001)	28480	08558-60167
50	2190-0390	6	1	WASHER-FL NM 1/4 IN .26-IN-ID .562-IN-OD	28480	2190-0390
51	08558-00123	3	1	INDEX DISK (OPT. 002) REFERENCE LEVEL	28480	08558-00123
51	08565-00043	5	1	INDEX DISK (STD. OPT. 001) REFERENCE LEVEL	28480	08565-00043
52	0510-0089	8	1	RETAINER-RING BSC EXT .188-IN-DIA BE-CU	28480	0510-0089
53	08565-60047	5	1	KNOB ASSY, REF. LEVEL (FINE)	28480	08565-60047
54	08557-00049	5	1	SIDE GUSSET (LEFT)	28480	08557-00049
55	08557-00043	4	1	SIDE GUSSET (RIGHT)	28480	08557-00043
56	5021-3229	2	1	WINDOW, FREQ. DISPLAY (GLUED TO 1)	28480	5021-3229

Reference Designator	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr. Part Number
1	08558-20114	4	1	SHAFT: FINE TUNE	28480	08558-20114
2	2260-0009	3	2	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	04805	511-041800-00-0280-2580
3	5001-5813	2	1	BRACKET-LEFT DPM MOUNTING	28480	5001-5813
4	3050-0038	4	1	WASHER-FL MTLC 9/16 IN .594-IN-ID	28480	3050-0038
5	2190-0067	4	2	WASHER-LK INTL T 1/4 IN .256-IN-ID	04805	1914-05
6	2950-0006	3	2	NUT-HEX-DBL-CHAM 1/4-32-THD .094-IN-THK	04604	9000
7	2190-0016	3	4	WASHER-LK INTL T 3/8 IN .377-IN-ID	04805	1920-02
8	2950-0001	8	4	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	04604	9002
9	2200-0105	4	6	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
10	08558-20059	6	2	HUB DRIVE	28480	08558-20059
11	5021-3226	9	1	SHAFT-MANUAL SWEEP	28480	5021-3226
12	0510-0015	0	5	RETAINER-RING E-R EXT .125-IN-DIA STL	01419	1500-12-ZD
13	1460-0578	4	2	SPRING-CPRSN .18-IN-OD .312-IN-OA-LG MUW	05191	LC-020B-2 MW
14	1460-0537	5	1	SPRING-TRSN MUW ZN	28480	1460-0537
15	08558-00053	8	1	STOP ARM	28480	08558-00053
16	0510-0027	4	1	RETAINER-PUSH ON	28480	0510-0027
17	5021-3213	4	1	DIECAST-FRONT SWITCH	28480	5021-3213
18	0380-0034	6	1	SPACER-RND .312-IN-LG .116-IN-ID	28480	0380-0034
19	1460-0012	1	1	SPRING-CPRSM .135-IN-OD .688-IN-OA-LG	28480	1460-0012
20	5021-3227	0	1	SHAFT-LOCKING	28480	5021-3227
21	1480-0017	8	1	PIN-DWL ANSI-HDND/GND .1252-IN-DIA	28480	1480-0017
22	5001-5818	7	1	LINK-LOCKING	28480	5001-5818
23	5021-3218	9	1	SHAFT-REF LEVEL	28480	5021-3218
24	08559-60060	4	2	HUB ASSEMBLY	28480	08559-60060
25	5021-3224	7	1	SHAFT-FREQUENCY SPAN	28480	5021-3224
26	1410-0006	8	7	BALL-BRG TYPE .1875-DIA GRADE-50 SST	04833	GRADE 50
27	1460-0623	0	4	SPRING-CPRSN .18-IN-OD .312-IN-OA-LG MUW	05191	LC-0168-2-MW
28	1480-0059	8	11	PIN-ROLL .062-IN-DIA .25-IN-LG STL	04559	52-012-062-0250
29	08557-60052	2	1	ROTOR AY-ATTENUATOR DRIVER	28480	08557-60052
30	08558-20089	2	1	BUSHING SLOTTED	28480	08558-20089
31	1460-1376	2	1	SPRING-TRSN MUW	28480	1460-1376
32	5061-5424	7	1	SHAFT ASSEMBLY-ATTENUATOR	28480	5061-5424
33	3050-0032	8	1	WASHER-FL MTLC NO. 8 .189-IN-ID	28480	3050-0032
34	2200-0111	2	1	SCREW-MACH 4-40 .5-IN-LG PAN-HD-POZI	28480	2200-0111
35	5001-5814	3	1	BRACKET-RIGHT DPM MOUNTING	28480	5001-5814
36	2200-0103	2	6	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	28480	2200-0103
37	5001-5816	5	1	DETENT-BANDWIDTH	28480	5001-5816
38	5021-3220	3	5	STUD-.500-IN-LG, 4-40 THD	28480	5021-3220
39	08558-40005	4	1	ROTOR DBL CONT-REFERENCE LEVEL	28480	08558-40005
40	08558-20058	5	1	HUB COUPLING	28480	08558-20058
41	5021-3225	8	1	SHAFT-BANDWIDTH	28480	5021-3225
42	5061-5423	6	1	DETENT-REFERENCE LEVEL	28480	5061-5423
43	5021-3221	4	3	STANDOFF-1 .438-IN-LG 4-40 THD	28480	5021-3221
44	08558-20061	0	1	LOCKOUT ROTATING	28480	08558-20061
45	08558-20139	3	1	SPACER-ROTOR	28480	08558-20139
46	1460-1860	9	2	SPRING-CPRSM .18-IN-OD .31-IN-OA-LG SST	04426	C0180-014-0310-S
47	2190-0019	6	2	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0019
48	2260-0002	6	2	NUT-HEX-DBL-CHAM 4-40-THD .062-IN-THK	28480	2260-0002
49	5061-5422	5	1	LOCATOR-INDEX DISC	28480	5061-5422
50	5021-3217	8	1	SHAFT-REFERENCE LEVEL FINE	28480	5021-3217
51	1490-0841	7	1	COUPLER-RGD .375-LG BRS	28480	1490-0841
52	3050-0011	3	1	WASHER-FL NM NO. 5 .13-IN-ID .25-IN-OD	04757	3482-4
53	3050-0080	6	1	WASHER-FL NM NO. 5 .13-IN-ID .25-IN-OD	04757	3482-12
54	08557-00039	9	1	BRACKET-ATTENUATOR	28480	08557-00039
55	1430-0036	6	1	GEAR-MIT 16-T 32-DP 20-DEG-PA BRS	04395	1B4RL4151-1
56	1460-1542	4	1	WIREFORM MUW	28480	1460-1542
57	1430-0568	9	1	GEAR-SPUR 40-T 48-DP 20-DEG-PA DLRN	04395	1T2-Y4840
58	08558-20111	1	1	BUCKING-CRS TUNE	28480	08558-20111
59	5001-5825	6	1	BRACKET-DUAL POT	28480	5001-5825
60	3050-0067	9	1	WASHER-FL MTLC 5/16 IN .375-IN-ID	04604	31-550
61	1460-0019	8	1	SPRING-CPRSN .384-IN-OD .375-IN-OA-LG	28480	1460-0019
62	3050-0017	9	1	WASHER-FL MTLC 1/4 IN .26-IN-ID	28480	3050-0017
63	2190-0390	6	1	WASHER-FL NM 1/4 IN .26-IN-ID .562-IN-OD	04604	103204
64	1430-0567	8	1	GEAR-SPUR 60-T 48-DP 20-DEG-PA DLRN	04395	1T2-Y4860
65	08558-20113	3	1	SHAFT-COARSE TUNE	28480	08558-20113

Figure 6-3. Switch Assembly A1A2 (1 of 2)



6-2. Cabinet Parts


A1A1
A1A2A1*
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A1A2A1S3*
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A1A2A1W3*
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P/O A1A2A1*
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A1A3*
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