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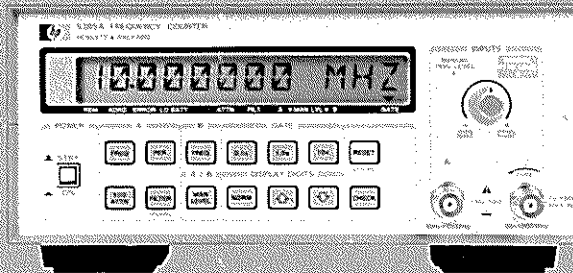
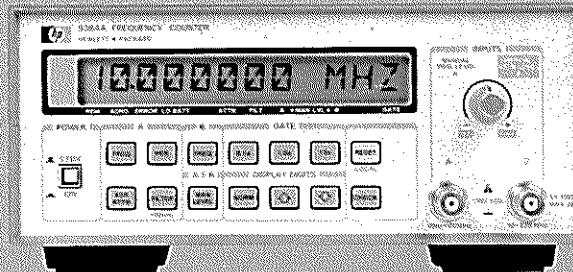
# OPERATING AND SERVICE MANUAL



東京支社販売支援部

**TEMPORARY  
MANUAL**

## 5384A 5385A Frequency Counters



*General Information  
Installation  
Operation and Programming  
Performance Tests  
Adjustments  
Replaceable Parts  
Manual Changes  
Service*



**HEWLETT  
PACKARD**

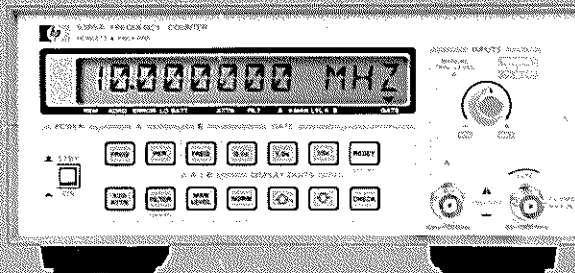
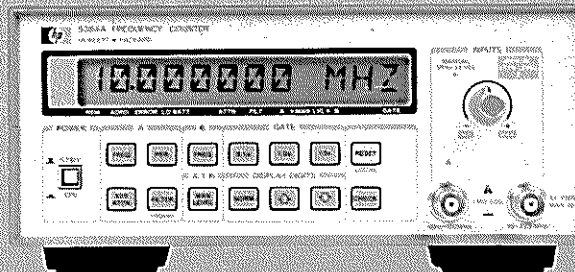
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**TEMPORARY  
MANUAL**



- General Information
- Installation
- Operation and Programming
- Performance Tests
- Adjustments
- Replaceable Parts
- Manual Changes
- Service



**HEWLETT  
PACKARD**

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# TEMPORARY OPERATING AND SERVICE MANUAL

## HP MODELS 5384A and 5385A FREQUENCY COUNTERS

**SERIAL PREFIX: 2312A**

This manual applies to Serial prefix 2312A, unless accompanied by a Manual change Sheet indicating otherwise.



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**PRINTED: JUNE 1983**

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## SAFETY CONSIDERATIONS

### GENERAL

This is a Safety Class I instrument. This instrument has been designed and tested according to international safety requirements.

This manual contains information, cautions, and warnings which must be followed by the service person to ensure safe operation and to retain the instrument in safe condition.

#### WARNING

**BEFORE SWITCHING ON THIS INSTRUMENT, THE PROTECTIVE EARTH TERMINALS OF THIS INSTRUMENT MUST BE CONNECTED TO THE PROTECTIVE CONDUCTOR OF THE (MAINS) POWER CORD. THE MAINS PLUG SHALL ONLY BE INSERTED IN A SOCKET OUTLET PROVIDED WITH A PROTECTIVE EARTH CONTACT. THE PROTECTIVE ACTION MUST NOT BE NEGATED BY THE USE OF AN EXTENSION CORD (POWER CABLE) WITHOUT A PROTECTIVE EARTH (GROUNDING) CONDUCTOR.**

#### WARNING

**ONLY FUSES WITH THE REQUIRED RATED CURRENT VOLTAGE AND SPECIFIED TYPE SHOULD BE USED. DO NOT USE REPAIRED FUSES OR SHORT-CIRCUITED FUSE-HOLDERS. TO DO SO COULD CAUSE A SHOCK OR FIRE HAZARD.**

#### WARNING

**WHENEVER IT IS LIKELY THAT THE PROTECTION HAS BEEN IMPAIRED, THE INSTRUMENT MUST BE MADE INOPERATIVE AND BE SECURED AGAINST ANY UNINTENDED OPERATION.**

#### WARNING

**ALL PROTECTIVE EARTH TERMINALS, EXTENSION CORDS, AUTOTRANSFORMERS, AND DEVICES CONNECTED TO THIS INSTRUMENT SHOULD BE CONNECTED TO A SOCKET OUTLET PROVIDED WITH A PROTECTIVE EARTH CONTACT. ANY INTERRUPTION OF THE PROTECTION WILL CAUSE A POTENTIAL SHOCK HAZARD THAT COULD RESULT IN PERSONAL INJURY.**

#### WARNING

**IF THE INSTRUMENT IS TO BE ENERGIZED VIA AN AUTOTRANSFORMER FOR VOLTAGE REDUCTION, MAKE SURE THAT THE COMMON TERMINAL IS CONNECTED TO THE NEUTRAL (EARTHED POLE) OF THE AC POWER SOURCE.**

#### WARNING

**ANY MAINTAINANCE OR SERVICE REQUIRING REMOVAL OF PROTECTIVE COVERS SHOULD BE PERFORMED BY SERVICE-TRAINED PERSONS WHO ARE AWARE OF THE HAZARDS INVOLVED (FOR EXAMPLE, FIRE AND ELECTRIC SHOCK).**

**WARNING**

**GROUNDING**

**BEFORE SWITCHING THIS INSTRUMENT, ensure that all devices connected to this instrument are connected to the protective (earth) ground. (Grounding one conductor of a two-conductor outlet is not sufficient.)**

**CAUTION**

**LINE VOLTAGE SELECTION**

**BEFORE SWITCHING ON THIS INSTRUMENT, make sure the instrument is set to the voltage of the power source. Verify that the power module is matched to the available line voltage. Verify that the correct fuse is installed.**

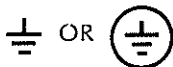
The following safety symbols are used on equipment and in manuals:



This symbol which appears on the instrument means you should refer to the instrument manual before operating, in order to avoid possible damage to the instrument. In the manual, information relating to the ATTENTION symbol will be identified with the symbol in the margin.



Indicates dangerous voltage (terminals fed from internal or external sources which exceeds 1000 volts).



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with the symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.



Frame and chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Alternating current.



Direct current.



Alternating or direct current.

**WARNING**

The WARNING signal denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury.

**CAUTION**

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.



ERRATA

Title Page:

- >Change SERIAL PREFIX to:
  - 2313A for the 5384A
  - 2312A for the 5485A

Page 8-9, Figure 8-4. 5384A/5385A A1 Motherboard Power Supply Assembly Schematic Diagram:

- >Change R52 to 51.1 ohms.
- >Add "Note 4. C28 not installed".

#CHANGE 1

Page 6-7, Table 6-2. A1 (05384-60001) Replacement Parts List:

>Change part number 0535-0004 to 2260-0001 NUT-HEX-DBL-CHAM 4-40-THD  
.094-IN-THK.

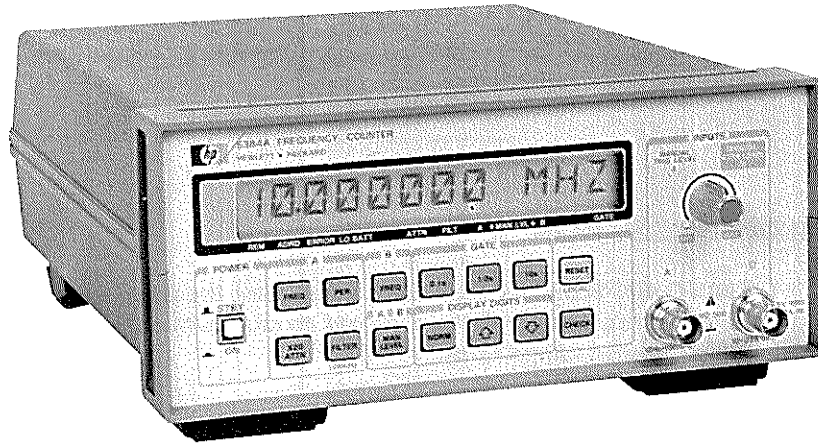
Page 6-11, Table 6-2. A1 (05384-60006) Replacement Parts List:

>Change part number 0535-0004 to 2260-0001 NUT-HEX-DBL-CHAM 4-40-THD  
.094-IN-THK.

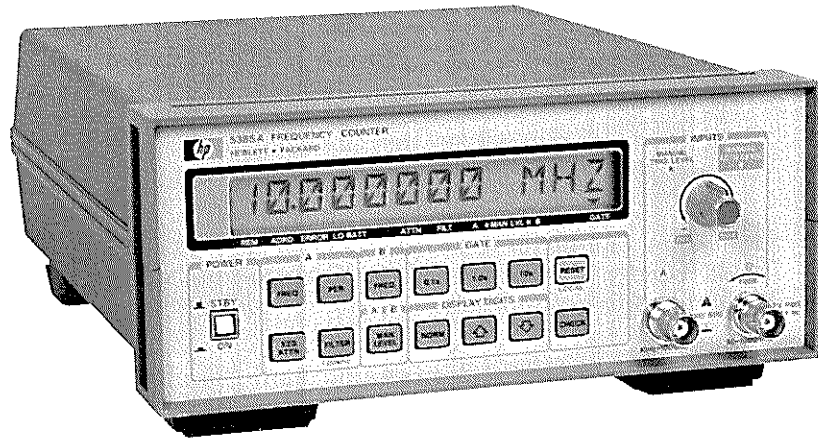
Page 6-15, Table 6-2. A1 (05384-60007) Replacement Parts List:

>Change part number 0535-0004 to 2260-0001 NUT-HEX-DBL-CHAM 4-40-THD  
.094-IN-THK.

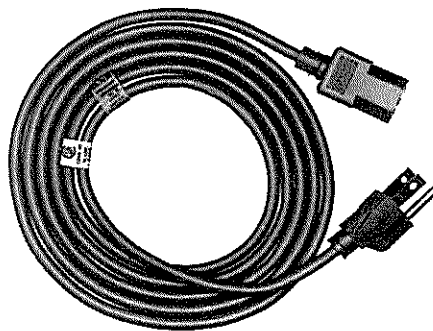
Models 5384A and 5385A  
General Information



**Model 5384A**



**Model 5385A**



**Power Cord**

*Figure 1-1. Models 5384A and 5385A Frequency Counters and Accessories*

## SECTION I GENERAL INFORMATION

### 1-1. INTRODUCTION

1-2. This manual provides you with information pertaining to the installation, operating, programming, testing, adjustments, and maintenance of the HP Models 5384A and 5385A Frequency Counters, shown in *Figure 1-1*.

### 1-3. MANUAL SUMMARY

1-4. The manual is divided into eight sections, each covering a particular topic for the operation of the HP Models 5384A and 5385A Frequency Counters. The topics by section number are:

Section	Topic
I	General Information
II	Installation
III	Operation and Programming
IV	Performance Tests
V	Adjustments
VI	Replaceable Parts
VII	Manual Changes
VIII	Service

### 1-5. SPECIFICATIONS

1-6. The instrument specifications and option specifications are listed in *Table 1-1*. These specifications are performance standards or limits against which the instrument may be tested.

### 1-7. SAFETY CONSIDERATIONS

1-8. This is a Safety Class I instrument. This instrument has been designed and tested according to international safety requirements.

1-9. This manual contains information, cautions, and warnings which must be followed by the service person to ensure safe operation and to retain the instrument in safe condition.

### 1-10. DESCRIPTION

1-11. The Hewlett-Packard Models 5384A and 5385A are frequency counters that make frequency and period measurements. The 5384A has a frequency range of 10 Hz to 225 MHz, and the 5385A has a frequency range of 10 Hz to 1000 MHz. Both counters are microprocessor based instruments with a data bus

port for remote operation through either HP-IL or HP-IB.

1-12. Both counters have "A" and "B" input channels with BNC type connectors.

1-13. Above the "A" and "B" input connectors is a dual purpose control that allows you to either set the trigger level of Channel A or adjust the input attenuation of Channel B.

1-14. A 100 kHz low pass filter can be toggled in or out of the Channel A signal path on each counter.

1-15. Measurement display and mode annunciators are shown on a 12-character alphanumeric liquid crystal display (LCD). Frequency and period measurements are displayed in engineering format, with three alpha characters used to designate units, e.g., MHz. The display will also give you brief messages and diagnostic prompts.

1-16. The 5384A and 5385A are designed so you may either rack mount or stack them.

1-17. A 10 MHz reference oscillator output is included in both counters. The connector for the 10 MHz output may also be used as an external 10 MHz reference oscillator input connection.

1-18. Option 001 is a temperature compensated crystal oscillator (TCXO). The TCXO is an option in the 5384A and standard in the 5385A.

1-19. A jack for connecting external power is provided on the rear panel and Option 002 battery pack can be installed to provide mobility.

1-20. Option 004 is an ovenized oscillator that provides a high stability time base giving substantially higher accuracy over variations in time and temperature.

1-21. Option 003 is the Hewlett-Packard Interface Loop (HP-IL) for remote control of the counters by battery operated controllers such as the HP-41C hand held controller and the HP-75 portable computer.

1-22. HP-IB is the Hewlett-Packard Interface Bus for remote control of the counters by computers and controllers. It is a standard feature in the instrument.



1-23. The HP-IB, (Hewlett-Packard Interface Bus) is Hewlett-Packard's implementation of IEEE Standard 488-1978 and ANSI Standard MC 1.1. HP-IB is a high-speed parallel interface bus. All devices on the bus are capable of being addressed at one time. However, only one device may respond at a time. A controller is used to command which device responds. (The 5384A or 5385A with HP-IB would make measurements and return data upon commands from a controller.)

1-24. The counter can be configured for either HP-IB or HP-IL, not both.

1-25. HP-IB or HP-IL allow the 5384A and 5385A to output data to other devices or, on a more complex level, respond to remote programming instructions to make a specific type of measurement, trigger that measurement, then read the result and send the reading back to the controller, or to another device on the interface.

## 1-26. OPTIONS

1-27. Option 001 is a Temperature Compensated Crystal Oscillator (TCXO). The TCXO is a 10 MHz oscillator, capable of making minor frequency corrections to compensate for temperature variations.

1-28. Option 002 Battery Pack is a lead acid type battery that provides at least 3 hours of operation while the counter is disconnected from the power line. Operation time is reduced to approximately 1-hour when operated with HP-IB.

1-29. The battery pack will be recharged in 16 hours if the counter is in the standby mode and either the line cord is attached or external dc is applied through the rear panel jack. The battery will trickle charge at a rate of approximately 10 mA while the counter is being used and is connected to either an ac power line or external dc. HP-IL is substituted for HP-IB when Option 002 is ordered with the instrument.

1-30. Option 003 is HP-IL, (Hewlett-Packard Interface Loop). HP-IL is a low cost, two-wire serial interface that permits communications from one device to another. As the name implies, the 5384A or 5385A is connected in a serial loop structure. Data or information, in the form of digital messages, travels from one device to the next in the loop. If the information

is not intended for the counter, the counter merely passes the information on to the next device in the loop. If the information is intended for the counter, the counter responds as directed by the information.

1-31. Option 004 is an ovenized oscillator that gives the 5384A and 5385A increased accuracy by providing a more stable time base reference signal. The oven maintains the oscillator at a constant temperature to minimize aging rate and frequency change due to temperature change and aging.

## 1-32. INSTRUMENT IDENTIFICATION

1-33. Hewlett-Packard instruments have a 2-section, 10-character serial number (0000A00000), which is located on the rear panel. The four-digit serial prefix identifies the instrument changes. If the serial prefix of your instrument differs from that listed on the title page of this manual, there are differences between this manual and your instrument. Instruments having higher serial prefixes are covered with a "Manual Changes" sheet included with this manual. If the change sheet is missing, contact the nearest Hewlett-Packard Sales and Service Office listed at the back of this manual. Instruments having a lower serial prefix than that listed on the title page are covered in Section VII.

## 1-34. ACCESSORIES

1-35. The accessory supplied is a detachable power cord 229 cm long (7½ feet), part number 8120-1378.

## 1-36. RECOMMENDED TEST EQUIPMENT

1-37. The test equipment listed in *Table 1-2* is recommended for use during performance tests, adjustments, and troubleshooting. Substitute test equipment may be used if it meets the required characteristics listed in the table.

1-38. Side Handle:

Option 401 Side Handle Kit.

1-39. Rack Mount Kits:

Rack Mount Kit, HP Part Number 5060-0173.  
Locking Rack Mount Kit for two 5384A/5385A modules, HP Part Number 5060-0174.

Table 1-1. Models 5384A/5385A Specifications

## GENERAL

**Check:** 10 MHz Self-test  
**Gate Times:** 0.1, 1, or 10 seconds, (Nominal).  
**Display:** 12-digit alphanumeric liquid crystal.  
**Display Digits (variable):** Frequency, 3 to 11; Period, 3 to 8.  
**Timebase Output:** 10 MHz, 25 mV pk-pk (nom.) into 50 ohm load.  
**External Timebase Input:** 10 MHz, .5V rms into 500 ohms;  
15V (dc + ac pk) max.  
**Operating Temperature:** 0° to 50°C  
**Power Requirements:**  
**AC Operation:** Selectable, 18 VA max.  
115V + 10%, -25%  
230V +10%, -15% 48-66 Hz  
115V +10%, 380-420 Hz  
**DC Operation:** 9 - 15V dc 1.0 A max.  
**Weight:** Net, 2.2 kg (4.8 lbs.); Shipping, 4.1 kg (9 lbs.)  
**Dimensions:** 238 mm W × 98 mm H × 276 mm D  
(9<sup>3</sup>/<sub>8</sub> × 3<sup>8</sup> × 13<sup>8</sup> in.)

### INPUT CHARACTERISTICS (Channel A)

**Range:** 10 Hz to 100 MHz

**Sensitivity:** [MAN LEVEL] off

15 mV rms sine wave 50 Hz to 100 MHz  
25 mV rms sine wave 10 Hz to 50 Hz  
45 mV pk-pk 5 ns minimum pulse width

**Dynamic Range:** 45 mV to 4 V pk-pk X  
attenuator setting.

**Coupling:** AC

**Impedance:**

X1: 1 MΩ NOMINAL || < 25 pF  
X20: 500 KΩ NOMINAL || < 25 pF

**Attenuator:** X1 or X20 NOMINAL,  
X20 increases to X40 below 50 Hz

**Low Pass Filter:** 100 kHz NOMINAL  
3 dB point

**Trigger Level:**

(MAN LEVEL) ON: variable from -0.1V  
to +0.1V X attenuator setting about  
average signal value.

(MAN LEVEL) OFF: automatically set to  
average value of signal.

**Damage Level:**

X1: 10 - 200 Hz 350V (dc + ac peak)  
0.2 - 420 kHz 170V (dc + ac peak)  
0.42 - 10 MHz (5 × 10<sup>7</sup>V rms Hz)/FREQ  
>10 MHz 5V rms

X20:

<1 MHz, Same as X1  
>1 MHz, 50V rms

**(Channel B 5384A)**

**Range:** 50 to 225 MHz

**Sensitivity:** 10 mV rms 50 to 200 MHz  
15 mV rms 200 to 225 MHz

**Dynamic Range:** 10 mV to 1V rms

**Coupling:** AC

**Impedance:** 50 ohm NOMINAL

**Attenuator Level:**

**Manual:** variable from X1 to X5  
(0 to 14 dB) NOMINAL.

**Auto:** AGC mode for improved noise  
suppression.

**Damage Level:** 350V dc + 5V rms ac

**(Channel B 5385A)**

**Fused input! Front panel accessible**

**Range:** 90 to 1000 MHz

**Sensitivity:** 10 mV rms (-27 dBm)

**Dynamic Range:** 10 mV to 7V rms (-27 to +30 dBm)

**Coupling:** AC

**Impedance:** 50 ohm NOMINAL

**Attenuator Level:**

**Manual:** variable from X1 to X18  
(0 to 25 dB) NOMINAL.

**Auto:** AGC mode for improved noise  
suppression.

**Damage Level:**

AC >1 MHz +30 dBm (7V rms)  
AC <1 MHz 2V rms  
DC ±5V

**TIMEBASE 5384A**

**Frequency:** 10 MHz

**Aging Rate:** <3 × 10<sup>-7</sup>/mo.

**Temperature:** <5 × 10<sup>-6</sup>, 0° to 50°C.  
ref. to 25°C.

**Line Voltage:** <1 × 10<sup>-7</sup> for ±10% variation.

**TIMEBASE 5385A (TCXO)**

**Frequency:** 10 MHz

**Aging Rate:** <1 × 10<sup>-7</sup>/mo.

**Temperature:** <1 × 10<sup>-6</sup>, 0° to 40°C.  
ref. to 25°C.

**Line Voltage:** <1 × 10<sup>-8</sup> for ±10% variation.

Table 1-1. Models 5384A/5385A Specifications (Continued)

**FREQUENCY A and B**

**Range Channel A:** 10 Hz - 100 MHz

**Range Channel B:**

5384A: 50 MHz - 225 MHz

5385A: 90 MHz - 1.0 GHz

**LSD Displayed:** 10 Hz to 1 nHz

**LSD**  $\frac{4 \text{ nsec}}{\text{Gate Time}} \times \text{FREQ}$

**Resolution:**  $\pm 1 \text{ LSD}$

$\pm \frac{(1.4 \times \text{Trigger Error} + 1 \text{ ns rms})}{\text{Gate Time}} \times \text{Freq}$

**Accuracy:**  $\pm \text{Resolution} \pm \text{Time Base Error} \times \text{Frequency}$

**PERIOD A**

**Range:** 10 ns to 0.1 s

**LSD Displayed:** .001 fs to 10 ns

**LSD:**  $\frac{4 \text{ ns}}{\text{Gate Time}} \times \text{period}$

**Resolution:**  $\pm \text{LSD}$

$\pm \frac{(1.4 \times \text{Trigger Error} + 1 \text{ ns rms})}{\text{Gate Time}} \times \text{Per}$

**Accuracy:**  $\pm \text{Resolution} \pm \text{Time Base Error} \times \text{Period}$

**OPTIONS**

**Option 001 (5384A), TXCO Timebase**

**Frequency:** 10 MHz

**Aging Rate:**  $< 1 \times 10^{-7}/\text{mo.}$

**Temperature:**  $< 1 \times 10^{-6}$ , 0° to 40°C ref. to 25°C.

**Line Voltage:**  $< 5 \times 10^{-8}$  for  $\pm 10\%$  variation.

**Option 002, Battery**

**Type:** Sealed Lead-acid; not covered under instrument warranty.

**Capacity:** Typically 4 hours of operation at 25°C (1)

**Recharge Time:** Typically 16 hours to 98% of full charge in instrument STBY (Standby) mode.

**Battery Low Annunciator:** Enabled 20 minutes prior to instrument shutdown nominally.

**Battery Save Switch (rear panel):** Prevents discharge of internal battery by the oven timebase, Option 004, during instrument standby (STBY).

**Line Failure Protection:** Instrument automatically switches to battery in case of line failure.

**Weight:** Option 002 adds 1.4 kg (3 lbs.) to weight of instrument. (1) without Option 004 installed.

HP-IL replaces HP-IB when Option 002 is ordered from the factory.

**Option 003, HP-IL**

All HP-IL programmable functions, controls, and operations are the same as those for HP-IB except for interface functions Auto Address and Parallel Poll, which are also included.

R, AH, SH1, D, LI, (T1-5), C0 DC2, DT1, PP1, SR2, AA1, RL2, PD0, DD1.

**Option 004, Oven Timebase**

**Frequency:** 10 MHz

**Aging Rate:**  $< 3 \times 10^{-8}/\text{mo.}$ (2)

**Temperature:**  $\pm 1 \times 10^{-7}$ , 0° to 50°C ref. to 25°C.

**Line Voltage:**  $< 2 \times 10^{-9}$  for a  $\pm 10\%$  variation.

**Battery Operation:** The instrument operates for 3 hours (typical) with Option 004. In STBY, the oven will operate continuous from a fully charged battery for up to 24 hours (typical) with BATT SAVE mode disabled (INT). (2) After 30 days continuous operation.

**HP-IB I/O INTERFACE**

**Programmable Functions:** Frequency A, Frequency B, Period A.

**Programmable Controls:** X20 Attn A, FILTER A, MAN LEVEL A/B, Gate Time.

**Display:** Normal, Increment, Decrement, Remote, Local.

**Misc. Functions & Operating Commands:**

Diagnostics, 10 MHz check, reset, initialize, Wait To Send ON/OFF, Device ID.

**Interface Functions:** Device Clear, Group Execute

Trigger Interface Clear, Local, Local Lockout, Send Status, Remote Service Request.

SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0, E1.

**Data Output:**

Output will be maximum resolution for the gate time selected and is not affected by the front panel Display Digits keys.

**Format:** 17 characters plus CR and LF (blanks may be inserted).

**Rate:** 4 readings/sec maximum at .1 s gate.

**Talk Only:** Set with address switch=31.

**DEFINITIONS**

**Measurement Gate Time:** selected value  $\pm 15\%$  + up to 1 period of input.

**Dynamic Range:** Minimum to maximum input voltage swing allowed for correct frequency counting.

**LSD Displayed:** dependent on gate time, input signal, and DISPLAY DIGITS control. In NORM mode, 8 digits are displayed. Using the display control, up to 11 digits may be present for frequency measurements, 8 digits maximum for period.

**LSD:** unit value of least significant digit rounded to the nearest decade, i.e., 4 Hz  $\rightarrow$  1 Hz, 6 Hz  $\rightarrow$  10 Hz.

**Trigger Error:**

**Channel A:**  $\frac{\sqrt{(ei)^2 + (en)^2}}{\text{Input slew rate at trigger point}}$  s rms,

where ei and en are input noise voltages (rms) for the counter and signal, respectively, for a 100 MHz bandwidth.

ei  $\leq 100 \mu\text{V}$  rms, typical

**Channel B:** negligible due to high signal slew rate at the trigger point.

**Best Case Resolution for 1 second gate ( $\pm$  Hz)**

Amplitude mV rms	Frequency (Hz)									
	10	100	1K	10K	100K	1M	10M	100M	200M	1.0G
50	.0003	.0003	.0003	.0003	.0008	.004	.04	0.4	0.8	4.0
100	.0002	.0002	.0002	.0003	.0007	.004	.04	0.4	0.8	4.0
500	.0002	.0002	.0002	.0003	.0006	.004	.04	0.4	0.8	4.0
1000	.0001	.0001	.0001	.0001	.0005	.004	.04	0.4	0.8	4.0

This chart shows best case frequency resolution vs sine wave input voltage (rms). Noise from the signal source is assumed to be zero and trigger error produced only by the counter's noise (i.e., 100  $\mu\text{V}$  rms).

Table 1-2. Recommended Test Equipment

Instrument	Critical specifications	Recommended Model	Use
50 Ohm Feedthrough	BNC Type	HP 10100C	P,A,T
Tee Connector	BNC Type	HP 1250-0781	P,A,T
Cables	BNC 50 ohm	HP 11170C	
Oscilloscope	100 MHz Bandwidth	HP 1740A	A,T
Synthesized Generator	90-1000 MHz	HP 8660C/86602A	P,T
Signal Generator	10-225 MHz	HP 8654A	P,A,T,
Synthesized Function Generator	10 Hz to 20 MHz	HP 3325A	A,T,P
DC Voltmeter	20V Range, 0.05V resolution	HP 3465	A,T
Power Splitter	90 MHz-1 GHz Cal. output	HP 11667A	A,T
Power Meter/Sensor	90 MHz-1 GHz, -9 to -24 dBm	HP 436A/8481A	P
10 dB Attenuator		HP 8491A	P
Adapter, Coaxial (2 required)	Type N(male)-to-BNC(female)	1250-07680	P
Adapter, Coaxial	Type N(male)-to-BNC(male)	1250-0082	P
Controller	HP-IB Compatible	HP-85A*	
Controller	HP-IL Compatible	HP-41CV	P
Interface	HP-IL Compatible	HP 82938A	

\*HP-85A consists of the following:

Controller ..... HP-85A  
 I/O ROM ..... 00085-15003  
 ROM Drawer ..... HP 82936A  
 HP-IB Interface Card/Cable ..... HP 82937A

## SECTION II INSTALLATION

### 2-1. INTRODUCTION

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

### 2-3. UNPACKING AND INSPECTION

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

### 2-5. PREPARATION FOR USE

#### WARNING

**IN BATTERY OPERATION, NO INHERENT GROUNDING IS PROVIDED. CONNECT A SEPARATE GROUNDING WIRE TO AVOID POSSIBLE SHOCK HAZARD WHEN MAKING MEASUREMENTS WITH THE COUNTER OPERATING ON THE BATTERY PACK.**

#### CAUTION

**Before connecting the instrument to ac power lines, be sure that the voltage selector is properly positioned as described below.**

### 2-6. POWER REQUIREMENTS

2-7. The counter has the following ac power requirements:

- 115V, +10%, -25%, 48-66 Hz single phase
- 230V, +10%, -15%, 48-66 Hz single phase
- 115V, +10%, -10%, 380-420 Hz single phase

### 2-8. LINE VOLTAGE SELECTION

2-9. The power line voltage is selected by the position of the LINE SELECT switch on the rear panel. Sliding the switch to the left selects 115V operation, sliding the switch to the right selects 230V operation. The voltages available are printed on the switch. The

specific voltage selected will be visible on the LINE SELECT switch, as shown in *Figure 2-1*. Before applying power, verify that the LINE SELECT switch is properly set for the desired ac supply voltage and that the correct fuse is installed.

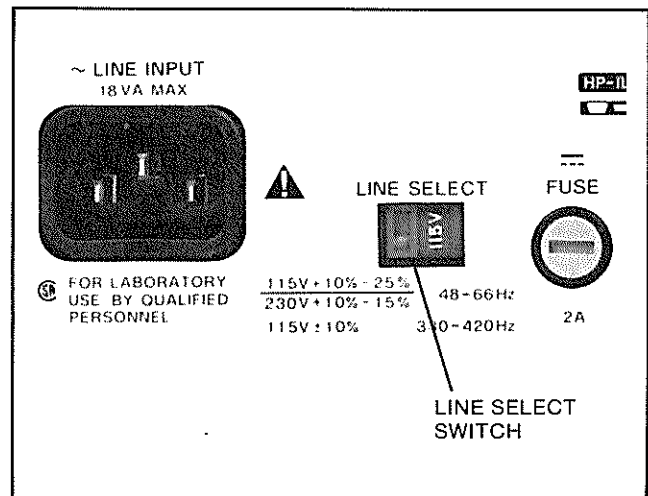


Figure 2-1. Line Voltage Selection

### 2-10. AC Line Fuse Selection

2-11. The main ac line fuse is not accessible from the outside of the cabinet. The cabinet should be opened only by qualified service personnel. The correct fuse value is 250 mA/250V Slow Blow for 115V or 230V operation.

### 2-12. DC Line Fuse Selection

2-13. To replace the dc fuse use a small flat-bladed screwdriver to remove the fuse from the fuseholder. Press in slightly and turn counterclockwise, until the fuse carrier springs free. Replace the fuse in the fuse carrier and reinstall by inserting and turning clockwise. Be sure to install the correct fuse value; 2 A/250V fast blow.

2-14. The dc line fuse is the main protective device for the instrument. The dc line fuse will blow whether the dc current source is the optional battery pack, power from the external dc power jack, or the built-in power supply.

### 2-15. Power Cable

2-16. The counter is shipped with a three-wire power cable. When the cable is connected to an

appropriate ac power source, this cable connects the instrument chassis to earth ground. The type of power cable plug shipped with each instrument depends on the country of destination. Refer to *Figure 2-2* for the part numbers of the power cable and plug configurations available.

**WARNING**

**BEFORE SWITCHING ON THIS INSTRUMENT THE PROTECTIVE EARTH TERMINAL OF THIS INSTRUMENT MUST BE CONNECTED TO THE PROTECTIVE CONDUCTOR OF THE (MAINS) POWER CORD. THE MAINS PLUG SHALL ONLY BE INSERTED IN A SOCKET OUTLET PROVIDED WITH A PROTECTIVE EARTH CONTACT. THE PROTECTIVE ACTION MUST NOT BE NEGATED BY THE USE OF AN EXTENSION CORD (POWER CABLE) WITHOUT A PROTECTIVE EARTH (GROUNDING) CONDUCTOR.**

**2-17. HP-IB Interconnections**

2-18. HEWLETT-PACKARD INTERFACE BUS. The counter with HP-IB is compatible with the Hewlett-Packard Interface Bus. Interconnection data concerning the rear panel HP-IB connector is provided in *Figure 2-3*. This connector is compatible with the HP 10833A/B/C/D cables. (See *Table 2-1* for cable descriptions). The HP-IB system allows interconnection of up to 15 (including the controller) HP-IB compatible instruments.

Table 2-1. HP-IB Cable Descriptions

HP Model	Cable Length
10833A	1 metre (3.3 feet)
10833B	2 metres (6.6 feet)
10833C	4 metres (13.2 feet)
10833D	0.5 metres (1.6 feet)

2-19. The HP-IB cables have identical "piggy-back" connectors on both ends so that several cables can be connected to a single source without special adapters or switch boxes. System components and devices may be connected in virtually any configuration desired. There must, of course, be a path from the calculator (or other controller) to every device operating on the bus. As a practical matter, avoid stacking more than three or four cables on any one connector. If the stack gets too large, the force on the stack produces great leverage which can damage the connector mounting.

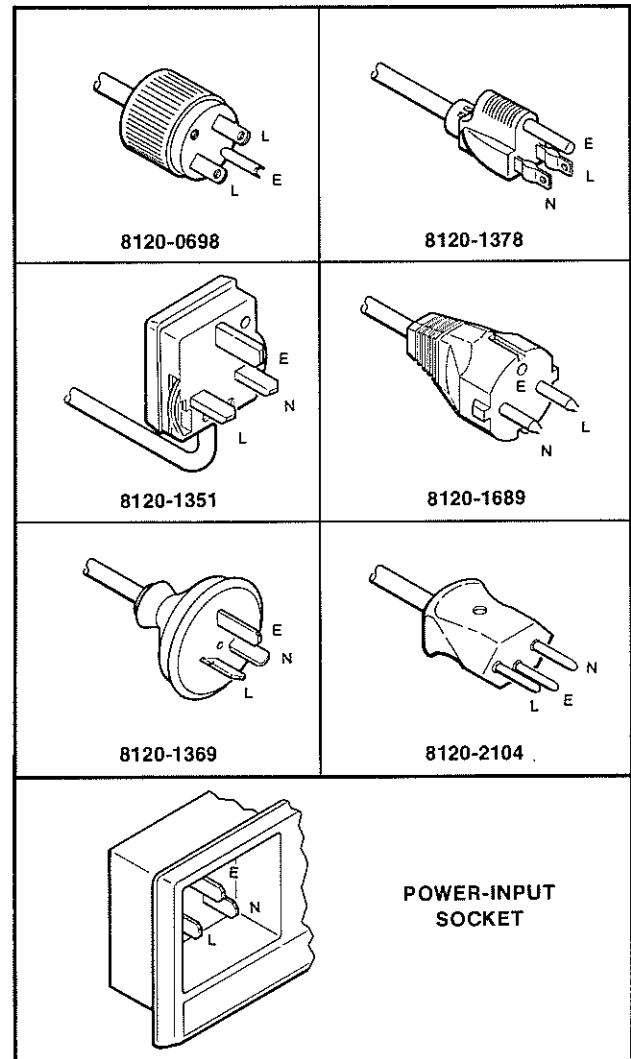


Figure 2-2. Power Cable HP Part Number versus Mains Plugs Available

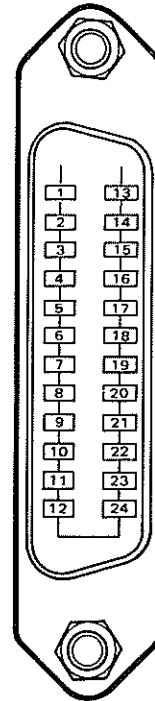
Be sure each connector is firmly (finger tight) screwed in place to keep it from working loose during use.

2-20. CABLE LENGTH RESTRICTIONS. To achieve design performance with the HP-IB, the proper voltage levels and timing relationships must be maintained. If the system cable is too long, the lines cannot be driven properly, and the system will fail to perform properly. Therefore, when interconnecting an HP-IB system, it is important to observe the following rules.

- a. The total cable length for the system must be less than or equal to 20 metres (65 feet).
- b. The total cable length for the system must be less than or equal to 2 metres (6.6 feet) times the total number of devices connected to the bus.
- c. The total number of instruments connected to the bus must not exceed 15.

PIN	LINE
1	DIO1
2	DIO2
3	DIO3
4	DIO4
13	DIO5
14	DIO6
15	DIO7
16	DIO8
5	EO1
17	REN
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	SHIELD-CHASSIS GROUND
18	P/O TWISTED PAIR WITH PIN 6
19	P/O TWISTED PAIR WITH PIN 7
20	P/O TWISTED PAIR WITH PIN 8
21	P/O TWISTED PAIR WITH PIN 9
22	P/O TWISTED PAIR WITH PIN 10
23	P/O TWISTED PAIR WITH PIN 11
24	ISOLATED DIGITAL GROUND

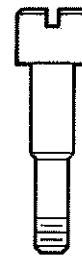
THESE PINS  
ARE  
INTERNALLY  
GROUNDED



**CAUTION**

The 5384A/5385A contains metric threaded HP-IB cable mounting studs as opposed to English threads. Metric threaded HP 10833A, B, C, or D HP-IB cable lockscrews must be used to secure the cable to the instrument. Identification of the two types of mounting studs and lockscrews is made by their color. English threaded fasteners are colored silver and metric threaded fasteners are colored black. DO NOT mate silver and black fasteners to each other or the threads of either or both will be destroyed. Metric threaded HP-IB cable lockscrew illustration and part number follows.

LOCKSCREW  
1390-0360



**Logic Levels**

The Hewlett-Packard Interface Bus logic levels are TTL compatible, i.e., the true (1) state is 0.0V dc to 0.4V dc and the false (0) state is +2.5V dc to +5.0V dc.

**Programming and Output Data Format**

Refer to Section III, Operation

**Mating Connector**

HP 1251-0293; Amphenol 57-30240.

**Mating Cables Available**

HP 10833A, 1 metre (3.3 ft.), HP 10833B, 2 metres (6.6 ft.),  
HP 10833C, 4 metres (13.2 ft.), HP 10833D, 1/2 metre (1.6 ft.).

**Cabling Restrictions**

1. A Hewlett-Packard Interface Bus System may contain no more than 2 metres (6.6 ft.) of connecting cable per instrument.
2. The maximum accumulative length of connecting cable for any Hewlett-Packard Interface Bus System is 20.0 metres (65.6 ft.).
3. The maximum number of instruments in one system is fifteen.

Figure 2-3. Hewlett-Packard Interface Bus Connections



### 2-21. HP-IB Talk/Listen Address Switch

2-22. The 5384A and 5385A provide a rear panel HP-IB instrument address selection switch. This switch determines the mode of remote operation as "Talk Only" or "addressable", and selects the HP-IB address. Instructions for changing the address are provided in Section III of this manual.

### 2-23. HP-IB Description

2-24. A description of the HP-IB is provided in Section III of this manual. A study of this information is necessary if the user is not familiar with the HP-IB concept. Additional information concerning the design criteria and operation of the bus is available in IEEE Standard 488-1978, titled "IEEE Standard Digital Interface for Programmable Instrumentation".



The above symbol when located in the upper corner of a page indicates HP-IB information is contained on that page. This information may be operation, performance, adjustments, or service related.

### 2-25. HP-IL Interconnections (Option 003)

2-26. The 5384A and 5385A with Option 003 are compatible with the Hewlett-Packard Interface Loop. The interface loop connection is made by a pair of two-wire balanced line cables. The cable is limited to 10 metres (32.8 feet) for unshielded cables (from one device to the next) and to 100 metres (328 feet) for shielded cables. A typical interface connection is shown in Figure 2-4.

### 2-27. HP-IL Description

2-28. An introductory description on HP-IL is provided in Section III of this manual. As HP-IL is a relatively new concept, it is recommended that users unfamiliar with the Interface Loop concept review this material prior to operating the instrument remotely.



The above symbol when located in the upper corner of a page indicates HP-IL information is contained on that page. This information may be operation, performance, adjustment, or service related.

### 2-29. Operating Environment

2-30. TEMPERATURE. The counter may be operated in temperatures from 0°C to +50°C.

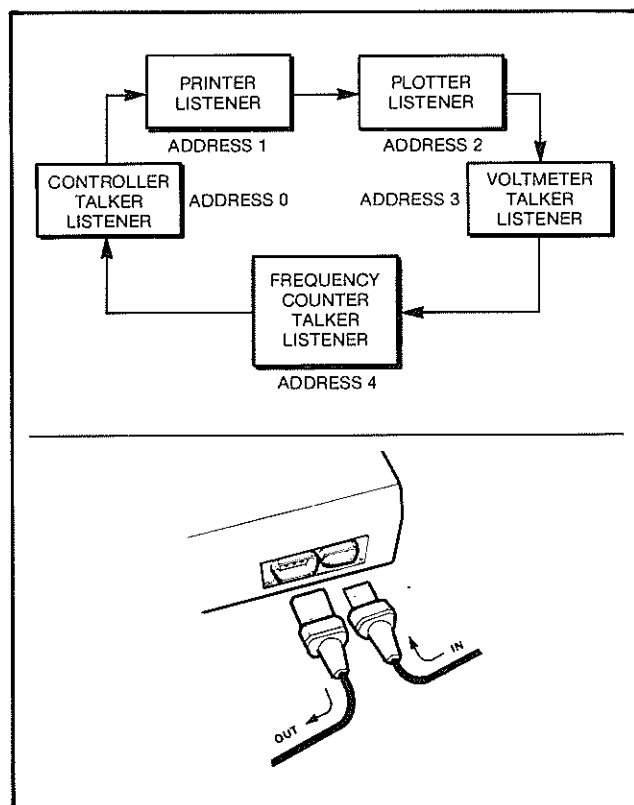


Figure 2-4. Typical HP-IL Interface Connection

2-31. HUMIDITY. The counter may typically be operated in environments with humidity up to 95% at 40°C. However, it should be protected from extreme temperatures which may cause condensation in the instrument.

2-32. ALTITUDE. The counter may be typically operated at altitudes up to 4,600 metres (15,000 feet).

### 2-33. STORAGE AND SHIPMENT

#### 2-34. Environment

2-35. The instrument may be stored or shipped in environments within the following limits:

- TEMPERATURE ..... -40°C to +75°C
- HUMIDITY ... Up to 95% noncondensing
- ALTITUDE ..... 15,240 Metres (50,000 feet)

2-36. The instrument should also be protected from temperature and humidity extremes which cause condensation within the instrument.

#### 2-37. Packaging

2-38. ORIGINAL PACKAGING. Containers and materials identical to those used in the 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. Also, mark the container FRAGILE to ensure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

**2-39. OTHER PACKAGING.** The following general instructions should be used for repacking with commercially available materials.

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

b. Use a strong shipping container. A double-wall carton made of 350-pound test material is adequate.

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

d. Seal the shipping container securely.

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

f. In any correspondence, refer to the instrument by model number and full serial number.

#### **2-40. WHERE TO SHIP YOUR UNIT FOR REPAIR**

**2-41.** Return your unit to the nearest designated Hewlett-Packard Sales and Service Office. Check the back of this manual for the address.

## SECTION III OPERATION AND PROGRAMMING

### 3-1. INTRODUCTION

3-2. This section gives complete operation and programming information for the HP 5384A and 5385A Frequency Counters. Descriptions of all front panel controls, connectors, and indicators, as well as an operator's check, operating instructions, programming instructions and codes, and operator's maintenance, are provided. Unless otherwise specified, all information pertains to both counters.

### 3-3. OPERATING CHARACTERISTICS

3-4. The HP 5384A and 5385A can be configured for system or benchtop use. They make frequency and period measurements. Inputs enter through two channels. Raw data from the input measurements are used by the counter's microprocessor to compute and format the result either for display or transmission over the interface. The operating range, resolution and accuracy for each individual functional mode is given in the Specifications, *Table 1-1*.

3-5. Descriptions of and operating instructions for Options 001, 002, 004, 003 are provided in this section.

### 3-6. OPERATING INSTRUCTIONS

3-7. Information and instructions for operating the HP 5384A and 5385A in both local and remote modes are provided in this section. The following paragraphs summarize the organization and content of the operating information.

3-8. LOCAL OPERATION. The operating information for local (or manual) operation of the counter consists of the following topics:

General Operation Information. The General Operation Information (starting with paragraph 3-13) describes the basic operation of the instrument display, the inputs, and the front panel keyboard.

Front and Rear Panel Features. The front and rear panel features consists of *Figures 3-7 through 3-9* which locate and describe all the operator controls and indicators.

Making Frequency and Period Measurements. Making Frequency and Period Measurements begins with paragraph 3-94, and describes the recommended procedure for making a measurement.

3-9. REMOTE OPERATION. The remote programming operating instructions begin with paragraph 3-103. A good working knowledge of the local operation of the counter is essential for remote programming, as most of the data messages perform the same key-stroke-like sequences. The Remote Operation/Programming instructions describe the following:

- Interface Description
- Interface Functional Overview
- Interface System Overview
- Address Selection
- Interface Function
- Interface Commands
- Input Format
- Output Format
- Measurement Triggering in Remote
- SRQ, SRQ Mask, and Status Byte
- Device Dependent Commands
- Device Command Definitions
- Power-up and Default States
- Programming Examples

### 3-10. OPERATOR'S MAINTENANCE

3-11. The only maintenance the operator should normally perform is the replacement of the dc line fuse. Refer to Section II, Line Voltage Selection, for instructions on changing the fuse.

3-12. The standard oscillator adjustment is also accessible from the rear panel. The oscillator is factory set at 10 MHz. Once adjusted, the oscillator should need little future attention except for periodic calibration using a precision frequency source. To adjust the standard oscillator, refer to Section V, Standard Oscillator Adjustment.

### 3-13. GENERAL OPERATION INFORMATION

#### 3-14. Introduction

3-15. The following paragraphs describe the general operating features of the HP 5384A and 5385A Frequency Counters.

#### 3-16. Display

3-17. All display functions are performed by a Liquid Crystal Display assembly. The assembly contains 12 alphanumeric characters; the display format for all

measurements is in engineering notation. The leftmost character is CHARACTER 1 and the rightmost is CHARACTER 12. The scale or units designation will always be shown in character positions 10, 11, and 12. If positions 10 and 11 are required to display a high resolution measurement, only character position 12 will be used to designate the scale or units.

3-18. Annunciation for all operating modes is also indicated by the display. When a mode is selected, an arrow appears at the bottom of the display just above the name of the mode label on the front panel.

**3-19. Keyboard**

3-20. The keyboard, located on the front panel, is a 14-position pushbutton assembly which is connected to a port on the microprocessor. The keyboard is divided into several groups, according to the purpose of the keys. From the left after the power switch, we have A, B, A&B, GATE, and DISPLAY DIGITS keys.

3-21. A blue RESET/LOCAL key and the CHECK key complete the keyboard assembly of the counter.

**3-22. INPUTS**

3-23. Immediately to the right of the keyboard is the INPUTS section. There are two BNC inputs (Channels A and B) and a control for either adjusting the trigger level of Channel A or attenuating the input signal to Channel B.

**3-24. Power-Up/Self-Check**



**BEFORE THE INSTRUMENT IS SWITCHED ON, ALL PROTECTIVE EARTH TERMINALS, EXTENSION CORDS, AUTOTRANSFORMERS AND DEVICES CONNECTED TO IT SHOULD BE CONNECTED TO A PROTECTIVE EARTH GROUNDED SOCKET. ANY INTERRUPTION OF THE PROTECTIVE EARTH GROUND WILL CAUSE A POTENTIAL SHOCK HAZARD THAT COULD RESULT IN PERSONAL INJURY.**



**Before energizing the counter, the instrument must be set to the voltage of the power source or damage to the instrument may result. See Section II.**

3-25. When you power-up the counter, an internal check is automatically made of several major components in its circuitry. During this cycle, all 12 Liquid Crystal Display (LCD) digits will be momentarily activated in a starburst pattern. Also activated are the colons and annunciators. If your instrument has an optional interface, (HP-IB or HP-IL) the address of the interface will briefly be displayed.

3-26. After the power-up sequence, the counter initializes itself. That is, Frequency A mode is selected for display and the preset trigger level mode is selected. The ATTN and LPF modes are disabled, and the gate time is set to 0.1 s. If no input signal is present after the Power-Up cycle, 00000000 will appear on the display. The power-up initialize state is listed in Table 3-1.

Table 3-1. Power-Up Initialize States

FUNCTION	STATE
REMOTE/LOCAL	LOCAL
GATE TIME	0.1 s
MANUAL LEVEL	OFF
WAIT-TO-SEND	OFF
DISPLAY DIGITS	NORMAL
FUNCTION	FREQ A
X20 ATTN	X1
FILTER	OFF
REMOTE DISPLAY	OFF

3-27. Any failure during the power-up cycle will cause an error message to be displayed momentarily. After the error is displayed, the counter will attempt to operate normally.

**3-28. Error Messages**

3-29. The counter will display error messages whenever the instrument enters an error state. Errors can occur either during self-test or after an improper operation has been attempted through the interface.

3-30. If an error occurs during power-up self-test, error messages will appear on the display. The message will be displayed for approximately one second to give the operator sufficient time to read the message. One second after the error is displayed, the counter will attempt to operate normally.

3-31. If an error occurs during the power-up self-test, the ERROR annunciator will be turned on. This annunciator will stay on as long as the instrument does not enter the diagnostic mode to warn the operator of potentially inaccurate results.

3-32. Several types of errors can occur when an improper operation is attempted through the inter-

face. Whenever an error message is generated because of an illegal operation, the error message will be displayed until the RESET/LOCAL key is pressed or a DCL (device clear) command is sent to the counter by the controller. Illegal commands can either be commands not recognizable to the counter or commands which are recognizable, but are invalid if the counter is in the diagnostic or talk only modes.

3-33. Instrument error messages are listed in Table 3-2.

Table 3-2. Error Messages

Error	Messages
10	Self-test error
50	Unrecognizable mnemonic in command
51	Illegal numeric character in command
52	First character of command is illegal
53	Illegal character in the "DR" (remote display) command
55	Invalid HP 5384/85 command
56	Invalid diagnostic command
60	ROM failure in I/O processor
61	RAM failure in I/O processor
70	Controller connected to talk-only instrument

### 3-34. FRONT PANEL FEATURES

3-35. The front panel controls, indicators, and connectors are shown in Figures 3-7 through 3-9.

3-36. The following paragraphs describe the general purpose and use of the operator keys and controls. They are discussed by functional grouping, as follows:

- a. ON/STBY
- b. A CHANNEL
- c. B CHANNEL and A&B
- d. GATE and DISPLAY DIGITS
- e. RESET/LOCAL and CHECK
- f. INPUTS

#### 3-37. ON/STBY

3-38. The ON/STBY switch connects or disconnects the output from the +5-volt supply to the rest of the instrument. It does not control the ac power line at the primary of the power transformer. If Option 004, the ovenized oscillator, is installed, +5 volts is supplied to the oscillator whether the power switch is in

the STBY (standby) mode or in the ON mode (with the ac power cord or external dc connected). Figure 3-1 shows the ON/STBY switch.

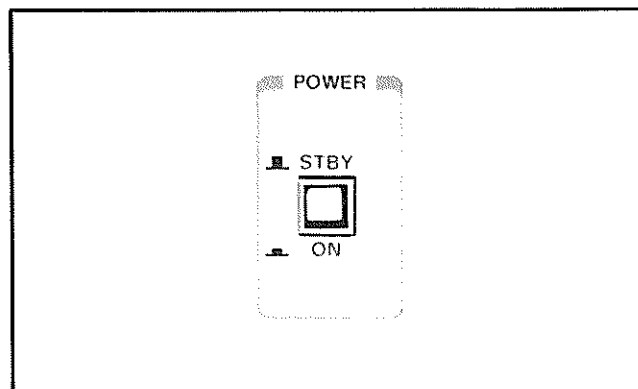


Figure 3-1. Front Panel ON/STBY Switch

#### 3-39. A CHANNEL

3-40. Function selection for the HP 5384A and 5385A is accomplished through a simple one key per function keyboard. You may select from four function modes (labeled in black) accessible from the four keys grouped under A. The arrows appearing in the bottom of the display identifies which functions are active. The four functions in the A channel group are: FREQ, X20 ATTN, PER, FILTER.

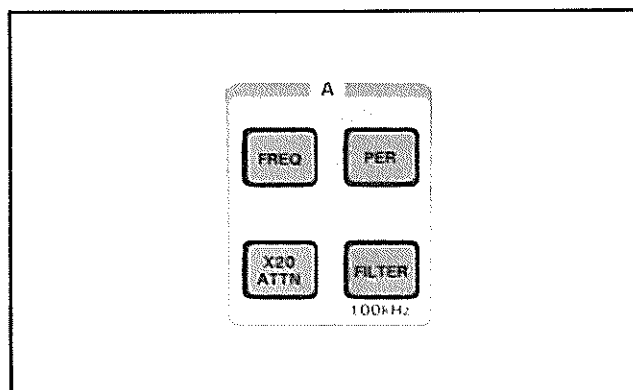


Figure 3-2. Front Panel A Channel Function Keys

3-41. FREQ key selects the frequency mode of operation for the A channel input. The frequency range of channel A in both counters is 10 Hz to 100 MHz. When channel A is selected, a black arrow appears in the bottom of the LCD over the "A" label located directly below the display window and the frequency at input A is measured and displayed.

3-42. If the counter has just been powered-up, Channel A is automatically selected (initialize mode) with a gate time of 0.1 s. If the counter has been

be displayed until the RESET/LOCAL key is pressed or a DCL (device clear) command is sent to the counter by the controller. Illegal commands can either be commands not recognizable to the counter or commands which are recognizable, but are invalid if the counter is in the diagnostic or talk only modes.

3-33. Instrument error messages are listed in Table 3-2.

Table 3-2. Error Messages

Error	Messages
10	Self-test error
50	Unrecognizable mnemonic in command
51	Illegal numeric in command
52	First character of command is illegal
53	Illegal character in the "DR" (remote display) command
55	Invalid HP 5384A/85A command or HP-IL protocol or frame error
56	Invalid diagnostic command
60	ROM failure in I/O processor
61	RAM failure in I/O processor
70	Controller connected to talk-only instrument

3-34. If the fuse in the Channel B input opens, the message "INPUT ERROR" will appear on the display.

INPUT ERROR

### 3-35. FRONT PANEL FEATURES

3-36. The front panel controls, indicators, and connectors are shown in Figures 3-7 through 3-9.

3-37. The following paragraphs describe the general purpose and use of the operator keys and controls. They are discussed by functional grouping, as follows:

- a. ON/STBY
- b. A CHANNEL
- c. B CHANNEL and A&B
- d. GATE and DISPLAY DIGITS
- e. RESET/LOCAL and CHECK
- f. INPUTS

### 3-38. ON/STBY

3-39. The ON/STBY switch connects or disconnects the output from the +5-volt supply to the rest of the instrument. It does not control the ac power line at the primary of the power transformer. If Option 004, the ovenized oscillator is installed, +5 volts is supplied

to the oscillator whether the power switch is in the STBY (standby) mode or in the ON mode (with the ac power cord or external dc connected). Figure 3-1 shows the ON/STBY switch.

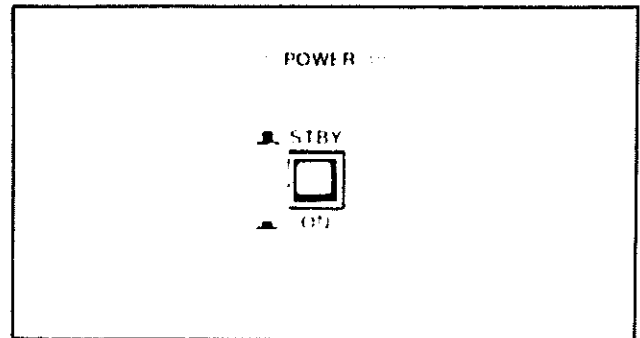


Figure 3-1. Front Panel ON/STBY Switch

### 3-40. A CHANNEL

3-41. Function selection for the HP 5384A and HP 5385A is accomplished through a simple one key per function keyboard. You may select from four function modes (labeled in black) accessible from the four keys grouped under A. The arrows appearing in the bottom of the display identifies which functions are active. The four functions in the A channel group are: FREQ, X20 ATTN, PER, FILTER. Refer to Figure 3-2, Front Panel A Channel Function Keys.

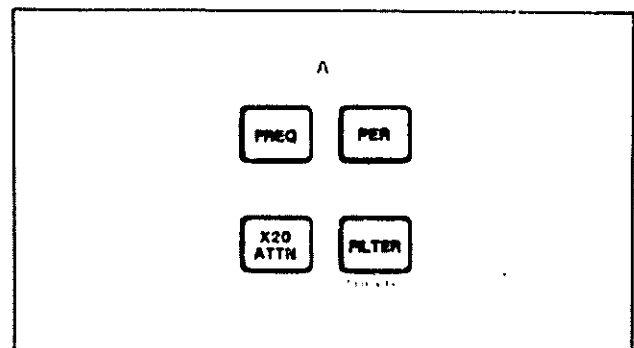


Figure 3-2. Front Panel A Channel Function Keys

3-42. FREQ key selects the frequency mode of operation for the A channel input. The frequency range of Channel A in both counters is 10 Hz to 100 MHz. When Channel A is selected, a black arrow appears in the bottom of the LCD over the "A" label located directly below the display window and the frequency at input A is measured and displayed.

3-43. If the counter has just been powered-up, Channel A is automatically selected (initialize mode) with a gate time of 0.1 s. If the counter has been

operated since being powered-up, the frequency measurement is made using the last gate time selected.

3-43. PER key selects the period mode of operation for the channel A input. When the PER key is pressed, the period of the frequency at input A is measured. The measurement is automatically made using the last gate time selected. The gate time is displayed in the right side of the LCD. As in frequency A, the resolution of the measurement is affected by the gate time.

3-44. X20 ATTN key provides attenuation of the input signal on channel A by a factor of approximately 20. Each press of the X20 ATTN key toggles between enabling and disabling an attenuation circuit. When a black arrow appears in the LCD above the "ATTN" label, the signal is attenuated. When no arrow appears, the signal is not attenuated.

3-45. The X20 ATTN sets the sensitivity of the channel A input to either 10 mV rms or 200 mV rms range if the MANUAL TRIG LEVEL control (discussed later) is in midrange position or disabled. The X20 ATTN operates independently of the front panel key MAN LEVEL. When the MAN LEVEL key is enabled, the X20 ATTN function will cause the range of the MANUAL TRIGGER LEVEL control to increase approximately 20 times.

3-46. The FILTER key provides a 100 kHz Low Pass Filter that can be toggled into or out of the channel A signal path. The Low Pass Filter will attenuate frequencies above 100 kHz. When the FILTER is in the signal path, a black arrow will appear in the LCD above the label "FILTER".

3-47. The FILTER will improve the accuracy and resolution of frequency measurements below 100 kHz by blocking high frequency signals and noise that may be riding on the low frequency being measured.

### 3-48. B Channel and A&B

3-49. Figure 3-3 shows the front panel B and A&B function keys. The FREQ key selects the frequency mode of operation for the B channel input for display on the LCD. Channel B frequency range for the 5384A is 50 MHz to 225 MHz. Channel B frequency range for the 5385A is 90 MHz to 1000 MHz.

3-50. When channel B is selected, a black arrow appears in the bottom of the LCD over the "B" label located directly below the display window.

3-51. MAN LEVEL key enables or disables the front panel MANUAL TRIG LEVEL/MANUAL ATTN LEVEL control in the INPUTS section.

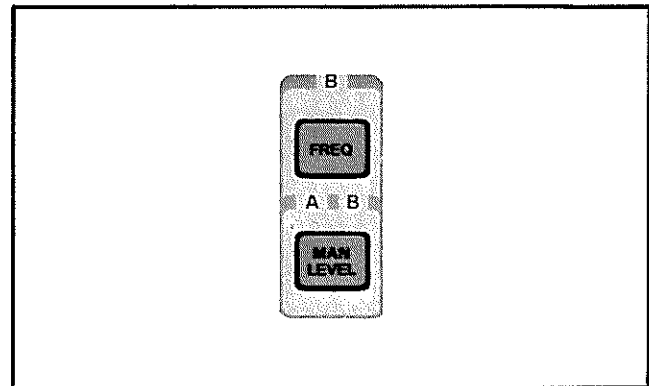


Figure 3-3. Front Panel B and A&B Function Keys

3-52. When the MAN LEVEL control is enabled (on), an arrow will appear in the LCD above the MAN LVL label immediately below the LCD. The trigger level of channel A becomes manually variable and the attenuation range becomes manually adjustable in Channel B.

3-53. When the MAN LEVEL control is disabled (off), the MANUAL TRIG/MANUAL ATTN LEVEL control has no effect on input sensitivity of either channel. Channel A sensitivity is maximum (<10 mV rms) and Channel B sensitivity is controlled by an automatic gain circuit for improved noise rejection.

### 3-54. GATE and DISPLAY DIGITS

3-55. The GATE keys are shown in Figure 3-4. The GATE keys select the approximate gate time in decade ranges. The actual gate time is determined by the microprocessor.

3-56. The 0.1 s key selects a 0.1-second gate time range for frequency, period and check measurements.

3-57. The 1.0 s key selects a 1.0-second gate time range.

3-58. The 10 s key selects a 10-second gate time range.

3-59. The greater the gate time the greater the accuracy and the number of digits of resolution you may obtain.

- 0.1 s 3 to 8 digits
- 1.0 s 3 to 9 digits
- 10 s 3 to 10 digits

If the most significant digits of resolution are between 1.0 and 1.299... one extra digit is displayed, giving a maximum of 11 digits.

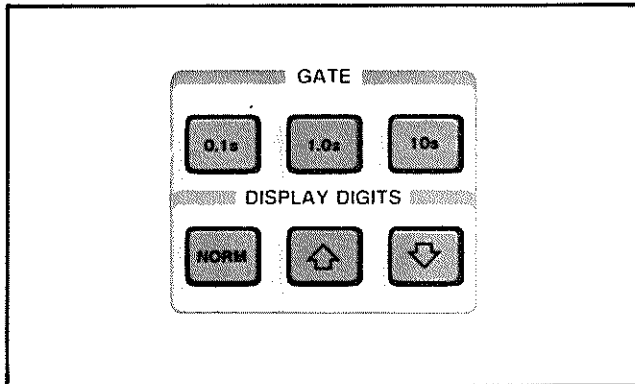


Figure 3-4. Front Panel GATE Select DISPLAY DIGITS Keys

3-60. The DISPLAY DIGITS keys are shown in Figure 3-4. They select the number of digits displayed on the LCD. However, these keys do not affect the resolution of the measurement sent over the interface bus. Measurements are always sent with maximum resolution over the interface.

3-61. NORM key selects the normal display resolution of eight digits and a three letter units annunciation.

3-62. The measurement display will begin on the left of the LCD (character position 1) and occupy the eight leftmost character positions. The three rightmost digits (character positions 10, 11, and 12) are used for units annunciation. Character position nine is left blank.

Example: 10.000000 MHz.

3-63. ↑ key will cause the number of digits displayed to increase to eight maximum for period measurements and 11 for frequency measurements. One press of the key causes one increment of digits displayed. When more than eight digits are displayed, the scale annunciation is reduced to only one character.

Example: 101.23456789M

3-64. This key will not affect the data sent over the interface. The counter will not display digits beyond its theoretical resolution. That is, if you ask for 11 digit resolution, you may get 7, 8, 9, 10, or 11 digits.

3-65. ↓ key will cause the number of digits displayed to decrease to a minimum of three digits. One press of the key decreases the number of digits displayed by one digit.

3-66. Changes do not show on the display until completion of the next gate cycle, which could be up

to 10 seconds. A new gate cycle is initiated when any key on the front panel is pressed. So, pressing any key on the front panel will cause a delay of up to 10 seconds before you will see the expected change in the display.

### 3-67. RESET/LOCAL and CHECK

3-68. The RESET/LOCAL and CHECK keys are shown in Figure 3-5.

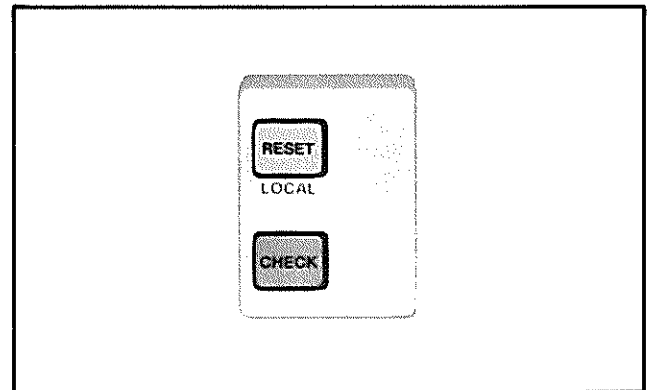


Figure 3-5. Front Panel RESET/LOCAL and CHECK Keys

3-69. When the counter is in the remote state and the local lockout (LLO) is not enabled, pressing the blue RESET/LOCAL key will return the counter to local keyboard control. The REM (remote) indicator arrow at the bottom left of the display will disappear. All functions and controls previously selected remain and a new measurement is initiated with the display reset to "00000000". If LLO is active, the RESET/LOCAL key as well as all other front panel keys are disabled.

3-70. If diagnostics are being executed while the counter is in either the local or remote state and the RESET/LOCAL key is pressed, the counter exits the diagnostic mode and defaults to the initialize mode of local operation.

3-71. If the counter is in local and not executing diagnostics, pressing the RESET/LOCAL key resets the display and initiates a new measurement.

3-72. The CHECK key is used to initiate tests that verify proper operation of the oscillator, shift register, microprocessor, display operation, and other hardware.

### 3-73. INPUTS

3-74. The INPUTS section consists of two input BNC type connectors and a MANUAL TRIGGER LEVEL/MANUAL ATTN LEVEL single-turn potentiometer that

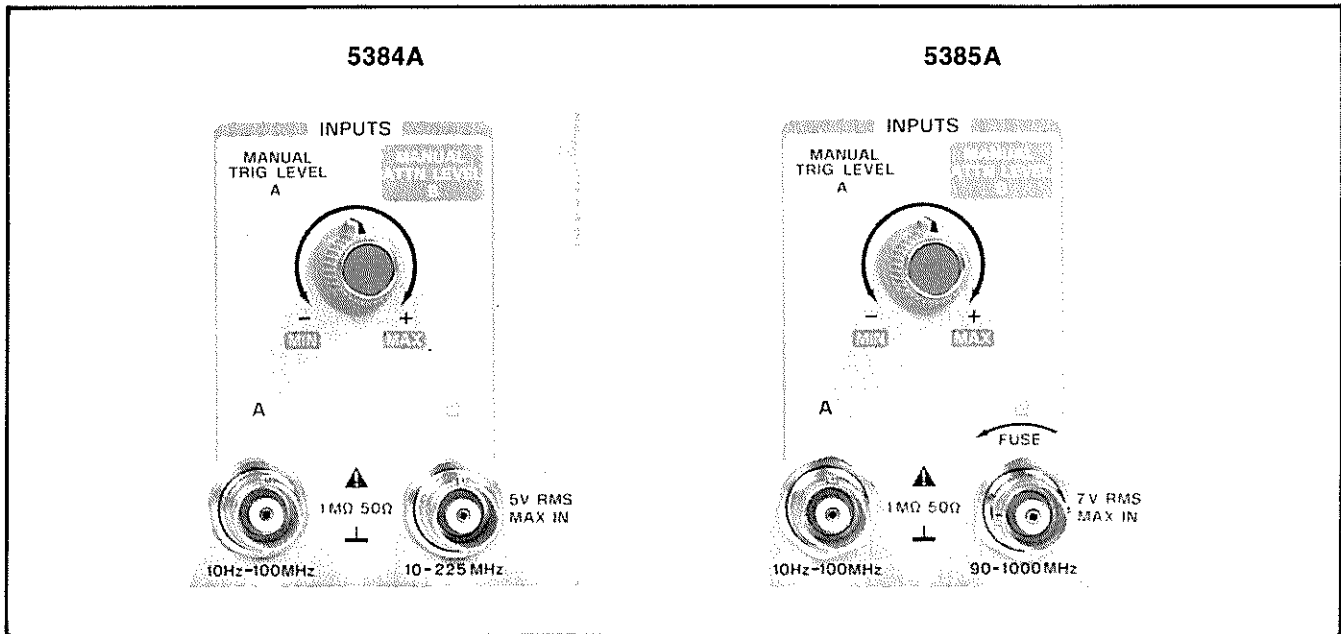


Figure 3-6. Front Panel INPUTS Section

controls the trigger level for channel A and manual attenuation for channel B. Figure 3-6 shows the INPUTS section.

3-75. Signals to be measured are connected to either channel A or channel B BNC connectors.

3-76. MANUAL TRIGGER LEVEL/MANUAL ATTN LEVEL is enabled or disabled by the MAN LEVEL key. When disabled, the MANUAL TRIGGER LEVEL/MANUAL ATTN LEVEL control has no effect on input sensitivity of channel A or B. Channel A sensitivity is maximum and channel B sensitivity is controlled by an automatic gain circuit. After power-up, the control is automatically disabled (initialize mode).

3-77. When the MANUAL TRIGGER/MANUAL ATTN LEVEL control is enabled, an arrow will appear on the LCD above the label MAN LVL. The DC offset level of channel A input is manually variable. A variable DC offset has the effect of being a polarity and trigger level control. When the X20 ATTN is disabled, the trigger level of input A may be set from -0.1 volts to +0.1 volts peak. At midrange, 0.0 volt level, channel A input sensitivity will be approximately 10 mV rms or  $\pm 15$  mV peak. If the X20 ATTN is enabled, these values increase by a nominal factor of 20.

3-78. When the MANUAL TRIGGER/MANUAL ATTN LEVEL control is enabled, Channel B attenuation becomes manually variable. See the specifications in Section 1.

3-79. There are two input BNC connectors; Channel A and Channel B. Channel A input frequency range is

from 10 Hz to 100 MHz for the 5384A and 5385A. Channel B input frequency range is 50 MHz to 225 MHz for the 5384A and 90 MHz to 1.0 GHz for the 5385A.

3-80. Both inputs are ac coupled with dc blocking up to 300V dc.

### 3-81. REAR PANEL FEATURES

3-82. A number of signal inputs, outputs, connectors and controls are provided on the rear panel.

3-83. The Input/Output interface connector provides optional remote control capabilities with either the Hewlett-Packard Interface Bus (HP-IB) or the Hewlett-Packard Interface Loop (HP-IL). Option 003 is HP-IL.

3-84. The interface address switch (ADDR) is a seven-position switch that is used to manually set the remote control address of the counter. The five rightmost switch positions are externally accessible and can be used by the operator for setting the address. The two leftmost switch positions are not used for normal operation. For a complete description of address selection, refer to Table 3-3, Address Selection, in the Remote Programming Instructions in this section.

3-85. The HP-IB and HP-IL capabilities of the counter are listed above the interface port. For a complete description of the listed capabilities, refer to paragraph 3-119, Interface Commands.



3-86. The AC LINE INPUT connector accepts the ac input power cord. The protective grounding conductor also connects to the instrument through the ac power connector.

3-87. The LINE SELECT switch selects the instrument line voltage. The switch selects either 115 or 230 volts. The number visible on the switch indicates the nominal line voltage to which the instrument must be connected for proper operation.

3-88. The DC FUSE is a two-ampere fast-blow fuse for the overvoltage protection of the dc power supply to the instrument. The fuse value should be two ampere 3AG fast-blow.

3-89. The EXT DC INPUT power connector accepts the two conductor dc input power cable. Input voltage range is from 9 volts to 15 volts dc and 1.0 ampere maximum. The EXT DC INPUT is fuse protected for a 2.0 ampere surge current.

3-90. The 10 MHz IN/OUT BNC connector provides a 10 MHz signal that may be used for calibration when the INT EXT (BATT SAVE) switch is in the INT position. When the INT EXT (BATT SAVE) switch is in the EXT position, the INPUT OUTPUT BNC connector becomes the external reference input for the counter.

3-91. The INT EXT (BATT SAVE) switch besides selecting an internal or external reference oscillator, also provides a battery save function when the Option 004 Oven Oscillator and Option 002 Battery Pack are installed. To save battery power with the oven oscillator installed, select EXT (BATT SAVE) with the INT EXT (BATT SAVE) switch.

3-92. When the counter contains an oven oscillator option and is powered by the battery pack option, the

INT EXT (BATT SAVE) switch will disconnect the oven oscillator from the battery when the counter is switched from ON to STBY (standby). If the ac power cord or the EXT dc power cable is connected, the oven oscillator will remain powered whether the counter is ON or in STBY, and the INT EXT (BATT SAVE) switch will not disconnect the oven oscillator from the battery.

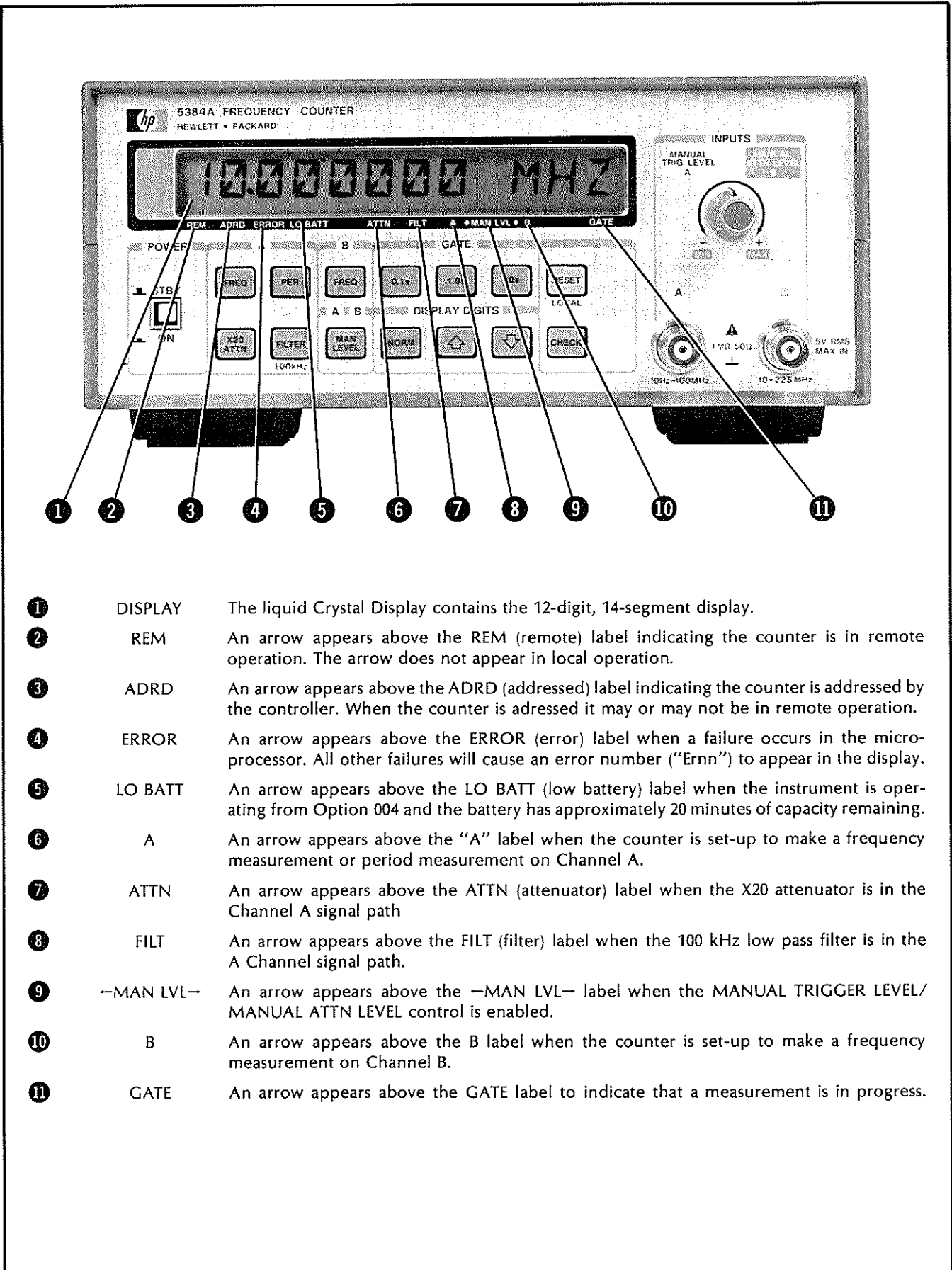
3-93. The INT EXT (BATT SAVE) switch allows the user to choose whether the oven of the oscillator will operate from battery power in STBY mode to maintain maximum accuracy or not operate the oven to save battery power. When the oven is powered up, the oscillator is relatively accurate 10 minutes after turn-on.

### **3-94. MAKING FREQUENCY AND PERIOD MEASUREMENTS**

3-95. The recommended sequence for setting-up and making a measurement with the HP 5384A or 5385A Frequency counter is given below.

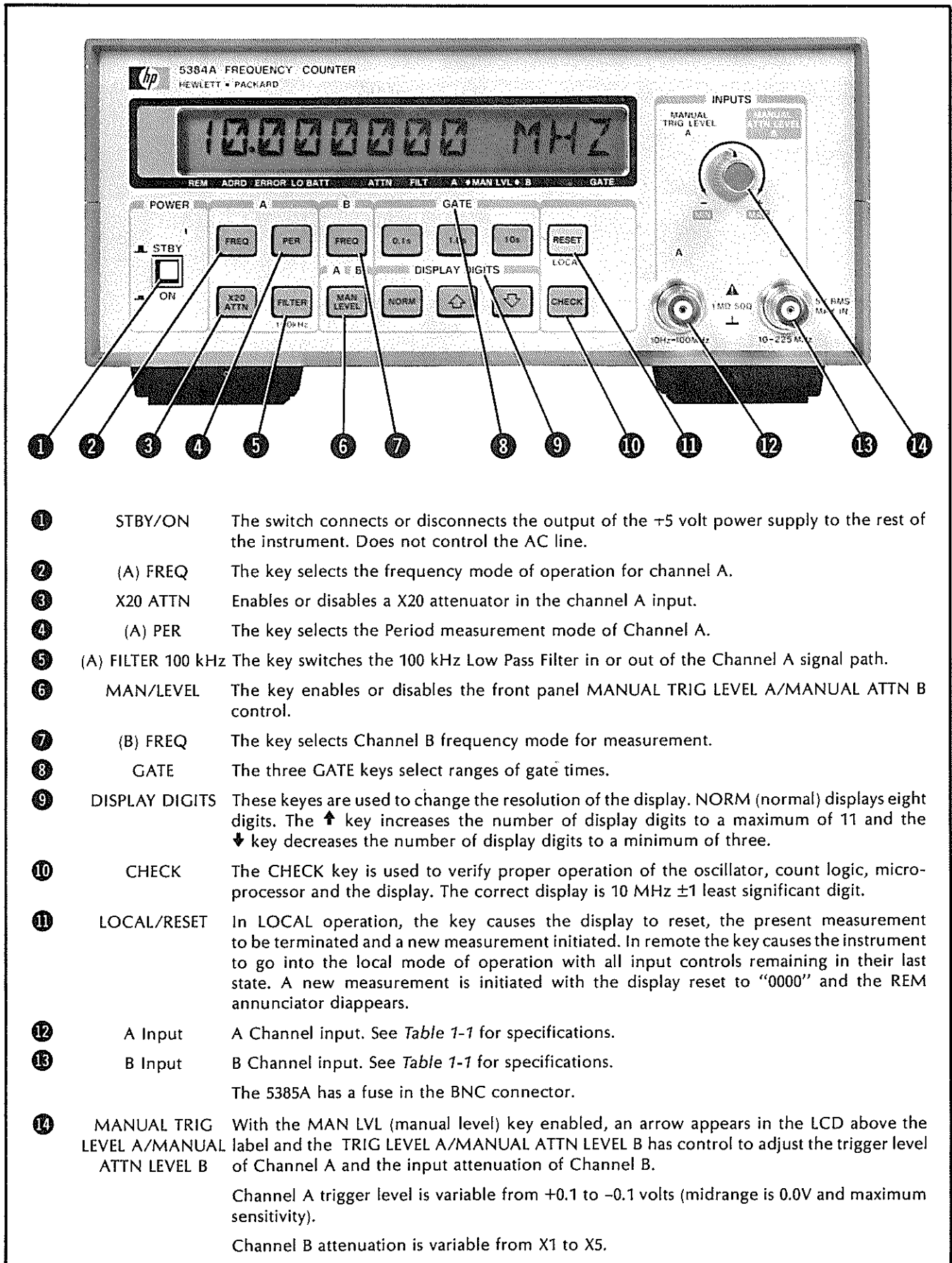
- a. Set the power switch to ON. The counter should perform a power-up self-check, then preset to the power-up initialize settings shown in Table 3-1.
- b. Press the key for the desired operating mode (frequency, period etc.).
- c. Connect a signal into the channel selected.
- d. If the display is unstable, use the attenuator, filter, or manual trigger level control and adjust for a stable reading. The above mentioned controls have limitations. They cannot compensate for excessively noisy or unstable signal sources.
- e. If desired, select a gate time and the number of display digits desired.

Models 5384A and 5385A  
 Operation and Programming



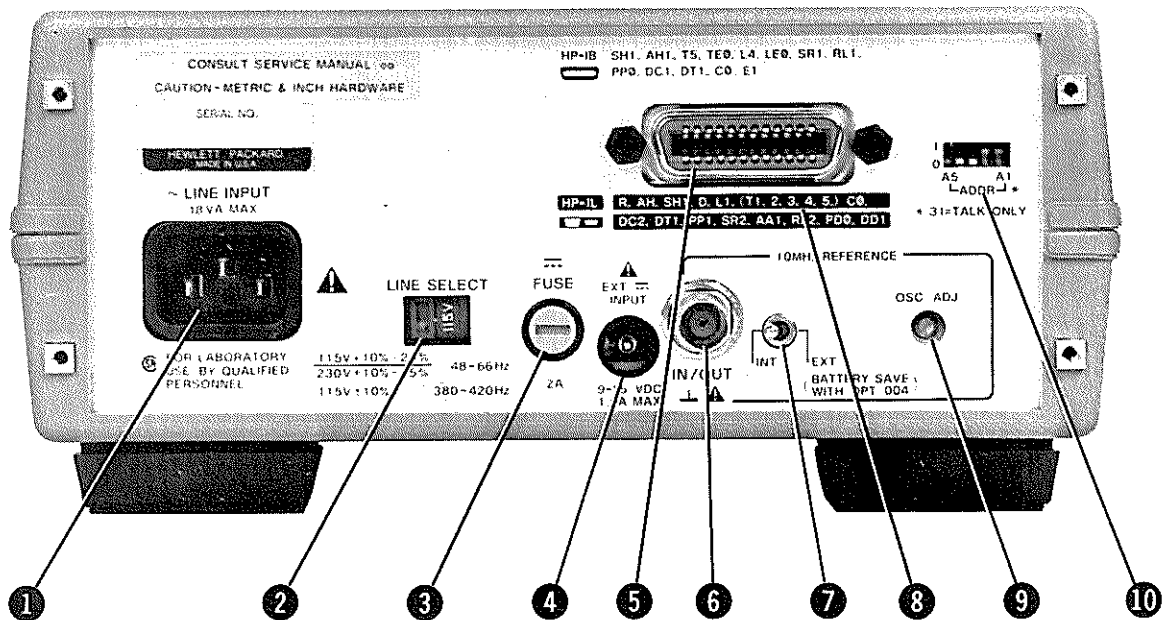
- ① DISPLAY The liquid Crystal Display contains the 12-digit, 14-segment display.
- ② REM An arrow appears above the REM (remote) label indicating the counter is in remote operation. The arrow does not appear in local operation.
- ③ ADRD An arrow appears above the ADRD (addressed) label indicating the counter is addressed by the controller. When the counter is addressed it may or may not be in remote operation.
- ④ ERROR An arrow appears above the ERROR (error) label when a failure occurs in the micro-processor. All other failures will cause an error number ("Ernn") to appear in the display.
- ⑤ LO BATT An arrow appears above the LO BATT (low battery) label when the instrument is operating from Option 004 and the battery has approximately 20 minutes of capacity remaining.
- ⑥ A An arrow appears above the "A" label when the counter is set-up to make a frequency measurement or period measurement on Channel A.
- ⑦ ATTN An arrow appears above the ATTN (attenuator) label when the X20 attenuator is in the Channel A signal path
- ⑧ FILT An arrow appears above the FILT (filter) label when the 100 kHz low pass filter is in the A Channel signal path.
- ⑨ -MAN LVL- An arrow appears above the -MAN LVL- label when the MANUAL TRIGGER LEVEL/MANUAL ATTN LEVEL control is enabled.
- ⑩ B An arrow appears above the B label when the counter is set-up to make a frequency measurement on Channel B.
- ⑪ GATE An arrow appears above the GATE label to indicate that a measurement is in progress.

Figure 3-7. Front Panel Indicators



- ① STBY/ON The switch connects or disconnects the output of the +5 volt power supply to the rest of the instrument. Does not control the AC line.
- ② (A) FREQ The key selects the frequency mode of operation for channel A.
- ③ X20 ATTN Enables or disables a X20 attenuator in the channel A input.
- ④ (A) PER The key selects the Period measurement mode of Channel A.
- ⑤ (A) FILTER 100 kHz The key switches the 100 kHz Low Pass Filter in or out of the Channel A signal path.
- ⑥ MAN/LEVEL The key enables or disables the front panel MANUAL TRIG LEVEL A/MANUAL ATTN B control.
- ⑦ (B) FREQ The key selects Channel B frequency mode for measurement.
- ⑧ GATE The three GATE keys select ranges of gate times.
- ⑨ DISPLAY DIGITS These keys are used to change the resolution of the display. NORM (normal) displays eight digits. The ↑ key increases the number of display digits to a maximum of 11 and the ↓ key decreases the number of display digits to a minimum of three.
- ⑩ CHECK The CHECK key is used to verify proper operation of the oscillator, count logic, micro-processor and the display. The correct display is 10 MHz ±1 least significant digit.
- ⑪ LOCAL/RESET In LOCAL operation, the key causes the display to reset, the present measurement to be terminated and a new measurement initiated. In remote the key causes the instrument to go into the local mode of operation with all input controls remaining in their last state. A new measurement is initiated with the display reset to "0000" and the REM annunciator disappears.
- ⑫ A Input A Channel input. See *Table 1-1* for specifications.
- ⑬ B Input B Channel input. See *Table 1-1* for specifications.  
The 5385A has a fuse in the BNC connector.
- ⑭ MANUAL TRIG LEVEL A/MANUAL ATTN LEVEL B With the MAN LVL (manual level) key enabled, an arrow appears in the LCD above the label and the TRIG LEVEL A/MANUAL ATTN LEVEL B has control to adjust the trigger level of Channel A and the input attenuation of Channel B.  
Channel A trigger level is variable from +0.1 to -0.1 volts (midrange is 0.0V and maximum sensitivity).  
Channel B attenuation is variable from X1 to X5.

Figure 3-8. Front Panel Controls



- ① AC LINE INPUT The connector accepts the ac input power cord.
- ② LINE SELECT The LINE SELECT switch selects line voltage of 115 or 230 volts. The selected voltage range is visible on the switch.
- ③ DC FUSE The DC FUSE is a two ampere fast blow fuse.
- ④ EXT DC INPUT The EXT DC INPUT power connector accepts the two-conductor input power cable. Input voltage range is from 9 volts to 15 volts dc and 1.0 ampere maximum.
- ⑤ Interface Connector The input/output interface connector provides optional remote control capabilities with either HP-IL (Option 003) or HP-IB. HP-IB is shown.
- ⑥ 10 MHz IN/OUT Connector The 10 MHz IN/OUT BNC connector provides a 10 MHz calibration signal when the INT EXT (BATT SAVE) switch is in the INT position. With the switch in the EXT (BATT SAVE) position, the IN/OUT BNC connector becomes the external reference input for the counter.
- ⑦ INT EXT (BATT SAVE) The switch selects the internal 10 MHz oscillator or an external reference oscillator. The switch also disconnects the Option 004 Oven Time Base from the Option 002 Battery Pack (if installed) when the counter is placed in STBY (standby).
- ⑧ Interface Capabilities The interface capability label lists the standard interface functions of the counter for the HP-IB or HP-IL.
- ⑨ STD. and TCXO OSC ADJ ONLY The internal time base oscillator is adjusted through this opening.
- ⑩ ADDR (address) The address switch is used to manually set the remote control address of the counter. The five rightmost switch positions determine the address.

Figure 3-9. Rear Panel Features



## 3-96. REMOTE PROGRAMMING

### 3-97. Introduction

3-98. The HP 5384A and 5385A frequency counters (with HP-IB) is compatible with the Hewlett-Packard Interface Bus, or (with Option 003) are compatible with the Hewlett-Packard Interface Loop. Remote programming allows the instrument to respond to remote control instructions and output measurement data via the interface. At the simplest level, the counter can output data in the talk only mode to other devices such as a printer. In more sophisticated systems, a controller can remotely program the counter to perform a specific type of measurement, trigger the measurement, and output the results.

#### NOTE

HP-IB is Hewlett-Packard's implementation of IEEE Std. 488-1978, "Standard Digital Interface for Programmable Instrumentation".

3-99. The programming information in this section, except where noted, applies to both HP-IB and HP-IL interfaces. In general, the HP-IB may be considered a subset of HP-IL, as almost all capabilities of the HP-IB are also capabilities of the HP-IL. Every effort has been made to make the programming of the counter consistent, regardless of which interface is configured.

3-100. To remotely program the counter efficiently, the operator must be familiar with the selected controller, the configured interface, and the local (manual) operation of the counter. Typical controllers for the HP-IB are the 9825A/B, 9826A, 9830A, 9835/45A, or 85A. Typical controllers for the HP-IL are the 85A, 41CV, 75A. Users of the HP-IB interface should find the following manuals useful background information:

Condensed Description of the Hewlett-Packard Interface Bus (P/N 59401-90030)

HP-IB programming Hints for Selected Instruments (P/N 59300-90005)

Tutorial Description of the Hewlett-Packard Interface Bus (P/N 5952-0156)

3-101. Users of the HP-IL interface may be unfamiliar with the HP-IL system. An introductory description of the interface system, and the Hewlett-Packard Interface Loop (HP-IL) is provided later in this section. More detailed information on the HP-IL is available in the following publications:

HP-IL Interface Specification (P/N 82166-90017)

The HP-IL System: An Introductory Guide to the Hewlett-Packard Interface Loop (Published by OSBORN/McGraw-Hill, 630 Bancroft Way, Berkley, CA 94710)

## 3-102. INTERFACE DESCRIPTION

### 3-103. Hewlett-Packard Interface Bus (HP-IB)

3-104. The Hewlett-Packard Interface Bus (HP-IB) system utilizes a party-line bus structure (devices share signal lines) to which a maximum of 15 devices may be connected in one continuous bus. Sixteen signal lines and 8 ground lines are used to interconnect devices in parallel arrangement and maintain an orderly flow of device and interface related information.

### 3-105. Hewlett-Packard Interface Loop (HP-IL)

3-106. The Hewlett-Packard Interface Loop (HP-IL) is a two-wire serial interface that provides programmable control of instruments while being easy to use and understand. The controller and all devices in the loop, including the counter, are connected together in series, forming a continuous loop communications circuit. Any information (instructions or data) that is transferred among HP-IL devices is passed from one device to the next around the loop (one direction only). If the information is not intended for a particular device, that device simply passes the information on to the next device in the loop. When the proper device receives the information, that device responds as directed. In this way, the controller or the counter can send information to and receive information from each device in the loop, according to the device's capability.

3-107. The counter may be connected anywhere in the interface loop. The loop consists of up to 30 devices plus the controller using simple addressing. When installing or removing the counter (or any other device) it is a good practice to turn off the controller first. Then simply disconnect the loop in one place and connect the counter at that point. Remember, the interface cables must form a continuous loop. All HP-IL connectors are designed to ensure proper orientation and indicate the direction of information transfer.

## 3-108. INTERFACE FUNCTIONAL OVERVIEW

3-109. Each device on the interface may possess one or more of the following major device capabilities: Controller, Talker, or Listener. The controller, as the



name implies, has the responsibility to control interface activity. The controller, of course, must be equipped with the proper interface module. Controllers transmit all device independent commands to other devices in the interface and usually have Talker and Listener capabilities. The counter cannot serve as a controller.

3-110. Talkers are devices that have the ability to send data or device dependent commands through the interface. Note that a talker will not actually send its data or information until told to do so by the controller. The counter has Talker capabilities. In special situations, one device may be classified as a Talk-only device and sends information to Listen-only devices. Such a system would not have a controller. For example, the counter can be configured to Talk-only mode and send measurement results to printer. (TALK ONLY Address = 31).

3-111. Listeners are devices with the capability to receive information over the interface. Listeners must also be enabled by the controller to receive the information.

### 3-112. INTERFACE SYSTEMS TERMS

3-113. The following paragraphs define the terms and concepts used to describe HP-IB and HP-IL system operations.

- a. ADDRESS: Each device in the interface is assigned an address. The address is used to specify which device on the interface will receive information or send information.
- b. BYTE: A byte is a unit of information consisting of eight binary digits called bits.
- c. DEVICE: Any instrument or unit that is HP-IB or HP-IL compatible is called a device.
- d. DEVICE DEPENDENT: An action a device performs in response to information sent through the interface. The action is characteristic of a particular instrument and will probably vary from device to device.
- e. DEVICE INDEPENDENT COMMAND: A command predefined by the interface standard to have a specified bit pattern and resulting action.
- f. DEVICE DEPENDENT COMMAND: A command not predefined by the interface standard, which is specific to a particular instrument or family of instruments.

g. POLLING: Polling is a process typically used by a controller to locate a device that has requested service from the controller. There are two types of polling; Serial Poll and Parallel Poll:

1. Serial Poll. When the controller executes a serial poll, the address device sends one byte of operational information called a status byte. If more than one device in the interface is capable of requesting service, each device on the interface must be serial polled until the device that requested service is located.
2. Parallel Poll. When the controller executes a parallel poll, all devices on the interface respond, each one setting or clearing a particular data bit to indicate whether or not it requested service.

### 3-114. ADDRESS SELECTION

3-115. MANUAL ADDRESSING. To use the counter in a system, set the rear panel address switches to the desired address. Addresses 0 through 30 represent the addressable mode range. Address 31 selects the Talk-only mode. The addressable mode is used when the counter functions as a talker and a listener. The TALK ONLY mode (Figure 3-10) is employed when the counter is operating in an output-only condition (no controller on the bus) and sends its data to another device on the bus, such as a printer, set to LISTEN ONLY.

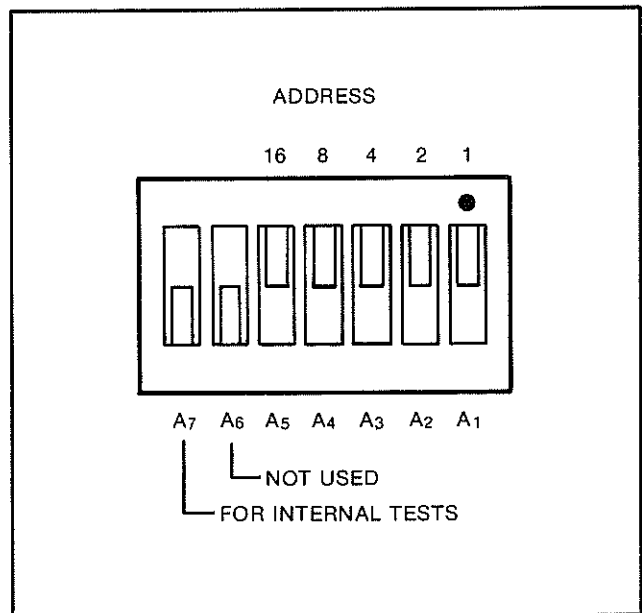


Figure 3-10. 5384A and 5385A Address Switches Shown in Address 31



3-116. The five rightmost switches, A<sub>5</sub> through A<sub>1</sub>, set the address of the counter. Table 3-3 shows all possible address settings and the corresponding ASCII codes used by some controllers for talk and listen. The counter is factory set to address 703 as shown in Table 3-3.

3-117. AUTOADDRESSING. Autoaddressing is a method of setting the instrument's address, unique to HP-IL, and is provided by the HP-85, 75 and 41. When autoaddressing is enabled, each device in the loop is assigned an address by the controller. The assigned address will probably be different than the factory preset address. The counter, for example, has a preset address of 703. If the counter is the only device in the loop with the controller, the controller will assign it an address of "1". The address permits the controller to specify or select a particular device in the loop when sending commands. As shown in Figure 3-11, addresses are assigned to particular devices sequentially around the loop in the direction of information flow. The first device after the controller is assigned an address of "1". The second device is assigned the address "2", and so on around the loop. The controller has an address of "0".

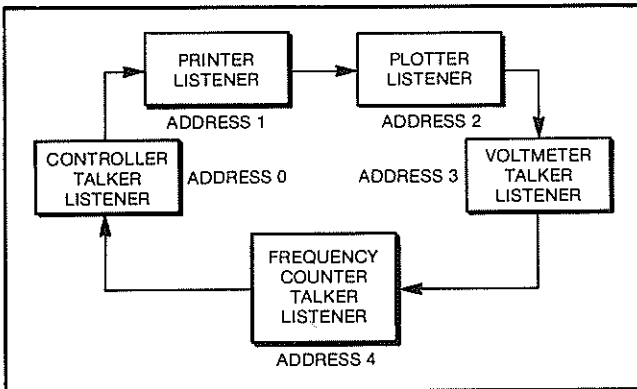


Figure 3-11. Typical HP-IL System Addressing

3-118. The interface status of the counter is indicated on the front panel by an arrow appearing above the REM ADRD labels on the front panel.

### 3-119. INTERFACE COMMANDS

3-120. The commands that the counter recognizes can be separated into two classes: device dependent commands and device independent commands. Device dependent commands are those that are unique to the instrument and are defined by the instrument designer. They are normally sent to an instrument as ASCII strings. A detailed description of device dependent commands begins in paragraph 3-146, Device Dependent Commands.

Table 3-3. Address Selection

Rear panel address switch:

ADDRESS

16 8 4 2 1

A<sub>7</sub> A<sub>6</sub> A<sub>5</sub> A<sub>4</sub> A<sub>3</sub> A<sub>2</sub> A<sub>1</sub>

NOT USED  
FOR INTERNAL TESTS

(Shown in addressable mode, and address 03)

**NOTE**

\*Select the decimal listen address from the table below and set the address switches to the corresponding positions.

ASCII CODE CHARACTER		ADDRESS SWITCHES					5-BIT DECIMAL CODE
LISTEN	TALK	A <sub>5</sub>	A <sub>4</sub>	A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	
SP	@	0	0	0	0	0	00
!	A	0	0	0	0	1	01
"	B	0	0	0	1	0	02
#	C	0	0	0	1	1	03
\$	D	0	0	1	0	0	04
%	E	0	0	1	0	1	05
&	F	0	0	1	1	0	06
'	G	0	0	1	1	1	07
(	H	0	1	0	0	0	08
)	I	0	1	0	0	1	09
*	J	0	1	0	1	0	10
+	K	0	1	0	1	1	11
,	L	0	1	1	0	0	12
-	M	0	1	1	0	1	13
.	N	0	1	1	1	0	14
/	O	0	1	1	1	1	15
Ø	P	1	0	0	0	0	16
1	Q	1	0	0	0	1	17
2	R	1	0	0	1	0	18
3	S	1	0	0	1	1	19
4	T	1	0	1	0	0	20
5	U	1	0	1	0	1	21
6	V	1	0	1	1	0	22
7	W	1	0	1	1	1	23
8	X	1	1	0	0	0	24
9	Y	1	1	0	0	1	25
:	Z	1	1	0	1	0	26
;		1	1	0	1	1	27
<	\	1	1	1	0	0	28
=		1	1	1	0	1	29
>	~	1	1	1	1	0	30



3-121. Device independent commands, on the other hand, are defined by the interface standard document and are the same in all instruments. These commands are identified by a three letter mnemonic such as GTL, which represents Go to Local. Device independent commands are sent as specially encoded bytes on the interface and not as ASCII strings. Thus these commands cannot be sent using the OUTPUT statement on the HP-85. However, many controllers do incorporate a command of the form SEND7;CMDnnn, where nnn is the decimal equivalent to the bit pattern corresponding to a particular device independent command.

### 3-122. INTERFACE CAPABILITIES

3-123. Since the device independent commands are standardized and are the same in all instruments, the functions these commands perform can be listed on the instrument in a standardized manner. This is known as the interface capability label.

HP-IB SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0, E1

HP-IL R, AH, SH1, D, L1, (T1, 2, 3, 4, 5,), C0, DC2, DT1, PP1, SR2, AA1, RL2, PD0, DD1

3-124. The number following the interface function code indicates the particular capability of that function.

3-125. Table 3-4 provides a list of the interface capabilities of the instrument.

### 3-126. META MESSAGES

3-127. In order to simplify the use of the HP-IB and HP-IL interfaces, HP has developed what is called the Meta Message concept. Rather than requiring the user to remember all the device independent messages and their interactions, useful sequences of these commands have been integrated into a single command on many of HP's controllers. For example, to clear the instrument at address 03 using the device independent commands, it is necessary to send the sequence ATN, UNL, MTA, LAD 03, SDC. In the HP-85, the command CLEAR 703 causes this sequence to be sent with no further user interaction. This greatly simplifies the use of the interface.

Table 3-4. Interface Capabilities

HP-IB	HP-IL	DESCRIPTION
SH1	SH1	The instrument can generate messages.
AH1	AH	The instrument can interpret received messages.
	R	The instrument can receive messages.
	D	The instrument can drive the HP-IL loop.
T5	T12345	The instrument can function as a talker. In addition, it can operate as a Talker Only instrument and can respond to serial poll, send device ID, and send accessory ID.
TE0		The instrument cannot function as an extended talker.
L4	L1	The instrument can function as a listener. It will accept commands via the interface. In addition, it will untalk itself if addressed as a listener.
LE0		The instrument cannot function as an extended listener.
SR1	SR2	The instrument can generate a service request. In addition, the instrument can generate an IDY frame on HP-IL.
RL1	RL2	The instrument can operate in both remote and local modes. In addition, it can respond to local lockout.
PP0	PP1	The instrument does not support parallel poll on HP-IB. On HP-IL, the instrument does support parallel poll.
DC1	DC2	The instrument supports both the device clear (DCL) and selected device clear (SDC) commands.
DT1	DT1	The instrument can be remotely triggered.
C0	C0	The instrument cannot function as a controller.
	AA1	The instrument can be remotely addressed with simple (non-extended) addresses.
	PD0	The instrument cannot be remotely powered down.
	DD1	The instrument responds to the device dependent listener (DDL) command.

3-128. Many of the meta messages as implemented on the HP-85 may be sent in either of two forms, either with or without addressing. The form with addressing will normally listen address the instrument. For example, the command REMOTE 703 will send REN and then make the instrument a listener. In the following tables, the form with addressing is shown.





3-129. Table 3-5 lists the meta messages, their results in the counter, and typical interface message sequences corresponding to them. The sequences are typical in that different controllers may send different sequences, while still obtaining the same results.

Table 3-5. Meta Messages

MESSAGE	DESCRIPTION/RESPONSE
DATA	A means to send device dependent command and receive measurement data. HP-IB:  UNL, MTA, LADn, data  HP-IL:  UNL, MTA, LADn, SDA, data
TRIGGER	Starts a new measurement.
CLEAR	Will clear the display. If in error state, clears error only.  UNL, MTA, LADn, SDC
REMOTE	Disables front panel keys (except for Reset/ Local).  REN, UNL, MTA, LADn
LOCAL	Enables the front panel keys.  UNL, MTA, LADn, GTL
LOCAL and CLEAR LOCKOUT	Enables the front panel keys and clears Local Lockout.
LOCAL LOCKOUT	Disables the Reset/Local key when in remote.  LLO
SERVICE REQUEST	This command is ignored when received by the instrument. It will be sent by the instrument when an enabled service condition is present.
STATUS BYTE	Presents stats information. HP-IB:  UNL, MLA, TADn, SPE, data, SPD, UNT  HP-IL:  UNL, MLA, TADn, SST, data, UNT
STATUS BIT	Single bit parallel poll response indicates whether this instrument is requesting service.  IDY
PASS CONTROL	Not supported.
ABORT	Terminates bus communications by unlistening and untalking all instruments.  IFC
DEVICE ID	Causes the instrument to send the string "HP 5384A and HP 5385A"  UNL, MLA, TADn, SDI, data
ACCESSORY ID	Causes the instrument to send the number 81 in binary. This identifies the instrument as a measuring instrument.  UNL, MLA, TADn, SAI, data

3-130. Table 3-6 lists the meta messages and the HP 9825, HP-85, and HP-41C commands that correspond to them. (Only the addressed form is shown for the

commands that support both the unaddressed and addressed forms. The HP-41C requires the address selection to be made using a SELECT statement.) The table assumes the instrument is set to address 03 and the interface to select code 7.

Table 3-6. Meta Messages and Controller Commands

MESSAGE	HP 9825	HP-85	HP-41C
DATA	wrt 703, A\$ red 703, A\$	OUTPUT 703, A\$ ENTER 703, A\$	OUTA INA
TRIGGER	trg 703	TRIGGER 703	TRIGGER
CLEAR	clr 703	CLEAR 703	
REMOTE	rem 703	REMOTE 703	REMOTE
LOCAL	lcl 703	LOCAL 703	LOCAL
LOCAL/CLEAR LOCKOUT	lcl 7	LOCAL 7	
LOCKOUT	llo 7	LOCAL LOCKOUT 7	
SERVICE REQUEST		STATUS 7,1, A	
STATUS BYTE	rds (703)	SPOLL (703)	INSTAT
*STATUS BIT		PPOLL (7)	
PASS CONTROL			
ABORT	cli 7	ABORTIO 7	STOPIO
*DEVICE ID		SEND 7, CMD 255	FINDID
*ACCESSORY ID		SEND 7, CMD 254	

\*HP-IL only.  
Typically, HP-IL uses a select code of 9nn and HP-IB uses an address code of 7nn.

### 3-131. SRQ, SRQ MASK, AND STATUS BYTE

#### 3-132. SRQ and Status Byte

3-133. When in remote operation, the counter can send a service request (SRQ) to the controller to indicate the need for attention and can act as an interrupt to the current sequence of events. Typically, SRQ indicates data is ready to transmit and/or an error condition exists. The counter can send an SRQ to the controller under any, all, or none of the following conditions, as defined by the Service Request Mask. The Service Request Mask (SM com-



mand) must be set prior to the condition. Refer to paragraph 3-137

- a. DATA READY. A measurement has been completed and is available for collection.
- b. ERROR. An Error or Failure condition exists, and is displayed.
- c. LOCAL. The instrument is in local.

3-134. In general, the controller can read the counter Status Byte at any time to check selected operating conditions. During remote operation, you may selectively program the counter Service Request Mask (SMnnn) to identify the conditions which you feel may require service or data collection.

3-135. Once SRQ has been sent, the controller can identify which condition or conditions caused the Service Request by reading the Status Byte. When the Status Byte is read, conditions that exist will be set to 1 whether or not enabled as a condition to generate SRQ. Sending a "rds (703)" with the 9825A, or "A=SPOLL (703)" with the HP-85A requests the eight-bit binary status byte. The number returned will be a decimal equivalent to the sum of the different status bits set, as shown in Table 3-7.

Table 3-7. 5384A and 5385A Status Byte

D7	D6	D5	D4	D3	D2	D1	D0
0	SRQ FLAG	POWER ON	LOCAL	0	ERROR or FAIL	0	DATA READY
128	64	32	16	8	4	2	1

3-136. For example; the instrument requested service (SRQ) and reading the Status Byte returned a value of "97". This can be interpreted as 64 + 32 + 1 = 97, meaning the SRQ FLAG is set, power is on, and data is ready. The bits of the Status Byte are set regardless of the Service Request Mask. However, if that bit is masked out, it will not generate an SRQ.

### 3-137. Service Request Mask

3-138. Upon receipt of the Service Request Mask Command (SM Command), the instrument will load the binary value of "nnn" into the service request mask register. The SRQ/line bit will be set if a bit in the status byte becomes set and the corresponding bit in the service request mask is set. To specify the service request mask, send the SM command followed by a decimal number representative of the binary sum of the bits that you want enabled. You may send any number between 0 and 255, although only the five least significant bits are used. The binary value of "nnn" is interpreted as follows:

BIT	MEANING	WEIGHT
NOT MASKABLE		
Bit 7	Always 0	128
Bit 6	SRQ	64
Bit 5	Power On	32
MASKABLE BITS		
Bit 4	Instrument in Local	16
Bit 3	Always 0	8
Bit 2	Error or Fail Condition	4
Bit 1	Always 0	2
Bit 0	Data Ready	1

For example, sending the command "SM5" will generate a service request (SRQ) after an error or fail condition or data is ready (4 + 1). Sending the command "SM0" masks off (or disables) all SRQ conditions. The condition or conditions which caused the service request may be determined by reading the Status Byte.

### 3-139. DEVICE DEPENDENT COMMANDS

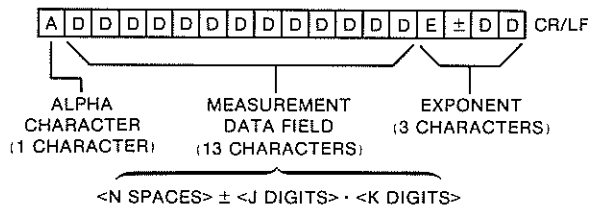
3-140. The counter will accept command strings in either upper or lower case. Spaces, commas, and semicolons between commands are interpreted as command terminators. In addition, parity bits will be ignored. Depending upon the controller, this can help to speed-up programming. The following free format command statements will produce identical results:

OUTPUT 703; "FU1,AT1,FI1,ML1,GA2,DN"

OUTPUT 703; "fu1,at1,fi1,ml1,ga2,dn"

### 3-141. Output Formats

3-142. Data is output to the HP-IB bus in the following format:



- Alpha character; F for frequency, S for period.
- Variable number of blanks
- + or - sign
- Digit
- Decimal Point
- Variable number of digits
- E
- + or - sign
- One exponent digit
- Carriage Return
- Line Feed



3-143. Blanks are inserted to make the message 17 bytes long.

For example:

```
F +4.5834126E+5<CR/LF>
|           |
17 characters
```

**NOTE**

There will be no decimal point in the string if it occurs just before the E (this will occur only for measurements with only one significant digit).

**3-144. Numeric Entry**

3-145. Numeric entry follows the code and format guidelines of the IEEE 728 standard for NR3 numbers. This is a “free format” type of input, with spaces allowed before a numeric entry begins, but not afterwards. A decimal point is allowed anywhere, but not required.

3-146. All local functions are programmable with individual command codes via the interface. In general, all functions operate the same in remote as in local. The counter commands are listed in *Table 3-8, Instrument Programming Command Set*.

3-147. The examples at the end of this section demonstrate programming capabilities of the counter. The examples are written for the HP-85 controller. A summary of the program operation and a line-by-line description are provided for each example.

**3-148. IN Initialize**

3-149. This command causes the instrument to exit its current state and go to the power on initialize state unless the instrument is in an error state. If the instrument is in an error state, the error condition must be cleared before the “IN” command is accepted. The error may be cleared by pressing the blue reset key on the front panel or by sending a DCL or SDC command to the instrument.

**3-150. WA0 and WA1 Wait to Send Mode Off/On**

3-151. The wait to send mode forces the instrument to wait for a measurement to be read by the controller before it can start a new measurement. This mode is especially useful when used with service request. The instrument will make a measurement and when the measurement is complete, it will assert SRQ alerting the controller to the fact that the measurement is complete. This process ensures that the controller

*Table 3-8. Instrument Command Set*

CODE	FUNCTION	DESCRIPTION
FU1	Freq. A	Measure frequency of A-Input
FU2	Per A	Measure period of A-Input
FU3	Freq. B	Measure frequency of B-Input
CK	CHECK10MHz	Check mode (10 MHz)
AT0	Attn A (X1)	Select X1 A-Input
AT1	Attn A (X20)	Select X20 A-Input
FI0	FILTER A (off)	Disable A-Input 100 kHz LPF
FI1	FILTER A (on)	Enable A-Input 100 kHz LPF
ML0	MAN LVL (off)	Disable Manual level control
ML1	MAN LVL (on)	Enable Manual level control
GA1	0.1s	Select 0.1 sec gate time
GA2	1.0s	Select 1.0 sec gate time
GA3	10s	Select 10 sec gate time
RE	Reset Gate	Reset Display & restart meas
DI	Digit Inc	Increment display digits
DD	Digit Dec	Decrement display digits
DN	Digit Norm	Display digits normal
FN11	Diag. 1	CPU self-test
FN12	Diag. 2	I/O Address
FN13	Diag. 3	Interpolator short-cal
FN14	Diag. 4	Interpolator long-cal
IN	Initialize	Reset & go to Default state
WA0	Wait (off)	Wait-to-send data mode off
WA1	Wait (on)	Wait-to-send data mode on
DR<string>	Rmte Dspy	Write to LCD “string”
DL	Lcl Dspy	Return LCD to local
ID or SI	Send ID	Send Device ID
SM<num>	SRQ mask	Set service request mask = <num>
SE	Send Error	Send error code

knows when the measurement was made and that it does not have to wait for the full duration of the measurement to receive data.

3-152. WA1 places the instrument in the wait to send mode. WA0 takes the instrument out of the wait to send mode and allows it to function in its normal state. In the normal state, measurements are made continuously regardless of whether or not those measurements were read by the controller.



### 3-153. DR (string) Remote Display

3-154. The remote display command is legal only when the counter is in the measurement mode. If the command is received while the counter is in the diagnostic mode, an error will be flagged.

3-155. The remote display command allows the user to send any message, 12 characters in length excluding punctuation, to the LCD. A punctuation mark (comma, colon, or decimal point) can be sent between each of the characters.

3-156. Although the counter will continue making measurements, the LCD will contain the message sent with the "DR" command rather than the measurement data.

3-157. Whenever a new message is to be displayed, the remote display command must be sent. Thus each new message must be sent in the form "DRXXXXXXXXX", where the X's represent the message to be displayed. Carriage return, line feed, form feed, horizontal tab, and vertical tab can be used as terminators for a remote display message. A message sent to the display will remain there until a command which causes a change in the display is sent to the counter.

3-158. The remote display mode can be terminated in several ways. Sending a "DL" (display local) command will terminate the remote display mode without changing the state of the counter in any other way. When the counter receives this command, it will clear the display and resume displaying measurement data. Sending a diagnostic command also terminates the remote display mode, but it causes the counter to exit the measurement mode as well. Pressing the RESET/LOCAL key is another way of terminating the remote display mode, however, the key will cause the counter to exit the remote state and enter the local state. Any transition from the remote state to the local state, caused by the controller, will terminate the remote display mode as well.

3-159. If an error condition is generated while the instrument is in the remote display mode, the error

message will be displayed just as in any other case. However, when the error is cleared, the counter will no longer be in the remote display mode; it will begin displaying the measurement data rather than the message contained in the LCD prior to the error condition.

### 3-160. DL Display Local

3-161. The display local command allows the user to terminate the remote display mode without changing the state of the counter in any other way. When the counter receives this command, it will clear the remote display message and begin displaying measurement data.

### 3-162. ID and SI Send Device ID

3-163. These two commands perform the same function. Whenever the counter receives either of these two commands, it will send its ID to the controller. Either "HP 5384A" or "HP 5385A" will be sent to the controller. The counter will wait until the device ID is read by the controller before it will resume taking measurements again.

### 3-164. SE Send Error

3-165. When the send error command is received, the instrument will send the number of the detected error (there may be more than one) to the interface bus. We recommend the "SE" command be used in a string by itself.

### 3-166. PROGRAM EXAMPLES

3-167. The following examples demonstrate programming capabilities of the 5384A and 5385A. The examples are written for the HP-85A controller. A summary of the program operation and a line-by-line description are provided for each example.

Example 1 Instrument Identification

Example 2 Reading Status Byte

Example 3 Frequency A

Example 4 Remote Display



### EXAMPLE 1. INSTRUMENT IDENTIFICATION

The following example demonstrates how to display the identification address of the counter on the display screen of the controller. The program clears the 5384A/5385A then requests the instrument identification. The response is read into "N\$", which is then displayed.

#### PROGRAM

```

10 REM      Example #1: INSTRUMENT IDENTIFICATION      "TAR1"
20 CLEAR @ DISP USING "5/"
30 DISP " Searching for 5384A address... " @ DISP
40 N$="NOT 5384A"
50 FOR S=700 TO 730
60 IF S=721 THEN 140
70 DISP S @ BEEP 250,75
80 SET TIMEOUT 7;100
90 OUTPUT S ;"ID"
100 ENTER S ; N$
110 IF N$="HP5384A" THEN 230
120 CLEAR S
130 ABORTIO 7
140 NEXT S
150 BEEP 200,200
160 CLEAR @ DISP USING "5/"
170 DISP "Address not found." @ DISP
180 DISP "Verify HP-IB connection and thatthe 5384A is not in the TALK"
190 DISP "ONLY mode."
200 DISP @ DISP "Press 'CONT' when ready."
210 PAUSE
220 GOTO 20
230 DISP @ BEEP @ DISP " HP 5384A FOUND AT ADDRESS";S;"!"
240 END

```

#### PROGRAM DESCRIPTION

- Line 10 Remarks; comments only, does not affect the program.
- Line 20 Clears the controller display only and places the cursor near the middle of the controller display screen.
- Line 30 Message inside quotes is displayed on controller display screen and the cursor skips one line.
- Line 40 Set "N\$" equal to "not 5384A".
- Line 50 Loop "S" from address 700 to 730
- Line 60 If instrument value = 721 then go to line 140 (calculator address).
- Line 70 Display instrument address and beep.
- Line 80 Set time out on address 7 to 100 ms.
- Line 90 Send "ID" command to instrument with address = to "S".
- Line 100 Read instrument "ID" response into "N\$".
- Line 110 If contents of "N\$" equals "HP 5384A", then jump to line 230.
- Line 120 Clear instrument at address "S".
- Line 130 Terminates any data transfer on address 7.
- Line 140 Increment to next address.
- Line 150 Beep.
- Line 160 Clears controller display only and places the cursor near the middle of the controller display.
- Line 170 Display string within quotes on the controller display and skip on line.
- Line 180 Display string within quotes on controller screen.
- Line 190 Display string within quotes on controller screen.
- Line 200 Skip one line and display string within quotes on controller display.
- Line 210 Halt program until user presses "CONT".
- Line 220 Go to line 20.
- Line 230 Skip a line, beep and display string within quotes and display the address of "HP 5384A".
- Line 240 End program execution.



## EXAMPLE 2. READING STATUS BYTE

The following example reads the status byte of the 5384A/5385A by a serial poll at address 03. The value returned is input into "A". The program then displays the meaning of each bit and the corresponding value returned in the status byte.

### PROGRAM

```
10 REM      Example #2:  READING STATUS BYTE          "TAR2"
20 S=703
30 CLEAR @ DISP USING "3/"
40 OUTPUT S ;"SM5"
50 A=SPOLL(S)
60 DISP "The value of the status byte      prior to the error condition is"
70 DISP "equal to";A;"."
80 DISP
90 DISP "Press 'CONT' to generate an SRQ and alter the status byte value."
100 DISP @ PAUSE
110 BEEP
120 OUTPUT S ;"FU5"
130 A=SPOLL(S)
140 DISP "The value of the status byte      after the error condition is"
150 DISP "equal to";A;"."
160 END
```

### PROGRAM DESCRIPTION

- Line 10 Remarks; comments only, does not affect the program.
- Line 20 Set "S" = to 703.
- Line 30 Clears the controller display only and the cursor skips three lines.
- Line 40 Send service request mask to 5384/85 at address equal to "S" for error or failure condition or data ready condition.
- Line 50 Read status of 5384A/5385A (into A) by a serial poll at address equal to "S".
- Line 60 Display message within quotes.
- Line 70 Display message within quotes and the status byte.
- Line 80 Skip line on controller screen.
- Line 90 Display message within quotes.
- Line 100 Skip line on controller screen and halt program execution until user presses "CONT".
- Line 110 Beep.
- Line 120 Output "FU5" command to 5384A/5385A at address "S" (error condition).
- Line 130 Read the status of 5384A/5385A (into A) by a serial poll at address "S".
- Line 140 Display message within quotes.
- Line 150 Display message within quotes and status byte.
- Line 160 End program execution.



### EXAMPLE 3. FREQUENCY A

The following example demonstrates how to display a Frequency A measurement on the controller display screen. The address is set to 03 and the "IN" command is sent to the 5384A/5385A. The response is read into "A\$", which is then displayed.

#### PROGRAM

```

10 REM    Example #3:    FREQUENCY A    "TAR3"
20 S=703
30 OUTPUT S ;"IN"
40 ENTER S ; A$
50 DISP "FREQUENCY A =" ;A$[2]
60 GOTO 30
70 END
    
```

#### PROGRAM DESCRIPTION

- Line 10 Remarks; comments only, does not affect the program.
- Line 20 Set "S" equal to 703.
- Line 30 Output "IN" command to 5384A/5385A to address "S".
- Line 40 Read 5384A/5385A response into "A\$".
- Line 50 Display "Frequency A ="; followed by the contents of the second character onward of "A\$".
- Line 60 Go to line 30.
- Line 70 End program execution.

### EXAMPLE 4. REMOTE DISPLAY

The following example demonstrates how to send messages to the display of the counter. The program sets the address to 03 then sends a message to the display of the counter.

#### PROGRAM

```

10 REM    Example #4    REMOTE DISPLAY    "TAR4"
20 S=703
30 OUTPUT S ;"DR HP 5384A"
40 END
    
```

#### PROGRAM DESCRIPTION

- Line 10 Remarks; comments only, does not affect the program.
- Line 20 Sets address equal to 703.
- Line 30 Send remote display message (HP 5384A) to instrument at address "S".
- Line 40 End program execution.



Table 3-9. LCD Character Set

LCD CHAR.	ASCII CHAR.	DECIMAL	LCD CHAR.	ASCII CHAR.	DECIMAL	LCD CHAR.	ASCII CHAR.	DECIMAL
	NULL, @	0, 64		SYNC, V	22, 86		,	44
	SOH, A	1, 65		ETB, W	23, 87		—, m	45, 109
	STX, B	2, 66		CAN, X	24, 88		.	46, ,
	EXT, C	3, 67		EM, Y	25, 89		/, n	47, 111
	EOT, D	4, 68		SUB, Z	26, 90		0, p	48, 112
	ENQ, E	5, 69		ESC,	27, 91		1, q	49, 113
	ACK, F	6, 70		FS, \	28, 92		2, r	50, 114
	BELL, G	7, 71		GS,	29, 93		3, s	51, 115
	BS, H	8, 72		RS, ^	30, 94		4, t	52, 116
	HT, I	9, 73		US, _	31, 95		5, u	53, 117
	LF, J	10, 74		space, `	32, 96		6, v	54, 118
	VT, K	11, 75		!, a	33, 97		7, w	55, 119
	FF, L	12, 76		", b	34, 98		8, x	56, 120
	CR, M	13, 77		#, c	35, 99		9, y	57, 121
	SO, N	14, 78		\$, d	36, 100		z	122
	SI, O	15, 79		%, e	37, 101		:	58, 122
	DLE, P	16, 80		&, f	38, 102		;	59, 123
	DC1, Q	17, 81		', g	39, 103		<,	60, 124
	DC2, R	18, 82		(, h	40, 104		=, }	61, 125
	DC3, S	19, 83		), i	41, 105		>, ~	62, 126
	DC4, T	20, 84		*, j	42, 106		?, DEL	63, 127
	NAK, U	21, 85		+, k	43, 107		l	108
							n	110



## SECTION IV PERFORMANCE TESTING

### 4-1. INTRODUCTION

4-2. The procedures in this section provide two types of tests. First, a complete performance test for the HP 5384A and 5385A Frequency Counters. They can be performed without access to the interior of the instrument. The second test is an HP-IB verification test using the HP-85 controller.

### 4-3. EQUIPMENT REQUIRED

4-4. Equipment required for complete test and operation verification is listed in *Table 1-2*. Any equipment which satisfies the critical specifications given in the table may be substituted for the recommended model numbers.

### 4-5. TEST RECORD

4-6. Results of the complete performance test should

be recorded on a copy of the performance Test Card at the end of this section.

### 4-7. ERROR MESSAGES

4-8. Under certain conditions the counter will display Error messages. Error messages typically occur during the power-up, initialize cycle. These messages indicate a hardware failure or the user has attempted an improper operation, either through the keyboard or the HP-IB.

### 4-9. Performance Test

4-10. The performance test is given in *Table 4-1*. The performance test verifies all specifications listed in *Table 1-1*. All tests can be performed without access to the interior of the instrument.

*Table 4-1. Performance Test*

#### I. POWER-UP CHECK

Description:

The 5384A/5385A Frequency Counter power is set to STBY, then on. The counter will be cycled through its power-up, initialize subroutine. This test is performed with **no** external time base signal applied to the counter. A test is made of all the major function blocks, then go to its initialize state.

1. Set-up:

Insure that no cables are connected to input A or to the interface connector. Cycle the POWER switch from STBY to ON.

2. Verify the following:

- a. A display "starburst" is shown in all 12-character positions for about one second.
- b. The selected address of the instrument interface is displayed for about one second.
- c. The display shows "00000000" and an arrow appears over the "A" for "A" channel selection.

3. Record the result on the test card (Pass/Fail).

#### II. CHANNEL A FREQUENCY RESPONSE AND SENSITIVITY TEST (5384A/5385A)

Description:

A signal generator with a calibrated output is set to the specified 5384A/5385A channel A minimum signal sensitivity level. The frequency is slowly increased from 10 Hz up to 20 MHz at a constant level. The 5384A/5385A reading is checked for the proper count. For the range of 20 MHz to 100 MHz, a different generator is used.

Table 4-1. Performance Test (Continued)

Specifications 10 Hz to 100 MHz:

- a. 25 mV rms, sine wave, 10 Hz to 50 Hz
  - b. 15 mV rms, sine wave, 50 Hz to 100 MHz
  - c. 45 mV peak-to-peak with minimum pulse width of 5 nanoseconds
1. 10 Hz to 100 Hz:
    - a. Connect the 3325A synthesizer/function generator to the 5384A/5385A A channel input as shown in Figure 4-1.

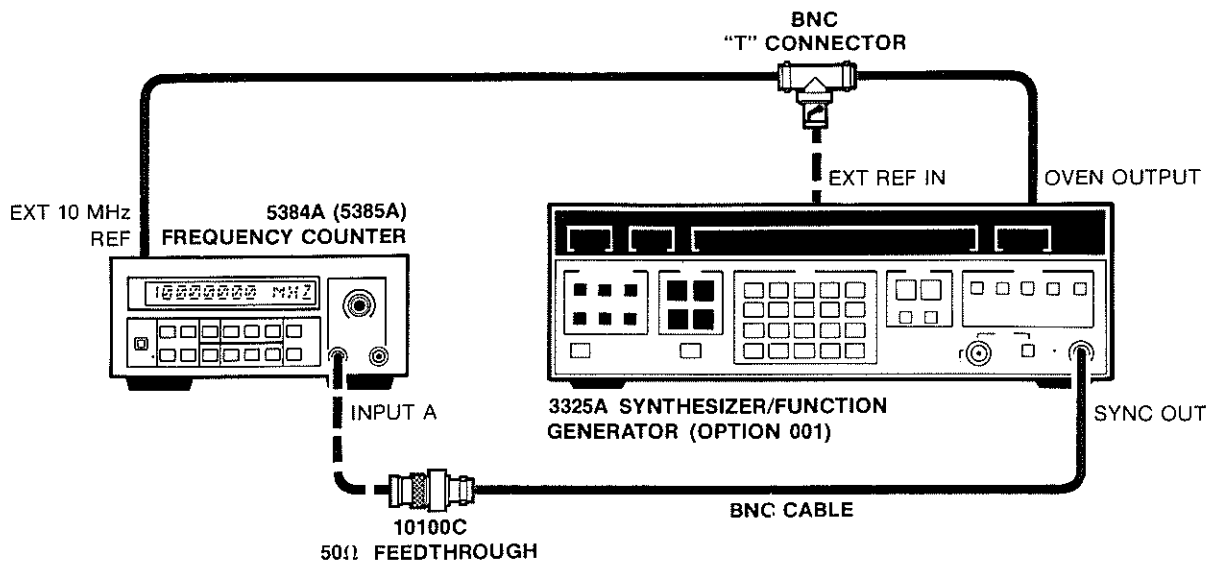


Figure 4-1. Channel A Frequency Response and Sensitivity Test Setup (5384A/5385A)

- b. Set the 3325A to output a 10 Hz sine wave at 25 mV rms. Increase the frequency of the 3325A and verify the 5384A/5385A displays the proper frequency from 10 Hz to 50 Hz. Record the results on the test card (Pass/Fail).
  - c. Measure actual sensitivity by decreasing the 3325A signal level until the 5384A/5385A displays an unstable count at 10 Hz and 50 Hz. Record the results on the test card (value).
2. 50 Hz to 20 MHz:
    - a. Use the same set-up shown in Figure 4-1.
    - b. Set the 3325A to output a 50 Hz sine wave at 15 mV rms. Increase the frequency of the 3325A and verify the 5384A/5385A displays the proper frequency from 50 Hz to 20 MHz. Record the results on the test card (Pass/Fail).
    - c. Measure actual sensitivity by decreasing the 3325A level until the counter displays an unstable count at 100 kHz, 1 MHz, and 20 MHz. Record the results on the test card (value).

Table 4-1. Performance Test (Continued)

3. 20 MHz to 100 MHz:
  - a. Connect the HP 8654A Signal Generator to the 5384A/5385A A channel input as shown in Figure 4-2.

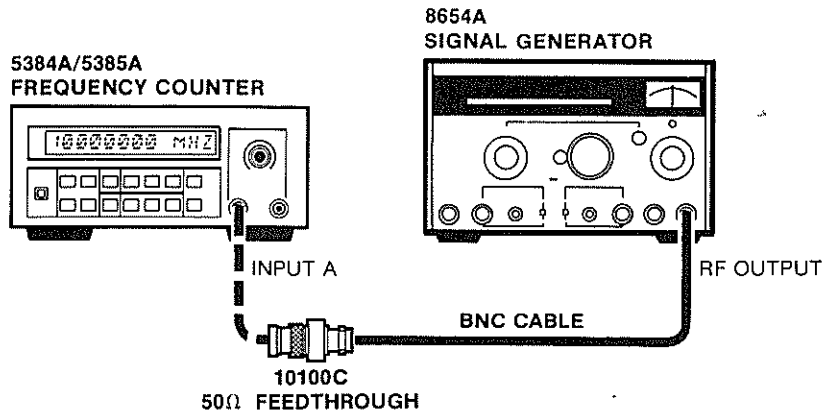


Figure 4-2. Channel A Frequency Response and Sensitivity Test Setup for 5384A/5385A

- b. Set the 8654A to output a 20 MHz sine wave at 15 mV rms. Increase the frequency of the 8654A and verify the counter displays the proper frequency from 20 MHz to 100 MHz. Record the results on the test card (Pass/Fail).
    - c. Measure actual sensitivity by decreasing the 8654A level until the counter displays an unstable count at 50 MHz, 75 MHz, and 100 MHz. Record the results on the test card (value).

### III. CHANNEL B FREQUENCY RESPONSE AND SENSITIVITY TEST FOR 5384A

Description:

A signal generator with a calibrated output is set to the specified 5384A channel B minimum signal sensitivity level. The frequency is slowly increased from 50 MHz up to 225 MHz at a constant level, and the 5384A reading is checked for the proper count.

Specifications 50 MHz to 225 MHz:

- a. 10 mV rms, sine wave, 50 MHz to 200 MHz
  - b. 15 mV rms, sine wave, 200 MHz to 225 MHz
1. 50 MHz to 200 MHz:
    - a. Connect the 8654A signal generator to the 5384A B channel input as shown in Figure 4-3.

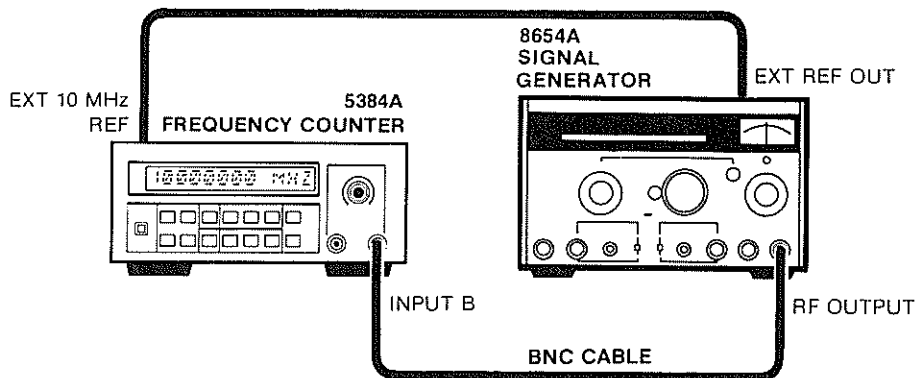


Figure 4-3. Channel B Frequency Response and Sensitivity Test Setup for 5384A

Table 4-1. Performance Test (Continued)

- b. Set the 8654A to output a 50 MHz sine wave at 10 mV rms. Select frequency B on the 5384A. Increase the frequency of the 8654A and verify that the 5384A displays the proper frequency from 50 MHz to 200 MHz. Record the results on the test card (Pass/Fail).
  - c. Measure actual sensitivity by decreasing the 8654A level until the 5384A displays an unstable count at 50 MHz, 125 MHz, and 200 MHz. Record results on the test card (value).
2. 200 MHz to 225 MHz:
- a. Set the 8654A to output a 200 MHz sine wave at 15 mV rms. Increase the frequency of the 8654A and verify that the 5384A displays the proper frequency from 200 MHz to 225 MHz. Record the results on the test card (Pass/Fail).
  - b. Measure actual sensitivity by decreasing the 8654A level until the counter gives an unstable count at 200 MHz, 210 MHz, and 225 MHz. Record the results on the test card (value).

**IV. CHANNEL B FREQUENCY RESPONSE AND SENSITIVITY TEST FOR 5385A**

Description:

A signal generator is connected through a power splitter to the 5385A channel B input and to a power meter. The signal generator is varied over the frequency range, maintaining the specified signal level. The counter should display the correct frequencies.

Specifications: 10 mV rms (-27 dBm) sine wave, 90 MHz to 1000 MHz

- a. Connect the signal generator and the power meter to the 5385A channel B input as shown in Figure 4-4.

**NOTE:** There shall be no cabling between the 11667A Power Splitter and the 5385A Input or between the Power Splitter and the Power Sensor.

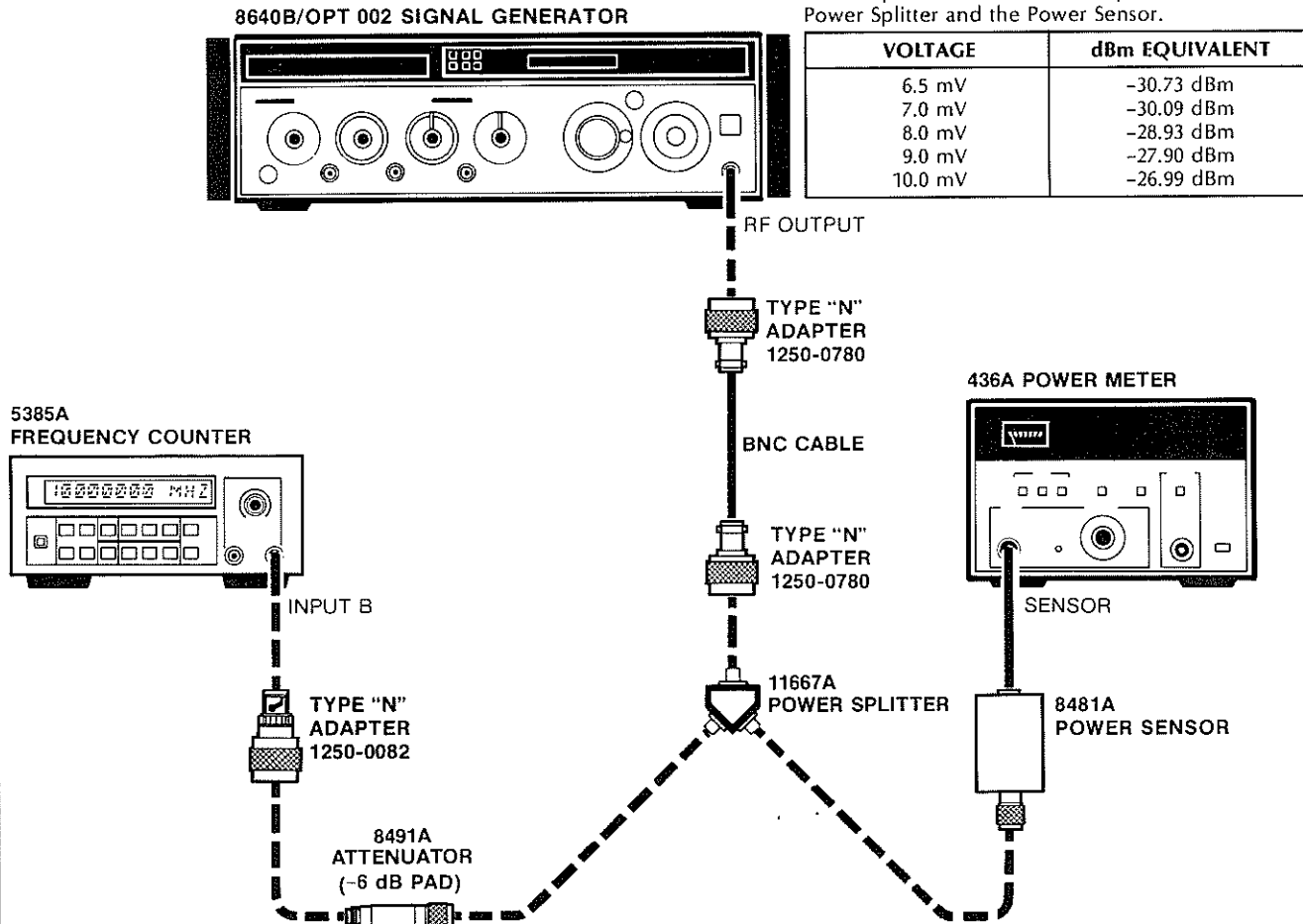


Figure 4-4. Channel B Frequency Response and Sensitivity Test Setup for 5385A

Table 4-1. Performance Test (Continued)

Note: There shall be no cabling between the 11667A Power Splitter and the 5385A channel B input or between the power splitter and the power sensor.

- b. Set the 8640B Signal Generator so the power meter reads  $-21$  dBm at 90 MHz. Increase the frequency of the signal generator while maintaining a  $-21$  dBm reading on the power meter, and verify the 5385A displays the proper frequencies from 90 MHz to 1000 MHz. Record the results on the test card (Pass/Fail).
- c. Measure actual sensitivity by decreasing the 8640B level until the 5385A displays an unstable count at 90 MHz, 400 MHz, 750 MHz, and 1000 MHz. record the results on the test card (value).

## V. PERIOD A TEST

Description:

A signal generator with a calibrated output drives channel A of the 5384A/5385A under test. The counter is set to measure the period of the signal. The 5384/5385A should display the proper count.

Specifications: 10 nanoseconds to 0.1 seconds (100 MHz to 10 Hz)

- a. Connect the 3325A synthesizer/function generator to the 5384A/5385A channel A input as shown in Figure 4-5.

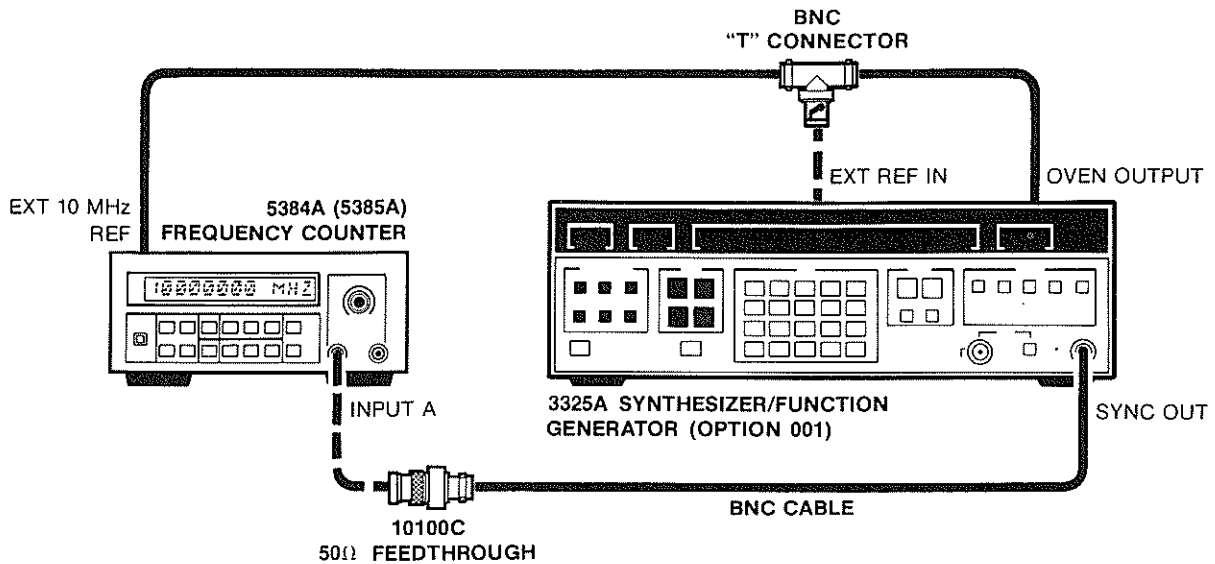


Figure 4-5. Period A Test Setup

- b. Set the counter power switch from STBY to ON and select PERIOD A. Set the GATE time to 1.0 seconds.
- c. Set the 3325A to output a 10 Hz sine wave at 100 mV rms. Verify the counter displays 100.00000 millisecond  $\pm 3$  microseconds. Record the results on the test card (Pass/Fail).

## VI. CHANNEL A FILTER AND ATTENUATOR TEST

Description:

A signal generator with a calibrated output drives the channel A of the 5384A or 5385A under test. The counter is set up for its Frequency A function, and the Channel A filter is exercised at frequencies beyond its nominal 3 dB point. The channel A attenuator is also exercised. The counter should display the proper frequencies.

Table 4-1. Performance Test (Continued)

Specifications:

- a. Low Pass Filter, 100 kHz, **nominal** at 3 dB point.
- b. X1 or X20, **nominal**, selectable.

Perform the following steps to use the Channel A Filter and Attenuator tests.

1. Set the counter POWER switch from STBY to ON; set the gate time to 1.0 seconds.
2. Connect the 3325A Synthesizer/Signal Generator to the 5384A/5385A channel A input as shown in Figure 4-6.

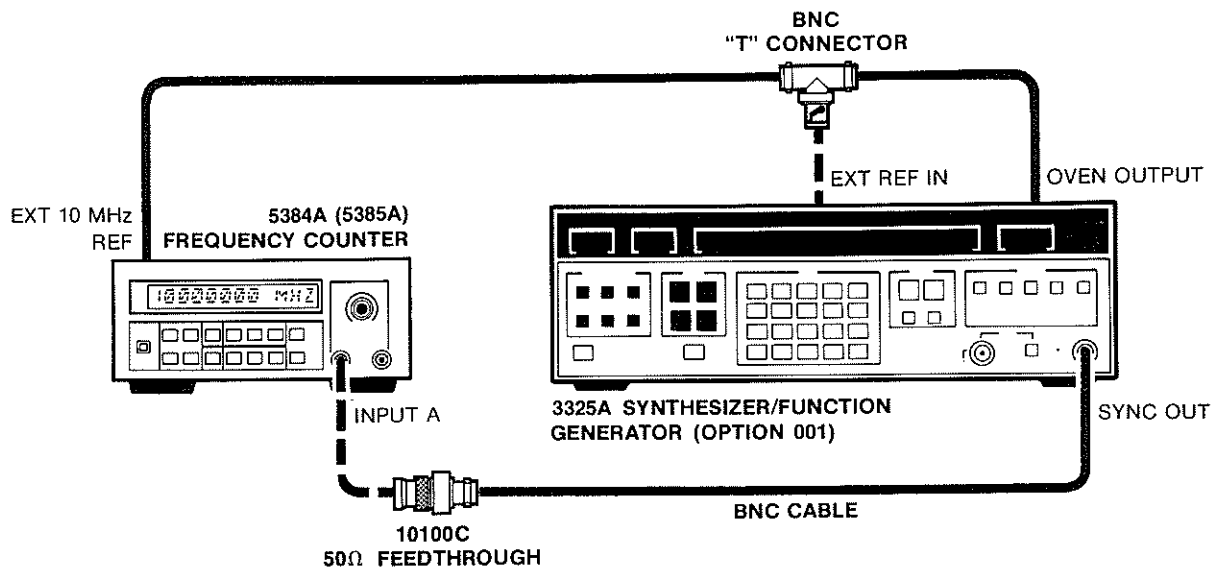


Figure 4-6. Channel A Filter and Attenuator Test Setup

3. Press the DISPLAY DIGITS "up" arrow twice.
4. Set the 3325A to output a 110 kHz sinewave at 10 mV rms. Verify that the counter displays 110.0000000K  $\pm 3$  millihertz, with a continuous indication above "A" and a flashing indicator above "GATE".
5. Enable the channel A FILTER function; observe that the 5384A/5385A reading becomes erroneous. An indicator arrow appears above the FILTER as well as "A" and "GATE". Disable the FILTER function and observe the counter displaying the same value as in step 4. Record the results on the test card (Pass/Fail).
6. Enable the channel A X20 ATTENUATOR; observe the 5384A/5385A display showing eight zeros with indicators above "ATTN" and "A" only. Disable the X20 ATTN function, and observe the counter displaying the same value as in step 4. Record the results on the test card (Pass/Fail).

**PERFORMANCE TEST CARD**

HEWLETT-PACKARD MODEL 5384A/5385A  
FREQUENCY COUNTER

Date \_\_\_\_\_

Serial Number \_\_\_\_\_

Test Performed By \_\_\_\_\_

TEST	DESCRIPTION	PASS	FAIL	ACTUAL VALUE
I.	POWER-UP CHECK			
	Starburst			
	Address			
	Eight zeros			
II.	CHANNEL A FREQUENCY RESPONSE AND SENSITIVITY			
	10 Hz to 100 Hz			
	10 Hz			_____
	50 Hz			_____
	100 Hz			_____
	100 Hz to 20 MHz			
	100 kHz			_____
	1 MHz			_____
	20 MHz			_____
	20 MHz to 100 MHz			
	50 MHz			_____
	75 MHz			_____
	100 MHz			_____
III.	CHANNEL B FREQUENCY RESPONSE AND SENSITIVITY 5384A			
	50 MHz to 200 MHz			
	50 MHz			_____
	125 MHz			_____
	200 MHz			_____
	200 MHz to 225 MHz			
	200 MHz			_____
	210 MHz			_____
	225 MHz			_____
IV.	CHANNEL B FREQUENCY RESPONSE AND SENSITIVITY TEST FOR 5385A			
	90 MHz to 1000 MHz			
	90 MHz			_____
	400 MHz			_____
	750 MHz			_____
	1000 MHz			_____
V.	PERIOD A TEST			
VI.	CHANNEL A FILTER AND ATTENUATOR			
	Filter			
	Attenuator			

## SECTION V ADJUSTMENTS

### 5-1. INTRODUCTION

5-2. This section describes the adjustments required to maintain the HP 5384A/5385A operating characteristics within specifications. Adjustments should be made when required, such as after a performance test failure or when components are replaced that may affect an adjustment.

5-3. *Table 5-1* lists the adjustment procedures, in the recommended order of performance, and indicates the adjustable components involved.

### 5-4. EQUIPMENT REQUIRED

5-5. The test equipment required for the adjustment procedures is listed in *Table 1-4*, Recommended Test Equipment. Substitute instruments may be used if they meet the critical specifications.

### 5-6. ADJUSTMENT LOCATIONS

5-7. Adjustment locations are identified in the procedure for each adjustment.

### 5-8. SAFETY CONSIDERATIONS

5-9. This section contains warnings that must be followed for your protection and to avoid damage to the instrument.

**WARNING**

**MAINTENANCE DESCRIBED HEREIN IS PERFORMED WITH POWER SUPPLIED TO THE INSTRUMENT, AND PROTECTIVE COVERS REMOVED. SUCH MAINTENANCE SHOULD BE PERFORMED ONLY BY SERVICE-TRAINED PERSONNEL WHO ARE AWARE OF THE HAZARDS INVOLVED (FOR EXAMPLE, FIRE AND ELECTRICAL SHOCK). WHERE MAINTENANCE CAN BE PERFORMED WITHOUT POWER APPLIED, THE POWER SHOULD BE REMOVED.**

**BEFORE ANY REPAIR IS COMPLETED, ENSURE THAT ALL SAFETY FEATURES ARE INTACT AND FUNCTIONING, AND THAT ALL NECESSARY PARTS ARE CONNECTED TO THEIR PROTECTIVE GROUNDING MEANS.**

### 5-10. 5384A/5385A ADJUSTMENT PROCEDURES

*Table 5-1. Adjustments*

ASSEMBLY	ADJUSTMENT	COMMENTS
A1 Motherboard	A1R77	5384A/5385A +3V dc Adjustment
A1 Motherboard	A1R43	5384A/5385A Chan. A Input Amplifier Adj
A1 Motherboard	A1R32	5384A Chan. B Input Amplifier Adjust
A1 Motherboard	A1R34	5385A Chan. B Input Amplifier Adjust
A1 Motherboard	A1C65 A1C66	Standard Osc. Adj
A1 Motherboard	Y1B	2 TCXO Osc. Adjust
A1 Motherboard	Y1A	Oven Osc. Adj
A3 Battery Chg	A3R26	Fast Chg Threshold Adjustment
A3 Battery Chg	A3R25	Fast Chg Current Adj

### 5-11. 5384A/5385A +3V dc Adjustment Procedure

5-12. The only voltage supply in the 5384A and 5385A that requires adjustment is the +3 Volts. To perform this adjustment, proceed as follows:

- a. Switch the counter from STBY to ON.
- b. Connect the positive terminal of the DVM to TP1 and the negative terminal to chassis ground.
- c. Adjust A1R77 for a DVM reading of 3.00 Volts,  $\pm 20$  mV.
- d. Switch the counter from ON to STBY. Disconnect the test equipment.

### 5-13. 5384A/5385A Channel A Input Amplifier Adjustment Procedure

5-14. To perform the sensitivity adjustment, proceed as follows:

- a. Remove the 5384A top and bottom covers; remove top RFI shield, P/N 05384-00009 (longer screw guides), and bottom RFI shield, P/N 05384-00010. Locate variable resistor A1R43 on the A1 Motherboard. Refer to A1 component locator in section VIII.



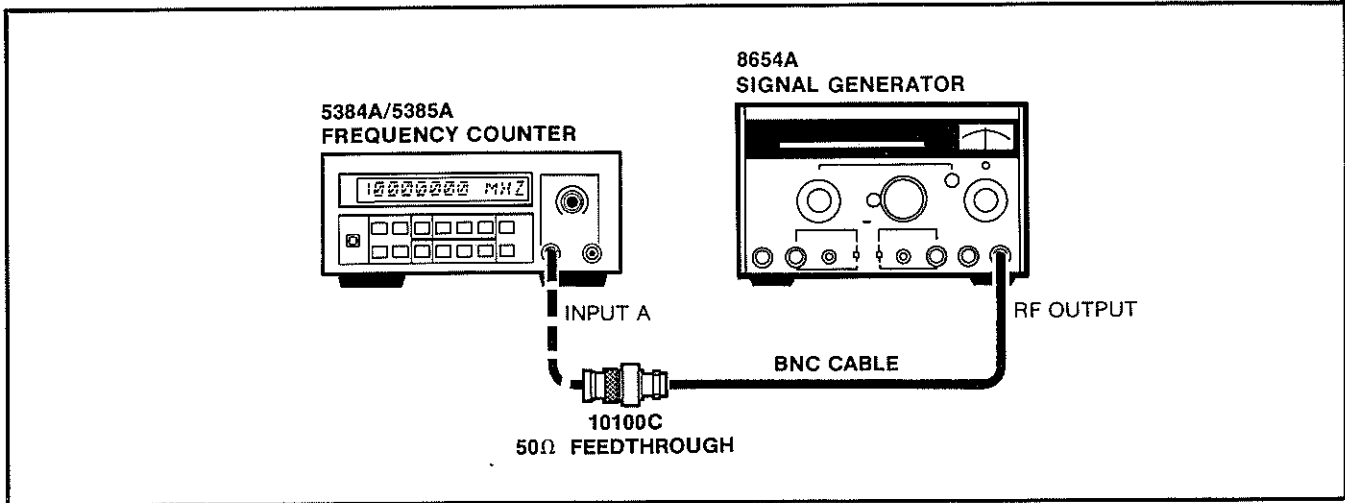


Figure 5-1. Channel A Input Amplifier Adjustment Setup

b. Connect the 8654A Signal Generator as shown in Figure 5-1.

c. Cycle the power switch from STBY to ON.

d. Set the 8654A to output a 100 MHz sine wave at 9 mV rms. Adjust A1R43 for a stable display count. Vary the frequency from 100 MHz to 10 MHz, and verify that the counter shows a stable display throughout.

e. Connect a suitable generator to INPUT A that can provide a 25 mV rms sine wave between 10 Hz and 100 Hz. Vary the generator frequency between 10 Hz and 100 Hz and verify that the displayed counts are stable.

b. Cycle the power switch from STBY to ON and press the **FREQ B** button on 5384A front panel.

c. Set the 8654A to output a 100 MHz sine wave at 9 mV rms. Adjust A1R32 for a stable display count. Vary the frequency from 100 MHz to 10 MHz, and verify that the counter shows a stable display.

d. Connect a suitable generator to INPUT B that can provide a 25 mV rms sine wave between 10 Hz and 100 Hz. Vary the generator frequency between 10 Hz and 100 Hz and verify that the displayed counts are stable. This completes the adjustment for Channels A and B; switch the counter to STBY and disconnect all test equipment.

### 5-15. 5384A Channel B Input Amplifier Adjustment Procedure

5-16. To perform the sensitivity adjustment proceed as follows:

a. Connect the 8654A Signal Generator as shown in Figure 5-2.

### 5-17. 5385A Channel B Input Amplifier Adjustment Procedure

5-18. To perform the sensitivity adjustments, proceed as follows:

a. Cycle the power switch from STBY to ON. Press **FREQ B** button on the front panel.

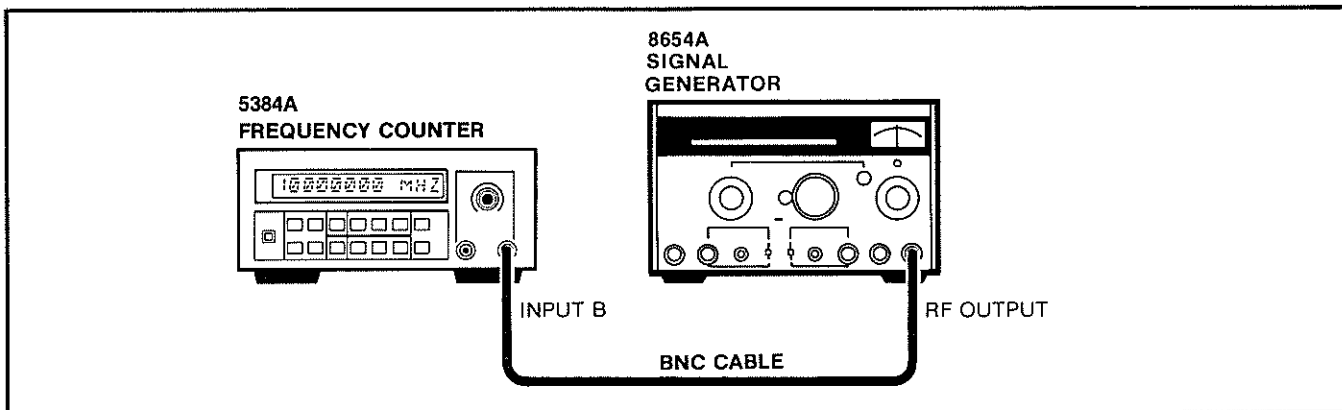


Figure 5-2. 5384A Channel B Input Amplifier Adjustment Setup

b. Insure that no signal is applied to the INPUT B of the 5385A.

c. Locate variable resistor A1R34 on the A1 Motherboard. Refer to the A1 component locator in section VIII.

5-19. SELF OSCILLATING ADJUSTMENT

a. Set A1R34 to the full clockwise position; observe the counter displaying 950 MHz,  $\pm 75$  MHz.

b. Connect instruments as shown in *Figure 5-3*.

5-20. SENSITIVITY ADJUSTMENT

a. Set the 8660C to output a 100 MHz sine wave, varying the 86603A vernier until the HP 436A Power Meter reads  $-24$  dBm,  $\pm 0.3$  dBm Adjust A1R34 for a stable display of 100.00000 MHz,  $\pm 10$  Hz.

b. Vary the frequency range from 90 MHz to 1000 MHz, and verify the 5385A displays the correct count.

c. Turn the 5385A and the 8660C off, and disconnect all test equipment.

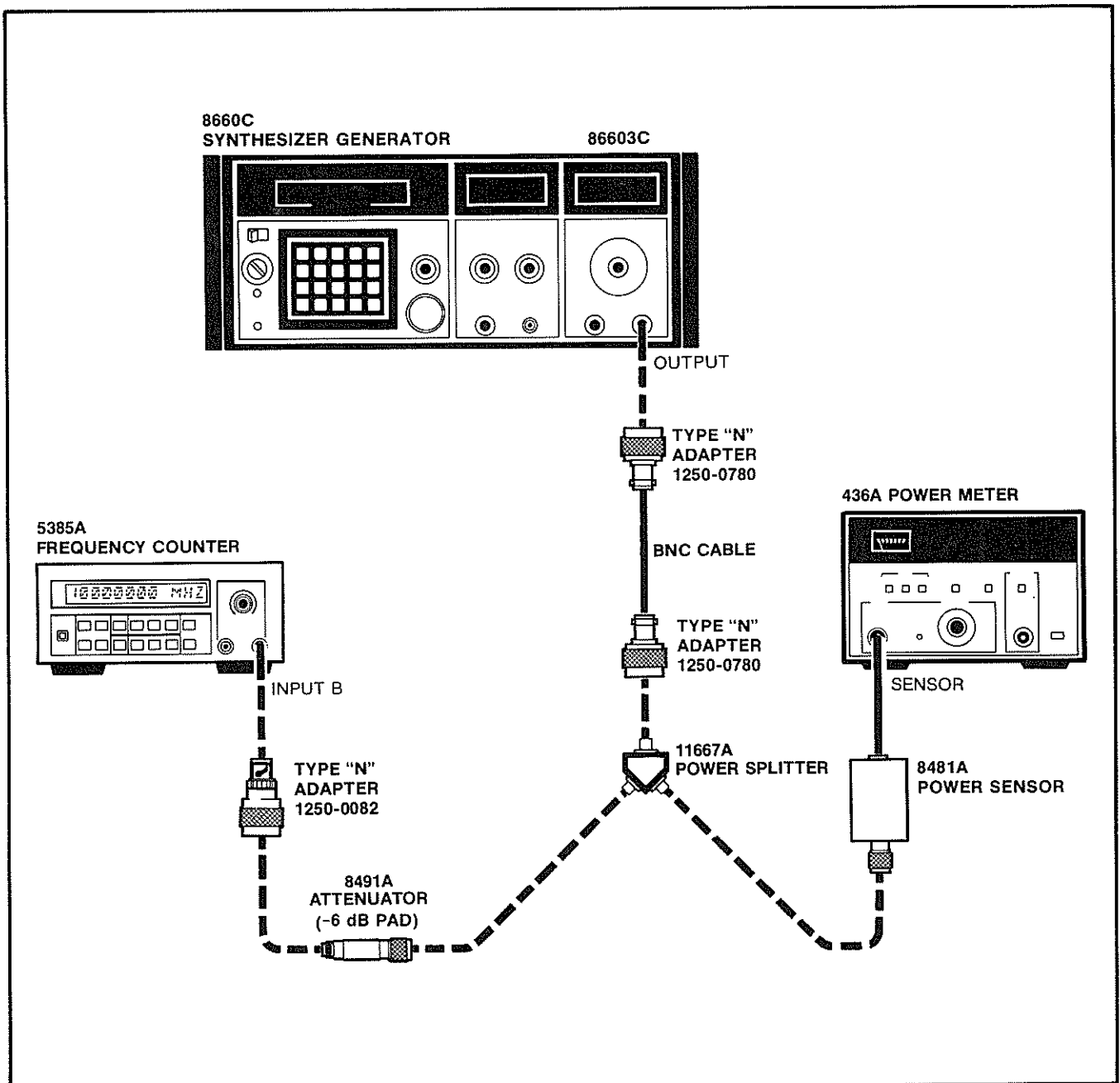


Figure 5-3. 5385A Channel B Sensitivity Adjustment Setup

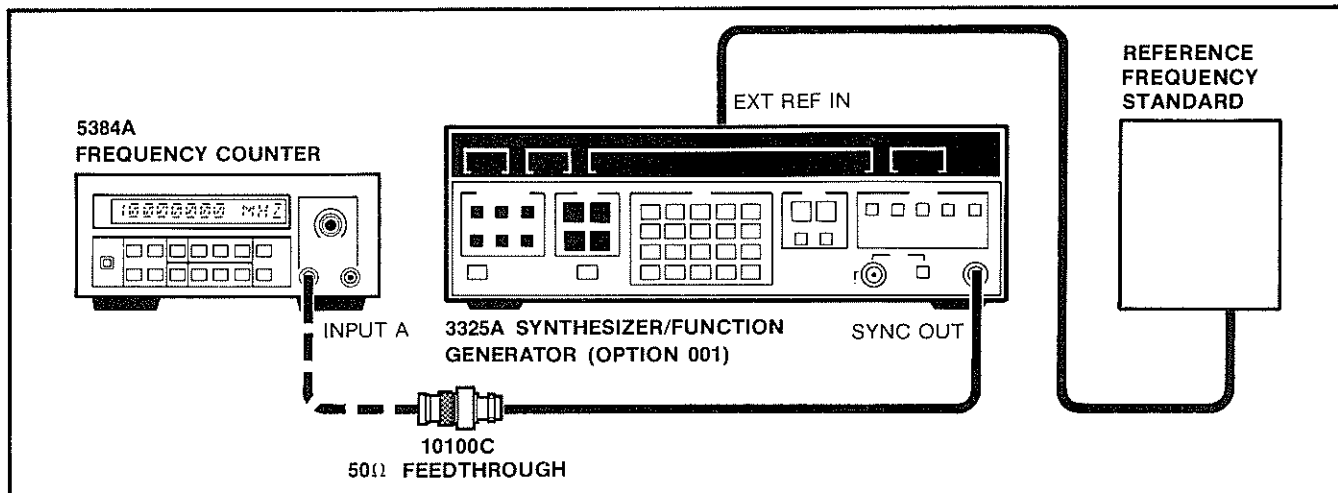


Figure 5-4. Standard Oscillator Adjustment Test Setup

**5-21. Standard Oscillator Adjustment Procedures**

5-22. To perform the standard oscillator adjustment, proceed as follows:

- a. Connect the 3325A Synthesizer/Function Generator as shown in Figure 5-4.
- b. Cycle the 5384A from STBY to ON.
- c. Set the 3325A Synthesizer/Function Generator to 10.000000 MHz at 100 mV rms. The 3325A should be locked to the house standard, if available.
- d. Adjust A1C66 (fine adjustment, see Figure 5-5) until the 5384A displays 10.000000 E6 ±2 counts. If A1C66 does not have enough range for this adjustment,

adjust A1C65 (course adjustment, see Figure 5-6) until the display is close enough for fine adjustment with A1C66.

- e. For access to A1C65, remove the top cover and the interface board.
- f. Remove the top cover by removing the four screws located at the bottom of the 5384A.
- g. Remove the interface board by unplugging its ribbon cable, removing the two screws on the back panel, then pulling the board up and off the plastic support post.
- h. Make course adjustment if necessary. See part "d" of this procedure.

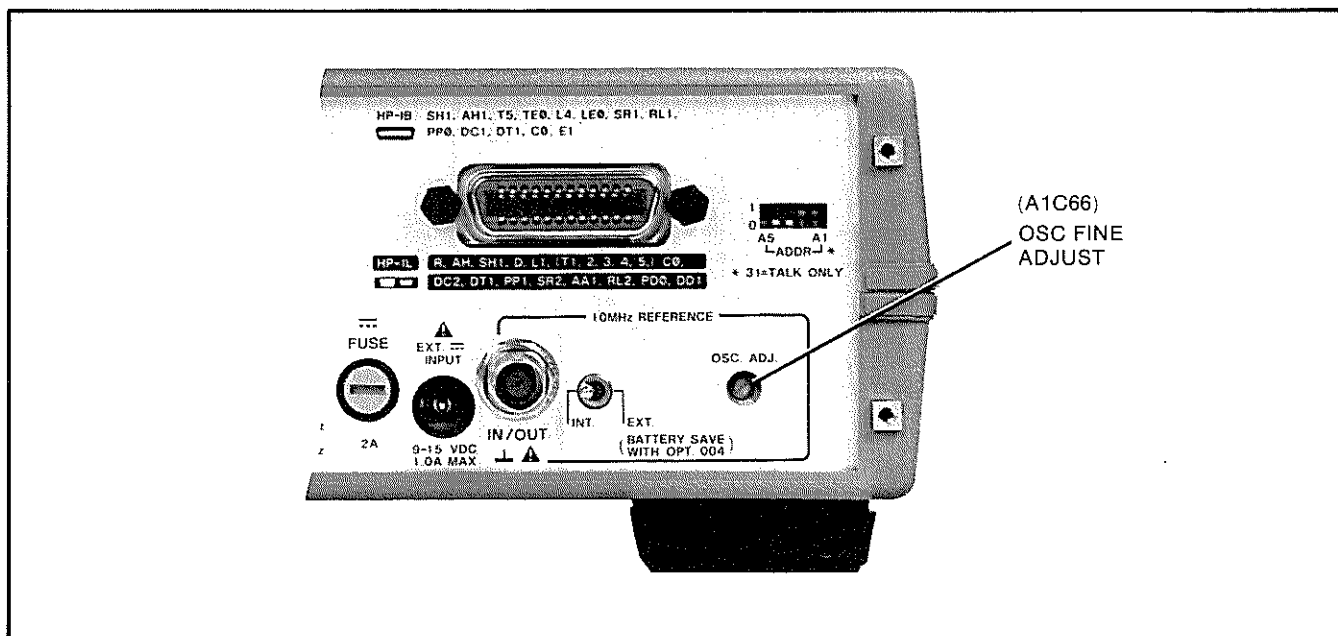


Figure 5-5. Standard Oscillator Adjustment

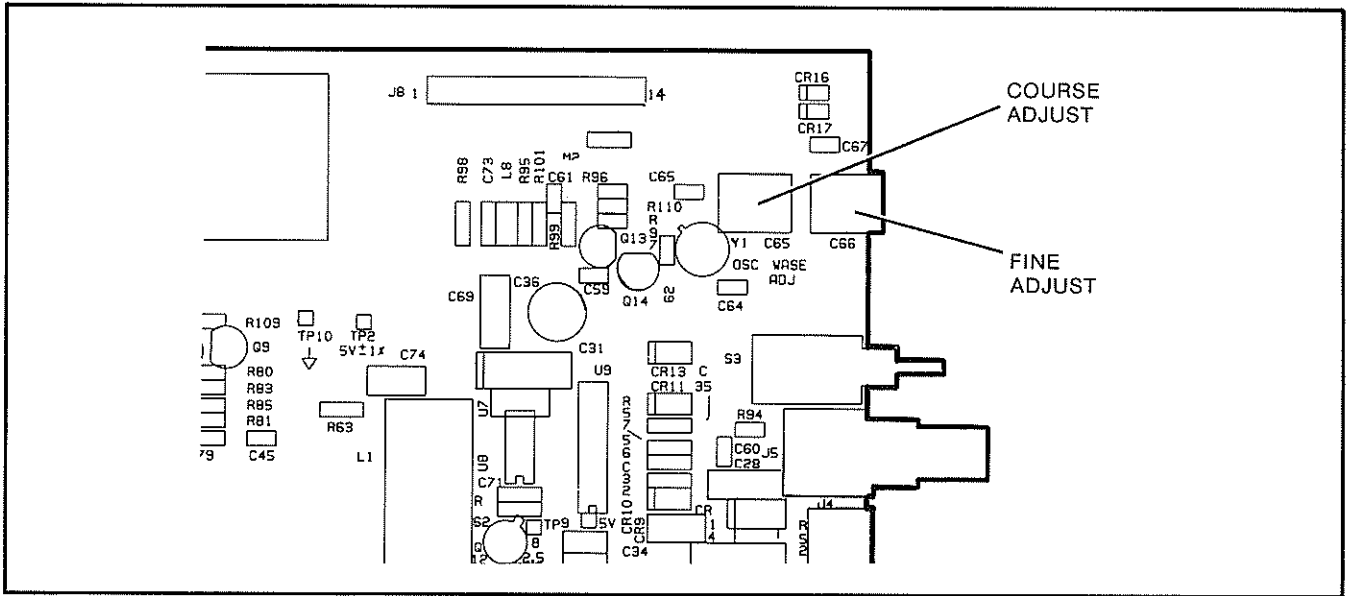


Figure 5-6. Standard Oscillator Course and Fine Adjustment Location

i. If removal of the top cover and interface board was required for oscillator adjustment, reinstall the interface board and top cover.

j. This completes the Standard Oscillator Adjustment.

40°C), then the TCXO must be offset by the amount labeled on its cover. This is to keep the TCXO frequency within the manufacturers temperature specifications. In this case use the procedure in paragraph 5-26. The TCXO is factory set for use at 25°C.

### 5-23. TCXO Adjustment Procedure

### 5-25. Adjustment of the TCXO at 25°C

5-24. Two procedures are given for the adjustment of the TCXO (Temperature Compensated Crystal Oscillator). If the operation of the counter will be solely at 25°C (78°F), then adjust the oscillator frequency as close as possible to 10 MHz using the procedure in paragraph 5-25. If the operation of the counter will be over the full temperature range (0° to

a. Connect a house standard (reference frequency) to the external SYNC input of a 1740A oscilloscope as shown in Figure 5-7. Set the 1740A oscilloscope to External SYNC.

b. Connect the 5384A/5385A rear panel 10 MHz REFERENCE IN/OUT to the channel A input of the 1740A oscilloscope as shown in Figure 5-7.

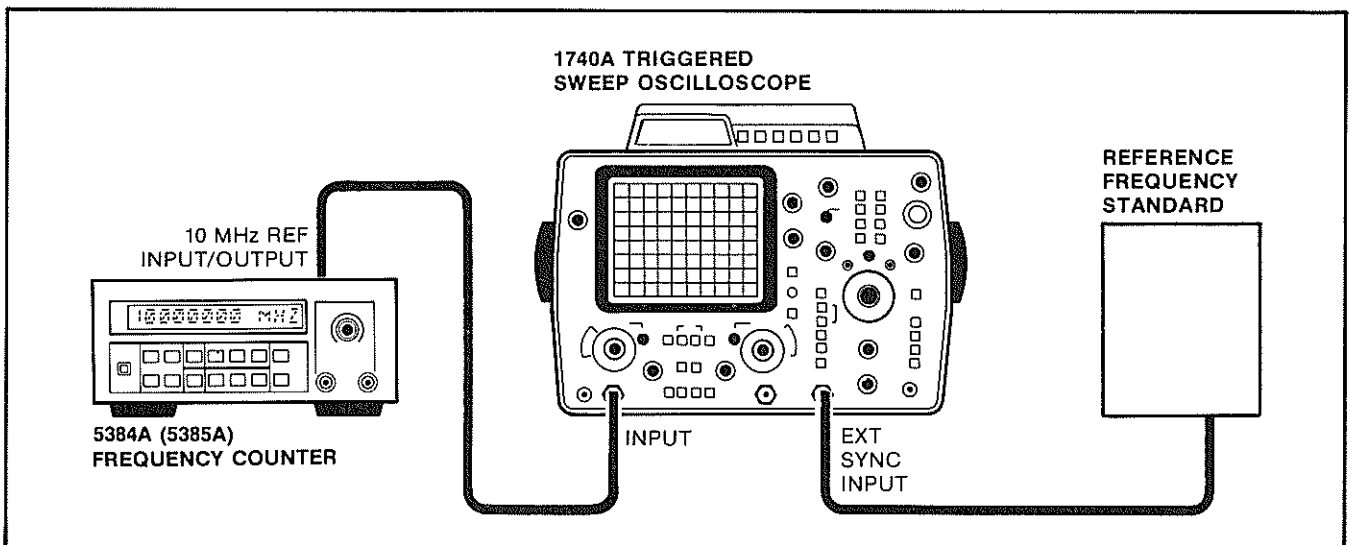


Figure 5-7. TCXO Adjustment Test Setup.

c. Adjust the TCXO frequency for minimum sideways movement of the 10 MHz signal with OSC ADJ on the TCXO.

d. By timing the sideways movement (in cm/second), the approximate offset can be determined based on the 1740A oscilloscope sweep speed as shown Table 5-2.

e. This completes the adjustment of the TCXO for use at 25°C.

Table 5-2. Approximate Offset Determination Table

MOVEMENT	SWEEP SPEED			NOTES
	1 $\mu$ s/cm	0.1 $\mu$ s/cm	0.01 $\mu$ s/cm	
1cm/s	1 $\times 10^{-6}$	1 $\times 10^{-7}$	1 $\times 10^{-8}$	Time scope trace movement with second hand of watch or clock
1cm/10s	1 $\times 10^{-7}$	1 $\times 10^{-8}$	1 $\times 10^{-9}$	
1cm/1000s	1 $\times 10^{-8}$	1 $\times 10^{-9}$	1 $\times 10^{-10}$	

For example, if the trace moves 1 centimetre in 10 seconds and the sweep speed is 0.01  $\mu$ s/cm, the oscillator signal is within 1 $\times 10^{-9}$  of the reference frequency.

### 5-26. Adjustment Of The TCXO With Offset (0° to 40°C).

a. To observe the offset stamped on the label of the TCXO, remove the top cover by removing the four screws located in the bottom half of the cabinet. For access to the two screws at the rear of the counter, remove the rear feet.

b. Connect a house standard (reference frequency) to the EXT FREQ STD INPUT of a high resolution counter such as an HP 5345A Electronic Counter, as shown in Figure 5-8.

c. Connect the 5384A/5385A rear panel 10 MHz REFERENCE IN/OUT to the 5345A Channel A Input BNC.

d. Set the 5345A to FREQUENCY A, GATE TIME to 1 second, AUTO DISPLAY, and SEP.

e. Adjust the TCXO frequency to 10 MHz  $\pm$  the offset labeled on the cover. For example, if the offset is +3.5 Hz, then the TCXO should be adjusted to a frequency of 10.0000035 MHz on the 5345A display at a room temperature of +25°C.

f. Reinstall covers; the TCXO offset adjustment is complete.

### 5-27. Oven Oscillator Adjustment Procedure

5-28. The following procedures describes the adjustment of the Oven Oscillator.

a. Remove the top cover by removing the four screws located in the bottom half of the cabinet. (For access to the two screws at the rear of the counter, remove the rear feet.) Lift off the top.

b. Adjust the +3V dc power supply as described in the 5384A/5385A +3V dc Adjustment Procedure.

c. The 5384A/5385A should now be allowed to operate for at least 30 minutes before proceeding with the oscillator adjustment.

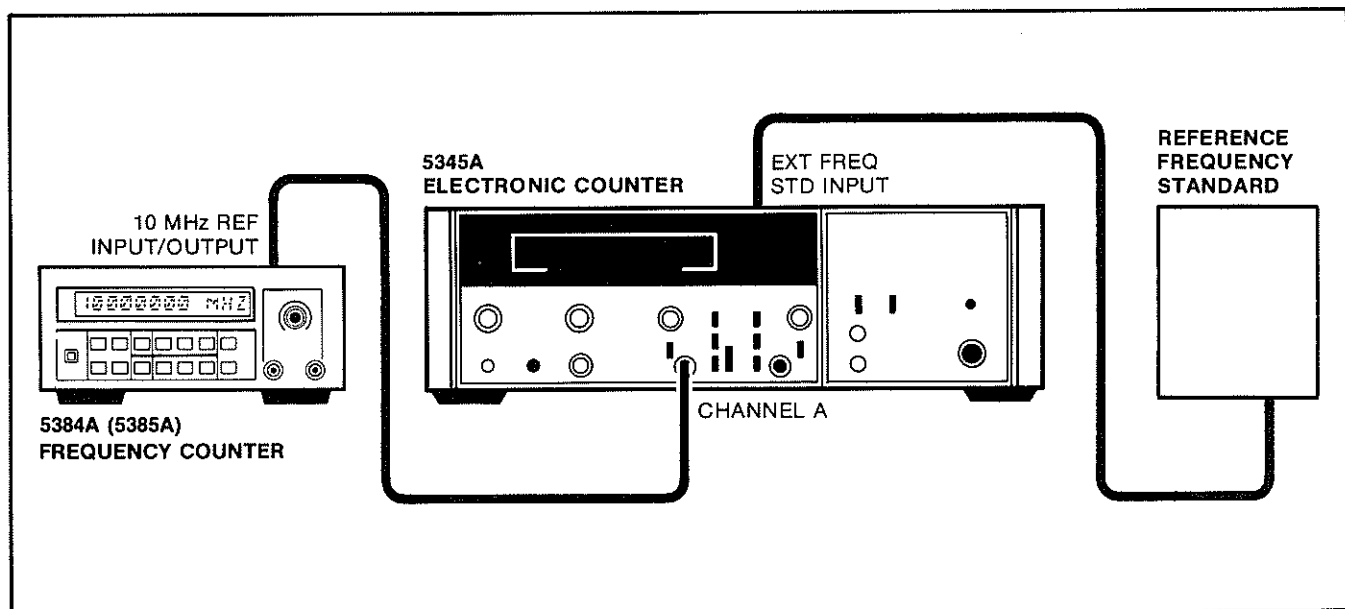


Figure 5-8. TCXO Offset Adjustment, 0° to 40°C

d. Connect the output of an 8660C to the 5384A/5385A Channel A Input BNC through a 50-ohm feedthrough as shown in *Figure 5-9*.

e. Set the 8660C Synthesizer/Generator to 100.000000 MHz at 100 mV rms. The 8660C must be referenced to a house standard.

f. Cycle the 5384A/5385A from STDBY to ON.

g. Turn the adjustment screw on the oven oscillator for a reading of 100.000000 MHz  $\pm 1$  count.

h. This completes the oven oscillator adjustment. Replace the cover to the counter; the counter should continue displaying 100.000000 MHz  $\pm 1$  count.

### 5-29. 5384A/5385A Battery Charger Adjustment Procedure

5-30. The (A3) Battery Charger board requires adjustment if U1, U2, or Q1 have been replaced.

5-31. To perform the battery charger adjustments, proceed as follows:

a. Remove the top cover but leave the Battery Charger circuit connected (via ribbon cable W2).

b. Apply power and allow 15-30 minutes for the circuitry to stabilize at room temperature.

### 5-32. Fast Charge Threshold Adjustment Procedure

a. Connect the negative lead of the DVM to chassis ground. Connect the positive lead of the DVM to U2 pin 13. See *Figure 8-7*, A3 schematic diagram.

b. Adjust A3R26 for a reading of 1.20V dc on the DVM.

### 5-33. Fast Charge Current Adjustment Procedure

a. Connect the positive lead of the DVM directly to the battery side resistor lead of A3R1.

b. Connect the negative lead of the DVM directly to the ground side resistor lead A3R1.

c. To place battery in a fast charge mode, short U2 pin 12 to ground by placing a short across A3R20.

d. Adjust A3R25 for a reading of .025V dc on the DVM.

e. The Battery Charger Adjustments are now complete; reinstall cover.

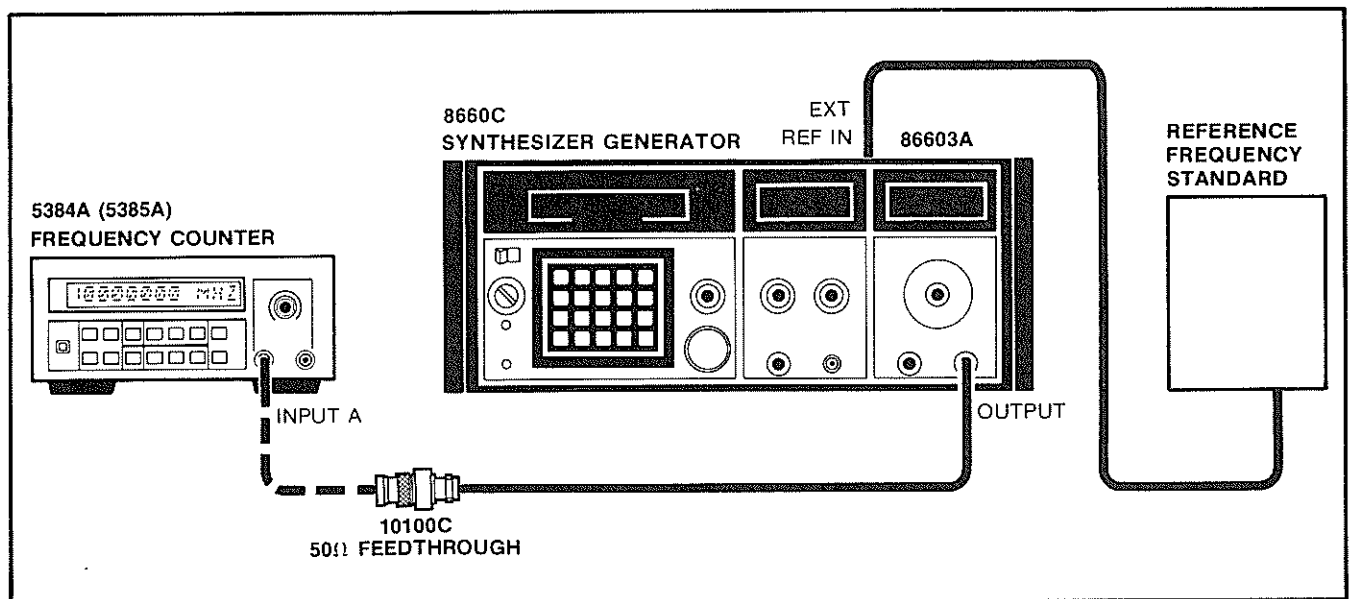


Figure 5-9. Oven Oscillator Adjustment

## SECTION VI REPLACEABLE PARTS

### 6-1. INTRODUCTION

6-2. This section contains information for ordering parts. *Table 6-1* lists abbreviations used in the parts list and throughout the manual. *Table 6-2* lists all replaceable parts in reference designation order. *Table 6-3* contains the name and addresses that correspond with the manufacturer's code numbers.

### 6-3. ABBREVIATIONS

6-4. *Table 6-1* lists abbreviations used in the parts lists, schematics, and throughout the manual. In some cases, two forms of the abbreviations are used, one all in capital letters, and one partial or no capitals. This occurs because the abbreviations in the parts are always all capitals. However, in the schematics and other parts of the manual, other abbreviations are used with both lower case and upper case letters.

### 6-5. REPLACEABLE PARTS LISTS

6-6. *Table 6-2* is the list of replaceable parts and is organized as follows:

- a. Electrical assemblies and their components in alphanumerical order by reference designation.
- b. Chassis-mounted parts in alphanumerical order by reference designation.
- c. Miscellaneous parts.

6-7. The information given for each part consists of the following:

- a. The Hewlett-Packard part number.
- b. Part number check digit (CD).
- c. The total quantity (Qty) used in the instrument.
- d. The description of the part.

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

f. The manufacturer's number for the part.

6-8. The total quantity for each part is given only once at the first appearance of the part number in the list.

### 6-9. ORDERING INFORMATION

6-10. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number (with the check list) indicate the quantity required, and address the order to the nearest Hewlett-Packard office. The check digit ensures accurate and timely processing of your order.

6-11. To order a part that is not listed in the replaceable parts table, include the instrument model number, 5384A or 5385A serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

### 6-12. DIRECT MAIL ORDER SYSTEM

6-13. Within the USA, Hewlett-Packard can supply parts through a direct mail order system. Advantages of using the system are:

a. Direct ordering and shipment from the HP Parts Center in Mountain View, California.

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

6-14. Mail order forms and specific ordering information is available through your local HP office. Address and phone numbers are located at the back of this manual.

## REFERENCE DESIGNATIONS

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

<p><b>A</b> = ampere <b>ac</b> = alternating current <b>ACCESS</b> = accessory <b>ADJ</b> = adjustment <b>A/D</b> = analog-to-digital <b>AF</b> = audio frequency <b>AFC</b> = automatic frequency control <b>AGC</b> = automatic gain control <b>AL</b> = aluminum <b>ALC</b> = automatic level control <b>AM</b> = amplitude modulation <b>AMPL</b> = amplifier <b>APC</b> = automatic phase control <b>ASSY</b> = assembly <b>AUX</b> = auxiliary <b>AVG</b> = average <b>AWG</b> = American wire gauge <b>BAL</b> = balance <b>BCD</b> = binary coded decimal <b>BD</b> = board <b>BE CU</b> = beryllium copper <b>BFO</b> = beat frequency oscillator <b>BH</b> = binder head <b>BKDN</b> = breakdown <b>BP</b> = bandpass <b>BPF</b> = bandpass filter <b>BRS</b> = brass <b>BWO</b> = backward-wave oscillator <b>CAL</b> = calibrate <b>ccw</b> = counterclockwise <b>CER</b> = ceramic <b>CHAN</b> = channel <b>cm</b> = centimeter <b>CMO</b> = coaxial <b>COEF</b> = coefficient <b>COM</b> = common <b>COMP</b> = composition <b>COMPL</b> = complete <b>CONN</b> = connector <b>CP</b> = cadmium plate <b>CRT</b> = cathode-ray tube <b>CTL</b> = complementary transistor logic <b>CW</b> = continuous wave <b>cw</b> = clockwise <b>D/A</b> = digital-to-analog <b>dB</b> = decibel <b>dBm</b> = decibel referred to 1 mW <b>dc</b> = direct current <b>deg</b> = degree (temperature interval or difference) <b>°</b> = degree (plane angle) <b>°C</b> = degree Celsius (centigrade) <b>°F</b> = degree Fahrenheit <b>°K</b> = degree Kelvin <b>DEPC</b> = deposited carbon <b>DET</b> = detector <b>diam</b> = diameter <b>DIA</b> = diameter (used in parts list) <b>DIFF AMPL</b> = differential amplifier <b>div</b> = division <b>DPDT</b> = double-pole, double-throw <b>DR</b> = drive <b>DSB</b> = double sideband <b>DTL</b> = diode transistor logic <b>DVM</b> = digital voltmeter <b>ECL</b> = emitter coupled logic <b>EMF</b> = electromotive force <b>EDP</b> = electronic data processing <b>ELECT</b> = electrolytic <b>ENCAP</b> = encapsulated <b>EXT</b> = external <b>F</b> = farad <b>FET</b> = field-effect transistor <b>F/F</b> = flip-flop <b>FH</b> = flat head <b>FOL H</b> = fillister head <b>FM</b> = frequency modulation <b>FP</b> = front panel <b>FREQ</b> = frequency <b>FXD</b> = fixed <b>g</b> = gram <b>GE</b> = germanium <b>GHz</b> = gigahertz <b>GL</b> = glass <b>GND</b> = ground(ed) <b>H</b> = henry <b>h</b> = hour <b>HET</b> = heterodyne <b>HEX</b> = hexagonal</p>	<p><b>HD</b> = head <b>HDW</b> = hardware <b>HF</b> = high frequency <b>HG</b> = mercury <b>HI</b> = high <b>HP</b> = Hewlett-Packard <b>HPF</b> = high pass filter <b>HR</b> = hour (used in parts list) <b>HV</b> = high voltage <b>Hz</b> = hertz <b>IC</b> = integrated circuit <b>ID</b> = inside diameter <b>IF</b> = intermediate frequency <b>IMPG</b> = impregnated <b>IN</b> = inch <b>INCD</b> = incandescent <b>INCL</b> = include(s) <b>INP</b> = input <b>INS</b> = insulation <b>INT</b> = internal <b>kg</b> = kilogram <b>KHz</b> = kilohertz <b>kΩ</b> = kilohm <b>kV</b> = kilovolt <b>lb</b> = pound <b>LC</b> = inductance-capacitance <b>LED</b> = light-emitting diode <b>LF</b> = low frequency <b>LG</b> = long <b>LH</b> = left hand <b>LIM</b> = limit <b>LIN</b> = linear taper (used in parts list) <b>lin</b> = linear <b>LK WASH</b> = lockwasher <b>LO</b> = low; local oscillator <b>LOG</b> = logarithmic taper (used in parts list) <b>log</b> = logarithm(ic) <b>LFP</b> = low pass filter <b>LV</b> = low voltage <b>m</b> = metre (distance) <b>mA</b> = milliamperes <b>MAX</b> = maximum <b>MΩ</b> = megohm <b>MEG</b> = meg (10<sup>6</sup>) (used in parts list) <b>MET FLM</b> = metal film <b>MET OX</b> = metal oxide <b>MF</b> = medium frequency; microfarad (used in parts list) <b>MFR</b> = manufacturer <b>mg</b> = milligram <b>MHz</b> = megahertz <b>mH</b> = millihenry <b>mho</b> = conductance <b>MIN</b> = minimum <b>min</b> = minute (time) <b>...</b> = minute (plane angle) <b>MINAT</b> = miniature <b>mm</b> = millimetre <b>MOD</b> = modulator <b>MOM</b> = momentary <b>MOS</b> = metal-oxide semiconductor <b>ms</b> = millisecond <b>MTG</b> = mounting <b>MTR</b> = meter (indicating device) <b>mV</b> = millivolt <b>mVac</b> = millivolt, ac <b>mVdc</b> = millivolt, dc <b>mVpk</b> = millivolt, peak <b>mVp-p</b> = millivolt, peak-to-peak <b>mVrms</b> = millivolt, rms <b>mW</b> = milliwatt <b>MUX</b> = multiplex <b>MY</b> = mylar <b>μA</b> = microampere <b>μF</b> = microfarad <b>μH</b> = microhenry <b>μmho</b> = micromho <b>μs</b> = microsecond <b>μV</b> = microvolt <b>μVac</b> = microvolt, ac <b>μVdc</b> = microvolt, dc <b>μVpk</b> = microvolt, peak <b>μVp-p</b> = microvolt, peak-to-peak <b>μVrms</b> = microvolt, rms <b>μW</b> = microwatt <b>nA</b> = nanoampere <b>NC</b> = no connection <b>N/C</b> = normally closed</p>	<p><b>NE</b> = neon <b>NEG</b> = negative <b>nF</b> = nanofarad <b>NI PL</b> = nickel plate <b>N/O</b> = normally open <b>NOM</b> = nominal <b>NORM</b> = normal <b>NPN</b> = negative-positive-negative <b>NPO</b> = negative-positive zero (zero temperature coefficient) <b>NRFR</b> = not recommended for field replacement <b>ns</b> = nanosecond <b>NSR</b> = not separately replaceable <b>nW</b> = nanowatt <b>OBD</b> = order by description <b>OD</b> = outside diameter <b>OH</b> = oval head <b>OP AMPL</b> = operational amplifier <b>OPT</b> = option <b>OSC</b> = oscillator <b>OX</b> = oxide <b>oz</b> = ounce <b>Ω</b> = ohm <b>P</b> = peak (used in parts list) <b>PAM</b> = pulse-amplitude modulation <b>PC</b> = printed circuit <b>PCM</b> = pulse-code modulation; pulse-count modulation <b>PDM</b> = pulse-duration modulation <b>pF</b> = picofarad <b>PH BRZ</b> = phosphor bronze <b>PHL</b> = philips <b>PIN</b> = positive-intrinsic-negative <b>PIV</b> = peak inverse voltage <b>pk</b> = peak <b>PL</b> = phase lock <b>PLO</b> = phase lock oscillator <b>PM</b> = phase modulation <b>PNP</b> = positive-negative-positive <b>P/O</b> = part of <b>POLY</b> = polystyrene <b>PORC</b> = porcelain <b>POS</b> = positive; position(s) (used in parts list) <b>POSN</b> = position <b>POT</b> = potentiometer <b>p-p</b> = peak-to-peak <b>PP</b> = peak-to-peak (used in parts list) <b>PPM</b> = pulse-position modulation <b>PREAMPL</b> = preamplifier <b>PRF</b> = pulse-repetition frequency <b>PRR</b> = pulse repetition rate <b>ps</b> = picosecond <b>PT</b> = point <b>PTM</b> = pulse-time modulation <b>PWM</b> = pulse-width modulation <b>PWV</b> = peak working voltage <b>RC</b> = resistance capacitance <b>RECT</b> = rectifier <b>REF</b> = reference <b>REG</b> = regulated <b>REPL</b> = replaceable <b>RF</b> = radio frequency <b>RFI</b> = radio frequency interference <b>RH</b> = round head; right hand <b>RLC</b> = resistance-inductance-capacitance <b>RMO</b> = rack mount only <b>rms</b> = root-mean-square <b>RND</b> = round <b>ROM</b> = read-only memory <b>R&amp;P</b> = rack and panel <b>RWW</b> = reverse working voltage <b>S</b> = scattering parameter <b>s</b> = second (time) <b>...</b> = second (plane angle) <b>S-B</b> = slow-blow fuse (used in parts list) <b>SCR</b> = silicon controlled rectifier; screw <b>SE</b> = selenium <b>SECT</b> = sections <b>SEMICON</b> = semiconductor <b>SHF</b> = superhigh frequency <b>SI</b> = silicon <b>SIL</b> = silver <b>SL</b> = slide <b>SNR</b> = signal-to-noise ratio <b>SPDT</b> = single-pole, double-throw <b>SPG</b> = spring <b>SR</b> = split ring</p>	<p><b>SPST</b> = single-pole, single-throw <b>SSB</b> = single sideband <b>SST</b> = stainless steel <b>STL</b> = steel <b>SQ</b> = square <b>SWR</b> = standing-wave ratio <b>SYNC</b> = synchronize <b>T</b> = timed (slow-blow fuse) <b>TA</b> = tantalum <b>TC</b> = temperature compensating <b>TD</b> = time delay <b>TERM</b> = terminal <b>TFT</b> = thin-film transistor <b>TGL</b> = toggle <b>THD</b> = thread <b>THRU</b> = through <b>TI</b> = titanium <b>TOL</b> = tolerance <b>TRIM</b> = trimmer <b>TSTR</b> = transistor <b>TTL</b> = transistor-transistor logic <b>TV</b> = television <b>TVI</b> = television interference <b>TWT</b> = traveling wave tube <b>U</b> = micro (10<sup>-6</sup>) (used in parts list) <b>UF</b> = microfarad (used in parts list) <b>UHF</b> = ultrahigh frequency <b>UNREG</b> = unregulated <b>V</b> = volt <b>VA</b> = voltampere <b>Vac</b> = volts ac <b>VAR</b> = variable <b>VCO</b> = voltage-controlled oscillator <b>Vdc</b> = volts dc <b>VDCW</b> = volts, dc, working (used in parts list) <b>V(F)</b> = volts, filtered <b>VFO</b> = variable-frequency oscillator <b>VHF</b> = very-high frequency <b>Vpk</b> = volts peak <b>Vp-p</b> = volts peak-to-peak <b>Vrms</b> = volts rms <b>VSWR</b> = voltage standing wave ratio <b>VTO</b> = voltage-tuned oscillator <b>VTVM</b> = vacuum-tube voltmeter <b>V(X)</b> = volts, switched <b>W</b> = watt <b>W/</b> = with <b>WIV</b> = working inverse voltage <b>WW</b> = wirewound <b>W/O</b> = without <b>YIG</b> = yttrium-iron-garnet <b>Zo</b> = characteristic impedance</p>
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**NOTE**  
All abbreviations in the parts list will be in upper case.

## MULTIPLIERS

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



Table 6-2. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	05384-60001	6	1	BOARD ASSEMBLY, MAIN (SERIES 2244)	28480	05384-60001
A1C1	0160-4704	9	1	CAPACITOR-FXD .01UF +-10% 500VDC CER	28480	0160-4704
A1C2	0160-5649	3	1	CAPACITOR-FXD 100PF +-5% 500VDC CER	28480	0160-5649
A1C3	0160-4385	2	1	CAPACITOR-FXD 15PF +-5% 200VDC CER 0+-30	28480	0160-4385
A1C4	0180-2816	2	1	CAPACITOR-FXD 68UF+-20% 10VDC TA	28480	0180-2816
A1C5	0180-0562	1	5	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	1760336X0010KA1
A1C6	0160-0573	2	1	CAPACITOR-FXD 4700PF +-20% 100VDC CER	28480	0160-0573
A1C7	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	1760336X0010KA1
A1C8	0160-0572	1	1	CAPACITOR-FXD 2200PF +-20% 100VDC CER	28480	0160-0572
A1C9	0160-3879	7	18	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C10	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C11	0160-4492	2	2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C12	0160-4492	2		CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C13	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	1760336X0010KA1
A1C14	0160-4423	9	1	CAPACITOR-FXD 470PF +-20% 500VDC CER	51642	200-500-X7R-471H
A1C15				NOT ASSIGNED		
A1C16	0180-2698	8	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C17	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C18	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C19	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C20	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C21	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C22	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C23	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C24				NOT ASSIGNED		
A1C25	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C26	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C27	0160-4554	7	8	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C28	0160-0127	2	3	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C29	0180-3276	0	2	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C30	0180-3276	0		CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C31	0180-0228	6	1	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X9015B2
A1C32	0160-4557	0	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104H050A
A1C33	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C34	0160-4819	7	2	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C35	0160-4822	2	3	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C36	0180-3279	3	1	CAPACITOR-FXD 390UF+100-10% 12VDC AL	28480	0180-3279
A1C37	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C38	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C39	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C40	0180-0291	3	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C41	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C42	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C43	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C44	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C45	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C46	0160-4822	2		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C47	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C48	0160-4822	2		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C49	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C50	0160-4810	8	1	CAPACITOR-FXD 330PF +-5% 100VDC CER	28480	0160-4810
A1C51	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C52	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C53	0160-0127	2		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C54	0180-2698	8		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C55	0160-4808	4	3	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C56	0160-4808	4		CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C57	0160-4808	4		CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C58	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C59	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C60	0160-3878	6	1	CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A1C61	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C62	0160-4801	7	1	CAPACITOR-FXD 100PF +-5% 100VDC CER	28480	0160-4801
A1C63	0160-4811	9	1	CAPACITOR-FXD 270PF +-5% 100VDC CER	28480	0160-4811
A1C64	0160-4786	7	1	CAPACITOR-FXD 27PF +-5% 100VDC CER 0+-30	28480	0160-4786
A1C65	0121-0105	4	1	CAPACITOR-V TRMR-CER 9-35PF 200V PC-MTG	52763	304324 9/35PF N650
A1C66	0121-0059	7	1	CAPACITOR-V TRMR-CER 2-8PF 350V PC-MTG	52763	304324 2/8PF NPD
A1C69	0160-0127	2		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C70	0160-4819	7		CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C71	0160-4805	1	1	CAPACITOR-FXD 47PF +-5% 100VDC CER 0+-30	28480	0160-4805
A1C72	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C73, A1C74				NOT ASSIGNED		
A2C75	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1CR1	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2N5 DO-35	28480	1901-0050
A1CR2	1901-0376	6	2	DIODE-GER PRP 35V 50MA DO-35	28480	1901-0376
A1CR3	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR4	1901-0535	9	1	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A1CR5	1901-0639	4	1	DIODE-PIN	28480	5082-3080

See introduction to this section for ordering information  
\*Indicates factory selected value

Models 5384A and 5385A  
Replaceable Parts

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1CR6	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR7	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR8	1706-0076	7	1	DIODE-FW BRDG 200V 2A	04713	MBA202
A1CR9	1084-0221	2	1	THYRISTOR-SCR VRRM=300	04713	MCR106-5
A1CR10	1702-3234	3	1	DIODE-ZNR 17.6V 5% DO-35 PD=.4W	28480	1702-3234
A1CR11	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR12	1701-0782	8	2	DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR13	1702-3110	4	1	DIODE-ZNR 5.9V 2% DO-35 PD=.4W TC=+.017%	28480	1702-3110
A1CR14	1701-0782	8	1	DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR15	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR16	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR17	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR18	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR19	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR20	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR21	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR22	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1CR23	1701-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1701-0050
A1E1	7170-0027	3	1	CORE-SHIELDING BEAD	28480	7170-0027
A1J1	1250-1782	9	2	CONNECTOR-RF BNC FEM PCH-PNL 50-OHM	28480	1250-1782
A1J2	1250-1782	9	2	CONNECTOR-RF BNC FEM PCH-PNL 50-OHM	28480	1250-1782
A1J3	1251-4743	0	1	CONNECTOR-AC PWR HP-9 MALE REC-FLG THRMPT	28480	1251-4743
A1J4	1251-8261	5	1	JACK POWER PCB MT	28480	1251-8261
A1J5	1250-1842	2	1	BNC RTANG PC HRT	28480	1250-1842
A1J6	1251-8304	7	1	CONN-POST TYPE 100-PIN-SPCG 8-CONT NOT ASSIGNED	28480	1251-8304
A1J7		4	1	CABLE ASSY 14 POST	28480	1251-7684
A1J8	1251-7684	6	1	CONN-POST TYPE 100-PIN-SPCG 14-CONT	28480	1251-8139
A1J9	1251-8139	6	1	CONN-POST TYPE 100-PIN-SPCG 14-CONT	28480	1251-8139
A1K1	0470-1317	3	1	RELAY-REED 1C 250MA 200VDC SVDC-COIL 3VA	28480	0470-1317
A1L1	7140-0710	4	1	INDUCTOR-FIXED NORM IND: 230UH @ 1.5ADC	28480	9140-0718
A1L2	9100-1788	6	4	CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1L3	9100-1788	6	6	CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1L4	9100-2562	6	1	INDUCTOR RF-CH-HLD 100UH 10%	28480	9100-2562
A1L6	9100-1788	6	6	CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1L7	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1M1	8159-0005	0	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A1Q1	1854-0215	1	5	TRANSISTOR NPN SJ PD=350MW FT=300MHZ	04713	2N3904
A1Q2	1855-0327	8	1	TRANSISTOR J-FET 2N4416 N-CHAN D-MODE	01275	2N4416
A1Q3	1853-0354	7	1	TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0354
A1Q4	1855-0414	4	1	TRANSISTOR J-FET 2N4393 N-CHAN D-MODE	04713	2N4393
A1Q5	1854-0215	1	4	TRANSISTOR NPN SJ PD=350MW FT=300MHZ	04713	2N3904
A1Q6	1854-0574	5	1	TRANSISTOR NPN SI PD=500MW FT=125MHZ	28480	1854-0574
A1Q7	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q8	1853-0015	7	2	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q9	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q10	1853-0363	8	1	TRANSISTOR PNP SI PD=50W FT=20MHZ	03508	X45H281
A1Q11	1854-0013	7	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A1Q12	1854-0477	7	1	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1Q13	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q14	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1R1	0678-8827	4	2	RESISTOR 1M 1% .125W F TC=0+-100	28480	0678-8827
A1R2	0757-0706	8	3	RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R3	0678-8827	4		RESISTOR 1M 1% .125W F TC=0+-100	28480	0678-8827
A1R4	0679-0071	6	2	RESISTOR 4.64M 1% .125W F TC=0+-100	28480	0679-0071
A1R5	0678-7276	5	1	RESISTOR 46.4K 1% .05W F TC=0+-100	24546	C3-1/8-T0-464K-F
A1R6	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R7	0757-0421	4	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R8	0678-3445	2	2	RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R9	0678-7236	7	4	RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R10	0678-7233	4	1	RESISTOR 750 1% .05W F TC=0+-100	24546	C3-1/8-T0-750R-F
A1R11	0678-7283	4	1	RESISTOR 90.9K 1% .05W F TC=0+-100	24546	C3-1/8-T0-9092-F
A1R12	0678-8812	7	1	RESISTOR 1 1% .125W F TC=0+-100	28480	0678-8812
A1R13	0678-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A1R14	0678-7244	7	2	RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R15	0678-3447	4	3	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R16	0678-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R17	1810-0541	4	1	NETWORK-RES 6-SIP MULTI-VALUE	28480	1810-0541
A1R18	1810-0219	3	1	NETWORK-RES 8-SIP 220.0 OHM X 4	01121	208B221
A1R19	0678-7220	9	3	RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R20	0678-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R21	0678-7249	2	2	RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R22	0757-0283	6	3	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R23	0678-7267	4	1	RESISTOR 19.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1962-F
A1R24	0678-7210	7	1	RESISTOR 82.5 1% .05W F TC=0+-100	24546	C3-1/8-T0-82R5-F
A1R25	0757-0706	8		RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R26	0757-0706	8		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R27	0698-7244	7		RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R28	0698-7249	2		RESISTOR 3.49K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3491-F
A1R29	0698-7236	7		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R30	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A1R31	0698-3437	2		RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A1R32	2100-0558	9	2	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	20480	2100-0558
A1R33	0698-3442	9	1	RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A1R34	0698-7245	2	1	RESISTOR 16.2K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1622-F
A1R35	0698-7236	7		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R36	0698-7229	8	6	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R37	0698-7205	0	3	RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A1R38	0698-7205	0		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A1R39	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R40	0698-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R41	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R42	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R43	2100-0558	9		RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	20480	2100-0558
A1R44	0698-7284	5	2	RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-100K-F
A1R45	0698-7209	4	1	RESISTOR 75 1% .05W F TC=0+-100	24546	C3-1/8-T0-75R0-F
A1R46	0698-7205	0		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A1R47	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R48	0698-7243	6	1	RESISTOR 1.96K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1961-F
A1R49	1010-0488	8	1	NETWORK-RES 8-SIP4.7K OHM X 4	20480	1010-0488
A1R50	0812-0021	8	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CM2R1-3-T2-47/100-J
A1R51	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R52	0757-0394	0	3	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R53	0698-3132	4	3	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R54	0757-1093	8	2	RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R55	0757-0465	6	3	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-100K-F
A1R56	0757-0407	6	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R57	0757-0289	2	1	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	HF4C1/8-T0-1332-F
A1R58	0757-0399	5	1	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A1R59	0757-0416	7	4	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R60	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R61	0698-3398	4	1	RESISTOR 46.4 1% .5W F TC=0+-100	20480	0698-3398
A1R62	0757-0200	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R63	0757-0200	7		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R64	0699-0071	6		RESISTOR 4.64K 1% .125W F TC=0+-100	20480	0699-0071
A1R65	1010-0370	7	1	NETWORK-RES 8-SIP220.0 OHM X 7	01121	200A221
A1R66	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R67	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R68	0698-3441	8	2	RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A1R69	0698-3441	8		RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A1R70	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R71	0698-7212	9		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R72	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R73	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-F
A1R74	0698-7219	6	1	RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-F
A1R75	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R76	0757-0419	0	1	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A1R77	2100-0554	5	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	20480	2100-0554
A1R78	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-100K-F
A1R79	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R80	0698-0082	7	5	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R81	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R82	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R83	0757-1093	8		RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R84	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R85	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R86	0698-3445	2		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R87	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R88	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R89	0698-3460	1	1	RESISTOR 422K 1% .125W F TC=0+-100	20480	0698-3460
A1R90	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R91	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R92	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R93	0757-0280	3	2	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R94	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R95	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R96	0698-7236	7		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R97	0698-7249	1	1	RESISTOR 3.16K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3161-F
A1R98	0757-0445	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-100K-F
A1R99	0757-0401	0	2	RESISTOR 180 1% .125W F TC=0+-100	24546	C4-1/8-T0-181-F
A1R100				NOT ASSIGNED		
A1R101	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R102	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F

See introduction to this section for ordering information  
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Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R103	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R104	0698-3152	8	1	RESISTOR 3.40K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A1R105	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R106	0837-0220	1	1	THERMISTOR ROD 10K-OHM TC=-3.83%/C-DEC	28480	0837-0220
A1R107	1810-0368	3	1	NETWORK-RES 6-SIP10.0K OHM X 5	01121	206A103
A1R108	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R109	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R110	0698-7284	5		RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1003-F
A1T1	9100-2684	3	1	TRANSFORMER-POWER 115/230; 48/60 HZ	28480	9100-2684
A1TP1	1251-0600	0	10	CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP2	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP3	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP4	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP5	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP6	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP7	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP8	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP9	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP10	1251-0600	0		CONNECTOR-SGL CNT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1U1	1820-2312	2	1	IC MISC	28480	1820-2312
A1U2-1	1818-0762	7	1	IC NMOS 32768 (32K) EPROM 450-NS 3-S	01295	TMS232JL
A1U2-2	1820-2650	1	1	NMOS 38P70 HPR	28480	1820-2650
A1U3	1820-3075	6	2	IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U4	1820-3075	6		IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U5	1820-3076	7	1	IC FF ECL/10KH D-H/S COM CLDCK DUAL	28480	1820-3076
A1U6	1858-0048	8	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	3L585	CA3127E
A1U7	1826-0904	6	1	IC-LM330T-5.0	28480	1826-0904
A1U8	1826-1544	0	1	V REF 8-DIP-C	04713	MC1403U
A1U9	1826-0428	9	1	IC 3524 MODULATOR 16-DIP-C	01295	SG3524J
A1U10	1826-0393	7	1	IC V RGLTR TO-220	27014	LH317T
A1U11	1858-0054	4	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	28480	1858-0054
A1U12	1826-0065	0	1	IC COMPARATOR PRCN 8-DIP-P PKG	50545	UPC311C
A1U13	1820-1425	6	1	IC SCHMITT-TRIG TTL LS NAND QUAD 2-INP	01295	SN74LS132N
A1U14	1820-2096	9	1	IC CNTR TTL LS 3IN DUAL 4-BIT	01295	SN74LS393N
A1U15	1820-1975	1	1	IC SHF-RCTR TTL LS NEG-EDGE-TRIG PRL-IN	01295	SN74LS165N
A1U16	1826-8501	9	1	IC MULTIPLEXR 2-CHAN-ANLG TRIPLE 16-DIP-P	04713	MC14053BCP
A1XU1	1200-0654	7	2	SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
A1XU2	1200-0654	7		SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
A1Y1	0410-0423	2	1	CRYSTAL-QUARTZ 10.000 MHZ	28480	0410-0423
A2W1	8120-4038	6	1	FLAT RIBBON ASSY 8-COND 2.5-IN-LG	28480	8120-4038
A1F1	2110-0201	0	1	FUSE .25A 250V TD 1.25X.25 UL	28480	2110-0201
A1F2	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	312002
R1	2100-2083	9	1	RESISTOR-VAR CONTROL CCP 20K 20% LIN	28480	2100-2083
S1	3101-2656	5	1	SS LTN SCL 90PC	28480	3101-2656
S2	3101-2644	1	1	SWITCH-PD DPDT ALTNG .5A 100VAC	28480	3101-2644
S3	3101-2453	0	1	SWITCH-TGL SUBMIN DPDT .02A 20VAC/DC PC	28480	3101-2453
W1	8120-1378	1	1	CABLE ASSY 18AWG 3-CONDCT JGK-JKT	28480	8120-1378
W1	8120-4168	3	1	CABLE ASSY 5384A	28480	8120-4168
W2	8120-4167	2	1	CBLY 14 PIN FT 26G	28480	8120-4167
W3	8150-0448	7	1	WIRE 24AWG BR 300V PVC 7X32 80C	28480	8150-0448
W4	8150-0447	8	1	WIRE 24AWG R 300V PVC 7X32 80C	28480	8150-0447
W5	8150-0450	1	1	WIRE 24AWG O 300V PVC 7X32 80C	28480	8150-0450
W6	8150-2846	3	1	WIRE 18AWG G/Y 300V PVC 19X30 105C	28480	8150-2846
XF1	2110-0269	0	2	FUSEHOLDER-CLIP TYPE.25D-FUSE	28480	2110-0269
XF2	2110-0642	3	1	FUSEHOLDER	28480	2110-0642
				MISCELLANEOUS		
	0340-0468	6	1	INSULATOR-XSTR NYLON	28480	0340-0468
	0340-0525	6	1	INSULATOR-XSTR ALUMINUM HD-ANDZ	28480	0340-0525
	0360-0040	2	1	TERMINAL-SLDR LUG LK-MTG FOR #1/4-SCR	28480	0360-0040
	0370-1005	2	1	KNOB-BASE-PTR 3/8 JGK .125-IN-ID	28480	0370-1005
	0370-2862	1	1	PUSHBUTTON 0.230 IN SQ; 0.425 IN HGT	28480	0370-2862
	0380-1332	9	2	STANDOFF-HEX M/F	28480	0380-1332
	0380-1582	1	2	SPACER-SNAP-IN 1.25 IN LG; .28 IN DIA	28480	0380-1582
	0403-0424	8	1	BUMPER FOOT-ADH MTG 20.5-MM-WD	28480	0403-0424
	0403-0469	1	1	BUMPER FOOT-ADH MTG 20.6-MM-WD	28480	0403-0469
	0510-1212	1	6	RETAINER-PUSH ON RND EXT .072-IN-DIA SST	28480	0510-1212
	0510-1220	1	5	RETAINER PR-ON STUD	28480	0510-1220
	0515-0105	9	4	SCREW-MACH M3 X 0.5 12MM-LG PAN-HD	28480	0515-0105
	0515-0211	8	2	SCREW-MACH M3 X 0.5 6MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0515-0212	9	2	SCREW-MACH M3.5 X 0.6 6MM-LG PAN-HD	00000	ORDER BY DESCRIPTION

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Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	0515-0244	7	7	SCREW-MACH M3 X 0.5 4MM-LG PAN-HD	28480	0515-0244
	0515-0350	6	4	SCREW-MACH M3.5 X 0.6 35MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0515-0404	1	3	SCREW-MACH M2.5 X 0.45 12MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0535-0004	9	2	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	0535-0006	1	2	NUT-HEX DBL-CHAM M4 X 0.7 3.2MM-THK	00000	ORDER BY DESCRIPTION
	05384-40001	4	1	SHELL-TOP, RFI	28480	05384-40001
	05384-40002	5	1	SHELL-BOTTOM, RFI	28480	05384-40002
	0590-1251	6	2	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	00000	ORDER BY DESCRIPTION
	0624-0333	6	2	SCREW-TPG 4-20 .25-IN-LG PAN-HD-POZI STL	28480	0624-0333
	1205-0355	5	1	HEAT SINK SGL TG-220-CS	13103	6043PB
	1460-1345	5	2	TILT STAND SST	28480	1460-1345
	1600-1185	9	2	FASTENER-RACK MOUNT	28480	1600-1185
	2190-0060	7	1	WASHER-LK INTL T 1/4 IN .256-IN-ID	28480	2190-0060
	2190-0068	5	1	WASHER-LK INTL T 1/2 IN .505-IN-ID	28480	2190-0068
	2190-0577	1	2	WASHER-LK HLCL NO. 10 .194-IN-ID	28480	2190-0577
	2190-0584	0	6	WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	2190-0585	1	4	WASHER-LK HLCL 3.5 MM 3.6-MM-ID	28480	2190-0585
	2190-0597	5	6	WASHER-LK EXT T 3.0 MM 3.2-MM-ID 6-MM-OD	28480	2190-0597
	2190-0646	5	2	WASHER-LK EXT T-B 4.0 MM 4.15-MM-ID	28480	2190-0646
	2740-0256	4	2	NUT-HEX-DBL-CHAM 1/2-28-THD .095-IN-THK	28480	2740-0256
	3050-0071	5	1	WASHER-FL MTLC NO. 8 .169-IN-ID	28480	3050-0071
	3050-0243	3	5	WASHER-FL NH 3/8 IN .385-IN-ID .75-IN-OD	28480	3050-0243
	3050-0892	8	4	WASHER-FL MTLC 3.5 MM 3.8-MM-ID	28480	3050-0892
	4040-1974	9	2	CLIP-DISPLAY LKG. .338-IN-WD .039-IN-THK	28480	4040-1974
	4040-2010	6	1	STIFFENER-DISPLAY 1.18-IN-WD .335-IN-THK	28480	4040-2010
	4177-0236	3	4	CLAMP TUBE HD, DN	28480	4177-0236
	8160-0373	8	2	RFI STRIP CONDCT-ELSTHR 2.6-MM-WD	28480	8160-0373
	5040-5448	1	1	WINDOW	28480	5040-5448
	5040-7201	8	2	FOOT (STANDARD)	28480	5040-7201
	5040-7222	3	2	FOOT NON-SKID	28480	5040-7222
	05384-00001	0	1	PANEL-FRONT	28480	05384-00001
	05384-00002	1	1	PANEL-REAR	28480	05384-00002
	05384-00003	2	1	PANEL-REAR	28480	05384-00003
	05384-00005	4	1	SPACER-BNC	28480	05384-00005
	05384-00009	8	1	SHIELD-RF TOP	28480	05384-00009
	05384-00010	1	1	SHIELD-RF BOTTOM	28480	05384-00010
	05384-20201	4	1	GROMMET	28480	05384-20201

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Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	05384-60006	1	1	BOARD ASSEMBLY, MAIN (TXCD)	28480	05384-60006
A1C1	0160-4704	9	1	CAPACITOR-FXD .01UF +-10% 500VDC CER	28480	0160-4704
A1C2	0160-5649	3	1	CAPACITOR-FXD 108PF +-5% 500VDC CER	28480	0160-5649
A1C3	0160-4385	2	1	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4385
A1C4	0180-2816	2	1	CAPACITOR-FXD 680UF+-20% 10VDC TA	28480	0180-2816
A1C5	0180-0562	1	5	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C6	0160-0573	2	1	CAPACITOR-FXD 4700PF +-20% 100VDC CER	28480	0160-0573
A1C7	0180-0562	1	1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C8	0160-0572	1	1	CAPACITOR-FXD 2200PF +-20% 100VDC CER	28480	0160-0572
A1C9	0160-3879	7	18	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C10	0160-3879	7	18	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C11	0160-4492	2	2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C12	0160-4492	2	2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C13	0180-0562	1	1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C14	0160-4423	9	1	CAPACITOR-FXD 470PF +-20% 500VDC CER	51642	200-500-X7R-471M
A1C15				NOT ASSIGNED		
A1C16	0180-2698	8	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C17	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C18	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C19	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C20	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C21	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C22	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C23	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C24				NOT ASSIGNED		
A1C25	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C26	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C27	0160-4554	7	8	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C28	0160-0127	2	3	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C29	0180-3276	0	2	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C30	0180-3276	0	2	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C31	0180-0228	6	1	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X7015B2
A1C32	0160-4557	0	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104H050A
A1C33	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C34	0160-4819	7	2	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C35	0160-4822	2	3	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C36	0180-3279	3	1	CAPACITOR-FXD 390UF+100-10% 12VDC AL	28480	0180-3279
A1C37	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C38	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C39	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C40	0180-0291	3	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C41	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C42	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C43	0180-0291	3	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C44	0180-0291	3	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C45	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C46	0160-4822	2	2	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C47	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C48	0160-4822	2	2	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C49	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C50	0160-4810	8	1	CAPACITOR-FXD 330PF +-5% 100VDC CER	28480	0160-4810
A1C51	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C52	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C53	0160-0127	2	3	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C54	0180-2698	8	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C55	0160-4808	4	3	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C56	0160-4808	4	3	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C57	0160-4808	4	3	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C58	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C59	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C60	0160-3878	6	1	CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A1C61 THRU A1C66				NOT ASSIGNED		
A1C67	0160-3879	7	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C68				NOT ASSIGNED		
A1C69	0160-0127	2	3	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C70	0160-4819	7	2	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C71	0160-4805	1	1	CAPACITOR-FXD 47PF +-5% 100VDC CER 0+-30	28480	0160-4805
A1C72	0180-0562	1	1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C73, A1C74				NOT ASSIGNED		
A1C75	0180-0562	1	1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1CR1	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR2	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR3	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR4	1901-0535	9	1	DIODE-5H SIG SCHOTTKY	28480	1901-0535
A1CR5	1901-0639	4	1	DIODE-PIN	28480	5082-3088
A1CR6	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR7	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR8	1906-0096	7	1	DIODE-FW BRDG 200V 2A	04713	HDA202
A1CR9	1884-0221	2	1	THYRISTOR-SCR VRRM=300	04713	HCR106-5
A1CR10	1902-3234	3	1	DIODE-ZNR 19.6V 5% DO-35 PD=.4W	28480	1902-3234

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1CR11	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR12	1901-0782	8	2	DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR13	1902-3110	4	1	DIODE-ZNR 5.9V 2% DO-35 PD=.4W TC=+.017%	28480	1902-3110
A1CR14	1901-0782	8		DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR15	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR16	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR17	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR18	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR19	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR20	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR21	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR22	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR23	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1E1	9170-0029	3	1	CORE-SHIELDING BEAD	28480	9170-0029
A1F1	2110-0201	0	1	FUSE .25A 250V TD 1.25X.25 UL	28480	2110-0201
A1F1	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
A1F2	2110-0002	9	1	FUGE 2A 250V NTD 1.25X.25 UL	75915	312002
A1J1	1250-1782	9	2	CONNECTOR-RF BNC FEM PCH-PNL 50-OHM	28480	1250-1782
A1J2	1250-1782	9		CONNECTOR-RF BNC FEM PCH-PNL 50-OHM	28480	1250-1782
A1J3	1251-4743	0	1	CONNECTOR-AC PWR HP-9 MALE REC-FLG THIRMP	28480	1251-4743
A1J4	1251-8261	5	1	JACK POWER PCB MT	28480	1251-8261
A1J5	1250-1842	2	1	BNC RTANG PC MNT	28480	1250-1842
A1J6	1251-8304	7	1	CONN-POST TYPE .100-PIN-SPCG 8-CONT	28480	1251-8304
A1J7				NOT ASSIGNED		
A1J8	1251-7684	4	1	CABLE ASSY 14 POST	28480	1251-7684
A1J9	1251-8139	6	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-8139
A1K1	0490-1317	3	1	RELAY-REED 1C 250MA 200VDC 5VDC-COIL 3VA	28480	0490-1317
A1L1	9140-0718	4	1	INDUCTOR-FIXED NORM IND: 230UH R 1.5ADC	28480	9140-0718
A1L2	9100-1788	6	4	CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1L3	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1L4	9100-2562	6	1	INDUCTOR RF-CH-MI D 100UH 10%	28480	9100-2562
A1L6	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1L7	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
A1M1	8159-0005	0	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A1Q1	1854-0215	1	3	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q2	1855-0327	8	1	TRANSISTOR J-FET 2N4416 N-CHAN D-MODE	01275	2N4416
A1Q3	1853-0354	7	1	TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0354
A1Q4	1855-0414	4	1	TRANSISTOR J-FET 2N4373 N-CHAN D-MODE	04713	2N4373
A1Q5	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q6	1054-0574	5	1	TRANSISTOR NPN SI PD=500MW FT=125MHZ	28480	1054-0574
A1Q7	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q8	1853-0015	7	2	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q9	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q10	1853-0363	8	1	TRANSISTOR PNP SI PD=50W FT=20MHZ	03508	X45H2B1
A1Q11	1854-0013	7	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A1Q12	1854-0477	7	1	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1R1	0698-8827	4	2	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R2	0757-0706	8	3	RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-TD-51R1-F
A1R3	0698-8827	4		RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R4	0699-0071	6	2	RESISTOR 4.64M 1% .125W F TC=0+-100	28480	0699-0071
A1R5	0698-7276	5	1	RESISTOR 46.4K 1% .05W F TC=0+-100	24546	C3-1/8-T0-4642-F
A1R6	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R7	0757-0421	4	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R8	0698-3445	2	2	RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R9	0698-7236	7	3	RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R10	0698-7233	4	1	RESISTOR 750 1% .05W F TC=0+-100	24546	C3-1/8-T0-750R-F
A1R11	0698-7283	4	1	RESISTOR 90.9K 1% .05W F TC=0+-100	24546	C3-1/8-T0-9092-F
A1R12	0698-8812	7	1	RESISTOR 1 1% .125W F TC=0+-100	28480	0698-8812
A1R13	0698-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A1R14	0698-7244	7	2	RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R15	0698-3447	4	3	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R16	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R17	1810-0541	4	1	NETWORK-RES 6-SIP MULTI-VALUE	28480	1810-0541
A1R18	1810-0219	3	1	NETWORK-RES 8-SIP 220.0 OHM X 4	208221	208221
A1R19	0698-7220	9	3	RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R20	0698-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R21	0698-7249	2	2	RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R22	0757-0283	6	3	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R23	0698-7267	7	1	RESISTOR 19.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1962-F
A1R24	0698-7210	4	1	RESISTOR 82.5 1% .05W F TC=0+-100	24546	C3-1/8-T0-82R5-F
A1R25	0757-0706	8		RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-TD-51R1-F

See introduction to this section for ordering information  
\*Indicates factory selected value

Models 5384A and 5385A  
Replaceable Parts

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R26	0757-0706	8		RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R27	0698-7244	7		RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R28	0698-7249	7		RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R29	0698-7236	2		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R30	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A1R31	0698-3437	2		RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A1R32	2100-0558	9	2	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	28480	2100-0558
A1R33	0698-3442	9	1	RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A1R34	0698-7265	2	1	RESISTOR 16.2K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1622-F
A1R35	0698-7236	7		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R36	0698-7229	8	6	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R37	0698-7205	0	3	RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A1R38	0698-7205	0		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A1R39	0698-7227	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R40	0698-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R41	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R42	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R43	2100-0558	9		RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	28480	2100-0558
A1R44	0698-7284	5	1	RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1003-F
A1R45	0698-7207	4	1	RESISTOR 75 1% .05W F TC=0+-100	24546	C3-1/8-T0-75R0-F
A1R46	0698-7205	0		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-51R1-F
A1R47	0698-7227	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R48	0698-7243	6	1	RESISTOR 1.96K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1961-F
A1R49	1810-0488	8	1	NETWORK-RES 8-SIP4.7K OHM X 4	28480	1810-0488
A1R50	0812-0021	8	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A1R51	0698-7227	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R52	0757-0394	0	3	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R53	0698-3132	4	3	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R54	0757-1093	8	2	RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R55	0757-0465	6	2	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R56	0757-0407	6	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R57	0757-0289	2	1	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A1R58	0757-0399	5	1	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A1R59	0757-0416	7	4	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R60	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R61	0698-3398	4	1	RESISTOR 46.4 1% .5W F TC=0+-100	28480	0698-3398
A1R62	0757-0200	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R63	0757-0200	7		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R64	0698-0071	6		RESISTOR 4.64K 1% .125W F TC=0+-100	28480	0698-0071
A1R65	1810-0378	7	1	NETWORK-RES 8-SIP220.0 OHM X 7	01121	208A221
A1R66	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R67	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R68	0698-3441	8	2	RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A1R69	0698-3441	8		RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A1R70	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R71	0698-7212	9		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R72	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R73	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-F
A1R74	0698-7219	6	1	RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-F
A1R75	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R76	0757-0419	0	1	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A1R77	2100-0554	5	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	28480	2100-0554
A1R78	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R79	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R80	0698-0082	7	5	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R81	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R82	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R83	0757-1093	8		RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R84	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R85	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R86	0698-3445	2		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R87	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R88	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R89	0698-3460	1	1	RESISTOR 422K 1% .125W F TC=0+-100	28480	0698-3460
A1R90	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R91	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R92	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R93	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R94	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R95	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R96 THRU A1R100				NOT ASSIGNED		
A1R101	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R102	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R103	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R104	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A1R105	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F

See introduction to this section for ordering information  
\*Indicates factory selected value



Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R106	0837-0220	1	1	THERMISTOR ROD 10K-OHM TC=-3.83%/C-DEG	28480	0837-0220
A1R107	1810-0368	3	1	NETWORK-RES 6-SIP10.0K OHM X 5	01121	266A103
A1R108	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/B-T0-4640-F
A1R109	0757-0401	0	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/B-T0-101-F
A1S1	3101-2656	5	1	SS LIN SEL 98PC	28480	3101-2656
A1S2	3101-2644	1	1	SWITCH-PB DPDT ALTNG .5A 180VAC	28480	3101-2644
A1S3	3101-2453	0	1	SWITCH-TGL SUBMIN DPDT .02A 280VAC/DC PC	28480	3101-2453
A1T1	9100-2684	3	1	TRANSFORMER-POWER 115/230; 48/60 HZ	28480	9100-2684
A1TP1	1251-0600	0	10	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP5	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP6	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP7	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP8	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP9	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP10	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1U1	1820-2312	2	1	IC MISC	28480	1820-2312
A1U2-1	1818-0762	7	1	IC NMOS 32768 (32K) EPROM 450-NS 3-S	01295	TMS2532JL
A1U2-2	1820-2650	1		NMOS 38P70 MPR	28480	1820-2650
A1U3	1820-3075	6	2	IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U4	1820-3075	6		IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U5	1820-3076	7	1	IC FF ECL/10KH D-M/S COM CLOCK DUAL	28480	1820-3076
A1U6	1858-0040	8	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	31585	CA3127E
A1U7	1826-0904	6	1	IC-LM330T-5.0	28480	1826-0904
A1U8	1826-0544	0	1	V REF 8-DIP-C	04713	MC1403U
A1U9	1826-0428	9	1	IC 3524 MODULATOR 16-DIP-C	01295	SG3524J
A1U10	1826-0393	7	1	IC V RGLTR TO-220	27014	LM317T
A1U11	1858-0054	4	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	28480	1858-0054
A1U12	1826-0065	8	1	IC COMPARATOR PRCN 8-DIP-P PKG	S0545	UPC311C
A1U13	1820-1425	6	1	IC SCHMITT-TRIG TTL LS NAND QUAD 2-INP	01295	SN74LS132N
A1U14	1820-2076	9	1	IC CNTR TTL LS BIN DUAL 4-BIT	01295	SN74LS393N
A1U15	1820-1975	1	1	IC SHF-RCVR TTL LS NEG-EDGE-TRIG PRL-IN	01295	SN74LS165N
A1U16	1826-0501	9	1	IC MULTIPLXR 2-CHAN-ANLG TRIPLE 16-DIP-P	94713	MC14053BCP
A1W1	8120-4168	3	1	CABLE ASSY 5384A	28480	8120-4168
A1XF1	2110-0269	0	1	FUSEHOLDER-CLIP TYPE,25D-FUSE	28480	2110-0269
A1XF2	2110-0642	3	1	FUSEHOLDER	28480	2110-0642
A1XU1	1200-0654	7	2	SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
A1XU2	1200-0654	7		SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
A1Y1	0960-0612	6	1	CRYSTAL-OSCILLATOR 10.0 MHZ; 0-55 DEG C	28480	0960-0612
	2190-0597	5	1	WASHER-LK EXT T 3.0 MM 3.2-MM-ID 6-MM-OD	28480	2190-0597
	7120-3731	3	1	LABEL-WARNING .5-IN-WD 1.375-IN-LG VINYL	28480	7120-3731
	05384-68006	7	1	BOARD ASSEMBLY-PCL-60006	28480	05384-68006
	0515-0105	9	4	SCREW-MACH M3 X 0.5 12MM-LG PAN-HD	28480	0515-0105
	0535-0004	9	2	NUT-HEX DDL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	05384-60007	2	1	BOARD ASSEMBLY (OVEN OSC)	28400	05384-60007
A1C1	0160-4704	9	1	CAPACITOR-FXD .01UF +-10% 500VDC CER	28480	0160-4704
A1C2	0160-5647	3	1	CAPACITOR-FXD 100PF +-5% 500VDC CER	28480	0160-5647
A1C3	0160-4385	2	1	CAPACITOR-FXD 15PF +-5% 200VDC CER 0+-30	28480	0160-4385
A1C4	0180-2816	2	1	CAPACITOR-FXD 68UF+-20% 10VDC TA	28480	0180-2816
A1C5	0180-0562	1	5	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C6	0160-0573	2	1	CAPACITOR-FXD 4700PF +-20% 100VDC CER	28480	0160-0573
A1C7	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C8	0160-0572	1	1	CAPACITOR-FXD 2200PF +-20% 100VDC CER	28480	0160-0572
A1C9	0160-3879	7	18	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C10	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C11	0160-4492	2	2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C12	0160-4492	2		CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C13	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C14	0160-4423	9	1	CAPACITOR-FXD 470PF +-20% 500VDC CER	51642	200-500-X7R-471M
A1C15				NOT ASSIGNED		
A1C16	0180-2698	8	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C17	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C18	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C19	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C20	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C21	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C22	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C23	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C24				NOT ASSIGNED		
A1C25	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C26	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C27	0160-4554	7	9	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C28	0160-0127	2	3	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C29	0180-3276	0	2	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C30	0180-3276	0		CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C31	0180-0228	6	1	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X0115B2
A1C32	0160-4557	0	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104H050A
A1C33	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C34	0160-4819	7	2	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C35	0160-4822	2	3	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C36	0180-3279	3	1	CAPACITOR-FXD 398UF+100-10% 12VDC AL	28480	0180-3279
A1C37	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C38	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C39	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C40	0180-0291	3	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C41	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C42	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C43	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C44	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C45	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C46	0160-4822	2		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C47	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C48	0160-4822	2		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C49	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C50	0160-4810	8	1	CAPACITOR-FXD 330PF +-5% 100VDC CER	28480	0160-4810
A1C51	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C52	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C53	0160-0127	2		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C54	0180-2698	8		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C55	0160-4808	4	3	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C56	0160-4808	4		CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C57	0160-4808	4		CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C58	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C59	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C60	0160-3878	6	1	CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A1C61 THRU A1C66				NOT ASSIGNED		
A1C67	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C68	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C69	0160-0127	2		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C70	0160-4819	7		CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C71	0160-4805	1	1	CAPACITOR-FXD 47PF +-5% 100VDC CER 0+-30	28480	0160-4805
A1C72	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C73, A1C74				NOT ASSIGNED		
A1C75	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1CR1	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2NS DD-35	28480	1901-0050
A1CR2	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DD-35	28480	1901-0376
A1CR3	1901-0376	6		DIODE-GEN PRP 35V 50MA DD-35	28480	1901-0376
A1CR4	1901-0535	9	1	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A1CR5	1901-0639	4	1	DIODE-PIN	28480	5082-3080

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1CR6	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR7	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR8	1906-0096	7	1	DIODE-FW BRDG 200V 2A	04713	HDA202
A1CR9	1884-0221	2	1	THYRISTOR-SCR VRRM=300	04713	MCR106-5
A1CR10	1902-3234	3	1	DIODE-ZNR 19.6V 5Z DO-35 PD=.4W	28480	1902-3234
A1CR11	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR12	1901-0782	8	2	DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR13	1902-3110	4	1	DIODE-ZNR 5.9V 2Z DO-35 PD=.4W TC=+.017%	28480	1902-3110
A1CR14	1901-0782	8		DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR15	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR16	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR17	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR18	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR19	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR20	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR21	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR22	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR23	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1F1	2110-0201	0	1	FUSE .25A 250V TD 1.25X.25 UL	28480	2110-0201
A1F1	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
A1F2	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	312002
A1J1	1250-1782	9	2	CONNECTOR-RF BNC FEH PCH-PNL 50-OHM	28480	1250-1782
A1J2	1250-1782	9		CONNECTOR-RF BNC FEH PCH-PNL 50-OHM	28480	1250-1782
A1J3	1251-4743	0	1	CONNECTOR-AC PWR HP-9 MALE REC-FLG THRM P	28480	1251-4743
A1J4	1251-8261	5	1	JACK POWER PCB MT	28480	1251-8261
A1J5	1250-1842	2	1	BNC RTANG PC MNT	28480	1250-1842
A1J6	1251-8304	7	1	CONN-POST TYPE .100-PIN-SPCG 8-CONT NOT ASSIGNED	28480	1251-8304
A1J7				CABLE ASSY 14 POST	28480	1251-7684
A1J8	1251-7684	4	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-8139
A1J9	1251-8139	6	1	RELAY-REED 1C 250MA 200VDC 5VDC-COIL 3VA	28480	0490-1317
A1K1	0490-1317	3	1		28480	0490-1317
A1Q1	1854-0215	1	3	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q2	1855-0327	8	1	TRANSISTOR J-FET 2N4416 N-CHAN D-MODE	01295	2N4416
A1Q3	1853-0354	7	1	TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0354
A1Q4	1855-0414	4	1	TRANSISTOR J-FET 2N4393 N-CHAN D-MODE	04713	2N4393
A1Q5	1854-0215	1	1	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q6	1854-0574	5	1	TRANSISTOR NPN SI PD=500MW FT=125MHZ	28480	1854-0574
A1Q7	1854-0215	1	1	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q8	1853-0015	7	2	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q9	1853-0015	7	1	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q10	1853-0363	8	1	TRANSISTOR PNP SI PD=50W FT=20MHZ	03508	X45H281
A1Q11	1854-0013	7	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A1Q12	1854-0477	7	1	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1R1	0698-8827	4	2	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R2	0698-8827	4		RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R2	0757-0706	8	3	RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R4	0699-0071	6	2	RESISTOR 4.64M 1% .125W F TC=0+-100	28480	0699-0071
A1R5	0698-7276	5	1	RESISTOR 46.4K 1% .05W F TC=0+-100	24546	C3-1/8-T0-4642-F
A1R6	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R7	0757-0421	4	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R8	0698-3445	2	2	RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R9	0698-7236	7	3	RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R10	0698-7233	4	1	RESISTOR 750 1% .05W F TC=0+-100	24546	C3-1/8-T0-750R-F
A1R11	0698-7283	4	1	RESISTOR 70.9K 1% .05W F TC=0+-100	24546	C3-1/8-T0-7092-F
A1R12	0698-8812	7	1	RESISTOR 1 1% .125W F TC=0+-100	28480	0698-8812
A1R13	0698-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A1R14	0698-7244	7	2	RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R15	0698-3447	4	3	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R16	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R17	1010-0541	4	1	NETWORK-RES 6-SIP MULTI-VALUE	28480	1010-0541
A1R18	1010-0219	3	1	NETWORK-RES 8-SIP 220.0 OHM X 4	01121	208R221
A1R19	0698-7220	9	3	RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R20	0698-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R21	0698-7249	2	2	RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R22	0757-0283	6	3	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R23	0698-7267	4	1	RESISTOR 19.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1962-F
A1R24	0698-7210	7	1	RESISTOR 82.5 1% .05W F TC=0+-100	24546	C3-1/8-T0-82R5-F
A1R25	0757-0706	8		RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R26	0757-0706	8		RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R27	0698-7244	7		RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R28	0698-7249	2		RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R29	0698-7236	7		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R30	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R31	0698-3437	2		RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A1R32	2100-0558	9	2	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	28480	2100-0558
A1R33	0698-3442	9	1	RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A1R34	0698-7265	2	1	RESISTOR 16.2K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1622-F
A1R35	0698-7236	7		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R36	0698-7229	8	6	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R37	0698-7205	0	3	RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R38	0698-7205	0		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R39	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R40	0698-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R41	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R42	0698-7227	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R43	2100-0558	9		RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	28480	2100-0558
A1R44	0698-7284	5	1	RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1003-F
A1R45	0698-7209	4	1	RESISTOR 75 1% .05W F TC=0+-100	24546	C3-1/8-T0-75R0-F
A1R46	0698-7205	0		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R47	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R48	0698-7243	6	1	RESISTOR 1.96K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1961-F
A1R49	1810-0488	8	1	NETWORK-RES 9-SIP4.7K OHM X 4	28480	1810-0488
A1R50	0812-0021	8	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW281-3-T2-47/100-J
A1R51	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R52	0757-0394	0	3	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R53	0698-3132	4	3	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R54	0757-1093	8	2	RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R55	0757-0465	6	2	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R56	0757-0407	6	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R57	0757-0289	2	1	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A1R58	0757-0399	5	1	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A1R59	0757-0416	7	3	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R60	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R61	0698-3398	4	1	RESISTOR 46.4 1% .5W F TC=0+-100	28480	0698-3398
A1R62	0757-0200	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R63	0757-0200	7		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R64	3699-0871	6		RESISTOR 4.64M 1% .125W F TC=0+-100	28480	0699-0871
A1R65	1810-0370	7	1	NETWORK-RES 8-SIP220.0 OHM X 7	01121	280A221
A1R66	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R67	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R68	0698-3441	8	2	RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A1R69	0698-3441	8		RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
A1R70	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R71	0698-7212	9		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R72	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R73	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-F
A1R74	0698-7219	6	1	RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-F
A1R75	0757-0426	3	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R76	0757-0419	0	1	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A1R77	2100-0554	5	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	28480	2100-0554
A1R78	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R79	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R80	0698-0882	7	5	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R81	0698-0882	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R82	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R83	0757-1093	8		RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R84	0698-0882	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R85	0698-0882	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R86	0698-3445	2		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R87	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R88	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R89	0698-3460	1	1	RESISTOR 422K 1% .125W F TC=0+-100	28480	0698-3460
A1R90	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R91	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R92	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R93	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R94	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R95	0757-0401	0	2	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R101	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R102	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R103	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R104	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A1R105	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R106	0837-0220	1	1	THERMISTOR ROD 10K-OHM TC=-3.83%/C-DEG	28480	0837-0220
A1R107	1810-0368	3	1	NETWORK-RES 6-SIP10.0K OHM X 5	01121	206A103
A1R108	0698-0882	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R109	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1S2	3101-2644	1	1	SWITCH-PB DPDT ALTNQ .5A 100VAC	28480	3101-2644
A1S3	3101-2453	0	1	SWITCH-TGL SUBMIN DPDT .02A 20VAC/DC PC	28480	3101-2453
A1TP1	1251-0600	0	10	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP5	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP6	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP7	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP8	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP9	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP10	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1U1	1820-2312	2	1	IC MISC	28480	1820-2312
A1U2-1	1818-0762	7	1	IC NMOS 32768 (32K) EPROM 450-NS 3-S	01295	TMS2532JL
A1U2-2	1820-2650	1		NMOS 38P70 MPR	28480	1820-2650
A1U3	1820-3075	6	2	IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U4	1820-3075	6		IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U5	1820-3076	7	1	IC FF ECL/10KH D-H/S COM CLOCK DUAL	28480	1820-3076
A1U6	1059-0040	8	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	31595	CA3127E
A1U7	1826-0904	6	1	IC-LM330T-5.0	28480	1826-0904
A1U9	1826-0428	9	1	IC 3524 MODULATOR 16-DIP-C	01295	SG3524J
A1U10	1026-0293	6	1	IC AUDIO AMPL 8-DIP-P PKG	04713	MC1306P
A1U11	1858-0054	4	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	28480	1858-0054
A1U12	1826-0065	0	1	IC COMPARTOR PRCN 8-DIP-P PKG	50545	UPC311C
A1U13	1820-1425	6	1	IC SCHMITT-TRIG TTL LS NAND QUAD 2-INP	01295	SN74LS132N
A1U14	1820-2096	9	1	IC CNTR TTL LS DIN DUAL 4 BIT	31295	SN74LS393N
A1U15	1820-1975	1	1	IC SHF-RCTR TTL LS NEG-EDGE-TRIG PRL-IN	01295	SN74LS165N
A1U16	1826-0581	9	1	IC MULTIPLXR 2-CHAN-ANLG TRIPLE 16-DIP-P	04713	MC14053BCP
A1XF1	2110-0269	0	1	FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A1XF2	2110-0642	3	1	FUSEHOLDER	28480	2110-0642
A1XU1	1200-0654	7	2	SOCKET-IC 40-COAT DIP DIP-SLDR	28480	1200-0654
A1XU2	1200-0654	7		SOCKET-IC 40-COAT DIP DIP-SLDR	28480	1200-0654
A1Y1	0960-0636	4	1	OVEN-OSCILLATOR MODULE FREQ: 10 MHZ	28480	0960-0636
	0515-0105	9	4	SCREW-MACH M3 X 0.5 12MM-LG PAN-HD	28480	0515-0105
	0535-0004	9	2	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	2190-0597	5	2	WASHER-LK EXT T 3.0 MM 3.2-MM-ID 6-MM-OD	28480	2190-0597
E1	9170-0029	3	1	CORE-SHIELDING BCAD	28480	9170-0029
L1	9140-0718	4	1	INDUCTOR-FIXED NORM IND: 230UH R 1.5ADC	28480	9140-0718
L2	9100-1788	6	5	CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
L3	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
L4	9100-2562	6	1	INDUCTOR RF-CH-HLD 100UH 10%	28480	9100-2562
L5	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
L6	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
L7	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHMS 180 MHZ	02114	VK200 20/48
R2	8159-0005	0	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
S1	3101-2656	5	1	SS LIN SEL 93PC	28480	3101-2656
T1	9100-2684	3	1	TRANSFORMER-POWER 115/230; 40/60 HZ	28480	9100-2684
W1	8120-4168	3	1	CABLE ASSY 5384A	28480	8120-4168

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2	05384-60102	B	1	DISPLAY ASSEMBLY	28480	05384-60102
	05384-60104	0	1	KEYBOARD ASSEMBLY LIQUID CRYSTAL DISPLAY ASSEMBLY	28480	05384-60104
W1	0120-4038	B	1	CABLE ASSEMBLY 5382	28480	0120-4038

See introduction to this section for ordering information  
 \*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3	05384-60003	8	1	ASSEMBLY-BATTERY PACK SERIES 2244	28480	05384-60003
A3C1	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A3C2	0180-0291	3	2	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A3C3	0160-4554	7	2	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A3C4	0180-0291	3	2	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A3C5	0180-0116	1	1	CAPACITOR-FXD 6.9UF+-10% 35VDC TA	56289	150D605X9035B2
A3CR1				NOT ASSIGNED		
A3CR2	1901-0050	3	6	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3CR3	1901-0050	3	6	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3CR4	1901-0050	3	6	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3CR5	1901-0050	3	6	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3CR6	1901-0050	3	6	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3CR7	1901-0050	3	6	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A3CR8	1901-1080	1	1	DIODE-SCHOTTKY 1N5817 20V 1A	28480	1901-1080
A3CR9	1901-0676	9	1	DIODE-SCHOTTKY 20V 5A	28480	1901-0676
A3F1	2110-0546	6	1	FUSE 5A 125V .201X.093	75915	275005
A3J1	1251-8139	6	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-8139
A3Q1	1858-0054	4	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	28480	1858-0054
A3Q2	1853-0363	8	1	TRANSISTOR PNP SI PD=50W FT=20MHZ	03508	X45H281
A3R1	0811-3333	7	1	RESISTOR .05 3% 2W PWV TC=0+-150	28480	0811-3333
A3R2	0757-0424	9	2	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1101-F
A3R3	0757-0422	5	1	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-TO-909R-F
A3R4				NOT ASSIGNED		
A3R5	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A3R6	0757-0465	6	5	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1003-F
A3R7	0698-3161	9	1	RESISTOR 38.3K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3832-F
A3R8	0757-0465	6	5	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1003-F
A3R9	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A3R10	0757-0397	3	1	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-68R1-F
A3R11	0757-0465	6	5	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1003-F
A3R12	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A3R13	0757-0203	6	1	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2001-F
A3R14	0757-0407	6	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-TO-201-F
A3R15	0698-3152	8	1	RESISTOR 3.40K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3481-F
A3R16	0757-0472	5	1	RESISTOR 200K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2003-F
A3R17	0757-0424	7	2	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1101-F
A3R18	0698-3266	5	1	RESISTOR 237K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2373-F
A3R19	0757-0465	6	5	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1003-F
A3R20	0757-0199	3	1	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2152-F
A3R21	0698-4008	5	1	RESISTOR 40K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4002-F
A3R22	0757-0463	4	1	RESISTOR 82.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-8252-F
A3R23	0757-0465	6	5	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1003-F
A3R24	0757-0427	0	1	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1501-F
A3R25	2100-3211	7	2	RESISTOR-TRMR 1K 10% C TOP-ADJ 1-TRN	28480	2100-3211
A3R26	2100-3211	7	2	RESISTOR-TRMR 1K 10% C TOP-ADJ 1-TRN	28480	2100-3211
A3U1	1826-0544	0	1	V REF 8-DIP-C	04713	MC1403U
A3U2	1826-0161	7	1	IC OP AMP GP QUAD 14-DIP-P PKG	04713	LM324P
A3W1	05315-60102	5	1	CABLE ASSY-POS LEAD	28480	05315-60102
A3W2	05315-60103	6	1	CABLE ASSY-NEG LEAD	28480	05315-60103
MISCELLANEOUS						
W2	8120-4167	2	1	CBLY 14 PIN FT 26G	28480	8120-4167
	05384-20303	7	1	PANELED BOARD (6)	28480	05384-20303
	05384-63003	4	1	SEQ PTS ASSY-60003	28480	05384-63003
	0340-0468	6	1	INSULATOR-XSTR NYLON	28480	0340-0468
	0340-0525	6	1	INSULATOR-XSTR ALUMINUM HD-ANDZ	28480	0340-0525
	0403-0424	8	1	BUMPER FOOT-ADH MTG 20.5-MM-WD	28480	0403-0424
	0510-1220	1	5	RETAINER PR-ON STUD	28480	0510-1220
	0515-0244	7	7	SCREW-MACH #3 X 0.5 4MM-LG PAN-HD	28480	0515-0244
	1420-0253	8	1	BATTERY 6V 5A-HR PB-ACID DISC	01417	8800-0011
	2190-0584	0	6	WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	3050-0243	3	5	WASHER-FL NM 3/8 IN .385-IN-ID .75-IN-OD	28480	3050-0243
	05384-00006	5	1	FRAME-BATT PACK	28480	05384-00006
	05384-00007	6	1	STOP-BATT PACK	28480	05384-00007

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4	05006-60004	2	1	BOARD ASSEMBLY, HP-IL (SERIES 2243)	28480	05006-60004
A4C1	0160-4801	7	1	CAPACITOR-FXD 100PF +-5% 100VDC CER	28480	0160-4801
A4C2	0160-4812	0	2	CAPACITOR-FXD 220PF +-5% 100VDC CER	28480	0160-4812
A4C3	0160-4812	0		CAPACITOR-FXD 220PF +-5% 100VDC CER	28480	0160-4812
A4C4	0180-0210	6	1	CAPACITOR-FXD 3.3UF+-20% 15VDC TA	56297	1500335X0015A2
A4C5	0160-4557	0	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	16297	CAC04X7R104M050A
A4CR1	1902-0970	8	4	DIODE-ZNR 33V 5% DO-35 PD=.4W TC=+.097%	28480	1902-0970
A4CR2	1902-0970	8		DIODE-ZNR 33V 5% DO-35 PD=.4W TC=+.097%	28480	1902-0970
A4CR3	1902-0970	8		DIODE-ZNR 33V 5% DO-35 PD=.4W TC=+.097%	28480	1902-0970
A4CR4	1902-0970	8		DIODE-ZNR 33V 5% DO-35 PD=.4W TC=+.097%	28480	1902-0970
A4CR5	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A4J1	05006-60104	3	1	CONN AY-HPIL	28480	05006-60104
A4J2	1251-8426	4	1	HEADER ASSY, 8 PIN	28480	1251-8426
A4L1	9100-1631	8	1	INDUCTOR RF-CH-HLD 56UH 5% .166DX.395LG	28480	9100-1631
A4L2	9100-1637	4	1	INDUCTOR RF-CH-HLD 120UH 5% .166DX.395LG	28480	9100-1637
A4R1	0757-0446	3	2	RESISTOR 15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1502-F
A4R2	0698-3446	3	2	RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A4R3	0757-0446	3		RESISTOR 15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1502-F
A4R4	0698-3446	3		RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A4R5	0757-0465	6	1	RESISTOR 180K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4R6	0757-0442	9	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R7	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4S1	3101-2215	2	1	SWITCH-RKR DIP-RKR-ASSY 7-1A .05A 30VDC	28480	3101-2215
A4T1	9100-4226	3	1	TRANSFORMER	28480	9100-4226
A4TP1	1251-4707	6	1	CONNECTOR-SGL CONT PIN .031-IN-BSC-SZ	28480	1251-4707
A4U1	1LB3-0003	8	1	IC HPIL 28 PIN	28480	1LB3-0003
A4U2-1	05006-80002	2	1	EPROM-HPIL	28480	05006-80002
A4U2-2	1820-2650	1	1	NMOS 38P70 HPR	28480	1820-2650
A4W1	8120-3671	1	1	FLAT RIBBON ASSY 14-COND	28480	8120-3671
A4XU1	1200-0567	1	1	SOCKET-IC 28-CONT DIP DIP-SLDR	28480	1200-0567
A4XU2	1200-0654	7	1	SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654

See introduction to this section for ordering information  
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Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5	05384-60005	0	1	BOARD ASSEMBLY, HP-IB (SERIES 2244)	28480	05384-60005
ASC1	0160-0229	7	1	CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	150D336X9010D2
ASC2	0160-4554	7	1	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
ASC3	0160-4557	0	2	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104H050A
ASC4	0160-4557	0	0	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104H050A
ASC5	0160-0210	6	1	CAPACITOR-FXD 3.3UF+-20% 15VDC TA	56289	150D335X0015A2
ASCR1	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DD-35	28480	1901-0050
ASJ1	1251-7162	3	1	CONNECTOR 24-PIN F MICRO-RIBBON	28480	1251-7162
ASL1	9100-1700	6	1	CHDKE-WIDE BAND ZMAX=680 OHM@ 100 MHZ	02114	VK200 20/40
ASL2	9100-1637	4	1	INDUCTOR RF-CH-MLD 120UH 5% .166DX.305LG	28480	9100-1637
ASR1	0698-3155	1	2	RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
ASR2	0698-0082	7	2	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
ASR3	0698-3155	1	1	RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
ASR4	0698-0082	7	1	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
ASR5	1010-0247	7	1	NETWORK-RES 16-DIP220.0 OHM X 8	01121	316B221
ASR6	0757-0465	6	1	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
ASR7	0698-3441	8	2	RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
ASR8	0698-3441	8	1	RESISTOR 215 1% .125W F TC=0+-100	24546	C4-1/8-T0-215R-F
ASS1	3101-2215	2	1	SWITCH-RKR DIP-RKR-ASSY 7-1A .05A 30VDC	28480	3101-2215
ASTP1	1251-8096	4	1	HEADER ASSY 7PIN	28480	1251-8096
ASU1	1020-2461	2	2	IC MISC TTL OCTL	04713	MC3447P3
ASU2	1020-2461	2	2	IC MISC TTL OCTL	04713	MC3447P3
ASU3	1020-1198	0	1	IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS03N
ASU4	1020-1440	5	1	IC LCH TTL LS QUAD	01295	SN74LS279N
ASU5	1020-37486	4	1	MICROPROCESSDR	28480	1020-37486
ASW1	8120-3671	1	1	FLAT RIBBON ASSY 14-COND	28480	8120-3671
ASXU5	1200-0654	7	1	SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654

See introduction to this section for ordering information  
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Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	05385-60001		7	MAIN BOARD ASSEMBLY	28480	05385-60001
A1C1	0160-4704		9	CAPACITOR-FXD .01UF +-10% 500VDC CER	28480	0160-4704
A1C2	0160-5649		3	CAPACITOR-FXD 100PF +-5% 500VDC CER	28480	0160-5649
A1C3	0160-4385		2	CAPACITOR-FXD 15PF +-5% 200VDC CER 0+-30	28480	0160-4385
A1C4	0180-2816		2	CAPACITOR-FXD 60UF+-20% 10VDC TA	28480	0180-2816
A1C5	0180-0562		1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C6	0160-0573		2	CAPACITOR-FXD 4700PF +-20% 100VDC CER	28480	0160-0573
A1C7	0180-0562		1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C8	0160-0572		1	CAPACITOR-FXD 2200PF +-20% 100VDC CER	28480	0160-0572
A1C9	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C10	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C11	0160-4492		2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C12	0160-4492		2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C13	0180-0562		1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C14	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C15	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C16	0160-3875		3	CAPACITOR-FXD 22PF +-5% 200VDC CER 0+-30	28480	0160-3875
A1C17	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C18	0160-4518		3	CAPACITOR-FXD 3.9PF +-1.5PF 200VDC CER	28480	0160-4518
A1C19	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C20	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C21	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C22	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C23	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C24				NOT ASSIGNED		
A1C25	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C26	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C27	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C28	0160-0127		2	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C29	0180-3276		0	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C30	0180-3276		0	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C31	0180-0228		6	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X9015B2
A1C32	0160-4557		0	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104M050A
A1C33	0160-0576		5	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C34	0160-4819		7	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C35	0160-4822		2	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C36	0180-3279		3	CAPACITOR-FXD 390UF+100-10% 12VDC AL	28480	0180-3279
A1C37	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C38				NOT ASSIGNED		
A1C39	0160-0576		5	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C40	0180-0221		3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C41	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C42	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C43	0180-0291		3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C44	0180-0291		3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C45	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C46	0160-4822		2	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C47	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C48	0160-4822		2	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C49	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C50	0160-4810		8	CAPACITOR-FXD 330PF +-5% 100VDC CER	28480	0160-4810
A1C51	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C52	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C53	0160-0127		2	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C54	0180-2698		8	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C55	0160-4808		4	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C56	0160-4808		4	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C57	0160-4808		4	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C58	0160-4554		7	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C59	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C60	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C61	0160-0576		5	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C62	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C63	0160-3872		0	CAPACITOR-FXD 2.2PF +-25PF 200VDC CER	28480	0160-3872
A1C64	0160-3875		3	CAPACITOR-FXD 22PF +-5% 200VDC CER 0+-30	28480	0160-3875
A1C65	0160-4040		6	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C66	0160-0576		5	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C67	0160-3879		7	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C69	0160-0127		2	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C70	0160-4819		7	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C71	0160-4805		1	CAPACITOR-FXD 47PF +-5% 100VDC CER 0+-30	28480	0160-4805
A1C72	0180-0562		1	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C73, A1C74				NOT ASSIGNED		
A1C75	0160-0576		5	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576

See introduction to this section for ordering information  
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Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1C76	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C77	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C78	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C79	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1CB1	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1CB2	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1CB3	0160-4046	0	2	CAPACITOR-FXD 1500PF +-5% 100VDC CER	28480	0160-4046
A1CB4	0160-4846	0		CAPACITOR-FXD 1500PF +-5% 100VDC CER	28480	0160-4846
A1CB5	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1CR1	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR2	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR3	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR4	1901-0639	4	4	DIODE-PIN	28480	5082-3080
A1CR5	1901-0639	4		DIODE-PIN	28480	5082-3080
A1CR6	1901-0639	4		DIODE-PIN	28480	5082-3080
A1CR7	1901-0639	4		DIODE-PIN	28480	5082-3080
A1CR8	1906-0096	7	1	DIODE-FW BRDG 200V 2A	04713	MDA202
A1CR9	1894-0221	2	1	THYRISTOR-SCR VRRM=300	04713	MCR106-5
A1CR10	1902-3234	3	1	DIODE-ZNR 19.6V 5% DO-35 PD=.4W	28480	1902-3234
A1CR11	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR12	1901-0782	8	2	DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR13	1902-3110	4	1	DIODE-ZNR 5.9V 2% DO-35 PD=.4W TC=+.017%	28480	1902-3110
A1CR14	1901-0782	8		DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR15	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR16	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR17	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR18	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR19	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR20	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR21	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR22	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR23	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR24	1901-0179	7	2	DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A1CR25	1901-0179	7		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A1CR26	1901-1068	5	2	DIODE-SM SIG SCHOTTKY	28480	1901-1068
A1CR27	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR28	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR29	1901-1068	5		DIODE-SM SIG SCHOTTKY	28480	1901-1068
A1CR30	1902-0126	6	1	DIODE-ZNR 2.61V 5% DO-7 PD=.4W TC=-.072%	28480	1902-0126
A1E1	9170-0029	3	1	CORE-SHIELDING BEAD	28480	9170-0029
A1J1	1250-1782	9	1	CONNECTOR-RF BNC FEM PCH-PNL 50-OHM	28480	1250-1782
A1J2	1250-1824	0	1	BNC FUSED PC MU	28480	1250-1824
A1J3	1251-4743	0	1	CONNECTOR-AC PWR HP-9 MALE REC-FLG THRM P	28480	1251-4743
A1J4	1251-8261	5	1	JACK POWER PCB HT	28480	1251-8261
A1J5	1250-1842	2	1	BNC RTANG PC MNT	28480	1250-1842
A1J6	1251-8304	7	1	CONN-POST TYPE .100-PIN-SPCG 8-CONT	28480	1251-8304
A1J7				NOT ASSIGNED		
A1J8	1251-7684	4	1	CABLE ASSY 14 POST	28480	1251-7684
A1J9	1251-8139	6	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-8139
A1K1	0490-1317	3	1	RELAY-REC'D 1C 250MA 200VDC 5VDC-COIL 3VA	28480	0490-1317
A1L1	9140-0718	4	1	INDUCTOR-FIXED NORM IND: 230UH @ 1.5ADC	28480	9140-0718
A1L2	9100-1788	6	9	CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L3	9140-0531	9	2	INDUCTOR RF-CH-MLD 1UH 5% .105DX.26LG	28480	9140-0531
A1L4	9100-2562	6	1	INDUCTOR RF-CH-MLD 100 UH 10%	28480	9100-2562
A1L5				NOT ASSIGNED		
A1L6	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L7	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L8				NOT ASSIGNED		
A1L9	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L10	9100-2817	4	2	INDUCTOR RF-CH-MLD 100NH 5% .105DX.26LG	28480	9100-2817
A1L11	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	92114	VK200 20/48
A1L12	9100-2817	4		INDUCTOR RF-CH-MLD 100NH 5% .105DX.26LG	28480	9100-2817
A1L13	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L14	9140-0521	7	1	INDUCTOR RF-CH-MLD 300NH 5% .105DX.26LG	28480	9140-0521
A1L15	9140-0310	2	1	INDUCTOR RF-CH-MLD 390NH 5% .105DX.26LG	28480	9140-0310
A1L16	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L17	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L18	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L19	9140-0531	9		INDUCTOR RF-CH-MLD 1UH 5% .105DX.26LG	28480	9140-0531
A1M1	8159-0005	0	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A1Q1	1854-0215	1	2	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904
A1Q2	1855-0327	8	1	TRANSISTOR J-FET 2N4416 N-CHAN D-MODE	01295	2N4416
A1Q3	1853-0334	7	1	TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0334
A1Q4	1855-0414	4	1	TRANSISTOR J-FET 2N4393 N-CHAN D-MODE	04713	2N4393
A1Q5	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1Q8	1853-0015	7	2	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q9	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1R10	1853-0363	8	1	TRANSISTOR PNP SI PD=50W FT=20MHZ	03508	X45H281
A1Q11	1854-0013	7	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A1Q12	1854-0477	7	1	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1R1	0698-8827	4	4	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R2	0757-0706	8	1	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R3	0698-8827	4	4	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R4	0699-0071	6	2	RESISTOR 4.64K 1% .125W F TC=0+-100	28480	0699-0071
A1R5	0698-7276	5	1	RESISTOR 46.4K 1% .05W F TC=0+-100	24546	C3-1/8-T0-4642-F
A1R6	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R7	0757-0421	4	4	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R8	0698-3445	2	2	RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R9	0698-7236	7	1	RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R5	0698-7233	4	1	RESISTOR 750 1% .05W F TC=0+-100	24546	C3-1/8-T0-750R-F
A1R11	0698-7203	4	1	RESISTOR 90.9K 1% .05W F TC=0+-100	24546	C3-1/8-T0-9092-F
A1R12	0698-8812	7	1	RESISTOR 1 1% .125W F TC=0+-100	28480	0698-8812
A1R13	0698-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A1R14	0698-7244	7	1	RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R15	0698-3447	4	3	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R16	0698-3447	4	4	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R17	1810-0541	4	1	NETWORK-RES 6-SIP MULTI-VALUE	28480	1810-0541
A1R18	1810-0219	3	1	NETWORK-RES 8-SIP220.0 OHM X 4	01121	208B221
A1R19	0698-7220	9	2	RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R20	0698-7220	9	9	RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R21	0698-7249	2	2	RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R22	0698-0084	9	1	RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A1R23	0757-0394	0	3	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R24	0757-0394	0	0	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R25	0698-3132	4	4	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R26	0757-0416	7	6	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R27	0757-0416	7	7	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R28	0698-3439	4	3	RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1R29	0698-8957	1	1	RESISTOR 500K 1% .125W F TC=0+-100	28480	0698-8957
A1R30	0698-3439	4	4	RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1R31	0698-8827	4	4	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R32	0757-0442	9	5	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R33	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R34	2100-1780	9	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	73138	82PR500
A1R35	0757-0280	3	4	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R36	0698-3439	4	4	RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1R37	0698-3155	1	1	RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A1R38	0757-0421	4	4	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R39	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R40	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R41	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R42	0698-8827	4	4	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R43	2100-0558	9	1	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	28480	2100-0558
A1R44	0757-0199	3	1	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A1R45 THRU A1R48				NOT ASSIGNED		
A1R49	1810-0488	8	1	NETWORK-RES 8-SIP4.7K OHM X 4	28480	1810-0488
A1R50	0812-0021	8	1	RESISTOR 47 5% 3W PW F TC=0+-90	91637	CW2B1-2-T2-47/100-J
A1R51				NOT ASSIGNED		
A1R52	0757-0394	0	0	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R53	0698-3132	4	4	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R54	0757-1093	8	2	RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R55	0757-0465	6	2	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R56	0757-0407	6	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R57	0757-0289	2	1	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A1R58	0757-0399	5	1	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A1R59	0757-0416	7	7	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R60	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R61	0698-3398	4	1	RESISTOR 46.4 1% .5W F TC=0+-100	28480	0698-3398
A1R62	0757-0260	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R63	0757-0260	7	7	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R64	0699-0071	6	6	RESISTOR 4.64K 1% .125W F TC=0+-100	28480	0699-0071
A1R65	1810-0370	7	1	NETWORK-RES 8-SIP220.0 OHM X 7	01121	208A221
A1R66	0686-7505	8	1	RESISTOR 75 5% .5W CC TC=0+412	01121	EB7505
A1R67	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R68	0757-0405	4	2	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R69	0757-0405	4	4	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R70	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R71	0698-7212	9	9	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R72	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R73	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T0-23R7-F
A1R74	0698-7219	6	1	RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-F
A1R75	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R76	0757-0419	0	1	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A1R77	2100-0554	5	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	20480	2100-0554
A1R78	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-100B-F
A1R79	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R80	0698-0082	7	5	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R81	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R82	0757-0203	6	2	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R83	0757-1093	8		RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R84	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R85	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R86	0698-3445	2		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R87	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R88	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R89	0698-3460	1	1	RESISTOR 422K 1% .125W F TC=0+-100	20480	0698-3460
A1R90	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R91	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-261R-F
A1R92	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-261R-F
A1R93	0757-0290	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R94	0698-7229	0	1	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R95	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R96	0698-7249	2		RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R97	0698-6808	5	1	RESISTOR 4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4001-F
A1R98 THRU A1R100				NOT ASSIGNED		
A1R101	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R102	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R103	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R104	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A1R105	0757-0203	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R106	0937-0220	1	1	THERMISTOR ROD 10K-OHM TC=-.3.8%/C-DEG	20480	0937-0220
A1R107	1010-0360	3	1	NETWORK-RES 6-S1P10.0K OHM X 5	01121	206A103
A1R108	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R109	0757-0401	0	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1TP1	1251-0600	0	13	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1TP2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S2 SQ	20480	1251-0600
A1TP3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1TP4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S2 SQ	20480	1251-0600
A1TP5	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1TP6	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S2 SQ	20480	1251-0600
A1TP7	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1TP8	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S2 SQ	20480	1251-0600
A1TP9	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1TP10	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S2 SQ	20480	1251-0600
A1TP11	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1TP12	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S2 SQ	20480	1251-0600
A1TP13	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ	20480	1251-0600
A1U1	1020-2312	2	1	MUL REG CTR	20480	1020-2312
A1U2-1	1010-0762	7	1	IC NMOS 32769 (32K) EPROM 450-NS 3-S	01295	7M82532JL
A1U2-2	1020-2650	1	1	NMOS 38P70 MPR	20480	1020-2650
A1U3	1020-3075	6	1	IC RCVR ECL/10KH LINE RCVR TPL	20480	1020-3075
A1U4	1013-0217	7	3	IC WIDEBAND AMPL T0-39 PKG	04713	MWA310
A1U5	1013-0217	7		IC WIDEBAND AMPL T0-39 PKG	04713	MWA310
A1U6	1058-0040	8	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	3L585	CA3127E
A1U7	1026-0904	6	1	IC-LM339T-5.0	20480	1026-0904
A1U8	1026-0544	0	1	V REF 8-DIP-C	04713	MC1403U
A1U9	1026-0420	9	1	IC 3524 MODULATOR 16-DIP-C	01295	SG3524J
A1U10	1026-0393	7	1	IC V RGLTR T0-220	27014	LK317T
A1U11	1058-0054	4	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	20480	1058-0054
A1U12	1026-0065	0	1	IC COMPARATOR PRCN 8-DIP-P PKG	56545	UPC31C
A1U13	1020-1425	6	1	IC SCHMITT-TRIG TTL LS NAND QUAD 2-IMP	01295	SN74LS132N
A1U14	1020-2096	9	1	IC CNTR TTL LS BTN DUAL 4-DIT	01295	SN74LS393N
A1U15	1020-1975	1	1	IC SHF-RCTR TTL LS NEG-EDGE-TRIG PRL-IN	01295	SN74LS165N
A1U16	1013-0217	7		IC WIDEBAND AMPL T0-39 PKG	04713	MWA310
A1U17	1026-0501	9	1	IC MULTIPLEX 2-CHAN-ANLG TRIPLE 16-DIP-P	04713	MC14053BCP
A1U18	1026-0161	7	1	IC OP AMP GP QUAD 14-DIP-P PKG	04713	LM324P
A1U19	1020-2904	8	1	IC PRESCR ECL	20480	1020-2904
A1W1	0120-4030	6	1	FLAT RIBBON ASSY 8-COND 2.5-IN-LG	20480	0120-4030
A1XU1	1200-0654	7	2	SOCKET-IC 40-CONT DIP DIP-SLDR	20480	1200-0654
A1XU2	1200-0654	7		SOCKET-IC 40-CONT DIP DIP-SLDR	20480	1200-0654
A1Y1	0960-0612	6		CRYSTAL-OSCILLATOR 10.0 MHZ; 0.55 DEG C	20480	0960-0612
A1Y1	0960-0636	4	1	OVEN-OSCILLATOR MODULE FREQ: 10 MHZ	20480	0960-0636

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3W1	05315-60102	5	1	CABLE ASSEMBLY-POSITIVE LEAD	28480	05315-60102
A3W2	05315-60103	6	1	CABLE ASSEMBLY-NEGATIVE LEAD	28480	05315-60103
A4	05006-68004	8	1	BOARD ASSEMBLY-PCL 60004	28480	05006-68004
A1F1	2110-0201	0	1	FUSE .25A 250V TD 1.25X.25 UL	28480	2110-0201
	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
A1F2	2110-0002	7	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	312062
R1	2100-2003	9	1	RESISTOR-VAR CONTROL CCP 2JK 20% LIN	28480	2100-2003
S1	3101-2656	5	1	SS LIN SEL 90PC	28480	3101-2656
S2	3101-2644	1	1	SWITCH-PB DPDT ALTNG .5A 100VAC	28480	3101-2644
S3	3101-2453	0	1	SWITCH-TGL SUBMIN DPDT .02A 20VAC/DC PC	28480	3101-2453
W1	0120-1378	1	1	CABLE ASSY 10AWG 3-CNDCT JGK-JKT	28480	0120-1378
W1	0120-4168	3	1	CABLE ASSY 5384A	28480	0120-4168
W2	0120-4167	2	1	CBL Y 14 PIN FT 26G	28480	0120-4167
W3	0150-0450	1	1	WIRE 24AWG 0 300V PVC 7X32 80C	28480	0150-0450
W4	0150-0468	5	1	WIRE 24AWG W/D/G 300V PVC 7X32 80C	28480	0150-0468
W5	0150-0499	8	1	WIRE 24AWG W/DL/V 300V PVC 7X32 80C	28480	0150-0499
W6	0150-2846	3	1	WIRE 18AWG G/Y 300V PVC 19X30 105C	28480	0150-2846
XF1	2110-0269	0	1	FUSEHOLDER-CLIP TYPE .25D-FUSE	28480	2110-0269
XF2	2110-0642	3	1	FUSEHOLDER	28480	2110-0642
				MISCELLANEOUS		
	0340-0468	6	1	INSULATOR-XSTR NYLON	28480	0340-0468
	0340-0525	6	1	INSULATOR-XSTR ALUMINUM HD-ANDZ	28480	0340-0525
	0360-0040	2	1	TERMINAL-SLDR LUG LK-MTG FGR-#1/4-SCR	28480	0360-0040
	0370-1005	2	1	KNOB-BASE-PTR 3/8 JGK .125-IN-ID	28480	0370-1005
	0370-2862	1	1	PUSHBUTTON 0.230 IN SQ; 0.425 IN HGT	28480	0370-2862
	0380-1332	9	2	STANDOFF-HEX M/F	28480	0380-1332
	0380-1582	1	2	SPACER-SWAP-IN 1.25 IN LG; .28 IN DIA	28480	0380-1582
	0403-0424	8	1	BUMPER FOOT-ADH MTG 20.5-MM-WD	28480	0403-0424
	0403-0469	1	1	BUMPER FOOT-ADH MTG 20.6-MM-WD	28480	0403-0469
	0510-1212	1	6	RETAINER-PUSH ON RND EXT .072-IN-DIA SST	28480	0510-1212
	0510-1220	1	5	RETAINER PR-DN STUD	28480	0510-1220
	0515-0105	9	4	SCREW-MACH M3 X 0.5 12MM-LG PAN-HD	28480	0515-0105
	0515-0211	8	2	SCREW-MACH M3 X 0.5 6MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0515-0212	9	2	SCREW-MACH M3.5 X 0.6 6MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0515-0226	5	4	SCREW-MACH M2.5 X 0.45 6MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0515-0244	7	7	SCREW-MACH M3 X 0.5 4MM-LG PAN-HD	28480	0515-0244
	0515-0350	6	4	SCREW-MACH M3.5 X 0.6 35MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0535-0004	9	2	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	0535-0006	1	2	NUT-HEX DBL-CHAM M4 X 0.7 3.2MM-THK	00000	ORDER BY DESCRIPTION
	05384-40001	4	1	SHELL-TOP, RFI	28480	05384-40001
	05384-40002	5	1	SHELL-BOTTOM, RFI	28480	05384-40002
	0690-1251	6	2	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	00000	ORDER BY DESCRIPTION
	0624-0333	6	2	SCREW-TPG 4-20 .25-IN-LG PAN-HD-POZI STL	28480	0624-0333
	0960-0612	6	2	CRYSTAL-OSCILLATOR 10.0 MHZ; 0-55 DEG C	28480	0960-0612
	1205-0355	5	1	HEAT SINK SCL TO-220-CS	13193	6043PB
	1460-1345	5	2	TILT STAND SST	28480	1460-1345
	1600-1185	9	2	FASTENER-RACK MOUNT	28480	1600-1185
	2190-0060	7	1	WASHER-LK INTL T 1/4 IN .256-IN-ID	28480	2190-0060
	2190-0068	5	1	WASHER-LK INTL T 1/2 IN .505-IN-ID	28480	2190-0068
	2190-0577	1	2	WASHER-LK HLCL NO. 10 .194-IN-ID	28480	2190-0577
	2190-0584	0	6	WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	2190-0585	1	4	WASHER-LK HLCL 3.5 MM 3.6-MM-ID	28480	2190-0585
	2190-0597	5	6	WASHER-LK EXT T 3.0 MM 3.2-MM-ID 6-MM-OD	28480	2190-0597
	2190-0646	5	2	WASHER-LK EXT T-B 4.0 MM 4.15-MM-ID	28480	2190-0646
	2940-0256	4	2	NUT-HEX-DBL-CHAM 1/2-28-THD .095-IN-THK	28480	2940-0256
	3050-0071	5	1	WASHER-FL MTLC NO. 8 .169-IN-ID	28480	3050-0071
	3050-0243	3	5	WASHER-FL NH 3/8 IN .385-IN-ID .75-IN-OD	28480	3050-0243
	3650-0892	8	4	WASHER-FL MTLC 3.5 MM 3.8-MM-ID	28480	3650-0892
	3101-2669	0	1	SP ARRAY RUBBER	28480	3101-2669
	4040-1974	9	2	CLIP-DISPLAY LKG .338-IN-WD .039-IN-THK	28480	4040-1974
	4040-2010	6	1	STIFFENER-DISPLAY 1.18-IN-WD .335-IN-THK	28480	4040-2010
	4177-0236	3	4	CLAMP TUDE HD, DN	28480	4177-0236
	8160-0373	8	2	RFI STRIP CNDCT-ELSTMR 2.6-MM-WD	28480	8160-0373
	9320-5195	3	1	LBL-LINE PTR 1.25-IN-WD X .5-IN-LG	28480	9320-5195
	5001-0438	7	2	TRIM-SIDE	28480	5001-0438
	5040-5447	0	1	LCD-KEY CLAMP	28480	5040-5447
	5040-5448	1	1	WINDOW	28480	5040-5448
	5040-7201	8	2	FOOT(STANDARD)	28480	5040-7201
	5040-7222	3	2	FOOT NON-SKID	28480	5040-7222

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
	5061-5217	6	1	DRVR ASSY-LCD	28480	5061-5217
	05384-00002	1	1	PANEL-REAR	28480	05384-00002
	05384-00003	2	1	PANEL-REAR	28480	05384-00003
	05384-00005	4	1	SPACER-BNC	28480	05384-00005
	05384-20201	4	1	GROMMET	28480	05384-20201
	05385-00001	1	1	PANEL-FRONT	28480	05385-00001
	05385-00002	2	1	SHIELD-RF	28480	05385-00002
	05385-68001	3	1	BAORD ASSEMBLY-PCL-60001	28480	05385-68001
	05385-68003	5	1	BAORD ASSEMBLY-PCL-60003	28480	05385-68003

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	05385-60003	9	1	BOARD ASSEMBLY-MAIN (OVEN)	28480	05385-60003
A1C1	0160-4704	9	1	CAPACITOR-FXD .01UF +-10% 500VDC CER	28480	0160-4704
A1C2	0160-5649	3	1	CAPACITOR-FXD 100PF +-5% 500VDC CER	28480	0160-5649
A1C3	0160-4385	2	1	CAPACITOR-FXD 15PF +-5% 200VDC CER 0+-30	28480	0160-4385
A1C4	0180-2816	2	1	CAPACITOR-FXD 68UF+-20% 10VDC TA	28480	0180-2816
A1C5	0180-0562	1	4	CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C6	0160-0573	2	1	CAPACITOR-FXD 4700PF +-20% 100VDC CER	28480	0160-0573
A1C7	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C8	0160-0572	1	1	CAPACITOR-FXD 2200PF +-20% 100VDC CER	28480	0160-0572
A1C9	0160-3879	7	6	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C10	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C11	0160-4492	2	2	CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C12	0160-4492	2		CAPACITOR-FXD 18PF +-5% 200VDC CER 0+-30	28480	0160-4492
A1C13	0180-0562	1		CAPACITOR-FXD 33UF+-20% 10VDC TA	56289	196D336X0010KA1
A1C14	0160-4040	6	18	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C15	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C16	0160-3875	3	2	CAPACITOR-FXD 22PF +-5% 200VDC CER 0+-30	28480	0160-3875
A1C17	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C18	0160-4518	3	1	CAPACITOR-FXD 3.9PF +-1.5PF 200VDC CER	28480	0160-4518
A1C19	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C20	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C21	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C22	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C23	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C24				NOT ASSIGNED		
A1C25	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C26	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C27	0160-4554	7	8	CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C28	0160-0127	2	3	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C29	0180-3276	0	2	CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C30	0180-3276	0		CAPACITOR-FXD 2200UF+100-10% 25VDC AL	28480	0180-3276
A1C31	0180-0228	6	1	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X901562
A1C32	0160-4557	0	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	16299	CAC04X7R104M050A
A1C33	0160-0576	5	6	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C34	0160-4819	7	2	CAPACITOR-FXD 2200PF +-5% 100VDC CER	28480	0160-4819
A1C35	0160-4822	2	3	CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C36	0180-3279	3	1	CAPACITOR-FXD 390UF+100-10% 12VDC AL	28480	0180-3279
A1C37	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C38				NOT ASSIGNED		
A1C39	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C40	0180-0291	3	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C41	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C42	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C43	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C44	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A1C45	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C46	0160-4822	2		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C47	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C48	0160-4822	2		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4822
A1C49				NOT ASSIGNED		
A1C50	0160-4810	8	1	CAPACITOR-FXD 330PF +-5% 100VDC CER	28480	0160-4810
A1C51	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C52	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C53	0160-0127	2		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C54	0180-2698	8	1	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	28480	0180-2698
A1C55	0160-4808	4	3	CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C56	0160-4808	4		CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C57	0160-4808	4		CAPACITOR-FXD 470PF +-5% 100VDC CER	28480	0160-4808
A1C58	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C59	0160-3879	7		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C60	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C61	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C62	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C63	0160-3872	0	1	CAPACITOR-FXD 2.2PF +-1.25PF 200VDC CER	28480	0160-3872
A1C64	0160-3875	3		CAPACITOR-FXD 22PF +-5% 200VDC CER 0+-30	28480	0160-3875
A1C65	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C66	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C67				NOT ASSIGNED		
A1C68	0160-4554	7		CAPACITOR-FXD .01UF +-20% 50VDC CER	28480	0160-4554
A1C69	0160-0127	2		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C70	0160-4819	7		CAPACITOR-FXD 2200UF +-5% 100VDC CER	28480	0160-4819
A1C71	0160-4805	1	1	CAPACITOR-FXD 47PF +-5% 100VDC CER 0+-30	28480	0160-4805
A1C72	0180-0582	1	1	CAPACITOR-FXD 33UF +-20% 10VDC TA	56289	196D336X0010KA1
A1C73, A1C74				NOT ASSIGNED		
A1C75	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C76	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040

See introduction to this section for ordering information  
\*Indicates factory selected value



Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1C77	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C78	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C79	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C80				NOT ASSIGNED		
A1C81	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C82	0160-4040	6		CAPACITOR-FXD 1000PF +-5% 100VDC CER	28480	0160-4040
A1C83	0160-4846	0	2	CAPACITOR-FXD 1500PF +-5% 100VDC CER	28480	0160-4846
A1C84	0160-4846	0		CAPACITOR-FXD 1500PF +-5% 100VDC CER	28480	0160-4846
A1C85	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1CR1	1901-0050	3	13	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR2	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR3	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A1CR4	1901-0639	4	4	DIODE-PIN	28480	5082-3080
A1CR5	1901-0639	4		DIODE-PIN	28480	5082-3080
A1CR6	1901-0639	4		DIODE-PIN	28480	5082-3080
A1CR7	1901-0639	4		DIODE-PIN	28480	5082-3080
A1CR8	1906-0096	7	1	DIODE-FW BRDG 200V 2A	04713	MDA202
A1CR9	1034-0221	2	1	THYRISTOR-SCR VRRM=300	04713	MC106-5
A1CR10	1902-3234	3	1	DIODE-ZNR 19.6V 5Z DO-35 PD=.4W	28480	1902-3234
A1CR11	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR12	1901-0782	8	2	DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR13	1902-3110	4	1	DIODE-ZNR 5.9V 2Z DO-35 PD=.4W TC=-.017Z	28480	1902-3110
A1CR14	1901-0782	8		DIODE-SCHOTTKY 1N5821 30V 3A	04713	1N5821
A1CR15	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR16	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR17	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR18	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR19	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR20	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR21	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR22	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR23	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR24	1901-0179	7	2	DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A1CR25	1901-0179	7		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A1CR26	1901-1060	5	2	DIODE-SM SIG SCHOTTKY	28480	1901-1060
A1CR27	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR28	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR29	1901-1060	5		DIODE-SM SIG SCHOTTKY	28480	1901-1060
A1CR30	1902-0126	6	1	DIODE-ZNR 2.61V 5Z DO-7 PD=.4W TC=-.072Z	28480	1902-0126
A1E1	7170-0029	3	1	CORE-SHIELDING BEAD	28480	7170-0029
A1F1	2110-0201	0	1	FUSE .25A 250V TD 1.25X.25 UL	28480	2110-0201
A1F2	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	312002
A1J1	1250-1782	9	1	CONNECTOR-RF BNC FEM PCH-PNL 50-OHM	28480	1250-1782
A1J2	1250-1824	0	1	BNC FUSED PC MU	28480	1250-1824
A1J3	1251-4743	0	1	CONNECTOR-AC PWR HP-9 MALE REC-FLG THRM P	28480	1251-4743
A1J4	1251-8261	5	1	JACK POWER PCB MT	28480	1251-8261
A1J5	1250-1842	2	1	BNC RTANG PC MNT	28480	1250-1842
A1J6	1251-8304	7	1	CONN-POST TYPE .100-PIN-SPCG 8-CONT	28480	1251-8304
A1J7				NOT ASSIGNED		
A1J8	1251-7684	4	1	CABLE ASSY 14 POST	28480	1251-7684
A1J9	1251-8139	6	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-8139
A1K1	0490-1317	3	1	RELAY-REED 1C 250MA 200VDC 5VDC-COIL 3VA	28480	0490-1317
A1L1	9140-0718	4	1	INDUCTOR-FIXED NORM IND; 230UH @ 1.5ADC	28480	9140-0718
A1L2	9100-1788	6	10	CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L3	9140-0531	9	2	INDUCTOR RF-CH-MLD 1UH 5Z .105DX.26LG	28480	9140-0531
A1L4	9100-2562	6	1	INDUCTOR RF-CH-MLD 100UH 10Z	28480	9100-2562
A1L5	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L6	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L7	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L8				NOT ASSIGNED		
A1L9	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L10	9100-2817	4	2	INDUCTOR RF-CH-MLD 100NH 5Z .105DX.26LG	28480	9100-2817
A1L11	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L12	9100-2817	4		INDUCTOR RF-CH-MLD 100NH 5Z .105DX.26LG	28480	9100-2817
A1L13	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L14	9140-0521	7	1	INDUCTOR RF-CH-MLD 300NH 5Z .105DX.26LG	28480	9140-0521
A1L15	9140-0310	2	1	INDUCTOR RF-CH-MLD 390NH 5Z .105DX.26LG	28480	9140-0310
A1L16	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L17	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L18	9100-1788	6		CHOKE-WIDE BAND ZMAX=680 OHM@ 180 MHZ	02114	VK200 20/48
A1L19	9140-0531	9		INDUCTOR RF-CH-MLD 1UH 5Z .105DX.26LG	28480	9140-0531
A1M2	8159-0005	0	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A1O1	1854-0215	1	2	TRANSISTOR NPN SJ PD=350MW FT=300MHZ	04713	2N3904
A1O2	1855-0327	8	1	TRANSISTOR J-FET 2N4416 N-CHAN D-MODE	01275	2N4416
A1O3	1853-0354	7	1	TRANSISTOR PNP SI TO-92 PD=350MW	28480	1853-0354
A1O4	1855-0414	4	1	TRANSISTOR J-FET 2N4393 N-CHAN D-MODE	04713	2N4393
A1O5	1854-0215	1		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	2N3904

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1Q6, A1Q7				NOT ASSIGNED		
A1Q8	1853-0015	7	2	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q9	1853-0015	7		TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A1Q10	1853-0363	8	1	TRANSISTOR PNP SI PD=50W FT=20MHZ	03508	X45H281
A1Q11	1854-0013	7	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A1Q12	1854-0477	7	1	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1R1	0698-8827	4	4	RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R2	0757-0706	8	1	RESISTOR 51.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-51R1-F
A1R3	0698-8827	4		RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R4	0699-0071	6	2	RESISTOR 4.64M 1% .125W F TC=0+-100	28480	0699-0071
A1R5	0698-7276	5	1	RESISTOR 46.4K 1% .05W F TC=0+-100	24546	C3-1/8-T0-4642-F
A1R6	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R7	0757-0421	4	4	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R8	0698-3445	2	2	RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R9	0698-7236	7	1	RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-F
A1R10	0698-7233	4	1	RESISTOR 750 1% .05W F TC=0+-100	24546	C3-1/8-T0-750R-F
A1R11	0698-7283	4	1	RESISTOR 90.9K 1% .05W F TC=0+-100	24546	C3-1/8-T0-9092-F
A1R12	0698-8812	7	1	RESISTOR 1 1% .125W F TC=0+-100	28480	0698-8812
A1R13	0698-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A1R14	0698-7244	7	1	RESISTOR 2.15K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2151-F
A1R15	0698-3447	4	2	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R16	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A1R17	1810-0541	4	1	NETWORK-RES 6-SIP MULTI-VALUE	28480	1810-0541
A1R18	1810-0219	3	1	NETWORK-RES 8-SIP220.0 OHM X 4	01121	208B221
A1R19	0698-7220	9	2	RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R20	0698-7220	9		RESISTOR 215 1% .05W F TC=0+-100	24546	C3-1/8-T0-215R-F
A1R21	0698-7249	2	2	RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R22	0698-0084	9	1	RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A1R23	0757-0394	0	3	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R24	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R25	0698-3132	4	4	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R26	0757-0416	7	5	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R27	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R28	0698-3439	4	3	RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1R29	0698-8957	1	1	RESISTOR 500K 1% .125W F TC=0+-100	28480	0698-8957
A1R30	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1R31	0698-8827	4		RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R32	0757-0442	7	5	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R33	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R34	2100-1788	9	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	73138	82PR500
A1R35	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R36	0698-3439	4		RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A1R37	0698-3155	1	1	RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A1R38	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R39	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R40	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R41	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R42	0698-8827	4		RESISTOR 1M 1% .125W F TC=0+-100	28480	0698-8827
A1R43	2100-0558	9	1	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	28480	2100-0558
A1R44	0757-0199	3	1	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A1R45 THRU A1R48				NOT ASSIGNED		
A1R49	1810-0488	8		NETWORK-RES 8-SIP4.7K OHM X 4	28480	1810-0488
A1R50	0812-0021	8	1	RESISTOR .47 5% 3W PW TC=0+-100	91637	CW2B1-3-T2-47/100-J
A1R51				NOT ASSIGNED		
A1R52	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R53	0698-3132	4		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A1R54	0757-1093	8	2	RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R55	0757-0465	6	2	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R56	0757-0407	6	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R57	0757-0289	2	1	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A1R58	0757-0399	5	1	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A1R59	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R60	0757-0346	2		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R61	0698-3398	4	1	RESISTOR 46.4 1% .5W F TC=0+-100	28480	0698-3398
A1R62	0757-0200	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R63	0757-0200	7		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R64	0699-0071	6		RESISTOR 4.64M 1% .125W F TC=0+-100	28480	0699-0071
A1R65	1810-0370	7	1	NETWORK-RES 8-SIP220.0 OHM X 7	01121	208A221
A1R66	0686-7505	8	1	RESISTOR 75 5% .5W CC TC=0+-412	01121	EB7505
A1R67	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R68	0757-0405	4	2	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R69	0757-0405	4		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R70	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R71	0698-7212	9		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-F
A1R72	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A1R73	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T0-23R7-F
A1R74	0698-7219	6	1	RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-F
A1R75	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1R76	0757-0417	0	1	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A1R77	2100-0554	5	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	28480	2100-0554
A1R78	0757-0465	6		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A1R79	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R80	0698-0082	7	5	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R81	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R82	0757-0283	6	2	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R83	0757-1093	8		RESISTOR 3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3001-F
A1R84	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R85	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R86	0698-3445	2		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A1R87	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R88	0757-0421	4		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R89	0698-3460	1	1	RESISTOR 422K 1% .125W F TC=0+-100	28400	0698-3460
A1R90	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R91	0698-3132	4		RESISTOR 241 1% .125W F TC=0+-100	24546	C4-1/8-T0-2410-F
A1R92	0698-3132	4		RESISTOR 241 1% .125W F TC=0+-100	24546	C4-1/8-T0-2410-F
A1R93	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R94	0698-7227	0	1	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-F
A1R95	0757-0401	0	2	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R96	0698-7249	2		RESISTOR 3.48K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3481-F
A1R97	0698-5808	5	1	RESISTOR 4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4001-F
A1R98 THRU A1R101				NOT ASSIGNED		
A1R102	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R103	0757-0416	7		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R104	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A1R105	0757-0283	6		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R106	0937-0220	1	1	THERMISTOR ROD 10K OHM TC=-3.83%/C-DEG	28480	0937-0220
A1R107	1810-0368	3	1	NETWORK-RES 6-SIP10.0K OHM X 5	01121	206A103
A1R108	0698-0082	7		RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A1R109	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1S1	3101-2656	5	1	SS LIN SEL 98PC	28480	3101-2656
A1S2	3101-2644	1	1	SWITCH-PB DPDT ALTNG .5A 100VAC	28480	3101-2644
A1S3	3101-2453	0	1	SWITCH-TGL SUBMIN DPDT .02A 20VAC/DC PC	28480	3101-2453
A1T1	9100-2684	3		TRANSFORMER-POWER 115/230; 4B/60 HZ	28480	9100-2684
A1TP1	1251-0600	0	13	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP5	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP6	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP7	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP8	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP9	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP10	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP11	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP12	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1TP13	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A1U1*	1820-2312	2	1	IC MISC	28480	1820-2312
A1U2-1	1818-0762	7	1	IC NMOS 32768 (32K) EPROM 450-NS 3-S	01295	TMS2532JL
A1U2-2	1820-2650	1	1	NMOS 38P70 MPR	28480	1820-2650
A1U3	1820-3075	6	1	IC RCVR ECL/10KH LINE RCVR TPL	28480	1820-3075
A1U4	1813-0217	7	3	IC WIDEBAND AMPL TD-39 PKG	04713	MWA310
A1U5	1813-0217	7		IC WIDEBAND AMPL TD-39 PKG	04713	MWA310
A1U6	1858-0040	8	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	3L505	CA3127E
A1U7	1826-0904	6	1	IC-LM330T-5.0	28480	1826-0904
A1U8	1826-0544	0	1	V REF 8-DIP-C	04713	MC1403U
A1U9	1826-0428	9	1	IC 3524 MODULATOR 16-DIP-C	01295	SG3524J
A1U10	1826-0393	7	1	IC V RGLTR TD-228	27014	LM317T
A1U11	1858-0054	4	1	TRANSISTOR ARRAY 16-PIN PLSTC DIP	28480	1858-0054
A1U12	1826-0065	0	1	IC COMPARATOR PRCN 8-DIP-P PKG	50545	UPC311C
A1U13	1820-1425	6	1	IC SCHMITT-TRIG TTL LS NAND QUAD 2-INP	01295	SN74LS132N
A1U14	1820-2096	9	1	IC CNTR TTL LS BIN DUAL 4-BIT	01295	SN74LS93N
A1U15	1820-1975	7	1	IC SHF-RCTR TTL LS NEG-EDGE-TRIG PRL-IN	01295	SN74LS165N
A1U16	1813-0217	1		IC WIDEBAND AMPL TD-39 PKG	04713	MWA310
A1U17	1826-0501	7	1	IC MULTIPLEXR 2-CHAN-ANLG TRIPLE 16-DIP-P	04713	MC14053BCP
A1U18	1826-0161	7	1	IC OP AMP GP QUAD 14-DIP-P PKG	04713	LM324P
A1U19	1820-2904	8	1	IC PRESCR ECL	28480	1820-2904
A1W1	8120-4168	3	1	CABLE ASSY 5384A	28480	8120-4168
A1XF1	2110-0269	0	1	FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A1XF2	2110-0642	3	1	FUSCHOLDER	28480	2110-0642
A1XU1	1200-0654	7	2	SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
A1XU2	1200-0654	7		SOCKET-IC 40-CONT DIP DIP-SLDR	28480	1200-0654
A1Y1	0960-0636	4	1	OVEN-OSCILLATOR MODULE FREQ: 10 MHz	28480	0960-0636

See introduction to this section for ordering information  
\*Indicates factory selected value

Table 6-2. Replaceable Parts (Continued)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
				MISCELLANEOUS		
	0515-0105	9	4	SCREW-MACH M3 X 0.5 12MM-LG PAN-HD	28480	0515-0105
	0535-0004	9	2	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
	2190-0597	5	2	WASHER-LK EXT T 3.0 MM 3.2-MM-ID 6-MM-DD	28480	2190-0597
	7120-3731	3	1	LABEL-WARNING .5-IN-WD 1.375-IN-LG VINYL	28480	7120-3731
	9100-2684	3	2	TRANSFORMER-POWER 115/230; 48/60 HZ	28480	9100-2684

See introduction to this section for ordering information  
 \*Indicates factory selected value

Table 6-3. Manufacturers Code List

MFR. NO.	MANUFACTURER NAME AND ADDRESS	ZIP CODE
50545	Nippon Electric Company, Tokyo, Japan	
00000	Any Satisfactory Supplier	
01121	Allen-Bradley Company, Milwaukee, WI	53204
01295	Texas Instrument Incorporated, Semiconductor Comp. Div., Dallas, TX	75222
01417	Chrysler Corporation Defense Opn. Division, Detroit, MI	48203
02114	Ferroxcube Corporation, Saugerties, NY	12477
03508	General Electric Company, Semiconductor Products Dept., Auburn, NY	13201
04713	Motorola Semiconductor Products, Phoenix, AZ	85008
13103	Thermally Company, Dallas, TX	75234
16299	Corning Glass Works, Component Division, Raleigh, NC	27604
19701	MEPCO/Electra Corporation, Mineral Wells, TX	76067
24546	Corning Glass Works (Bradford), Bradford, PA	16701
27014	National Semiconductor Corporation, Santa Clara, CA	95051
28480	Hewlett-Packard Company, Corporate Headquarters, Palo Alto, CA	94304
3L585	RCA Corporation Solid State Division, Somerville, NJ	
51642	Centre Engineering Incorporated, State College, PA	16801
52763	Stettner Electronics Incorporated, Chattanooga, TN	13035
56289	Sprague Electric Company, North Adams, MA	01247
73138	Beckman Instruments Incorporated, Helipot Division, Fullerton, CA	92634
75915	Littelfuse Incorporated, Des Plaines, IL.	60016
91637	Dale Electronics Incorporated, Columbus, NE	68601

## SECTION VII MANUAL CHANGES

### 7-1. INTRODUCTION

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

### 7-3. MANUAL CHANGES

7-4. This manual applies directly to Models 5384A and 5385A Frequency Counters with serial number prefix 2312A and below.

7-5. As engineering changes are made, newer instruments may have serial prefix numbers higher than those listed on the title page of this manual. The manuals for these instruments will be supplied with Manual Changes sheets containing the required information. Replace affected pages or modify existing manual information as directed in the Manual Changes pages. Contact the nearest Hewlett-Packard Sales and Service Office if the change information is missing.

## SECTION VIII SERVICE

### 8-1. INTRODUCTION

8-2. This section provides service information and symbol descriptions, component locators, and schematic diagrams. The arrangement of the content of this section is described in detail below. Refer to the Table of Contents for specific page and paragraph numbers.

a. **SCHEMATIC DIAGRAM SYMBOLS AND REFERENCE DESIGNATIONS.** Describes the symbols used on schematic diagrams and reference designators used for parts, subassemblies and assemblies.

b. **IDENTIFICATION MARKINGS.** Describes the method used by Hewlett-Packard for identifying printed-circuit boards and assemblies.

c. **SAFETY CONSIDERATIONS.** Describes the safety considerations applicable during maintenance, adjustments, and repair.

d. **SAFETY SYMBOLS.** Lists and describes the safety symbols used on equipment and in manuals.

e. **RECOMMENDED TEST EQUIPMENT.** Refers to test equipment specified in *Table 1-2*.

f. **SERVICE AIDS.** Information provided to assist service personnel.

### 8-3. SCHEMATIC DIAGRAM SYMBOLS AND REFERENCE DESIGNATORS

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

### 8-5. Reference Designations

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

### 8-7. IDENTIFICATION MARKINGS ON PRINTED-CIRCUIT BOARDS

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

8-9. The assembly part number has 10 digits (such as 05384-60001) and is the primary identification. All assemblies with the same part number are interchangeable. When a production change is made on an assembly that makes it incompatible with previous assemblies, a change in part number is required. The series number (such as 2312A) is used to document minor electrical changes. As changes are made, the series number is incremented. When replacement boards are ordered, you may receive a replacement with a different series number. If there is a difference between the series number marked on the board and the schematic in this manual, a minor electrical difference exists. If the number on the printed-circuit board is lower than that on the schematic, refer to Section VII for backdating information. If it is higher, refer to the looseleaf manual change sheets for this manual. If the manual change sheets are missing, contact your local Hewlett-Packard Sales and Support Office. See the listing on the back cover of this manual.

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

### 8-11. SAFETY CONSIDERATIONS

8-12. Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operation and to retain the instrument in safe condition. Service and adjustments should be performed only by service-trained personnel.

**WARNING**

**ALL PROTECTIVE EARTH TERMINALS, EXTENSION CORDS, AUTOTRANSFORMERS AND DEVICES CONNECTED TO THE INSTRUMENT SHOULD BE CONNECTED TO A PROTECTIVE EARTH GROUNDED SOCKET. ANY INTERRUPTION OF THE PROTECTIVE EARTH GROUNDING WILL CAUSE A POTENTIAL SHOCK HAZARD THAT COULD RESULT IN PERSONAL INJURY.**

**ONLY THE 250V FUSES WITH THE REQUIRED RATED CURRENT AND SPECIFIED TYPE SHOULD BE USED. DO NOT USE REPAIRED FUSES OR SHORT CIRCUITED FUSEHOLDERS. TO DO SO COULD CAUSE A SHOCK OR FIRE HAZARD.**

8-13. Any adjustments, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved.

8-14. Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of power.

**WARNING**

**POWER IS ALWAYS PRESENT AT THE POWER SWITCH AND TRANSFORMER, AND UNREGULATED DC IS PRESENT WHENEVER THE LINE CORD IS ATTACHED. UNPLUGGING THE POWER CORD IS NECESSARY TO REMOVE ALL POWER FROM THE INSTRUMENT.**

8-15. Make sure that only fuses with the required rated current and of the specified type (normal blow,

time delay are used for replacement). The use of repaired fuses and short circuiting of fuseholders must be avoided. Whenever it is likely that this protection has been impaired, the 5384A/5385A must be made inoperative and secured against any unintended operation.

**WARNING**

**THE SERVICE INFORMATION IS OFTEN USED WITH POWER SUPPLIED AND PROTECTIVE COVERS REMOVED FROM THE 5384A/5385A. ENERGY AVAILABLE AT MANY POINTS MAY, IF CONTACTED, RESULT IN PERSONAL INJURY.**

**8-16. Safety Symbols**

8-17. The safety symbols shown in *Figure 8-1* are used on equipment and in manuals.

**8-18. RECOMMENDED TEST EQUIPMENT**

8-19. Test equipment and test equipment accessories required to maintain the 5384A/5385A are listed in *Table 1-2*. Equipment other than that listed may be used if it meets the critical specifications.

**8-20. SERVICE AIDS**

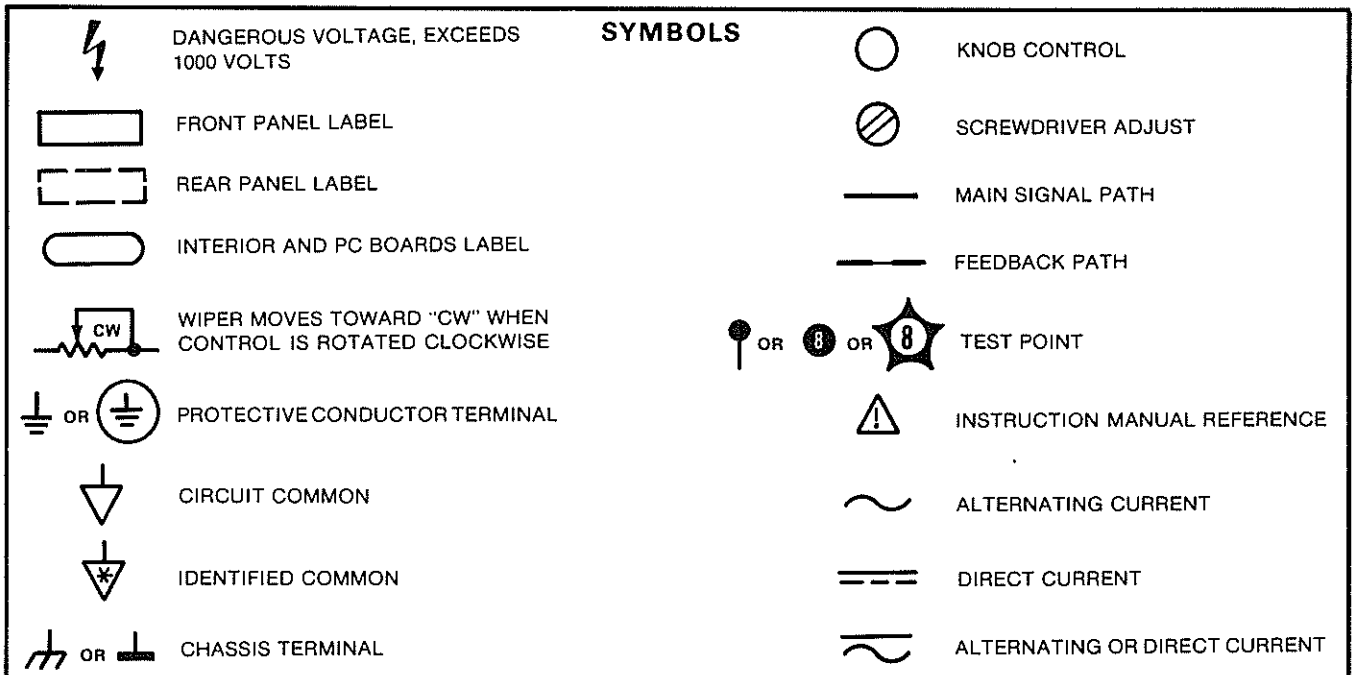
**8-21. Pozidriv Screwdrivers**

8-22. Many screws in the counter appear to be Phillips, but are not. To avoid damage to the screw slots, pozidriv screwdrivers should be used.

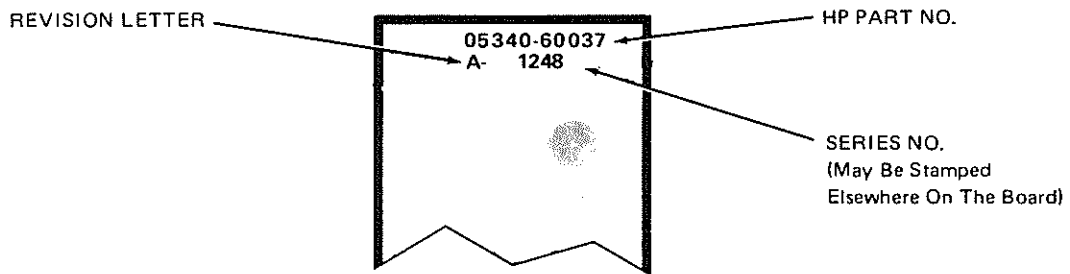
**8-23. Service Aids on Printed Circuit Boards**

8-24. The servicing aids include test points, transistor and integrated circuit designations, adjustment callouts, and assembly stock numbers.





**PRINTED CIRCUIT BOARD IDENTIFICATION**



**REFERENCE DESIGNATIONS**

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

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

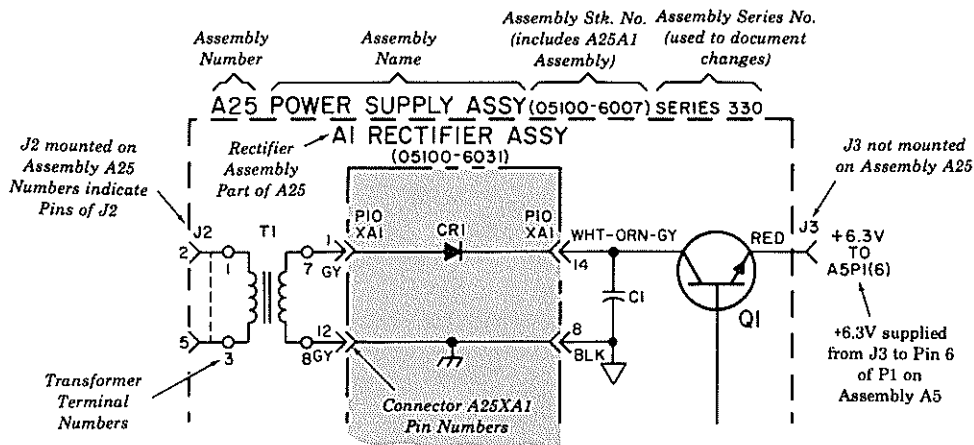
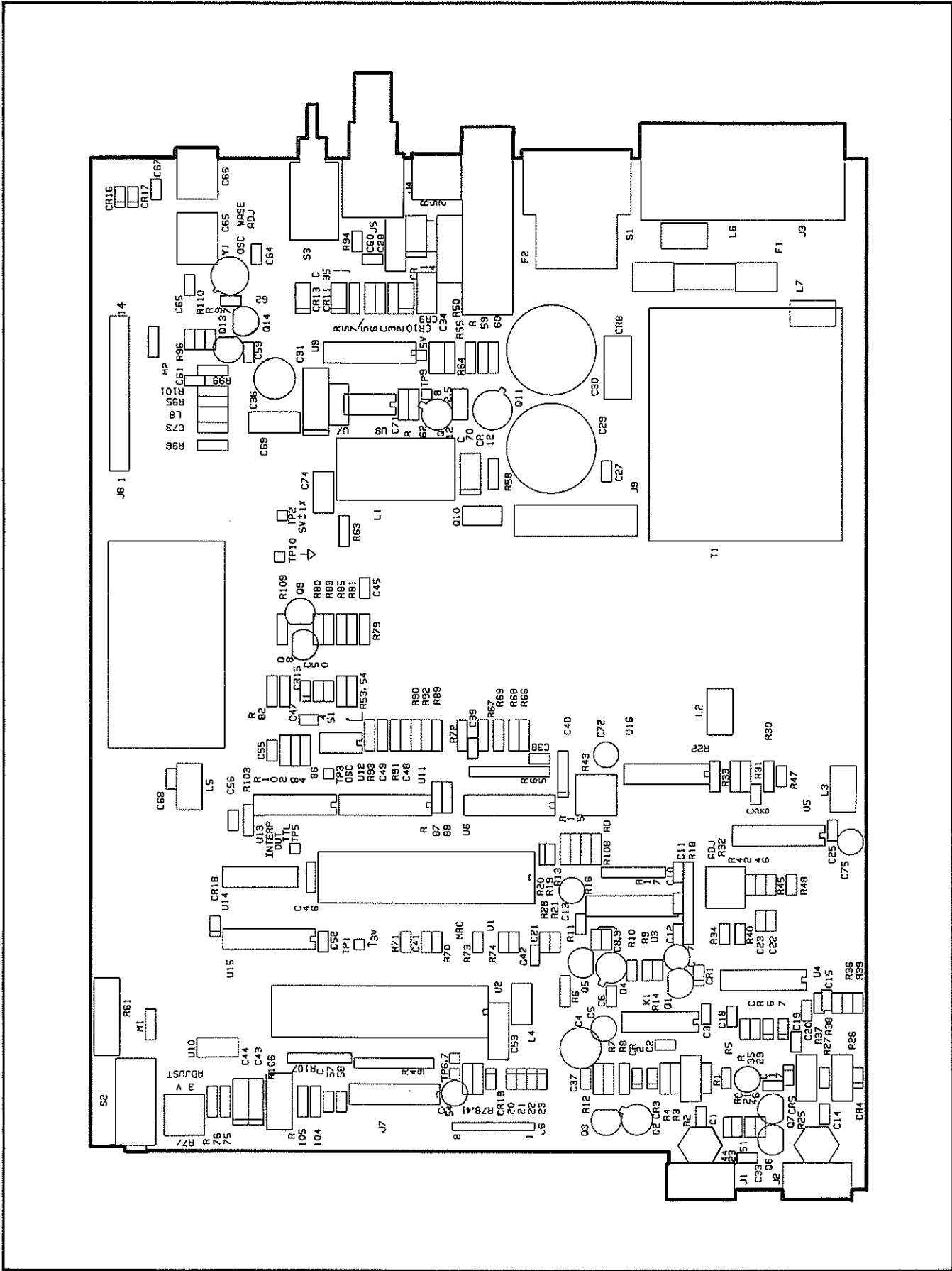


Figure 8-1. Schematic Diagram Notes



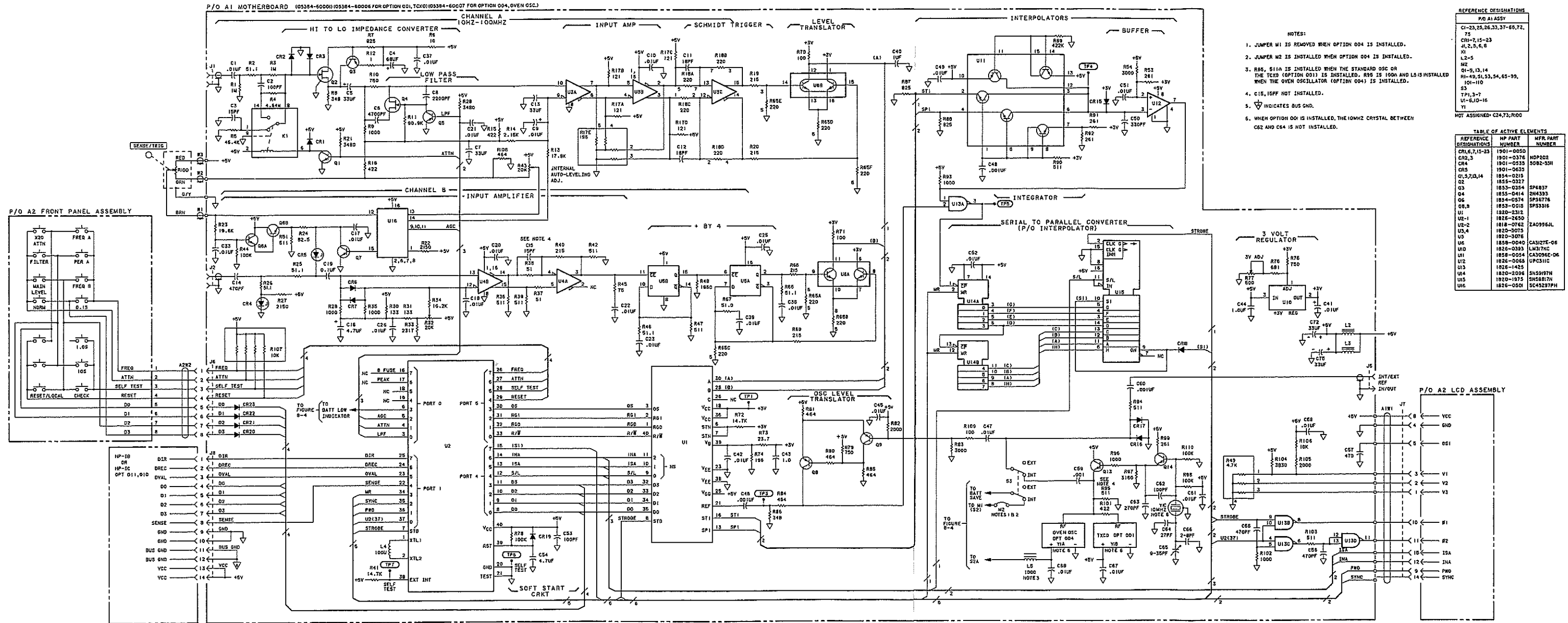
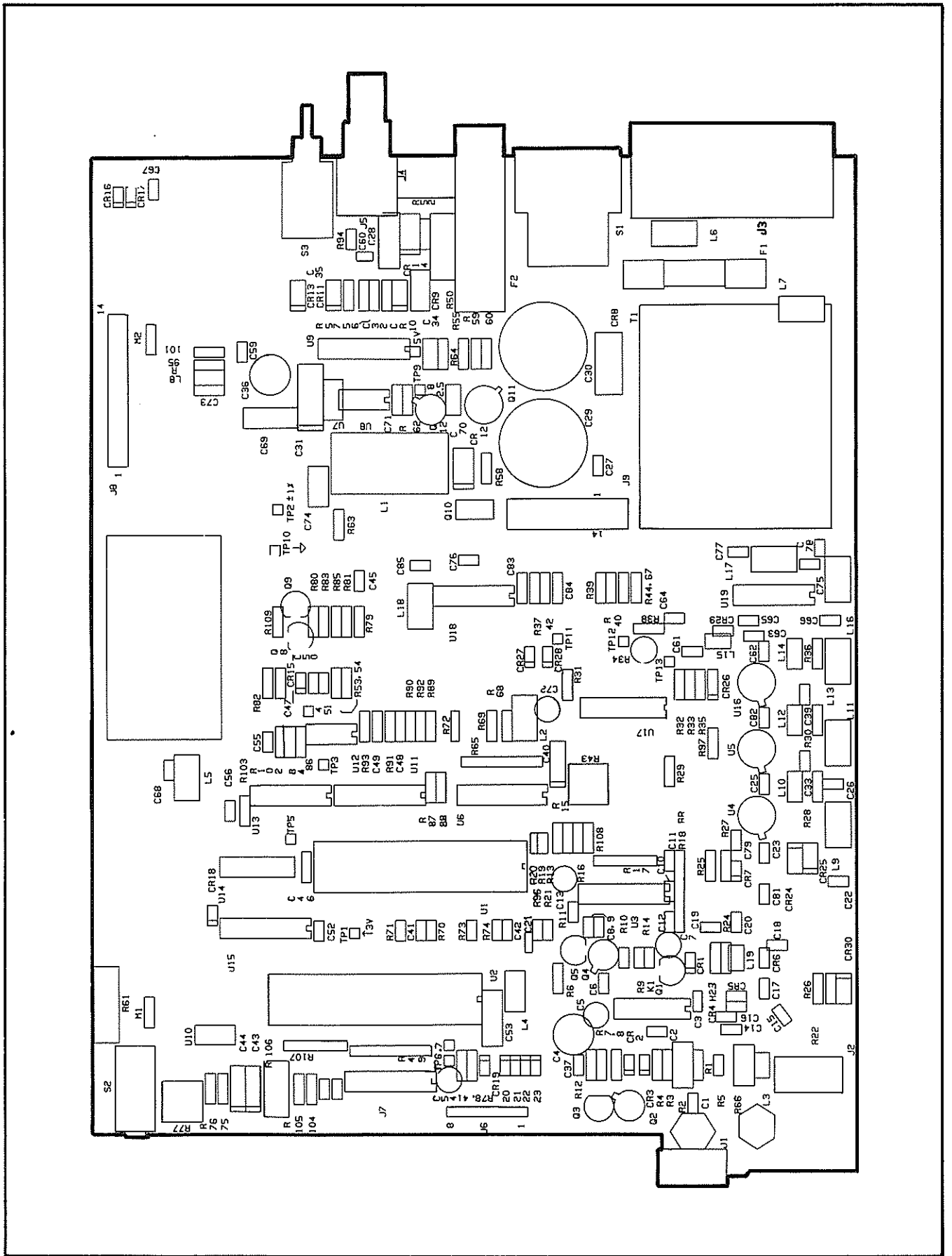


Figure 8-2. 5384A A1 Motherboard Assembly



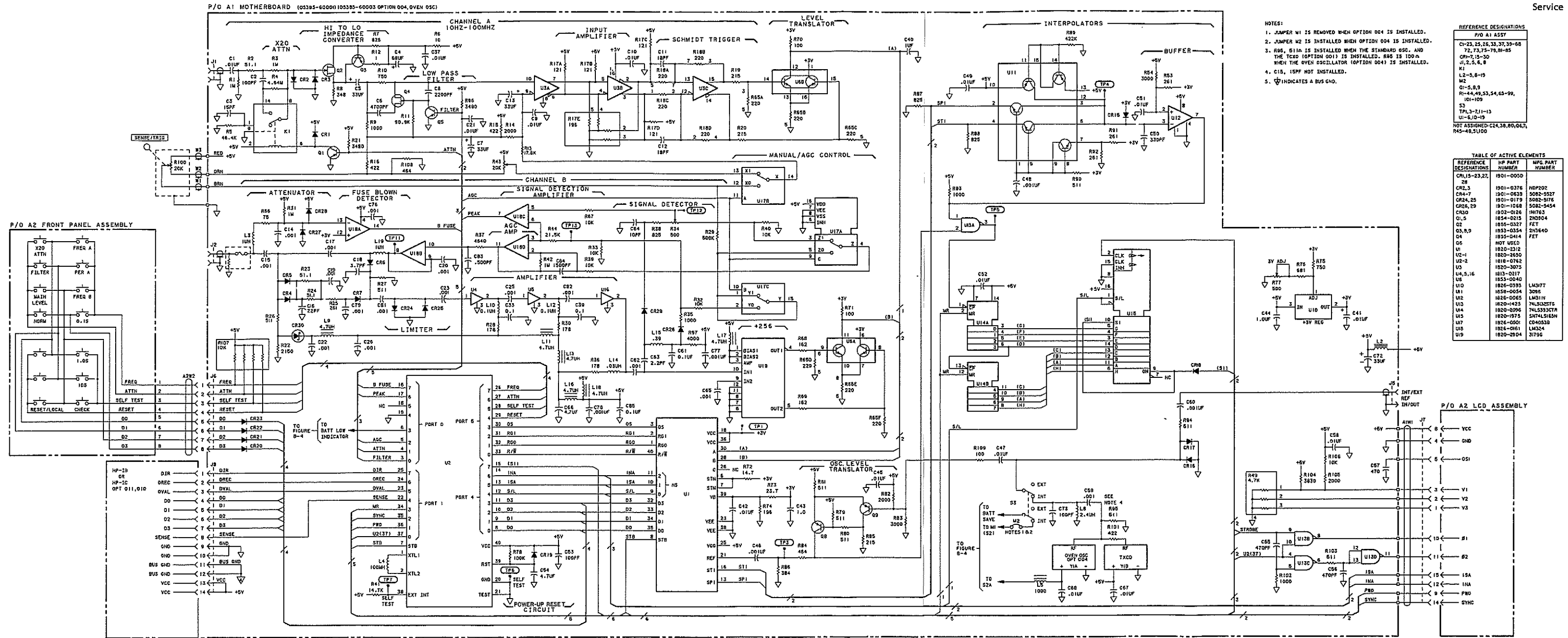
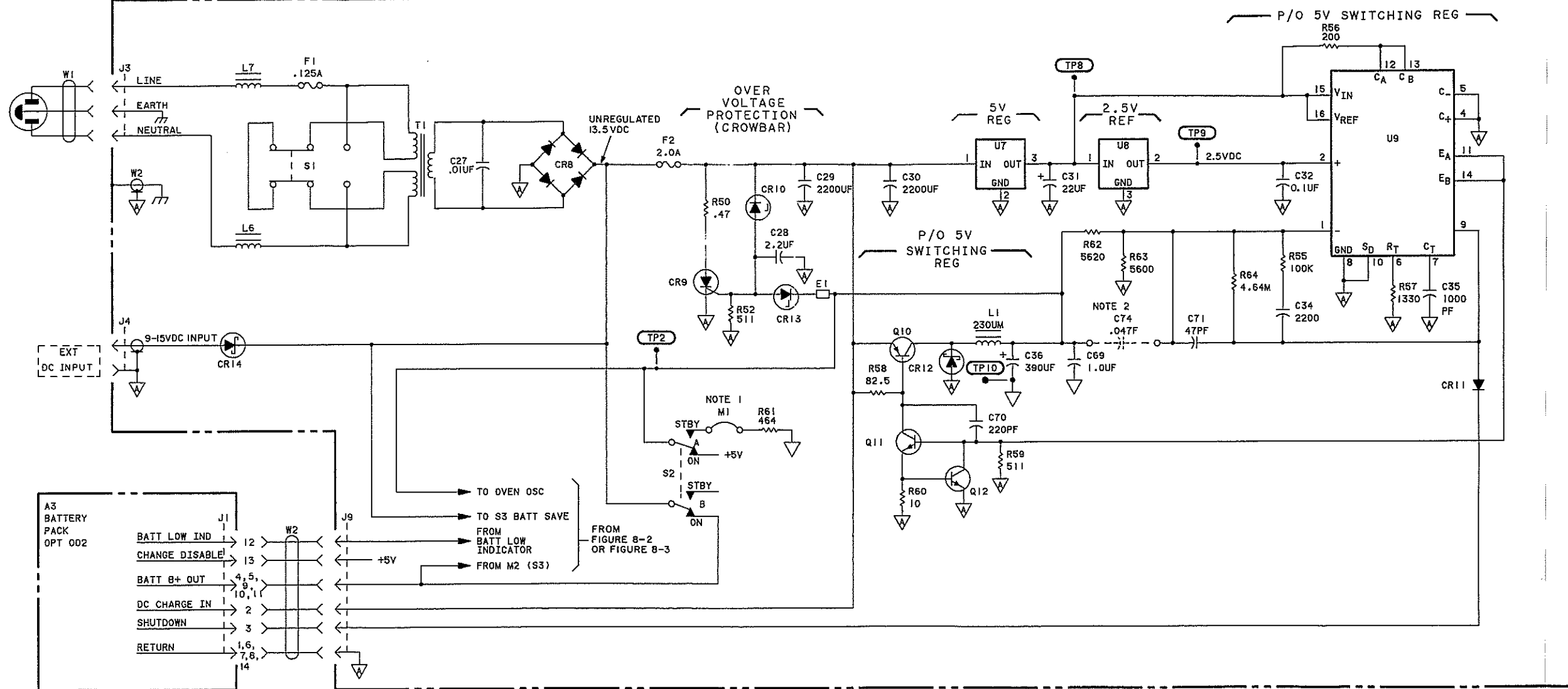


Figure 8-3. 5385A A1 Motherboard Assembly

P/O AI MOTHERBOARD (POWER SUPPLY) (05384-60001; 05384-60006 OPTION 001, TCXO; 05384-60007 OPTION 004, OVEN OSC) (05385-60001; 05385-60003 OPTION 004 OVEN OSC)



NOTES

1. JUMPER M1 IS REMOVED WHEN OPTION 004 IS INSTALLED.
2. C74, .047UF NOT INSTALLED.
3.  $\nabla$  INDICATES A COMMON CONNECTION.

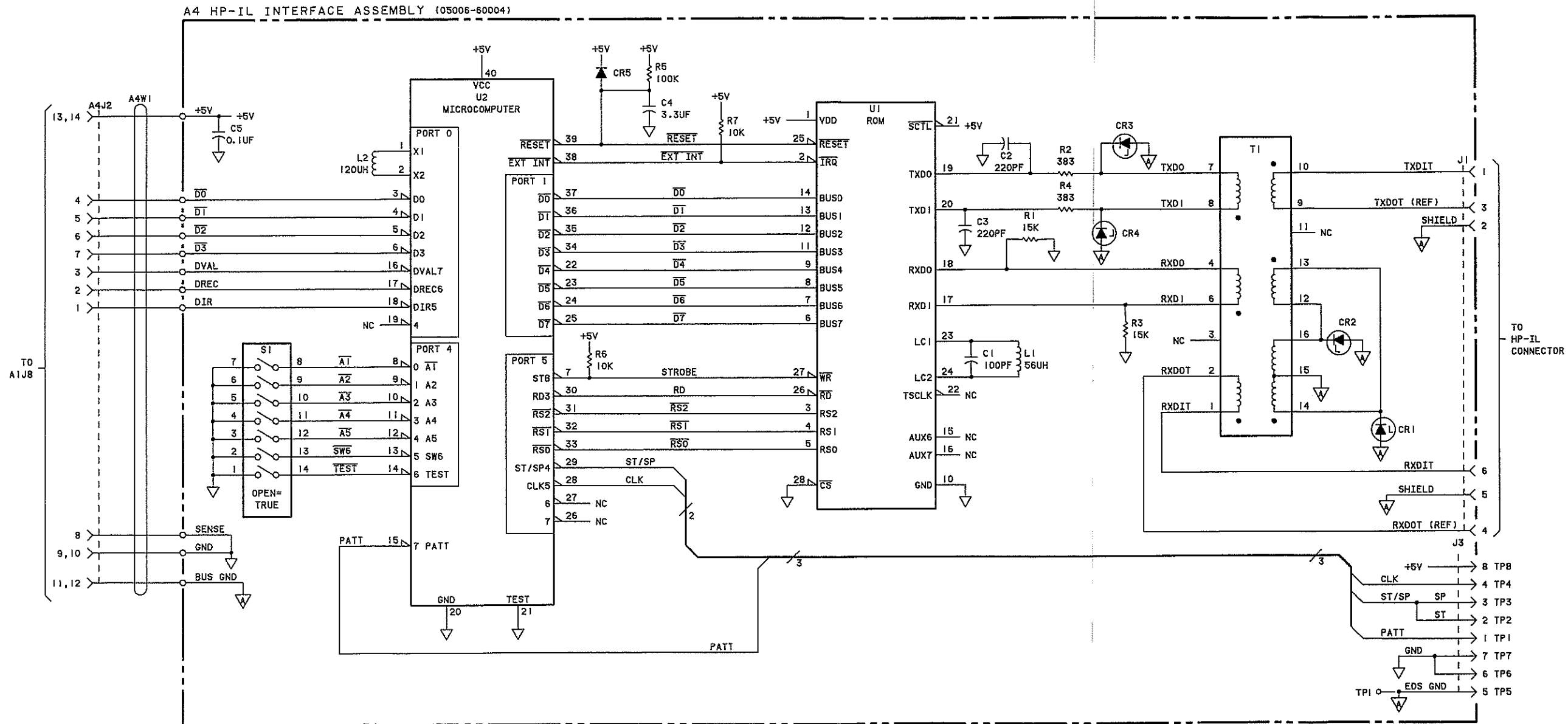
REFERENCE DESIGNATIONS

P/O AI ASSY	
C27-32, 34-36, 69-71, 79	
CR8-14	
E1	
F1, 2	
J3, 4, 9	
L1, 6, 7	
M1	
Q10-12	
R50, 52, 55-64	
S1, 2	
T1	
TP2, 8-10	
U7-9	

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBER	MFR. PART NUMBER
CR8	1906-0096	SDA296-2
CR9	1884-0221	SCR1153K
CR10	1902-3234	SZ30016-266
CR11	1901-0050	
CR12, 14	1901-0782	1N5821
CR13	1902-3110	SZ30017-117
Q10	1853-0363	X45H281
Q11	1854-0013	2N2218A
Q12	1854-0477	2N2222A
U7	1826-0904	LM330T
U8	1826-0544	MC1403U
U9	1826-0428	S63524J

Figure 8-4. 5384A/5385A A1 Motherboard Power Supply Assembly



NOTES  
1. INDICATES EDS GND OR BUS GND.

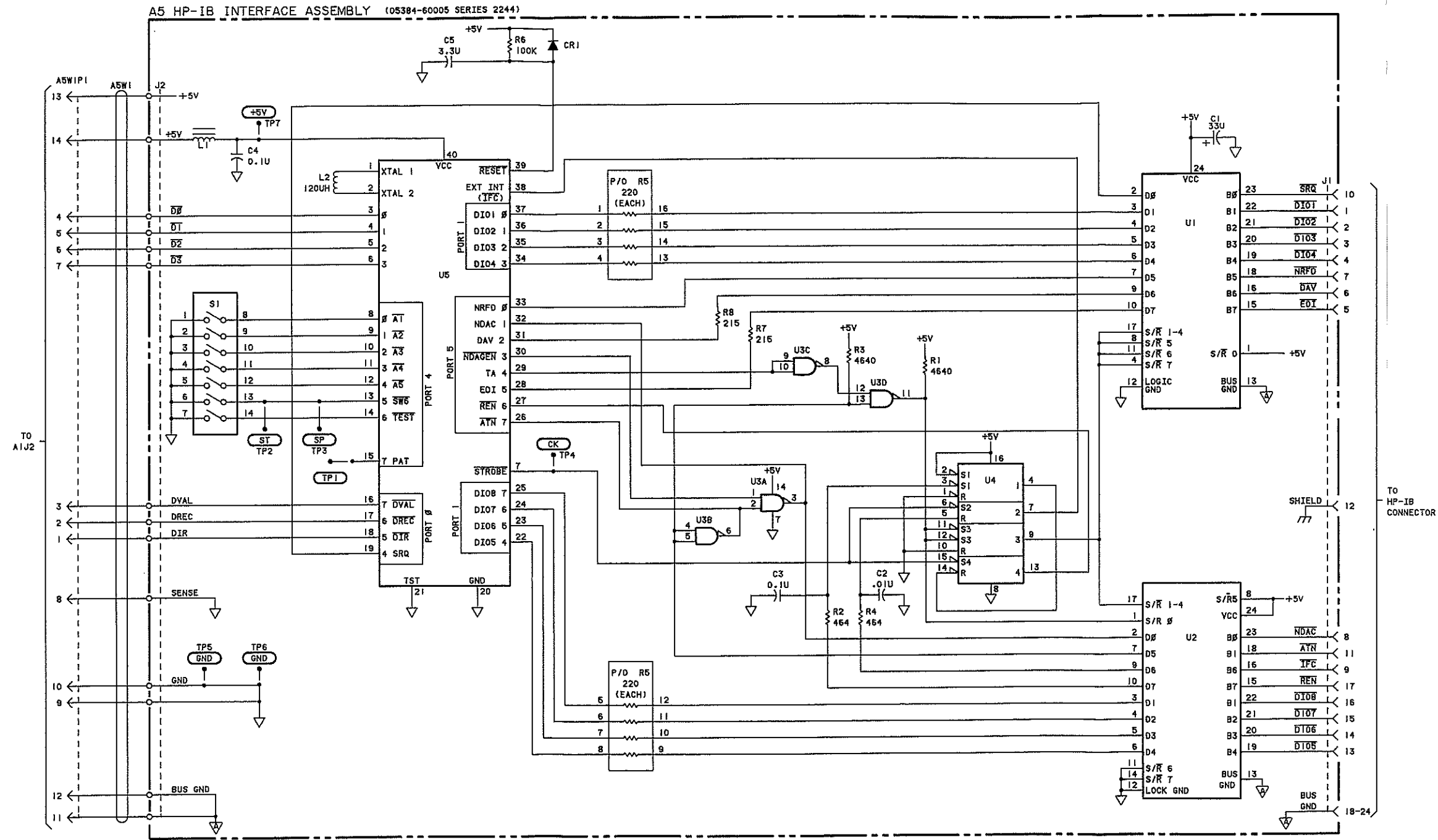
REFERENCE DESIGNATIONS

A4 ASSY		
CI-5		
CR1-5		
J1,2		
L1,2		
R1-7		
T1		
TP1		
UI,2		
WI		

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBER	MFR. PART NUMBER
CR1-4	1902-0970	SZ30035-28
CR5	1901-0050	FDH6308
U1	1LB3-0003	
U2-1	1820-2650	MK9740R-00-0
U2-2	05006-80002	

Figure 8-5. A4 HP-IL Interface Assembly



- NOTES:
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
  2. UNLESS OTHERWISE INDICATED:  
RESISTANCE IN OHMS;  
CAPACITANCE IN FARADS;  
INDUCTANCE IN HENRIES
  3. ASTERISK (\*) INDICATES FACTORY SELECTED COMPONENT, AVERAGE VALUE SHOWN.
  4. ▽ INDICATES BUS GND.

REFERENCE DESIGNATIONS  
A5 ASSY

C1-C5
CR1
J1-J2
L1,L2
R1-R8
S1
TP1-TP7
U1-U6
W1

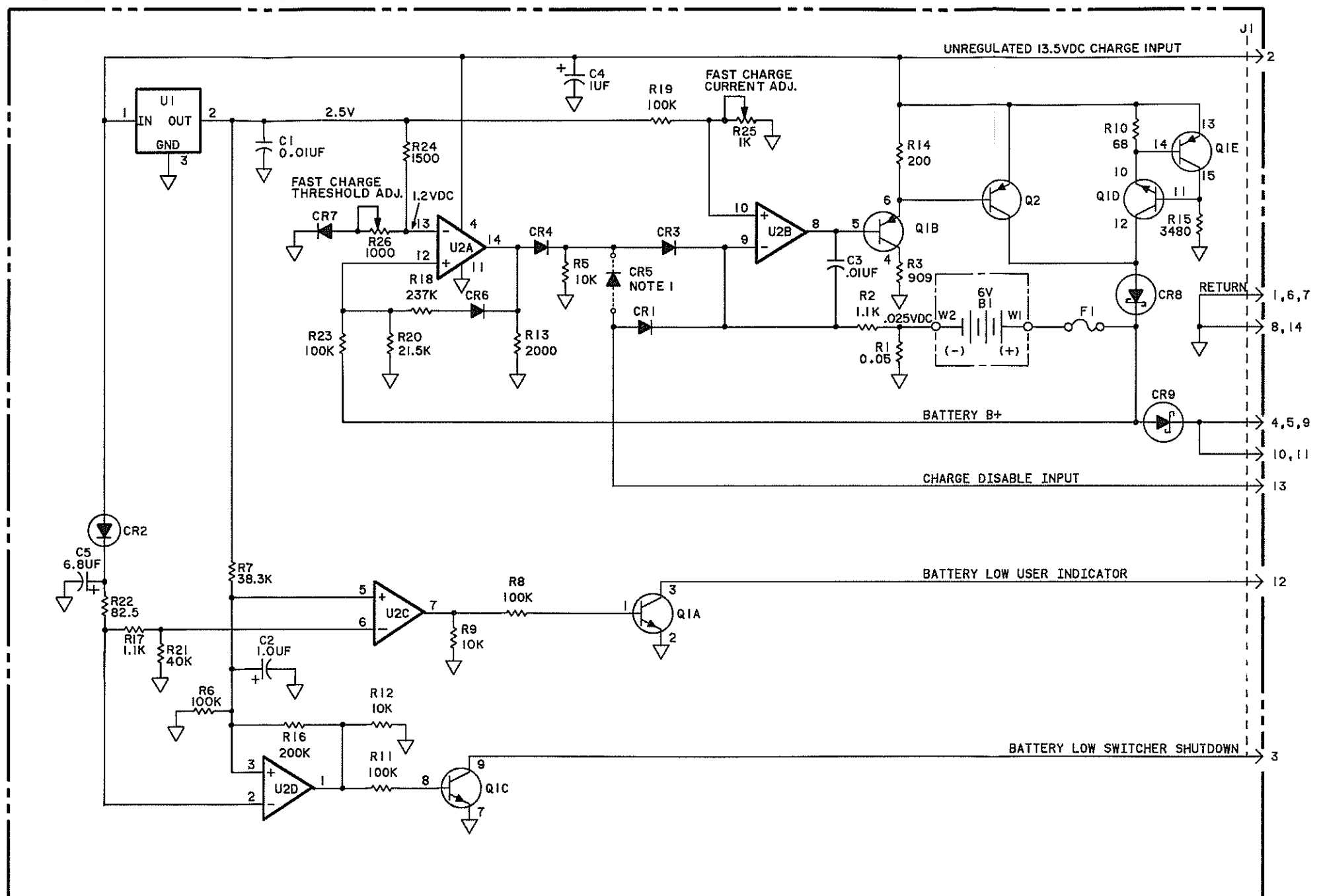
TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBER	MFR. PART NUMBER
CR1	1901-0050	
U1,2	1820-2461	MC3447P3
U3	1820-1198	SN74LS03N
U4	1820-1440	SN74LS279N
U5	1820-37486	

Figure 8-6. A5 HP-IB Interface Assembly



A3 BATTERY CHARGER OPTION ASSEMBLY (05384-60003)



NOTES  
1. CR5 IS NOT INSTALLED.

REFERENCE DESIGNATIONS

A3 ASSY	
BI	
CI-5	
CR1-9	
F1	
J1	
Q1,2	
R1-26	
U1,2	
W1,2	

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBER	MFG. PART NUMBER
CR1-7	1901-0050	FDH6308
CR8	1901-1080	IN5817
CR9	1901-0676	SBD5041
Q1	1858-0054	CA3096E-06
Q2	1853-0363	X45H281
U1	1826-0544	SC76571LK
U2	1826-0161	LM324N

TO AIJ9

Figure 8-7. A3 Battery Pack Assembly

