

NETWORK ANALYZER

8410B

SUPPLEMENT
PART NO. 08410-90048

USE THIS SUPPLEMENT WITH
MANUAL PART NO. 08410-90020
PRINTED DECEMBER 1971

APRIL 1975

HEWLETT  PACKARD

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SECTION I

NETWORK ANALYZER

INTRODUCTION

This supplement describes the differences between the Model 8410A and the Model 8410B. In addition, this supplement describes the changes necessary to the 8410A Operating and Service Manual (08410-90020) to document the 8410B.

DESCRIPTION

The 8410B incorporates an AUTO frequency range mode, which gives it the capability of automatically tracking the HP 8620A Sweep Oscillator over octave and multioctave frequency bands from 110 MHz to 18 GHz. In all other respects and functions the 8410B is the same as the 8410A.

MANUAL CHANGES FOR MODEL 8410B

Make the following manual changes to the 8410A Operating and Service Manual (08410-90020) to document the 8410B.

1-A. SAFETY CONSIDERATIONS

General

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

Operation

BEFORE APPLYING POWER, make sure the instrument's ac input is set for the available ac line voltage, that the correct fuse is installed, and that all normal safety precautions have been taken.

Service

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

Adjustment or repair of the opened instrument with the ac power connected should be avoided as much as possible and, when inevitable, should be performed only by a skilled person who knows the hazard involved.

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

Make sure only fuses of the required current rating and type (normal blow, time delay, etc.) are used for replacement. Do not use repaired fuses or short circuit the fuse holders.

Whenever it is likely that the protection has been impaired, make the instrument inoperative and secure it against any unintended operation.

WARNING

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

BEFORE SWITCHING ON THE INSTRUMENT, the protective earth terminals of the 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 protective earth contact. The protection must not be negated by using an extension cord (power cable) without a protective grounding conductor.

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal is likely to make this instrument dangerous. Intentional interruption of the earth ground is prohibited.

Servicing this instrument often requires that you work with the instrument's protective covers removed and with ac power connected. Be very careful; the energy at many points in the instrument may, if contacted, cause personal injury.

With the ac power cable connected, the ac line voltage is present at the terminals of the power line module and at the LINE power switch. Be very careful. Bodily contact with this voltage can be fatal.

CAUTION

BEFORE SWITCHING ON THIS INSTRUMENT, make sure instrument's ac input is set to the voltage of the ac power source.

BEFORE SWITCHING ON THIS INSTRUMENT, make sure that all devices connected to the instrument are connected to the protective earth ground.

BEFORE SWITCHING ON THIS INSTRUMENT, make sure the line power (mains) plug is connected to a three-conductor line power outlet that has a protective (earth) ground. (Grounding one conductor of a two-conductor outlet is not sufficient.

BEFORE SWITCHING ON THIS INSTRUMENT, make sure the ac-line fuse is of the required current rating and type (normal-blow, time-delay, etc.).

Page 1-2, Table 1-1:

Substitute Table 1-1A for Table 1-1.

Table 1-1A. Models 8410B and 8411A Specifications

<p>Frequency Range: 8410B: 0.110 to 18 GHz. 8411A: 0.110 to 12.4 GHz. Option 018: 0.110 to 18 GHz.¹ 8411A Input Impedance: 50 ohms nominal. SWR <1.5:1, 0.11 to 8.0 GHz; <2:1, 8.0 to 12.4 GHz; typically increases to a 10:1 SWR, 12.4 to 18 GHz. Channel Isolation: >65 dB, 0.1 to 6 GHz; >60 dB, 6 to 12.4 GHz; >50 dB, 12.4 to 18 GHz.</p> <p style="text-align: center;">AMPLITUDE</p> <p>Amplitude Range: Reference Channel: Any 20 dB range between -16 and -44 dBm; reference channel level meter indicates proper range. A 20 dB variation causes <1.5 dB and <4° change in amplitude and phase indications. Test Channel: -10 to -78 dBm from 0.11 to 12.4 GHz; -10 to -68 dBm from 12.4 to 18 GHz. Maximum RF input to either Channel: 50 mW (+17 dBm) damage level. Maximum dc on RF Line: +3 V (damage Level). IF Gain Control: Adjusts gain of test channel relative to reference channel. Range: 69 dB total in 10 dB and 1 dB steps; vernier provides continuous adjustment over at least 2 dB. Accuracy: ±0.1 dB per 10-dB step, ±0.05 dB per 1-dB step. Maximum cumulative, ±0.2 dB.</p> <p>Frequency Response: Reference and test channels typically track within: ±0.3 dB for any octave 0.11 to 8 GHz. ±0.4 dB, 8 to 12.4 GHz. ±1.5 dB, 12.4 to 18 GHz.</p> <p>Noise: Less than -78 dBm equivalent input noise 0.11 to 12.4 GHz; -68 dBm 12.4 to 18 GHz.</p> <p style="text-align: center;">PHASE</p> <p>Phase Range: 0 to 360° Control: Vernier provides continuous phase reference adjustment over at least 90°.</p>	<p>Frequency Response: Reference and test channels typically track within: ±1° for any octave 0.11 to 8 GHz. ±2°, 8 to 12.4 GHz. ±10°, 12.4 to 18 GHz.</p> <p style="text-align: center;">GENERAL</p> <p>Outputs: Two rear panel auxiliary outputs provide 278 kHz IF signals; outputs may be used for signal analysis, special applications, and convenient test points; modulation bandwidth nominally 10 kHz. Reference Channel IF: 2 volts peak-to-peak. Test Channel IF: 10 volts peak-to-peak or less, depending on signal level and test channel gain setting. Connectors (8411A): APC-7. Cable Supplied: Source Control Cable HP Part No. 8120-2140 for use with the 8620A Sweep Oscillator. Power: 100, 120, 220, or 240V ac +5% -10%, 50 to 60 Hz, 70 watts (includes 8411A). Weight: 8410: Net, 33 lb (14,9 kg). Shipping 41 lb (18,5 kg). 8411A: Net, 7 lb (3,2 kg). Shipping 10 lb (4,5 kg). Dimension: 8410: 7½ in. high, 16-¾ in. wide, 18-¾ in. deep (191 x 425 x 467 mm). 8411A: 2-5/8 in. high, 9 in. wide, 5-5/8 in. deep (67 x 228 x 143 mm), exclusive of connectors. 5-ft cable permanently attached for connection to 8410B.</p>
	<p>¹ Specifications for the 8411A 018 Option below 12.4 GHz are the same as the standard instrument. Specifications above 12.4 GHz apply to the Option 018 only.</p>

Page 1-3, Paragraph 1-15

For accessories furnished, add the following:

SOURCE CONTROL CABLE

Provides the control logic interconnections to the 8620A Sweep Oscillator necessary for automatic operation.

Page 1-5, Figure 1-2:

Change item 5 to read as follows:

5. **FREQ RANGE (GHz)**. Automatic or manual frequency range selection control. In AUTO position, automatically selects proper frequency range. Particular frequency ranges can be selected. Selected range must include the frequency (or frequencies) at which measurements are to be made. The dial is marked to indicate that an 8411A Option 18 is required for frequency ranges above 12.4 GHz.

Add to Item 7 the following:

Because the meter averages in RF power during the automatic relocking cycle and sweeper retrace, the meter level should be set at a slow sweep rate.

Page 1-6, Figure 1-3:

Substitute Figure 1-3A. Model 8410B Rear Panel Features.

Page 1-7, Paragraph 1-42:

Add the following:

NOTE: In the AUTO mode of operation, Display Blanking, from the 8620A Sweep Oscillator, must be connected to the plug-in CRT display unit (8412A or 8414A).

Page 1-9, Paragraph 1-69:

Add the following:

For AUTO mode operation, a 1V/GHz Frequency Reference voltage is supplied by the RF plug-in of the 8620A Sweep Oscillator. The requirements for this voltage are that it be positive in polarity and in direct proportion (1V/GHz) to the signal source output frequency.

Page 1-9, Paragraph 1-70:

Add the following:

1-70A. 8620A SWEEP OSCILLATOR with RF PLUG IN

Table 1-6A gives a serial number breakdown of the 8620A Sweep Oscillator and RF plug-ins that are compatible for 8410B AUTO mode operation. Instruments with serial prefixes, or numbers, not included in Table 1-6A require a service kit and modification. For Service Note and Modification Kit part numbers, contact the local Hewlett-Packard Field Office.

NOTE

An 8620A Sweep Oscillator modified for compatibility with the 86290A RF plug-in needs an additional modification for compatibility with the Model 8410B in AUTO mode of operation. This modification provides a path for the Stop Sweep signal from the 8410B, and consists of a jumper between 8620A-J7 (A17) and 8620A-J2 (27). If the jumper is installed, then grounding 8620A-J2 (27) will stop the 8620A Sweep Oscillator from sweeping.

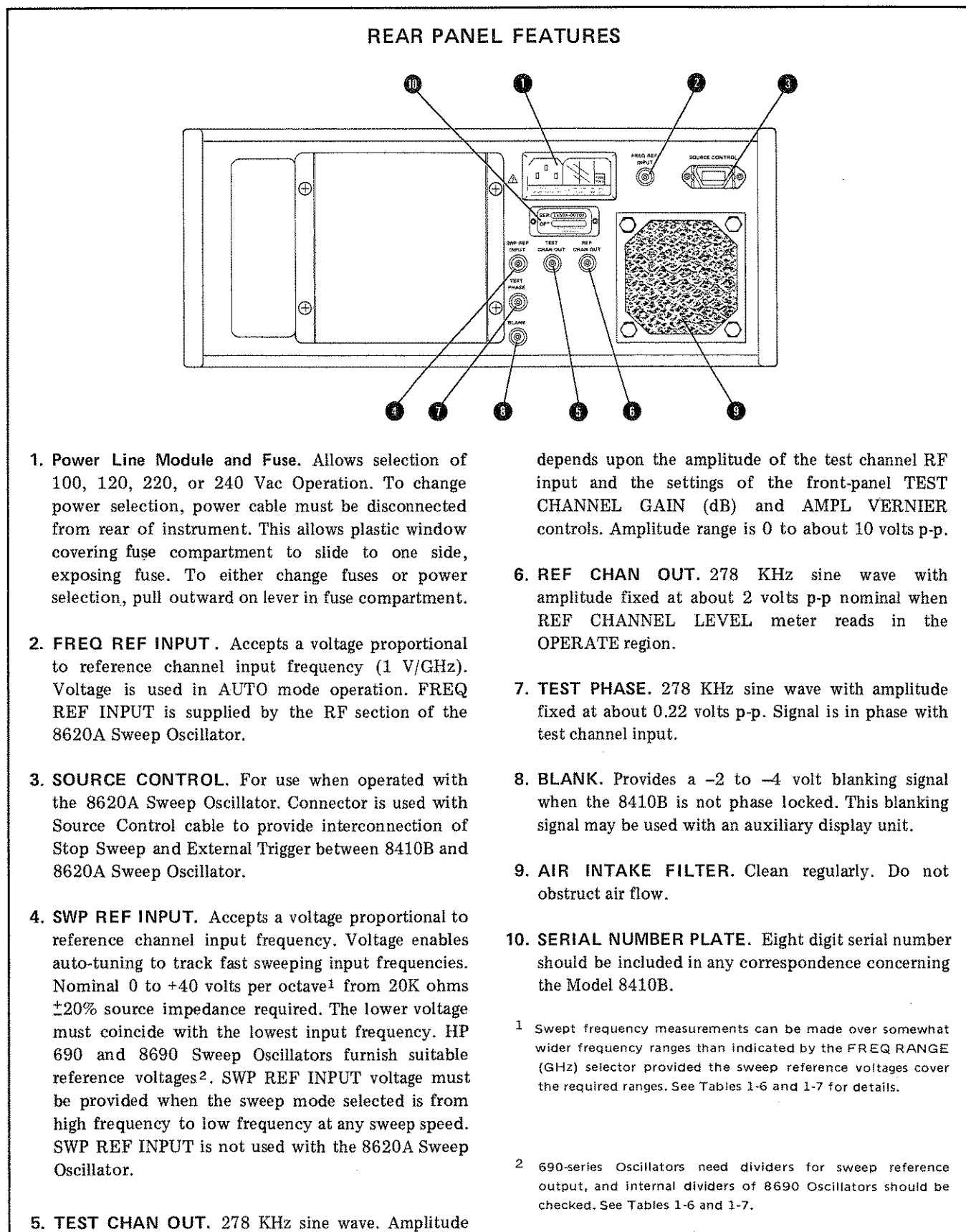


Figure 1-3A. Model 8410B Rear Panel Features

Page 1-10:
Add Table 1-6A.

Table 1-6A. AUTO Tune/Source Compatibility

HP Model Number	Instrument Serial Prefix or Number
8620A (Mainframe)	1427A01876 and above.
86290A	1432A00101 and above.
Other Rf plug-ins	1506A and above.

Page 1-12, Paragraphs 1-91 thru 1-95:

Substitute the following:

1-91. POWER REQUIREMENTS

1-92. The 8410B requires a power source of 100, 120, 220, or 240 volts ac +5% --10%, 50 to 60 Hz, single phase. Power output should be capable of 85 watts when the 8413 Phase-Gain Indicator plug-in is installed, and 105 watts when a CRT display plug-in is installed (8412A rectangular display or 8414A Polar display).

1-93. LINE VOLTAGE SELECTION

1-94. Figure 1-4A provides instructions for line voltage and fuse selection. A set of fuses is supplied with the instrument.

CAUTION

To prevent damage to the instrument, make the line voltage selection before connecting line-power.

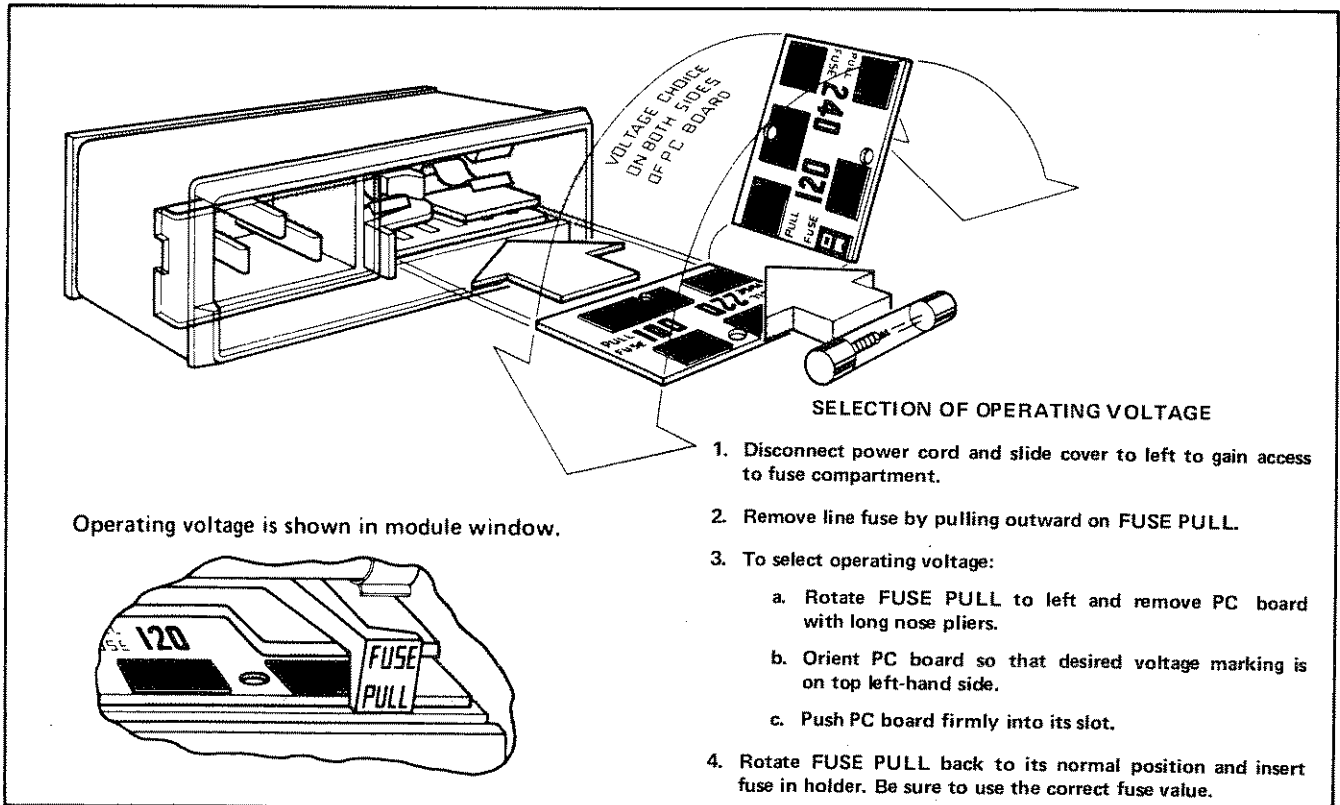


Figure 1-4A. Line Voltage Selection

Page 1-16, Paragraph 1-120:

Delete "unscrew retaining ring near the front panel,".

Page 2-1, Paragraph 2-4:

Change line voltage requirements to 100, 120, 220, or 240 volts ac +5 -10%.

Page 2-1, Table 2-1:

Change Signal Source Frequency Range to 0.11 to 18 GHz.

Add Recommended HP Model 8620A/86290A.

Page 3-1

Add the following maintenance precaution:

PRINTED CIRCUIT BOARD REMOVAL. Turn off the line voltage before removing, or replacing, printed circuit boards. Damage to integrated circuits may occur if power is applied during printed circuit board removal or replacement.

Page 3-1, Paragraph 3-4:

Change line voltage requirements to 100, 120, 220, or 240 volts ac +5% -10%.

Page 3-1, Paragraph 3-9:

Change to read as follows:

A circuit board extender (HP Part No. 08410-60109) is supplied with the 8410B and is stored behind the front panel assembly (Figure 3-19A). The extender raises boards clear of the chassis for easier access to the test points, and is designed to work with either 12 or 15 pin circuit boards.

Page 3-3, Table 3-1:

Change Signal Source Frequency Range to 0.11 to 18 GHz.

Add Recommended HP Model 8620A/86290A.

Page 3-4, Table 3-1:

Change Item 11 to: Digital Voltmeter, Recommended HP Model 3480 C/D with 3484A multifunction unit.

Page 3-6, Table 3-2:

Add the following:

P/O Table 3-2. 8410B Alignment Controls

REFERENCE DESIGNATOR	FUNCTION AFFECTED	COMPONENT LOCATION FIGURE	ADJUSTMENT PROCEDURE Figure 3-11
A9R9	VTO Trigger Threshold	3-82	15
A9R17	Sweep Delay	3-82	15
A18R2	Auto frequency range selection.	3-84	16

Page 3-46, Figure 3-11:

Add the following adjustment procedures.

TEST	DESCRIPTION AND PROCEDURE
15	<p>CIRCUIT 8410B AUTOMATIC CONTROL ASSEMBLY A9. (Adjust A9R9 and A9R17).</p> <p>DESCRIPTION The VTO Trigger Threshold (A9R9) is adjusted to ensure the automatic relocking cycle is triggered when the 8411A VTO reaches the upper limits of frequency range.</p> <p>The Sweep Delay is adjusted to give the 8410B enough time to stabilize after phase locking.</p>

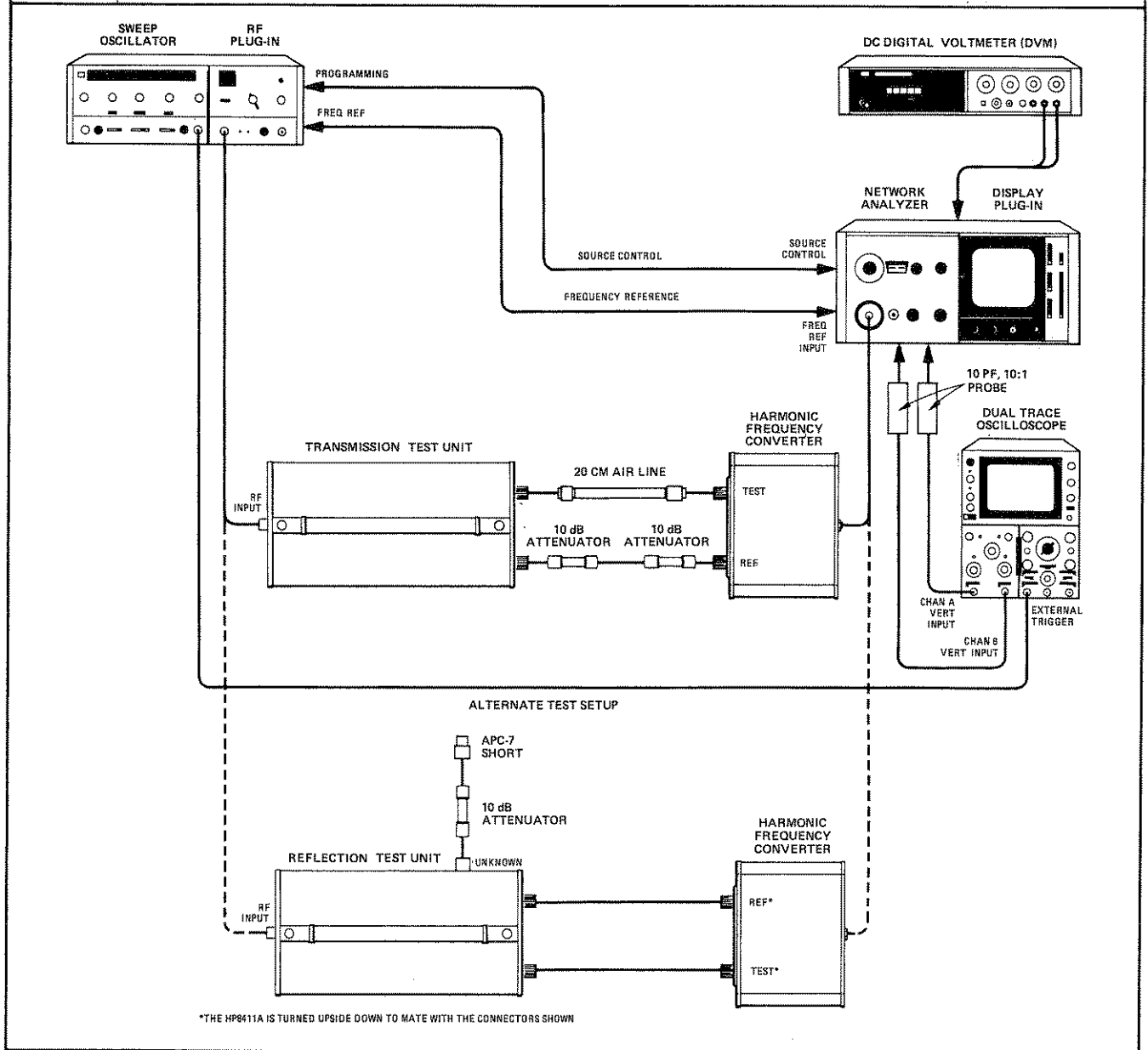


Figure 3-11. Adjustment Procedure (Sheet 25 of 27).

TEST	DESCRIPTION AND PROCEDURE
<p>15 (Cont'd)</p>	<p>PROCEDURE</p> <ol style="list-style-type: none"> a. Connect DVM between A9TP1 and chassis ground. Adjust VTO trigger threshold THR (A9R9) for 11.20 Vdc \pm0.01 Vdc. b. Phase lock 8410B as follows: <ol style="list-style-type: none"> 1. Set sweep oscillator to sweep over less than one octave band. (For example 4.5 GHz to 7.5 GHz). 2. Set FREQ RANGE (GHz) switch on 8410B to AUTO position. 3. With the sweep oscillator set to a slow sweep time, adjust RF power from the sweep oscillator for REF CHANNEL LEVEL meter indication in the middle of the OPERATE range. Reset sweep time to a faster sweep. 4. Set SWEEP STABILITY for best display on 8412A, 8413A, or 8414A. 5. Adjust 8410B PHASE VERNIER control; phase indication on 8412A, 8413A, or 8414A should change smoothly, indicating the 8410B is tracking properly. c. Connect 10:1 probes of dual trace oscilloscope to 8410B — A9TP2 and A9TP3. Set up oscilloscope to A plus B display. Adjust sweep delay DLY (A9R17) for a positive pulse of 1.6 msec duration.
<p>16</p>	<p>CIRCUIT 8410B A/D CONVERTER A18 (Adjust A18R2)</p> <p>DESCRIPTION The frequency range switching points in AUTO mode are affected by the A/D reference voltage set by A18R2. For this adjustment no test setup is required.</p> <p>PROCEDURE</p> <ol style="list-style-type: none"> a. Connect DVM between 8410B-A18TP8 and chassis ground. Adjust A18R2 A/D ADJ for 11.25 Vdc \pm0.01 Vdc.

Figure 3-11. Adjustment Procedure (Sheet 26 of 27)

Page 3-52, Table 3-8:

Change A9 to HP Part No. 08410-60106 ASSY: AUTOMATIC CONTROL

NOTE: See Table 3-8A for complete parts list.

Page 3-59, Table 3-8:

Add the following:

C39	0160-2436	C:FXD CER 10 PF 20% 200VDCW
C40	0160-2438	C:FXD CER 5000 PF +80-20% 200VDCW
C41	0160-2436	C:FXD CER 10 PF 20% 200VDCW
C42	0160-2436	C:FXD CER 10 PF 20% 200VDCW
C43	0160-2436	C:FXD CER 10 PF 20% 200VDCW
C44	0160-2436	C:FXD CER 10 PF 20% 200VDCW
C45	0160-2436	C:FXD CER 10 PF 20% 200VDCW
C46	0160-0939	C:FXD MICA 430 PF 5% 300VDGW
FL1	5060-9422	LINE POWER MODULE

Delete J14.

Change J17 to HP Part No. 1251-0143 CONNECTOR: 14 PIN FEMALE

Change J18 to HP Part No. 1510-0087 BINDING POST:GRAY

Page 3-60, Table 3-8:

Add L13 HP Part No. 9100-2249 COIL: FXD 1.15 μ H \pm 10%

Change S1 to HP Part No. 3100-3317.

Delete S2

Change T1 to HP Part No. 9100-3812

Add XA17 HP Part No. 1251-1190 CONNECTOR:PC EDGE 2 ROW 24 CONTACT

Add XA18 HP Part No. 1251-1190 CONNECTOR:PC EDGE 2 ROW 24 CONTACT

Add XA19 HP Part No. 1251-1190 CONNECTOR:PC EDGE 2 ROW 24 CONTACT

Delete XF1

Change COVER:MOVABLE HOUSING BOARD to HP Part No. 08410-0060

Change COVER:MOVABLE HOUSING CONNECTOR to HP Part No. 08410-00059.

Page 3-61, Table 3-8:

Change KNOB:BLACK 3/4" DIAL to HP Part No. 08410-00058

Page 3-62, Table 3-8:

Change Item 2 to HP Part No. 08410-00056.

Page 3-63, Table 3-8:

Change Item 2 to HP Part No. 7120-4476.

Change Item 4 to HP Part No. 08410-00061.

Page 3-64

Add Table 3-8A

Page 3-72

Add Figure 3-16A. 8410B Troubleshooting Procedure.

Page 3-74, Figure 3-19 (Sheet 1 of 2):

Substitute Figure 3-19A.

Page 3-75, Figure 3-21:

Substitute Figure 3-21A.

Page 3-78, Figure 3-24:

Substitute Figure 3-24A.

Page 3-79, Figure 3-26:

Change the note in the PHASE-LOCK AND SEARCH CIRCUIT block to read as follows:

NOTE

Frequency is 250 Hz in the two lowest and the highest frequency ranges.
Amplitude depends on frequency range switch setting.

Page 3-101, Figure 3-70:

Change description of 938 wire from XA5-1 to read as follows:

PHASE ERROR SIGNAL TO A19-23 FREQUENCY RANGE ASSEMBLY

Page 3-103, Figure 3-74

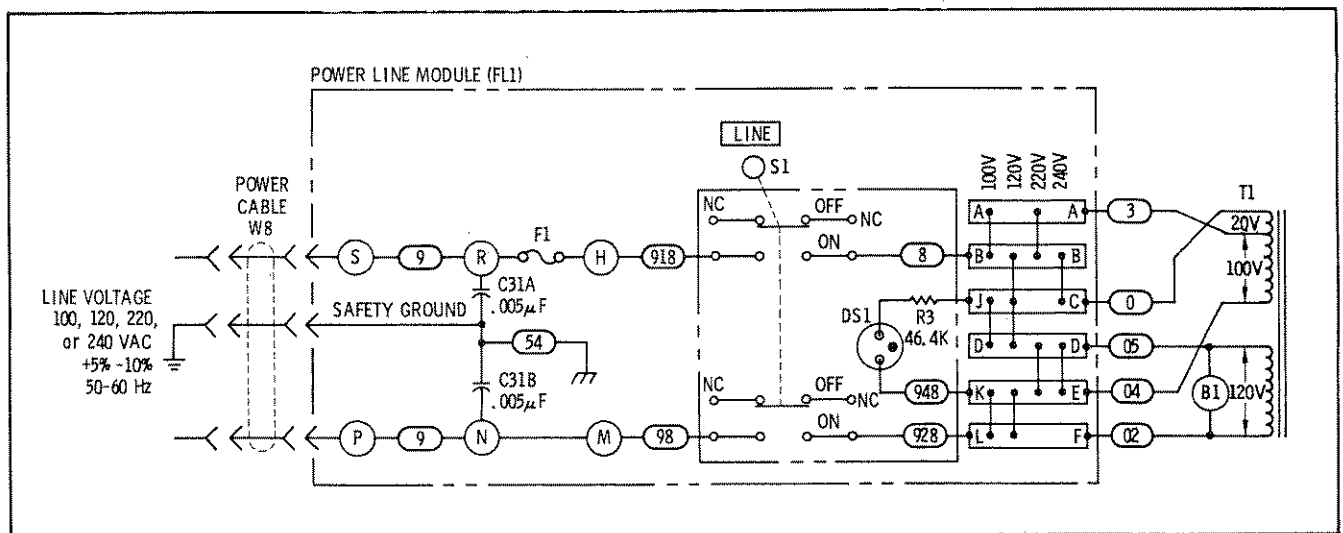
Substitute Figure 3-74A.

Page 3-106, Figure 3-77:

Change $\pm 20V$ power supply outputs as shown in partial schematic on page 1-11.

Page 3-108, Figure 3-81:

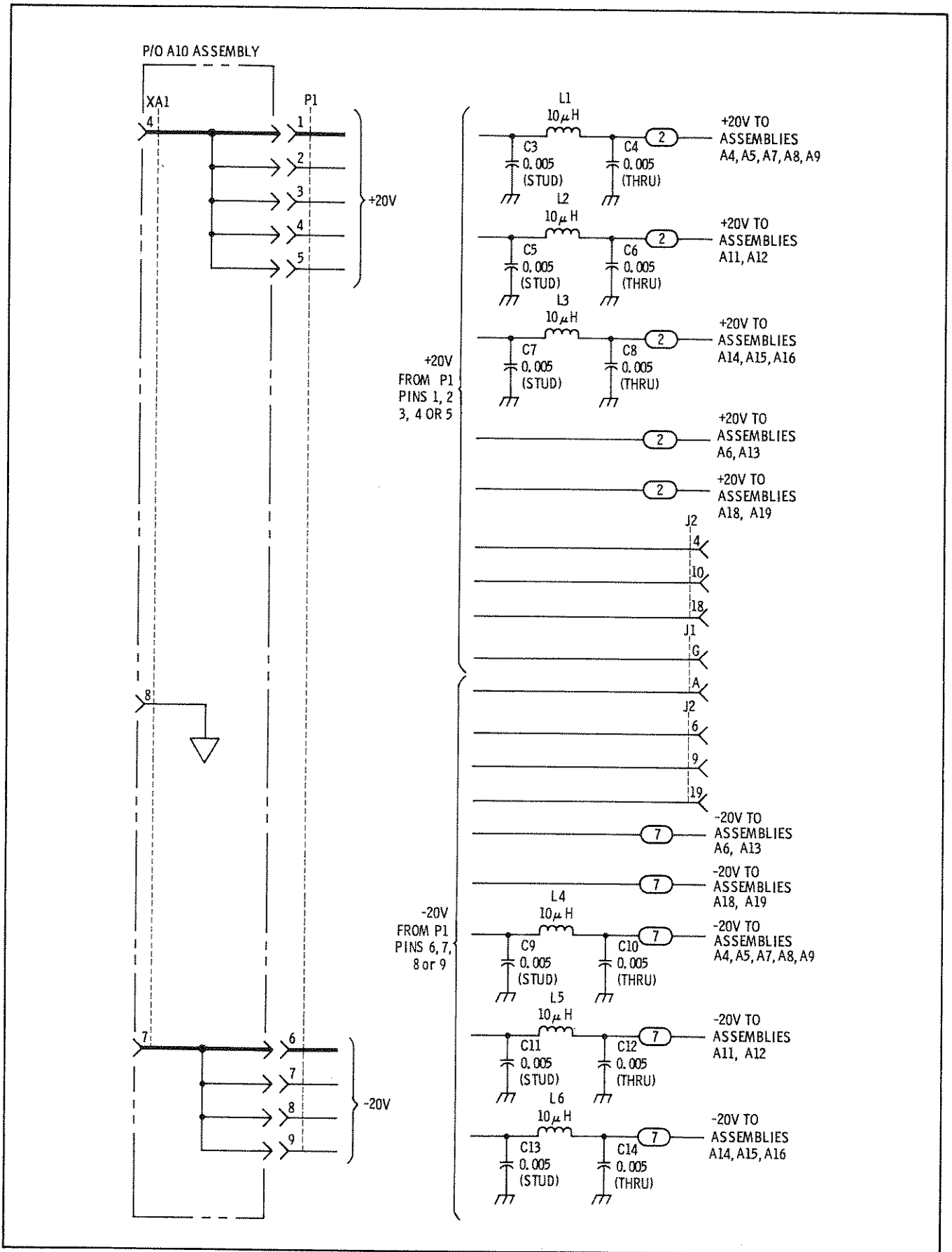
Substitute partial schematic shown below for primary power section.



P/O Figure 3-81. Power Supply Schematic Diagram

After Page 3-108:

Add Figures 3-82 thru 3-88.



P/O Figure 3-77. 8410B +20V and -20V Power Supply Schematic Diagram

Table 3-8A. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9	C8410-60106	1	BOARD ASSY, AUTOMATIC CONTROL	28480	08410-60106
A9C1	0160-0575	2	CAPACITOR-FXD .047UF +-20% 50WVDC CER	28480	0160-0575
A9C2	0160-3877	1	CAPACITOR-FXD 100PF +-20% 200WVDC CER	28480	0160-3877
A9C3	0160-0575	1	CAPACITOR-FXD .047UF +-20% 50WVDC CER	28480	0160-0575
A9C4	0160-0571	1	CAPACITOR-FXD 470PF +-20% 100WVDC CER	28480	0160-0571
A9C5	0180-1745	1	CAPACITOR-FXD; 1.5UF+-10% 20VDC TA	56289	150D155X9020A2
A9C6	0180-1743	2	CAPACITOR-FXD; .1UF+-10% 35VDC TA-SOLID	56289	150D104X9035A2
A9C7	0180-1743	2	CAPACITOR-FXD; .1UF+-10% 35VDC TA-SOLID	56289	150D104X9035A2
A9C8	0160-4084	2	CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A9C9	0180-1746	3	CAPACITOR-FXD; 15UF+-10% 20VDC TA-SOLID	56289	150D156X9020B2
A9C10	0160-4084	1	CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A9CR1	1901-0040	2	DIODE-SWITCHING ZNS 30V 50MA	28480	1901-0040
A9CR2	1901-0040	2	DIODE-SWITCHING ZNS 30V 50MA	28480	1901-0040
A9G1	1854-0071	10	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G2	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G3	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G4	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G5	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G6	1855-0020	3C	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A9G7	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G8	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G9	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9G10	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A9F1	0757-0465	6	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A9F2	0757-0461	1	RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A9F3	0757-0442	3	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A9F4	0683-1055	1	RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CI1055
A9F5	0757-0458	5	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A9F6	0757-0458	1	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A9F7	0757-0458	1	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A9F8	0698-3162	1	RESISTOR 46.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4642-F
A9F9	2100-3109	1	RESISTOR-VAR TRMR 2KOHM 10% C SIDE ADJ	32997	3006P-1-202
A9F10	0757-0290	1	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	ME4C1/8-T0-6191-F
A9F11	0757-0428	3	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A9F12	0757-0421	4	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A9F13	0757-0416	3	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A9F14	0757-0458	3	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A9F15	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A9F16	0757-0420	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A9F17	2100-3094	1	RESISTOR-VAR TRMR 10KOHM 10% C SIDE ADJ	32997	3006P-1-104
A9F18	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A9F19	0698-3158	2	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A9F20	0757-0444	1	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A9F21	0757-0123	1	RESISTOR 34.8K 1% .125W F TC=0+-100	24546	C5-1/4-T0-3482-F
A9F22	0698-0083	3	RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A9F23	0698-3156	3	RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A9F24	0698-0083	1	RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A9F25	0757-0280	2	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9F26	0698-3155	1	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A9F27	0698-3156	1	RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A9F28	0698-3158	1	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A9F29	0757-0440	2	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A9F30	0698-3153	1	RESISTOR 3.83K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3831-F
A9F31	0757-0416	2	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A9F32	0757-0438	2	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A9F33	0698-3446	2	RESISTOR 383 1% .125W F TC=0+-100	16299	C4-1/8-T0-383R-F
A9F34	0698-3443	3	RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A9F35	0757-0428	1	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A9F36	0698-3260	30	RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A9U1	1820-1538	1	IC CD4011AE	02735	CD4011AE
A9U2	1820-1569	2	IC MC14528CP	04713	MC14528CP
A9U3	1820-1569	1	IC MC14528CP	04713	MC14528CP
A9U4	1826-0026	2	IC LM311H	27014	LM311H
A9VR1	1902-0680	2	DIODE-ZNR 1N827 6.2V 5% DO-7 PD=.25W	33877	1N827
A9VR2	1902-0071	2	DIODE-ZNR 9V 5% DO-14 PD=.5W TC=+.001%	28480	1902-0071
A9VR3	1902-0025	1	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A9XU1	1200-0508	7	SOCKET; ELEC; IC 14-COUNT DIP SLDR TERM	06776	ICN-143-S3W
A9XU2	1200-0507	10	SOCKET; ELEC; IC 16-COUNT DIP SLDR TERM	06776	ICN-163-S3W
A9XU3	1200-0507	1	SOCKET; ELEC; IC 16-COUNT DIP SLDR TERM	06776	ICN-163-S3W
A9XU4	1200-0455	2	SOCKET; ELFC; IC 8-COUNT DIP SLDR TERM	91506	508-A6-10

Table 3-8A. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A17	08410-60109	1	BOARD ASSY, EXTENDER	28480	08410-60109
A18	08410-60107	1	BOARD ASSY, A/O CONVERTER	28480	08410-60107
A18C1	0180-1746	1	CAPACITOR-FXD; 15UF+-10% 20VDC TA-SOLID	56289	1500156X902082
A18C2	0160-3466		CAPACITOR-FXD 100PF +-10% 100VDC CER	28480	0160-3466
A18C3	0180-1746		CAPACITOR-FXD; 15UF+-10% 20VDC TA-SOLID	56289	1500156X902082
A18CR1	1901-0470		DIODE-HV RECT 1KV 600MA	04713	SF1358-14
A18MP1	5040-6843		EXTRACTOR, P.C. BOARD	28480	5040-6843
A18MP2	5000-9043	1	PIN: P.C. BOARD EXTRACTOR	28480	5000-9043
A18Q1	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A18R1	0698-0082	1	RESISTOR 464 1% .125W F TC=0+-100	16299	C4-1/8-TQ-6460-F
A18R2	2100-3154		RESISTOR-VAR TRMR 1KOHM 10% C SIDE ADJ	32997	3006P-1-102
A18R3	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TQ-825R-F
A18R4	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-1101-F
A18R5	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TQ-825R-F
A18R6	0757-0417	2	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-TQ-562R-F
A18R7	0698-3466		RESISTOR 393 1% .125W F TC=0+-100	16299	C4-1/8-TQ-383R-F
A18R8	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-TQ-287R-F
A18R9	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-TQ-196R-F
A18R10	0698-3438		RESISTOR 147 1% .125W F TC=0+-100	16299	C4-1/8-TQ-147R-F
A18R11	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TQ-101-F
A18R12	0757-0397		RESISTOR 69.1 1% .125W F TC=0+-100	24546	C4-1/8-TQ-691R-F
A18R13	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-TQ-511R-F
A18R14	0698-3434		RESISTOR 34.8 1% .125W F TC=0+-100	16299	C4-1/8-TQ-348R-F
A18R15	0698-3432		RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/4-TQ-26R1-F
A18R16	0757-0276	1	RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-TQ-6192-F
A18R17	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-TQ-5112-F
A18R18	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-TQ-511R-F
A18R19	0757-0458		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-5112-F
A18R20	0757-0462		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-7502-F
A18R21	0698-3450	1	RESISTOR 42.2K 1% .125W F TC=0+-100	16299	C4-1/8-TQ-4222-F
A18R22	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-1003-F
A18R23	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-1003-F
A18R24	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-1003-F
A18R25	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-1003-F
A18R26	0757-0465	1	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TQ-1003-F
A18R27	0698-3159		RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-TQ-2612-F
A18U1	1820-1534	1	IC CD4001AE	02735	CD4001AE
A18U2	1820-1535		IC CD4025AE	02735	CD4025AE
A18U3	1820-1570		IC MC14532CP	04713	MC14532CP
A18U4	1820-1570		IC MC14532CP	04713	MC14532CP
A18U5	1820-1540		IC CD4042AE	02735	CD4042AE
A18U6	1820-1540	3	IC CD4042AE	02735	CD4042AE
A18U7	1826-0026		IC LM311H	27014	LM311H
A18U8	1826-0161		IC LM324N	27014	LM324N
A18U9	1820-1540		IC CD4042AE	02735	CD4042AE
A18U10	1820-1540		IC CD4042AE	02735	CD4042AE
A18U11	1826-0161	1	IC LM324N	27014	LM324N
A18U12	1826-0161		IC LM324N	27014	LM324N
A18VR1	1902-0680	1	DIODE-ZNR 1N827 6.2V 5% DO-7 PD=.25W	03877	1N827
A18VR2	1902-0071		DIODE-ZNR 9V 5% DO-14 PD=.5W TC=+.001%	28480	1902-0071
A18VR3	1902-3256		DIODE-ZNR 22.7V 5% DO-7 PD=.4W TC=+.076%	04713	SZ 10939-290
A18VR4	1902-3182		DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	04713	SZ 10939-206
A18XU1	1200-0508	1	SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	06776	ICN-143-S3W
A18XU2	1200-0508		SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	06776	ICN-143-S3W
A18XU3	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A18XU4	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A18XU5	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A18XU6	1200-0507	1	SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A18XU7	1200-0455		SOCKET; ELEC; IC 8-CONT DIP SLDR TERM	91506	508-46-10
A18XU8	1200-0508		SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	06776	ICN-143-S3W
A18XU9	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A18XU10	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	05776	ICN-163-S3W
A18XU11	1200-0508	1	SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	06776	ICN-143-S3W
A18XU12	1200-0508		SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	06776	ICN-143-S3W
A19	08410-60108	1	BOARD ASSY, FREQUENCY RANGE	28480	08410-60108
A19C1	0180-0374	1	CAPACITOR-FXD; 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A19MP1	5040-6843		EXTRACTOR P.C. BOARD	28480	5040-6843
A19MP2	5000-9043		PIN: P.C. BOARD EXTRACTOR	28480	5000-9043
A19Q1	1855-0082		TRANSISTOR MOSFET P-CHAN D-MODE SI	28480	1855-0082
A19Q2	1855-0082		TRANSISTOR MOSFET P-CHAN D-MODE SI	28480	1855-0082
A19Q3	1855-0082	TRANSISTOR MOSFET P-CHAN D-MODE SI	28480	1855-0082	
A19Q4	1855-0082	TRANSISTOR MOSFET P-CHAN D-MODE SI	28480	1855-0082	
A19Q5	1855-0082	TRANSISTOR MOSFET P-CHAN D-MODE SI	28480	1855-0082	

Table 3-8A. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A19Q6	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q7	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q8	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q9	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q10	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q11	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q12	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q13	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q14	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q15	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q16	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q17	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q18	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q19	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q20	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q21	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q22	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q23	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q24	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q25	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q26	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q27	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q28	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q29	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q30	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q31	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q32	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q33	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19Q34	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A19R1	0757-0462		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A19R2	0757-0462		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A19R3	0757-0462		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A19R4	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A19R5	0757-0462		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A19R6	0757-0462		RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A19R7	0698-3154	1	RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A19R8	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A19R9	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R10	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R11	0757-0199	1	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A19R12	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R13	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R14	0757-0279	1	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A19R15	0698-3429	1	RESISTOR 19.6 1% .125W F TC=0+-100	03888	PME555-1/3-T0-1946-F
A19R16	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R17	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R18	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A19R19	0757-0399	1	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-8255-F
A19R20	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R21	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R22	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A19R23	0698-3444	2	RESISTOR 316 1% .125W F TC=0+-100	16299	C4-1/8-T0-316R-F
A19R24	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R25	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R26	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A19R27	0698-3447	1	RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A19R28	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R29	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R30	0698-3444		RESISTOR 316 1% .125W F TC=0+-100	16299	C4-1/8-T0-316R-F
A19R31	0757-0418	1	RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-T0-619R-F
A19R32	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R33	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R34	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A19R35	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A19R36	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R37	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R38	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-T0-196R-F
A19R39	0757-1094	1	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A19R40	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R41	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R42	0698-3438		RESISTOR 147 1% .125W F TC=0+-100	16299	C4-1/8-T0-147R-F
A19R43	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A19R44	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A19R45	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555

Table 3-8A. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A19R46	0757-0402	1	RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A19R47	0698-3152	1	RESISTOR 3.48K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3481-F
A19P48	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R49	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R50	0757-0398	1	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-7500-F
A19R51	0757-0200	1	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A19R52	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R53	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R54	0757-0595	1	RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-5622-F
A19R55	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R56	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A19R57	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R58	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R59	0698-3435	1	RESISTOR 385. 1% .125W F TC=0+-100	16299	C4-1/8-T0-3853-F
A19R60	0757-0439	1	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A19R61	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R62	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME55S
A19R63	0698-3431	1	RESISTOR 23.7 1% .125W F TC=0+-100	03888	PME55-1/8-T0-2377-F
A19R64	0757-0238	1	RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A19R65	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A19S1	3101-1273	1	SWITCH-SL DPDT-NS SUBMIN 2A 120VAC	28480	3101-1273
A19U1	1820-1526	2	IC CD4028AE	02735	CD4028AE
A19U2	1820-1526		IC CD4028AE	02735	CD4028AE
A19U3	1820-1535		IC CD4025AE	02735	CD4025AE
A15VR1	1902-3193	1	DIODE-ZNR 13.3V 5% DO-7 PD=.4W TC*+.059%	04713	SZ 10939-218
A19XU1	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A19XU2	1200-0507		SOCKET; ELEC; IC 16-CONT DIP SLDR TERM	06776	ICN-163-S3W
A19XU3	1200-0508		SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	06776	ICN-143-S3W

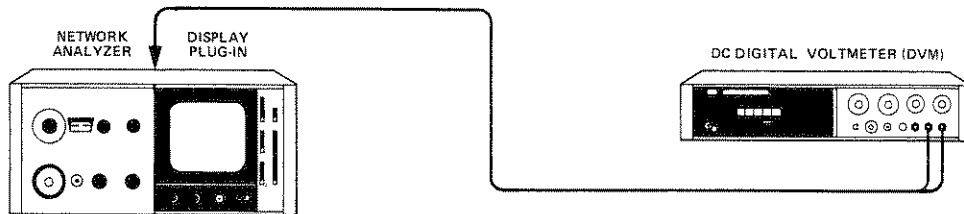
8410B TROUBLESHOOTING PROCEDURE

DESCRIPTION

If the 8410B has trouble phase locking or tracking over single octave or multioctave bands, the following troubleshooting procedure should be followed. The troubleshooting is divided into two parts. Part I tests the A19 Frequency Range Assembly and part of the A18 A/D Converter Assembly used in both AUTO mode and for selected frequency ranges. Part II tests the A9 Automatic Control Assembly and part of the A18 A/D Converter used in AUTO mode only.

PART I

TEST SETUP



NOTE: Use floating terminals on Digital Voltmeter.

TEST EQUIPMENT: Item 11, Table 3-1.

PROCEDURE

- a. Check overall frequency range selection as follows:
 1. Remove A9 Automatic Control Assembly.
 2. Position A19S1 to TEST.
 3. Stepping FREQ RANGE (GHz) control through all frequency range positions, make resistance checks designated in the table below.

NOTE

Use 10K ohms fullrange display on Digital Voltmeter. Improper range selection may result in inaccurate readings.

4. If the resistance check is good, proceed to Part II of the troubleshooting procedure. If the resistance check is incorrect, proceed to Part I, step b.
- b. Set FREQ RANGE (GHz) control to the position where an incorrect indication was found in step a. Make voltage checks at the designated test points in the table below.

Figure 3-16A. 8410B Troubleshooting Procedures (Sheet 1 of 6)

PART I (Con't.)														
RESISTANCE (OHMS)														
FREQ RANGE (GHz)	A19TP5 to A19TP2						A19TP4 to A19TP3							
	LOW	NOMINAL	HIGH	LOW	NOMINAL	HIGH	LOW	NOMINAL	HIGH	LOW	NOMINAL	HIGH	LOW	HIGH
0.1 – 0.25	3.318K	3.528K	3.743K	37	56	84								
0.18 – 0.35	1.705K	1.816K	1.930K	56	75	105								
0.25 – 0.5	1.110K	1.185K	1.264K	114	137	170								
0.35 – 0.7	612	657	706	321	357	402								
0.5 – 1.0	481	518	559	411	452	504								
0.7 – 1.4	292	318	348	573	624	685								
1.0 – 2.0	269	293	322	733	794	865								
1.4 – 2.8	193	213	237	1.188K	1.276K	1.375K								
2.0 – 4.0	151	168	190	1.492K	1.599K	1.717K								
2.8 – 5.7	118	134	154	2.263K	2.418K	2.583K								
4.0 – 8.0	87	100	119	3.046K	3.250K	3.463K								
5.7 – 11.3	70	83	100	4.825K	5.138K	5.462K								
8.0 – 16.0	54	65	82	6.423K	6.838K	7.264K								
11.3 – 18.0	40	51	67	8.568K	9.118K	9.682K								

TEST POINT	FREQ RANGE (GHZ)													
	0.1-0.25	0.18-0.35	0.25-0.5	0.35-0.7	0.5-1.0	0.7-1.4	1.0-2.0	1.4-2.8	2.0-4.0	2.8-5.7	4.0-8.0	5.7-11.3	8.0-16.0	11.3-18.0
A18TP2	+12V	+12V	0V	0V	+12V	+12V	0V	0V	+12V	+12V	0V	0V	+12V	+12V
A18TP3	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	0V	0V	0V	0V	0V	0V
A18TP4	0V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V
A18TP5	+12V	0V	+12V	0V	+12V	0V	+12V	0V	+12V	0V	+12V	0V	+12V	0V
A18TP6	+12V	+12V	+12V	+12V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	0V	0V

c. If Part I, step B checks good, the problem is on the A19 Frequency Range Assembly. If Part I, step B check indicates incorrect, the problem is on the A18 A/D Converter Assembly.

d. Replace A9 Automatic Control Assembly and return A18S1 to NORMAL position.

Figure 3-16A. 8410B Troubleshooting Procedures (Sheet 2 of 6)

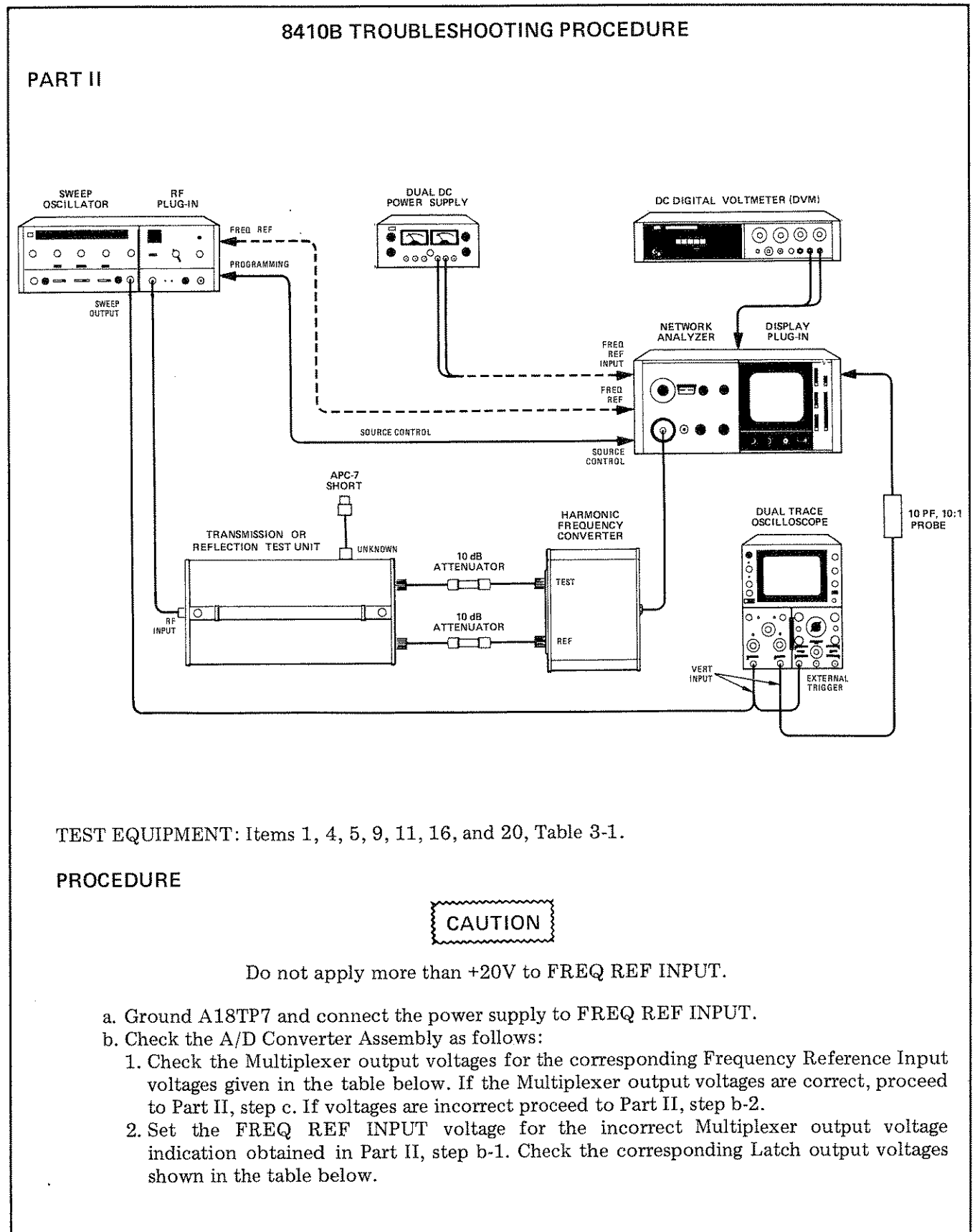


Figure 3-16A. 8410B Troubleshooting Procedures (Sheet 3 of 6)

PART II (Cont'd)													
3. If the Latch output voltages are incorrect, the trouble is in the Log A/D Converter or Latch circuitry. If the Latch output voltages are correct, the trouble is in the Encoder or Multiplexer circuitry.													
MULTIPLEXER OUTPUTS													
FREQ REF INPUT	A18TP2	A18TP3	A18TP4	A18TP5	A18TP6								
+0.1V	+12V	+12V	0V	+12V	+12V								
+0.2V	+12V	+12V	0V	0V	+12V								
+0.3V	0V	+12V	0V	+12V	+12V								
+0.4V	0V	+12V	0V	0V	+12V								
+0.6V	+12V	+12V	0V	+12V	0V								
+0.8V	+12V	+12V	0V	0V	0V								
+1.2V	0V	+12V	0V	+12V	0V								
+1.7V	0V	+12V	0V	0V	0V								
+2.4V	+12V	0V	+12V	+12V	+12V								
+3.4V	+12V	0V	+12V	0V	+12V								
+4.8V	0V	0V	+12V	+12V	+12V								
+7.0V	0V	0V	+12V	0V	+12V								
+9.5V	+12V	0V	+12V	+12V	0V								
+11.5V	+12V	0V	+12V	0V	0V								
LATCH OUTPUTS													
FREQ REF INPUT	A8U5	A18U6				A18U9				A18U10			
	Pin 1	Pin 1	Pin 11	Pin 10	Pin 2	Pin 1	Pin 11	Pin 10	Pin 2	Pin 1	Pin 11	Pin 10	Pin 2
+0.1V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V
+0.2V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	+12V
+0.3V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V
+0.4V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V	+12V
+0.6V	0V	0V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V	+12V	+12V
+0.8V	0V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V
+1.2V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V
+1.7V	0V	0V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
+2.4V	0V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
+3.4V	0V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
+4.8V	0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
+7.0V	0V	0V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
+9.5V	0V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
+11.5V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V	+12V
c. Remove ground from A18TP7 and disconnect power supply. d. Connect FREQ REF INPUT from sweep oscillator and set FREQ RANGE (GHz) control to AUTO. e. Set the sweep oscillator to sweep over more than one octave band (Example 2GHz to 6 GHz)													

Figure 3-16A. 8410B Troubleshooting Procedures (Sheet 4 of 6)

- f. With Channel A of the oscilloscope connected to the 8620A SWEEP OUT, connect Channel B to the test points designated in the timing diagram below. Set oscilloscope for a chopped display and negative trigger slope. Check that the two triggers and the leading edges of each pulse coincide (except HOLD ALLOW, which may remain high (+10V) for more than one trigger).

NOTE

If an 86290A RF section is used, an additional external trigger will appear if the sweep oscillator is operated over a sequential break point (6.2 GHz or 12.4 GHz).

- g. If Part II step f check indicates incorrect, the problem is in the A9 Automatic Control Assembly or the control signals fed to it.

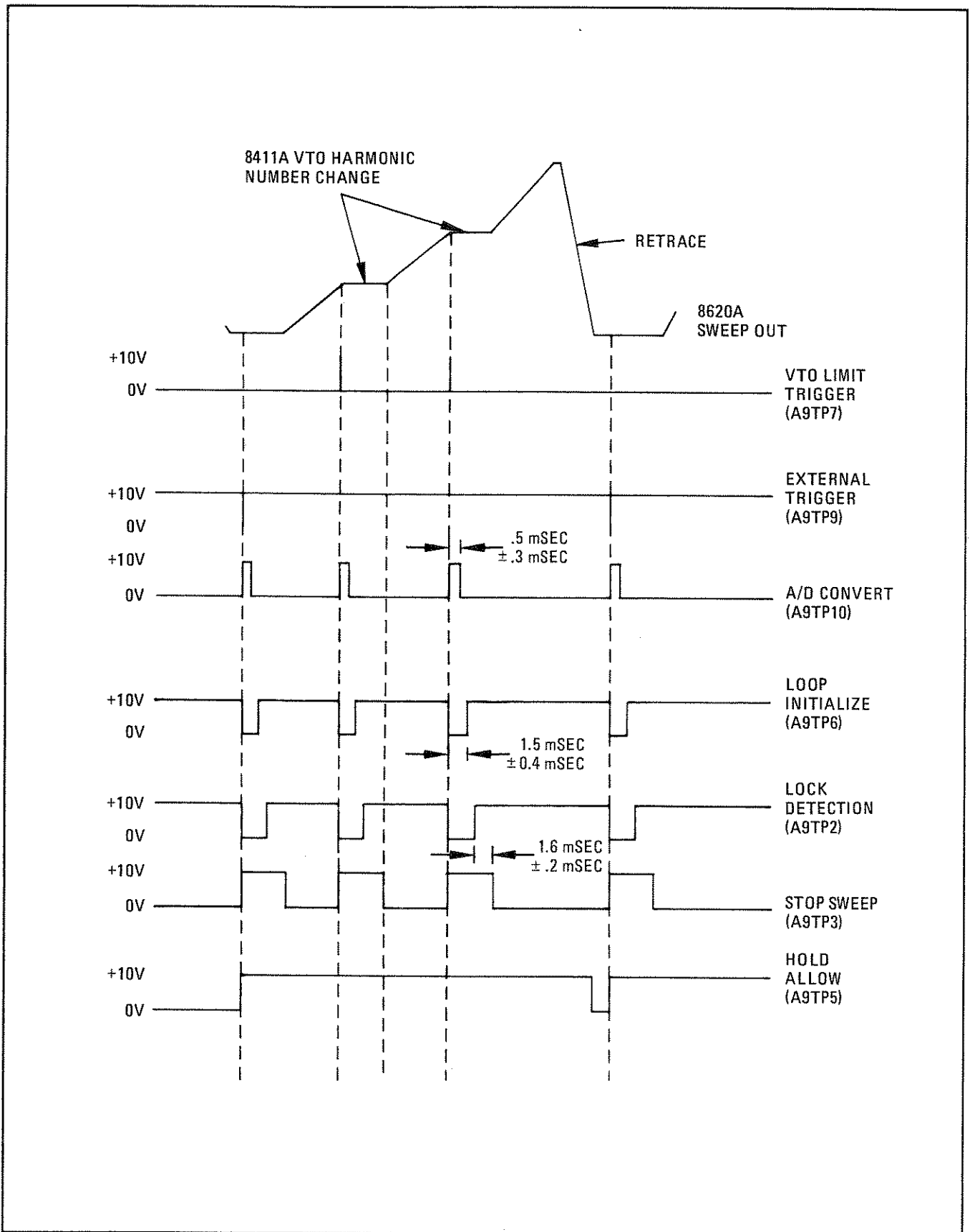


Figure 3-16A. 8410B Troubleshooting Procedures (Sheet 6 of 6)

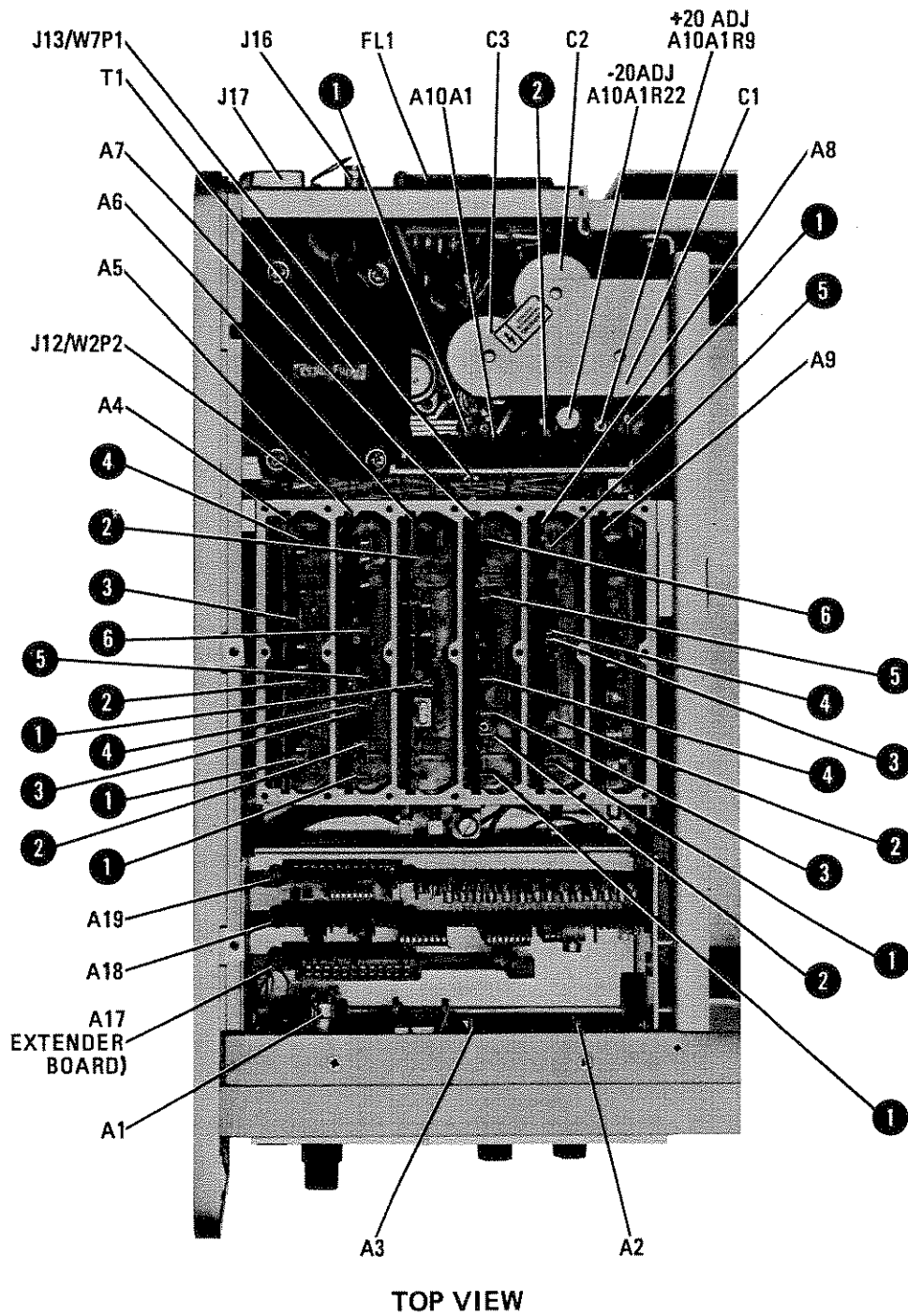


Figure 3-19A. Model 8410B Test Points

