Errata

Title & Document Type: **1725A Oscilloscope Operating and Service Manual**

Manual Part Number: **01725-90902**

Revision Date: **June 1980**

About this Manual

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HP References in this Manual

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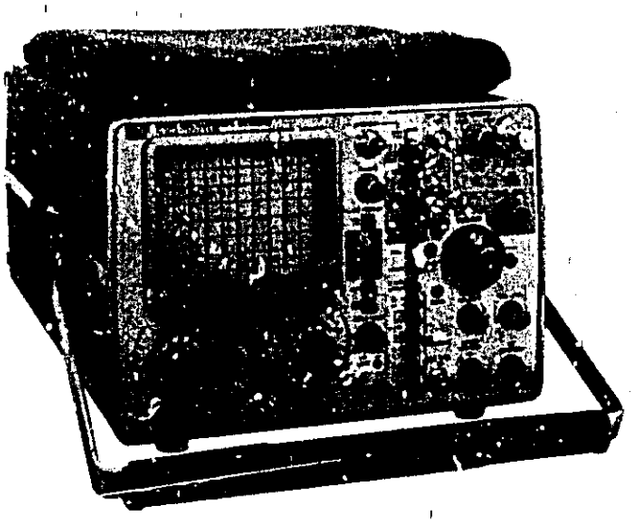
Agilent Technologies

OPERATING AND SERVICE MANUAL

1725A
OSCILLOSCOPE



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SAFETY

This product has been designed and tested according to International Safety Requirements. To ensure safe operation and to keep the product safe, the information, cautions, and warnings in this manual must be heeded. Refer to Section I and the Safety Summary for general safety considerations applicable to this product.

CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY

This Hewlett-Packard product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

The cathode-ray tube (CRT) in the instrument and any replacement CRT purchased from HP are also warranted against electrical failure for a period of one year from the date of shipment from Colorado Springs. BROKEN TUBES AND TUBES WITH PHOSPHOR OR MESH BURNS, HOWEVER, ARE NOT INCLUDED UNDER THIS WARRANTY.

For warranty service or repair, this product must be returned to a service facility designated by HP. However, warranty service for products installed by HP and certain other products designated by HP will be performed at Buyer's facility at no charge within the HP service travel area. Outside HP service travel areas, warranty service will be performed at Buyer's facility only upon HP's prior agreement and Buyer shall pay HP's round trip travel expenses.

For products returned to HP for warranty service, Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HP SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

S C W & A 9/78 (CRT)

OPERATING AND SERVICE MANUAL

MODEL 1725A
OSCILLOSCOPE

(Including Options 001, 003, 011, 090, 096, 101, and 580.)

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed **2025A**

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

Manual Part Number 01725-90902
Microfiche Part Number 01725-90802

PRINTED: JUNE 1980

SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

GROUND THE INSTRUMENT.

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE.

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

USE CAUTION WHEN EXPOSING OR HANDLING THE CRT.

Breakage of the Cathode-ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the instrument. Handling of the CRT shall be done only by qualified maintenance personnel using approved safety mask and gloves.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS.

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

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SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. The Hewlett-Packard Model 1725A is a general purpose, wide-band oscilloscope designed for bench or field service. It provides accurate measurements of high-frequency signals and fast rise-time pulses with 10-mV/div vertical deflection capability over the full 275 MHz bandwidth. Selectable input impedance of either 50 ohms or 1 megohm provides an impedance that best meets measurement applications. Its low shunt capacitance of less than 11 pF reduces phase shift and signal loss in pulse or cw measurements.

1-3. This manual contains installation, operating, and service instructions for the 1725A. Instrument specifications and procedures for verifying proper operation are included. Procedures are also included for adjusting the instrument to its performance specifications. Schematic diagrams, theory of operation, and troubleshooting information are provided for use in maintaining the instrument.

1-4. This section of the manual contains performance specifications and a list of options available. It also lists the accessories supplied and other accessories that are available. Instrument and manual identification information are also included.

1-5. SPECIFICATIONS.

1-6. Table 1-1 is a complete list of 1725A specifications. Any change in the specifications due to manufacturing, design, or traceability to the U.S. National Bureau of Standards will be listed on a manual change sheet included with this manual. The manual and manual change sheet supersede all previous information concerning specifications of the 1725A.

1-7. ACCESSORIES SUPPLIED.

1-8. The following accessories are supplied with the 1725A:

One Blue Light Filter, HP Part No. 01740-02701
One Front-panel Cover, HP Part No. 5040-0516
One Vinyl Storage Pouch, HP Part No. 1540-0292
One 7.5-ft Power Cord, see Section II
Two 10:1 Divider Probes, HP Model 10017A
One Attenuator Resistor Kit, HP Part No. 5080-9696
One Operators Guide
One Operating and Service Manual

1-9. ACCESSORIES AVAILABLE.

1-10. The following accessories are available for the 1725A:

Model 10020A Resistive Divider Probe Kit
Model 1120A 500 MHZ Active Probe
Model 10023 Temperature Probe
Model 1112A Inverter Power Supply
Model 10491B Rack Mount Adapter*
Models 1006A and 1007A Test Mobiles
Model 197B Oscilloscope Camera

*Not compatable with option 034/035

1-11. OPTIONS.

1-12. The following options extend the usefulness of the 1725A. Replaceable parts are listed at the end of table 6-2.

OPTION 001. Supplies a fixed ac power cord in place of the detachable power cord.

OPTION 003. Supplies two rear-panel connectors for probe power. (See schematic 20.)

OPTION 011. Replaces standard P31 phosphor CRT (V1) with internal graticule P11 phosphor CRT. A new gate assembly A14 is also supplied.

OPTION 034. Provides a built-in digital multimeter that can be used for time interval measurements or as a separate digital multimeter. See schematics 11 and 19 for interface connections. This option is covered in a separate operating and service manual.

OPTION 035. Same as option 034 but for 50HZ line operation

OPTION C90. Deletes the two 10017A divider probes normally supplied. Other probes may be specified that are more suited to your needs.

OPTION 096. Replaces the standard 10017A probes with 10016B 10:1 voltage divider probes.

OPTION 101. Adapts the 1725A for use with an HP Model 1607A Logic State Analyzer to provide both digital and analog analyses. (See schematic 21.)

OPTION 580. Provides a special bottom cover to meet Canadian Fire Safety Codes.

1-13. INSTRUMENTS COVERED BY MANUAL.

1-14. Attached to the instrument is a serial number plate. The serial number is in the form: 0000A00000.

LF Reject: attenuates signals below approx 7 kHz.
HF Reject: attenuates signals above approx 7 kHz.
TRIGGER HOLDOFF: time between sweeps continuously variable exceeding one full sweep from 10 ns/div to 50 ms/div.

MAIN INTENSIFIED

DELAYED SWEEP: intensified that part of main time base to be expanded to full screen in delayed time base mode. Stop control adjusts position of intensified portion of sweep. Rear panel intensity ratio control sets relative intensity of brightened segment.

ΔTIME MODE: intensifies two parts of main time base to be expanded to full screen in delayed time base mode. "START" control positions the first intensified portion of the sweep. "STOP" control positions the second intensified portion of the sweep. Rear panel intensity control sets relative intensity of brightened segments.

DELAYED TIME BASE

SWEEP
Ranges: 10 ns/div to 20 ms/div (20 ranges) in 1, 2, 5 sequence.
Accuracy (0 to +55°C): same as main time base.
Magnifier (0 to +55°C): same as main time base.
TRIGGERING
Internal: same as main time base except there is no Line Frequency triggering.
Starts After Delay: delayed sweep automatically starts at end of delay period.
Trigger: with delayed trigger level control out of detent (starts after delay) delayed sweep is triggerable at end of delay period.
External: dc to 100 MHz on signals of 50 mV p-p or more increasing to 100 mV p-p at 300 MHz. Maximum input, ±250 V (dc + peak ac) at 1 kHz or less.
External Input RC: approx 1 megohm shunted by approx 15 pF.

TRIGGER LEVEL AND SLOPE
Internal: at any point on the vertical waveform displayed when in triggered mode.
External: continuously variable from +1.0 V to −1.0 V on either slope of the trigger signal, +10 V to −10 V in divide by 10 mode (÷10).
COUPLING: AC, DC, LF REJ, or HF REJ.
AC: attenuates signals below approx 10 Hz.
LF Reject: attenuates signals below approx 7 kHz.
HF Reject: attenuates signals above approx 7 kHz.
DELAY TIME RANGE: 0.5 to 10X Main Time/Div settings of 20 ns to 0.5 s (minimum delay 50 ns).

Table 1-1. Specifications (Cont'd)

DIFFERENTIAL TIME MEASUREMENT ACCURACY

Main Time Base Setting	Accuracy (+15°C to +35°C)
50 ns/div to 2 ms/div	±(0.5% ±0.1% of full scale)
20 ns/div	±(1% ±0.2% of full scale)
50 ms/div to 0.5 s/div	±3%

DELAY JITTER: <0.005% (1 part in 20 000) of maximum delay in each step.

ΔTIME INTERVAL ΔTIME MODE

FUNCTION: measures time interval between two events on channel A (channel A display); between two events on channel B (channel B display); or between two events starting from an event on either channel A or B and ending with an event on either channel A or B (alternate display).

ACCURACY: measurement accuracy is the Time Interval Accuracy plus the external DVM accuracy.

Main Time Base Setting	Accuracy (+20°C to +30°C)
100 ns/div to 20 ms/div	±0.5% of reading ±0.05% of fs
50 ns/div*	±0.5% of reading ±0.1% of fs
20 ns/div*	±0.5% of reading ±0.2% of fs
50 ms/div to 0.5 s/div	±3%

*Starting after 60 ns of sweep.

ACCURACY (1715A Option 034)

Main Time Base Setting	Accuracy (+20°C to +30°C)
100 ns/div to 20 ms/div	±0.5% of reading ±0.05% of fs
50 ns/div	±0.5% of reading ±0.06% of fs
20 ns/div*	±0.5% of reading ±0.15% of fs
50 ms/div to 0.5 s/div	±3%

*Starting after 60 ns of sweep

STABILITY (0 to +55°C): short-term 0.005%. Temperature, ±0.03%/°C deviation from calibration temperature range.

TIME INTERVAL OUTPUT VOLTAGE: varies from 50 V to 100 mV full scale. Full scale output voltage can be determined by multiplying the number on the TIME/DIV dial by 10 V (e.g., 0.05 s, 0.05 ms, or 0.05 μs per div gives 0.5 V output full-scale).

MIXED TIME BASE

Dual time base in which the main time base drives the first portion of sweep and the delayed time base completes the sweep at the faster delayed sweep. Also operates in single sweep mode.

X-Y OPERATION

BANDWIDTH

Y-axis (channel A): same as channel A.

X-axis (channel B): dc to >1 MHz.

DEFLECTION FACTOR: 5 V/div (10 calibrated positions) in 1, 2, 5 sequence.

PHASE DIFFERENCE BETWEEN CHANNELS: <3°, dc to 1 MHz.

CATHODE-RAY TUBE and CONTROLS

TYPE: post accelerator, approx 20.5 kV accelerating potential, aluminized P31 phosphor.

GRATICULE: 8 x 10 div internal graticule. 0.2 subdivision markings on major horizontal and vertical axes. 1 div = 1 cm. Rear panel adjustment aligns trace with graticule. Internal flood gun graticule illumination.

BEAM FINDER: returns trace to CRT screen regardless of setting of horizontal, vertical, or intensity controls.

INTENSITY MODULATION (Z-AXIS): +8 V, >50 ns width pulse blanks trace of any intensity, usable to 20 MHz for normal intensities. Input R, 1 kΩ ±10%. Maximum input, ±10 V (dc + peak ac).

AUTO-FOCUS: automatically maintains beam focus with variations of intensity.

INTENSITY LIMIT: automatically limits beam current to decrease possibility of CRT damage. Circuit response time ensures full writing speed for viewing low duty cycle, fast rise-time pulses.

REAR PANEL CONTROLS: astigmatism, pattern, main/delayed intensity ratio, and trace align.

GENERAL

REAR PANEL OUTPUTS: Vertical output; main and delayed gates, —0.7 to +1.3V capable of supplying approx 3 mA.

CALIBRATOR: type, 1 kHz ±15% square wave; 3 V p-p ±1%, <0.1 μs rise time.

POWER: 100, 120, 220, 240, —10% +5% 48 to 440 Hz; 110 VA max.

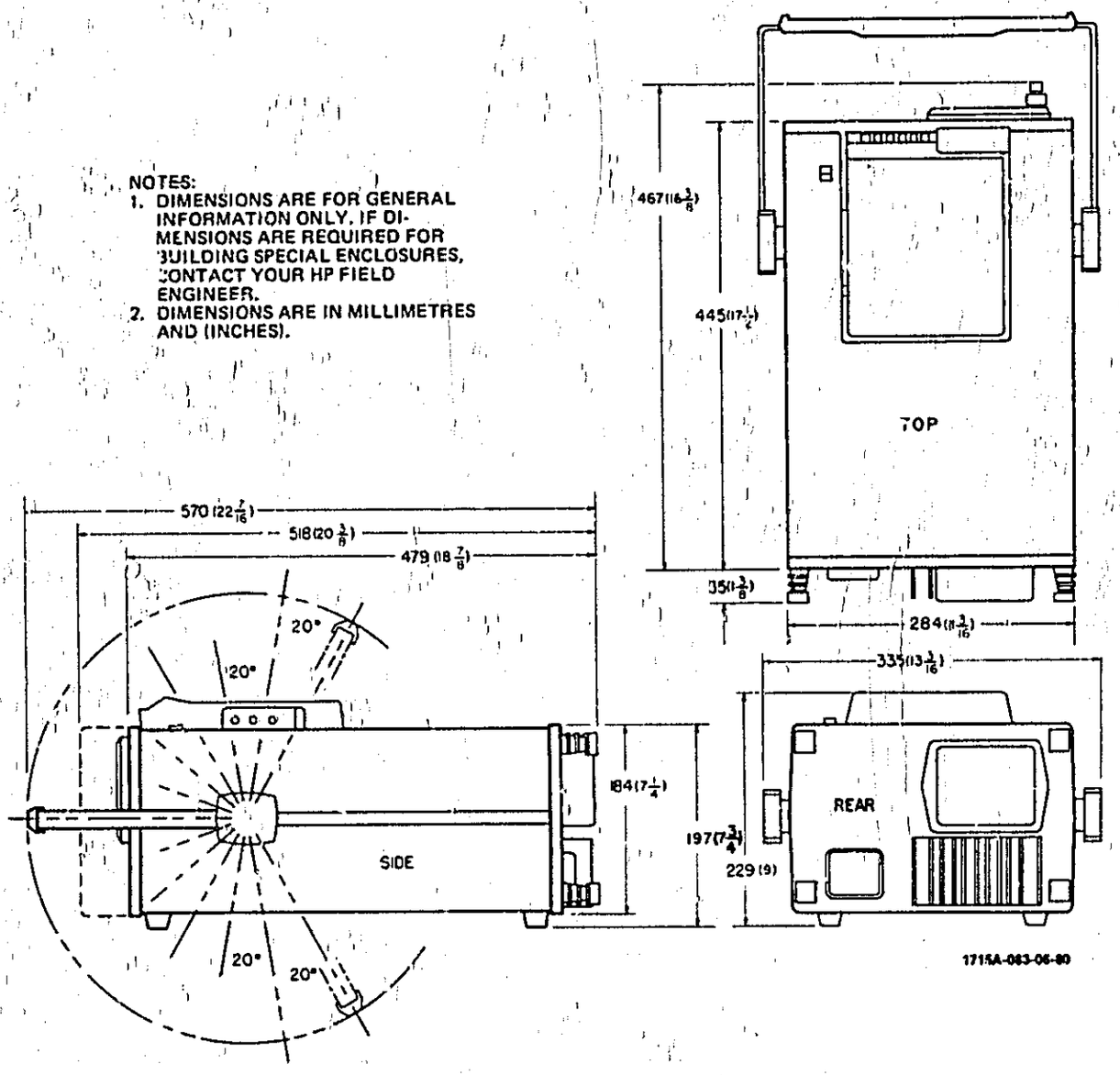
WEIGHT: net, 12.9 kg (28.5 lb); shipping, 17.9 kg (39.5 lb).

OPERATING ENVIRONMENT: temperature, 0 to +55°C (+32°F to +130°F); humidity, to 95% relative humidity at +40°C (+104°F); altitude, to 4600 m (15 000 ft); vibration, vibrated in three planes for 15 min. each with 0.254 mm (0.010 in.) excursion, 10 to 55 Hz.

Table 1-1. Specifications (Cont'd)

DIMENSIONS:

NOTES:
1. DIMENSIONS ARE FOR GENERAL INFORMATION ONLY. IF DIMENSIONS ARE REQUIRED FOR BUILDING SPECIAL ENCLOSURES, CONTACT YOUR HP FIELD ENGINEER.
2. DIMENSIONS ARE IN MILLIMETRES AND (INCHES).



SECTION II

INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information and instructions for installing and interfacing the Model 1725A. Included are initial inspection procedures, power and grounding requirements, installation instructions, and procedures for repacking the instrument for shipment.

2-3. INITIAL INSPECTION.

2-4. This instrument was carefully inspected both mechanically and electrically before shipment. It should be free of mars or scratches and in perfect electrical order upon receipt. To confirm this, inspect the instrument for damage that may have occurred in transit. If the instrument was damaged in transit, file a claim with the carrier. Check for supplied accessories (listed in Section I) and test electrical performance of the instrument using performance test procedures outlined in Section V. If there is damage or deficiency, see the warranty in the front of this manual.

WARNING

Read the Safety Summary at the front of this manual before installing or operating the instrument.

2-5. POWER CORDS AND RECEPTACLES.

2-6. Figure 2-1 illustrates the configurations used for HP power cords. The number directly above each drawing is the HP part number for the power cord equipped with a connector of that configuration. If the appropriate power cord is not included with the instrument, notify the nearest HP Sales and Service Office and a replacement cord will be provided.

2-7. POWER REQUIREMENTS.

2-8. The 1725A can be operated from any power source supplying 100 V, 120 V, 220 V, or [illegible] V —10% +5%, single phase, 48 to 440 Hz. Power dissipation is 110 VA maximum.

CAUTION

Instrument damage may result if the line-voltage selection switch is not set correctly for the input power source.

2-9. The instrument is normally set at the factory for 120-volt operation. To operate the instrument from any other ac power source, proceed as follows:

a. Verify that Model 1725A power cable is not connected to any input power source.

b. Move LINE VOLTAGE SELECT switch on rear panel to 220 or 240 position.

c. Replace 1.5 Amperes LINE FUSE with 0.8 ampere fuse provided with instrument.

d. Connect input power cable to 220- or 240-Vac source.

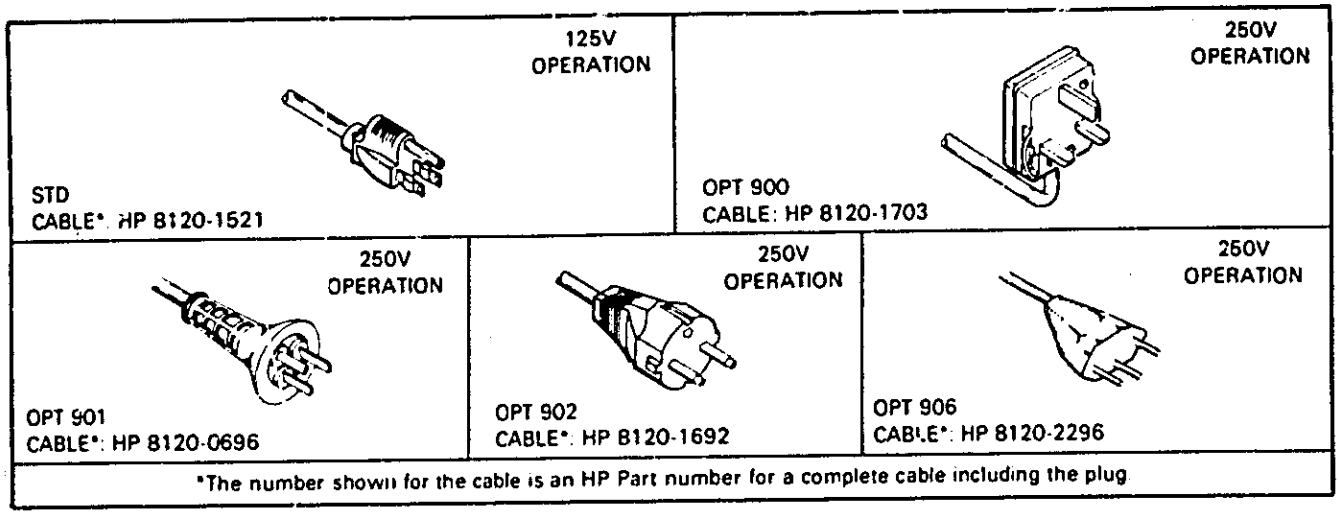


Figure 2-1. Input Power Cable Part Numbers

2-10. REPACKING FOR SHIPMENT.

2-11. If the instrument is to be shipped to a Hewlett-Packard Sales/Service Office for service or repair, attach a tag showing owner (with address), complete instrument serial number, and a description of the service required.

2-12. Use the original shipping carton and packing material. If the original packing material is not available, the Hewlett-Packard Sales/Service Office will provide information and recommendations on materials to be used.

SECTION III

OPERATION

3-1. INTRODUCTION.

3-2. This section provides general operating instructions, functional identification of all controls and connectors, and operating information for the Model 1725A.

3-3. INSTRUMENT CAPABILITIES.

3-4. The 1725A has two vertical preamplifiers for dual-channel operation. Each channel offers a choice of ac, high-Z dc, or 50-ohm input coupling. With the dual trace feature, displays can be obtained on channel A, channel B, or on both channels. Simultaneous display of two signals is possible in either chop or alternate mode of display. A+B and A—B modes are also available. In addition, an X-Y mode of operation is provided; in this mode, the instrument becomes an X-Y display with inputs through channel A (Y-axis) and channel B (X-axis). Sensitivity of each axis is controlled by the channel A or channel B attenuator.

3-5. Ten calibrated switch settings on each vertical amplifier provide a deflection factor range from 10 mV/div to 5 V/div in 1, 2, 5 sequence. The vertical verniers permit fine adjustment between calibrated steps and extend the least sensitive deflection factor (5 V/div) to at least 12.5 V/div.

3-6. Main horizontal amplifier sweep-speed settings from 10 ns/div to 0.5 s/div are available in a 1, 2, 5 sequence. The main sweep speed is calibrated when the SWEEP VERNIER control is in the CAL detent position.

3-7. FRONT- AND REAR-PANEL DESCRIPTIONS.

3-8. Front- and rear-panel features are described in figure 3-1. Description numbers match the numbers on the illustration.

3-9. GENERAL OPERATING INSTRUCTIONS.

3-10. Before connecting ac power to the 1725A, make sure the rear-panel line voltage select switches are set to correspond to the voltage of the available power line. The instrument is normally set at the factory to operate from a 120-Vac source. If a different power source is to be used, refer to Section II for proper switch settings and fuse type.

3-11. INITIAL TURN-ON. To place the 1725A into operation, perform the following steps:

a. Set INTENSITY fully counterclockwise.

b. Set VERT DISPLAY to ALT.

c. Set INT TRIG to A.

d. Set verniers for channels A and B to CAL detent.

e. Set B INVERT switch to out position.

f. Set vertical couplings for channels A and B to GND.

g. Set horizontal POSITION control to midrange.

h. Set main TIME/DIV to 1 mSEC.

i. Set delayed TIME/DIV to OFF.

j. Set main SWEEP VERNIER to CAL detent.

k. Set AUTO/NORM switch to AUTO.

l. Set main INT/EXT trigger switch to INT.

m. Set LINE/SCALE ILLUM switch to on and allow 5-minute warm-up period.

n. Adjust INTENSITY control for just visible trace.

3-12. TRACE ALIGN ADJUSTMENT. The trace align adjustment compensates for external magnetic fields that may affect alignment of the horizontal trace with respect to the graticule. When the instrument is moved to a new location, trace alignment should be checked and adjusted if necessary. To align the trace, proceed as follows:

a. Perform paragraph 3-11.

b. Adjust channel A POSITION control until trace is on center horizontal graticule line.

c. Using a non-metallic alignment tool, adjust TRACE ALIGN control (rear panel) until trace aligns with horizontal graticule.

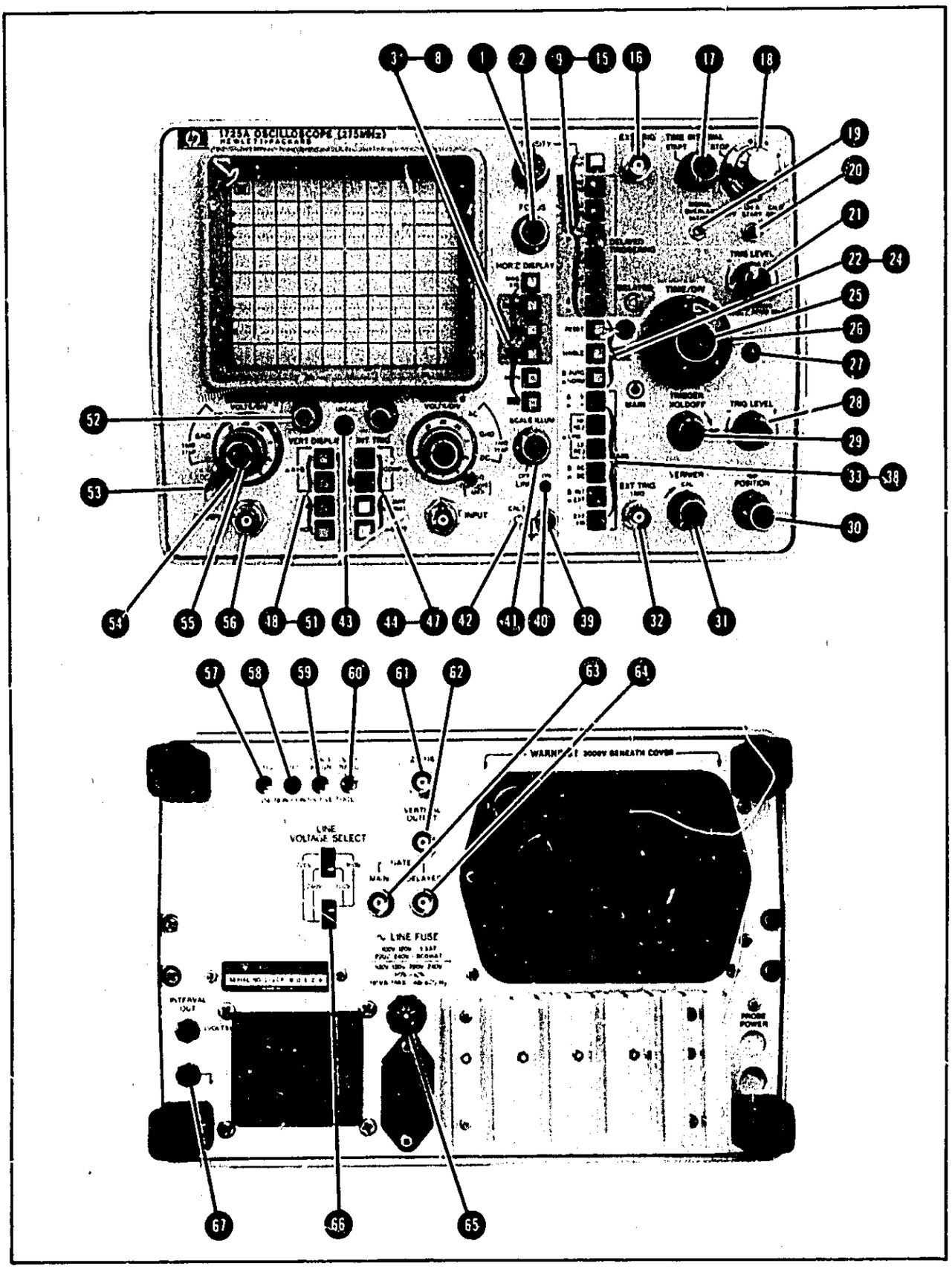


Figure 3-1. Controls and Connectors (Sheet 1 of 2)

1. **INTENSITY.** Controls brightness of display.
2. **FOCUS.** Controls focus of display.
3. **MAG X10.** In X10 position, sweep or X in X-Y mode, is magnified 10 times.
4. **DLY'D.** Selects delayed sweep mode for display.
5. **MIXED.** Selects mixed sweep mode for display.
6. **MAIN INTEN.** Intensifies delayed sweep portion of main sweep.
7. **MAIN.** Selects main sweep mode for display.
8. **X-Y.** Display mode for providing X-axis deflection with signal applied to channel B input.
9. **BEAM FIND.** Returns display to viewing area.
10. **Delayed EXT + 10.** Attenuates external trigger signal by factor of 10; increases external trigger range to ±10 V.
11. **Delayed INT/EXT.** Selects internal or external delayed sweep triggering.
12. **Delayed AC/DC.** Selects delayed sweep triggering coupling.
13. **Delayed LF REJ.** Attenuates delayed trigger signals below 15 kHz.
14. **Delayed HF REJ.** Attenuates delayed trigger signals above 15 kHz.
15. **Delayed slope.** Selects slope of delayed trigger signal that starts sweep.
16. **Delayed EXT TRIG.** BNC connector for delayed external trigger signal.
17. **TIME INTERVAL START.** Selects delay time between start of main sweep and start of delayed sweep.
18. **TIME INTERVAL STOP.** Control for decreasing delay time interval between two events.
19. **SIGNAL OVERLAY (ΔT = 0).** Screwdriver adjustment for nulling measurement errors (refer to paragraph 3-25 for details).
20. **Time Interval Mode Switch.**
    ΔT OFF. Turns off second delayed-sweep marker, providing conventional single marker delayed-sweep operation.

    A START. Sets first delayed-sweep marker on channel A and second delayed-sweep marker on channel B. This allows time measurement from channel A to channel B.

    B START. Reverses the markers, putting first marker on channel B and second marker on channel A. This allows time measurement from channel B to channel A.
21. **Delayed TRIG LEVEL.** Selects amplitude point on trigger signal that starts delayed sweep. There is a detent position for STARTS AFTER DELAY.
22. **RESET.** Resets sweep in SINGLE sweep mode; reset light indicates when sweep is armed.
23. **SINGLE.** Selects single or normal sweep operation.
24. **AUTO/NORM.**
    a. **AUTO.** Automatic sweep in absence of trigger signal. Triggering occurs on trigger signals above 40 Hz.
    b. **NORM.** Sweep is triggered only by applying trigger signal.
25. **Main TIME/DIV.** Controls sweep time in MAIN sweep mode.
26. **Delayed TIME/DIV.** Controls sweep time in MIXED and DLY'D sweep modes; controls intensified portion of sweep in MAIN INTEN sweep mode.
27. **UNCAL light.** Indicates when SWEEP VERNIER is out of CAL detent.
28. **Main TRIG LEVEL.** Selects amplitude point on trigger signal that starts main sweep.
29. **TRIGGER HOLDOFF.** Provides control of time between sweeps. With control fully counterclockwise, holdoff time is minimum.
30. **Horizontal POSITION.** Controls coarse and fine horizontal position of display.
31. **SWEEP VERNIER.** Provides fine adjustment of sweep time between calibrated positions of TIME/DIV switch. UNCAL light indicates when control is out of CAL detent position.
32. **Main EXT TRIG.** BNC connector for main external trigger signal.
33. **Main slope.** Selects slope of main trigger signal that starts sweep.
34. **Main HF REJ.** Attenuates main trigger signals above 15 kHz.
35. **Main LF REJ.** Attenuates main trigger signals below 15 kHz.

    NOTE

    LINE trigger is selected by engaging both HF REJ and LF REJ pushbutton switches simultaneously.

36. **Main AC/DC.** Selects main sweep triggering coupling.
37. **Main INT/EXT.** Selects internal or external main sweep triggering.
38. **Main EXT + 10.** Attenuates external trigger signal by factor of 10; increases external trigger range to ±10 V.
39. ⏚. Chassis ground connection for external equipment.
40. **Power lamp.** Lights when input LINE power switch on.
41. **LINE/SCALE ILLUM.** Controls brightness of scale illumination; also contains input power switch. With control completely counterclockwise in LINE OFF position, ac power is disconnected internally.
42. **CAL 3 V.** Provides 1-kHz, negative square wave of 3 volts ±1%.
43. **Vertical UNCAL light.** Lights when either channel A or channel B vernier is out of CAL detent.
44. **INT TRIG A.** Selects channel A input signal for triggering.
45. **INT TRIG B.** Selects channel B input signal for triggering.

    NOTE

    Engaging both channel A and channel B INT TRIG pushbutton switches results in composite triggering (COMP) on the displayed signal(s).

46. **BW LIMIT (20 MHz).** Display bandwidth limited to 20 MHz. Useful for noise reduction in normal and cascade operation.
47. **B INVERT.** Control used to invert polarity of channel B signal display.
48. **VERT DISPLAY A.** Selects channel A input signal for display.
49. **VERT DISPLAY B.** Selects channel B input signal for display.

    NOTE

    Engaging both channel A and channel B vertical display pushbuttons results in A+B (algebraic addition) display.

50. **ALT.** Displays each channel on alternate sweeps.
51. **CHOP.** Displays each channel by switching between channels at 1-MHz rate.
52. **POSITION A.** Varies vertical position of channel A display.
53. **Coupling.** Selects capacitive (AC), direct (DC), or 50-ohm coupling of input signal. GND position disconnects input signal and grounds input to vertical preamplifier.
54. **VOLTS/DIV.** Selects vertical deflection factor necessary for calibrated measurements.
55. **Vernier.** Provides fine adjustment of volts/div between calibrated positions of VOLTS/DIV switch.
56. **INPUT.** BNC connector for channel A input signal.
57. **ASTIG.** Adjusts roundness of writing spot.
58. **PATT.** Adjusts for uniform pattern over CRT viewing area.
59. **TRACE ALIGN.** Adjust to align trace with horizontal graticule.
60. **INTEN RATIO.** Adjusts intensity of intensified portion of sweep in MAIN INTEN mode of operation.
61. **Z AXIS.** BNC connector for Z-axis input.
62. **VERTICAL OUTPUT.** BNC connector for vertical amplifier output signal; provides approximately X10 gain, dc coupled, and source impedance of 100 ohms.
63. **GATE MAIN.** BNC connector for main gate output to external equipment.
64. **GATED DELAYED.** BNC connector for delayed gate output to external equipment.
65. **LINE FUSE:** AC power input fuse.
66. **LINE VOLTAGE SELECT.** Selects 100/120/220/240 Vac operation.
67. **INTERVAL OUT.** Banana jack connector for time interval measurement. Voltage output and position of TIME/DIV control indicates time interval in s, ms, or μs.

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Figure 3-1.
Controls and Connectors (Sheet 2 of 2)

3-13. FOCUS AND ASTIGMATISM ADJUSTMENTS. Adjust focus and astigmatism as follows:

a. Turn INTENSITY control fully counterclockwise.

b. Set LINE/SCALE ILLUM switch to on position.

c. Set channel A controls as follows:

VOLTS/DIV	.01
Coupling	GND
VERT DISPLAY	A
Vernier	fully cw
INT TRIG	B
POSITION	as required
HORIZ DISPLAY	X-Y

d. Set INTENSITY to observe spot.

e. Adjust FOCUS and ASTIG controls for best DEFINED SPOT.

3-14. OPERATORS CHECK.

3-15. Model 1725A operation may be checked without additional test equipment by using the CAL 3 V output as a signal source. The following procedures functionally check each display mode and operation of front-panel controls.

3-16. Operators checks must be performed in the sequence given. Do not start a procedure in mid-sequence, as succeeding steps depend on control settings and results of previous steps. If any results are unobtainable, refer to Section V.

a. Set Model 1725A controls as follows:

CHANNEL A

VOLTS/DIV	.5
Coupling	DC
Vernier	CAL
POSITION	as required
VERT DISPLAY	A
B INVERT	out

TIME BASE

Horizontal POSITION	as required
SWEEP VERNIER	CAL
HORIZ DISPLAY	MAIN
Main TIME/DIV	.5 mSEC
Delayed TIME/DIV	.01 μSEC
AUTO/NORM	AUTO
Main INT/EXT	INT
Main slope +/—	+
Delayed slope +/—	+
Main TRIG LEVEL	as required
Delayed TRIG LEVEL	ccw detent
TRIGGER HOLDOFF	ccw
MAG X10	out
Time Interval Mode Switch	CH A START

b. Set INTENSITY, FOCUS, and POSITION controls for desired baseline display.

c. Apply CAL 3 V output directly to channel A INPUT.

d. Adjust main TRIG LEVEL for stable display. Verify six pulses with leading edge of first and sixth pulse on first and eleventh vertical graticule lines respectively (±15%).

e. Set HORIZ DISPLAY for MAIN INTEN operation.

f. Set delayed TIME/DIV to 0.2 mSEC. Verify intensified portion of sweep.

NOTE

Intensified portion should cover 4 to 5 divisions.

g. Adjust TIME INTERVAL START control until intensified portion is centered on CRT.

h. Set HORIZ DISPLAY for DLY'D operation. Verify that intensified portion is expanded to 10 divisions.

i. Set HORIZ DISPLAY for MAIN INTEN operation.

j. Vary TIME INTERVAL START control. Verify that intensified portion moves smoothly along display.

k. Vary TIME INTERVAL STOP control. Verify that second intensified portion moves smoothly along display.

l. Set delayed TIME/DIV control to 0.01 μSEC.

m. Rotate SWEEP VERNIER counterclockwise to stop. Verify 15 or more pulses between first and eleventh graticule lines.

n. Disconnect CAL 3 V from vertical channel A INPUT connector.

o. Set main TIME/DIV to 0.01 SEC.

p. Set main TRIG LEVEL control to fully clockwise position.

q. Set AUTO/NORM switch to NORM.

r. Select SINGLE operation.

s. Press RESET pushbutton switch. Verify no sweep.

t. Rotate main TRIG LEVEL fully counterclockwise. Verify one sweep; RESET indicator goes off after sweep.

u. Set AUTO/NORM switch to AUTO.

v. Press RESET pushbutton. Verify one sweep.

w. Disengage SINGLE pushbutton.

x. Press ALT sweep pushbutton.

y. Set MAIN TIME/DIV to 5 μSEC and set delayed TIME/DIV to 0.5 μsec.

z. Adjust TIME INTERVAL STOP control. Only marker on channel B should move.

aa. Adjust TIME INTERVAL START control. Both markers should move in unison.

ab. Set time interval mode switch to CH B START.

ac. Repeat steps z and aa. TIME INTERVAL STOP control will only move the marker on channel A.

3-17. OPERATING INFORMATION.

3-18. The following paragraphs provide additional information concerning use of one special function over another.

3-19. AC VERSUS DC. Ac coupling removes the dc level from trigger signals and attenuates signals below 10 Hz. Dc coupling connects input signals directly to the input amplifier. With dc coupling selected, a large dc voltage component in an input signal can offset the input signal outside the trigger level range of the 1725A and cause the oscilloscope to lose trigger.

3-20. AUTO VERSUS NORM. In AUTO operation, a bright base line will be displayed in the absence of a trigger signal. A trigger of 40 Hz or higher overrides AUTO operation and produces a presentation. Adjustment of main TRIG LEVEL control may be necessary for a stable display. If the trigger is <40 Hz, NORM operation must be used. A trigger signal is always needed in NORM operation to generate a sweep.

3-21. MIXED SWEEP. In MIXED sweep modes of operation, a dual sweep-speed display is presented. The main sweep drives the first portion of the display and the delayed sweep completes the display. This mode can also be used when SINGLE sweep is selected.

3-22. DELAYED TRIGGERING. When the delayed TRIG LEVEL control is in the detent position, (starts after delay mode), the delayed sweep starts immediately after the delay period selected by TIME INTERVAL STOP control. When the delayed TRIG LEVEL control is out of detent, the delayed sweep is started by the first trigger signal occurring after the delay period. In this mode, the delay period consists of the time selected by the TIME INTERVAL STOP control and the elapse time until a new trigger signal occurs.

NOTE

When delayed TRIG LEVEL is out of detent, the two marker Δt system is disabled and the oscilloscope defaults to a single marker display. Output from INTERVAL OUT (or DVM on Option 034/035) will indicate the position of the STOP control, not the time interval displayed.

3-23. DELAYED SWEEP. After obtaining a sweep, any portion can be expanded up to 1 ns per division with 5% accuracy over center eight major divisions (X10 magnification) or 10 ns per division with 3% accuracy. This permits viewing of critical rise times or signal shapes with increased resolution.

3-24. REDUCING JITTER. Sweep jitter can be reduced by using the delayed TRIG LEVEL control. By rotating the delayed TRIG LEVEL control out of detent, the delayed sweep starts on a trigger point on the wave form selected by the trigger source selection switches. This trigger is qualified by delay time so the delay sweep will start on the first trigger point after the delay time. This reduces the trigger accumulated since start of the main sweep.

3-25. Δ TIME MEASUREMENTS. Detailed operating instructions for the two marker Δt system and some of its many applications are contained in the Operator Guide. Please refer to this publication for measurement applications such as pulse width, duty cycle, and transition time.

3-26. The Δt = 0 (R24) adjustment removes range to range tracking offsets in the two marker Δt system. The Δt Offset Adjustment (A18R23, side panel adjustment) can remove small systematic errors such as unequal length probes that become apparent at faster sweep speeds. The Δt Offset adjustment (A18R23) should be checked only where interchannel measurements are being performed. The front panel Δt = 0 adjustment procedure is required as part of the setup for any Δt measurement. This adjustment must be repeated for each change in Main Sweep Time setting.

3-27. The ΔT = 0 adjustment (R24) is set as follows:

a. Set MAIN TIME/DIV as required.

b. Set DELAYED TIME/DIV to the fastest sweep speed that can produce a usable display.

c. Connect both probes to a common current node.

d. Set TIME INTERVAL START fully ccw.

e. Set ΔT OFF/A START/B START to A START.

f. Select MAIN INTEN display mode.

g. Set ΔT STOP control to zero and with the ΔT START control position the markers over a leading edge transition of the signal being displayed.

h. Select DLY'D DISPLAY mode.

i. Switch between A START and B START modes and adjust the Δt Offset Adjustment (A18R23, side panel adjustment) for minimum change in the position of the markers.

j. Adjust front panel ΔT = 0 (R24) for precise overlap of the two markers.

NOTE

Changes in MAIN SWEEP TIME/DIV setting require readjustment of the ΔT = 0 control. Changes in equipment setup, i.e. probes, require readjustment of the Δt Offset (A18R23).

SECTION IV

PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

4-2. This section contains functional descriptions keyed to overall, simplified block diagrams of circuit groups that appear in Section VIII, (figure 8-3). For simplicity, the block diagrams are drawn for function and do not show circuit details. Schematics are located in Section VIII.

4-3. VERTICAL SECTION BLOCK DIAGRAM.

4-4. INPUT ATTENUATORS. Channel A and channel B attenuators accept the input signals applied to the front-panel INPUT connectors. The attenuators select the type of input coupling (50Ω, DC, GND, AC) and set the vertical deflection factor (5 mV/div to 5 V/div) as selected by the front-panel VOLTS/DIV switches.

4-5. VERTICAL PREAMPLIFIER AND CONTROL IC. The vertical preamplifier and control integrated circuit (IC) accept a single-ended signal from the attenuator and convert it to a differential signal. The differential signal is then amplified and a portion of it is used for the sync amplifier while the main path is then acted upon by the polarity switch, vernier, position, and channel switch controls (in that sequence).

4-6. DELAY LINE. The delay line assembly delays the vertical signal approximately 50 nanoseconds. This delay allows the sweep to trigger before the vertical signal reaches the CRT plates.

4-7. VERTICAL OUTPUT AMPLIFIER. The vertical output amplifier provides drive to the CRT vertical deflection plates.

4-8. HORIZONTAL SECTION BLOCK DIAGRAM.

4-9. TRIGGER CIRCUIT. The internal sync amplifier provides the synchronization signal for the main and delayed trigger generators. The generators develop the trigger signals that start the main and delayed sweep. The trigger is also applied to an auto circuit that is used in AUTO mode only. The outputs of the generators are controlled by the level of the sync signal applied and the reset signal from the holdoff control circuit. When the reset signal is logic high, the generator is inoperative. When the reset signal is low, the generator is operational and a trigger signal can be developed if there is an internal or external sync input.

4-10. SWEEP AND INTEGRATOR CIRCUITS. The sweep circuits initiate a horizontal sweep by the trigger signal that is applied to their inputs. A Miller integrator produces the horizontal sweep ramp; slope is controlled by the TIME/DIV switch on the front panel of the instrument. Output from the Miller integrator is applied through horizontal display control switches to the horizontal preamplifier circuit.

4-11. The horizontal sweep is also compared to a reference voltage by a comparator sweep length that drives the reset circuit. The reset circuit, along with other holdoff circuits, controls the timing sequence of the sweep ramp.

4-12. HOLDOFF CIRCUITRY. The holdoff circuit establishes the time interval between trigger points. This time interval is adjustable by the TRIGGER HOLDOFF control. The sweep ramp and the TIME/DIV switch control the holdoff ramp generator. When the generator is activated, a ramp, determined by a selected holdoff capacitor and the TRIGGER HOLDOFF control, is produced. When the ramp reaches a predetermined voltage level, the reset circuit activates. This arms the trigger generator. Upon receipt of a new trigger signal, a new sweep is generated.

4-13. HORIZONTAL PREAMPLIFIER. The horizontal preamplifier provides amplification for the sweep-time ramp. A horizontal POSITION control establishes a reference level for the horizontal sweep. The BEAM FIND switch, when engaged, reduces emitter current in the output stage of the preamplifier so that the horizontal sweep will be returned to the viewing area of the CRT.

4-14. HORIZONTAL OUTPUT. The horizontal output stage provides drive to the CRT horizontal deflection plates.

4-15. GATE CIRCUITRY.

4-16. The gate assembly contains the circuitry necessary to control brightness of the CRT display. An intensity control circuit is used for brightening or blanking the CRT when necessary. Astigmatism, focus, pattern, and floodgun filament controls are part of the gate assembly. A 3-V calibrator is also part of the gate assembly.

4-17. HIGH-VOLTAGE POWER SUPPLY.

4-18. The high-voltage power supply consists of the high-voltage oscillator and a rectifying network. The high-voltage oscillator produces cathode and grid voltages for the CRT. A secondary winding on the high-voltage transformer provides voltage for the CRT cathode heater.

4-19. The CRT cathode voltage is sampled and fed back to a HV oscillator control circuit on the gate assembly. If the cathode voltage becomes more negative, less current supplied, the output amplitude of the oscillator is reduced and the cathode voltage will return to its normal operating value. If the cathode becomes less negative, more current is supplied to the oscillator.

4-20. A tap on the secondary of the high-voltage transformer is connected to a multiplier assembly. Output of the multiplier (X6) is connected the CRT post-accelerator terminal.

4-21. LOW-VOLTAGE POWER SUPPLY.

4-22. The low-voltage power supply operates from an ac power source. The ac line is applied to the input power circuit where 100/120/220/240-Vac operation is selectable. The input power circuit contains the ac line protection fuse. The ac input is applied to a stepdown power transformer.

4-23. Secondary outputs from the power transformer are applied to rectifiers and voltage regulator circuits, which convert input ac power to usable dc outputs of different voltage levels.

4-24. CIRCUIT DETAILS.

4-25. The following paragraphs provide a detailed explanation of the individual circuits in the Model 1725A. Circuits that are identical for both channels are only explained for channel A.

4-26. ATTENUATOR ASSEMBLIES.

4-27. GENERAL INFORMATION. (See schematic 1.) The channel A attenuator assembly is a two section, cam-actuated attenuator. The first section is controlled by coupling switch A1S1. The second section is controlled by VOLTS/DIV switch A1S2. The attenuator components are closely mounted and their interrelationship is critical. If a malfunction occurs in an attenuator assembly, it is recommended that the attenuator board be replaced.

4-28. In describing the attenuator assembly, only basic reference designators will be used. When referring to table 6-2 (Section VI), prefix all basic reference designators (except A3 assembly components) with A1. See figure 4-1 for simplified block diagram of the attenuator.

4-29. INPUT. The input signal applied to channel A INPUT connector J1 is routed to coupling switch A1S1 through a 50-ohm stripline that is part of the etched circuit board. With A1S1 in its AC position, the input signal is applied through capacitor A1C1 to the first section of the attenuator. The value of A1C1 is such that signals below 10 Hz will be attenuated. In GND position, A1S1 disconnects the input signal and applies a ground to the attenuator input. In DC position, A1S1 forms a straight-through connection and applies the input signal directly to the high impedance section of the attenuator. In 50Ω position, A1S1 terminates the input signal in 50 ohms. The termination consists of two 100-ohm resistors. A1R1 and A1R2.

NOTE

These resistors are constructed of flameproof material as a precaution against overvoltage application in the 50Ω position of A1S1. The resistors are mounted in sockets to facilitate replacement.

4-30. ATTENUATOR STAGES. The VOLTS/DIV switch A1S2 controls a two-section cascaded attenuator. Each section consists of a group of attenuation networks. The high-impedance section contains X1, X10, and X100 networks. The low-impedance section contains X1, X2, and X5 networks. Each position of A1S2 cascades a network in the high-impedance section with a network in the low-impedance section. By cascading different network combinations, the attenuator provides 10 mV/div to 5 V/div vertical deflection.

4-31. A high-to-low impedance converter stage is inserted between the two sections of attenuator switch A1S2. The high frequency amplifier section of the impedance converter consists of field-effect transistor (FET) A1Q1 connected in a source follower configuration. Input to the gate of the FET is capacitively coupled through A1C5. Transistor A1Q2 functions as the current source for A1Q1. Emitter follower A1Q3 drives the resistive divider network of the low impedance section of attenuator switch A1S2. Under input overvoltage conditions, A1CR1 prevents the reverse breakdown of the base-emitter junction of A1Q3.

4-32. The low frequency path of the input signal consists of error amplifier A3U1 and level shifter A3Q5. The error amplifier samples the input and output signals within a frequency range of DC to 1 kHz. It generates a correction signal to the high frequency amplifier to replace the missing low frequency signal components. The input signal sample is accomplished through a resistor divider network consisting of A1R8 and A3R57—A3R59. This provides isolation of capacitive loading to high frequency signals and over-voltage protection for the error amplifier. The gain of the low frequency path is set by adjusting the resistor divider ratio used to sample the output signal. Adjustment is accomplished with A3R55. Transistor A3Q5 functions

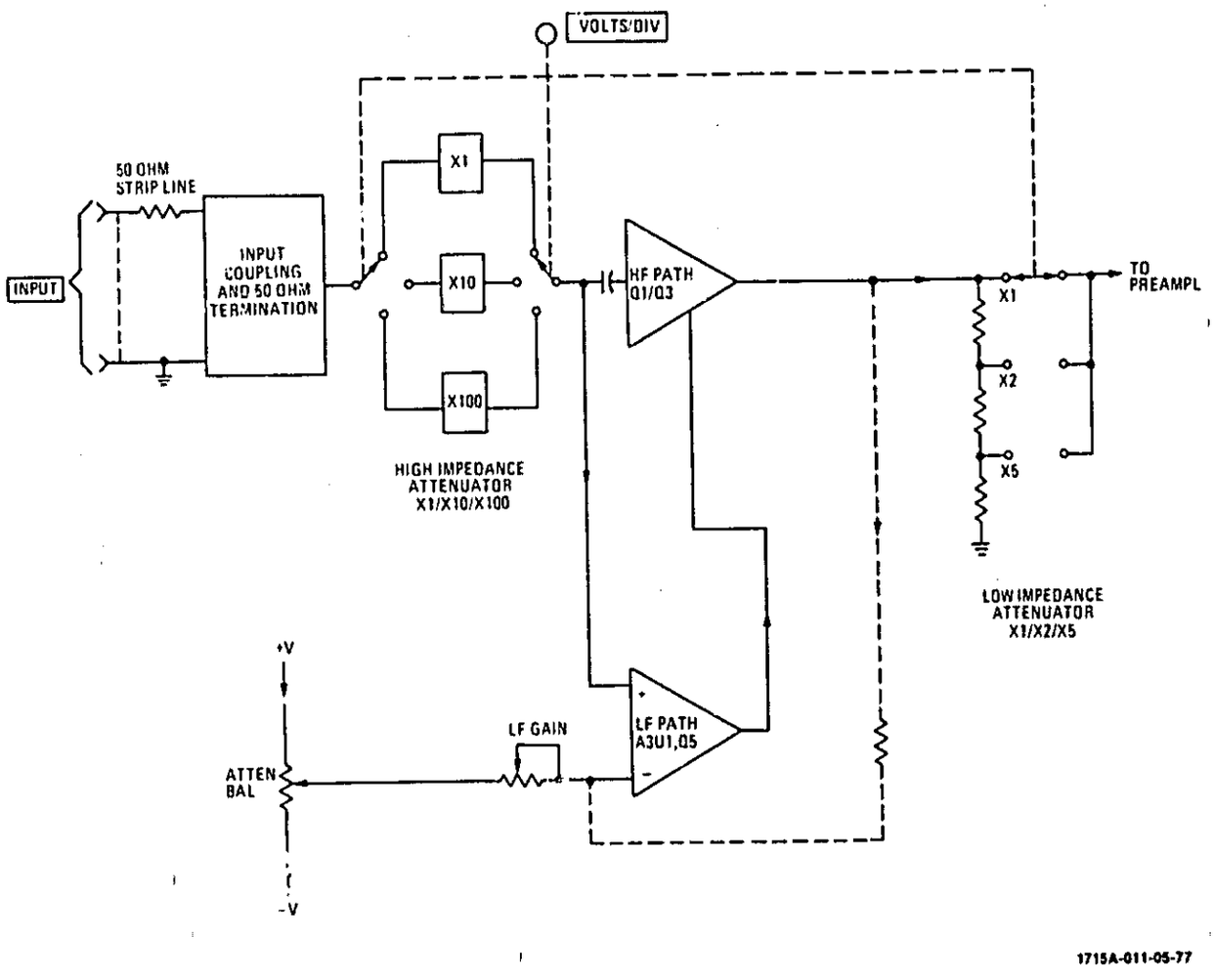


Figure 4-1. Attenuator Simplified Block Diagram

as a level shifter for the low frequency correction signal. The low frequency correction signal is applied through current source A1Q2 to the high frequency amplifier circuit.

4-33. The channel B attenuator (A2) functions identically as the channel A attenuator described in paragraphs 4-27 through 4-32. See schematic 2 for channel B component identification.

4-34. VERTICAL SECTION.

4-35. GENERAL INFORMATION. (See schematic 3.) Each channel preamplifier circuit consists of an integrated circuit (IC) and associated biasing networks. Both ICs are mounted on substrate assembly A3A1. The IC provides two outputs; one output is the main vertical signal, and the other is the internal sync signal.

4-36. PREAMPLIFIER STAGE. Since channel A and channel B are similar, only channel A will be described in detail. Where channel B differs from channel A, the difference will be discussed.

4-37. The input signal from attenuator A1 is applied to the channel A section of substrate assembly A3A1. The input amplifier stage is balanced by main balance potentiometer A3R4 (A3R12 for channel B). A signal split is then accomplished with the two signals taken out separately (main signal and sync signal for time base triggering).

4-38. Outputs from channel A and channel B are combined in a common load resistor and applied to the input of delay line driver stage A3Q1/A3Q2.

4-39. The sync outputs of channel A and channel B

are combined in a common base stage and its output drives a balanced 300Ω line to the input of the main sync amplifier (A10).

4-40. The output of A3Q1/A3Q2 is connected to delay line assembly A4 through a bandwidth limit circuit that limits the amplifier, 3 dB down to 20 MHz. A3Q1/A3Q2 operates as a differential common emitter amplifier.

4-41. BEAM FIND switch A8S1A (see schematic 14) supplies emitter bias (—15 V) to amplifier A3Q1/A3Q2. When A8S1A is pressed, the emitter bias is removed from the circuit. The signal sensitivity is reduced enough to return the trace to the viewing area of the CRT.

4-42. Each channel has a vertical POSITION control (R3 and R4) located on the front panel of the instrument. Vertical positioning of the viewed display is accomplished by adding or subtracting current in the main signal path. This results in shifting the vertical dc level of the output signal and causes the trace on the CRT to move up or down.

4-43. With front-panel vernier controls A1R1 and A2R1 in CAL detent position, the gain of each channel is adjusted by A3R1 (channel A) and A3R14 (channel B). By adjusting the ratio of bias current through two parallel connected junctions, the current division between the two junctions can be controlled.

4-44. An input signal applied to channel B can be inverted for A—B operation by front-panel B INVERT switch A6S1D. A saturated switch and bias circuit is also provided so that only a dc level change is needed to switch polarity. The dc level change (+15 V) is supplied by the B INVERT switch when engaged.

4-45. PREAMPLIFIER CONTROLS. (See schematic 5.) The internal Trigger Switch Assembly, A6, and Vertical Display Switch Assembly, A7, control the operation of substrate assembly A3A1. Control of the substrate assembly is described in the following paragraphs.

4-46. Channel A Display. Engaging VERT DISPLAY switch A7S1A selects the channel A input signal for display on the CRT. When engaged A7S1A applies a constant high (+4.3 V) to the set input on flip-flop A7U1, causing its Q output (pin 2) to be held high and its $\overline{Q}$ output (pin 3) to be held low.

4-47. Since A7U1 is held in its set condition, the base bias applied to A7Q2 is more positive than that applied to A7Q1. Transistor A7Q2 conducts, and applies a disabling voltage to the channel B channel switch on assembly A3. With +V1 bias removed, output from the channel B preamplifier is inhibited.

4-48. Channel B Display Engaging VERT DISPLAY switch A7S1B selects the channel B input signal for display on the CRT. When engaged, A7S1B applies a constant high to the reset input (pin 4) on flip-flop A7U1.

4-49. With A7S1B engaged and A7U1 held in its reset condition, the $\overline{Q}$ output of A7U1 is held high and the Q output is held low. With its base bias more positive, A7Q1 conducts and applies a disabling voltage to the channel A channel switch on assembly A3. With +V1 bias removed, output from the channel A preamplifier is inhibited.

4-50. Channel A and Channel B Displays. To display signals applied to both channels, VERT DISPLAY switches A7S1A and A7S1B are not engaged. The set and reset voltages applied to A7U1 are low. The flip-flop is controlled by inputs from either the ALT signal through OR/NOR gate A7U2A or by the CHOP signal generated by chop oscillator A7U2B. The high and low inputs from either the ALT signal or the chop oscillator cause the Q and $\overline{Q}$ output of A7U1 to alternate between high and low logic levels. This action causes A7Q1 and A7Q2 to conduct alternately.

4-51. Channel A + B Display. To algebraically display input signals applied to both channels, VERT DISPLAY switches A7S1A and A7S1B are pressed simultaneously. With both switches engaged, —15 V bias is removed from the emitter circuits of A7Q1 and A7Q2, cutting them off. This causes both channel A and channel B preamplifier stages on assembly A3 to be operational. In addition, with both A7S1A and A7S1B engaged, +15 V is applied to the junction of A3R21 and A3VR3. This increases the current available at the output circuit of the preamplifiers by effectively bypassing A3R21.

4-52. For composite triggering in A+B or CHOP mode of operation, +15 V is applied to the emitter circuits of A3Q3/Q4 through trigger switches A6S1A and A6S1B. This increases the current available at the emitters of sync amplifier A3Q3/A3Q4.

4-53. CHOP Mode Display. When CHOP mode of display is selected by VERT DISPLAY switch A7S1D, a low (+3.5 V) is applied to pin 13 of OR/NOR gate A7U2B. With a low applied to pin 13, A7U2B operates as an astable multivibrator. The repetition rate of A7U2B, controlled by feedback capacitor A7C3, is approximately 1 MHz. The NOR gate output of A7U2B is applied through OR/NOR A7U2C gate as a clock signal to flip-flop A7U1. The Q and $\overline{Q}$ output of the flip-flop control the operation of A7Q1/A7Q2 explained previously.

4-54. The NOR gate output of A7U2B is also applied to the gate assembly, A14, as a chop blanking signal. The chop blanking signal blanks the CRT trace during channel switching.

4-55. ALT Mode Display. When ALT mode of display is selected by VERT DISPLAY switch A7S1C, it releases all other display switches (A7S1A, A7S1B, and A7S1D). In addition, it supplies the LALT signal to the analog assembly, A18. The LALT signal will be discussed later.

4-56. The ALT signal that is developed on the main sweep assembly, A8, is applied to an input on OR/NOR gate A7U2A. At the start of the main of sweep, the ALT signal goes high. With one input high, the NOR output of U2A (pin 5) is low. The low is applied through A7U2B to the clock input of flip-flop A7U1. At the end of the main sweep, the ALT signal goes low and the NOR output of A7U2A goes high. The positive transition at the input to flip-flop A7U1 causes it to change states. Thus, at the end of each sweep, channel control flip-flop A7U1 alternately disables channel A or channel B.

4-57. CHANNEL A SYNC CIRCUIT. Internal sync switch assembly, A6, contains the sync control circuitry necessary for selective internal triggering.

4-58. When the A sync mode is selected, switch A6S1A is pushed in and A6S1B is out. In this switch configuration, A7U3Q2 is turned on and A7U3Q1 is off. Constant current source A7U3Q5 supplies current to A7U3Q2. When A7U3Q2 is conducting a low is applied to A7U3 pin 5, disabling the channel B sync circuit.

4-59. CHANNEL B SYNC CIRCUIT. When the B sync mode is selected, switch A6S1B is pushed in and A6S1A is out. In this switch configuration, A7U3Q2 is turned off, and A7U3Q1 is conducting. Constant current source A7U3Q5 supplies current to A7U3Q1. As long as A7U3Q1 is conducting a low is applied to A7U3 pin 1, disabling the channel A sync circuit.

4-60. Composite Sync Circuit. When composite sync is selected, channel A and channel B sync switches (A6S1A and A6S1B) are engaged simultaneously. With both sync switches engaged, a ground is applied to the emitter circuit of A7U3Q5, cutting it off. With A7U3Q5 cut off, the emitter circuit of A7U3Q1/A7U3Q2 is disabled, cutting off A7U3Q1 and A7U3Q2. In addition, with both sync switches engaged, -15V is applied to the emitter circuit of A7U3Q3 and A7U3Q4 through CHOP display switch A7S1D.

4-61. For composite sync, the outputs of A7U3Q3 and A7U3Q4 are controlled by the Q and $\overline{Q}$ outputs of A7U1. When the Q output of A7U1 is high ($\overline{Q}$ output low), A7U3Q4 conducts and A7U3Q3 is cut off. With A7U3Q4 conducting, its output (A7U3 pin 11) is approximately the bias voltage applied to its emitter (A7U3 pin 10). The low at A7U3 pin 11 is applied to the B sync enabling network on assembly A3, preventing a channel B sync signal from being generated.

4-62. When the $\overline{Q}$ output of A7U1 is high, A7U3Q3 conducts and its collector (pin 8) is approximately the bias voltage applied to its emitter (A7U3 pin 7). The low at A7U3 pin 8 is applied to the A sync enabling network on assembly A3, preventing a channel A sync signal from being generated. Thus as A7U1 toggles for the Alt Mode Display (paragraph 4-55), the sweep is alternately triggered by channel A and by channel B.

4-63. Composite Sync Chop Mode Display. When composite sync is selected for CHOP mode of display A7U3 is disabled by removing the -15V bias from both sections of the IC. This prevents A7U3 from applying a disabling voltage to either channel A or channel B enabling networks on assembly A3. The sync signal generated is a composite of signals applied to channel A and channel B.

4-64. Also, when composite sync is selected for CHOP mode of display, +15 V is applied by the CHOP switch, A7S1D, through sync switches A6S1A and A6S1B to emitter circuits of sync amplifier A3Q3/A3Q4. The additional voltage source increases current available at the input to the sync amplifier (similar to A+B operation of the main signal amplifier, A3Q1/A3Q2). When the B INVERT switch, A6S1D, is engaged during this mode of operation, the channel B sync signal is inverted prior to developing the composite sync signal by applying +15 V through A6R1 and A6S1D to a crossover network in the channel B sync circuit on A3A1. This results in the channel B sync signal being inverted prior to combining with the channel A sync signal.

4-65. DELAY LINE ASSEMBLY. The output of main signal amplifier A3Q1/A3Q2 is applied to delay line assembly A4. The delay line has a differential impedance of approximately 125 ohms and provides a time delay of approximately 50 nanoseconds. This delay is sufficient to allow the internal sync signal to trigger the time base to start the horizontal sweep. Without the insertion of this time delay in the signal path, the sweep would start after the signal reached the vertical deflection plates of the CRT and the leading edge of fast rise time signals would not be displayed.

4-66. VERTICAL OUTPUT AMPLIFIER. (See schematic 4.) The vertical output amplifier assembly, A5, consists of two integrated circuits with their associated control components. Integrated circuit A5U1 is the main vertical amplifier. It receives the differential signal from the delay line assembly, A4, amplifies it and applies it to output amplifier A5U2. Frequency adjustments A5C4, A5C6, A5C7, A5C13, A5R11, and A5R22 are adjusted for optimum pulse response.

4-67. Output amplifier A5U2 is a shunt-feedback differential amplifier whose transimpedance converts the current gain of A5U1 to a voltage gain at the input of the CRT. The CRT's vertical section is the distributed line type with a 330-ohm terminating impedance.

4-68. HORIZONTAL SECTION.

4-69. MAIN TRIGGER CIRCUITRY. (See schematics 6 and 7.) The internal sync signal developed on the preamplifier assembly, A3, is connected to the horizontal display switch assembly, A10, through a 300-ohm impedance cable. Signal amplification is accomplished by sync amplifier stages A10Q1-A10Q6. Output from A10Q5 is applied through X-Y switch A10S1F to the VERTICAL OUTPUT connector, J4, on the rear panel of the instrument. Output from A10Q6 drives dual emitter followers A10Q7/A10Q8. Transistor A10Q7 supplies the main sync signal. Transistor A10Q8 supplies the delayed sync signal.

4-70. There are two sources of sync input to the main trigger circuit (see figure 4-4 at the back of this section for time base simplified block diagram). One input is from the EXT TRIG connector, J1, on the front panel of the instrument. The other input is from the internal sync source, A10Q7. The position of the INT/EXT switch, A8S10, determines which trigger source is selected. The external sync is applied to A8S10 through the EXT +10 switch, A8S1P. When A8S1P is engaged, a voltage divider network connected to the external input circuit reduces the input signal by a factor of 10.

4-71. The sync signal (external or internal) is applied to a high-frequency circuit and to a low-frequency circuit (see schematic 7). The high-frequency circuit consists of A8Q1/A8Q2. This circuit readily passes all frequencies above 15 kHz. The low-frequency circuit consists of A8U1/A8Q3 and readily passes all frequencies below 15 kHz.

4-72. The low-frequency path for the trigger signal is through the INT/EXT switch, AC/DC switch, and LF REJ switch to the input of an inverting operational amplifier, A8U1. The output of A8U1 is applied to A8Q3 that functions as an emitter follower. The output of the low-frequency path is applied to U2 pin 14. Front-panel TRIG LEVEL control R15 is part of the low-frequency path.

4-73. With the AC/DC switch, A8S1N, in its AC position, A8C1 blocks the dc component of the trigger signal. When the LF REJ switch, A8S1M, is engaged, the low-frequency circuit is disconnected and the input to A8U1 is grounded. Pressing both the LF REJ switch and the HF REJ switch applies the line-frequency signal from primary ac power transformer T1 (see schematic 18) to the input of A8U1.

4-74. For high-frequency rejection, the HF REJ switch, A8S1L, is engaged. This applies −15 V through A8R7 to the gate of A8Q1. The source of A8Q1 and the emitter of A8Q2 are clamped by diodes A8CR2 through A8CR4 turning them off.

4-75. After conditioning by the high- and low-frequency bandpass circuits, the sync signal is applied to A8U2. The IC contains the pulse shaping network, arming circuitry, and trigger controls required to develop the trigger signal.

4-76. The sync signal is amplified by A8U2 and converted to differential signals. The differentially constructed signals are applied to the inputs of a pair of dual-input Schmitt trigger circuits located in the IC. Another Schmitt trigger on the IC controls the dual-input Schmitts.

4-77. At the end of the holdoff period, the holdoff-comparator develops a reset signal that is applied to the first Schmitt trigger on A8U2. The Schmitt trigger changes state, arming the second Schmitt trigger. When the applied trigger signal reaches the selected trigger level established, the second Schmitt trigger fires. One-half cycle later (when the trigger signal falls below the selected trigger level), the third Schmitt trigger fires producing trigger outputs from A8U2 (pin 1 and pin 2).

4-78. The input sensitivity on which A8U2 generates a trigger pulse is controlled by the main trigger sensitivity potentiometer, A8R47. The input sync signal slope on which A8U2 generates a trigger pulse is controlled by the main slope switch, A8S1K. This switch applies +5 volts to pin 16 for positive slope triggering and a ground for negative slope triggering.

4-79. The output of A8U2 (pin 2) is applied as one input of a dual-input current switch consisting of A8Q8 through A8Q10. The other input to the current switch is from the bright-line auto generator, A8U3. When the output of A8U2 (pin 2) or collector of Q36 (no. U3) goes low, either transistor A8Q8 or A8Q9 will conduct. With either transistor conducting the current path for the current switch is through A8R36, A8R37, the conducting transistor, and A8R41. The signal developed at the high end of A8R41 is the main gate signal applied to the gate Schmitt circuit (see schematic 13). In addition, when A8Q8 or A8Q9 conducts, A8Q10 cuts off. With A8Q10 cut off, a sweep ramp is generated by the integrator circuit (see schematic 8).

4-80. Transistor array A8U3 forms the bright-line auto circuit. In the absence of a sync signal, the output at A8U2 pin 2 is high, cutting off A8Q8. The complementary low output at A8U2 pin 1 is applied to the base of transistor A8U3Q3 which drives the base of A8Q11 low causing A8C15 to change to the lower voltage level. The emitter of A8Q11 follows the negative charging of A8C11 which will reach its final charge in approximately 25 milliseconds unless a new sync signal occurs. With the lower voltage at the emitter of A8Q11, A8U3Q1 will now follow the auto signal applied to the base of A8U3Q5. A8U3Q1/A8U3Q2 form a Schmitt trigger circuit. With a sync signal applied, A8U3Q1 conducts constantly,

holding off A8U3Q2. In the absence of a sync signal, the Schmitt trigger will follow the auto signal. When A8U3Q2 conducts its collector goes low, turning on A8Q9, and in turn, cutting off A8Q10. With A8Q10 cut off, the main sweep is activated. At the end of the main sweep, the reset signal goes high and is applied to A8U2 pin 4. With a high applied to A8U2 pin 4, the output at A8U2 pin 6 is low, turniyng on A8Q5. When A8Q5 conducts it turns on A8U3Q5 which turns on A8U3Q1. With A8U3Q1 conducting, bias is removed from A8U3Q2 cutting it off. The output at A8U3 pin 5 goes high, turning off A8Q9 and turning on A8Q10. With A8Q10 conducting, a new sweep ramp will not be generated. At the end of the holdoff period, the reset signal goes low, the output at A8U2 pin 6 goes high, and A8Q5 turns off. When A8Q5 turns off, the cycle is repeated and a new sweep is initiated.

4-81. In NORM position of the AUTO/NORM switch A8S1K, +5 V is applied to the base of A8U3Q4 turning it on. With A8U3Q4 conducting, forward bias is applied to the base of A8U3Q5 turning it on. This applies a constant forward bias to A8U3Q1 turning it on. With A8U3Q1 conducting, A8U3Q2 and A8Q9 are cut off. In the absence of a trigger signal A8Q8 is also cut off and A8Q10 is conducting, preventing the generation of a sweep ramp. When a sync signal is applied to A8U2, the output at A8U2 pin 2 goes low. This turns on A8Q8 and turns off A8Q10, starting a new sweep.

4-82. For single-sweep operation the SINGLE switch, A8S1I, is pressed. With A8S1I engaged, +5 V is applied through resistor network A8R30, A8R32, and A8R34 to A8U2 pin 5. This prevents A8U2 from developing a trigger signal. When the RESET switch, A8S1H, is pressed, it causes a negative-going spike to be applied to A8U2 pin 5. A8U2 is armed causing the output at A8U2, pin 6 to go high turning off A8Q5. A8Q4 and A8Q6 turn on and the reset lamp, DS4, on the front panel lights. A sync signal will produce one sweep.

4-83. The outputs of A8Q8 and A8Q9 develop the ALT and ALT GATE signals through A8Q17. The ALT signal is applied to the vertical display switch assembly, A7 where it is used to select the proper vertical preamplifier channel. The ALT GATE signal is applied to the analog assembly, A18, says a clock signal for flip-flop A18U7. The flip-flop develops the H1M and H2M signals.

4-84. MAIN SWEEP AND INTEGRATOR. (See schematic 8.) The main integrator, in conjunction with the sweep time controls, generates the main sweep ramp. The sweep is applied to the horizontal circuits.

4-85. The main integrator circuit is controlled by A8Q10 on assembly A8. When conducting, A8Q10 serves as a current source and prevents generation of a main sweep ramp. When A8Q10 is cut off by the bright-line auto circuit or the receipt of a trigger signal, A11Q1B and A11Q2 turn off, removing reset current from the ramp capacitors. With A11Q2 cut off, the Miller integrator circuit, A11Q3/A11Q4, is activated. Depending upon the position of the main TIME/DIV switch, A11S1, a specific integrating capacitor is connected between the gate of A11Q3 and the collector of A11Q4. The TIME/DIV switch also connects a specific integrating resistor to the emitter circuit of A11Q6 that functions as a constant current source for the ramp capacitors. When A11Q2 turns off the charging current drained by A11Q6 flows through the selected ramp capacitor (A11C11 through A11C17). This results in a linear, positive-going ramp at the output of A11Q4. The ramp generated is applied to emitter follower A11Q5. The output of A11Q5 is applied to the horizontal amplifier through the horizontal display switch assembly, A10.

4-86. The output of constant current source A11Q6 is controlled by the operational amplifier, A11U1. A different reference voltage is developed for different ranges covered by the TIME/DIV switch. This reference voltage is applied to A11U1 pin 3. When different ranges are selected by the TIME/DIV switch, the values of the ramp capacitor, integrating resistor, and A11U1 reference voltage are changed. This action changes the ramp slope for various sweep speeds. The ramp slope can be varied for any selected range with the main SWEEP VERNIER potentiometer, R12. The potentiometer is part of a voltage divider in parallel with the reference voltage applied to A11U1. When the fastest range (10 ns) of the TIME/DIV switch is selected, capacitors A11C3 and A11C4 function as the ramp generator.

4-87. The sweep ramp, developed at the collector of A11Q4 is applied to the base of A12Q12. Conduction through A12Q12 and A12Q13 follows the positive-going sweep ramp and charges (positively) a particular holdoff capacitor (A12C2 through A12C8) in the collector circuits of A12Q1 through A12Q7. The holdoff capacitor that charges positively is determined by which transistor is conducting. Depending upon the position of the TIME/DIV switch, A11S1 (see schematic 8), base bias is applied to only one transistor which conducts. With the TIME/DIV switch in either the 10-nanosecond or 20-nanosecond position, no transistor is biased on. The holdoff capacitor, which is always in the circuit, is A12C1.

4-88. When the selected holdoff capacitor charges to approximately +11 V, transistor A12Q8 turns off and transistor A12Q9 turns on. The output of A12Q9 is the positive reset pulse applied to A8U2 (refer to paragraph 4-80).

4-89. While the reset pulse is positive, A8Q8 and A8Q9 are turned off and A8Q10 turns on (see schematic 7). Since the base bias on A11Q1A (see schematic 8) is more positive than A11Q1B, A11Q1B conducts heavily and discharges the selected ramp capacitor (A11C11 through A11C17) through A11Q2. When the voltage on the base of A11Q1A reaches the voltage level applied to the base of A11Q1B, both A11Q1B and A11Q2 turn on and the sum of currents at the gate of A11Q3 is zero and the ramp is reset.

4-90. As the sweep ramp resets, transistors A12Q12 and A12Q13 turn off (see schematic 12). The selected holdoff capacitor (A12C1-A12C8) discharges through A12R1 and the TRIGGER HOLDOFF potentiometer, R8. The position of R8 determines the rate of discharge and therefore the holdoff period. When the holdoff capacitor discharges to approximately +1.4 V, A12Q10 turns off and A12Q11 turns on causing the reset signal to go negative. The negative transition of the reset signal arms trigger generator A8U2. Upon receipt of the next sync signal a new sweep is generated.

4-91. The positive-going ramp of the main sweep is also applied to integrated circuit A12U1 (pin 4). The IC is a transistor array that generates the delay comparator control signal used to energize the delay trigger generator (see schematic 9). Four signals are applied to A12U1 from the analog assembly, A18. Two signals are control signals and two signals are level references. The two control signals, H1M and H2M, are complementary and alternately become high and low during successive sweeps of the main sweep ramp. For example, on one sweep of the trace, H1M is high and H2M is low. When H1M is high, it enables a section of A12U1 that compares the input reference signal V1M with the sweep ramp. When the sweep ramp reaches the reference established by V1M, A12U1 energizes the delay trigger generator, A8U5, causing a bright segment to appear on the trace. On the next sweep of the trace, H2M becomes high, enabling a different section of A12U1. This section of A12U1 compares V2M with the sweep ramp. When the sweep ramp reaches the reference level established by V2M, A12U1 again energized the delay trigger generator causing another bright segment to appear on the trace. Thus, for every two sweeps, two bright spots appear on the trace. The first bright spot is used as a reference point where time measurements begin. The second bright spot indicates the end of the time period being measured.

4-92. The Schmitt control circuit (see schematic 13) provides the gate assembly, A14, with the proper input for each display mode. The main and delayed sweep require their own respective gates, (see figure 4-2 for simplified block diagram of gate Schmitt circuit). In mixed mode of display, a gate is generated at the start of the main sweep and stops at the end of the delayed sweep. Depending upon which input is supplied, gate Schmitt (A8U7) changes state on the first positive control pulse and resets on the first negative control pulse. The pulses are provided by differentiating the control pulses.

4-93. DELAYED SWEEP CIRCUITRY. (See schematics 9 and 10.) The delayed trigger, integrator, and sweep circuits function similarly to the main sweep circuit described previously. The one exception is that the slowest speed for delayed sweep is 20 milliseconds. Refer to paragraphs 4-69 through 4-92 for theory of operation of trigger, integrator, and sweep circuits.

4-94. ANALOG ASSEMBLY, A18. (See schematic 11.) The analog assembly produces the control signals and reference voltages applied to the delay comparator circuit. The outputs of assembly A18 are controlled by a number of input signals. The signals are discussed in the following paragraphs.

4-95. To accomplish valid time interval measurements, certain front-panel controls must be properly positioned, or control signals H1M and H2M will not be generated. To develop control signals H1M and H2M, the following front-panel controls must be positioned as indicated: horizontal display MAIN INTEN (HMI) or DLY'D (HDLY) pushbutton must be engaged, main SWEEP VERNIER (HCAL) control must be in CAL detent position delayed TRIG LEVEL (HAT) must be in START AFTER DELAY detent and time interval mode switch in ΔT OFF. The signals from these controls are applied to NAND gate A18U6.

4-96. If front-panel controls are not set properly for time interval measurement, the output of A18U6 will go high, turning on transistors A18Q6 and A18Q8. With A18Q6 and A18Q8 on, A18U7 is held in the preset state, holding H2M high. With H2M high, only one ramp comparator is enabled. A18Q8 clamps V1M low (approximately +1.4 V).

4-97. The transistor circuitry of A18Q3-Q5 control the D-input to flip-flop A18U7. When the instrument is not operated in the ALT mode of vertical display, the LALT signal is high, turning off A18Q4 and applying reverse bias to A18CR2. With A18Q4 turned off, A18Q3 is turned on, applying reverse bias to A18CR1. When the Q output of A18U7 is low, the signal is applied through A18CR4 to the base of A18Q5, turning it off. This action applies a high through A18R29 to the D-input of the flip-flop. Upon receipt of the next ALT GATE signal, the flip-flop is clocked and the Q output goes high. With the Q output high, A18CR4 is reverse biased and A18Q5 turns on, applying a low to the D-input of the flip-flop. Upon receipt of the next ALT GATE signal, the flip-flop is clocked and its Q output becomes low, completing the cycle. In this manner the H1M and H2M signals alternate between high and low with

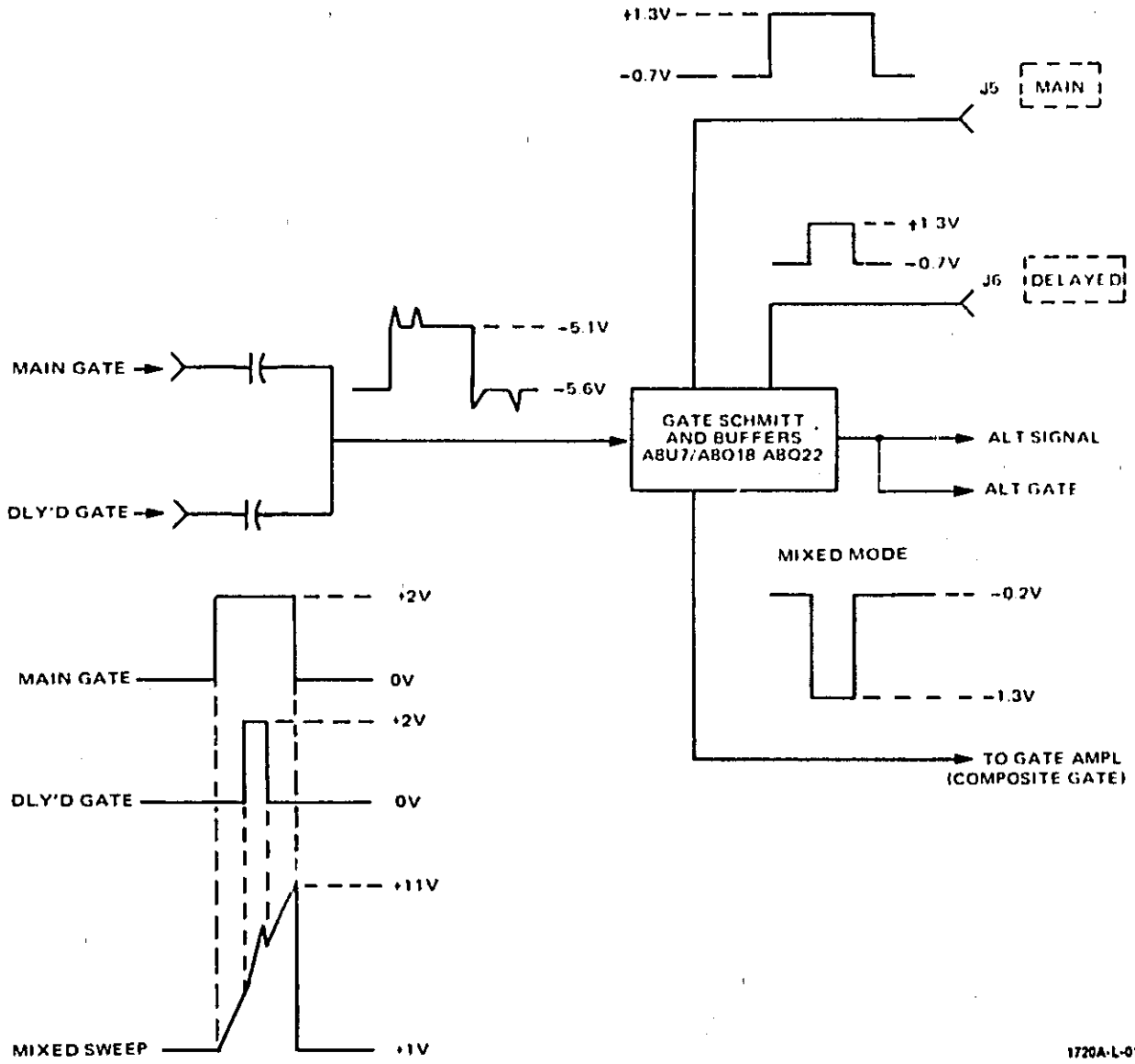


Figure 4-2. Schmitt Simplified Block Diagram (Mixed Mode)

each ALT GATE signal. Therefore, to display two bright segments on the CRT trace, two sweeps of the trace are required.

4-98. When the instrument is operated in the ALT mode of vertical display, a low (LALT) is applied to the junction of A18R26 and A18CR2. LALT enables ECL to TTL level transaltor A18Q3/A18Q4 and disables A18Q5. With A18Q3/A18Q4 enabled, channel switching information controls A18U7, H1M, and H2M are coordinated with the channel selected by time interval mode switch S3.

4-99. The time interval START potentiometer, R7, establishes the position of the first bright segment displayed on the CRT trace. The V1M signal is developed through the isolation amplifier, A18U1. The time interval STOP potentiometer, R23, establishes the position of the second bright setment displayed on the CRT. Output from R23 is applied through amplifiers A18U2 and A18U3 to an input on the summing amplifier, A18U4. The other input to A18U4 is the V1M signal. The output of A18U4 (V2M) is the V1M signal. The output of A18U4 (V2M) is the sum between the V1M signal and the position of R23. The summation on A18U4 establishes the baseline for the time interval STOP voltage so any cw adjustment of STOP potentiometer will delay the second marker beyond the position of the first.

4-100. The output from A18U2 is also applied to inverting amplifier A18U5. The output of A18U5 is applied to a voltage divider network consisting of A18R32 through A18R40. The voltage divider network is connected to different positions of the TIME/DIV switch, S1. The output from the TIME/DIV switch is applied to the INTERVAL OUT connectors, J7 and J8. The SIGNAL OVERLAY (ΔT=0) potentiometer, R24, is used to balance the outputs from the time interval START potentiometer, R7, and time interval STOP potentiometer, R23.

4-101. HORIZONTAL DISPLAY SWITCH ASSEMBLY. (See schematic 6.) The horizontal display switch assembly selects the mode of horizontal display. The different modes are X10 magnification, delayed sweep, mixed sweep, main/delayed intensified sweep, main sweep, and X-Y display.

4-102. X10 Magnification. The MAG switch, A10S1A, supplies bias to one of two circuits in the horizontal preamplifier. When not engaged, A10S1A supplies forward bias to a X1 stage (A8Q28/A8Q29) on the horizontal preamplifier. When engaged, A10S1A removes the forward bias from the X1 stage and applies it to a X10 stage (A8Q26/A8Q27).

4-103. Delayed Sweep. The DLY'D sweep switch A10S1B performs three functions. When engaged, A10S1B reverse biases the main gate control circuit preventing development of a main gate signal. Also, when engaged, A10S1B routes the delayed sweep ramp to the horizontal preamplifier. It furnishes the HDLY signal for the analog assembly.

4-104. Mixed Sweep. The MIXED sweep switch, A10S1C, performs two functions. When engaged, A10S1C applies the main sweep ramp as the reset reference to the delayed sweep integrator circuit. Also, when engaged, A10S1C routes the delayed sweep ramp to the horizontal preamplifier.

4-105. Main Intensified. The MAIN INTEN sweep switch A10S1D performs four functions. When engaged, A10S1D removes the +5 V bias applied to intensity gate A14Q10. It also applies +5 V to the delayed gate control circuit, disabling it. In addition, A10S1D routes the main sweep ramp to the horizontal preamplifier. It furnishes the HMI signal for the analog assembly.

4-106. Main Sweep. The MAIN sweep switch, A10S1E, performs three functions, When engaged, A10S1E applies +5 V to the delay comparator control and to the delayed gate control circuits disabling them. In addition, A10S1E routes the main sweep ramp to the horizontal preamplifier.

4-107. X-Y Control. The X-Y switch, A10S1F, performs a number of functions. When engaged, A10S1F removes the sync signal from rear-panel connector J4 and applies it to the horizontal preamplifier. It applies the x-y offset voltage to the horizontal preamplifier. The x-y control signal is grounded to prevent generation of the composite gate signal. It also inhibits the main signal applied to a connector on the rear of the instrument, inhibits the sweep circuit, and unblanks the CRT.

4-108. HORIZONTAL PREAMPLIFIER. (See schematic 14.) The horizontal preamplifier converts the single ended sweep from the sweep generator into a differential sweep for driving the horizontal output amplifier. During x-y operation, horizontal position and the x signal are summed and applied to the preamplifier. The preamplifier provides sweep gain adjustment, trace magnification (X10), and trace centering.

4-109. Transistors A8Q23 and A8Q24 are emitter followers used to provide input isolation. Current in the collector circuit of A8Q25 is determined by the setting of the horizontal POSITION control, R13A/B. The output current from A8Q25 is applied to A8Q24 base resistor A8R137. In x-y operation, channel B vernier controls the x-axis gain. A8R133 serves as the x-axis gain calibration adjustment. An offset current is supplied to the junction of A8R132, A8R133, and A8R135 to center the x-y display. Variable capacitor A8C45 compensates the x-y phase.

4-110. The emitter outputs from transistors A8Q23 and A8Q24 are applied to a dual differential stage that furnishes the X1 or X10 magnification for the horizontal sweep. When the MAG switch, A10S1A, is not engaged, +53 V is applied to the emitter circuits of transistors A8Q28 and A8Q29, biasing them on. Gain for the X1 range is adjusted by A8R148. Engaging the MAG switch removes the +53 V bias from A8Q28/A8Q29 and applies it to the emitter circuits of A8Q26 and A8Q27. Gain for the X10 range is adjusted by A8R146. Resistors A8R152, A8R153, and A8R154 provide a dc balance network for the differential amplifier.

4-111. Differential amplifier A8Q30/A8Q31 provides differential drive to the horizontal output amplifier. This stage, as well as the preceding differential stage, will current limit when overdriven. This prevents saturation of the output amplifier. Transistor A8Q32 functions as a constant current source for the amplifier stage. When the BEAM FIND switch, A8S1A, is pressed, less current is supplied to the amplifier stage. This ensures that the horizontal portion of the trace is returned to the viewing area of the CRT.

4-112. HORIZONTAL OUTPUT. (See schematic 15.) The horizontal output is a differential shunt-feedback amplifier. The currents through A13R3 and A13R4 determine the output voltage since little

current flows in the bases of transistors A13Q1, A13Q2, A13Q3, and A13Q4. Variable capacitors A13C5 and A13C7 control the fast corner response, and A13C6 and A13C8 control the slightly slower corner response of the circuit. Resistors A13R1 and A13R2 establish the minimum output voltage level. With the input circuit disconnected, the minimum output voltage level is approximately +9 V.

4-113. Transistors A13Q1 through A13Q4 are emitter followers with A13Q1 and A13Q4 providing the dc signal path and A13Q2 and A13Q3 providing the ac signal path. In a similar manner, A13Q5 and A13Q8 are the dc signal path, and A13Q6 and A13Q7 are the ac signal path. Transistors A13Q6 and A13Q7 are current sources, and resistors A13R23 and A13R24 serve to lower the power in these transistors. Each side of the output amplifier can swing from approximately +9 V to +95 V.

4-114. GATE ASSEMBLY AND CALIBRATOR.

4-115. GATE CIRCUITRY. (See schematics 16 and 17.) The gate assembly controls intensity of the trace on the CRT. The gate preamplifier, consisting of A14Q1 through A14Q10 sums all desired functions necessary for control of trace intensity. This is accomplished with current switches (see figure 4-3 for simplified block diagram of gate circuit).

4-116. Gate Preamplifier. The setting of the front-panel INTENSITY control, R2, controls the base voltage applied to A14Q8. The emitter voltage of A14Q8 follows the base voltage and is 0.6 V above the base voltage. This voltage applied to A14R18 establishes the current for current switch A14Q1, A14CR3, and A14Q9.

4-117. The composite gate signal from the gate Schmitt is applied to the base of A14Q1. This signal switches the current path between A14Q1 or A14Q9, thus causing the gate output voltage to the high-voltage power supply to change.

4-118. The intensified gate functions in a similar manner. It is a current switch consisting of A15Q10, A14CR4, and A14CR5. Its current source is the voltage at the emitter of A14Q8 across A14R22 and A14R23. Zener diode A14VR1 and resistor A14R24 limit the maximum level of the intensified gate. The main intensity control signal is applied through A14R25 to this current switch. The main intensity signal enables the current switch during main intensified mode only.

4-119. Chop blanking is accomplished by current switch A14Q2 and A14Q3. When CHOP mode of operation s selected, the chop blanking signal applied to the base of A14Q2 turns it on and off. The alternating action switches the current path between A14Q2 and A14Q3. Transistor A14Q3 sinks current from A14Q9 turning off the trace when switching channels.

4-120. When the BEAM FIND switch, A8S1A, is pressed, the front-panel INTENSITY control, R2, is disabled and a fixed voltage is supplied through the gate amplifier to the high-voltage power supply. A z-axis voltage applied to A14R6 similarly causes a current change through the gate amplifier. A z-axis signal of > +1 V, pulse width > 50 ns, dc to 20 MHz will blank the CRT trace of normal intensity. A z-axis signal of +8 V will blank the CRT trace regardless of intensity setting.

4-121. Transistors A14Q4 and A14Q5 make up an intensity limit circuit. As intensity becomes excessive in the CRT, its first accelerator begins to draw cur-

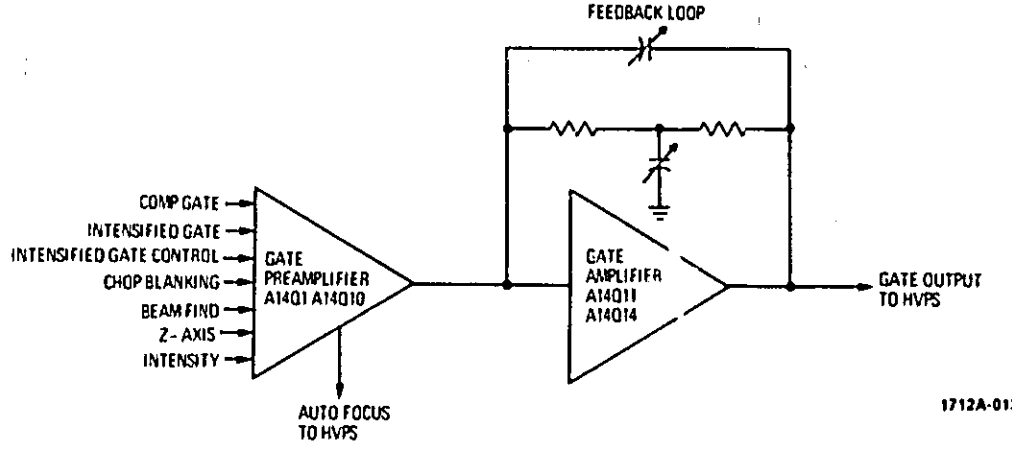


Figure 4-3. Gate Control Simplified Block Diagram

rent. This increases current through A14R16, causing the voltage on the base of A14Q4 to change. The voltage at the emitter of A14Q4 follows the base voltage and is 0.6 V below the base. This raises the voltage applied to the base of A14Q8 through front-panel INTENSITY control R2. Variable resistor A14R15 establishes the level at which limiting takes place. Variable resistor A14R10 sets the maximum level the gate output can reach, providing optimum gate drive to the CRT.

4-122. An autofocus circuit is incorporated in the instrument. Varying the INTENSITY control, R2, varies the bias applied to the emitter circuit of A14Q7. As conduction through A14Q7 increases or decreases, the voltage drop across the FOCUS control, R1, changes accordingly (see schematic 17). This automatically corrects the focus adjustment for changes in intensity level.

4-123. Gate Amplifier. The gate amplifier output is a shunt feedback stage consisting of A14Q11 through A14Q14. Transistors A14Q11 and A14Q13 are emitter followers with A14Q11 providing the ac signal path. Resistors A14R30 and A14R31 provide the dc feedback path. Variable capacitor A14C7 controls fast corner response while A14C8 controls slightly slower corner response.

4-124. Due to the high open loop gain of the amplifier most of the current appearing at the summing junction (bases of A14Q11 and A14Q13 flows through the feedback resistors A14R30 and A14R31. This results in a change in output voltage equal to the input current times the feedback resistance (A14R30 plus A14R31). Under certain conditions, the gate output may swing from +5 V to +100 V.

4-125. CALIBRATOR. (See schematic 16.) The calibrator consists of integrated circuit A14U1 and associated bias controls. It is connected in a multivibrator configuration and free-runs at approximately 1 kHz. The calibrator amplifier adjustment, A14R51, is adjusted to produce a square wave with 3 volts amplitude at the CAL 3 V terminal on the front panel.

4-126. CRT CONTROLS. (See schematic 17.) There are few CRT adjustments physically located on the gate assembly, A14, yet are accessible at the rear panel of the instrument for CRT control. These adjustments are TRACE ALIGN (A14R67), ASTIG (A14R74), and PATT (A14R76). A functional description of these controls is given in Section III.

4-127. Two additional CRT controls physically located on A14 are screwdriver adjustments. The floodgun pattern control, A14R64, adjusts the voltage applied to flood-gun filaments of the CRT to control scale illumination range. The ORTHO ADJ control, A14R70, adjusts current through the y-axis alignment coil on the CRT.

4-128. HIGH-VOLTAGE POWER SUPPLY.

4-129. The high-voltage power supply contains a high-voltage oscillator and a rectifying circuit. The high-voltage regulator is part of A14.

4-130. When the instrument is turned on, +20 V (unregulated) is applied to transistor Q1, turning it on. As Q1 conducts through the primary winding of the high-voltage transformer, A15T1, (pin 3 and 4), positive feedback to the base of Q1 occurs through another winding on the transformer (pins 1 and 2). The circuit oscillates at a rate determined by the inherent distributed inductance and capacitance of the circuit. The magnitude of the oscillations, and consequently the output of the power supply, is controlled by voltage on the collector of voltage regulator A14Q17.

4-131. A reference voltage from the +15 V supply is established at the junction of A15R10 and A15R12 and is applied to the base of A14Q15 on A14. A sample of the rectified cathode voltage is fed back to the base of A14Q15 through A15R10. Any difference in cathode voltage is amplified and inverted by the Darlington amplifier, A14Q15/Q16. Output of the Darlington pair drives the base of A14Q17. causing its collector voltage to change. This change is coupled through a winding on A15T1 to the base of Q1 and causes the amplitude of its oscillations to change. This change is in such a direction as to correct the original change in the rectified cathode voltage. Diode A15CR1 and A15CR2 protect the oscillator transistor base from excess reverse voltage.

4-132. The CRT cathode and grid voltages are developed in the secondary of A15T1. The cathode voltage is rectified and filtered before application to the cathode of the CRT. It is also used as a feedback control to the high-voltage oscillator, as a reference for the CRT filament winding, for grid bias supply, and for the focus voltage-divider network. The cathode voltage will vary between —2827 V and —2973 V, depending on component tolerance and is not adjustable.

4-133. The CRT grid voltage is supplied by a voltage tap (pin 5) on the secondary winding of A15T1. Approximately 300 V peak is developed and applied through a series RC network (A15C2/A15R2) to diodes which clamp the voltage swing between that established by the INT SET control, A15R3, and the gate dc levels. The peak-to-peak voltage swing is rectified, and applied to the grid with reference to cathode voltage and controls the beam brightness.

4-134. The unrectified cathode voltage in the secondary of A15R1 is applied to the multiplier assembly, A16, where the voltage is multiplied approximately six times. The output of the multiplier (approximately +17.5 kV) is applied to the post-accelerator connector on the CRT.

4-135. Another secondary winding of A15T1 provides filament voltage for the CRT. This winding is referenced to the rectified cathode voltage through A15R5.

4-136. LOW-VOLTAGE POWER SUPPLY.

4-137. The low-voltage power supply provides regulated +5 V, +15 V, +53.3 V, +115 V, and —15 V for operation of the various circuits in the instrument. All low-voltage supplies are referenced to the +15 V supply for regulation purposes.

4-138. ±15-VOLT SUPPLIES. (See schematic 19.) One of the secondary windings on input power transformer T1 is connected to bridge rectifier A17CR7. The rectified voltage (nominally +20 Vdc is filtered by A17C8. The output of the supply is maintained at +15 volts by integrated circuit A17U2 and series regulator transistor Q5. Regulator A17U2 contains a differential amplifier with a Darlington output. The reference circuit A17VR3, is connected to the noninverting input of the differential amplifier (pin 3) through A17R20. The +15-volt output is divided through A17R22, A17R23, and A17R24. The wiper of potentiometer A17R23 is connected to the inverting input of the differential amplifier. The Darlington output (pin 6) drives the base of series transistor Q5. Resistor A17R23 is adjusted to compensate for variations of the reference voltage so that with an output of +15 volts from the supply, the inverting and non-inverting input voltages are equal.

4-139. The IC regulation includes an output current limiting circuits consisting of an NPN transistor whose collector is connected to the differential amplifier and first base of the Darlington pair (within the IC). The emitter and base connections for the NPN transistor are pins 1 and 10 on A17U2. When load current through A17R21 produces a sufficient voltage drop, the NPN transistor conducts, pulling the input to the Darlington pair toward the emitter potential of Q5. This limits the output current. The output current limit is 0.55 to 0.75 ampere.

4-140. —15-volt Supply. (See schematic 19.) Operation of the —15 V regulator, A17U3, is identical to that of the +15 V regulator except that the inverting input to the IC is the sum of the +5 V and —15 V outputs (nominally 0 V).

4-141. +5-VOLT SUPPLY. (See schematic 18.) The +5-volt regulator A17U1 functions identically to that of the +15 V regulator A17U2 except that the reference is provided by the output of the +15 V supply and divided by A17R15 and A17R16.

4-142. +115-VOLT AND +53.3-VOLT POWER SUPPLIES. (See schematic 18.) The +115-volt and +53.3-volt power supplies function identically, therefore only the +115-volt supply will be discussed.

4-143. The ac input voltage from power transformer T1 is applied to bridge rectifier A17CR1. The dc output from A17CR1 is filtered by A17C1. A +15 V reference is applied through A17CR5 to the emitter of transistor A17Q3. The base of A17Q3 is connected to a voltage-divider network across the output circuit. If the output falls below +115 V, the base of A17Q3 becomes less positive than the emitter and it conducts. With A17Q3 turned on, conduction through Darlington pair Q2 and A17Q2 increases. This results in an increase in output voltage. When the output voltage again reaches +115 volts, A17Q3 turns off. Transistor A17Q1 and resistor A17R2 form a current limiting circuit. As current requirements increase toward the limit of the supply capability, the voltage drop across A17R2 is applied to the base of A17Q1 which conducts and limits current drain from the Darlington pair.

4-144. The +53.3-volt power supply functions identically as the +115-volt supply. The Darlington pair consists of transistor Q3 and A17Q5. The current limiting circuit consists of transistor A17Q4 and resistor A17R8.

4-145. FLOODGUN FILAMENT VOLTAGE. (See schematic 19.) Floodgun filament voltage is developed in a secondary winding of ac power transformer T1. The ac input voltage is rectified by A17CR9/CR10 and filtered by A17C14. One branch of the output circuit is applied directly to the floodgun filament connection on the CRT. The other branch is applied to a control circuit on gate assembly A14. Output of the control circuit on assembly A14 is applied to the other filament connection on the CRT (see schematic 17).

4-146. LINE FREQUENCY. (See schematic 18.) The line frequency trigger signal is developed in the same secondary winding of power transformer T1 that is used for the +5-volt power supply. The line frequency signal is applied through A17R18 to the HF REJ switch, A8S1M, on assembly A8 (see schematic 7).

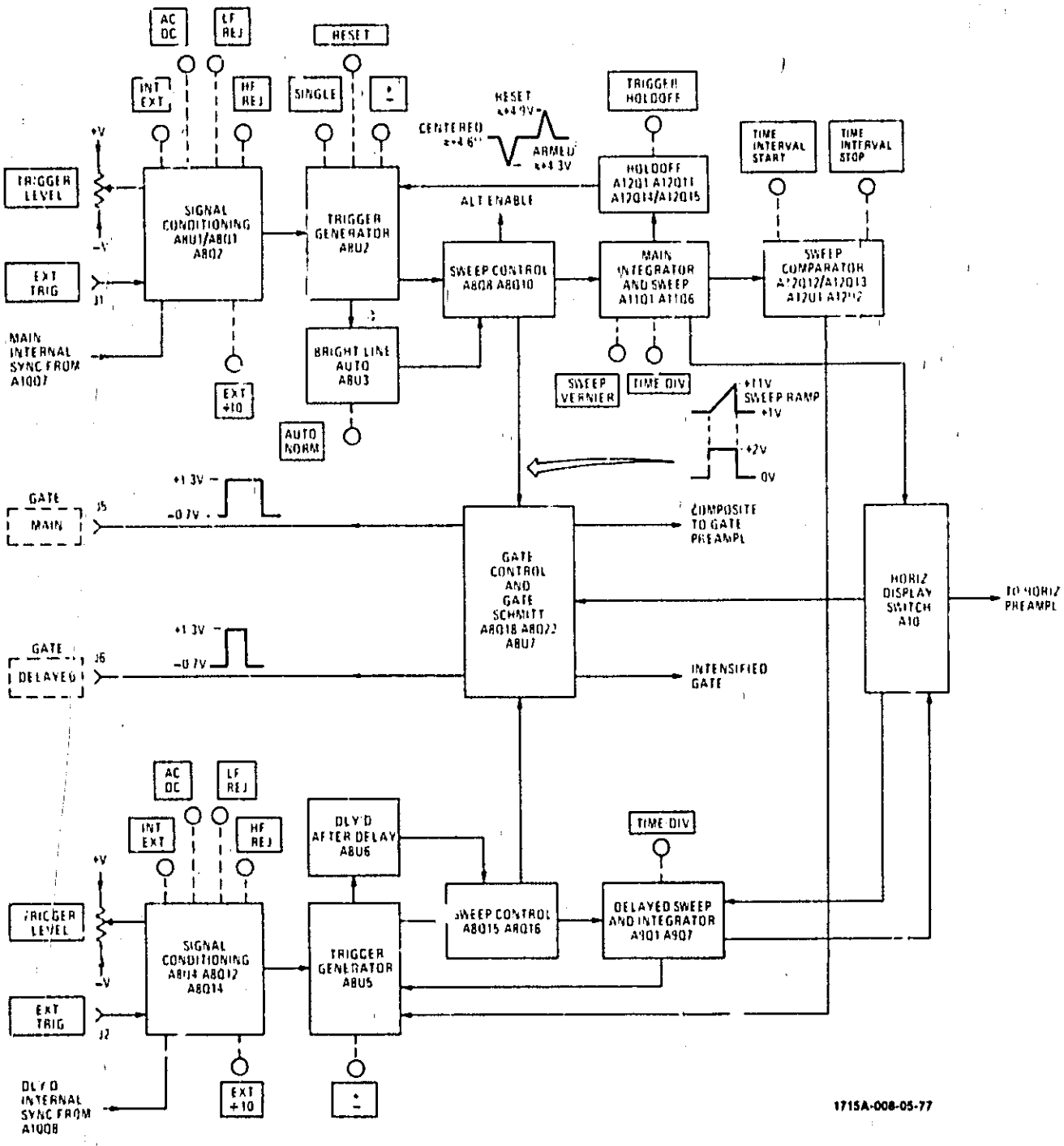


Figure 4-4. Time Base Simplified Block Diagram

SECTION V

PERFORMANCE CHECK AND ADJUSTMENTS

5-1. INTRODUCTION.

5-2. This section contains step-by-step procedures for checking the instrument specifications as given in table 1-1 of this manual. The performance checks are arranged in numerical order. For best results, this order should be followed. Included in this section are test setups, procedures, and test equipment required. Most test points and adjustment locations are shown within the procedures in which they are referenced. The procedures for making all internal adjustments are covered in paragraphs 5-39 through 5-90.

5-3. TEST EQUIPMENT.

5-4. Recommended test equipment and accessories are listed in table 5-1. Test equipment equivalent to that recommended may be substituted, provided it meets the required characteristics listed in the table. For best results, use recently calibrated test equipment.

5-5. PERFORMANCE CHECKS.

5-6. The performance checks given in this section are suitable for incoming inspections, preventative maintenance, and troubleshooting. The checks are designed to verify the published instrument specifications. Perform the checks in the order given, and record the measured information on the performance check record at the end of this section.

5-7. ADJUSTMENTS.

5-8. The adjustment procedures are arranged in a recommended sequence of adjustments. While most adjustments may be made independent of other adjustments, it is recommended that adjustments be made sequentially as a number of adjustments are directly related to preceding or following adjustments.

5-9. PERFORMANCE CHECK RECORD.

5-10. Each measurement point in the performance check is repeated in the performance check record. The pages may be removed for filing. The first time the performance check is made, enter the results on the performance check record and file it for future reference.

5-11. FRONT-PANEL CONTROL SETTINGS.

5-12. Set up the instrument and perform initial adjustments outlined in Section III before proceeding with the performance check and adjustment procedures.

5-13. The control settings listed below are to be used for each performance check and adjustment procedure. If a control is to be set to another position, it will be listed in the procedure. After the completion of each performance check or adjustment procedure, set the controls back to the original front-panel settings.

Control	Position
Vertical (channels A and B):	
POSITION	centered
VOLTS/DIV	.1
Coupling	DC
Verniers	CAL
VERT DISPLAY	A
INT TRIG	A
BW LIMIT	out position
B INVERT	out position
Horizontal:	
POSITION (coarse and fine)	centered
HORIZ DISPLAY	MAIN
MAG X10	X1 position
STOP	1.00
TIME/DIV (main)	.1 mSEC
TIME/DIV (delayed)	OFF
TRIG LEVEL (delayed)	STARTS AFTER DELAY
TRIG LEVEL (main)	midrange
SWEEP VERNIER	CAL
TRIGGER HOLDOFF	detent position
All time base pushbuttons	out position
INTENSITY	visible trace

5-14. PERFORMANCE CHECK PROCEDURES.

5-15. DEFLECTION FACTOR. Ranges are from 10 mV/div to 5 V/div (9 ranges) in 1, 2, 5 sequence. Accuracy is ±2% with the vernier in calibrated position. The vernier is continuously variable between all ranges and extends maximum deflection factor to at least 12.5 volts/div. The UNCAL light indicates when vernier is not in CAL position.

Table 5-1. Recommended Test Equipment

Instrument		Required Characteristics	Required For
Type	Model		
DC Standard Voltmeter	HP Model 740B	Voltage: 0.5 to 30V Accuracy: to 0.1%	P,A
VHF Oscillator	HP Model 3200B	Frequency: to 300 MHz Accuracy: +2%	P,A
Test Oscillator	HP Model 651B	Frequency: 10MHz	P,A
RF Voltmeter	HP Model 3406A	Voltage: to 3V	P,A
50 OHM TEE	HP Model 11063A		P,A
Time-mark Generator	Tektronix* TG 501	Time marks: 2 ns to 0.5 s	P,A
Fast-rise Pulse Generator	Tektronix* PG 506	Pulse rise time: <400 ps	P
Multifunction Digital Voltmeter	HP Model 34740A with 34702A	Voltage Range: >±15V Accuracy: ±0.1%	A
Probe	HP Model 10018A	Divide Ratio: 10:1	A
20-dB Attenuator	HP Model 355D	Attenuator: 20 dB	A
50-ohm Power Divider	HP Model 11549A		P
Test Oscilloscope	HP Model 1740A	100 MHZ, Delayed Sweep Scope	A
Pulse Generator	HP Model 8013B	Trigger Output Frequency: 10 kHz	A

*Requires Tektronix Model TM 503 Main Frame

P = Performance Check, A = Adjustment Procedure.

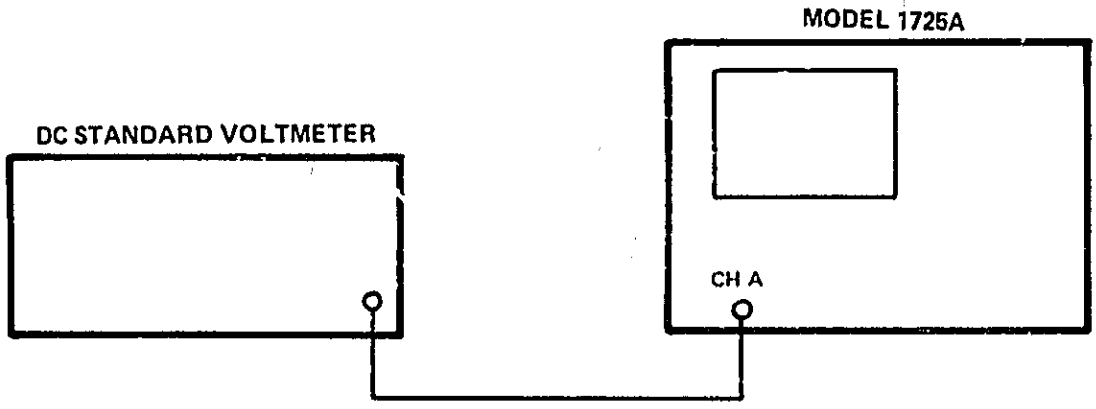


Figure 5-1. Deflection Factor Test Setup

5-16. The deflection factor is checked by applying a dc voltage-calibrated signal to the input. The displayed displacement is compared against the voltage standard.

Equipment Required:

DC Standard voltmeter

5-17. Perform deflection factor check as follows:

a. Connect instruments as shown in figure 5-1.

b. Set main TIME/DIV control to .5 mSEC.

c. Set channels A and B VOLTS/DIV controls to .01 position.

d. Set base line to bottom graticule line.

e. Set dc standard voltmeter controls for 50-mV dc output signal.

f. Note display. Vertical deflection should be 5 divisions ±2% (±.1 div).

g. Observe vertical deflection factors specified in table 5-2.

h. Set dc standard voltmeter output for 30V.

i. Set channel A VOLTS/DIV control to 5.

j. Rotate channel A vernier fully counterclockwise. Vernier UNCAL light should be lighted and display amplitude should decrease to less than 2.4 divisions.

k. Set channel A vernier to CAL position.

l. Connect dc standard voltmeter to channel B INPUT connector.

m. Set VERT DISPLAY control to B.

n. Set INT TRIG control to B.

o. Repeat steps d through k for channel B.

p. Disconnect test equipment.

q. Set Model 1725A front-panel controls to initial settings.

Table 5-2. Deflection Factor Accuracy

DC Standard Settings (Volts)	VOLTS/DIV Settings	Vertical Display (div)
.05	.01	5 ±2% (±.1)
.1	.02	5 ±2% (±.1)
.3	.05	6 ±2% (±.12)
.5	.1	5 ±2% (±.1)
1	.2	5 ±2% (±.1)
3	.5	6 ±2% (±.12)
5	1	5 ±2% (±.1)
10	2	5 ±2% (±.1)
30	5	6 ±2% (±.12)

5-18. CALIBRATOR ACCURACY. The calibrator output is a square wave with 3V ±1% amplitude, at approximately 1 kHz.

5-19. The amplitude is checked by comparing the p-p signal against a known 0.1% signal.

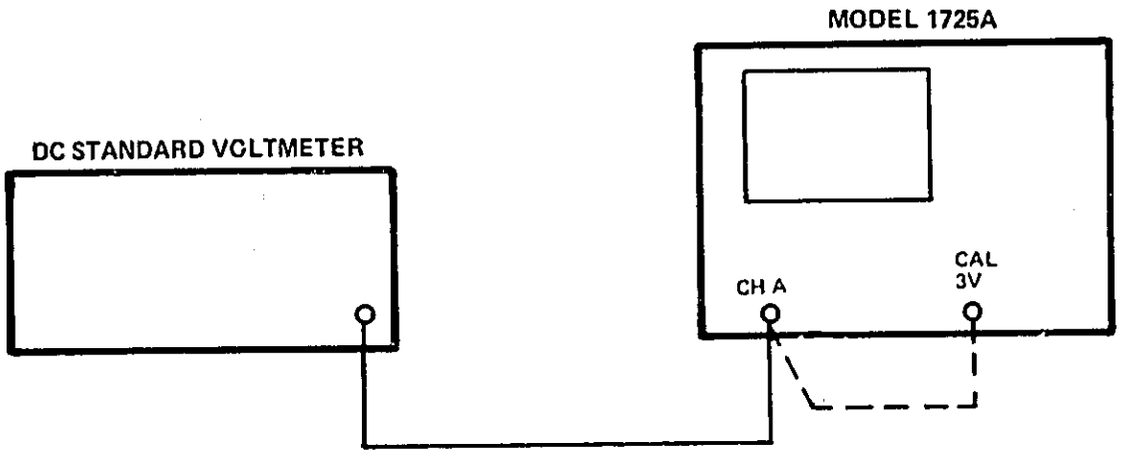


Figure 5-2. Calibrator Accuracy Test Setup

Equipment Required:

DC Standard voltmeter

5-20. Perform calibrator accuracy check as follows:

a. Connect equipment as shown in figure 5-2.

b. Set Model 1725A controls as follows:

TIME/DIV (main) ..... .5 mSEC
VOLTS/DIV (channel A) 5

c. Set dc standard voltmeter for 3V dc output signal.

d. Note vertical deflection on CRT.

e. Disconnect dc standard voltmeter from Model 1725A.

f. Connect Model 1725A CAL 3 V output to channel A INPUT connector using test lead and adapter.

g. Note vertical deflection on CRT. Vertical deflection should be same as noted in step d, ±1%. Frequency should be approximately 1 kHz.

h. Disconnect test lead.

i. Set Model 1725A front-panel controls to initial settings.

5-21. Z-AXIS BLANKING. A signal of +8 volts, >50-ns wide pulse will blank a trace of any intensity. Usable to 20 MHz for normal intensity.

5-22. A free-running trace of normal intensity is obtained on CRT. A signal of +8 volts is applied to the Z-AXIS input connector on the rear panel of Model 1725A. The display should be blanked regardless of INTENSITY setting.

Equipment Required:

DC Standard voltmeter

5-23. Perform Z-axis blanking check as follows:

a. Obtain free-running base line on CRT.

b. Adjust INTENSITY control for normal viewing level of baseline.

c. Connect equipment as shown in figure 5-3.

d. Set dc standard voltmeter for +8 volts, dc output signal.

e. Observe base line is blanked.

f. Disconnect test equipment.

g. Set Model 1725A front-panel controls to initial settings.

5-24. BANDWIDTH. Direct or with HP Model 10020A probe, or with 10 X, 10-megohm divider probe (HP Model 10014A). (3 dB down from a 10-MHz 6-division reference signal from a terminated 50-ohm source.) DC coupled: dc to 275 MHz; AC coupled: 10 Hz to 275 MHz.

5-25. To check the bandwidth, a vhf oscillator is used to apply a 6-division 10-MHz reference signal to the input of Model 1725A. An rf voltmeter is used to measure the signal level. The vhf oscillator frequency is increased to 275 MHz and the amplitude is adjusted to give the same indication on the rf voltmeter. Displayed amplitude must be equal to or greater than 4.2 divisions.

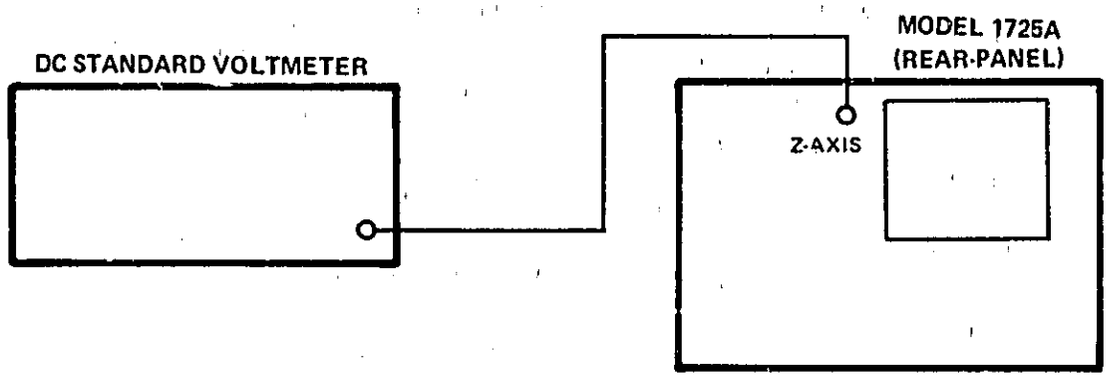


Figure 5-3. Z-axis Blanking Test Setup

Equipment Required:

VHF oscillator
RF voltmeter
50-ohm tee
50-ohm termination
50-ohm power divider
20-dB attenuator

5-26. Perform bandwidth check as follows:

a. Connect equipment as shown in figure 5-4.

b. Set channel A and B input couplings to 50Ω position.

c. Adjust vhf oscillator for 10-MHz 6-division display.

d. Note indication on rf voltmeter.

e. Increase signal output of vhf oscillator to 275 MHz.

f. Adjust output amplitude of signal from vhf oscillator until rf voltmeter indication is same as noted in step d.

g. Observe display. Signal amplitude should be equal to or greater than 4.2 divisions.

h. Disconnect input signal from channel A INPUT connector.

i. Connect input signal to channel B INPUT connector.

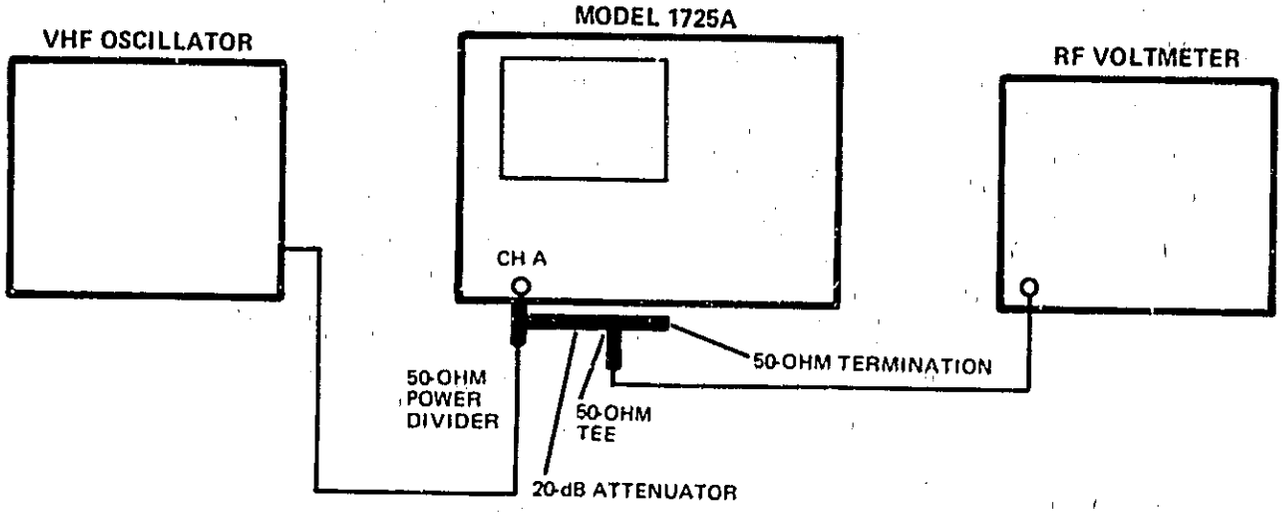


Figure 5-4. Bandwidth Test Setup

j. Set VERT DISPLAY control to B.

k. Set INT TRIG control to B.

l. Repeat steps c through h for channel B.

m. Disconnect test equipment.

n. Set 1725A front-panel controls to initial settings.

5-27. TRIGGERING. Internal triggering occurs from dc to 100 MHz on signals causing 0.5 division or more of vertical deflection, increasing to 1-division vertical deflection at 300 MHz in all display modes. Triggering on line frequency is also selectable. External triggering occurs from dc to 100 MHz on signals with an amplitude of 50 mV p-p or more, increasing to 100 mV p-p at 300 MHz.

5-28. In the internal trigger mode triggering is checked against certain vertical deflections on the CRT. In the external trigger mode, the input signal amplitude is monitored with an rf voltmeter.

Equipment Required:

VHF oscillator
RF voltmeter
50-ohm tee
50-ohm power divider
50-ohm termination

5-29. Perform triggering check as follows:

a. Connect equipment as shown in figure 5-5.

b. Set Model 1725A channel A coupling to 50Ω position.

c. Set vhf oscillator for 100 MHz, 0.5 division of vertical deflection output signal.

d. Adjust main TIME/DIV and main TRIG LEVEL controls for stable display. (If stable display is obtained, instrument is triggering properly.)

e. Set vhf oscillator for 300 MHz, 1 division of vertical deflection output signal.

f. Adjust main TRIG LEVEL control for stable display. (If stable display is obtained, instrument is triggering properly.)

g. Set main INT/EXT switch to EXT position.

h. Set vhf oscillator for 100-MHz, 17.7-mV output signal as observed on rf voltmeter (50 mV p-p).

i. Adjust main TRIG LEVEL control for stable display. (If stable display is obtained, instrument is triggering properly.)

j. Set vhf oscillator for 300-MHz 35.4-mV output signal as indicated on rf voltmeter (100 mV p-p).

k. Adjust main TRIG LEVEL control for stable display. (If stable display is obtained, instrument is triggering properly.)

l. Set main INT/EXT switch to INT position.

m. Set main TIME/DIV control to 20-nSEC position.

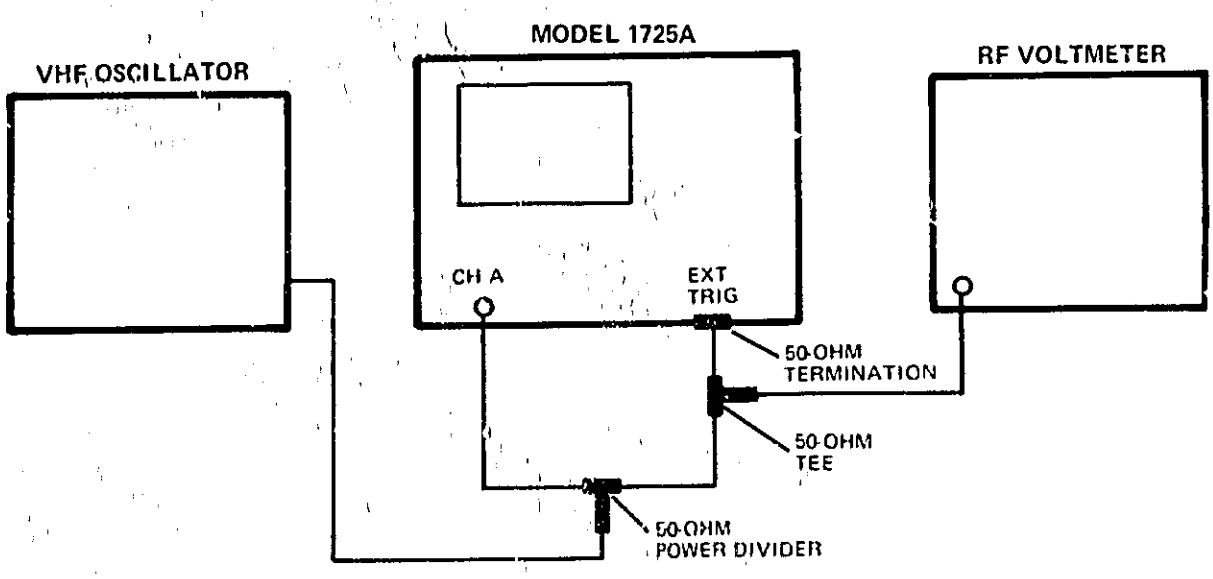


Figure 5-5. Main Triggering Test Setup

n. Set delayed TIME/DIV control to 10-nSEC position.

o. Adjust vhf oscillator for 1 division of signal amplitude.

p. Adjust main TRIG LEVEL control for stable display.

q. Set HORIZ DISPLAY control to DLY'D.

r. Adjust delayed TRIG LEVEL control for stable display.

s. Connect equipment as shown in figure 5-6.

t. Set delayed INT/EXT switch to EXT position.

u. Set HORIZ DISPLAY control to MAIN.

v. Set vhf oscillator for 300-MHz 35.4-mV output signal as indicated on rf voltmeter (100 mV p-p).

w. Adjust channel A VOLTS/DIV switch to .05.

x. Adjust main TRIG LEVEL for stable display.

y. Set HORIZ DISPLAY to DLY'D.

z. Adjust delayed TRIG LEVEL for stable display. (Readjust main TRIG LEVEL if necessary.)

aa. If stable display is obtained, instrument is triggering properly.

ab. Disconnect test equipment.

ac. Set Model 1725A front-panel controls to initial settings.

5-30. COMMON-MODE REJECTION. At least 40 dB, dc to 5 MHz, decreasing to 26 dB at 50 MHz. The common-mode signal amplitude is equivalent to 12 divisions with one vernier adjusted for optimum rejection.

5-31. Identical signals are applied to both channels A and B with channel B set to the inverted mode. The displayed signal is the common-mode signal.

Equipment Required:

Test oscillator
50-ohm power divider

5-32. Perform common-mode rejection check as follows:

a. Connect equipment as shown in figure 5-7.

NOTE

Cables used to connect channels A and B INPUT connectors to 50-ohm power divider must be of the same electrical length.

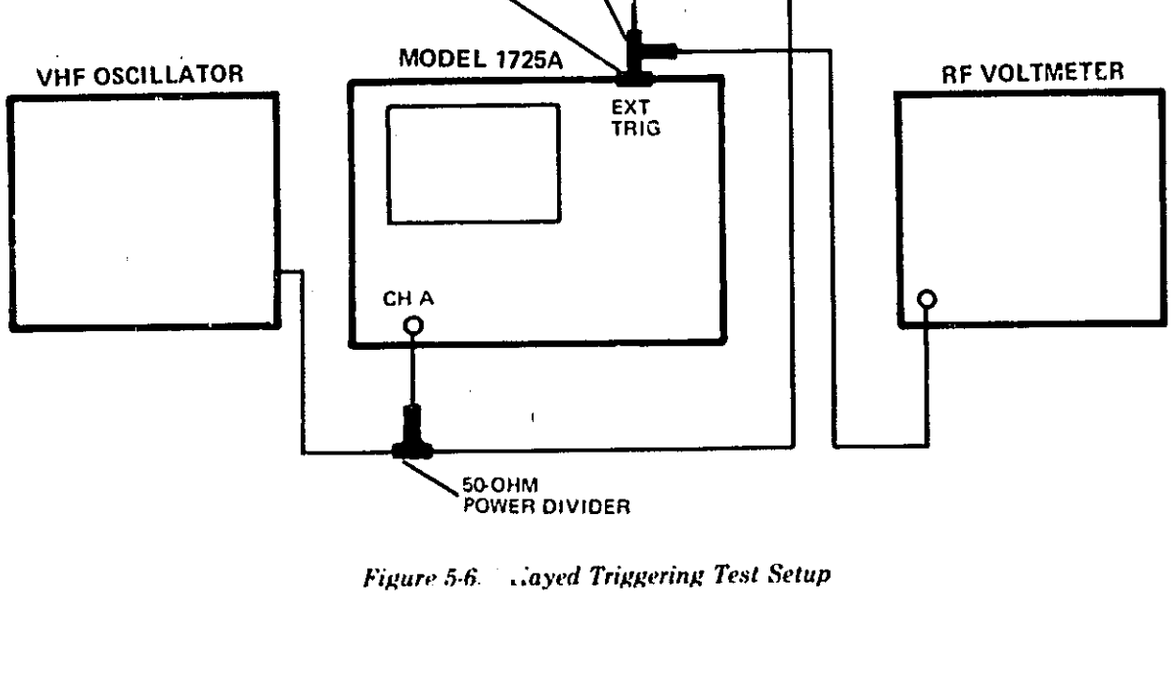


Figure 5-6. Delayed Triggering Test Setup

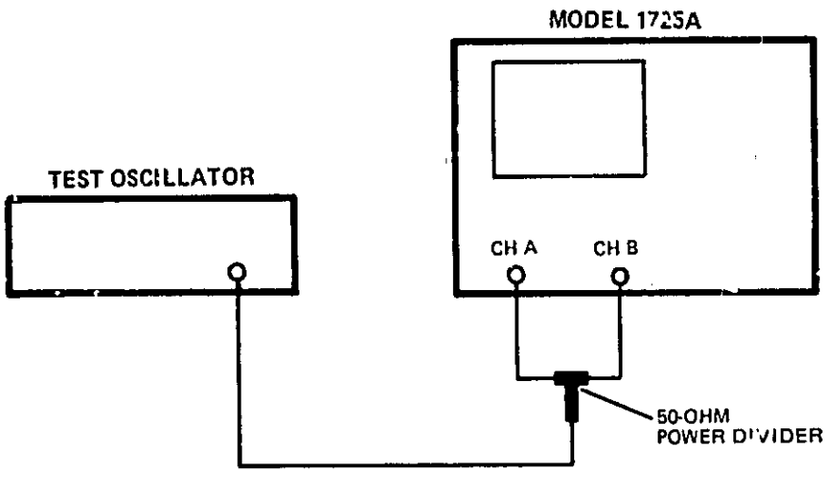


Figure 5-7. CMRR Test Setup

b. Set Model 1725A front-panel controls as follows:

VOLTS/DIV (channels A and B)..... .1
Coupling (channels A and B)..... 50Ω
B INVERT ..... engaged

c. Set test oscillator for 5-MHz 2-division amplitude display on CRT.

d. Set channels A and B VOLTS/DIV controls to .01 position.

e. Set VERT DISPLAY control for A+B operation (both A and B pushbutton switches depressed).

f. Adjust either channel A or channel B vernier (whichever is most effective) to achieve minimum deflection.

g. Deflection should be less than one minor division (40 dB).

h. Set test oscillator for 50-MHz output.

i. Repeat steps b through f, using 50 MHz.

j. Deflection should be less than 1.1 major division (26 dB).

k. Disconnect test equipment.

l. Set Model 1725A front-panel controls to initial settings.

5-33. SWEEP-TIME ACCURACY. The ranges are from .01 μs/div to 0.5 s/div (24 ranges) in 1, 2, 5 sequence. The accuracy of the .01 μs/div through .05 μs/div and .05 s/div through 0.5 s/div ranges is ±3%. The accuracy of the .1 μs/div through .02 s/div ranges is ±2%. The stipulated accuracies of all ranges are with the vernier in calibrated position. The vernier is continuously variable between all ranges and extends slowest sweep to at least 1.25 s/div. The vernier UNCAL light indicates when the vernier is not in CAL position.

5-34. The Model 1725A time base is compared to a time-mark generator to verify accuracy.

Equipment Required:

Time-mark generator

5-35. Perform sweep time accuracy check as follows:

a. Connect equipment as shown in figure 5-8.

b. Set channel A input coupling to 50Ω position.

c. Check main sweep accuracy in accordance with table 5-3.

d. Set HORIZ DISPLAY control to DLY'D.

e. Check delayed sweep accuracy in accordance with table 5-4.

f. Disconnect test equipment.

g. Set Model 1725A front-panel controls to initial settings.

5-36. DIFFERENTIAL TIME INTERVAL ACCURACY. ±0.5% of measurement; ±0.05% to 0.2% of full scale depending upon main time base setting, measured at normal room temperature (≈22.2°C).

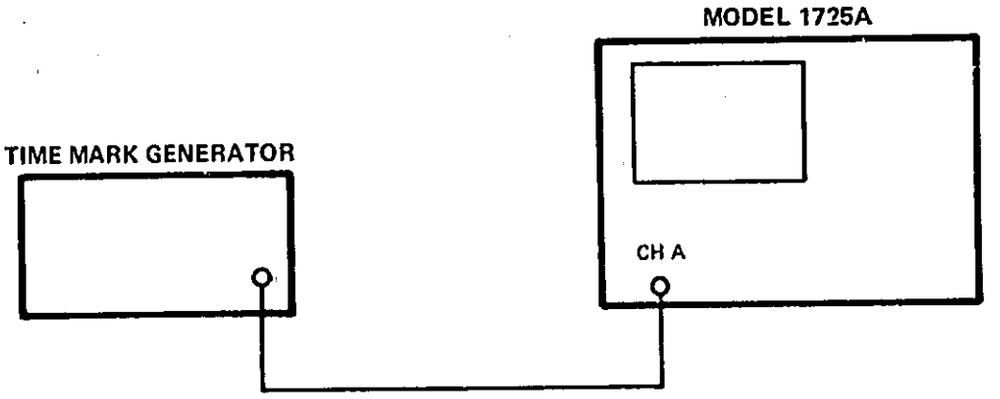


Figure 5-8. Main Sweep Time Test Setup

Table 5-3. Main Sweep Performance Check

Main TIME/DIV and Time Mark Generator Settings	*Accuracy (0°C to 55°C)	
	X1	X10
.01 µSEC to .05 µSEC**	±3% (within .3 div)	±5% (within .4 div)***
.1 µSEC to .02 SEC	±2% (within .2 div)	±3% (within .3 div)
.05 SEC to .5 SEC	±3% (within .3 div)	±3% (within .3 div)

*Set one time mark at 1st left graticule line and read error at 11th graticule line. Adjust main TRIGGER LEVEL control as necessary for stable display.

**Exclude time marks occuring in first 10 nanoseconds of sweep.

***Measure accuracy over inside eight divisions on X10, .01 µSEC to .05 µSEC sweep speeds.

Table 5-4. Delayed Sweep Performance Check

*Delayed TIME/DIV and Time Mark Generator Settings	**Accuracy (0°C to 55°C)	
	X1	X10
.01 µSEC to .05 µSEC***	±3% (within .3 div)	±5% (within .4 div)****
.1 µSEC to .02 SEC	±2% (within .2 div)	±3% (within .3 div)

*Main TIME/DIV switch is always one sweep position slower than delayed TIME/DIV switch setting.

**Set one time mark at 1st left graticule line and read error at 11th graticule line. Adjust main and delayed TRIGGER LEVEL controls as necessary for stable display.

***Exclude time marks occuring in first 10 nanoseconds of sweep.

****Measure accuracy over inside eight divisions on X10, .01 µSEC to .05 µSEC sweep speeds.

5-37. To measure time interval accuracy, a time-mark generator signal is applied and the time interval voltage is measured across 8 divisions of main sweep.

Equipment

Time-mark generator
Multifunction digital voltmeter
(Delete on Option 034)

5-38. Perform differential time interval accuracy check as follows:

a. Connect time mark generator to Model 1725A as shown in figure 5-9.

b. Set Model 1725A front panel controls as follows:

TIME/DIV (main) ..... .02 uSEC
TIME/DIV (delayed)..... .01 uSEC
HORIZ DISPLAY..... MAIN INTEN
VOLTS/DIV (channel A) 0.5
INT/EXT (main)..... EXT
Time Interval Mode Switch ..... CH A START

c. Set time-mark generator for 20 ns time marks.

d. Connect multifunction digital voltmeter to Model 1725A INTERVAL OUT banana-jack connector (rear panel); Option 034 switch DVM to time interval measurement mode.

e. Adjust time interval STOP control for .140 volts displayed on DVM.

f. Adjust time interval START control to position first intensified marker on a time mark at least 60 ns after the beginning of main sweep.

g. Select DLY'D and MAG X10.

h. Center leading edge of time mark with time interval START control.

i. Superimpose two time marks using time interval STOP control.

j. DVM reading must be .140 V ± .0011 V.

k. Repeat steps a-j using time-marks, main and delayed TIME/DIV settings, and DVM readings as follows:

MAIN TIME/DIV	DELAYED TIME/DIV	TIME MARKS	DVM READINGS
.05 µSEC	.01 µSEC	50 ns	.400 V ±.002 V
.5 µSEC	.05 µSEC	.5 µs	4.00 V ±.02 V
5 µSEC	.5 µSEC	5 µs	40.0 V ±.2 V
.05 mSEC	5 µSEC	50 µs	.400 V ±.002 V
.5 mSEC	.05 mSEC	.5 ms	4.00 V ±.02 V

l. Disconnect test equipment and set Model 1725A front-panel controls to initial settings.

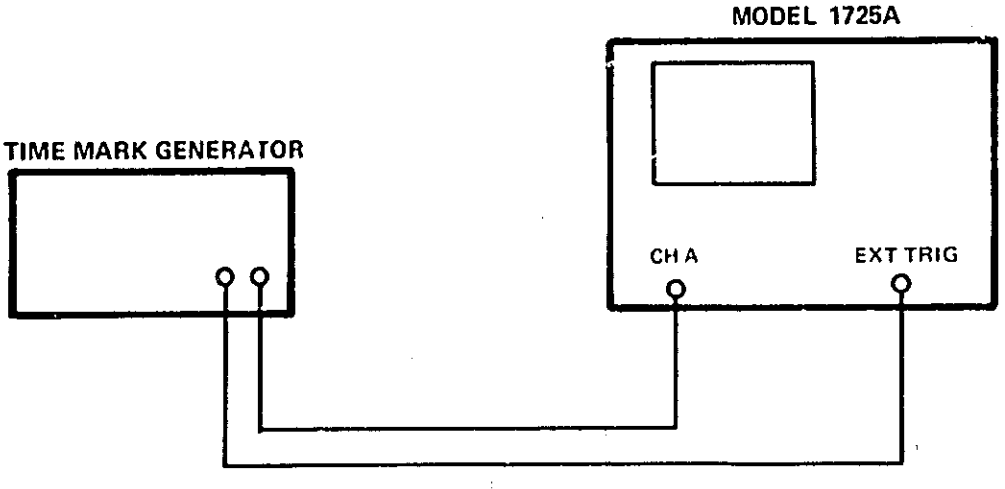


Figure 5-9. Sweep-time Test Setup

5-39. ADJUSTMENT PROCEDURES.

WARNING

Read the Safety Summary at the front of this manual before performing adjustment procedures.

5-40. Remove top and bottom covers from the instrument; set front-panel controls to initial settings listed in paragraph: Front-panel control settings; apply power and allow thirty minutes for instrument to warmup.

5-41. LOW-VOLTAGE POWER SUPPLY ADJUSTMENT. (See schematic 19 and figures 5-10 and 8-2.) The +15-volt power supply is the only adjustable low-voltage power supply in the instrument. All other low-voltage power supplies are referenced to the output of the +15-volt supply.

Equipment Required:

Multifunction digital voltmeter

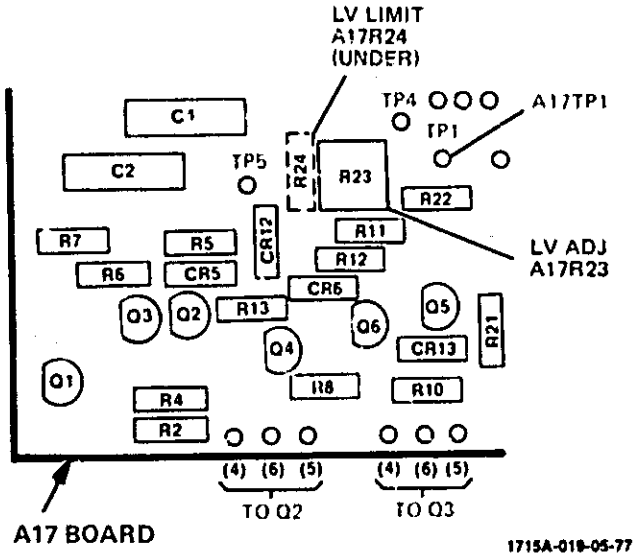


Figure 5-10. Low-voltage Power Supply Adjustment

5-42. Adjust low-voltage power supply as follows:

NOTE

Perform steps a through g only if LVPS assembly A17 has been replaced. Otherwise adjust LVPS by performing steps f and k through m.

a. Set A17R23, LV ADJ, fully clockwise.

b. Turn off ac input power to Model 1725A.

c. Remove LVPS assembly A17 retaining screws.

d. Raise front of assembly A17 until adjustment A17R24 is accessible.

CAUTION

Be careful not to short A17 assembly to chassis or other assemblies.

e. Turn on ac input power to Model 1725A.

f. Connect multifunction digital-voltmeter (DVM) test lead to test point A17TP1.

g. Adjust A17R24, LV LIMIT, for an indication on DVM of +15.3 V.

h. Turn off ac input power to Model 1725A.

i. Remount LVPS assembly A17 with retaining screws removed in step c.

j. Turn on ac input power to Model 1725A.

k. Adjust A17R23 for an indication on DVM of +15 V ±50 mV.

l. Disconnect test equipment.

5-43. INTENSITY SET ADJUSTMENT. (See schematic 17 and figures 5-11 and 8-2.) The intensity set is adjusted so that the front-panel INTENSITY control will adjust the trace from fully off to maximum brightness for the fastest sweep speeds.

Equipment Required:

Test oscilloscope
10:1 divider probe

5-44. Adjust intensity set as follows:

a. Set front-panel main TIME/DIV control to 5 μs position.

b. Connect test oscilloscope to test point A14TP4 using 10:1 divider probe.

c. Connect 10:1 divider probe ground lead to A14TP5.

d. Set front-panel INTENSITY control for a 10 V pk-pk gate pulse.

e. Adjust A15R3, INT SET, to just extinguish trace on CRT.

f. Disconnect test equipment.

g. Set Model 1725A front-panel controls to initial settings.

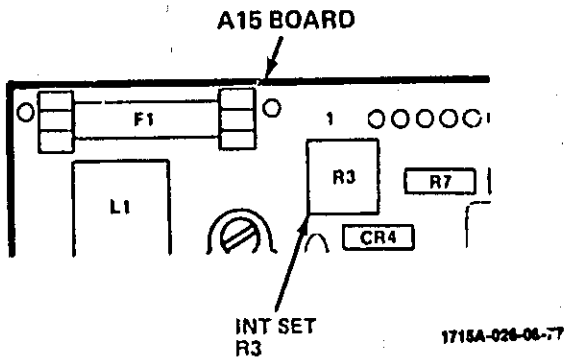


Figure 5-11. Intensity Adjustment

5-45. GATE-RESPONSE, AMPLITUDE, and AUTO-FOCUS ADJUSTMENTS. (See figures 5-12 and 8-2.) The gate amplifier is adjusted for optimum rise time, over-shoot, and correct amplitude. The auto-focus circuit is adjusted for optimum focus at all intensity levels.

Equipment Required:

Test oscilloscope
10:1 divider probe

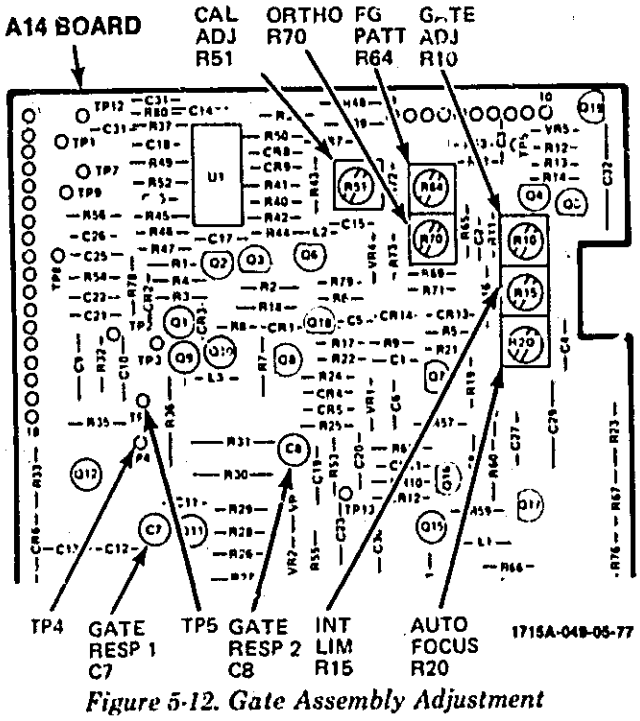


Figure 5-12. Gate Assembly Adjustment

5-46. Adjust gate response, amplitude, and autofocus as follows:

a. Set Model 1725A front panel controls as follows::

POSITION (channel A) .. fully clockwise
TIME/DIV (main) 5μSEC
INTENSITY ..... fully clockwise

b. Connect test oscilloscope to test point A14TP4 using 10:1 divider probe.

c. Connect 10:1 divider probe ground lead to test point A14TP5.

d. Set intensity limit adjust A14R15 fully counter-clockwise.

e. Set gate adjust, A14R10, for gate amplitude of +70 volts.

f. Expand sweep time of test oscilloscope to observe leading edge and overshoot of gate pulse.

g. Alternately turn HF Adj A14C7 and LF Adj A14C8 for fastest rise time and flattest pulse top (A14C7 adjusts fast corner).

h. Set Auto Focus Adj A14R20 fully ccw.

i. Set controls as follows:

TIME/DIV (main)..... .01 mSEC
TIME/DIV (delayed) ..... .01 μSEC
HORIZ DISPLAY ..... DLY'D
INTENSITY ..... maximum
POSITION (channel A) fully centered

j. Observe center screen trace width while at optimum focus. Trace width should be 1 mm. If not, adjust Gate Adj A14R10 slightly to make width 1 mm.

k. Set INTENSITY to 10 o'clock position.

l. Set HORIZ DISPLAY to MAIN.

m. Adjust Auto Focus A14R20 for best focus.

n. Set HORIZ DISPLAY to DLY'D.

o. Set INTENSITY to maximum.

p. Refocus, using front panel FOCUS, if necessary.

q. Set INTENSITY to 10 o'clock position.

r. Set HORIZ DISPLAY to MAIN.

s. Readjust Auto Focus A14R20 is necessary for best focus.

t. Set Model 1725A front-panel controls to initial settings except as follows:

POSITION (channel A) .. fully clockwise
TIME/DIV (main) ..... .01 SEC
INTENSITY ..... fully clockwise

u. Set test oscilloscope TIME/DIV control to 0.02 SEC/div.

v. Use test oscilloscope (connected to test point A14TP4 through 10:1 divider probe) to observe waveform as shown in figure 5-13. If necessary, readjust intensity limit A14R15 to make pulse 30 V to 50 V as shown.

w. Disconnect test equipment.

x. Set Model 1725A front-panel controls to initial settings.

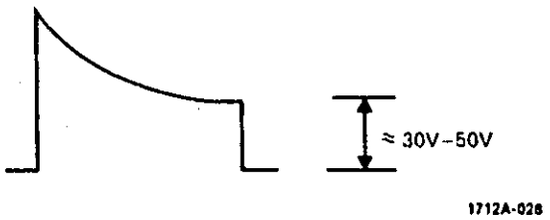


Figure 5-13. Intensity Limit Adjustment

5-47. TRACE ALIGN. (See schematic 17.) The rear-panel TRACE ALIGN control is adjusted to align the horizontal trace parallel to the horizontal-graticule lines.

Equipment Required: None

5-48. Perform trace align adjustment as follows:

a. Adjust front-panel INTENSITY and FOCUS controls to obtain sharp trace on CRT.

b. Adjust rear-panel TRACE ALIGN control A14R67 so that horizontal trace exactly parallels center horizontal-graticule line.

5-49. ORTHOGONALITY AND PATTERN ADJUSTMENTS. (See schematic 17 and figures 5-12 and 8-2.) The orthogonal adjustment aligns the vertical trace with the vertical axis. The pattern adjustment minimizes pincushioning and barreling (trace bow).

Equipment Required: Test oscillator

5-50. Perform orthogonality and pattern adjustment as follows:

a. Connect test oscilator to channel A INPUT connector.

b. Set test oscillator controls for 1 kHz, greater than 6-division output display signal.

c. Set front-panel INT TRIG control for B trigger.

d. Set front-panel HORIZ DISPLAY control for X-Y mode of display.

e. Align vertical trace with center vertical-graticule line using front-panel horizontal POSITION control.

f. Adjust orthogonal control A14R70 so that vertical trace exactly parallels center vertical-graticule line.

g. Set front-panel HORIZ DISPLAY control for MAIN mode of display.

h. Set front-panel INT TRIG control for A trigger.

i. Set test oscillator controls for 500 kHz, 6-division output display signal.

j. Adjust rear-panel PATT control, A14R76, to obtain best raster display (minimum pincushioning or barreling at top, bottom, and both sides of display).

k. Disconnect test equipment.

l. Set Model 1725A front-panel controls to initial settings.

5-51. FLOODGUN PATTERN AND INTENSITY RATIO ADJUSTMENTS. (See schematics 16 and 17; figures 5-12 and 8-2.) The floodgun pattern control is adjusted for the most uniform CRT illumination. The intensity ratio between the normal portion and intensified portion of the sweep is set to the desired contrast.

Equipment Required: None

5-52. Adjust floodgun pattern and intensity ratio as follows:

a. Set front-panel AUTO/NORM pushbutton switch to NORM.

b. Set front-panel SCALE ILLUM control fully clockwise.

c. Set floodgun pattern control, A14R64, fully counterclockwise.

d. Slowly turn floodgun pattern control A14R64 clockwise until an even intensity pattern is noted.

e. Set Model 1725A front-panel controls as follows:

AUTO/NORM	AUTO
HORIZ DISPLAY	MAIN INTEN
TIME/DIV (delayed)	.02 mSEC

f. Turn rear-panel INTEN RATIO control A14R23 fully clockwise.

g. Turn rear-panel INTEN RATIO control A14R23 counterclockwise until desired contrast between normal and intensified protion of trace is obtained.

h. Set Model 1725A front-panel controls to initial settings.

5-53. ATTENUATOR BALANCE ADJUSTMENTS. (See schematics 1 and 2; figures 5-14 and 8-2.) The attenuators are balanced so the trace does not shift when attenuators are changed from one range to another.

Equipment Required: None

5-54. Adjust attenuator balance as follows:

a. Set front-panel channel A VOLTS/DIV switch to .05 position.

b. Center trace using front-panel channel POSITION control.

c. Set channel A VOLTS/DIV switch to .1 position.

d. Center trace using channel A attenuator-balance adjustment A3R52.

e. Set VERT DISPLAY to B.

f. Repeat steps a through d for channel B using channel B attenuator-balance adjustment A3R66.

g. Set 1725A front-panel controls to initial settings.

5-55. VERTICAL PREAMPLIFIER BALANCE ADJUSTMENT. (See schematic 3 and figures 5-14 and 8-2.)

Equipment Required: None

5-56. Adjust vertical preamplifier balance as follows:

a. Center channel A trace on CRT.

b. Adjust main balance adjustment A3R4 for minimum trace shift as channel A vernier is rotated through its range.

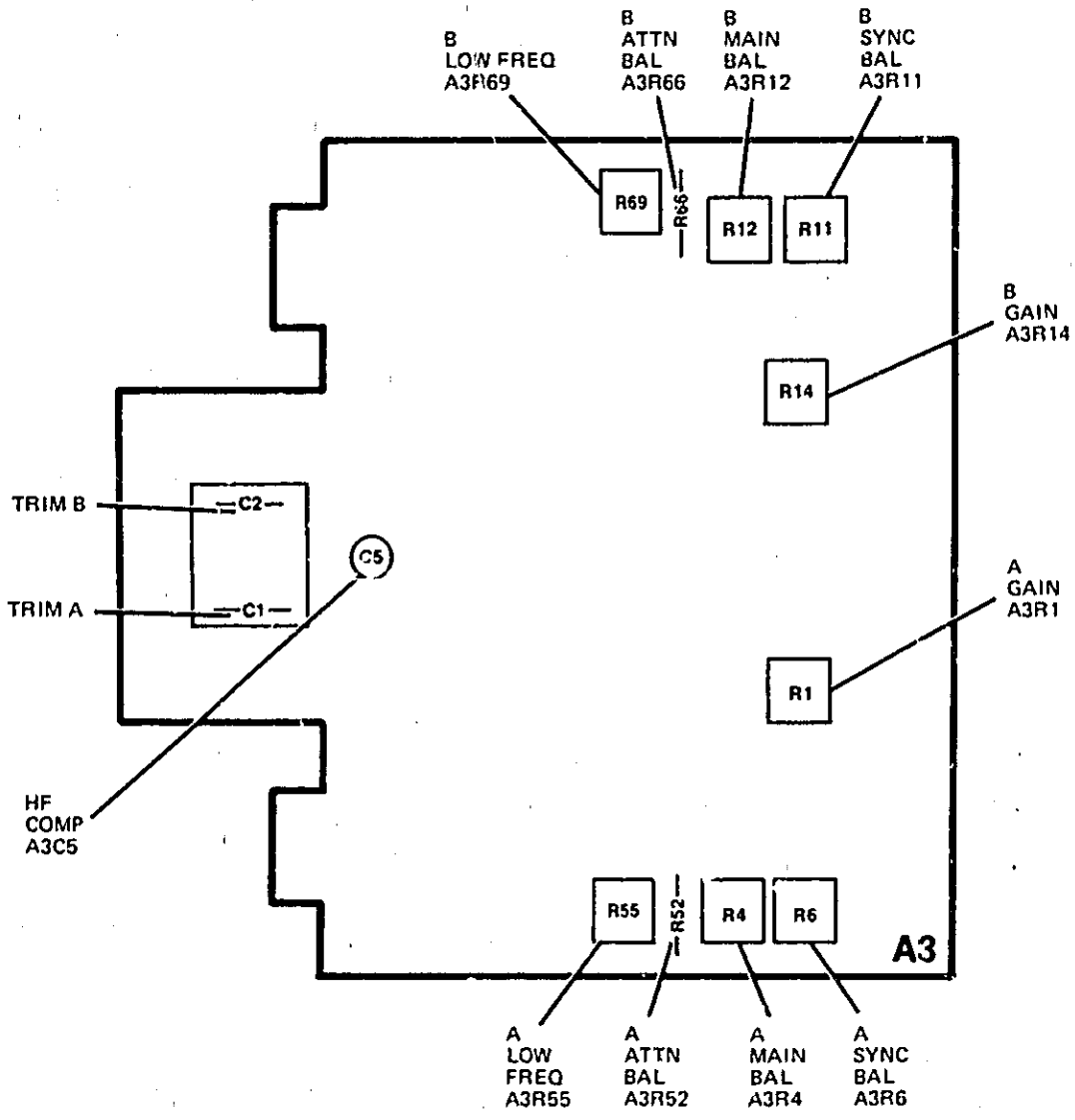


Figure 5-14. Vertical-preamplifier Adjustments

c. Set VERT DISPLAY control to channel B.

d. Repeat steps a and b for channel B using channel B main balance adjustment A3R12.

e. Set 1725A front-panel controls to initial settings.

5-57. SYNC AMPLIFIER BALANCE ADJUSTMENTS. (See schematics 3 and 6; figures 5-14, 5-15, and 8-2.) With no input, the sync amplifier circuit is balanced for a 0-volt outp

Equipment Required:

Multifunction digital voltmeter (DVM)

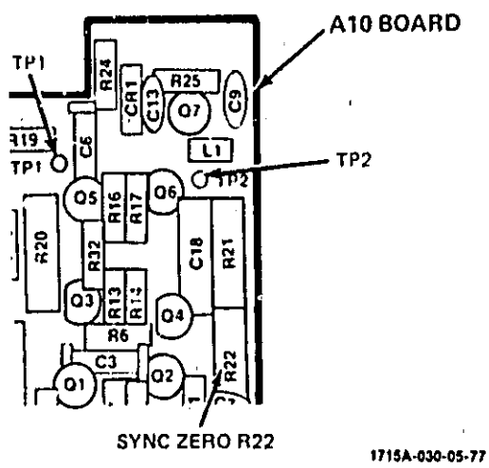


Figure 5-15. Sync Balance Adjustment

5-58. Adjust sync-amplifier balance as follows:

a. Connect DVM across test points A10TP1 and and A10TP2 (DVM ground lead connected to A10TP2).

b. Set channel A sync-balance adjustment A3R6 for indication of 0 volt ±10 mV.

c. Set front-panel INT TRIG control to B trigger.

d. Set channel B sync-balance adjustment, A3R11 for indication of 0 volt ±10 mv.

e. Remove DVM ground lead from test point A10TP2.

f. Connect DVM ground lead to chassis ground.

g. Set sync zero adjustment A10R22 for DVM indication of 0 volt ±20 mV.

h. Disconnect test equipment.

i. Set 1725A front-panel controls to initial settings.

5-59. OUTPUT AMPLIFIER BALANCE ADJUSTMENTS. (See schematic 4 and figures 5-16 and 8-2.) The vertical output amplifier is balanced to center the vertical portion of the display.

5-60. Adjust output-amplifier balance as follows:

a. Press front-panel BEAM FIND pushbutton switch.

b. Center trace by adjusting balance control, A5R23.

c. Release BEAM FIND switch.

5-61. LOW FREQUENCY RESPONSE ADJUSTMENTS. (See schematics 1 and 2; figures 5-14 and 8-2.) Using a 100-Hz square wave input, the low frequency circuit is adjusted for optimum pulse response.

Equipment Required:

Pulse generator

5-62. Adjust low-frequency response as follows:

a. Connect output of pulse generator to channel A INPUT connector.

b. Set Model 1725A front-panel controls as follows:

Coupling (both channels) 50Ω
TIME/DIV (main) ..... 1 mSEC

c. Set pulse generator controls for 100-Hz 6-division output display signal.

d. Adjust front-panel main TRIG LEVEL control for stable display.

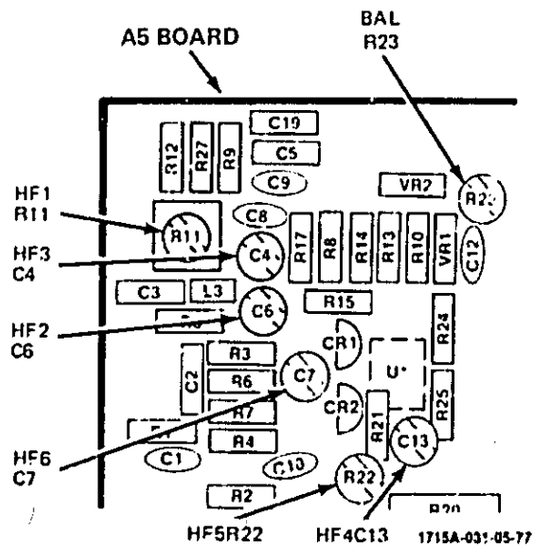


Figure 5-16. Vertical Output Amplifier Adjustments

e. Set channel A low-frequency adjustment A3R55 for best signal response.

f. Connect output from pulse generator to channel B INPUT connector.

g. Set front-panel VERT DISPLAY control to channel B.

h. Set INT TRIG control to B trigger.

i. Set channel B low-frequency adjustment A3R69 for best signal response.

j. Disconnect test equipment.

k. Set 1725A front-panel controls to initial settings.

5-63. ATTENUATOR COMPENSATION ADJUSTMENTS. (See schematics 1 and 2; figures 5-17 and 8-2.) The attenuators are adjusted for optimum signal response using a 10-kHz square-wave signal.

Equipment Required:
Pulse generator

5-64. Adjust attenuator-compensation as follows:

a. Connect pulse generator 50-ohm output to channel A INPUT connector.

b. Set Model 1725A front-panel controls as follows:

VOLTS/DIV (channel A)	.1
Coupling (both)	50Ω
TIME/DIV (main)	.01 mSEC

c. Set pulse generator for 10-kHz ≈0.5 V output-display signal.

d. Set channel A .1 V attenuator-compensation adjustment A1A1C3 for optimum square-wave response.

e. Set channel A VOLTS/DIV switch to 1 VOLTS/DIV position.

f. Increase pulse generator output to ≈5 volts.

g. Set channel A 1 V attenuator compensation adjustment A1A1C4 for optimum square-wave response.

h. Disconnect pulse generator from channel A INPUT connector.

i. Connect pulse generator 50-ohm output to channel B INPUT connector.

j. Set front-panel VERT DISPLAY control to channel B display.

k. Set front-panel INT TRIG control to B trigger.

l. Repeat steps b through g for channel B attenuator using adjustments A2A1C3 for .1 V compensation and A2A1C4 for 1 V compensation.

m. Disconnect test equipment.

n. Set Model 1725A front-panel controls to initial settings.

5-65. CALIBRATOR AMPLITUDE ADJUSTMENT. (See schematic 16 and figures 5-12 and 8-2.) The calibrator output is compared visually to a known standard and adjusted for exactly —3 volts.

Equipment Required:
DC Standard voltmeter

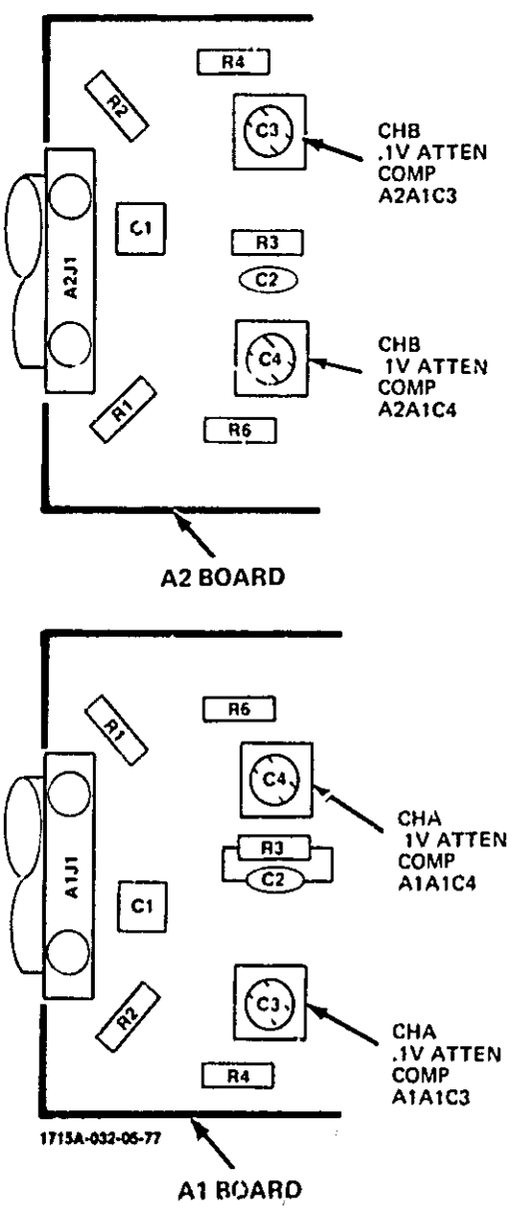


Figure 5-17. Attenuator Adjustments

5-66. Adjust calibrator amplitude as follows:

a. Set channel A VOLTS/DIV switch to 0.5 V position.

b. Set channel A coupling to DC position.

c. Connect dc standard to channel A INPUT connector.

d. Set dc standard to 3 V p-p output.

e. Adjust channel A vernier for display of six divisions.

f. Disconnect dc standard from 1725A.

g. Connect CAL 3 V output to channel A INPUT connector.

h. Adjust cal ampl adj A4R51 for 6-division display.

i. Disconnect CAL 3 V output from channel A INPUT connector.

j. Set 1725A front-panel controls to initial settings.

5-67. VERTICAL GAIN ADJUSTMENTS. (See schematic 3 and figures 5-14 and 8-2.) Vertical preamplifier gain is calibrated using the CAL 3 V output.

5-68. Adjust vertical-gain as follows:

a. Using test lead and adapter, connect CAL 3 V output to channel A INPUT connector.

b. Set channels A and B VOLTS/DIV switches to .5 position.

c. Set channel A gain adjustment A3R1 for exactly six divisions of vertical deflection.

d. Using test lead and adapter, connect CAL 3 V output to channel B INPUT connector.

e. Set front-panel VERT DISPLAY control for channel B display.

f. Set front-panel INT TRIG control for B trigger.

g. Set channel B gain adjustment A3R14 for exactly six divisions of vertical deflection.

h. Disconnect test lead.

i. Set Model 1725A front-panel controls to initial settings.

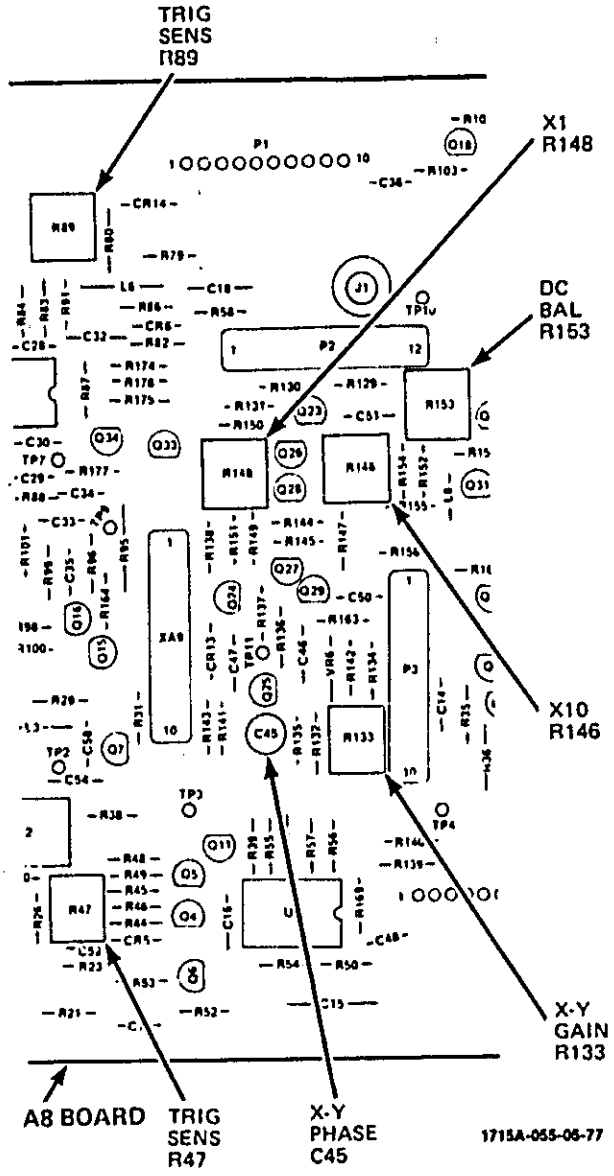


Figure 5-18. Horiz Sweep Assembly Adjustments

5-69. TRIGGER RECOGNITION THRESHOLD ADJUSTMENTS. (See schematics 7 and 9; figures 5-18 and 8-2.) The main- and delayed-trigger recognition circuitry are adjusted for optimum triggering over the triggering spectrum.

Equipment Required:
Test Oscillator

5-70. Adjust trigger-recognition threshold as follows:

a. Set Model 1725A front-panel controls as follows:

Coupling (channel A)	GND
AUTO/NORM	NORM
TIME/DIV (main)	1 mSEC
INT/EXT (main)	EXT

b. Set main trigger sensitivity adjustment A8R47 fully clockwise.

c. Set test oscillator controls for 30 mV pk-pk, 10 MHz sine wave output.

d. Connect test oscillator to main EXT TRIG input connector.

e. Slowly turn main TRIG LEVEL control from one extreme to other. Note that one sweep occurs for each direction of rotation.

f. While turning main TRIG LEVEL control, slowly adjust A8R47 counterclockwise until sweep occurs for only one direction of rotation of main TRIG LEVEL control.

g. Set Model 1725A front-panel controls as follows:

AUTO/NORM	AUTO
HORIZ DISPLAY	DLY'D
INT/EXT (delayed)	EXT
TIME/DIV (delayed)	.5 mSEC
TRIG LEVEL (main)	fully cw
TRIG LEVEL (delayed)	midrange

h. Set test oscillator controls for 30 mV pk-pk, 10 MHz sine wave output.

i. Connect test oscillator to delayed EXT TRIG input connector.

j. Set delayed trigger sensitivity adjustment A8R89 fully counter clockwise.

k. While turning delayed TRIG LEVEL control from one extreme to other, adjust A8R89 counter-clockwise until sweep occurs for only one direction of rotation.

l. Disconnect test equipment.

m. Set Model 1725A front-panel controls to initial settings.

5-71. ANALOG ASSEMBLY A18 ADJUSTMENTS. **(See schematic 11 and figures 5-19 and 8-2.)** The amplifiers on analog assembly A18 are balanced so that the time interval START and time interval STOP potentiometers track each other.

Equipment Required:

Time-mark generator
Multifunction digital voltmeter

5-72. Adjust the analog assembly as follows:

a. Connect multifunction digital voltmeter to Model 1725A INTERVAL OUT connector (rear panel); Option 034, switch DVM to time interval measurement mode.

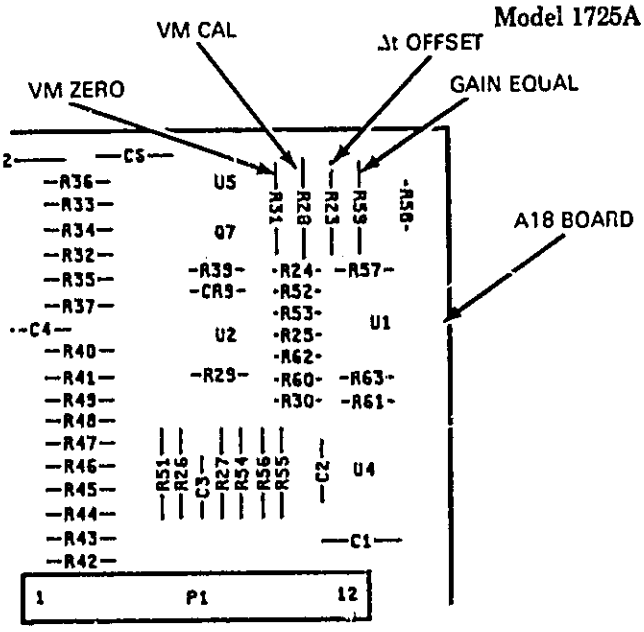


Figure 5-19. Analog Assembly Adjustments

b. Set Model 1725A front-panel controls as follows:

Time Interval STOP	0.00 (fully ccw)
TIME/DIV (main)	1.0 μSEC
TIME/DIV (delayed)	.01 μSEC
HORIZ DISPLAY	MAIN INTEN
Coupling (channel A)	50Ω
VOLTS/DIV (channel A)	0.5
SIGNAL OVERLAY (ΔT = 0)	midrange
Time Interval Mode Switch	CH A START

c. Connect time-mark generator to Model 1725A channel A INPUT connector.

d. Set time-mark generator for 1μs time marks.

e. Using the TIME INTERVAL START control, position intensified dot on the last time mark. Set TIME INTERVAL STOP control fully CCW.

f. Set HORIZ. DISPLAY to DELAY. Adjust TIME INTERVAL START control as required to display the last time mark.

g. Adjust gain Equal (A18R59) until two time marks are superimposed.

h. Vary TIME INTERVAL START control until second time mark is displayed on screen. Adjust front panel Δt = 0 control until the two time marks are superimposed.

i. Vary the TIME INTERVAL START control until the last time mark is displayed on screen. Repeat steps f through h until both the second and tenth time marks are superimposed.

j. Set VERTICAL DISPLAY to ALT.

k. Apply 1 μs time marks through identical length cables to channels A and B. Vary the TIME INTERVAL START control until second marker is displayed.

l. Switch to B START and adjust Δt offset (A18R23) to correct for 1/2 of the shift.

m. Switch to A START and realign time marks using the front panel Δt = 0 control.

n. Repeat steps l through m to remove all shift when switching from A START to B START.

With time interval STOP control set to 0.00 (±1 dial line width), adjust A18R31 for multifunction digitial voltmeter indication of zero ±2 mV (Option 034 to zero ±2 mV).

Set time interval STOP control to 10.00 (±1 dial line width).

Adjust A18R28 for digital voltmeter indication of 10.00 V ±10 mV.

Disconnect test equipment.

Set Model 1725A front-panel controls to initial settings.

5-73. HORIZONTAL AMPLIFIER X1 ADJUSTMENT. (See schematics 8 and 14; figures 5-18, 5-20, and 8-2.) The horizontal amplifier gain is adjusted to a known reference standard.

Equipment Required:

Time-mark generator

5-74. Adjust horizontal amplifier X1 as follows:

a. Connect time-mark generator to channel A INPUT connector.

b. Set Model 1725A controls as follows:

Coupling (channel A) ..... GND
Main TIME/DIV ..... .01 mSEC
Delayed TIME/DIV ..... .01 μSEC
HORIZ DISPLAY ..... MAIN INTEN

c. Set time interval STOP control to 8.00.

d. Adjust time interval START control until two intensified spots are observed.

e. Adjust X1 Gain Adj A8R148 for exactly 8 divisions of separation between two spots.

f. Set channel A coupling to 50Ω position.

g. Set time-mark generator for 10 μs output markers.

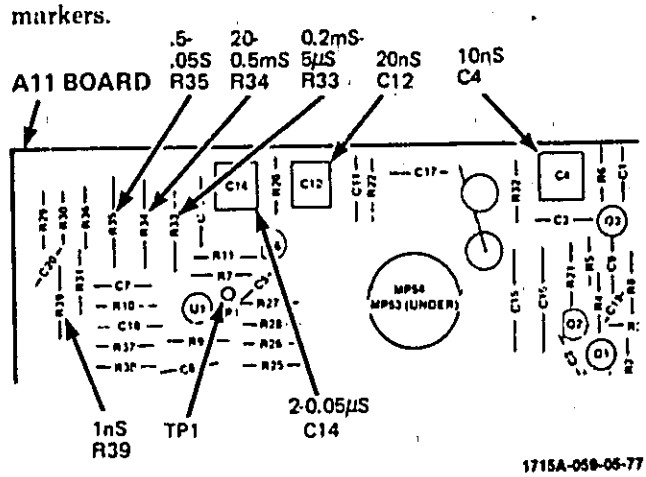


Figure 5-20. Main Sweep Adjustment

h. Adjust A11R33 (.2MS-5US) for exactly 1 marker/div.

i. Press MAG X10 pushbutton switch.

j. Adjust A8R146 (X10 Gain Adj) until one time marker coincides with far left graticule line and one time marker coincides with far right graticule line.

k. Disconnect test equipment.

l. Set Model 1725A front-panel controls to initial settings.

5-75. X10 AMPLIFIER BALANCE ADJUSTMENT. (See schematic 14 and figures 5-18 and 8-2.)

Equipment Required:

5-76. Adjust X10 amplifier balance as follows:

a. Set 1725A front-panel controls as follows:

Coupling (channel A) 50Ω
VOLTS/DIV (channel A) 5
TIME/DIV (main) ..... .2 μSEC

b. Connect time-mark generator to channel A INPUT connector.

c. Set time-mark generator for 1 μs time markers.

d. Set HORIZ DISPLAY control to MAG X10.

e. Using horizontal POSITION control, center middle time marker on CRT screen.

f. Set HORIZ DISPLAY control to MAG X1.

g. Using dc balance adjustment A8R153, position center time marker to center of CRT screen.

h. Repeat steps e through g switching between X1 and X10 displays until middle time marker remains at center of CRT screen when magnified.

i. Disconnect test equipment.

j. Set 1725A front-panel controls to initial settings.

5-77. 1, 10, AND 20 NS SWEEP TIME AND LINEARITY ADJUSTMENTS. (See figures 5-20, 5-21, and 8-2.)

5-78. Adjust fast sweep speeds as follows:

a. Set Model 1725A controls as follows:

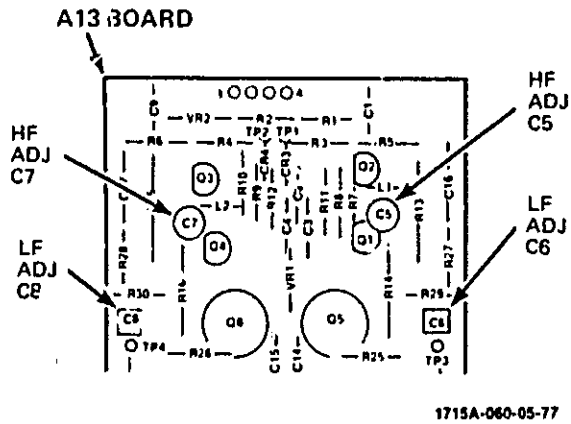


Figure 5-21. Horizontal-linearity Adjustments

Coupling (channel A)	50Ω
VOLTS/DIV (channel A)	.5
Main INT/EXT	EXT
Main TIME/DIV	.01 μSEC

b. Connect time-mark generator to channel A INPUT connector.

c. Set time-mark generator for 10 ns output markers.

d. Externally trigger main sweep.

e. Adjust 10 NS Adj A11C4 until one marker is on each graticule. Disregard first major division of sweep.)

f. Set Model 1725A controls as follows:

Main TIME/DIV	.02 μSEC
Delayed TIME/DIV	.01 μSEC
HORIZ DISPLAY	DLY'D
MAG X10	engaged

g. Set time interval STOP control to 5.00 (Option 034 to .100).

h. Set time-mark generator for 50 ns output markers.

i. Increase INTENSITY control and rotate horizontal POSITION control until leading edge of first marker is displayed at center screen. Then rotate horizontal POSITION control to display second leading edge.

j. Adjust 20 NS Adj A11C12 until first time marker coincides with second time marker. (This marker can be positioned either before or after displayed one when rotating A11C12 from one extreme to other).

k. Set time-mark generator for 2 ns output markers.

l. Set Model 1725A controls as follows:

VOLTS/DIV (channel A)	.2
Delayed TIME/DIV	OFF
HORIZ DISPLAY	MAIN
MAG X10	X1

m. Center display on CRT with horizontal POSITION control.

n. Press MAG X10 pushbutton switch.

o. Note whether 2 ns sweep is slow across right half of CRT (more than 2 complete cycles every 2 major divisions) or whether sweep is fast (less than 2 complete cycles for every 2 major divisions).

p. If sweep is slow (as noted in step q) slowly adjust LF Adj A13C6 and LF Adj A13C8 clockwise in 180° increments until linearity is within ±.5 minor division.

q. Observe sweep across left half on CRT. If sweep is slow, adjust HF Adj A13C5 and HF Adj A13C7 counterclockwise in 180° increments for best linearity. If sweep is fast, adjust A13C5 and A13C7 clockwise in 180° increments for best linearity.

NOTE

Disregard first 15 ns of sweep.

r. Repeat steps o through q to compensate for interaction.

s. Set Model 1725A controls as follows:

Main TIME/DIV	.01 μSEC
MAG X10	X1

t. Center display using horizontal POSITION controls.

u. Press MAG X10 pushbutton switch.

v. Adjust 10 NS X10 Adj A11R39 until one cycle is displayed every two divisions over inside eight divisions (±2 minor divisions).

NOTE

From this point on, do not adjust 10 NS (A11C4) or 20 NS (A11C12) adjustments.

w. Disconnect test equipment.

x. Set Model 1725A front-panel controls to initial settings.

5-79. PRELIMINARY (COARSE) MAIN SWEEP TIME. ADJUSTMENT. (See schematic 8 and figures 5-20 and 8-2.) The main time base is calibrated using a known time standard.

Equipment Required:

Time-mark generator

5-80. Calibrate main time base as follows:

a. Connect time-mark generator to channel A INPUT connector.

b. Set Model 1725A controls as follows:

Coupling (channel A) 50Ω
VOLTS/DIV (channel A) 5
Main TIME/DIV ..... .05 μSEC
Main EXT/INT ..... EXT

c. Externally trigger Model 1725A

d. Set main TIME/DIV and time-mark generator output as shown in table 5-5 and make adjustments as indicated for one marker per div.

Table 5-5. Initial Main Sweep Adjustment

Time-mark Generator Settings	Main TIME/DIV Settings	Adjustment
50 ns	.05 μSEC	A11C14
5 μs	.005 mSEC	A11R33
.5 ms	.5 mSEC	A11R34
50 ms	.05 SEC	A11R35

5-81. DELAYED SWEEP TIME ADJUSTMENTS. (See schematic 10 and figures 5-22 and 8-2.) The delayed time base is calibrated to a known standard.

Equipment Required:

Time-mark generator

5-82. Adjust delayed sweep speeds as follows:

a. Connect time-mark generator to channel A INPUT connector.

b. Set Model 1725A controls as follows:

Coupling (channel A) 50Ω
HORIZ DISPLAY ..... DLY'D
Main TIME/DIV ..... .02 μSEC
Delayed TIME/DIV ..... .01 μSEC
Delayed EXT/INT ..... EXT
Time interval START ..... fully ccw
Delayed TRIG LEVEL ..... as required

c. Externally trigger Model 1725A.

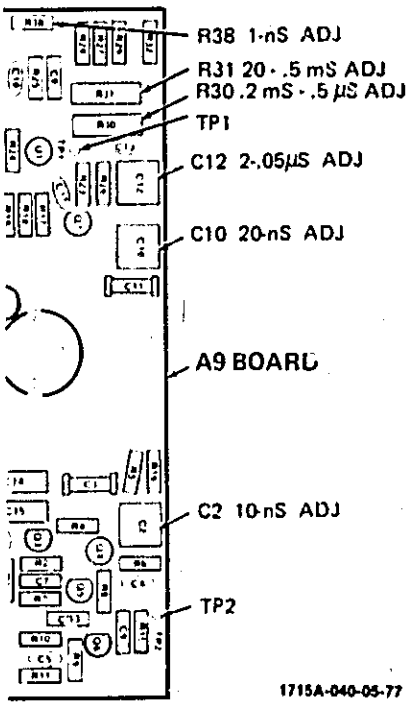


Figure 5-22. Delayed Sweep Adjustments

d. Set time-mark generator and other controls as indicated in table 5-6 and make adjustments as required.

e. Disconnect test equipment.

f. Set Model 1725A front-panel controls to initial settings.

5-83. MAIN SWEEP FINE ADJUSTMENT. (See schematic 8 and figures 5-20 and 8-2.)

NOTE

These adjustments use the accuracy of the TIME INTERVAL STOP dial to calibrate the main sweep more accurately than is possible using the visual method. These adjustments must be performed if the differential time accuracy specification is to be met.

Equipment Required:

Time-mark generator

5-84. Perform main-sweep fine adjustments as follows:

a. Connect time-mark generator to channel A INPUT connector.

b. Set 1725A front-panel controls as follows:

Main TIME/DIV	.5 μSEC
Delayed TIME/DIV	.01 μSEC
HORIZ DISPLAY	MAIN INTEN
TIME INTERVAL START	fully ccw
TIME INTERVAL STOP	8.00

c. Set time-mark generator to 0.5 μs.

d. Set HORIZ DISPLAY to DLY'D.

e. Rotate TIME INTERVAL START cw until second time mark is displayed at center screen.

f. Adjust 0.05 μs adj A11C14 until first time mark coincides with ninth, ±0.23 div.

g. Set MAG X10 to X10 position.

h. Set time-mark generator, and other controls as indicated in table 5-7 and check test limits. If any are not met, readjust A11C14 to distribute any error evenly among all effected ranges.

i. Set MAG X10 to X1.

j. Check ranges indicated in table 5-8 and adjust A11R33, 0.2 ms through 5 μs adj, as required. Rotate TIME INTERVAL STOP fully ccw, then rotate cw to locate pulses in each case.

k. Set time-mark generator and other controls as indicated in table 5-9 and check test limits. Adjust A11R34 20 ms through .5 ms adj, as necessary to make all tests within limits. Rotate TIME INTERVAL STOP fully ccw then cw to locate pulses in each case.

l. Disconnect test equipment.

5-85. VERTICAL AMPLIFIER PULSE RESPONSE ADJUSTMENT. (See schematics 3 and 4 and figures 5-14, 5-16 and 8-2.)

Equipment Required:

Fast-rise pulse generator

5-86. Adjust vertical amplifier pulse responses as follows:

a. Connect fast-rise pulse generator to channel A INPUT connector.

b. Set Model 1725A front-panel controls as follows:

Coupling (both channels)	50Ω
TIME/DIV (main)	.01 μSEC

c. Adjust fast-rise pulse generator output and channel A VOLTS/DIV control to obtain exactly 5 divisions of vertical deflection.

NOTE

Verify that channel A VOLTS/DIV vernier is in CAL detent position.

d. Adjust HF compensation capacitor A3C5 and TRIM A capacitor A3A1C1 for minimum overshoot (minimum capacitance).

e. Make adjustments shown in table 5-10 for vertical preamplifier A3 and output amplifier A5.

NOTE

If pulse generator being used is specified for 3% overshoot, do not set adjustments for less than 3% since this is effectively detuning the vertical amplifier bandwidth. Also, when performing step e, change sweep times as necessary to display best pulse. Repeat the procedure if necessary until optimum pulse response is obtained.

f. Connect pulse generator to channel B INPUT connector.

g. Set VERT DISPLAY control to B.

h. Set INT TRIG control to B.

i. Adjust TRIM B capacitor A3A1C2 to make channel B response most similar to channel A response.

j. Disconnect test equipment.

k. Set 1725A front-panel controls to initial settings.

5-87. X-Y GAIN ADJUSTMENT. (See schematic 14 and figures 5-18 and 8-2.) A low-frequency signal is applied to channel A and then to channel B. While in the X-Y mode of operation, channel B is adjusted to equal the gain of channel A.

Equipment Required:

Test oscillator

5-88. Adjust the X-Y gain as follows:

a. Connect test oscillator to Model 1725A channel A INPUT connector.

Table 5-6. Delayed Sweep Adjustments

Time-mark Generator	Main TIME/DIV	Delayed TIME/DIV	ADJUST	Test Limit
10 ns	.02 µSEC	.01 µSEC	A9C2	±0.5 minor div
2 ns	.02 µSEC	.01 µSEC	(MAG X10 ENGAGED) A9R38	±2 minor div*
20 ns	.05 µSEC	.02 µSEC	A9C10	±0.5 minor div*
50 ns	.1 µSEC	.05 µSEC	A9C12	±0.5 minor div
.1 µs	.2 µSEC	.1 µSEC	A9C12	±0.5 minor div
.2 µs	.5 µSEC	.2 µSEC	A9C12	±0.5 minor div
.5 µs	1 µSEC	.5 µSEC	A9C12	±0.5 minor div
1 µs	.002 mSEC	1 µSEC	A9C12	±0.5 minor div
2 µs	.005 mSEC	.002 mSEC	A9C12	±0.5 minor div
5 µs	.01 mSEC	.005 mSEC	A9R30	±0.5 minor div
10 µs	.02 mSEC	.01 mSEC	A9R30	±0.5 minor div
20 µs	.05 mSEC	.02 mSEC	A9R30	±0.5 minor div
50 µs	.1 mSEC	.05 mSEC	A9R30	±0.5 minor div
.1 ms	.2 mSEC	.1 mSEC	A9R30	±0.5 minor div
.2 ms	.5 mSEC	.2 mSEC	A9R30	±0.5 minor div
.5 ms	1 mSEC	.5 mSEC	A9R31	±0.5 minor div
1 ms	.002 SEC	1 mSEC	A9R31	±0.5 minor div
2 ms	.005 SEC	.002 SEC	A9R31	±0.5 minor div
5 ms	.01 SEC	.005 SEC	A9R31	±0.5 minor div
10 ms	.02 SEC	.01 SEC	A9R31	±0.5 minor div
20 ms	.05 SEC	.02 SEC	A9R31	±0.5 minor div

*Over center 8 divisions

Table 5-7. .002 mSEC - .05 µSEC Sweep Adjustment

MAG X10-X1	Time-mark Generator	Main TIME/DIV	Delayed TIME/DIV	Time Interval STOP		Test Limit (major div)
				STD	OPTION 034	
X10	50 ns	.05 µSEC	.01 µSEC	8.00	.400	2.5
	.1 µs	.1 µSEC	.01 µSEC	8.00	.800	4.5
	.2 µs	.2 µSEC	.02 µSEC	8.00	1.600	4.5
	1 µs	1 µSEC	.1 µSEC	8.00	8.00	4.5
	2 µs	2 µSEC	.2 µSEC	8.00	16.00	4.5

Table 5-8. .2 mSEC - 5 µSEC Sweep Adjustment

MAG X10-X1	Time-mark Generator	Main TIME/DIV	Delayed TIME/DIV	Time Interval STOP		Test Limit (major div)
				STD	OPTION 034	
X1	5 µs	5 µSEC	.1 µSEC	8.00	40.0	2.25
	10 µs	.01 mSEC	.2 µSEC	8.00	.0800	2.25
	20 µs	.02 mSEC	.5 µSEC	8.00	.160	1.8
	50 µs	.05 mSEC	1 µSEC	8.00	.400	2.25
	.1 ms	.1 mSEC	.002 mSEC	8.00	.800	2.25
	.2 ms	.2 mSEC	.005 mSEC	8.00	1.60	1.8

Table 5-9. 20 mSEC - .5 mSEC Sweep Adjustment

MAG X10-X1	Time-mark Generator	Main TIME/DIV	Delayed TIME/DIV	Time Interval STOP		Test Limit (major div)
				STD	OPTION 034	
X1	.5 ms	.5 mSEC	.01 mSEC	8.00	4.00	2.25
	1 ms	1 mSEC	.02 mSEC	8.00	8.00	2.25
	2 ms	2 mSEC	.05 mSEC	8.00	16.0	1.8
	5 ms	5 mSEC	.1 mSEC	8.00	40.0	2.25
	10 ms	.01 SEC	.2 mSEC	8.00	.0800	2.25
	20 ms	.02 SEC	.5 mSEC	8.00	.160	1.8

b. Set Model 1725A front-panel controls as follows:

VOLTS/DIV (channels A and B)..... .1
VERT DISPLAY and
INT TRIG ..... X-Y operation
Coupling (channels A and B)..... 50Ω
HORIZ DISPLAY..... X-Y

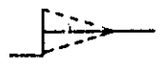
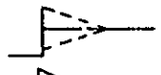
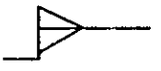
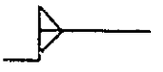
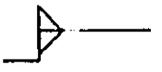
c. Set test-oscillator output for approximately 100 Hz.

d. Adjust test-oscillator output for exactly 6 divisions of Y-axis deflection.

e. Disconnect test oscillator from Model 1725A channel A INPUT connector.

f. Connect test oscillator to Model 1725A channel B INPUT connector.

Table 5-10. Vertical-amplifier Adjustments

Adjustment	Ref Designation	Effect on Pulse
HF 1 HF 2	A5R11 A5C6	
HF 3	A5C4	
HF 4 HF 5	A5C13 A5R22	
HF 6	A5C7	
HF Comp TRIM A TRIM B	A3C5 A3A1C1 A3A1C2	

g. Adjust X-Y gain adjustment A8R133 for exactly 6 divisions of X-axis deflection.

h. Disconnect test equipment.

i. Set Model 1725A front-panel controls to initial settings.

5-89. X-Y PHASE ADJUSTMENT. (See schematic 14) and figures 5-18 and 8-2.) A 3-MHz signal is applied and the amplifiers are matched for less than 3° of phase shift.

Equipment Required:

Test oscillator
50-ohm power divider

5-90. Adjust X-Y phase as follows:

a. Connect test-oscillator to both channel A INPUT connector and channel B INPUT connector using 50-ohm power divider.

NOTE

Cable lengths from TEE connections to channel INPUT connectors should be as short as possible and of the same electrical length.

b. Set Model 1725A front-panel controls as follows:

Coupling (both channels)..... 50Ω
VERT DISPLAY and
INT TRIG ..... X-Y operation
VOLTS/DIV (both channels)..... .05
HORIZ DISPLAY..... X-Y

c. Adjust test-oscillator output for 3-MHz, ≈500-mV p-p.

d. Adjust X-Y phase adjustment, A8C45, until ellipse most resembles straight diagonal line.

e. Disconnect test equipment.

f. Set Model 1725A front-panel controls to initial settings.

PERFORMANCE CHECK RECORD
MODEL 1725A

Instrument Serial Number _____ Date _____

Check	Specification	Measured
DEFLECTION FACTOR		CH A CH B
.01 VOLTS/DIV	5 div ±2% (±.1)	_____ _____
.02 VOLTS/DIV	5 div ±2% (±.1)	_____ _____
.05 VOLTS/DIV	6 div ±2% (±.12)	_____ _____
.1 VOLTS/DIV	5 div ±2% (±.1)	_____ _____
.2 VOLTS/DIV	5 div ±2% (±.1)	_____ _____
.5 VOLTS/DIV	6 div ±2% (±.12)	_____ _____
1 VOLTS/DIV	5 div ±2% (±.1)	_____ _____
2 VOLTS/DIV	5 div ±2% (±.1)	_____ _____
5 VOLTS/DIV	6 div ±2% (±.12)	_____ _____
CALIBRATOR		
Accuracy	3V ±1%	_____
Frequency	≈ 1kHz	_____
Z-AXIS BLANKING		
CRT blanked	+ 8V input	_____ _____
BANDWIDTH		
Channel A bandwidth	> 4.2 div	_____
Channel B bandwidth	> 4.2 div	_____
		_____
		_____
TRIGGERING		
Main Internal Triggering (100 MHz)	(√)	_____
Main Internal Triggering (300MHz)	(√)	_____
Main External Triggering (100 MHz)	(√)	_____
Main External Triggering (300 MHz)	(√)	_____
Delayed Internal Triggering (300 MHz)	(√)	_____
Delayed External Triggering (300 MHz)	(√)	_____
COMMON MODE REJECTION		
Channels A and B (5 MHz)	< 1 minor div	_____
Channels A and B (50 MHz)	< 1.1 div	_____

PERFORMANCE CHECK RECORD (Cont'd)
MODEL 1725A

Instrument Serial Number _____ Date _____

Check	Specification	Measured
SWEEP TIME ACCURACY		
Main TIME/DIV		
.01 µSEC	Over 10 div ±3% (within .3 div)	
.02 µSEC		
.05 µSEC		
.1 µSEC		
.2 µSEC		
.5 µSEC		
1 µSEC		
.002 mSEC		
.005 mSEC		
.01 mSEC		
.02 mSEC	Over 10 div ±2% (within .2 div)	
.05 mSEC		
.1 mSEC		
.2 mSEC		
.5 mSEC		
1 mSEC		
.002 SEC		
.005 SEC		
.01 SEC		
.02 SEC		
.05 SEC	Over 10 div ±3% (within .3 div)	
.1 SEC		
.2 SEC		
.5 SEC		
Delayed TIME/DIV		
.01 µSEC	Over 10 div ±3% (within .3 div)	
.02 µSEC		
.05 µSEC		
.1 µSEC		
.2 µSEC		
.5 µSEC		
1 µSEC		
.002 mSEC		
.005 mSEC	Over 10 div ±2% (within .2 div)	
.01 mSEC		
.02 mSEC		
.05 mSEC		
.1 mSEC		
.2 mSEC		
.5 mSEC		
1 mSEC		

PERFORMANCE CHECK RECORD (Cont'd)
MODEL 1725A

Instrument Serial Number _____ Date _____

Check	Specification	Measured
.002 SEC .005 SEC .01 SEC .02 SEC	Over 10 div ±2% (within .2 div)	_____ _____ _____ _____
DIFFERENTIAL TIME INTERVAL		
Accuracy	< 0.8 mV	_____
RISE TIME		
Channel A rise time Channel B rise time	< 1.27 ns < 1.27 ns	_____ _____

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. Table 6-2 lists all replaceable parts in reference designator order. Table 6-3 contains the names and addresses that corresponds to the manufacturer's code numbers.

6-3. REPLACEABLE PARTS LIST.

6-4. Table 6-2 is the list of replaceable parts and is organized as follows:

a. List of electrical assemblies.

b. Chassis-mounted parts in alphanumerical order by reference designation.

c. Electrical assemblies and their components in alphanumerical order by reference designation.

The information given for each part consists of the following:

a. The Hewlett-Packard part number.

b. The total quantity (Qty) in the instrument.

c. The description of the part.

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

e. The manufacturers' number for the part.

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

6-5. ORDERING INFORMATION.

6-6. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard office.

6-7. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

6-8. SPARE PARTS KIT.

6-9. Stocking spare parts for an instrument is often done to ensure quick return to service after a malfunction occurs. Hewlett-Packard has a Spare Parts Kit available for this purpose. The kit consists of selected replaceable assemblies and components for this instrument. The contents of the kit and the Recommended Spares List are based on failure reports and repair data, and parts support for one year. A Recommended Spares List for this instrument may be obtained on request and the Spare Parts Kit may be ordered through your nearest Hewlett-Packard office.

6-10. DIRECT MAIL ORDER SYSTEM.

6-11. Within the USA, Hewlett-Packard can supply parts through a direct mail order system. Advantages of using the system are as follows:

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

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

c. Prepaid transportation (there is a small handling charge for each order).

d. No invoices—to provide these advantages, a check or money order must accompany each order.

6-12. 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.

Table 6-1. Reference Designators and Abbreviations

REFERENCE DESIGNATORS

A	= assembly	**F**	= fuse	**MP**	= mechanical part	**U**	= integrated circuit
B	= motor	**FL**	= filter	**P**	= plug	**V**	= vacuum tube, neon bulb, photocell, etc
BT	= battery	**IC**	= integrated circuit	**Q**	= transistor		
C	= capacitor	**J**	= jack	**R**	= resistor	**VR**	= voltage regulator
CP	= coupler	**K**	= relay	**RT**	= thermistor	**W**	= cable
CR	= diode	**L**	= inductor	**S**	= switch	**X**	= socket
DL	= delay line	**LS**	= loud speaker	**T**	= transformer	**Y**	= crystal
DS	= device signaling (lamp)	**M**	= meter	**TB**	= terminal board	**Z**	= tuned cavity network
E	= misc electronic part	**MK**	= microphone	**TP**	= test point		

ABBREVIATIONS

A	= amperes	**H**	= henries	**N/O**	= normally open	**RMO**	= rack mount only
AFC	= automatic frequency control	**HDW**	= hardware	**NOM**	= nominal	**RMS**	= root mean square
AMPL	= amplifier	**HEX**	= hexagonal	**NPO**	= negative positive zero (zero temperature coefficient)	**RWV**	= reverse working voltage
		HG	= mercury				
BFO	= beat frequency oscillator	**HR**	= hour(s)				
BE CU	= beryllium copper	**HZ**	= hertz	**NPN**	= negative positive negative	**S-B**	= slow blow
BH	= binder head					**SCR**	= screw
BP	= bandpass			**NRFR**	= not recommended for field replacement	**SE**	= selenium
BRS	= brass	**IF**	= intermediate freq			**SECT**	= section(s)
BWO	= backward wave oscillator	**IMPG**	= impregnated	**NSR**	= not separately replaceable	**SEMICON**	= semiconductor
		INCD	= incandescent			**SI**	= silicon
CCW	= counter clockwise	**INCL**	= include(s)			**SIL**	= silver
CER	= ceramic	**INS**	= insulation(ed)	**OBD**	= order by description	**SL**	= slide
CMO	= cabinet mount only	**INT**	= internal	**OH**	= oval head	**SPG**	= spring
COEF	= coefficient			**OX**	= oxide	**SPL**	= special
COM	= common	**K**	= kilo = 1000			**SST**	= stainless steel
COMP	= composition					**SR**	= split ring
COMPL	= complete	**LH**	= left hand	**P**	= peak	**STL**	= steel
CONN	= connector	**LIN**	= linear taper	**PC**	= printed circuit		
CP	= cadmium plate	**LK WASH**	= lock washer	**PF**	= picofarads = 10^{-12} farads	**TA**	= tantalum
CRT	= cathode ray tube	**LOG**	= logarithmic taper			**TD**	= time delay
CW	= clockwise	**LPF**	= low pass filter	**PH BRZ**	= phosphor bronze	**TGI**	= toggle
				PHL	= Phillips	**THD**	= thread
DEPC	= deposited carbon	**M**	= milli = 10^{-3}	**PIV**	= peak inverse voltage	**TI**	= titanium
DR	= drive	**MEG**	= meg = 10^{6}	**PNP**	= positive negative positive	**TOL**	= tolerance
		MET FLM	= metal film			**TRIM**	= trimmer
ELECT	= electrolytic	**MET OX**	= metallic oxide	**P/O**	= part of	**TWT**	= traveling wave tube
ENCAP	= encapsulated	**MFR**	= manufacturer	**POLY**	= polystyrene		
EXT	= external	**MHZ**	= mega hertz	**PORC**	= porcelain	**U**	= micro = 10^{-6}
		MINAT	= miniature	**POS**	= position(s)		
F	= farads	**MOM**	= momentary	**POT**	= potentiometer	**VAR**	= variable
FH	= fil head	**MOS**	= metal oxide substrate	**PP**	= peak to peak	**VDCW**	= dc working volts
FIL H	= fillister head	**MTG**	= mounting	**PT**	= point		
FXD	= fixed	**MY**	= mylar	**PWV**	= peak working voltage	**W/**	= with
						W	= watts
G	= giga (10^{9})	**N**	= nano (10^{-9})	**RECT**	= rectifier	**WIV**	= working inverse voltage
GE	= germanium	**N/C**	= normally closed	**RF**	= radio frequency		
GL	= glass	**NE**	= neon	**RH**	= round head or right hand	**WW**	= wirewound
GRD	= grounded	**NI PL**	= nickel plate			**W/O**	= without

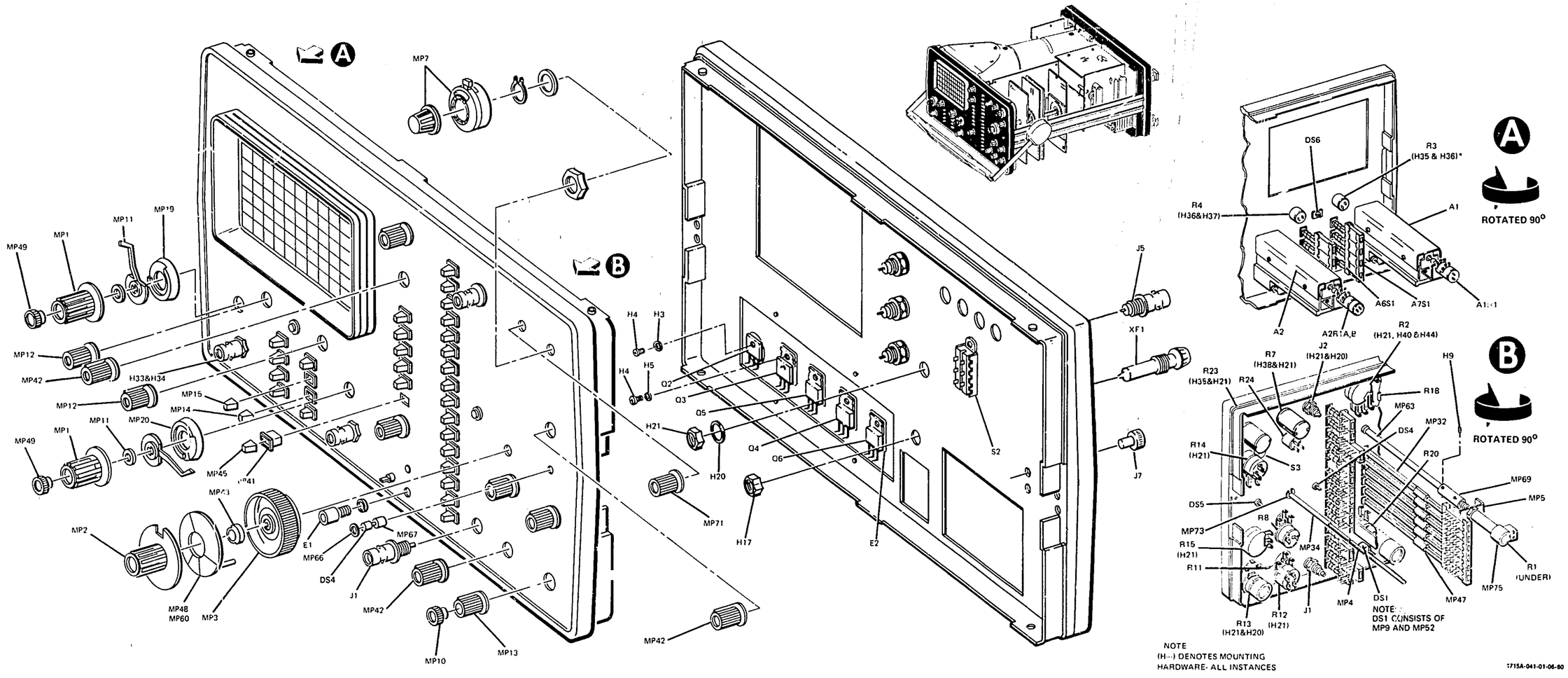


Figure 6-1.
Illustrated Parts Breakdown (Sheet 1 of 2)

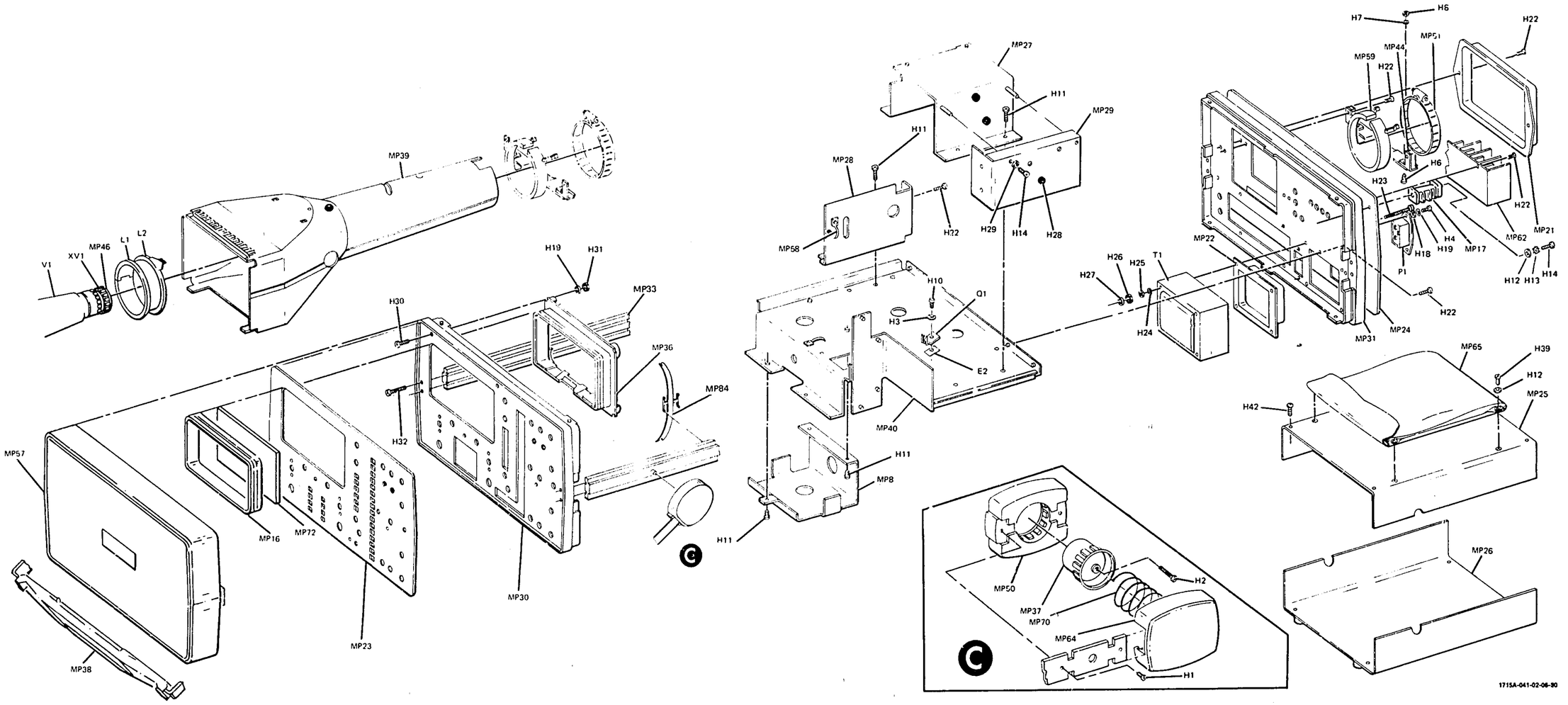


Figure 6-1. Illustrated Parts Breakdown (Sheet 2 of 2)

Table 6-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			CHASSIS PARTS		
A1	01720-63403	1	CHANNEL "A" ATTENUATOR ASSY	28480	01720-63403
A2	01720-63404	1	CHANNEL "B" ATTENUATOR ASSY	28480	01720-63404
A3	01722-66537	1	VERTICAL PREAMPLIFIER ASSY	28480	01722-66537
A4	01720-61626		DELAY LINE ASSY	28480	01720-61626
A5	01720-66561	1	VERTICAL OUTPUT ASSY	28480	01720-66561
A6	01720-66534	1	INTERNAL TRIGGER SWITCH ASSY	28480	01720-66534
A7	01720-66535	1	VERTICAL DISPLAY SWITCH ASSY	28480	01720-66535
A8	01722-66531	1	HORIZONTAL SWEEP ASSY	28480	01722-66531
A9	01720-66547	1	DELAY SWEEP SWITCH ASSY	28480	01720-66547
A10	01720-66566		BOARD ASSY, HORIZONTAL DISPLAY SWITCH	28480	01720-66566
A11	01720-66562	1	MAIN SWEEP SWITCH ASSY	28480	01720-66562
A12	01722-66530	1	HOLDOFF DELAY COMPARATOR	28480	01722-66530
A13	01720-66560	1	HORIZONTAL OUTPUT ASSY	28480	01720-66560
A14	01720-66564	1	GATE ASSY	28480	01720-66564
A15	01720-66563	1	HV POWER SUPPLY ASSY	28480	01720-66563
A16	0960-0117		HV MULTIPLIER ASSY	28480	0960-0117
A17	01720-66559	1	LV POWER SUPPLY ASSY	28480	01720-66559
A18	01710-66564	1	ANALOG ASSY	28480	01710-66564
DS1	2140-0391	1	LAMP, GLOW	08806	ANSI G2B
DS4	1990-0586	3	LED VISIBLE	28480	1990-0586
DS5	1990-0586		LED VISIBLE	28480	1990-0586
DS6	1990-0586		LED VISIBLE	28480	1990-0586
E1	1510-0038	1	BINDING POST, SINGLE, 1/4 32	28480	1510-0038
E2	0340-0630	5	INSULATOR, TRANSISTOR	28480	0340-0630
E3	5080-8670	1	TSTR MATCHED PAIR	28480	5080-8670
F1	2110-0304		FUSE 1.5A 250 V SLO-BLO (110-V OPERATION)	28480	2110-0304
F1	2110-0020	1	FUSE 0.8A 250 V SLO-BLO (220-V OPERATION)	71400	MDL 8/10
H1	2360-0201	4	SCREW MACH 6-32 .5 IN LG PAN HD POZI	28480	2360-0201
H2	2510-0111	2	SCREW MACH 8-32 .75 IN LG PAN HD	28480	2510-0111
H3	2190-0010	6	WASHER LOCK .12 IN ID, .275 IN OD	04713	04A52200F01
H4	2200-0141	7	SCREW MACH 4-40 .312 IN LG PAN HD	28480	2200-0141
H5	3050-0791	4	WASHER SHLDR NO. 4 .116 IN ID .21 IN OD	28480	3050-0791
H6	2360-0197	2	SCREW MACH 6-32 .375 IN LG PAN HD	28480	2360-0197
H7	2190-0046	4	WASHER LOCK HLCL NO. 6 .141 IN ID .239 IN OD	28480	2190-0046
H8	2420-0003	2	NUT HEX DBL CHAM 6-32 THD .094 THK	28480	2420-0003
H9	3030-0022	4	SCREW SET 6-32 .125 IN LG SMALL CUP PT	28480	3030-0022
H10	2200-0143	5	SCREW MACH 4-40 .375 IN LG PAN HD	28480	2200-0143
H11	2200-0103	13	SCREW MACH 4-40 .25 IN LG PAN HD	28480	2200-0103
H12	3050-0066	3	WASHER FL MTLC NO. 8 .147 IN ID .375 IN OD	28480	3050-0066
H13	2190-0008	6	WASHER LOCK EXT T NO. 6 .141 IN ID .32 IN OD	78189	1806-00
H14	2360-0135	3	SCREW MACH 6-32 1.5 IN LG PAN HD	28480	2360-0135
H15		1	NOT ASSIGNED		
H16			NOT ASSIGNED		
H17	2950-0038	1	NUT SPECIALTY 1/2-24 THD .125 THK .688 OD	28480	2110-0669
H18	3050-0235	4	WASHER FL MTLC NO. 4 .117 IN ID .25 IN OD	28480	3050-0235
H19	2190-0030	8	WASHER LOCK HLCL NO. 4 .115 IN ID .173 IN OD	28480	2190-0030
H20	0360-1632	7	TERMINAL, SLDR LUG, 3-8 SCR, .375/.109	79963	761 3-8
H21	2950-0043	16	NUT HEX DBL CHAM 3/8-32 THD .094 THK	73734	2X 28200
H22	2200-0107	39	SCREW MACH 4-40 .375 IN LG PAN HD	28480	2200-0107
H23	2510-0138	4	SCREW MACH 8-32 3 IN LG PAN HD POZI	28480	2510-0138
H24	3050-0152	4	WASHER SHLDR NO. 8 .172 IN ID .438 IN OD	28480	3050-0152
H25	3050-0071	4	WASHER FL MTLC NO. 8 .169 IN ID .438 IN OD	28480	3050-0071
H26	2190-0017	4	WASHER LOCK HLCL NO. 8 .168 IN ID .507 IN OD	28480	2190-0017
H27	2660-0001	4	NUT HEX DBL CHAM 8-32 THD .125 THK	28480	2660-0001
H28	0400-0010	1	GROMMET VINYL 0.250 IN ID	00000	OBD
H29	2190-0007	4	WASHER LOCK INTL T NO. 6 .141 IN ID .288 IN OD	78189	1906-00
H30	2200-0167	4	SCREW MACH 4-40 .375 IN LG 82 DEG FL HD	28480	2200-0167
H31	2260-0002	6	NUT HEX DBL CHAM 4-40 THD .062 THK	28480	2260-0002
H32	0624-0334	4	SCREW TPG B 15 1.25 IN LG PAN HD	28480	0624-0334
H33	2190-0102	2	WASHER LOCK INTL T NO. 7/16 .472 IN ID	78189	1922-01
H34	2950-0035	2	NUT HEX DBL CHAM 15/32-32 THD .078 THK	28480	2950-0035
H35	2190-0084	4	WASHER LOCK INTL T NO. 1/4 .266 IN ID .408 IN OD	78189	1214-06
H36	2950-0072	3	NUT HEX DBL CHAM 1/4-32 THD .062 THK	82389	P 1975
H37	0360-0040	1	TERMINAL, SLDR LUG, 1/4 SCR .25/.093	73734	1958
H38	3050-0050	4	WASHER FL MTLC NO. 7/16 .5 IN ID .75 IN OD	28480	3050-0050
H39	2360-0117	4	SCREW MACH 6-32 .375 IN LG PAN HD	28480	2360-0117
H40	2190-0016	3	WASHER LK INTL T NO. 3/8 .377 IN ID .507 IN OD	78189	1920-02
H41	0360-0024	2	TERMINAL, SLDR LUG 3/8 SCR, .38/.062	79963	508 H380
H42	2200-0762	8	SCREW MACH 4-40 .250 IN LG TR HD POZI	04771	OBD
H43	2190-0018	2	WASHER LK HLCL NO. 8 .141 IN ID	28480	2190-0018
H44	2360-0195	2	SCREW MACH 6-32 .312 IN LG PAN HD POZI	28480	2360-0195
H45	3050-0010	2	WASHER FL MTLC NO. 6 .147 IN ID	28480	3050-0010
H46	1410-0052	1	BUSHING-POT 3/8-32	28480	1410-0052
J1	1250-0118	6	CONNECTOR RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J2	1250-0118		CONNECTOR RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J3	1250-0118		CONNECTOR RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J4	1250-0118		CONNECTOR RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J5	1250-0118		CONNECTOR RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J6	1250-0118		CONNECTOR RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J7	1251-0202	2	CONNECTOR-BNA JACK SINGLE	83330	2218
L1	5060-0435	1	COIL ALIGNMENT, X AXIS	28480	5060-0435
L2	01720-60603	1	COIL ALIGNMENT, Y AXIS	28480	01720-60603
MP1	0370-2787	2	KNOB ASSY-VOLTS/DIV	28480	0370-2787
MP2	01740-67402	1	KNOB ASSY-TIME/DIV	28480	01740-67402
MP3	01720-67403	1	KNOB-DELAYED SWEEP	28480	01720-67403
MP4	01722-63701	1	SHAFT ASSY, MAIN SWEEP	28480	01722-63701
MP5	01720-01211	1	BRACKET FOCUS	28480	01720-01211

See introduction to this section for ordering informatio .

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
MP6			NOT ASSIGNED		
MP7	1140-0036	1	COUNTING DISPLAY, TURNS DIAL 2 SCALES	12697	461
MP8	01720-04101	1	BRACKET, DELAY LINE	28480	01720-04101
MP9	5060-0451	1	LENS ASSY	28480	5060-0451
MP10	0370-0963	1	KNOB, CONC, RND, (HORIZ POSITION FINE)	28480	0370-0963
MP11	5040-7598	2	LEVER, COUPLING	28480	5040-7598
MP12	0370-1001	2	KNOB, BASE, PTR, .375 IN, JGK, SGI	28480	0370-1001
MP13	0370-1100	1	KNOB, B. E CONC PTR, 5 IN, JGK	28480	0370-1100
MP14	0370-0603	3	PUSHBUTTON M GRAY	28480	0370-0603
MP15	0370-2630	14	PUSHBUTTON WILLOW GRN SQ	28480	0370-2630
MP16	5040-0578	1	BEZEL CRT	28480	5040-0578
MP17	5040-7829	4	FOOT:CORD WRAP	28480	5040-7829
MP18			NOT ASSIGNED		
MP19	5020-8745	1	SPACER, DIAL, LEFT COUPLING	28480	5020-8745
MP20	5020-8744	1	SPACER, DIAL, RIGHT COUPLING	28480	5020-8744
MP21	01701-04108	1	COVER, CRT	28480	01701-04108
MP22	01710-04103	1	COVER, TRANSFORMER	28480	01710-04103
MP23	01725-00201	1	PANEL, FRONT	28480	01725-00201
MP24	01712-00204	1	PANEL, REAR	28480	01712-00204
MP25	01725-04101	1	COVER, TOP	28480	01725-04101
MP26	01725-04103	1	COVER, BOTTOM	28480	01725-04103
MP27	01720-01212	1	BRACKET, GATE/HV	28480	01720-01212
MP28	01720-04106	1	BRACKET, VERTICAL OUTPUT	28480	01720-04106
MP29	01720-04106	1	COVER, HV	28480	01720-04106
MP30	01715-20501	1	FRAME, FRONT	28480	01715-20501
MP31	01720-20504	1	FRAME, REAR	28480	01720-20504
MP32	01720-23201	6	EXTENDER, SWITCH	28480	01720-23201
MP33	01720-23701	2	RAIL, SIDE	28480	01720-23701
MP34	01720-23705	1	SHAFT, MAIN SWEEP, INNER	28480	01720-23705
MP35			NOT ASSIGNED		
MP36	01740-24702	1	SUPPORT, CRT CAMERA	28480	01740-24702
MP37	5020-8733	2	GEAR, HUB, HANDLE	28480	5020-8733
MP38	1440-0154	1	ASSY, HANDLE	28480	01440-0154
MP39	01741-66001	1	SHIELD ASSY, CRT	28480	01741-66001
MP40	01720-60101	1	DECK, MAIN	28480	01720-60101
MP41	0370-2626	30	BEZEL, PUSHBUTTON, GRAY	28480	0370-2626
MP42	0370-1099	7	KNOB, BASE, PTR, .5 IN, JGK, SGI DECAL	28480	0370-1099
MP43	01720-22501	1	RING, ANTI RUN	28480	01720-22501
MP44	01720-01209	2	BRACKET, CRT MOUNTING	28480	01720-01209
MP45	0370-0671	13	PUSHBUTTON, LEG BLUE, SQ	28480	0370-0671
MP46	5040-7648	1	CRT PLATE (P/O W5)	28480	5040-7648
MP47	01830-23201	6	COUPLER, SWITCH EXTEN	28480	01830-23201
MP48	5040-5952	1	CORE:DIAL TIME/DIV	28480	5040-5952
MP49	01720-67405	2	KNOB, CONCENTRIC (VERNIER)	28480	01720-67405
MP50	5020-8734	2	RING, HANDLE	28480	5020-8734
MP51	1400-1010	1	CLAMP, HOSE, 2.37 DIA .37 W STL	28480	1400-1010
MP52	5060-0458	1	HEADER:LAMP	28480	5060-0458
MP53	01720-61901	1	SWITCH, ROTOR, MALE	28480	01720-61901
MP54	01720-61902	2	SWITCH, ROTOR, FEMALE	28480	3130-0350
MP55	01720-61903	1	SWITCH, ROTOR, MALE	28480	01720-61903
MP56	01720-61904	1	SWITCH, ROTOR, FEMALE	28480	01720-61904
MP57	5040-0516	1	COVER, PANEL	28480	5040-0516
MP58			NOT ASSIGNED		
MP59	01220-42301	1	HOLDER, TUBE	28480	01220-42301
MP60	0350-1025	1	DECAL, TIME/DIV DIAL	28480	0350-1025
MP61	01722-09101	3	SPRING, PC BOARD HOLDER	28480	01722-09101
MP62	01720-20503	1	HEAT SINK	28480	01720-20503
MP63	01720-23706	1	SHAFT, EXTENSION	28480	01720-23706
MP64	5040-0511	2	CAP, TRIM	28480	5040-0511
MP65	1540-0292	1	CASE ACCESS PVC 10.5 LG 1.5 WD 13.5 DP	28480	1540-0292
MP66	1400-0640	3	CLAMP, RETAINER RING, LED MTG, .27 IN	28480	1400-0640
MP67	1400-0647	3	CLAMP, CLIP:LED PANEL MT, BLK POLYP	28480	1400-0647
MP68	0510-1101	3	RETAINER, RING, .33 DIA, NI PLT BE CU	28480	0510-1101
MP69	1500-0215	1	COUPLER, SOLID	28480	1500-0215
MP70	1460-0604	2	SPRING CPRSN CYL .95 OD 1.185 LG MUW	28480	1460-0604
MP71	0370-1091	1	KNOB, BASE, RND, .5 IN, JGK, SGI DECAL	28480	0370-1091
MP72	01740-02701	1	FILTER:CONTRAST	28480	01740-02701
MP73	0510-0511	1	RETAINER RING E-R .25 DIA CD DICRMT DP	28480	0510-0511
MP74	2950-0072	3	NUT:HEX DBL CHAM 1/4-32 THD 0.62 THK	82389	P 1975
MP75	5040-0421	1	INSULATOR COVER: POTENTIOMETER	28480	5040-0421
MP76	01722-61901	1	SWITCH, ROTOR, MALE	28480	01722-61901
MP77	01722-61902		SWITCH, ROTOR, FEMALE	28480	01722-61902
MP78			NOT ASSIGNED		
MP79	01741-09101	2	SPRING, GROUND	28480	01720-09103
MP82	01720-01210	1	BRACKET:HV CABLE	28480	01720-01210
MP83	01720-04110	1	COVER:PROBE POWER	28480	01720-04110
MP84	01720-09102	1	SPRING-HOLD DOWN	28480	01720-09102
MP85	01725-01201	1	THERMAL SHIELD	28480	01725-01201
MP86	01725-94301	1	LABEL-ΔT OFFSET ADJ	28480	01725-94301
P1	1251-2357	1	AC POWER PLUG	28480	1251-2357
Q1	1854-0320	1	TRANSISTOR NPN SI PD=83.5W FT=4MHZ	28480	1854-0320
Q2	1854-0330	1	TRANSISTOR NPN SI PD=21W FT=10MHZ	28480	1854-0330
Q3	1854-0737	1	TRANSISTOR NPN SI (2N6477)	28480	1854-0737
Q4	1854-037[illegible]		TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
Q5	1854-037[illegible]		TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
Q6	1854-0370		TRANSISTOR NPN 2N5294 SI PD=1.8W	02735	2N5294
R1	2100-0665	1	RESISTOR VAR 5M 20% CC (FOCUS)	71590	MODEL 2 HV
R2	2100-3638	1	RESISTOR VAR 10K 2.5W 10% CC (INTENSITY)	28480	2100-3638
R3	2100-3385	2	RESISTOR VAR 2K 20% CC (VERT POSITION CH A)	12697	382
R4	2100-3385		RESISTOR VAR 2K 20% CC (VERT POSITION CH B)	12697	382
R5	0687-3311	1	RESISTOR 330 OHM 10% .5W CC TUBULAR	01121	EB3311
R6	0684-1221		RESISTOR 1.2K 10% .25W CC TUBULAR	01121	CB1221

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
R7	2100-3586	2	RESISTOR-VAR PREC WW 10-TRN 50K 3%	03744	35405-622 503
R8	2100-0660	1	RESISTOR VAR 100K 20% SPST SW (HOLDOFF)	28480	2100-0660
R9	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
R10	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
R11	0757-0458		RESISTOR 51.1K 1% .125W F TUBULAR	24546	C4 1/8-T0-5112 F
R12	2100-0657	1	RESISTOR-VAR 100K 30% DPST SW (SWEEP VERNIER)	28480	2100-0657
R13	2100-3731	1	RESISTOR-VAR CNCTRC 20K/20K 20% CC (HORIZ POSITION)	28480	2100-3731
R14	2100-0680	1	RESISTOR-VAR 50K CCSW (DELAY TRIG LEVEL)	28480	2100-0680
R15	2100-0661	1	RESISTOR-VAR 50K 30% CC (MAIN TRIG LEVEL)	28480	2100-0661
R18	0687 8211	1	RESISTOR 820 OHM 10% .5W CC TUBULAR	01121	EB8211
R19	0687 3931	1	RESISTOR 39K 10% .5W CC TUBULAR	01121	EB3931
R20	2100-3387	1	RESISTOR-VAR 5K 20% DPST SW (SCALE ILLUM)	28480	2100-3387
R21	0757-0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0-101 F
R23	2100-3586		RESISTOR-VAR PREC WW 10-TRN 50K 3%	03744	35405-622 503
R24	2100-2361		RESISTOR-VAR, CONT, 10K 20% CC 5W (PART OF R20)	28480	2100-2361
S1	3101 0625	1	SWITCH SL 2 DPDT NS 3A 125VAC	82389	47206-LFE
S2	3101 2224	1	SWITCH TGL	28480	3101-2224
S3	9100-3410	1	TRANSFORMER,POWER	28480	9100-3410
T1	5083-5552	1	CRT, P31	28480	5083-5552
V1					
W1	8120-1521	1	CABLE, UNSHLD 3 COND 18AWG	28480	8120-1521
W2	01720-61622	1	CABLE ASSY, SYNC	28480	01720-61622
W3	01720-61623	1	CABLE ASSY, HORIZONTAL INPUT	28480	01720-61623
W4	01720-61624	1	CABLE ASSY, HORIZONTAL OUTPUT	28480	01720-61624
W5	01720-61630	1	CABLE ASSY, CRT BASE	28480	01720-61630
W6	01720-61640	1	CABLE ASSY, CRT NECK PINS	28480	01720-61640
W7	01720-61639	1	CABLE ASSY HV REG	28480	01720-61639
W8	01720-61638	1	CABLE ASSY, VERTICAL OUTPUT	28480	01720-61638
W9	01710-61649	1	CABLE ASSY, DIGITAL	28480	01710-61649
W9W1	01710-61643	1	CABLE ASSY, ZERO	28480	01710-61643
W9W2	01710-61644		CABLE ASSY:STOP CONTROL	28480	01710-61644
W9W3	01712-61603		CABLE ASSY:START CONTROL	28480	01712-61603
W10	01710-61648	1	CABLE ASSY, MAIN	28480	01710-61648
W10W1	01720-61609		CABLE ASSY, 4 COND	28480	01720-61609
W10W2	01720-61610		CABLE ASSY:TWIN COAX	28480	01720-61610
W10W3	01720-61612		CABLE ASSY:COAX	28480	01720-61612
W10W4	01722-61606		CABLE ASSY COAX	28480	01722-61606
W11	01720-61625	1	CABLE ASSY, TWIN	28480	01720-61625
W12	01712-61607		CABLE ASSY, REAR PANEL "T" OUTPUT	28480	01712-61607
W17	01720-61634	1	CABLE ASSY, MAIN B	28480	01720-61634
XF1	1400-0084	2	FUSEHOLDER, EXTR POST, BAY CAP, 15A	28480	1400-0084
XV1	5040-7649	1	SOCKET, CRT (P/O W5)	28480	5040-7649
A1	01720-63403	2	CHANNEL "A" ATTENUATOR ASSY	28480	01720-63403
A1A1	01720-66544	1	BOARD ASSY, CHANNEL "A" ATTENUATOR (A1A1Q1 NOT INCLUDED ORDER SEPARATELY)	28480	01720-66544
A1R1	2100-0664	1	RESISTOR-VAR 5K 10% SPST SW	28480	2100-0664
A1R2	0698-3132	4	RESISTOR 261 OHM 1% .125W F TUBULAR	16299	C4 1/8 T0 2610 F
A1A1Q1	5080-9691	1	FET, MATCHED PAIR (NOT PAIR OF A1A1 (ORDER SEPARATELY)	28480	5080-9691
A1A1Q2	1854-0636	9	TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854-0636
A1A1Q3	1854-0632	2	TRANSISTOR NPN SI PD=180MW FT=4GHZ	25403	BFR 91
A1A1R1	0698-6433	4	RESISTOR 100 OHM 1% .25W F TUBULAR	28480	0698-6433
A1A1R2	0698-6433		RESISTOR 100 OHM 1% .25W F TUBULAR	28480	0698-6433
A2	01720-63404		CHANNEL "B" ATTENUATOR ASSY	28480	01720-63404
A2A1	01720-66545	1	BOARD ASSY, CHANNEL "B" ATTENUATOR (A2A1Q1 NOT INCLUDED ORDER SEPARATELY)	28480	01720-66545
A2R1	2100-3453	1	RESISTOR-VAR 2.5K/5K 10% DPST SW	28480	2100-3453
A2R2	0698-3132		RESISTOR 261 OHM 1% .125W F TUBULAR	16299	C4 1/8 T0 2610 F
A2A1Q1	5080-9691		FET, MATCHED PAIR (P/O A1A1Q1)		
A2A1Q2	1854-0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854-0636
A2A1Q3	1854-0632		TRANSISTOR NPN SI PD=180MW FT=4GHZ	25403	BFR 91
A2A1R1	0698-6433		RESISTOR 100 OHM 1% .25W F TUBULAR	28480	0698-6433
A2A1R2	0698-6433		RESISTOR 100 OHM 1% .25W F TUBULAR	28480	0698-6433
A3	01722-66537	1	VERTICAL PREAMPLIFIER ASSY	28480	01722-66537
A3A1	5081-3023	1	ASSY, SUBSTRATE (NOT SUPPLIED WITH A3, ORDER SEPARATELY)	28480	5081-3023
A3C1			NOT ASSIGNED		
A3C2	0160-3802		CAPACITOR FXD 150PF +80 -20% 100WVDC	28480	0160-3802

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3C3	0160-3470		CAPACITOR-FXD .01UF +80-20% 50WVDC	28480	0160-3470
A3C4	0160-3470		CAPACITOR-FXD .01UF +80-20% 50WVDC	28480	0160-3470
A3C5	0121-0467	3	CAPACITOR-VAR TRMR, CER, 3-8PF	28480	0121-0467
A3C6	0140-0203	1	CAPACITOR-FXD 30PF +-5% 500WVDC	72136	DM15E300J0500WV
A3C7			NOT ASSIGNED		
A3C8	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC	28480	0160-3451
A3C9	0140-0196	3	CAPACITOR-FXD 150PF +-5% 300WVDC	72136	DM15F151J0300WV1CR
A3C10	0140-0196		CAPACITOR-FXD 150PF +-5% 300WVDC	72136	DM15F151J0300WV1CR
A3C11	0140-0190	2	CAPACITOR-FXD 39PF +-5% 300WVDC	72136	DM15E390J0300WV1CR
A3C12	0140-0190		CAPACITOR-FXD 39PF +-5% 300WVDC	72136	DM15E390J0300WV1CR
A3C13	0160-2200	2	CAPACITOR-FXD 360PF +-5% 300WVDC	28480	0160-2200
A3C14	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC	28480	0160-3451
A3C15			NOT ASSIGNED		
A3C16	0180-0229	11	CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	1500105X0050A2
A3C17	1080-0223		CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A3C18	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A3C19	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A320	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A3C21	0180-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A3C22	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20WVDC TA	56289	150D105X9020A2
A3C23	0160-0141	4	CAPACITOR-FXD 1500PF +-10% 1000WVDC	28480	0160-0141
A3C24	0180-1746	10	CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X9020B2
A3C25	0180-0229	7	CAPACITOR-FXD 33UF +-10% 10VDC TA SOLID	56289	150D336X9010B2
A3C26	0180-1746		CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X9020B2
A3C27	0160-0141		CAPACITOR-FXD 1500PF +-10% 1000WVDC	28480	0160-0141
A3C28	0180-1746		CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X9020B2
A3C29	0180-0229		CAPACITOR-FXD 33UF +-10% 10VDC TA SOLID	56289	150D336X9010B2
A3C30	0180-1746		CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X9020B2
A3C31	0180-0291		CAPACITOR-FXD 1UF +-10% 35WVDC TA	56289	150D105X9035A2
A3C32	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC	28480	0160-3451
A3CR1	5080-0442	1	DIODES, MATCHED	28480	5080-0442
A3CR2	1901-0179	2	DIODE, SWITCHING 15 V 50 MA DO-7	28480	1901-0179
A3CR3	1901-0179		DIODE, SWITCHING 15 V 50 MA DO-7	28480	1901-0179
A3L1	9100-2257	2	COIL-FXD MOLDED RF CHOKE, .82UH 10%	24226	10-820
A3L2	9100-2257		COIL-FXD MOLDED RF CHOKE, .82UH 10%	24226	10-820
A3L3	9140-0142	5	COIL-FXD MOLDED RF CHOKE, 2.2 UH 10%	24226	10-221
A3L4	9140-0142		COIL-FXD MOLDED RF CHOKE, 2.2 UH 10%	24226	10-221
A3L5	9140-0142		COIL-FXD MOLDED RF CHOKE, 2.2 UH 10%	24226	10-221
A3L6	9140-0142		COIL-FXD MOLDED RF CHOKE, 2.2 UH 10%	24226	10-221
A3L7	9140-0142		COIL-FXD MOLDED RF CHOKE, 2.2 UH 10%	24226	10-221
A3L8	9170-0029	9	CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2/4A
A3L9	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2/4A
A3L10	9170-0016	3	CORE, SHIELDING BEAD	02114	56-500-65A1/3B
A3L11	9170-0016		CORE, SHIELDING BEAD	02114	56-500-65A1/3B
A3Q1	1854-0724		TRANSISTER, (MATCHED PAIR WITH A3Q2)	28480	1854-0724
A3Q2			(MATCHED PAIR WITH A3Q1)		
A3Q3	1854-0345	2	TRANSISTOR NPN 2N5179 SI PD=200MW	04713	2N5179
A3Q4	1854-0345		TRANSISTOR NPN 2N5179 SI PD=200MW	04713	2N5179
A3Q5	1853-0036	27	TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A3Q6	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A3R1	2100-3252	4	RESISTOR, VAR, TRMR 5K OHM 10% C	32997	3389P-1-502
A3R2	0757-0419	6	RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-681R-F
A3R3	0757-0419		RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-681R-F
A3R4	2100-3211	3	RESISTOR, VAR, TRMR 1K OHM 10% C	32997	3389P-1-102
A3R5	0757-0290		RESISTOR 6.19K 1% .125W F TUBULAR	19701	MFC-1/8-T0-6191-F
A3R6	2100-3252		RESISTOR, VAR, TRMR 5K OHM 10% C	32997	3389P-1-502
A3R7	0684-1021	25	RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A3R8	0684-2211	12	RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A3R9	0684-2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A3R10	0757-0290		RESISTOR 6.19K 1% .125W F TUBULAR	19701	MFC-1/8-T0-6191-F
A3R11	2100-3252		RESISTOR, VAR, TRMR 5K OHM 10% C	32997	3389P-1-502
A3R12	2100-3211		RESISTOR, VAR, TRMR 1K OHM 10% C	32997	3389P-1-102
A3R13	0684-1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A3R14	2100-3252		RESISTOR, VAR, TRMR 5K OHM 10% C	32997	3389P-1-502
A3R15	0757-0419		RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-681R-F
A3R16	0757-0419		RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-681R-F
A3R17	0757-0447		RESISTOR 16.2K 1% .125W F TUBULAR	28480	0757-0447
A3R18	0684-2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A3R19	0757-0447		RESISTOR 16.2K 1% .125W F TUBULAR	24546	C4-1/8-T0-1622-F
A3R20	0684-2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A3R21	0698-3437	1	RESISTOR 133 OHM 1% .125W F TUBULAR	16299	C4-1/8-T0-133R-F
A3R22	0757-0820	2	RESISTOR 1.1K 1% .5W F TUBULAR	30983	MF7C1/2-T0-1101-F
A3R23	0698-7196	3	RESISTOR 21.5 OHM 2% .05W F TUBULAR	24546	C3-1/8-T00-21R5-G
A3R24	0698-7196		RESISTOR 21.5 OHM 2% .05W F TUBULAR	24546	C3-1/8-T00-21R5-G
A3R25	0698-7196		RESISTOR 21.5 OHM 2% .05W F TUBULAR	24546	C3-1/8-T00-21R5-G
A3R26	0684-5621	2	RESISTOR 5.6K 10% .25W CC TUBULAR	01121	CB5621
A3R27	0757-0410	6	RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-301R-F
A3R28	0757-0410		RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-301R-F
A3R29	0757-0276	6	RESISTOR 61.9 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-6192-F
A3R30	0757-0276		RESISTOR 61.9 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-6192-F
A3R31	0757-0280	11	RESISTOR 1K 1% .125W F TUBULAR	28480	0757-0280
A3R32	0684-1811	3	RESISTOR 180 OHM 10% .25W CC TUBULAR	01121	CB1811
A3R33	0684-1811		RESISTOR 180 OHM 10% .25W CC TUBULAR	01121	CB1811
A3R34	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	28480	0757-0280

See introduction to this section for ordering information

Table 5-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3R35	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	28480	0757-0280
A3R36	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	28480	0757-0280
A3R37	0757-1094	4	RESISTOR 1.47K 1% .125W F TUBULAR	24546	C4-1/8-TO-1471-F
A3R38	0757-1094		RESISTOR 1.47K 1% .125W F TUBULAR	24546	C4-1/8-TO-1471-F
A3R39	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4-1/8-TO-1001-F
A3R40	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4-1/8-TO-1001-F
A3R41			NOT ASSIGNED		
A3R42	0698-3433	2	RESISTOR 28.7 OHM 1% .125W F TUBULAR	03888	MPE55-1/8-TO-28R7-F
A3R43	0698-3433		RESISTOR 28.7 OHM 1% .125W F TUBULAR	03888	PME55-1/8-TO-28R7-F
A3R44	0757-0419		RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-681R-F
A3R45	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4-1/8-TO-1001-F
A3R46	0684-0271	6	RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A3R47	0684-0271		RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A3R48	0684-0271		RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A3R49	0684-0271		RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A3R50	0761-0025	5	RESISTOR 120 OHM 5% 1W MO TUBULAR	24546	FP32-1-TOO-121-J
A3R51	0761-0025		RESISTOR 120 OHM 5% 1W MO TUBULAR	24546	FP32-1-TOO-121-J
A3R52	2100-3064	2	RESISTOR, VAR, TRMR 100K OHM 10% C	32997	3006P-1-104
A3R53	0757-0462	2	RESISTOR 75K 1% .125W F TUBULAR	24546	C4-1/8-TO-7502-F
A3R54	0757-0394	8	RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A3R55	2100-3253	4	RESISTOR, VAR, TRMR 50K OHM 10% C	32997	3386P-1-503
A3R56	0698-4525	2	RESISTOR 187K 1% .125W F TUBULAR	24546	C4-1/8-TO-1873-F
A3R57	0698-3263	2	RESISTOR 500K 1% .125W F TUBULAR	19701	MF5C1/8-TO-5003-F
A3R58	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A3R59	0698-6426	2	RESISTOR 213K 1% .125W F TUBULAR	24546	C4, T-0
A3R60	0698-6439	2	RESISTOR 10M 5% .125W F TUBULAR	28480	0698-6439
A3R61	0684-5601	8	RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A3R62	0757-0431	4	RESISTOR 2.43K 1% .125 W F TUBULAR	24546	C4-1/8-TO-2431-F
A3R63	0757-0274	7	RESISTOR 1.21K 1% .125W F TUBULAR	24546	C4-1/8-TO-1213-F
A3R64	0757-0431		RESISTOR 2.43K 1% .125W F TUBULAR	24546	C4-1/8-TO-2431-F
A3R65	0757-0274		RESISTOR 1.21K 1% .125W F TUBULAR	24546	C4-1/8-TO-1213-F
A3R65	2100-3094		RESISTOR, VAR TRMR 100K OHM 10% C	32997	3006P-1-104
A3R67	0757-0462		RESISTOR 75K 1% .125W F TUBULAR	24546	C4-1/8-TO-7502-F
A3R68	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A3R69	2100-3253		RESISTOR, VAR, TRMR 50K OHM 10% C	32997	3386P-1-503
A3R70	0698-4525		RESISTOR 187K 1% .125W F TUBULAR	24546	C4-1/8-TO-1873-F
A3R71	0698-3263		RESISTOR 500K 1% .125W F TUBULAR	19701	MS5C1-8-TO-5003-F
A3R72	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A3R73	0698-6426		RESISTOR 213K 1% .125W F TUBULAR	24546	C4, T-0
A3R74	0698-6439		RESISTOR 10M 5% .125W F TUBULAR	28480	0698-6439
A3R75	0698-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A3R76	0757-0431		RESISTOR 2.43K 1% .125W F TUBULAR	24546	C4-1/8-TO-2431-F
A3R77	0757-0274		RESISTOR 1.21K 1% .125W F TUBULAR	24546	C4-1/8-TO-1213-F
A3R78	0757-0429		RESISTOR 1.82K 1% .125W F TUBULAR	24546	C4-1/8-TO-1821-F
A3R79	0757-0274		RESISTOR 1.21K 1% .125W F TUBULAR	24546	C4-1/8-TO-1213-F
A3R80			NOT ASSIGNED		
A3R81			NOT ASSIGNED		
A3R82			NOT ASSIGNED		
A3R83			NOT ASSIGNED		
A3U1	1826-0553	2	IC, LINEAR	28480	1826-0187
A3U2	1826-0553		IC, LINEAR	28480	1826-0187
A3VR1	1902-0049	2	DIODE-ZNR 6.10V 5% DO-7 PD=.4W	28480	1902-0049
A3VR2	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W	28480	1902-0049
A3VR3	1902-3082	2	DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC=	04713	SZ-10039-86
A3A1	5081-3023	1	ASSY, SUBSTRATE (NOT SUPPLIED WITH A3, ORDER SEPARATELY)	28480	5081-3023
A4	01720-61626	1	DELAY LINE ASSY	28480	01720-61626
A5	01720-66561	1	VERTICAL OUTPUT ASSY (A5A1, A5U1, A5U2 NOT INCLUDED ORDER SEPARATELY)	28480	01720-66561
A5A1	5081-3021	1	RESISTOR ASSY (NOT PART OF A5)	28480	5081-3021
A5C1	0160-3451	85	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C2	0160-3567	1	CAPACITOR-FXD 10PF +-5% 100WVDC CER 0+	28480	0160-3567
A5C3	0160-2264	2	CAPACITOR-FXD 2 PF +-5% 500WVDC CER 0+	28480	0160-2264
A5C4	0121-0467		CAPACITOR, VAR, TRMR, CER 3-9PF	28480	0121-0467
A5C5	0160-0160	2	CAPACITOR-FXD 8200PF +-10% 200WVDC POLYE	56289	292P82292
A5C6	0121-0046	2	CAPACITOR, VAR, TRMR, CER, 9/35PF	73809	DV11P535D
A5C7	0121-0466	1	CAPACITOR; VAR, TRMR CER, 1/3PF	28480	0121-0466
A5C8	0140-0193	1	CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A5C9	0160-0297	1	CAPACITOR-FXD 1200PF +-10% 200WVDC POLYE	56289	292P12292
A5C10	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C11	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C12	0160-3443	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0160-3443
A5C13	0121-0491		CAPACITOR, VAR, TRMR, CER; 5-30PF	28480	0121-0491
A5C14	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C15	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C16	0180-0230		CAPACITOR-FXD, 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A5C17	0160-3451		CAPACITOR-FXD, .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C18	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A5C19	0180-1735	1	CAPACITOR-FXD .22UF +-10% 35VDC TA	56289	150D224X9035A2
A5C20	0160-2198		CAPACITOR-FXD 20PF +-5% 300WVDC	72136	RDM15C200J3C
A5C21	0160-3647	2	CAPACITOR-FXD 10 PF +-5% 100 WVDC CER (FACTORY SELECTED)	28480	0160-3647
A5CR1	0122-0077	2	DIO-VVC 6.8PF C1/C10=1300000 MIN	04713	MV2201
A5CR2	0122-0077		DIO-VVC 6.8PF C1/C10=1900000 MIN	04713	MV2201

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5CR3	1901 0047		DIODE SWITCHING, 20V MAX VRM 75MA	28480	1901 0047
A5CR4	1901 0047		DIODE SWITCHING, 20V MAX VRM 75MA	28480	1901 0047
A5L1	9140 0098	2	COIL FXD, MOLDED RF CHOKE, 2.2UH 10%	24226	15/221
A5L2	9140 0098		COIL FXD, MOLDED RF CHOKE, 2.2UH 10%	24226	15/221
A5L3	9170 0029	9	CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56 590 65A2/4A
A5R1	0757 0388	1	RESISTOR 30.1 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 30R1 F
A5R2	0684 1001	23	RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A5R3	0757 0276	4	RESISTOR 61.9 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 6192 F
A5R4	0757 0276		RESISTOR 61.9 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 6192 F
A5R5	0757 0424	1	RESISTOR 1.1K 1% .125W F TUBULAR	24546	C4 1/8 T0 1101 F
A5R6	0698 7203	3	RESISTOR 42.2 OHM 2% .05W F TUBULAR	24546	C3 1/8 T00 42R2 G
A5R7	0698 7203		RESISTOR 42.2 OHM 2% .05W F TUBULAR	24546	C3 1/8 T00 42R2 G
A5R8	0698 3441	2	RESISTOR 215 OHM 1% .125W F TUBULAR	16299	C4 1/8 T0 215R F
A5R9	0698 0084	2	RESISTOR 2.15K 1% .125W F TUBULAR	16299	C4 1/8 T0 2151 F
A5R10	0757 0278	2	RESISTOR 1.78K 1% .125W F TUBULAR	24546	C4 1/8 T0 1781 F
A5R11	2100 0667	1	RESISTOR VAR TRMR 2K OHM 10% C TOP ADJ	73138	72PR2K
A5R12	0698 3132		RESISTOR 261 OHM 1% .125W F TUBULAR	16299	C4 1/8 T0 2610 F
A5R13	0698 3150	2	RESISTOR 2.37K 1% .125W F TUBULAR	16299	C4 1/8 T0 2371 F
A5R14	0757 0429	5	RESISTOR 1.82K 1% .125W F TUBULAR	24546	C4 1/8 T0 1821 F
A5R15	0698 7236	1	RESISTOR 1K 2% .05W F TUBULAR	24546	C3 1/8 T0 1001 G
A5R16	0757 0458	2	RESISTOR 36.5K 1% .125W F TUBULAR	24546	C4 1/8 T0 3652 F
A5R17	0757 0437	4	RESISTOR 4.75K 1% .125W F TUBULAR	24546	C4 1/8 T0 4751 F
A5R18	0757 0274		RESISTOR 1.21K 1% .125W F TUBULAR	24546	C4 1/8 T0 1213 F
A5R19	0757 0818	1	RESISTOR 825 OHM 1% .5W F TUBULAR	19701	MF7C1/2 T0 825R F
A5R20	0757 0798	1	RESISTOR 110 OHM 1% .5W F TUBULAR	19701	MF7C 1/2 T0 111 F
A5R21	0698 7203		RESISTOR 42.2 OHM 2% .05W F TUBULAR	24546	C3 1/8 T00 42R2 G
A5R22	2100 2061	1	RESISTOR VAR, TRMR, 200 OHM 10% C	30983	ET50W201
A5R23	2100 2060	1	RESISTOR VAR, TRMR, 50 OHM 20% C	32997	3329H 1 50R
A5R24	0757 0398	7	RESISTOR 75 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 75R0 F
A5R25	0757 0398		RESISTOR 75 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 75R0 F
A5R26	0698 3394	1	RESISTOR 31.6 OHM 1% .5W F TUBULAR	19701	MF7C1/2 T0 31R6 F
A5R27	0757 0437		RESISTOR 4.75K 1% .125W F TUBULAR	24546	C4 1/8 T0 4751 F
A5R28	0761 0025		RESISTOR 120 OHM 5% 1W MO TUBULAR	24546	FP32 1 T00 121 J
A5R29	0761 0025		RESISTOR 120 OHM 5% 1W MO TUBULAR	24546	FP32 1 T00 121 J
A5R30	0761 0025		RESISTOR 120 OHM 5% 1W MO TUBULAR	24546	FP32 1 T00 121 J
A5R31	0698-7222		RESISTOR 260 OHM 1% .05W F TC=0+-100	24546	C3-1/8-T0-261R-G
A5RT1	0837 0113	1	THERMISTOR, NEG TC, 100K DISC	0041N	4D101
A5U1	5081 3022	1	IC, (NOT PART OF A5 ORDER SEPARATELY)	28480	5081 3022
A5U2	5081 3024	1	IC, (NOT PART OF A5 ORDER SEPARATELY)	28480	5081 3024
A5VR1	1902 0025	2	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939 182
A5VR2	1902 3082	1	DIODE-ZNR 4.64 V VZ, .4W MAX PD	28480	1902-3082
A5XU1	1200 0473	4	SOCKET, ELEC, IC 16 CONT DIP SLDR TERM	28480	1200 0473
A6	01720 66531	1	INTERNAL TRIGGER SWITCH ASSY	28480	01720 66534
A6CR1	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A6R1	0684 2731	2	RESISTOR 27K 10% .25W CC TUBULAR	01121	CB2731
A6R2	0684 2731		RESISTOR 27K 10% .25W CC TUBULAR	01121	CB2731
A6S1	3101 0658	1	SWITCH PB 4STA 4PDT .394 IN CTRS .45A	28480	3101 0658
A6XA3	1251 3472	2	CONNECTOR, 8 CONT, FEM, POST TYPE	27264	09 52 3081
A6XA7	1251 0628	1	CONNECTOR, 10 CONT, FEM, POST TYPE	27264	09 52 3103
A7	01720 66557	1	VERTICAL DISPLAY SWITCH ASSY	28480	01720 66557
A7C1	0180 0230		CAPACITOR FXD, 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A7C2	0180 0230		CAPACITOR FXD, 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A7C3	0160 2209	1	CAPACITOR FXD, 200PF +-5% 300WVDC MICA	28480	0160-2209
A7C4	0160 3470		CAPACITOR FXD, .01UF +80-20% 50WVDC CER	28480	0160 3470
A7C5	0160 2204		CAPACITOR FXD, 100PF +-5% 300WVDC MICA	28480	0160-2204
A7CR1	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A7CR2	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A7P1	1251 0629	1	CONNECTOR, 10 CONT, MALE, POST TYPE	27264	09 64 1103
A7Q1	1854 0882		TRANSISTOR NPN SI	28480	1854 0882
A7Q2	1854 0882		TRANSISTOR NPN SI	28480	1854 0882
A7R1	0698 3150		RESISTOR 2.37K 1% .125W F TUBULAR	16299	C4 1/8 T0 2371 F
A7R2	0698 3226	1	RESISTOR 6.49K 1% .125W F TUBULAR		
A7R3	0757 0273	3	RESISTOR 3.01K 1% .125W F TUBULAR	24546	C4 1/8 T0 3011 F
A7R4	0757 0407	3	RESISTOR 200 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 201 F
A7R5	0698 4380		RESISTOR 45.3 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 75R0 F
A7R6	0698 4380		RESISTOR 45.3 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 75R0 F
A7R7	0757 0809	1	RESISTOR 332 OHM 1% .5W F TUBULAR	19701	MF7C1/2 T0 332R F
A7R8	0757 0740	2	RESISTOR 2.21K 1% .25W F TUBULAR	24546	C5 1/4 T0 2211 F
A7R9	0757 0740		RESISTOR 2.21K 1% .25W F TUBULAR	24546	C5 1/4 T0 2211 F
A7R10	0683 1825	2	RESISTOR 1.8K 5% .25W CC TUBULAR	01121	CB1825
A7R11	0684 2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A7R12	0684 2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A7R13	0757-0400		RESISTOR 90.9 OHM 1% .125W F TC=0+-100		0757-0400
A7R14			NOT ASSIGNED		
A7R15	0683-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
A7R16	0683-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
A7R17	0683-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
A7R18	0683-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
A7R19	0683-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
A7R20	0683-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
A7S1	3101-0661	1	SWITCH PB 4STA 4PDT .394 IN CTRS .45A	28480	3101 0661
A7U1	1820-0820	1	IC FF ECL J BAR K BAR COM CLOCK DUAL	04713	MC10135L
A7U2	1820-0803	1	IC GATE ECL OR-NOR TPL04713	04713	MC10105P
A7U3	1821-0001	5	IC LIN CA3046 TRANSISTOR ARRAY	02735	CA3046
A7XA3	1251-3472		CONNECTOR, 8 CONT, FEM, POST TYPE	27264	09 52 3081
A7XU1	1200-0607		SOCKET IC 14 CONT DIP SLDR TERM	28480	1200-0607
A7XU2	1200-0607		SOCKET IC 14 CONT DIP SLDR TERM	28480	1200-0607
A7XU3	1200-0607		SOCKET IC 14 CONT DIP SLDR TERM	28480	1200-0607
A8	01722-66531	1	HORIZONTAL SWEEP ASSY (A8U2, A8U5 NOT INCLUDED ORDER SEPARATELY)	28480	01722-66531

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8C1	0160-4690	2	CAPACITOR-FXD .02UF +80-20% 600 WVDC	28480	0160-4690
A8C2	0160-3446		CAPACITOR FXD 220PF +-10% 1000WVDC CER	28480	0160-3446
A8C3	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C4	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C5	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C7	0160-2246	2	CAPACITOR FXD 3.6PF +-.25PF 500WVDC CER	28480	0160-2246
A8C8	0160-3318		CAPACITOR FXD .047UF +-10% 100WVDC	28480	0160-3318
A8C9	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C10	0160-3569	2	CAPACITOR FXD 27PF +-5% 100WVDC CER 0+	28480	0160-3569
A8C11	0160-3318		CAPACITOR FXD .047UF +-10% 100WVDC	28480	0160-3318
A8C12	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C13	0160-2265	6	CAPACITOR FXD 22PF +-5% 500WVDC CER 0+	28480	0160-2265
A8C14	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C15	0160-0168	1	CAPACITOR FXD 1UF +-10% 200WVDC POLYE	56289	2C2P10492
A8C16	0180-0197	20	CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	1500225X9020A2
A8C17	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C18	0160-2257		CAPACITOR FXD 10PF +-5% 500WVDC	28480	0160-2257
A8C19	0160-3446		CAPACITOR FXD 220PF +-10% 1000WVDC CER	28480	0160-3446
A8C20	0160-4690		CAPACITOR-FXD .02UF +80-20% 600 WVDC	28480	0160-4690
A8C21	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C22	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C23	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C24	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C25	0160-2246		CAPACITOR FXD 3.6PF +-.25PF 500WVDC CER	28480	0160-2246
A8C26	0160-3318		CAPACITOR FXD .047UF +-10% 100WVDC	28480	0160-3318
A8C27	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC	28480	0160-345[illegible]
A8C28	0160-3569		CAPACITOR FXD 47PF +-5% 100WVDC CER 0+	28480	0160-3569
A8C29	0160-3318		CAPACITOR FXD .047UF +-10% 100WVDC	28480	0160-3318
A8C30	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C31	0150-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	[illegible]50-3451
A8C32	0150-0116		CAPACITOR FXD 47PF +-5% 500WVDC	28480	[illegible]50-0116
A8C33	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C34	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C35	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C36	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C37	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C38	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C39	0160-2265		CAPACITOR FXD 22PF +-5% 500WVDC CER 0+	28480	0160-2265
A8C40	0160-2265		CAPACITOR FXD 22PF +-5% 500WVDC CER 0+	28480	0160-2265
A8C41	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C42	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C43	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	1500225X9020A2
A8C44	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	1500225X9020A2
A8C45	0121-0046		CAPACITOR VAR, TRMR, CER, 9/35PF	73399	DV11PS35D
A8C46	0160-2257	2	CAPACITOR FXD 10PF +-5% 500WVDC CER 0+	28480	0160-2257
A8C47	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C48	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C49	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	1500225X9020A2
A8C50	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C51	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C52	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C53	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A8C54	0150-0115	1	CAPACITOR FXD 27PF +-10% 500WVDC CER	28480	0150-0115
A8C56	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC	28480	0160-3451
A8C57	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC	28480	0160-3451
A8C58	0160-2202		CAPACITOR FXD 75PF +-5% 300WVDC MICA	28480	0160-2202
A8CR1	1901-0376	2	DIODE GEN PRP 35V 50MA	28480	1901-0376
A8CR2	1901-0047	11	DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR3	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR4	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR5	1910-0016	2	DIODE SWITCHING 1US 60V 60MA	28480	1910-0016
A8CR6	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR7	1901-0376		DIODE GEN PRP 35V 50MA	28480	1901-0376
A8CR8	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR9	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR10	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR11	1910-0016		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR12	1901-0047		DIODE SWITCHING 1US 60V 60MA	28480	1910-0016
A8CR13	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR14	1901-0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901-0047
A8CR15	1901-0376		DIODE GEN PRP 35V 50MA	28480	1901-0376
A8CR16	1901-0040		DIODE SWITCHING 30V 50 MA 2NS	28480	1901-0040
A8J1	1250-0083	1	CONNECTOR RF BNC FEM SGL HOLE FR	24931	28JR 130-1
A8L1	01921-61303	2	BEAD	28480	01921-61303
A8L2	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2-4A
A8L3	9140-0115	3	COIL, FXD, MOLDED RF CHOKE, 22UH 10%	82142	22-4422-8K
A8L4	01921-61303		BEAD	28480	01921-61303
A8L5	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2-4A
A8L6	9140-0115		COIL, FXD, MOLDED RF CHOKE, 22UH 10%	82142	22-4422-8K
A8L7	9140-0138	1	COIL, FXD, MOLDED RF CHOKE, 180UH 5%	24226	15/183
A8L8	9100-2256	1	COIL, FXD, MOLDED RF CHOKE, .56UH 10%	24226	10-560
A8P1	1251-3475	4	CONNECTOR, 10 PIN, MALE, POST TYPE	27264	09-60-1101

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8P2	1251 3072	1	CONNECTOR, 12 CONT, MALE, POST TYPE	27264	09 56 1121
A8P3	1251 3319		CONNECTOR, 10 CONT, MALE, POST TYPE	27264	09 64 1101 (A2402 10A)
A8P4	1251 3197	2	CONNECTOR, 12 CONT, MALE, POST TYPE	27264	09 60 1121 (2403 12A)
A8P5	1251 3276	1	CONNECTOR, 6 CONT, MALE, POST TYPE	27264	09 60 1061 (A2403 6A)
A8P6	1251 3197		CONNECTOR, 12 CONT, MALE, POST TYPE	27264	09 60 1121 (2403 12A)
A8Q1	1855 0081	3	TRANSISTOR, J FET N CHAN, D MODE SI	01295	2N5245
A8Q2	1854 0646		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854 0646
A8Q3	1854 0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854 0071
A8Q4	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q5	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q6	1854 0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854 0071
A8Q7	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q8	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q9	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q10	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q11	1854 0691		TRANSISTOR NPN SI TO-92 PD=350MW	02037	SPS7438
A8Q12	1855 0081		TRANSISTOR, J FET N CHAN, D MODE SI	01295	2N5245
A8Q13	1854 0646		TRANSISTOR NPN SI TO-72 PD 200MW	28480	1854 0646
A8Q14	1854 0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854 0071
A8Q15	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q16	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q17	1853 0015	5	TRANSISTOR PNP SI CHIP PD=200MW	28480	1853 0015
A8Q18	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q19	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q20	1854 0092	8	TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q21	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q22	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q23	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q24	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q25	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q26	1853 0015		TRANSISTOR PNP SI CHIP PD=200MW	28480	1853 0015
A8Q27	1853 0015		TRANSISTOR PNP SI CHIP PD=200MW	28480	1853 0015
A8Q28	1853 0015		TRANSISTOR PNP SI CHIP PD=200MW	28480	1853 0015
A8Q29	1853 0015		TRANSISTOR PNP SI CHIP PD=200MW	28480	1853 0015
A8Q30	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q31	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q32	1854 0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854 0092
A8Q33	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A8Q34	1854 0067		TRANSISTOR NPN SI PD=360MW FT=75MHZ	28480	1854 0067
A8Q35,36,37	1854 0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854 0071
A8R1	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A8R2	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A8R3	0757 0488	4	RESISTOR 909K 1% .125W F TUBULAR	19701	MFF 1/8, T 1
A8R4	0757 0465	4	RESISTOR 100K 1% .125W F TUBULAR	24546	C4 1/8 TO 1003 F
A8R5	0757 0488		RESISTOR 909K 1% .125W F TUBULAR	19701	MFF 1/8, T 1
A8R6	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A8R7	0684 1061	3	RESISTOR 10M 10% .25W CC TUBULAR	01121	CB1061
A8R8	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R9	0757 0283	13	RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 TO 2001 F
A8R10	0757 0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 150R F
A8R11	0757 0487		RESISTOR 825K 1% .125W F TUBULAR	91637	MF5C, T 0
A8R12	0757 0464		RESISTOR 90.9K 1% .125W F TUBULAR	24546	C4 1/8 TO 9092 F
A8R13	0757 0488		RESISTOR 909K 1% .125W F TUBULAR	19701	MFF 1/8, T 1
A8R14	0684 2221	17	RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R15	0757 0485		RESISTOR 681K 1% .125W F TUBULAR	19701	MFF 1/8, T 1
A8R16	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R17	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R18	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R19	0684 2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A8R20	0684 2721	2	RESISTOR 2.7K 10% .25W CC TUBULAR	01121	CB2721
A8R21	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A8R22	0683 2705	2	RESISTOR 27 OHM 5% .25W CC TUBULAR	01121	CB2705
A8R23	0757 0734	2	RESISTOR 1.21K 1% .25W F TUBULAR	24546	C5 1/4 TO 1211 F
A8R24	0757 0416	8	RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 511R F
A8R25	0698 3431	4	RESISTOR 23.7 OHM 1% .125W F TUBULAR	03888	PME55 1/8 TO 23R7 F
A8R26	0698 3431		RESISTOR 23.7 OHM 1% .125W F TUBULAR	03888	PME55 1/8 TO 23R7 F
A8R27	0757 0429		RESISTOR 1.82K 1% .125W F TUBULAR	24546	C4 1/8 TO 1821 F
A8R28	0757 0404	2	RESISTOR 130 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 131 F
A8R29	0684 0271		RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A8R30	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A8R31	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R32	0698 3153	4	RESISTOR 3.83K 1% .125W F TUBULAR	16299	C4 1/8 TO 3831 F
A8R33	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A8R34	0757 0409	4	RESISTOR 274 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 274R F
A8R35	0684 3901	6	RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R36	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A8R37	0757 0427	6	RESISTOR 1.5K 1% .125W F TUBULAR	24546	C4 1/8 TO 1501 F
A8R38	0757 0401		RESISTOR 100 1% .125W TC=0+-100	24546	C4-1/8-TO-101RF
A8R39	0757 0421	15	RESISTOR 825 1% .125W TC=0+-100	24546	C4-1/8-TO-825RF
A8P40	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R41	0757 0410	3	RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 301R F
A8R42	0698 3153		RESISTOR 3.83K 1% .125W F TUBULAR	16299	C4 1/8 TO 3831 F

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8R43	0757 0409		RESISTOR 274 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 274R F
A8R44	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R45	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A8R46	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TO-825R-F
A8R47	2100 0564		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500K
A8R48	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TO-825R-F
A8R49	0757-0413		RESISTOR 392 1% .125W F TC=0+-100	24546	C4-1/8-TO-392R-F
A8R50	0757-0406	3	RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-TO-182R-F
A8R51	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3321-F
A8R52	0757-0434		RESISTOR 3.65K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3651-F
A8R53	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A8R54	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A8R55			NOT ASSIGNED		
A8R56			NOT ASSIGNED		
A8R57			NOT ASSIGNED		
A8R58	0698 0085	3	RESISTOR 2.61K 1% .125W F TUBULAR	16299	C4 1/8 TO 2611 F
A8R59	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A8R61	0757 0488		RESISTOR 909K 1% .125W F TUBULAR	19701	MFF-1/8, T-1
A8R62	0757 0465		RESISTOR 100K 1% .125W F TUBULAR	24546	C4 1/8 TO 1003 F
A8R63	0757 0464		RESISTOR 90.9K 1% .125W F TUBULAR	24546	C4 1/8 TO 9092 F
A8R64	0757 0488		RESISTOR 909K 1% .125W F TUBULAR	19701	MFF-1/8, T-1
A8R65	0684 1061		RESISTOR 10M 10% .25W CC TUBULAR	01121	CB1061
A8R66	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A8R67	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R68	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 TO 2001 F
A8R69	0757 0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-150R-F
A8R70	0757 0487		RESISTOR 825K 1% .125W F TUBULAR	91637	MFBC, T-0
A8R71	0757 0488		RESISTOR 909K 1% .125W F TUBULAR	19701	MFF 1/8, T-1
A8R72	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R73	0757 0485		RESISTOR 681K 1% .125W F TUBULAR	19701	MFF 1/8, T-1
A8R74	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R75	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R76	0684 2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A8R77	0683 2705		RESISTOR 27 OHM 5% .25W CC TUBULAR	01121	CB2705
A8R78	0684 2721		RESISTOR 2.7K 10% .25W CC TUBULAR	01121	CB2721
A8R79	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A8R80	0757 0734		RESISTOR 1.21K 1% .25W F TUBULAR	24546	C5 1/4 TO 1211 F
A8R81	0757 0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 511R F
A8R82	0698 3151		RESISTOR 2.87K 1% .125W F TUBULAR	16299	C4-1/8 TO-2871 F
A8R83	0698 3431		RESISTOR 23.7 OHM 1% .125W F TUBULAR	03888	PME55 1/8 T0 23R7 F
A8R84	0698 3431		RESISTOR 23.7 OHM 1% .125W F TUBULAR	03888	PME55 1/8 TO 23R7 F
A8R85	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R86	0684 0271		RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A8R87	0757 0409		RESISTOR 274 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 274R F
A8R88	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A8R89	2100 0564		RESISTOR VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500K
A8R90	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R91	0698 3153		RESISTOR 3.83K 1% .125W F TUBULAR	16299	C4 1/8 TO 3831 F
A8R92	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R93	0684 2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A8R94	0684 2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A8R95	0757 0834	2	RESISTOR 5.62K 1% .5W F TUBULAR	19701	MF7C1/2 TO 5621 F
A8R96	0757 0419		RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 681R F
A8R97	0757 0417	3	RESISTOR 562 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 562R F
A8R98	0698 0064		RESISTOR 2.15K 1% .125W F TUBULAR	16299	C4 1/8 TO 2151 F
A8R99	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R100	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R101	0684 1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A8R102	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R103	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A8R104	0757 0419		RESISTOR 681 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 681R F
A8R105	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R106	0757-0421	4	RESISTOR 825 1% .125W F TUBULAR	28480	0757-0421
A8R107	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R108	0698 6612	3	RESISTOR 2K .1% .125W F TUBULAR	19701	MF4C1/8 T2 2001 B
A8R109	0698 6612		RESISTOR 2K .1% .125W F TUBULAR	19701	MF4C1/8 T2 2001 B
A8R110	0698 3441		RESISTOR 215 OHM 1% .125W F TUBULAR	16299	C4 1/8 TO 215R F
A8R111	0757 0417		RESISTOR 562 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 562R F
A8R112	0757 0420	2	RESISTOR 750 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 751 F
A8R113	0757 0428		RESISTOR 1.62K 1% .125W F TUBULAR	24546	C4 1/8 TO 1621 F
A8R114	0698 7401	1	RESISTOR 1.71K .1% .125W F TUBULAR	19701	MF4C1/8 T2 1711 B
A8R115	0698 6612		RESISTOR 2K .1% .125W F TUBULAR	19701	MF4C1/8 T2 2001 B
A8R116	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A8R117	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R118	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R119	0698 3136	2	RESISTOR 17.8K 1% .125W F TUBULAR	16299	C4 1/8 TO 1782 F
A8R120	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A8R121	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R122	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R123	0698 3445	1	RESISTOR 348 OHM 1% .125W F TUBULAR	16299	C4 1/8 TO 348R F
A8R124	0757 0405	1	RESISTOR 162 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 162R F

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8R125	0684 3901		RESISTOR 39 OHM 10% .25W CC TUBULAR	01121	CB3901
A8R126	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A8R127	0684 1001		RESIS..OR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A8R128	0684 1001		RESISTOR 10 OHM 1 %.25W CC TUBULAR	01121	CB1001
A8R129	0757 0278		RESISTOR 1.78K 1% .125W F TUBULAR	24546	C4 1/8-T0-1781 F
A8R130	0757 0422	2	RESISTOR 909 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-909R F
A8R131	0684 1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A8R132	0757 0447	1	RESISTOR 16.2K 1% .125W F TUBULAR	24546	C4 1/8 T0 1622 F
A8R133	2100 0654		RESISTOR VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500K
A8R134	0698 3430		RESISTOR 178 1% .125WF TC=0 +-100	02995	MF4C-1
A8R135	0757 0407		RESISTOR 200 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 201 F
A8R136	0757 0401	6	RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 101 F
A8R137	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A8R138	0684 1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A8R139	0757 0456		RESISTOR 36.5K 1% .125W F TUBULAR	24546	C4 1/8 T0 3652 F
A8R140	0698 0085		RESISTOR 2.61K 1% .125W F TUBULAR	16299	C4 1/8 T0 2611 F
A8R141	0757 0435	5	RESISTOR 3.92K 1% .125W F TUBULAR	24546	C4 1/8 T0 3921 F
A8R142	0757 0436	4	RESISTOR 4.32K 1% .125W F TUBULAR	24546	C4 1/8 T0 4321 F
A8R143	0757 0440	2	RESISTOR 7.5K 1% .125W F TUBULAR	24546	C4 1/8-T0-7501 F
A8R144	0757 0451	6	RESISTOR 24.3K 1% .125W F TUBULAR	24546	C4 1/8 T0 2432 F
A8R145	0757 0451		RESISTOR 24.3K 1% .125W F TUBULAR	24546	C4 1/8 T0 2432 F
A8R146	2100 0668	1	RESISTOR VAR TRMR 100 OHM 10% C TOP ADJ	73138	72PR100K
A8R147	0757 0406	6	RESISTOR 182 OHM 1% .125W F TUBULAR	02995	MF4C-1
A8R148	2100 3211		RESISTOR VAR TRMR 1K OHM 10% C SIDE ADJ	32997	3389P-1-102
A8R149	0757 0430		RESISTOR 2.21K 1% .125W F TUBULAR	02995	MF4C-1
A8R150	0757 0451		RESISTOR 24.3K 1% .125W F TUBULAR	24546	C4 1/8-T0-2432 F
A8R151	0757 0451		RESISTOR 24.3K 1% .125W F TUBULAR	24546	C4 1/8 T0 2432 F
A8R152	0757 0124	2	RESISTOR 39.2K 1% .125W F TUBULAR	24546	C5-1/4 T0 3922 F
A8R153	2100 3253		RESISTOR VAR TRMR 50K OHM 10% C TOP ADJ	32997	3389P-1-503
A8R154	0757 0124		RESISTOR 39.2K 1% .125W F TUBULAR	24546	C5-1/4 T0 3922 F
A8R155	0757 0410		RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 301R F
A8R156	0757 0410		RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 301R F
A8R157	0757 0398		RESISTOR 75 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 75R0 F
A8R158	0757 0398		RESISTOR 75 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 75R0 F
A8R159	0757 0417		RESISTOR 562 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 562R F
A8R160	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 T0 2001 F
A8R161	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 T0 2001 F
A8R162	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A8R163	0684 1221	4	RESISTOR 1.2K 10% .25W CC TUBULAR	01121	CB1221
A8R164	0698 3439	1	RESISTOR 178 OHM 1% .125W F TUBULAR	16299	C4 1/8 T0 178R F
A8R165	0757 0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 511R F
A8R166	0757 0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 511R F
A8R167	0757 0282	2	RESISTOR 221 OHM 1% .125W F TUBULAR	24546	C4 1/8 T0 221R F
A8R168	0757 0424		RESISTOR 1.1K 1% .125W F TUBULAR	28480	0757-0424
A8R169	0684 1011		RESISTOR 100 10% .25W FC 0+-100	28480	0684-1011
A8R170	0757 0480		RESISTOR 432K 1% .125W F TUBULAR	30983	MF4C1/8 T0 4323 F
A8R171	0757 0480		RESISTOR 432K 1% .125W F TUBULAR	30983	MF4C1/8 T0 4323 F
A8R172	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A8R173	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A8R174	0757 0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4 1/8 T0 1001 F
A8R175	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 2001 F
A8R176	0757 0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4 1/8 T0 1001 F
A8R177	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 2001 F
A8R178	0684 1051		RESISTOR 1M OHM 10% .25W CC TUBULAR	01121	CB1051
A8R179	0684 1011		RESISTOR 100 OHM 5% .25W CC TUBULAR	01121	CB1011
A8S1	3101 0659	1	SWITCH PB 16STA .394 IN CTRS .45A 115VAC	28480	3101 0659
A8U1	1826 0086	4	IC LIN AMPLIFIER	07263	776HC
A8U2	5081 3019	2	ASSY, SUBSTRATE (NOT SUPPLIED W/A8, ORDER SEPARATELY)	28480	5081 3019
A8U3	1821 0001		NOT ASSIGNED		
A8U4	1826 0086		IC LIN AMPLIFIER	07263	776HC
A8U5	5081 3019		ASSY, SUBSTRATE (NOT SUPPLIED W/A8, ORDER SEPARATELY)	28480	5081 3019
A8U6	1821 0001		IC LIN CA3046 TRANSISTOR ARRAY	02735	CA3046
A8U7	1821 0001		IC LIN CA3046 TRANSISTOR ARRAY	02735	CA3046
A8VR1	1902 3048	4	DIODE-ZNR 3.48V 5% DO-7 PD=.4W	04713	SZ 10939-50
A8VR2	1902 3048		DIODE ZNR 3.48V 5% DO-7 PD=.4W	04713	SZ 10939-50
A8VR3	1902 3048		DIODE ZNR 3.48V 5% DO-7 PD=.4W	04713	SZ 10939-50
A8VR4	1902 3048		DIODE-ZNR 3.48V 5% DO-7 PD=.4W	04713	SZ 10939-50
A8VR5	1902 3104	1	DIODE ZNR 5.62V 5% DO-7 PD=.4W	04713	SZ 10939-110
A8VR6	1902 3149	1	DIODE-ZNR 9.09V 5% PD=.4W	28480	1902-3149
A8W1	01720 61620	1	CABLE ASSY, COAX	28480	01720-61620
A8XA9	01722 27601	3	CONNECTOR PC EDGE 10 CONT	71785	252-10-30-310
A8XA11	01722 27601		CONNECTOR PC EDGE 10 CONT	71785	252-10-30-310
A8XA12	01722 27601		CONNECTOR PC EDGE 10 CONT	71785	252-10-30-310
A8XA19	1251 1886		CONNECTOR, 30F RECP	28480	1251 1886
A3XA22	1251 1633		CONNECTOR, 15F RECP	28480	1251 1633
A8XU2	1200 0607		SOCKET, ELEC, IC 16 CONT DIP SLDR TERM	28480	1200 0607
A8XU3	1200 0638	4	SOCKET, ELEC, IC 14 CONT DIP SLDR TERM	28480	1200 0638
A8XU5	1200 0607		SOCKET, ELEC, IC 16 CONT DIP SLDR TERM	28480	1200 0607
A8XU6	1200 0638		SOCKET, ELEC, IC 14 CONT DIP SLDR TERM	28480	1200 0638
A8XU7	1200 0638		SOCKET, ELEC, IC 14 CONT DIP SLDR TERM	28480	1200 0638
A9	01720 66547	1	DELAY SWEEP SWITCH ASSY	28480	01720 66547
A9C1	0150 0116	1	CAPACITOR FXD 47PF +-10% 500WVDC CER	28480	0150 0116
A9C2	0121 0495	6	CAPACITOR VAR TRMR 1.9/15.7PF	28480	0121 0495

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9C3	0150-0063	1	CAPACITOR-FXD 10PF +-5PF 500WVDC CER	28480	0150-0063
A9C4	0140-0218	2	CAPACITOR-FXD 160PF +-2% 300WVDC MICA	72136	DM15F161G0300WV1CR
A9C5	0140-0218		CAPACITOR-FXD 160PF +-2% 300WVDC MICA	72136	DM15F161G0300WV1CR
A9C6	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C7	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A9C8	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A9C9	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A9C10	0121-0495		CAPACITOR-VAR-TRMR 1.9/15.7PF	28480	0121-0495
A9C11	0160-2261	3	CAPACITOR-FXD 15PF +-5% 500WVDC CER 0+	28480	0160-2261
A9C12	0121-0495		CAPACITOR-VAR-TRMR 1.9/15.7PF	28480	0121-0495
A9C13	0160-0974	2	CAPACITOR-FXD 80PF +-2% 300WVDC MICA	28480	0160-0974
A9C14	0160-3541		CAPACITOR-FXD .01UF +-5% 100WVDC CER	84411	HEW-192
A9C15	0160-3324	2	CAPACITOR-FXD 1UF +-5% 100WVDC MET POLYC	28480	0160-3324
A9C16	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C17	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C18	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A9C19	0160-2250	1	CAPACITOR-FXD 5.1PF +-.25PF 500WVDC	28480	0160-2250
A9CR1	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A9CR2	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A9CR3	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A9L1	9140-0115		COIL-FXD, MOLDED RF CHOKE, 22UH 10%	82142	22-4422-BK
A9L2	9170-0029		CORE-MAG SHIELDING BEAD	02114	56-590-65-A2/4A
A9L3			NOT ASSIGNED		
A9L4	9170-0029		CORE-MAG SHIELDING BEAD	02114	56-590-65-A2/4A
A9L5	9170-0029		CORE-MAG SHIELDING BEAD	02114	56-590-65-A2/4A
A9MP1	1460-1148	2	SPRING-TORSION	00000	OBD
A9MP2	01840-22502	2	ROLLER, DETENT	28480	01840-22502
A9Q1	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A9Q2	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A9Q3	1853-0244	2	TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0244
A9Q4	1855-0081		TRANSISTOR J-FET N CHAN D-MODE SI	01295	2N5245
A9Q5	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A9Q6	1854-0628		TRANSISTOR NPN SI PD=625MW FT=800MHZ	04713	MPS-H17
A9Q7	1854-0691		TRANSISTOR NPN	28480	1854-0691
A9Q8	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A9Q9	1854-0691		TRANSISTOR NPN	28480	1854-0691
A9R1	0698-3446	1	RESISTOR 3 OHM 1% .125W F TUBULAR	16299	C4-1/8-T0-3R3-F
A9R2	0757-0280		RESISTOR 1% .125W F TUBULAR	24546	C4-1/8-T0-1001-F
A9R3	0757-0288	3	RESISTOR 9.09K 1% .125W F TUBULAR	19701	MF4C1/8-T0-9091-F
A9R4	0684-2201	4	RESISTOR 22 OHM 10% .25W CC TUBULAR	01121	CB2201
A9R6	0757-0470		RESISTOR 750 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-751-F
A9R7	0683-1035	2	RESISTOR 10K 5% .25W CC TUBULAR	01121	CB1035
A9R8	0684-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A9R9	0684-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A9R10	0687-1821	1	RESISTOR 1.8K 10% .5W CC TUBULAR	01121	EB1821
A9R11	0684-4721	5	RESISTOR 4.7K 10% .25W CC TUBULAR	01121	CB4721
A9R12	0687-3321	1	RESISTOR 3.3K 10% .5W CC TUBULAR	01121	EB3321
A9R13	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A9R14	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A9R15	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A9R16	0687-2721	2	RESISTOR 2.7K 10% .5W CC TUBULAR	01121	EB2721
A9R17	0698-6450	2	RESISTOR 2.5K .1% .125W F TUBULAR	03888	PME55-T-2
A9R18	0698-5449	3	RESISTOR 5K .1% .125W F TUBULAR	19701	MF4C1/8-T2-5001-B
A9R19	0698-6360	2	RESISTOR 10K .1% .125W F TUBULAR	19701	MF4C1/8-T0-1002-B
A9R20	0698-6842	2	RESISTOR 25K .1% .125W F TUBULAR	19701	MF4C1/8-T2-2502-B
A9R21	0698-6450	2	RESISTOR 50K .1% .125W F TUBULAR	19701	MF4C1/8-T2-5002-B
A9R22	0698-4158	2	RESISTOR 100K .1% .125W F TUBULAR	19701	MF4C1/8-T2-1003-B
A9R23	0757-0427		RESISTOR 1.5K 1% .125W F TUBULAR	24546	C4-1/8-T0-1501-F
A9R24	0684-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A9R25	0684-4751	3	RESISTOR 4.7M 10% .25W CC TUBULAR	01121	CB4751
A9R26	0757-0427		RESISTOR 1.5K 1% .125W F TUBULAR	24546	C4-1/8-T0-1501-F
A9R27	0757-0426	2	RESISTOR 1.3K 1% .125W F TUBULAR	24546	C4-1/8-T0-1301-F
A9R28	0757-0435		RESISTOR 3.92K 1% .125W F TUBULAR	24546	C4-1/8-T0-3921-F
A9R29	0698-0085		RESISTOR 2.61K 1% .125W F TUBULAR	16299	C4-1/8-T0-2611-F
A9R30	2100-3056	5	RESISTOR-VAR TRMR 5K OHM 10% C SIDE ADJ	32997	3006P-1-502
A9R31	2100-3056		RESISTOR-VAR TRMR 5K OHM 10% C SIDE ADJ	32997	3006P-1-502
A9R32	0757-0439	1	RESISTOR 6.81K 1% .125W F TUBULAR	24546	C4-1/8-T0-6811-F
A9R33	0757-0836	1	RESISTOR 7.5K 1% .5W F TUBULAR	19701	MF7C1/2-T0-7501-F
A9R34	0684-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A9R35	0757-0434	5	RESISTOR 3.66K 1% .125W F TUBULAR	24546	C4-1/8-T0-3661-F
A9R36	0757-0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-511R-F
A9R37	0757-0446	5	RESISTOR 15K 1% .125W F TUBULAR	24546	C4-1/8-T0-1502-F
A9R38	2100-3354	3	RESISTOR-VAR TRMR 50K OHM 10% C SIDE ADJ	73138	72XR504
A9R39	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A9U1	1826-0086		IC-LIN AMPLIFIER	07263	776HC
A10	01720-66566	1	BOARD ASSY, HORIZONTAL DISPLAY SWITCH	28480	01720-66566
A10C1	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C2	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C3	0160-2253	1	CAPACITOR-FXD 6.8PF +-.25PF 500WVDC CER	28480	0160-2253
A10C4	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C5	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10C6	0160-2261		CAPACITOR FXD 15PF +-5% 500WVDC CER 0+	28480	0160-2261
A10C7	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C8	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C9	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C10	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C11			NOT ASSIGNED		
A10C12	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C13	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C14	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C15	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C16	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C17	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C18	0160-0160		CAPACITOR FXD 8200PF +-10% 200WVDC POLYE	56289	292P82292
A10C19	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10C20	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A10CR1	1901-0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901-0040
A10CR2	1901-0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901-0040
A10L1	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2/4A
A10L2	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2/4A
A10Q1	1854-0546		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0546
A10Q2	1854-0546		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0546
A10Q3	1853-0352	4	TRANSISTOR PNP SI CHIP TO-92 PD=350MW	28480	1853-0352
A10Q4	1853-0352		TRANSISTOR PNP SI CHIP TO-92 PD=350MW	28480	1853-0352
A10Q5	1853-0352		TRANSISTOR PNP SI CHIP TO-92 PD=350MW	28480	1853-0352
A10Q6	1853-0352		TRANSISTOR PNP SI CHIP TO-92 PD=350MW	28480	1853-0352
A10Q7	1854-0345		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0345
A10Q8	1854-0546		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0546
A10R1	0757-0434		RESISTOR 3.65K 1% .125W F TUBULAR	24546	C4-1/8-T0-3651-F
A10R2	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A10R3	0698-3447	1	RESISTOR 422 OHM 1% .125W F TUBULAR	16299	C4-1/8-T0-422-F
A10R4	0757-0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-151-F
A10R5	0757-0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-151-F
A10R6	0757-0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-151-F
A10R7	0757-0394		RESISTOR FXD 51.1 OHM 1% .125W F	24546	C4-1/8-T0-51R1-F
A10R8	0757-0394		RESISTOR FXD 51.1 OHM 1% .125W F	24546	C4-1/8-T0-51R1-F
A10R9	0757-0815		RESISTOR 562 OHM 1% .5W F TUBULAR	30983	MF7C1/2-T0-562R-F
A10R10	0757-1060		RESISTOR 196 OHM 1% .5W F TUBULAR	30983	MF7C1/2-T0-196R-F
A10R11	0757-0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-101-F
A10R12	0757-0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-101-F
A10R13	0698-3429	2	RESISTOR 19.6 OHM 1% .125W F TUBULAR	03888	PME55-1/8-T0-19R6-F
A10R14	0698-3429		RESISTOR 19.6 OHM 1% .125W F TUBULAR	03888	PME55-1/8-T0-19R6-F
A10R15	0757-0069	1	RESISTOR 121 OHM 1% .25W F TUBULAR	19701	MF52C1/4-T0-121R-F
A10R16	0684-2201		RESISTOR 22 OHM 10% .25W CC TUBULAR	01121	CB2201
A10R17	0684-2201		RESISTOR 22 OHM 10% .25W CC TUBULAR	01121	CB2201
A10R18	0684-6811	3	RESISTOR 680 OHM 10% .25W CC TUBULAR	01121	CB6811
A10R19	0757-0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-101-F
A10R20	0757-0817	2	RESISTOR 750 OHM 1% .5W F TUBULAR	19701	MF7C1/2-T0-751-F
A10R21	0757-0817		RESISTOR 750 OHM 1% .5W F TUBULAR	19701	MF7C1/2-T0-751-F
A10R22	2100-3351	2	RESISTOR VAR TRMR 500 OHM 10% C SIDE ADJ	73138	72XR501
A10R23	0757-0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-101-F
A10R24	0684-6811		RESISTOR 680 OHM 10% .25W CC TUBULAR	01121	CB6811
A10R25	0684-1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A10R26	0684-6811		RESISTOR 680 OHM 10% .25W CC TUBULAR	01121	CB6811
A10R27	0684-1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A10R28	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A10R29	0757-0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4-1/8-T0-2001-F
A10R30	0757-0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-511R-F
A10R31	0757-0434		RESISTOR 3.65K 1% .125W F TUBULAR	24546	C4-1/8-T0-3651-F
A10R32	0757-0422		RESISTOR 909 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-909R-F
A10R33	0757-0393	2	RESISTOR 47.5 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-47R5-F
A10R34	0757-0393		RESISTOR 47.5 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-47R5-F
A10S1	3101-0678	1	SWITCH PB 6STA 4PDT .394 IN CTRS .45A	28480	3101-0678
A11	01720-66562	1	MAIN SWEEP SWITCH ASSY	28480	01720-66562
A11C1	0140-0203	1	CAPACITOR FXD 30PF +-5% 500WVDC MICA	72136	DM15E300J0500WV1CR
A11C2	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A11C3	0160-2257		CAPACITOR FXD 10PF +-.5% 500WVDC CER 0+	28480	0160-2257
A11C4	0121-0495		CAPACITOR VAR TRMR 1.9-15.7PF	28480	0121-0495
A11C5	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A11C6	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A11C7	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A11C8	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A11C9	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A11C10	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A11C11	0160-2261		CAPACITOR FXD 15PF +-5% 500WVDC CER 0+	28480	0160-2261
A11C12	0121-0495		CAPACITOR VAR TRMR 1.9-15.7PF	28480	0121-0495
A11C13	0160-0974		CAPACITOR FXD 80PF +-2% 300WVDC MICA	28480	0160-0974
A11C14	0121-0495		CAPACITOR VAR TRMR 1.9-15.7PF	28480	0121-0495
A11C15	0160-3541		CAPACITOR FXD .01UF +-5% 100WVDC CER	84411	HEW 192

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A11C16	0160-3324		CAPACITOR-FXD 1UF +-5% 100WVDC MET POLYC	28480	0160-3324
A11C17	0180-0481	1	CAPACITOR-FXD 100UF +-10% 20VDC TA WET	28480	0180-0481
A11C18	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A11C20	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC	28480	0160-3451
A11CR1			NOT ASSIGNED		
A11CR2			NOT ASSIGNED		
A11CR3	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A11CR4	1906-0042	1	DIODE, MULT, SILICON, DUAL	28480	1906-0042
A11CR5	1910-0030	1	DIODE-SWITCHING 1US 15V 50MA	28480	1910-0030
A11L1	9140-0112	1	COIL, FXD, MOLDED RF CHOKE, 4.7UH 10%	24226	15/471
A11L2	9170-0029		CORE-MAG SHIELDING BEAD	02114	56-590-65A2/4A
A11MP1	1460-1148		SPRING-TORSION	00000	OBD
A11MP2	01840-22502		ROLLER-DETENT	28480	01840-22502
A11MP3	1205-0235	1	HEAT DISSIPATOR SGL TO-36 PKG	28480	1205-0235
A11Q1	1853-0316	1	TRANSISTOR-PNP DUAL 150% HFE 5MV VBE	28480	1853-0316
A11Q2	1853-0244		TRANSISTOR-PNP SI CHIP PD=310MW	28480	1853-0244
A11Q3	1855-0081		TRANSISTOR, J-FET N-CHAN, D MODE SI	01295	2N5245
A11Q4	1854-0723	5	TRANSISTOR-NPN SI TO-72	28480	1854-0723
A11Q5	1854-0628		TRANSISTOR-NPN SI TO-92 PD=625MW	04713	MPS-H17
A11Q6	1854-0691		TRANSISTOR-NPN	28480	1854-0691
A11Q7	1853-0354	2	TRANSISTOR-PNP SI CHIP TO-92 PD=300MW	28480	1853-0354
A11Q8	1854-0691		TRANSISTOR-NPN	28480	1854-0691
A11R1	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A11R2	0757-0282		RESISTOR 221 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-221R-F
A11R3	0757-0288		RESISTOR 9.09K 1% .125W F TUBULAR	19701	MF4C1/8-TO-9091-F
A11R4	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4-1/8-TO-1001-F
A11R5	0684-2201		RESISTOR 22 OHM 10% .25W CC TUBULAR	01121	CB2201
A11R6	0757-0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4-1/8-TO-1001-F
A11R7	0757-0427		RESISTOR 1.5K 1% .125W F TUBULAR	24546	C4-1/8-TO-1501-F
A11R8	0683-1035		RESISTOR 10K 5% .25W CC TUBULAR	01121	CB1035
A11R9	0684-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A11R10	0684-4751		RESISTOR 4.7M 10% .25W CC TUBULAR	01121	CB4751
A11R11	0757-0427		RESISTOR 1.5K 1% .125W F TUBULAR	24546	C4-1/8-TO-1501-F
A11R12	0684-3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A11R13	0684-1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A11R14	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A11R15	0684-5601		RESISTOR 56 OHM 10% .25W CC TUBULAR	01121	CB5601
A11R16	0684-4721		RESISTOR 4.7K 10% .25W CC TUBULAR	01121	CB4721
A11R17	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A11R18	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A11R19	0684-1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A11R20	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A11R21	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A11R22	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A11R23	0698-6688		RESISTOR-FXD 99.8K .1% .125W F TUBULAR	19701	MF4C1/8-T9-9982-B
A11R24	0698-8562		RESISTOR-FXD 49.9K .1% .125W	28480	0698-8562
A11R25	0698-6042		RESISTOR 25K .1% .125W F TUBULAR	19701	MF4C1/8-T2-2502-B
A11R26	0698-6360		RESISTOR 10K .1% .125W F TUBULAR	19701	MF4C1/8-T2-1002-B
A11R27	0698-5449		RESISTOR 5K .1% .125W F TUBULAR	19701	MF4C1/8-T2-5001-B
A11R28	0698-6450		RESISTOR 2.5K .1% .125W F TUBULAR	03888	PME55, T-2
A11R29	0757-0426		RESISTOR 1.3K 1% .125W F TUBULAR	24546	C4-1/8-TO-1301-F
A11R30	0757-0435		RESISTOR 3.92K 1% .125W F TUBULAR	24546	C4-1/8-TO-3921-F
A11R31	0757-0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4-1/8-TO-2001-F
A11R32	0687-2721		RESISTOR 2.7K 10% .5W CC TUBULAR	01121	EB2721
A11R33	2100-3056		RESISTOR-VAR TRMR 5K OHM 10% C SIDE ADJ	32997	3006P-1-502
A11R34	2100-3056		RESISTOR-VAR TRMR 5K OHM 10% C SIDE ADJ	32997	3006P-1-502
A11R35	2100-3056		RESISTOR-VAR TRMR 5K OHM 10% C SIDE ADJ	32997	3006P-1-502
A11R36	0757-0438	6	RESISTOR 5.11K 1% .125W F TUBULAR	24546	C4-1/8-TO-5111-F
A11R37	0757-0446		RESISTOR 15K 1% .125W F TUBULAR	24546	C4-1/8-TO-1502-F
A11R38	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A11R39	2100-3354		RESISTOR-VAR TRMR 50K OHM 10% C SIDE ADJ	73138	72XR504
A11U1	1826-0066	1	IC-LIN AMPLIFIER	07263	776MC
A11VR1	1902-0041	4	DIODE-ZNR 5.11V 5% DO-7 PD=.4W	04713	SZ 10039-08
A12	01722-66530	1	HOLDOFF DELAY COMPARATOR	28480	01722-66530
A12C1	0140-0191	1	CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J030oWV1CR
A12C2	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC	28480	0160-2204
A12C3	0160-0298		CAPACITOR-FXD .0015UF +-10% 200WVDC	56289	292P15292
A12C4	0160-0161		CAPACITOR-FXD .01UF +-10% 200WVDC	56289	292P10392
A12C5	0160-0165		CAPACITOR-FXD .056UF +-10% 200WVDC	28480	0160-0165
A12C6	0160-0230		CAPACITOR-FXD 1UF +-20% 50VDC TA SOLID	56289	150D105X0050A2
A12C7	0160-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A12C8	0180-0094	1	CAPACITOR-FXD 100UF +75-10% 25VDC AL	56289	30D107G025DD2
A12C9	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A12C10	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A12C11	0180-1746	5	CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X902082
A12C12	0180-1746		CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X902082
A12C13	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A12C14	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A12C15	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A12C16	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12C17	0180 0197		CAPACITOR FXD 2 2UF +-10% 20VDC TA	56289	150D225X9020A2
A12CR1	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A12CR2	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A12CR3	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A12CR4	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A12CR5	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A12CR6	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A12CR7	5080 0697	1	DIODES, MATCHED QUAD	28480	5080 0697
A12P1			PART OF P.C. BOARD		
A12P2	1251 3319		CONNECTOR; 10 CONT; MALE; POST TYPE	27264	09 64 1101(A2402 10A)
A12P3	1251 3195	2	CONNECTOR; 4 CONT; MALE; POST TYPE	27264	09 60 1041(2403 04A)
A12Q1	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q2	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q3	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q4	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q5	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q6	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q7	1854 0636		TRANSISTOR NPN SI TO 92 PD=350MW	28480	1854 0636
A12Q8	1853 0086	2	TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0086
A12Q9	1853 0086		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0086
A12Q10	1854 0642	3	TRANSISTOR NPN SI TO 92 PD=350MW	04713	MPS-A17
A12Q11	1854 0642		TRANSISTOR NPN SI TO 92 PD=350MW	04713	MPS-A17
A12Q12	1853 0354		TRANSISTOR PNP SI CHIP PD=350MW	28480	1853 0354
A12Q13	1854 0642		TRANSISTOR NPN SI TO 92 PD=350MW	04713	MPS-A17
A12Q14	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A12Q15	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A12Q16	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A12Q17	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A12Q18	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A12Q19	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A12R1	0757 0446		RESISTOR 15K 1% .125W F TUBULAR	24546	C4 1/8 TO 1502 F
A12R2	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R3	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R4	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R5	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R6	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R7	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R8	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R9	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A12R10	0757 0274		RESISTOR 1.21K 1% .125W F TUBULAR	24546	C4 1/8 TO 1213 F
A12R11	0757 0437		RESISTOR 4.75K 1% .125W F TUBULAR	24546	C4 1/8 TO 4751 F
A12R12	0757 0427		RESISTOR 1.5K OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 1501 F
A12R13	0698 3153		RESISTOR 3.83K 1% .125W F TUBULAR	16299	C4 1/8 TO 3831 F
A12R14	0757 0437		RESISTOR 4.75K 1% .125W F TUBULAR	24546	C4 1/8 TO 4751 F
A12R15	0757 0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 511R F
A12R16	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A12R17	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A12R18	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A12R20	0684 3921	2	RESISTOR 3.9K 10% .25W CC TUBULAR	01121	CB3921
A12R21	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R22	0684 1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A12R23	0757 0428		RESISTOR 1.62K 1% .125W F TUBULAR	24546	C4 1/8 TO 1621 F
A12R24	0687 1521	1	RESISTOR 1.5K 10% .5W CC TUBULAR	01121	EB1521
A12R25	0757 0442	8	RESISTOR 10K 1% .125W F TUBULAR	24546	C4 1/8 TO 1002 F
A12R26	0757 0442		RESISTOR 10K 1% .125W F TUBULAR	24546	C4 1/8 TO 1002 F
A12R27	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R28	0684 3311		RESISTOR 330 OHM 10% .25W CC TUBULAR	01121	CB3311
A12R29	0757 0429		RESISTOR 1.82K 1% .125W F TUBULAR	24546	C4 1/8 TO 1821 F
A12R30	0684 5631	2	RESISTOR 56K 10% .25W CC TUBULAR	01121	CB5631
A12R31	0684 2701	4	RESISTOR 27 OHM 10% .25W CC TUBULAR	01121	CB2701
A12R32	0684 2701		RESISTOR 27 OHM 10% .25W CC TUBULAR	01121	CB2701
A12R33	0684 2701		RESISTOR 27 OHM 10% .25W CC TUBULAR	01121	CB2701
A12R34	0684 2701		RESISTOR 27 OHM 10% .25W CC TUBULAR	01121	CB2701
A12R35	0698 3132		RESISTOR 261 OHM 1% .125W F TUBULAR	16299	C4 1/8 TO 2610 F
A12R36	0757 0273		RESISTOR 3.01K 1% .125W F TUBULAR	24546	C4 1/8 TO 3011 F
A12R37	0757 0399	1	RESISTOR 82.5 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 82R5 F
A12R38	0757 0400		RESISTOR 274 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 274R F
A12R39	0757 0434		RESISTOR 3.65K 1% .125W F TUBULAR	24546	C4 1/8 TO 3651 F
A12R40	0757 0407		RESISTOR 200 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 201 F
A12R41	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A12R42	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A12R43	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A12R44	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A12R45	0757 0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 101 F
A12R46	0757 0401		RESISTOR 100 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 101 F
A12U1	1858 0040	1	IC DGTL CA3127E TRANSISTOR ARRAY	02735	CA3127E
A12VR1	1902 0041		DIODE ZNR 5.11V 5% DO-7 PD=.4W	04713	SZ 10939 98
A12VR2	1902 3182		DIODE ZNR 12.3V VZ, .4W MAX PD	04713	SZ 10939 207
A12XU1	1200-0607		SOCKET, ELEC, IC 16 CONT DIP SLDR TERM	28480	1200-0607
A13	01720-66560	1	HORIZONTAL OUTPUT ASSY	28480	01720-66560

See Introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A13C1	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A13C2	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A13C3	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A13C4	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A13C5	0121-0168	4	CAPACITOR VAR TRMR, PSTN; .2/1.5PF	28480	0121-0168
A13C6	0132-0004	2	CAPACITOR VAR TRMR; PSTN; 7/3PF	72982	535-009-4R
A13C7	0121-0168		CAPACITOR VAR TRMR; PSTN; .2/1.5PF	28480	0121-0168
A13C8	0132-0004		CAPACITOR VAR TRMR; PSTN; 7/3PF	72982	535-009-4R
A13C9	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A13C10	0160-3665	2	CAPACITOR FXD .01UF +80-20% 500WVDC CER	28480	0160-3665
A13C11	0160-3665		CAPACITOR FXD .01UF +80-20% 500WVDC CER	28480	0160-3665
A13C12	0160-3665		CAPACITOR FXD .01UF +80-20% 500WVDC CER	28480	0160-3665
A13C13	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A13C14	0160-3665		CAPACITOR FXD .01UF +80-20% 500WVDC	28480	0160-3665
A13C15	0160-3665		CAPACITOR FXD .01UF +80-20% 500WVDC	28480	0160-3665
A13C16	0160-2240	2	CAPACITOR FXD 2PF +-.25PF 500WVDC CER	28480	0160-2240
A13C17	0160-2240		CAPACITOR FXD 2PF +-.25PF 500WVDC CER	28480	0160-2240
A13CR1	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A13CR2	1901-0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901-0040
A13CR3	1901-0047		DIODE SWITCHING 20V MAX VRM 75MA	28480	1901-0047
A13CR4	1901-0047		DIODE SWITCHING 20V MAX VRM 75MA	28480	1901-0047
A13L3	9140-0179	1	COIL FXD; MOLDED RF CHOKE; 22UH 10%	24226	15/222
A13MP1	1205-0033	2	HEAT DISSIPATOR SGL TO5 PKG	28480	1205-0033
A13P1	1251-3105		CONNECTOR, 4 CONT; MALE; POST TYPE	27264	09-60-1041(2403-04A)
A13Q1	1853-0354	1	TRANSISTOR NPN SI TO-52 PD=360MW	28480	1854-0364
A13Q2	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A13Q3	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A13Q4	1853-0354		TRANSISTOR PNP SI CHIP TO-92 PD=350MW	28480	1853-0354
A13Q5	1854-0419		TRANSISTOR NPN SI TO-39 PD=200MHZ	28480	1854-0419
A13Q6	1853-0232	3	TRANSISTOR PNP SI CHIP TO-39 PD=1W	28480	1853-0232
A13Q7	1853-0232		TRANSISTOR PNP SI CHIP TO-39 PD=1W	28480	1853-0232
A13Q8	1854-0419		TRANSISTOR NPN SI TO-39 PD=1W FT=200MHZ	28480	1854-0419
A13R1	0757-0442		RESISTOR 10K 1% .125W F TUBULAR	24546	C4-1/8-TO-1002-F
A13R2	0757-0442		RESISTOR 10K 1% .125W F TUBULAR	24546	C4-1/8-TO-1002-F
A13R3	0757-0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-151-F
A13R4	0757-0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-151-F
A13R5	0757-0421		RESISTOR 825 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-825R-F
A13R6	0757-0421		RESISTOR 825 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-825R-F
A13R7	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A13R8	0684-2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A13R9	0684-2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A13R10	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A13R11	0684-2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A13R12	0684-2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A13R13	0698-6542	2	RESISTOR 3.6K 2% 1W MO TUBULAR	FR003	C32
A13R14	0760-0017	2	RESISTOR 3.9K 2% 1W MO TUBULAR	FR003	C32
A13R15	0698-6542		RESISTOR 3.6K 2% 1W MO TUBULAR	FR003	C32
A13R16	0760-0017		RESISTOR 3.9K 2% 1W MO TUBULAR	FR003	C32
A13R17	0757-0853	3	RESISTOR 51.1K 1% .5W F TUBULAR	19701	MF7C1/2-TO-5112-F
A13R18	0757-0853		RESISTOR 51.1K 1% .5W F TUBULAR	19701	MF7C1/2-TO-5112-F
A13R19	0757-0436		RESISTOR 4.32K 1% .125W F TUBULAR	24546	C4-1/8-TO-4321-F
A13R20	0757-0436		RESISTOR 4.32K 1% .125W F TUBULAR	24546	C4-1/8-TO-4321-F
A13R21	0757-0726	2	RESISTOR 511 OHM 1% .25W F TUBULAR	24546	C5-1/4-TO-511R-F
A13R22	0757-0726		RESISTOR 511 OHM 1% .25W F TUBULAR	24546	C5-1/4-TO-511R-F
A13R23	0761-0006	2	RESISTOR 10K 5% 1W MO TUBULAR	24546	FP32-1-1002-J
A13R24	0761-0006		RESISTOR 10K 5% 1W MO TUBULAR	24546	FP32-1-1002-J
A13R25	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A13R26	0757-0394		RESISTOR 51.1 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-51R1-F
A13R27	0698-3162	3	RESISTOR 46.4K 1% .125W F TUBULAR	16299	C4-1/8-TO-4642-F
A13R28	0698-3162		RESISTOR 46.4K 1% .125W F TUBULAR	16299	C4-1/8-TO-4642-F
A13R29	0757-0442		RESISTOR 10K 1% .125W F TUBULAR	24546	C4-1/8-TO-1002-F
A13R30	0757-0442		RESISTOR 10K 1% .125W F TUBULAR	24546	C4-1/8-TO-1002-F
A13VR1	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W	04713	SZ 10939-98
A13VR2	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W	04713	SZ 10939-98
A14	01720-66564	1	GATE ASSY	28480	01720-66564
A14C1	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C2	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C3	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C4	0180-0291	5	CAPACITOR FXD 1UF +-10% 35VDC TA SOLID	56289	150D105X9035A2
A14C5	0160-3451		CAPACITOR FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C6	0180-0291		CAPACITOR FXD 1UF +-10% 35VDC TA SOLID	56289	150D105X9035A2
A14C7	0121-0168		CAPACITOR VAR, TRMR; PSTN, .2/1.5PF	28480	0121-0168
A14C8	0121-0168		CAPACITOR VAR; TRMR; PSTN; .2/1.5PF	28480	0121-0168
A14C9	0160-2003	2	CAPACITOR FXD .05UF +-20% 500WVDC CER	28480	0160-2003
A14C10	0160-2003		CAPACITOR FXD .05UF +-20% 500WVDC CER	28480	0160-2003
A14C11	0160-3665		CAPACITOR FXD .01UF +80-20% 500 WVDC CER	28480	0160-3665
A14C12	0160-3665		CAPACITOR FXD .01UF +80-20% 500 WVDC CER	28480	0160-3665
A14C13	0160-3665		CAPACITOR FXD .01UF +80-20% 500 WVDC CER	28480	0160-3665
A14C14	0180-0197		CAPACITOR FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A14C15	0180-0291		CAPACITOR FXD 1UF +-10% 35VDC TA-SOLID	56289	150D105X9035A2

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A14C16	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C17	0180-1745	2	CAPACITOR-FXD 1.5UF +-10% 20VDC TA	56289	150D155X9020A2
A14C18	0180-0291		CAPACITOR-FXD 10UF +-10% 35VDC TA SOLID	56289	150D106X9035A2
A14C19	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A14C20	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C21	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A14C22	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C23	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A14C24	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C25	0180-0197		CAPACITOR-FXD 2.2UF +-10% 20VDC TA	56289	150D225X9020A2
A14C26	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-3451
A14C27	0180-1746		CAPACITOR-FXD 15UF +-10% 20VDC TA SOLID	56289	150D156X9020B2
A14C28	0160-3453	2	CAPACITOR-FXD .05UF +80-20% 100WVDC CER	28480	0160-3453
A14C29	0170-0040		CAPACITOR-FXD .047UF +-10% 200WVDC POLYE	56289	292P47392
A14C30	0180-0291		CAPACITOR-FXD 10UF +-10% 35VDC TA SOLID	56289	150D106X9035A2
A14C31	0160-2198	1	CAPACITOR-FXD 20PF +-5% 300WVDC MICA D+	28480	0160-2198
A14C32	0180-0094		CAPACITOR-FXD 100UF +75-10% 25VDC AL	56289	30D107G025DD2
A14CR1	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR2	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR3	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR4	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR5	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR6	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR7	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR8	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR9	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR10	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR11	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR12	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A14CR13	1901-0040		DIODE-SWITCHING 30V MAX VRM 50MA	28480	1901-0040
A14CR14	1901-0040		DIODE-SWITCHING 30V MAX VRM 50MA	28480	1901-0040
A14CR15	1901-0376		DIODE-GEN PRP 35V 50MA	28480	1901-0376
A14CR16	1901-0040		DIODE-SWITCHING 30V MAX VRM 50MA	28480	1901-0040
A14CR17	1901-0040		DIODE-SWITCHING 30V MAX VRM 50MA	28480	1901-0040
A14J1	1251-0569		CONNECTOR, 10 PIN F POST TYPE	27264	09-52-3101
A14L1	9140-0129	1	COIL-FXD, MOLDED RF CHOKE, 220UH 5%	24226	15/223
A14L2	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2/4A
A14L3	9170-0029		CORE, MAG, SHIELDING BEAD, .138 OD .047	02114	56-590-65A2/4A
A14L4	9170-0029		FERRITE BEAD	28480	9170-0029
A14MP1	1206-0033		HEAT DISSIPATOR SGL TO5 PKG	28480	1206-0033
A14P1	1251-0674	2	CONNECTOR; 10 CONT; MALE; POST TYPE	27264	09-66-1101
A14P1	1251-0674		CONNECTOR 10-PIN MALE POST TYPE	27264	09-66-1011
A14P1	1257-3496		CONNECTOR 8-PIN MALE POST TYPE	27264	09-66-1081
A14P2	1251-0674	3	CONNECTOR; 10 CONT; MALE; POST TYPE	27264	09-66-1101
A14Q1	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A14Q2	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A14Q3	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A14Q4	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A14Q5	1853-0036	1	TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A14Q6	1854-0053		TRANSISTOR NPN 2N2218 SI PD=800MW	04713	2N2218
A14Q7	1853-0036		TRANSISTOR PNP SI CHIP PD=625MW	28480	1853-0336
A14Q8	1853-0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853-0036
A14Q9	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A14Q10	1854-0019	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A14Q11	1853-0203		TRANSISTOR PNP SI CHIP TO-18 PD=360MW	28480	1853-0203
A14Q12	1853-0232		TRANSISTOR PNP SI CHIP TO-39 PD=1W	28480	1853-0232
A14Q13	1854-0019	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A14Q14	1854-0410		TRANSISTOR NPN SI TO-39 PD=1W FT=200MHZ	28480	1854-0410
A14Q15	1854-0023		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0023
A14Q16	1854-0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A14Q17	1854-0036	1	TRANSISTOR PNP SI CHIP PD=310MW	28480	1854-0036
A14Q18	1854-0215	2	TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A14Q19	1884-0074		THYRISTOR, SCR JEDEC 2N5060	04713	2N5060
A14Q20	1855-0255		TRANSISTOR, FET	28480	1855-0255
A14Q21	1855-0255		TRANSISTOR, FET	28480	1855-0255
A14R1	0684-2211	1	RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A14R2	0757-1283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 TO 2001 F
A14R3	0757-0415	2	RESISTOR 475 OHM 1% .125W F TUBULAR	28480	0757-0415
A14R4	0757-0317		RESISTOR 1.33K 1% .125W F TUBULAR	28480	0757-0317
A14R5	0684-2211	1	RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A14R6	0684-4711		RESISTOR 470 OHM 10% .25W CC	01121	CB4711
A14R7	0698-3450		RESISTOR 17.2K 1% .125W F TUBULAR	16299	C4 1/8 TO 4222 F
A14R8	0684-3921	2	RESISTOR 3.9K 1% .25W F TUBULAR	28480	0684-3921
A14R9	0684-1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A14R10	2100-0568		RESISTOR-VAR TRMR 2K OHM 10% C TOP ADJ	73138	72P
A14R11	0698-3178	1	RESISTOR 17.8K 1% .125W F TUBULAR	16299	C4 1/8 TO 1782 F
A14R12	0684-1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A14R13	0757-0469	2	RESISTOR 150K 1% .125W F TUBULAR	24546	C4 1/8 TO 1503 F
A14R14	0757-0431		RESISTOR 24.3K 1% .125W F TUBULAR	24546	C4 1/8 TO 2432 F
A14R15	2100-3213		RESISTOR-VAR TRMR 200K OHM 10% C SIDE ADJ	32997	3389P-1-204
A14R16	0684-1021	1	RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A14R17	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A14R18	0757-0820		RESISTOR 1.1K 1% .5W F TUBULAR	19701	MF7C1/2 TO 1101 F
A14R19	0687-4751		RESISTOR 4.7M 10% .5W CC TUBULAR	01121	EB4751
A14R20	2100-3213		RESISTOR-VAR TRMR 200K OHM 10% C SIDE ADJ	32997	3389P-1-204

See Introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A14R21	0684 4731		RESISTOR 47K 10% .25W CC TUBULAR	01121	CB4731
A14R22	0683 5615	1	RESISTOR 560 OHM 5% .25W CC TUBULAR	01121	CB5615
A14R23	2100-3274	3	RESISTOR VAR TRMR 10K OHM 10% C SIDE ADJ	32997	3389H
A14R24	0757 0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4 1/8 TO 1001 F
A14R25	0757 0284		RESISTOR 1.47K 1% .125W F TUBULAR	24546	C4 1/8 TO 1471 F
A14R26	0684 4701	1	RESISTOR 47 OHM 10% .25W CC TUBULAR	01121	CB4701
A14R27	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A14R28	0684 1811		RESISTOR 180 OHM 10% .25W CC TUBULAR	01121	CB1811
A14R29	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A14R30	0757 0831	1	RESISTOR 4.32K 1% .5W F TUBULAR	19701	MF4C1/2 TO 4321 F
A14R31	0757 0834		RESISTOR 5.62K 1% .5W F TUBULAR	19701	MF7C1/2 TO 5621 F
A14R32	0699-0002	1	RESISTOR 6.8 OHM 10% .5W CC TUBULAR	01121	E68G1
A14R33	0757 0436		RESISTOR 4.32K 1% .125W F TUBULAR	24546	C4 1/8 TO 4321 F
A14R34	0757 0853		RESISTOR 51.1K 1% .5W F TUBULAR	19701	MF7C1/2 TO 5112 F
A14R35	0757 0728	1	RESISTOR 619 OHM 1% .25W F TUBULAR	24546	C5 1/4 TO 619R F
A14R36	0761 0073	1	RESISTOR 13K 5% 1W MO TUBULAR	24546	FP32 1 T00 1302 J
A14R37	0757 0438		RESISTOR 5.11K 1% .125W F TUBULAR	24546	C4 1/8 TO 5111 F
A14R38	0757 0448	2	RESISTOR 18.2K 1% .125W F TUBULAR	24546	C4 1/8 TO 1822 F
A14R39	0757 0435		RESISTOR 3.92K 1% .125W F TUBULAR	24546	C4 1/8 TO 3921 F
A14R40	0684 2711	1	RESISTOR 270 OHM 10% .25W CC TUBULAR	01121	CB2711
A14R41	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 TO 2001 F
A14R42	0757 0416		RESISTOR 511 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 511R F
A14R43	0757 0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4 1/8 TO 1001 F
A14R44	0757-1094		RESISTOR 1.47K 1% .125W F TUBULAR	24546	C4 1/8 TO 1471 F
A14R45	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 TO 2001 F
A14R46	0757 0435		RESISTOR 3.92K 1% .125W F TUBULAR	24546	C4 1/8 TO 3921 F
A14R47	0698 3154	1	RESISTOR 4.22K 1% .125W F TUBULAR	16299	C4 1/8 TO 4221 F
A14R48	0757 0448		RESISTOR 18.2K 1% .125W F TUBULAR	24546	C4 1/8 TO 1822 F
A14R49	0757 0438		RESISTOR 5.11K 1% .125W F TUBULAR	24546	C4 1/8 TO 5111 F
A14R50	0757 0317	1	RESISTOR 1.33K 1% .125W F TUBULAR	24546	C4 1/8 TO 1331 F
A14R51	2100-3212	1	RESISTOR VAR TRMR 200 OHM 10% C SIDE ADJ	32997	3389P-1 201
A14R52	0698-3252	1	RESISTOR 450 OHM 1% .1W CF TUBULAR	28480	0698-3252
A14R53	0683 0475	4	RESISTOR 4.7 OHM 5% .25W CC TUBULAR	01121	CB47G5
A14R54	0683 0475		RESISTOR 4.7 OHM 5% .25W CC TUBULAR	01121	CB47G5
A14R55	0683 0475		RESISTOR 4.7 OHM 5% .25W CC TUBULAR	01121	CB47G5
A14R56	0683 0475		RESISTOR 4.7 OHM 5% .25W CC TUBULAR	01121	CB47G5
A14R57	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A14R58	0757 0458	2	RESISTOR 51.1K 1% .125W F TUBULAR	24546	C4 1/8 TO 5112 F
A14R59	0684 1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A14R60	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A14R61	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A14R62	0757 0438		RESISTOR 5.11K 1% .125W F TUBULAR	24546	C4 1/8 TO 5111 F
A14R63	0684 3921		RESISTOR 3.9K 10% .25W CC TUBULAR	01121	CB3921
A14R64	2100-3210		RESISTOR VAR TRMR 10K OHM 10% C SIDE ADJ	32997	3389P-1 103
A14R65	0684 1221		RESISTOR 1.2K 10% .25W CC TUBULAR	01121	CB1221
A14R66	0758 0028	4	RESISTOR 270 OHM 5% .25W F TUBULAR	24546	C5 1/4 TO 271 J
A14R67	2100-3353	1	RESISTOR VAR TRMR 20K OHM 10% C SIDE ADJ	73138	2XR203
A14R68	0758 0028		RESISTOR 270 OHM 5% .25W F TUBULAR	24546	C5 1/4 TO 271 J
A14R69	0758 0028		RESISTOR 270 OHM 5% .25W F TUBULAR	24546	C5 1/4 TO 271 J
A14R70	2100-0558		RESISTOR VAR TRMR 20K OHM 10% C TOP ADJ	73138	72P
A14R71	0758 0028		RESISTOR 270 OHM 5% .25W F TUBULAR	24546	C5 1/4 TO 271 J
A14R72	0757 0446		RESISTOR 15K 1% .125W F TUBULAR	24546	C4 1/8 TO 1502 F
A14R73	0698 3162		RESISTOR 46.4K 1% .125W F TUBULAR	16299	C4 1/8 TO 4642 F
A14R74	2100-3355	1	RESISTOR VAR TRMR 100K OHM 10% C SIDE ADJ	73138	72XR104
A14R75	0684 5631		RESISTOR 56K 10% .25W CC TUBULAR	01121	CB5631
A14R76	2100-3354		RESISTOR VAR TRMR 50K OHM 10% C SIDE ADJ	73138	72XR504
A14R77	0684 3931	1	RESISTOR 39K 10% .25W CC TUBULAR	01121	CB3931
A14R78	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A14R79	0684 1521	2	RESISTOR 1.5K 10% .25W CC TUBULAR	01121	CB1521
A14R80	0757 0397		RESISTOR 68.1 OHM 1% .125W F TUBULAR	28480	0757 0397
A14R81	0684 104[illegible]		RESISTOR 100K 10% .25W CC TUBULAR	01121	CB1041
A14R82	0684-1021		RESISTOR 1K 10% .25W FC TC=-400, +600	01121	CB1021
A14R83	0690-8221		RESISTOR 8.2K 10% 1W CC TC=0+647	01121	CB8211
A14R84	0690-8221		RESISTOR 8.2K 10% 1W CC TC=0+647	01121	CB8211
A14U1	1821 0001		IC LIN CA3046 TRANSISTOR ARRAY	02735	CA3046
A14VR1	1902 3035	2	DIODE-ZNR 3.16V 5% DO-7 PD=.4W	04713	SZ 10939 38
A14VR2	1902 3096	3	DIODE-ZNR 5.23V 5% DO-7 PD=.4W	04713	SZ 10939 101
A14VR3	1902 3096		DIODE-ZNR 5.23V 5% DO-7 PD=.4W	04713	SZ 10939 101
A14VR4	1902 3096		DIODE-ZNR 5.23V 5% DO-7 PD=.4W	04713	SZ 10939 101
A14VR5	1902 3149		DIODE ZNR 9.09V VZ, .4W MAX	04713	SZ 10939 170
A14VR6	1902-0972		DIODE-ZNR 66V 2% PD=.4W	28480	1902-0972
A14XU1	1200 0441	1	SOCKET-ELEC, IC 14 CONT DIP SLDR TERM	24995	583527-1
A15	01720-66563	1	HIGH VOLTAGE POWER SUPPLY ASSY	28480	01720-66563
A15C1	0180 0116		CAPACITOR FXD 6 8UF +-10% 35VDC TA	56289	150D685X903582
A15C2	0160-2264		CAPACITOR FXD 20PF +-5% 500WVDC CER 0+	28480	0160-2264
A15C3	0160-3666	3	CAPACITOR FXD .01UF +80-20% 500WVDC CER	28480	0160-3666
A15C4	0160-4079	1	CAPACITOR FXD 1500PF +-20% 4000WVDC MET	28480	0160-4079
A15C5	0160-0544	1	CAPACITOR FXD .022UF +-20% 4000WVDC MET	84411	HEW 337
A15C6	0160-4024		CAPACITOR FXD .01UF +-20% 4000 WVDC MET	56289	430P104040
A15C7	0160-4079		CAPACITOR FXD 1500PF +-20% 4000WVDC MET	28480	0160-4079
A15C8	0160-3453		CAPACITOR FXD .06UF +80-20% 100WVDC CER	28480	0160-3453
A15C9	0160-4079	15	CAPACITOR FXD 1500PF +-20% 4000WVDC MET	28480	0160-4079
A15CR1	1901 0028		DIODE PWR RECT 400V 750MA	04713	SR1358 9
A15CR2	1901 0028		DIODE PWR RECT 400V 750MA	04713	SR1358 9

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A15CR3	1901 0683	1	DIODE-HV RECT 250NS 10KV 5MA	28480	1901 0683
A15CR4	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A15CR5	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A15CR6	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A15CR7	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A15DS1	2140-0013	5	LAMP, GLOW, BULB, T-2 5-7V	74276	NE23A
A15DS2	2140-0013		LAMP, GLOW, BULB, T-2 5-7V	74276	NE23A
A15DS3	2140-0013		LAMP, GLOW, BULB, T-2 5-7V	74276	NE23A
A15DS4	2140-0013		LAMP, GLOW, BULB, T-2 5-7V	74276	NE23A
A15DS5	2140-0013		LAMP, GLOW, BULB, T-2 5-7V	74276	NE23A
A15E1	2110-0269	2	FUSEHOLDER	28480	2110-0269
A15F1	2110-0020	1	FUSE .8A 250V SLO-BLO	71400	MDL 6/10
A15L1	9100-3139	1	COIL; 75 UH	28480	9100-3139
A15MP1	5040-0402	1	MOUNT-TRANSFORMER	28480	5040-0402
A15MP2	5040-0430	1	MOUNT-TRANSFORMER	28480	5040-0430
A15P1	1251-3319		CONNECTOR; 10 CONT; MALE; POST TYPE	27264	09-64-1101(A2402-10A)
A15R1	0757-0412		RESISTOR 365 OHM 1% .125W F TUBULAR	24546	C4-1/8-T0-365R F
A15R2	0757-0465		RESISTOR 100K 1% .125W F TUBULAR	24546	C4-1/8-T0-1003 F
A15R3	2100-3253		RESISTOR-VAR TRMR 50K OHM 10% C TOP ADJ	32997	3386P-1-503
A15R4	0683-1825		RESISTOR 1.8K 5% .25W CC TUBULAR	01121	CB1825
A15R5	0684-1041		RESISTOR 100K 10% .25W CC TUBULAR	01121	CB1041
A15R6	0684-1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A15R7	0684-1011		RESISTOR 100 OHM 10% .25W CC TUBULAR	01121	CB1011
A15R8	0684-1061		RESISTOR 10M 10% .25W CC TUBULAR	01121	CB1061
A15R9	0684-1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A15R10	0698-8018	1	RESISTOR 30M 1% 3W CP TUBULAR	03888	PVC175 3 T0 3004 F
A15R11	0699-0171	1	RESISTOR 6.6M 5% 2W CF TUBULAR	28480	0699-0171
A15R12	0757-0469	1	RESISTOR 150K 1% .125W F TUBULAR	24546	C4-1/8-T0-1503-F
A15R13	0698-6442	1	RESISTOR 13M 5% 1W CF TUBULAR	28480	0698-6442
A15R14	0684-4731		RESISTOR 47K 10% .25W CC TUBULAR	01121	CB4731
A15R15	2100-0658		RESISTOR-VAR 20K .5W 10% C TOP ADJ	73138	72P
A15T1	01720-61101	1	TRANSFORMER	28480	01720-61101
A16	0960-0117	1	HIGH VOLTAGE MULTIPLIER ASSY	28480	0960-0117
A17	01720-66559	1	LOW VOLTAGE POWER SUPPLY ASSY	28480	01720-66559
A17C1	0180-2172	1	CAPACITOR-FXD; 130UF +75-10% 200VDC AL	56289	30D137G200HL4
A17C2	0180-0089	2	CAPACITOR-FXD; 10UF +50-10% 150VDC AL	56289	30D106F150DD2
A17C3	0180-0489	1	CAPACITOR-FXD, 520UF +75-10% 100VDC AL	56289	39D527F100JP4
A17C4	0180-0089		CAPACITOR-FXD, 10UF +50-10% 150VDC AL	56289	30D106F150DD2
A17C5	0180-1988	1	CAPACITOR-FXD; 2600UF +75-10% 15VDC AL	56289	39D268G015JJ4
A17C6	0160-3448		CAPACITOR-FXD; 1000PF +-10% 1000WVDC CER	28480	0160-3448
A17C7	0180-0341	1	CAPACITOR-FXD, 25UF +75-10% 12VDC AL	56289	30D256C012BB2
A17C8	0180-2371	1	CAPACITOR-FXD, 4700UF +75-10% 30VDC AL	28480	0180-2371
A17C9	0160-3448		CAPACITOR-FXD, 1000PF +-10% 1000WVDC CER	28480	0160-3448
A17C10	0180-0045	2	CAPACITOR-FXD; 20UF +75-10% 25VDC AL	56289	30D206G025CB2
A17C11	0180-2351	1	CAPACITOR-FXD; 2000UF +75-10% 50VDC AL	28480	0180-2351
A17C12	0160-3448		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3448
A17C13	0180-0045		CAPACITOR-FXD, 40UF +75-10% 25VDC AL	56289	30D206G025CB2
A17C14	0180-2500	1	CAPACITOR-FXD; 1500UF +50-10% 16VDC AL	28480	0180-2500
A17C15	0180-174-	1	CAPACITOR-FXD; 150UF +20% 15VDC TA	56289	150D157X0015
A17C16	0160-3443		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17C17	0170-0022		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17C18	0170-0022		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17C19	0160-4213		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17C20	0160-4213		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17C21	0160-4213		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17C22	0160-4213		CAPACITOR-FXD 1UF +80-20% 50V CER	28480	0160-3443
A17CR1	1906 0006	2	DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906 0006
A17CR2	1906 0006		DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906 0006
A17CR3	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR4	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR5	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR6	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR7	1906 0048	2	DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906 0048
A17CR8	1906 0048		DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906 0048
A17CR9	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR10	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR11	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17CR12	1901 0028		DIODE-PWR RECT 400V 750MA	04713	SR1358 9
A17DS1	2140-0018	1	LAMP, GLOW, BULB T-2, 58V	08806	A9A (NE-2E1)
A17P1	1251-3475	2	CONNECTOR; 10-CONT; MALE, POST TYPE	27264	09-60-1101
A17P2	1251-3475		CONNECTOR; 10-CONT; MALE; POST TYPE	27264	09-60-1101
A17P3	1251-3192	1	CONNECTOR; 3-CONT; MALE; POST TYPE	27264	09-60-1031(2403-03A)
A17Q1	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A17Q2	1854-0675	1	TRANSISTOR NPN SI PD=625MW FT=50MHZ	28480	1854-0675
A17Q3	1853-0317	1	TRANSISTOR PNP SI CHIP PD=625MW	28480	1853-0317
A17Q4	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A17Q5	1854-0396		TRANSISTOR NPN SI TO-39 PD=10W	28480	1854-0396
A17Q6	1853-0080	1	TRANSISTOR PNP SI CHIP PD=300MW	28480	1853-0080
A17R1	0684-1041		RESISTOR 100K 10% .25W CC TUBULAR	01121	CB1041
A17R2	0683-0515	1	RESISTOR 5.1 OHM 5% .25W CC TUBULAR	01121	CB51G5
A17R3	0687-1041	1	RESISTOR 100K 10% .5W CC TUBULAR	01121	EB1041
A17R4	0683-1025	2	RESISTOR 1K 5% .25W CC TUBULAR	01121	CB1025
A17R5	0684-2741	1	RESISTOR 270K 10% .25W CC TUBULAR	01121	CB2741
A17R6	0757-0465		RESISTOR 100K 1% .125W F TUBULAR	24546	C4-1/8-T0-1003-F
A17R7	0757-0446		RESISTOR 15K 1% .125W F TUBULAR	24546	C4-1/8-T0-1502-F
A17R8	0698-3547	1	RESISTOR 1 OHM 5% .5W CC TUBULAR	01121	EB10G5
A17R9	0687-6831	1	RESISTOR 68K 10% .5W CC TUBULAR	01121	EB6831
A17R10	0683-1025		RESISTOR 1K 5% .25W CC TUBULAR	01121	CB1025

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A17R11	0684 6831	1	RESISTOR 68K 10% .25W CC TUBULAR	01121	CB6831
A17R12	0757 0454	1	RESISTOR 33.2K 1% .125W F TUBULAR	24546	C4 1/8 TO 3322 F
A17R13	0757 0445	1	RESISTOR 13K 1% .125W F TUBULAR	24546	C4 1/8 TO 1302 F
A17R14	0811 1665	3	RESISTOR .82 OHM 5% 2W PW TUBULAR	75042	BWH2 82/100 J
A17R15	0698 3329	3	RESISTOR 10K .5% .125W F TUBULAR	03888	PME55 1/8 TO 1002 D
A17R16	0698 5579	1	RESISTOR 5K .5% .125W F TUBULAR	24546	C4 1/8 TO 5001 D
A17R17	0757 0433	2	RESISTOR 3.32K 1% .125W F TUBULAR	24546	C4 1/8 TO 3321 F
A17R18	0683 3355	1	RESISTOR 3.3M 5% .25W CC TUBULAR	01121	CB3355
A17R19	0757 0443	1	RESISTOR 6.2K 2% .125W F TUBULAR	24546	C4 1/8 TO 6201 G
A17R20	0757 0429		RESISTOR 1.82K 1% .125W F TUBULAR	24546	C4 1/8 TO 1821 F
A17R21	0811 1533	2	RESISTOR .68 OHM 5% 2W PW TUBULAR	75042	BWH2 11/16 J
A17R22	0757 0437		RESISTOR 4.75K 1% .125W F TUBULAR	24546	C4 1/8 TO 1751 F
A17R23	2100 3212		RESISTOR VAR TRMR 200 OHM 10% C	32997	3389P 1 201
A17R24	2100 3050		RESISTOR VAR TRMR 5K OHM 10% C	32997	3006P 1 502
A17R25	0698 3329		RESISTOR 10K .5% .125W F TUBULAR	03888	PME55 1/8 TO 1002 D
A17R26	0698 3129		RESISTOR 10K .5% .125W F TUBULAR	03888	PME55 1/8 TO 1002 D
A17R27	0683 5125	1	RESISTOR 5.1K 5% .25W CC TUBULAR	01121	CB5125
A17R28	0811 1553		RESISTOR .68 OHM 5% 2W PW TUBULAR	75042	BWH2 11/16 J
A17R29	0757 0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4 1/8 TO 1001 F
A17U1	1820 0196	3	IC LIN REGULATOR	07263	723HC
A17U2	1820 0196		IC LIN REGULATOR	07263	723HC
A17U3	1820 0196		IC LIN REGULATOR	07263	723HC
A17VR1	1902 3036		DIODE ZNR 3.16V 5% DO 7 PD=.4W	04713	SZ 10939 38
A17VR2	1902 3149	1	DIODE ZNR 9.09V 5% DO 7 PD=.4W	04713	SZ 10939 170
A17VR3	1902 0680		DIODE ZNR 6.2V 5%	12954	1N827
A17VR4	1902 3323		DIODE ZNR 42.2V 5%	28480	1902 3323
A18	01710 66564	1	ANALOG ASSEMBLY	28480	01710 66564
A18C1	0180 0230	1	CAPACITOR FXD 01UF +-20% 50 VDC TR SOLID	56289	150D105 X0050A2
A18C2	0160 2055	4	CAPACITOR FXD 01UF +80 20% 100 VDC CER	28480	0160 2055
A18C3	0160 3622	2	CAPACITOR FXD 1UF +80 20% 100 VDC CER	28480	0160 3622
A18C4	0160 3622		CAPACITOR FXD 1UF +80 20% 100 VDC CER	28480	0160 3622
A18C5	0180 1746	1	CAPACITOR FXD 15UF +-10% 20 VDC TA SOLID	56289	150D156 X9020B2
A18C6	0160 2055		CAPACITOR FXD 01UF +80 20% 100 VDC CER	28480	0160 2055
A18C7	0160 2055		CAPACITOR FXD 01UF +80 20% 100 VDC CER	28480	0160 2055
A18C8	0160 2055		CAPACITOR FXD 01UF +80 20% 100 VDC CER	28480	0160 2055
A18CR1	1901 0040	5	DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR2	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR3	1910 0030	2	DIODE GE 15V 50MA 1US DO 7	28480	1901 0030
A18CR4	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR5	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR6	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR7	1901 0047	2	DIODE SWITCHING 2NS MAX VRM 75MA	28480	1901 0047
A18CR8	1901 0047		DIODE SWITCHING 2NS MAX VRM 75MA	28480	1901 0047
A18CR9	1910 0030		DIODE GE 15V 50MA 1US DO 7	28480	1901 0030
A18P1	1251 5635	2	CONNECTOR 12 PIN MALE POST TYPE	28480	1251 5635
A18P2	1251 5635		CONNECTOR 12 PIN MALE POST TYPE	28480	1251 5635
A18Q1	1853 0036	6	TRANSISTOR PNP SI PD 310MW FT 250MHZ	28480	1853 0036
A18Q2	1853 0036		TRANSISTOR PNP SI PD 310MW FT 250MHZ	28480	1853 0036
A18Q3	1854 0036		TRANSISTOR PNP SI PD 310MW FT 250MHZ	28480	1853 0036
A18Q4	1854 0036		TRANSISTOR PNP SI PD 310MW FT 250MHZ	28480	1853 0036
A18Q5	1854 0215	2	TRANSISTOR NPN SI PD 350MW FT 300MHZ	04713	2N3904
A18Q6	1853 0036		TRANSISTOR PNP SI PD 310MW FT 250MHZ	28480	1853 0036
A18Q7	1854 0523	1	TRANSISTOR NPN SI TO 39PD 1W FT 150MHZ	28480	1854 0523
A18Q8	1853 0036		TRANSISTOR PNP SI PD 310MW FT 250MHZ	28480	1853 0036
A18Q9	1854 0215		TRANSISTOR NPN SI PD 350MW FT 300MHZ	04713	2N3904
A18R1	0757 0421	2	RESISTOR FXD 825 1% 125W TC 0+-100	24546	C4 1 8 TO 825R F
A18R2	0757 0430	3	RESISTOR FXD 2 21K 1% 125W F TUBULAR	02995	MF4C 1
A18R3	0698 3154	1	RESISTOR FXD 4 22K 1% 125W F TUBULAR	16299	C4 1 8 TO 4221 F
A18R4	0698 0085	1	RESISTOR FXD 2 61K 1% 125W F TUBULAR	16299	C4 1 8 TO 2611 F
A18R5	0684 1031	4	RESISTOR FXD 10K 10% 25W CC TUBULAR	01121	CB1003
A18R6	0684 3331	3	RESISTOR FXD 33K 10% 25W FC TC 400 +800	01121	CB3331
A18R7	0684 1031		RESISTOR FXD 10K 10% 25W CC TUBULAR	01121	CB1031
A18R8	0757 0283	5	RESISTOR FXD 2K 1% 125W F TUBULAR	24546	C4 1 8 TO 2001 F
A18R9	0684 1031		RESISTOR FXD 10K 10% 25W CC TUBULAR	01121	CB1031
A18R10	0684 3321	1	RESISTOR FXD 3 3K 10% 25W CC TUBULAR	01121	CB3321
A18R11	0757 0421		RESISTOR FXD 825 1% 125W F TC 0+-100	24546	C4 1 8 TO 825R F
A18R12	0698 3558	1	RESISTOR FXD 4 02K 1% 125W F TC 0+-100	24546	C4 1 8 TO 4021 F
A18R13	0757 0317	1	RESISTOR FXD 1 33 1% 125W F TUBULAR	24546	C4 1 8 TO 1331 F
A18R14	0757 0283		RESISTOR FXD 2K 1% 125W F TUBULAR	24546	C4 1 8 TO 2001 F
A18R15	0757 0283		RESISTOR FXD 2K 1% 125W F TUBULAR	24546	C4 1 8 TO 2001 F
A18R16	0757 0280	4	RESISTOR FXD 1K 1% 125W F TUBULAR	28480	0757 0280
A18R17	0757 0446	1	RESISTOR FXD 15K 1% 125W F TUBULAR	24546	C4 1 8 TO 1502 F
A18R18	0684 1031		RESISTOR FXD 10 10% 25W CC TUBULAR	01121	CB1031
A18R19	0684 3331		RESISTOR FXD 33K 10% 25W FC TC 400 +800	01121	CB3331
A18R20	0684 3331		RESISTOR FXD 33K 10% 25W FC TC 400 +800	01121	CB3331
A18R21	0757 0280		RESISTOR FXD 1K 1% 125W F TUBULAR	28480	0757 0280
A18R22	0757 0280		RESISTOR FXD 1K 1% 125W F TUBULAR	28480	0757 0280
A18R23	2100 3094	2	RESISTOR VAR TRMR 100K 10% C SIDE ADJ	32997	3006P 1 104
A18R24	0757 0487	2	RESISTOR FXD 825K 1% 125W F TUBULAR	91637	MFSCT 0
A18R25	0757 0465	3	RESISTOR FXD 100K 1% 125W F TUBULAR	24546	C4 1 8 TO 1003 F
A18R26	0757 0410	1	RESISTOR FXD 301 1% 125W F TUBULAR	24546	C4 1 8 TO 301R F
A18R27	0698 3449	1	RESISTOR FXD 28 7K 1% 125W TC 0+-100	24546	C4 1 8 TC 2872 F
A18R28	2100 3103	1	RESISTOR VAR 10K 10% C SIDE ADJ 17 TRN	32997	3006P 1 103
A18R29	0757 0449	2	RESISTOR FXD 20K 1% 125W F TC 0+-100	24546	C4 1 8 TO 2002 F
A18R30	0698 6688	6	RESISTOR FXD 99 8K 1% 125W F TUBULAR	19701	MF4C1 8 T9 9982 B

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A18R31	2100-3094		RESISTOR-VAR TRM 100K 10% C SIDE ADJ	32997	3006P-1-104
A18R32	0757-0475	1	RESISTOR-FXD 274K 1% 125W F TC=0+-100	24546	C4-1/8-T0-2743-F
A18R33	0757-0283		RESISTOR-FXD 2K 1% 125W F TUBULAR	24546	C4-1/8-T0-2001-F
A18R34	0757-0465	1	RESISTOR-FXD 100K 1% 125W F TUBULAR	24546	C4-1/8-T0-1003-F
A18R35	0698-3156	1	RESISTOR-FXD 17.8K 1% 125W F TC=0+-100	24546	C4-1/8-T0-1782-F
A18R36	0757-0447	1	RESISTOR-FXD 16.2K 1% 125W F TUBULAR	28480	0757-0447
A18R37	0698-6688		RESISTOR-FXD 99.8K 1% 125W F TUBULAR	19701	MF4C1/8-T9-9982-B
A18R38	0761-0030	1	RESISTOR-FXD 22K 5% 1W MO TC=0+-200	28480	0761-0030
A18R39	0757-0430		RESISTOR-FXD 2.21K 1% 125W F TUBULAR	32997	MF4C-1
A18R40	0757-0430		RESISTOR-FXD 2.21K 1% 125W F TUBULAR	32997	MF4C-1
A18R41	0698-6977	1	RESISTOR-FXD 30K 1% 125W F	02995	MF4C-1
A18R42	0698-6360	1	RESISTOR FXD 10K 1% 125W F TUBULAR	19701	MF4C1/8-T9-1002-B
A18R43	0698-5449	1	RESISTOR-FXD 5K 1% 125W F TUBULAR	19701	MF4C1/8-T2-5001-B
A18R44	0698-6348	1	RESISTOR-FXD 3K 1% 125W F TUBULAR	19701	MF4C1/8-T9-3001-B
A18R45	0698-3491	1	RESISTOR-FXD 1K 1% 125W F TUBULAR	19701	MF4C1/8-T2-1001-B
A18R46	0698-6317	1	RESISTOR-FXD 500 1% 125W F TUBULAR	03886	PME55-1/8-T9-500R-B
A18R47	0698-6295	1	RESISTOR-FXD 300 1% 125W F TUBULAR	19701	MF4C 1/8-T2-300R-B
A18R48	0698-4343	2	RESISTOR-FXD 100 1% 125W F TUBULAR	19701	MF4C-1/8 T2-100R-B
A18R49	0698-4343		RESISTOR-FXD 100 1% 125W F TUBULAR	19701	MFC4-1/8-T2-100R-B
A18R50	0757-0280		RESISTOR-FXD 1K 1% 125W F TUBULAR	28480	0757-0280
A18R51	0757-0487		RESISTOR-FXD 825K 1% 125W F TUBULAR	91637	MF5C T-0
A18R52	0757-0283		RESISTOR-FXD 2K 1% 125W F TUBULAR	24546	C4-1/8-T0-2001-F
A18R53	0757-0465	1	RESISTOR-FXD 100K 1% 125W F TUBULAR	24546	C4-1/8-T0-1003-F
A18R54	0698-4471		RESISTOR-FXD 7.15K 1% 125W F TC=0+-100	24546	C4-1/8-T0-7151-F
A18R55	0698-3268	1	RESISTOR-FXD 11.5K 1% 125W F TC=0+-100	24546	C4-1/8-T0-1152-F
A18R56	0698-6688		RESISTOR-FXD 99.8K 1% 125W F TUBULAR	19701	MF4C-1/8-T9-9982-B
A18R57	0757-0458	1	RESISTOR-FXD 51.1K 1% 125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A18R58	0698-6688		RESISTOR-FXD 99.8K 1% 125W F TUBULAR	19701	MF4C-1/8-T9-9982-B
A18R59	2100-3154	1	RESISTOR-TRMR 1K 10% C SIDE-ADJ 17TRN	32997	3006P-1-102
A18R60	0698-6688		RESISTOR-FXD 99.8K 1% 125W F TUBULAR	19701	MF4C-1/8-T9-9982-B
A18R61	0757-0449		RESISTOR-FXD 20K 1% 125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A18R62	0757-0416	1	RESISTOR-FXD 511 1% 125W F TUBULAR	24546	C4-1/8-T0-511R-F
A18R63	0698-6688		RESISTOR-FXD 99.8K 1% 125W F TUBULAR	19701	MF4C-1/8-T9-9982-B
A18R64	0684-1001	2	RESISTOR-FXD 10 10% 25W CC TUBULAR	01121	CB1001
A18R65	0684-1001		RESISTOR-FXD 10 10% 125W CC TUBULAR	01121	CB1001
A18R66	0683-4725		RESISTOR-FXD 4.7K 5% 25W FC TC=-400/+700	01121	CB4525
A18U1	1826-0528	4	IC OP AMP TO-99	27014	LF356BH
A18U2	1826-0528	1	IC OP AMP TO-99	27014	LF356BH
A18U3	1820-1297		IC GATE TTL LS EX CL NOR QUAD 2 INP	01295	2N74LS266N
A18U4	1826-0528		IC OP AMP TO-99	29014	LF356BH
A18U5	1826-0528		IC OP AMP TO-99	29014	LF356BH
A18U6	1820-1204	1	IC GATE TTL LS NAND DUAL 4-INP	01295	SN74LS20N
A18U7	1820-1112	1	IC FF TTL LS D-TYPE POS EDGE-TRIG	01295	SN74LS74AN
A18VR1	1902-3069	1	DIODE-ZNR 3.83V 5% DO-35 PD=.4W	28480	1902-3069
			PARTS LIST FOR OPTION 001		
P1			NOT USED		
MP80	0400-0013	1	GROMMET NYLON	28480	0400-0013
MP81	01720-03201	1	PLATE:PWR CORD ADAPTER	28480	01720-03201
W1	8120-1202	1	FIXED POWER CORD	28480	8120-1202
			PARTS LIST FOR OPTION 003		
A19	01720-60005		ASSY:PROBE POWER	28480	01720-60005
A19A1	01720-66516		BOARD ASSY:PROBE POWER	28480	01720-66516
A19A1C1	0180-1746		C:15 UF 20VDCW	56289	150D156X902082
A19A1CR1	1901-0028		CR:DIODE SI	04713	SR1358-9
A19A1MP1	1205-0096		HEATSINK FOR Q1	02608	22258
A19MP2	0340-0631	1	SPACER FOR A1921	28480	0340-0631
A19A1Q1	1854-0039		TSTR:SI NPN	04713	2N3053
A19A1Q2	1853-0086		TSTR:SI PNP	28480	1853-0086
A19A1R1	0698-3156		R:4.64K 1/8W	16299	C4-1/8-T0-4641-F
A19A1R2	0757-0451		R:24.3K 1/8W	24546	C4-1/8-T0-2432-F
A19A1R3	0683-1525		R:1.5K 1/4W	01607	CB1525
A19J1, 2	5060-0467		CONN:MALE PROBE	28480	5060-0467
A19MP1, 2	01710-24704		SPACER:JACK	28480	01710-24704
A19MP3	01720-01208		BRACKET:POWER PROBE	28480	01720-01208
A19W1	01720-61606		CABLE ASSY:3 COND	28480	01720-61606
			PARTS LIST FOR OPTION 011		
A14	01720-66565	1	GATE ASSY	28480	01720-66565
V1	5083-5642	1	CRT, P11	28480	5083-5642
			PARTS LIST FOR OPTION 034/035		
	MODEL 3476A01		DVM		
F2	2110-0420	1	FUSE:.032A 250V	04703	312.031
MP25	01725-04102	1	TOP COVER	28480	01710-04106
MP65	1540-0446	1	POUCH	28480	1540-0446
MP84	5040-7946	1	BUTTON:SWITCH, ROCKER	28480	5040-7946
MP85	5040-8302	1	ADAPTER:3476A	28480	5040-8302
MP86	01710-24705	2	SPACER	28480	01710-24705
S4	3101-2080	1	SWITCH:DVM	28480	3101-2080
T2	9100-3956	1	TRANSFORMER	28480	9100-3956
W13	01710-61638	1	POWER CABLE ASSY	28480	01710-61638
			KIT FOR OPTION 034/035		
	01715-69501		FIELD INSTALLATION	28480	01715-69501

See introduction to this section for ordering information

Table 6-2. Replaceable Parts (Cont'd)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			PARTS LIST FOR OPTION 101		
A26	01710-66565	1	BOARD ASSY STATE DISPLAY	28480	01710 66565
A26C1	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160 3451
A26C2	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160 3451
A26C3	0160-3446		CAPACITOR-FXD 220PF +-10% 1000WVDC CER	28480	0160 3446
A26C4	0160-3451		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160 3451
A26CR1	1911 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR2	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR3	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR4	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR5	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR6	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR7	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26CR8	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A26P1	1251 3976		CONNECTOR-MALE	28480	1251 3976
A26P2	1251 3976		CONNECTOR-MALE	28480	1251 3976
A26Q1	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26Q2	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26Q3	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26Q4	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26Q5	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A26Q6	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26Q7	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A26Q8	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26Q9	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A26Q10	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS3611
A26R1	0684 0271		RESISTOR 2.7 OHM 10% .25W CC TUBULAR	01121	CB27G1
A26R2	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A26R3	0698-3155		RESISTOR 4.64K 1% .125W F TUBULAR	16299	C4 1/8 TO 4641 F
A26R4	0698 3155		RESISTOR 4.64K 1% .125W F TUBULAR	16299	C4 1/8 TO 4641 F
A26R5	0757 0283		RESISTOR 2K 1% .125W F TUBULAR	24546	C4 1/8 TO 2001 F
A26R6	0757 0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 151 F
A26R7	0757 0729		RESISTOR 68.1 OHM 1% .25W F TUBULAR	24546	C4 1/4 TO 68R1 F
A26R8	0757 0284		RESISTOR 150 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 151 F
A26R9	0757 0427		RESISTOR 1.5K 1% .125W F TUBULAR	24546	C4 1/8 TO 1501 F
A26R10	0698 3152		RESISTOR 3.48K 1% .125W F TUBULAR	16299	C4 1/8 TO 3481 F
A26R11	0757 0288		RESISTOR 9.09K 1% .125W F TUBULAR	19701	MF4C1/8 TO 9091 F
A26R12	0757 0280		RESISTOR 1K 1% .125W F TUBULAR	24546	C4 1/8 TO 1001 F
A26R13	0757 0410		RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 301R F
A26R14	0757 0410		RESISTOR 301 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 301R F
A26R15	0757 0421		RESISTOR 825 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 825R F
A26R16	0698 0086		RESISTOR 2.61K 1% .125W F TUBULAR	16299	C4 1/8 TO 2611 F
A26R17	1810 0243		RESISTOR 6.8K, 8 SECTION	28480	1810 0243
A26R18	0684 4711		RESISTOR 470 OHM 10% .5W CC TUBULAR	01121	EB4711
A26R19	0757 0932		RESISTOR 2.2K 2% .125W F TUBULAR	24546	C4 1/8 TO 2201 G
A26R20	0684 1001		RESISTOR 10 OHM 10% .25W CC TUBULAR	01121	CB1001
A26R21	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A26S1	3101 0973	1	SWITCH, SL, DPDT .5A 125VAC/DC	79727	GF126 0018
A26VR1	1902 3094		DIODE ZNR 5.11V 2% DO-7 PD=.4W	04713	SZ10939 99
A26VR2	1902 3140	1	DIODE ZNR 9.09V 5% DO-7 PD=.4W	04713	SZ10939 170
A27	01710 66564		BOARD ASSY DIODE INTERFACE	28480	01710 66564
A27CR1	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A27CR2	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A27CR3	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
A27CR4	1901 0047		DIODE SWITCHING 10NS 20V 75MA	28480	1901 0047
R2	2100 3244		RESISTOR-VAR W/SW 10K 20% CC 4PST SW	28480	2100 3244
MP42	01710 67403		KNOB ASSY 101 (INTENSITY CONTROL ONLY)	28480	01710 67403
W14	01710 61645		CABLE OPTION 101 MAIN	28480	01710 61645
W15	01710 61636		CABLE OPTION 101 TWIN	28480	01710 61636
W16	01710 61637	1	CABLE OPTION 101 COAX	28480	01710 61637
			PARTS LIST FOR OPTION 580		
MP26	01720-04113		COVER BOTTOM	28480	01720 04113

Table 6-3. List of Manufacturers' Codes

Mfr No.	Manufacturer Name	Address	Zip Code
FR003	SOVCOR ELECTRONIQUE	LE VESINET FRANCE	
00000	NO M F DESCRIPTION FOR THIS MFG NUMBER		
0041N	NL INDUSTRIES	HIGHSTOWN NJ	08520
01121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS TX	75231
01607	DEL PRO CORP.	BROOKLYN NY	11210
01921	PARCO MANU. CORP.	SYRACUSE NY	13201
02114	FERROXCUBE CORP	SAUGERTIES NY	12477
02392	GEODESICS INCORP.	RALEIGH NC	27603
02735	RCA CORP SOLID STATE DIV	SOMMERVILLE NJ	08876
02995	OPPENHEIMER PRECISION PRODUCTS, INCORP.	WILLOW GROVE PA	19090
03412	CORNING GLASS WORKS (WILMINGTON)	WILMINGTON NC	28401
03744	MONATCO MANU.	KANSAS CITY KS	66115
03888	PYROFILM CORP	WHIPPANY NJ	07981
04200	JOANELL LABORATORIES	LIVINGSTON NJ	07039
04563	NEUSES PK, INC.	ARLINGTON HEIGHTS IL	60006
04703	LITTLEFUSE, INC.	DES PLAINS IL	60016
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
04771	AUTOMATIC DEVICES CO.	ALLENTOWN PA	18103
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
08806	GE CO MINIATURE LAMP PROD DEPT	CLEVELAND OH	44112
12697	CLAROSTAT MFG CO INC	DOVER NH	03820
13103	THERMALLOY CO	DALLAS TX	75247
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	27604
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	14070
24546	CORNING GLASS WORKS	BRADFORD PA	16701
24931	SPECIALTY CONNECTOR CO INC	INDIANAPOLIS IN	46227
24995	ENVIRONMENTAL CONTAINER SYSTEMS INC	PALO ALTO CA	94304
25403	AMPEREX ELEK CORP SEMICON & MC DIV	SLATERSVILLE RI	02876
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	95051
27264	MOLEX PRODUCTS CO	DOWNERS GROVE IL	60515
28480	HEWLETT PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
30983	MEPCO/ELECTRA CORP	SAN DIEGO CA	92121
32997	BOURNS INC TRIMPOT PROD DIV	RIVERSIDE CA	92507
4H713	CINCH MFG CO	SHELBYVILLE IN	46176
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
71400	BUSSMAN MFG DIV OF MCGRAW EDISON CO	ST LOUIS MO	63017
71590	CENTRALAB ELEK DIV GLOBE UNION INC	MILWAUKEE WI	53201
71744	CHICAGO MINIATURE LAMP WORKS	CHICAGO IL	60640
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
72136	ELECTRO MOTIVE MFG CO INC	WILLIMANTIC CT	06226
72982	ERIE TECHNOLOGICAL PRODUCTS INC	ERIE PA	16512
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	FULLERTON CA	92634
73734	FEDERAL SCREW PRODUCTS INC	CHICAGO IL	60618
73899	JFD ELECTRONICS CORP	BROOKLYN NY	11210
74970	JOHNSON E F CO	WASECA MN	56093
7504L	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
78189	ILLINOIS TOOL WORKS INC	ELGIN IL	60126
79963	ZIERICK MFR CO	MT KISCO NY	10549
82142	NO M DESCRIPTION FOR THIS MFG NUMBER		
82389	SWITCHCRAFT INC	CHICAGO IL	60630
84411	TRW CINCH DIV	OGALLALA NE	69153
9D949	AMPHENOL SALES DIV OF BUNKER RAMO	HAZELWOOD MO	63042
91637	DALE ELECTRONICS INC	COLUMBUS NE	68601

See introduction to this section for ordering information

SECTION VII

MANUAL CHANGES

7-1. INTRODUCTION.

7-2. This section contains information for adapting this manual to instruments for which the content does not apply directly.

7-3. MANUAL CHANGES.

7-4. To adapt this manual to your instrument, refer to table 7-1 and make all manual changes listed for your instrument serial prefix number. Perform these changes in the sequence listed. If your instrument serial prefix number is not listed on the title page or in table 7-1, it may be documented in a yellow MANUAL CHANGES supplement. For additional information about serial number coverage, refer to INSTRUMENTS COVERED BY MANUAL in Section I.

Table 7-1. Manual Changes by Serial Prefix Number

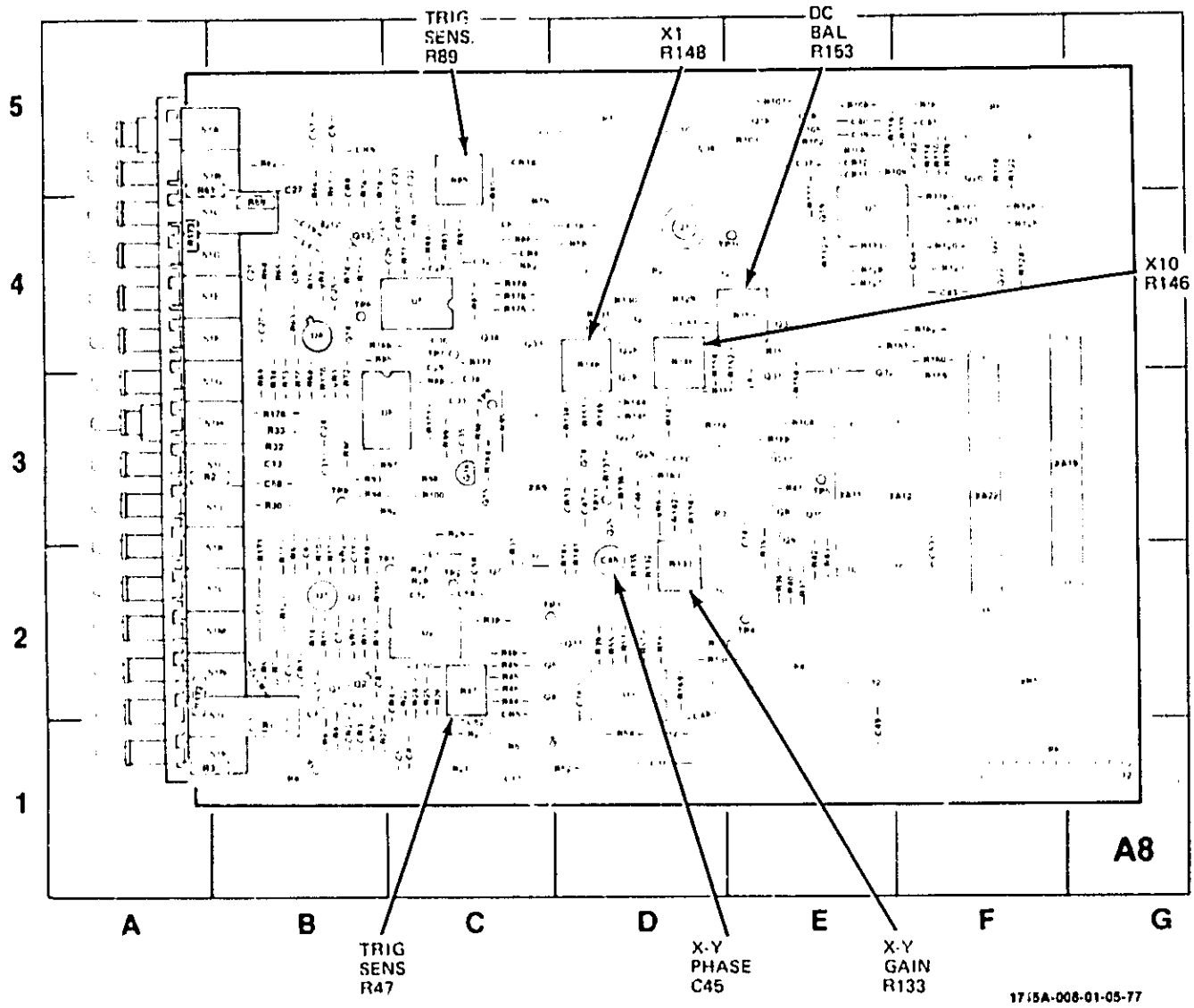
Serial Prefix Number	Make Manual Changes
1720A	4, 3, 2, 1
1823A	4, 3, 2
1849A	4, 3
1915A	4

7-5. MANUAL CHANGE INSTRUCTIONS.

CHANGE 1

SECTION VI,
Table 6-2. Replaceable Parts,
Change: A8, HP and Mfr Part Nos. to 01711-66528 (two places).
Delete: A8CR15.
Delete: A8CR16.
Change: A8Q34, HP and Mfr Part Nos. to 1854-0071, TRANSISTOR NPN SI PD = 300 MW FT = 200 MHz.
Delete: A8Q35.
Delete: A8Q36.
Delete: A8Q37.
Change: A8R38, HP Part No. to 0684-2211, RESISTOR 220 OHM 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part No. CB2211.
Change: A8R39, HP Part No. to 0684-3311, RESISTOR 330 OHM 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part No. CB3311.
Change: A8R45, HP Part No. to 0684-3311, RESISTOR 330 OHM 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part No. CB3311.
Change: A8R46, HP Part No. to 0757-0281, RESISTOR 2.74K 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-2741-F.
Change: A8R48, HP Part No. to 0684-1011, RESISTOR 100 OHM 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part No. CB1011.
Change: A8R49, HP Part No. to 0757-0274, RESISTOR 1.21K 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-1213-F.
Change: A8R50, HP No. to 0757-0421, RESISTOR 825 OHM 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-825R-F.
Change: A8R51, HP Part No. to 0757-0280, RESISTOR 1K 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-1001-F.
Change: A8R52, HP Part No. to 0684-2211, RESISTOR 220 OHM 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part No. CB2211.
Add: A8R55, HP Part No. 0757-0283, RESISTOR 2K 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-2001-F.
Add: A8R56, HP Part No. 0757-0419, RESISTOR 681 OHM 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-681R-F.
Add: A8R57, HP Part No. 0684-1031, RESISTOR 10K 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part No. CB1031.
Change: A8R169, HP Part No. to 0757-0398, RESISTOR 75 OHM 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-75R0-F.
Add: A8U3, HP Part No. 1821-0001, IC LIN CA3046 TRANSISTOR ARRAY, Mfr Code 02735, Mfr Part No. CA3046.

SECTION VIII,
Figure 8-10 (Sheet 1 of 2),
Replace A8 Component Locator with figure 7-1, A8 Component Locator.
Figure 8-10 (Sheet 2 of 2),
Replace Schematic 7 with figure 7-2, Main Sweep Trigger Schematic.



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B 2	C34	C 3	CR12	E 5	Q18	E 5	R20	B 1	R55	D 2	R90	B 3	R124	F 4	R158	F 3	S1M	B 2
C2	B 2	C35	C 1	CR13	D 1	Q19	E 4	R21	C 1	R56	D 2	R91	C 4	R125	F 4	R159	F 3	S1N	B 2
C3	B 2	C36	D 5	CR14	C 5	Q20	F 5	R22	C 2	R57	D 2	R92	C 3	R126	F 4	R160	F 4	S1O	B 2
C4	C 1	C37	E 5	J1	D 4	Q21	F 4	R23	C 1	R58	D 4	R93	B 3	R127	F 4	R161	F 4	S1P	B 1
C5	C 1	C38	E 5	L1	B 2	Q22	F 4	R24	C 2	R59	B 5	R94	B 3	R128	F 4	R162	F 4	TP1	C 2
C6	B 2	C39	E 5	L2	B 2	Q23	D 4	R25	C 2	R61	A 5	R95	C 3	R129	D 4	R163	D 3	TP2	C 2
C7	B 2	C40	E 5	L3	C 2	Q24	D 1	R26	C 2	R62	B 5	R96	C 3	R130	D 4	R164	C 3	TP3	C 2
C8	B 2	C41	F 5	L4	B 4	Q25	D 1	R27	C 2	R63	B 4	R97	C 3	R131	D 4	R165	B 2	TP4	E 2
C9	B 5	C42	F 5	L5	C 4	Q26	D 4	R28	C 2	R64	B 4	R98	C 3	R132	D 3	R166	C 4	TP5	E 3
C10	C 2	C43	F 4	L6	C 4	Q27	D 3	R29	C 3	R65	B 4	R99	C 3	R133	D 1	R167	F 6	TP6	B 4
C11	B 2	C44	F 4	L7	E 3	Q28	D 3	R30	B 3	R66	B 5	R100	C 3	R134	D	R168	E 3	TP7	C 4
C12	C 2	C45	D 2	R1	E 3	Q29	D 3	R31	C 3	R67	B 5	R101	C 3	R135	D	R169	D 2	TP8	B 3
C13	B 3	C46	D 3	P1	D 5	Q30	F 4	R32	B 3	R68	B 3	R102	E 5	R136	D	R170	B 3	TP9	C 3
C14	E 3	C47	D 3	P2	D 4	Q31	E 3	R33	B 3	R69	B 3	R103	E 5	R137	D 1	R171	B 2	TP10	F 4
C15	D 1	C48	D 2	P3	D 3	Q32	E 3	R34	B 3	R70	B 3	R104	E 3	R138	D 3	R172	B 2	TP11	D 3
C16	D 2	C49	F 1	P4	E 2	Q33	C 4	R35	E 5	R71	B 4	R105	E 5	R139	D 3	R173	B 4	U1	B 2
C17	C 1	C50	D 1	P5	E 5	Q34	C 4	R36	E 3	R72	B 3	R106	E 5	R140	D 3	R174	C 4	U2	C 2
C18	D 1	C51	D 4	P6	F 1	R1	B 2	R37	E 3	R73	B 3	R107	E 5	R141	D 2	R175	C 4	U3	D 3
C19	B 4	C52	C 1	Q1	B 2	R3	B 1	R38	C 2	R74	B 4	R108	E 5	R142	D 3	R176	C 4	U4	B 4
C20	B 4	C53	F 2	Q2	B 2	R4	B	R39	D 2	R75	B 4	R109	E 5	R143	D 2	R177	C 4	U5	C 4
C21	B 4	C54	C 2	Q3	B 2	R5	B 2	R40	E 2	R76	B 5	R110	E 5	R144	D 3	R178	B 3	U6	C 3
C22	C 5	C56	1	Q4	C 2	R6	B 1	R41	E 3	R77	C 4	R111	E 4	R145	D 3	R179	F 6	U7	E 4
C23	C 5	C57	E 5	Q5	C 2	R7	B 2	R42	E 2	R78	B 5	R112	E 5	R146	D 4	S1A	B 5	VR1	B 2
C24	B 3	C58	B 1	Q6	D 1	R8	B 1	R43	E 2	R79	C 4	R113	E 4	R147	D 3	S1B	B 5	VR2	B 3
C25	B 4	CR1	B 2	Q7	C 2	R9	B 2	R44	C 2	R80	C 5	R114	E 5	R148	D 4	S1C	B 4	VR3	B 3
C26	C 4	CR2	B 1	Q8	E 5	R10	B 2	R45	C 2	R81	C 4	R115	E 5	R149	D 3	S1D	B 4	VR4	B 4
C27	B 5	CR3	B 1	Q9	E 5	R11	B 2	R46	C 2	R82	C 4	R116	E 4	R150	D 4	S1E	B 4	VR5	F 2
C28	C 4	CR4	C 2	Q10	E 5	R12	B 2	R47	C 2	R83	C 4	R117	E 4	R151	D 3	S1F	B 4	VR6	D 3
C29	C 4	CR5	C 2	Q11	D 2	R13	B 2	R48	C 2	R84	C 4	R118	E 5	R152	E 4	S1G	B 3	XA9	C 3
C30	C 4	CR6	C 4	Q12	B 4	R14	B 2	R49	C 2	R85	C 4	R119	E 5	R153	E 4	S1H	B 3	XA11	E 3
C31	B 3	CR7	B 4	Q13	B 4	R15	B 2	R50	D 1	R86	C 4	R120	E 4	R154	D 4	S1J	B 3	XA12	E 3
C32	E 4	CR8	B 5	Q14	B 4	R16	B 2	R51	D 2	R87	C 4	R121	E 4	R155	D 3	S1K	B 3	XA19	G 3
C33	E 1	CR9	B 5	Q15	C 3	R17	B 2	R52	D 1	R88	C 3	R122	E 5	R156	D 3	S1K	B 2	XA22	F 3
C34	C 1	CR10	C 4	Q16	C 3	R18	B 2	R53	C 1	R89	C 5	R123	E 4	R157	E 4	S1L	B 2		
C35	C 1	CR11	E 5	Q17	E 1	R19	B 1	R54	D 1										

Figure 7-1. Replacement for A8 Component Locator

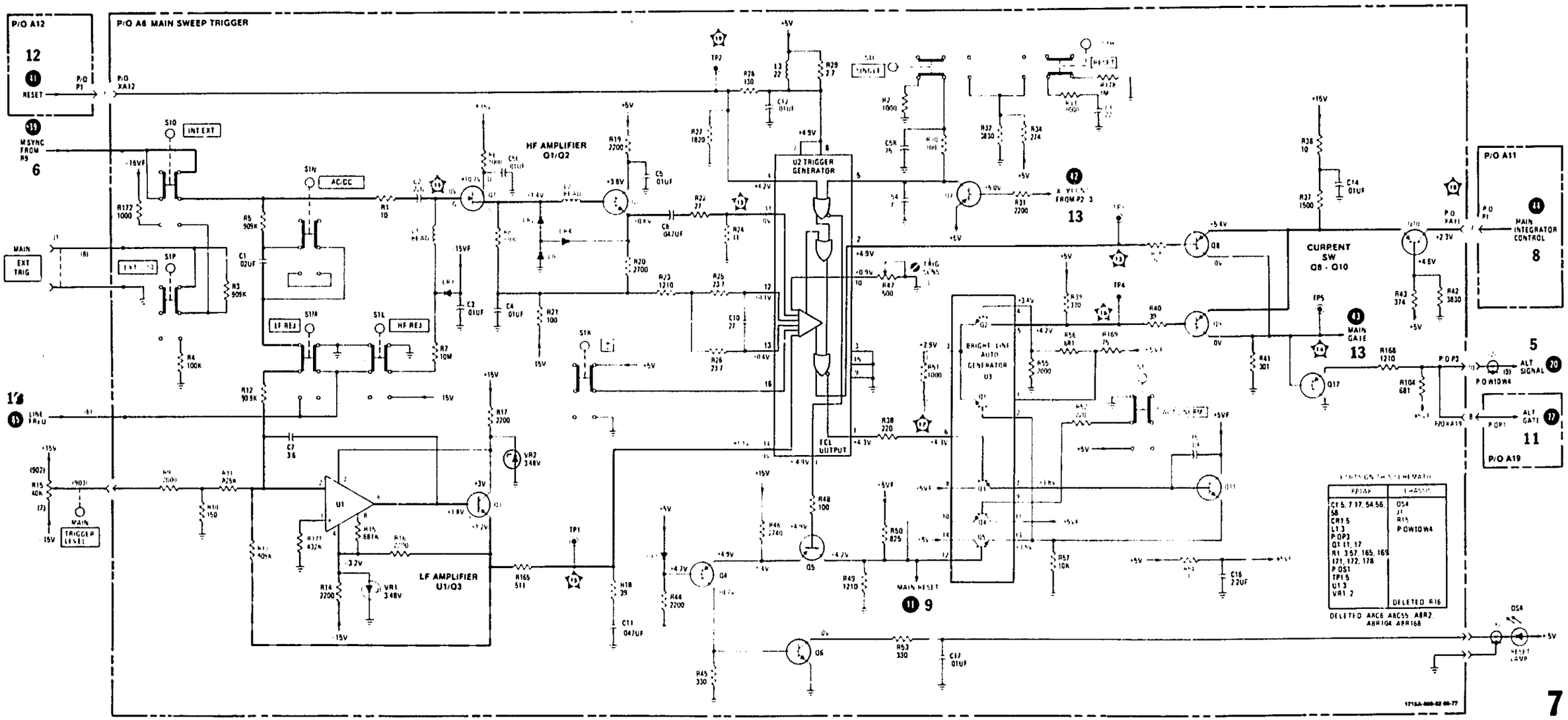


Figure 7-2.
Replacement for Schematic 7

CHANGE 2

SECTION VI,
Table 6-2. Replaceable Parts,
Change: A14, HP and Mfr Part Nos. to 01720-66551 (two places).
Change: W6, HP and Mfr Part Nos. to 01720-61605.
Delete: A14R82.
Delete: A14R83.
Delete: A14R84.
Delete: A14VR6.
Change Parts List for Option 011.
Change: A14, HP and Mfr Part Nos. to 01720-66555.

SECTION VIII,
Schematic 17, Gate Assembly and H.V. Power Supply,
Change Schematic 17 as shown in figure 7-3.

CHANGE 3

SECTION VI,
Table 6-2. Replaceable Parts,
Delete: H43.
Delete: H44.
Delete: H45.
Change: L2, HP and Mfr Part Nos. to 00191-66004, COIL ALIGNMENT Y-AXIS.
Change: MP39, HP and Mfr Part Nos. to 01720-60601, SHIELD ASSY, CRT.

CHANGE 4

SECTION V, ADJUSTMENTS,
Replace paragraph 5-71, Analog Assembly A18 Adjustments, with the following procedure:

5-71. ANALOG ASSEMBLY A18 ADJUSTMENTS.

(See schematic 11 and figures 5-19 and 8-2.) The amplifiers on analog assembly A18 are balanced so that the time interval START and time interval STOP potentiometers trace each other.

Equipment Required:
Time-mark generator
Multifunction digital voltmeter

5-72. Adjust the analog assembly as follows:

a. Connect multifunction digital voltmeter to Model 1725A INTERVAL OUT connector (rear panel); Option 034, switch DVM to time interval measurement mode.

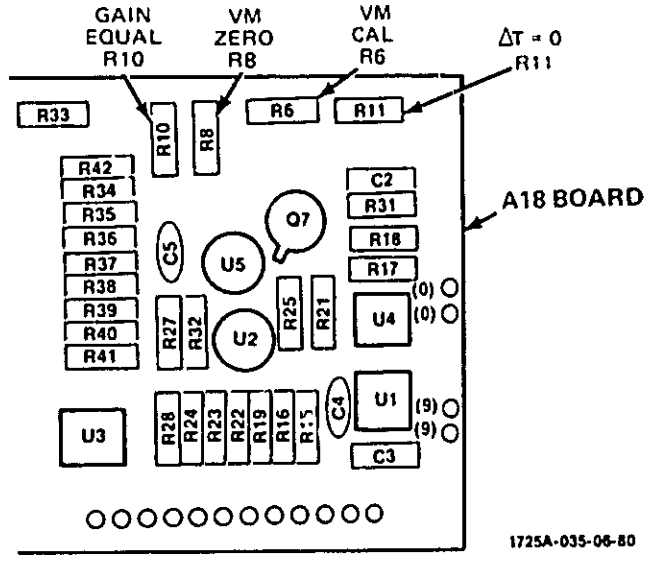


Figure 7-4. Analog Assembly Adjustments

b. Set Model 1725A front-panel controls as follows:

Time Interval STOP ..... 0.00 (fully ccw)
TIME/DIV (main) ..... 1.0 μSEC
TIME/DIV (delayed) ..... .01 μSEC
HORIZ DISPLAY ..... MAIN INTEN
Coupling (channel A) 50Ω
VOLTS/DIV (channel A) 0.5
SIGNAL OVERLAY (ΔT = 0) ..... midrange
Time Interval Mode Switch .... CH A START

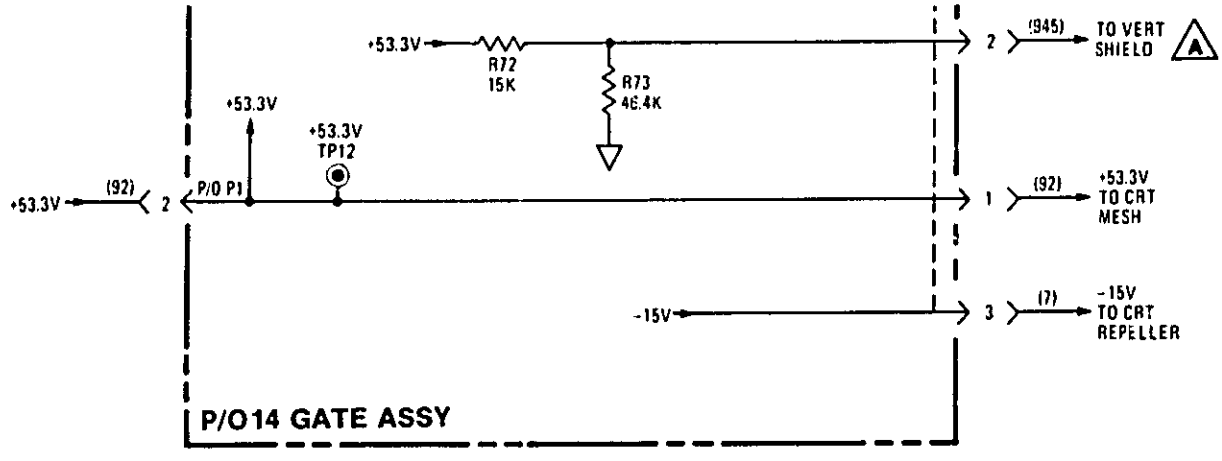


Figure 7-3. Changes to Schematic 17

c. Connect time-mark generator to Model 1725A channel A INPUT connector.

d. Set time-mark generator for 1 μs time marks.

e. Adjust time interval START control to position intensified spot on second time mark from left.

f. Set HORIZ DISPLAY to DLY'd.

g. Set time interval START control as required to observe second time mark (superimposed).

h. Adjust A18R11 to exactly superimpose time mark observed in step g.

i. Set time interval START control to observe tenth time mark.

NOTE

Do not adjust time interval STOP control.

j. Adjust A18R10 to superimpose exactly two time marks observed.

k. Repeat steps c through j until no interaction occurs.

l. With time interval STOP control set to 0.00 (±1 dial line width), adjust A18R8 for multifunction digital voltmeter indication of zero ±2 mV (Option 034 to zero ±2 mV).

m. Set time interval STOP control to 10.00 (±1 dial line width).

n. Adjust A18R6 for digital voltmeter indication of 10.00 V ±10 mV.

o. Disconnect test equipment.

p. Set Model 1725A front-panel controls to initial settings.

SECTION VI,
Table 6-2. Replaceable Parts,
Change: A3, HP and Mfr Part Nos. to 01720-66524, VERTICAL PRE-AMP ASSY (two places).
Change: A5, HP and Mfr Part Nos. to 01720-66538, VERTICAL OUTPUT ASSY (two places).
Change: A7, HP and Mfr Part Nos. to 01720-66535, VERTICAL DISPLAY SWITCH ASSY (two places).
Change: A8, HP and Mfr Part Nos. to 01722-66528, HORIZ. SWEEP ASSY (two places).
Change: A10, HP and Mfr Part Nos. to 01720-66536, HORIZ. DISPLAY SWITCH ASSY (two places).
Change: A11, HP and Mfr Part Nos. to 01720-66564, MAIN SWEEP SWITCH ASSY (two places).
Change: A12, HP and Mfr Part Nos. to 01722-66520, HOLDOFF-DELAY COMPARATOR (two places).
Change: A13, HP and Mfr Part Nos. to 01720-66537, HORIZ. OUTPUT ASSY (two places).
Change: A14, HP and Mfr Part Nos. to 01720-66554, GATE ASSY (two places).
Change: A15, HP and Mfr Part Nos. to 01720-66548, H.V. POWER SUPPLY ASSY (two places).
Change: A17, HP and Mfr Part Nos. to 01720-66528, L.V. POWER SUPPLY ASSY (two places).
Change: A18, HP and Mfr Part Nos. to 01710-66557, ANALOG ASSY (two places).
Delete: H46.
Change: MP 25, HP and Mfr Part Nos. to 01720-04102, COVER, TOP.
Change: MP26, HP and Mfr Part Nos. to 01720-04105, COVER, BOTTOM.
Delete: MP85.
Delete: MP86.
Change: R24, HP and Mfr Part Nos. to 2100-2488, RESISTOR-VAR, CONT 10K 20% CC.
Change: W6, HP and Mfr Part Nos. to 01720-61623, CABLE ASSY CRT NECK PINS.
Change: W7, HP and Mfr Part Nos. to 01720-61631, CABLE ASSY H.V.
Change: W8, HP and Mfr Part Nos. to 01720-61619, CABLE ASSY VERTICAL OUTPUT.
Change: W9, HP and Mfr Part Nos. to 01710-61640, CABLE ASSY, DIGITAL.
Change: W10, HP and Mfr Part Nos. to 01710-61641, CABLE ASSY, MAIN.
Change: W17, HP and Mfr Part Nos. to 01720-61602, CABLE ASSY, MAIN.
Change: A8R168, HP Part No. to 0757-0274, RESISTOR 1.21K 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-1213-F.
Change: A14R3, HP Part No. to 0757-0418, RESISTOR 619 OHM 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-T0-619R-F.
Change: A14R4, HP and Mfr Part No. to 0757-0429, RESISTOR 1.82K 1% .125W F TUBULAR, Mfr. Code 24546, Mfr Part No. C4-1/8-T0-1821-F.
Delete: A17C17.
Delete: A17C18.
Delete: A17C19.
Delete: A17C20.
Delete: A17C21.
Delete: A17C22.
Replace A18 Parts List with table 7-3.
Change Parts List for Option 003 as follows:
Change: A19, HP and Mfr Part Nos. to 01720-60001, PROBE POWER ASSY.
Change Parts List for Option 011 as follows:
Change: A14, HP and Mfr Part Nos. to 01720-66531, GATE ASSY.
Change Parts List for Option 034/035 as follows:
Change: MP25, HP and Mfr Part Nos. to 01710-04106.
Change Parts List for Option 101 as follows:
Change: W14, HP and Mfr Part Nos. to 01710-61635, CABLE ASSY MAIN.

Table 7-2. Replacement for A7 Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7	01720 66535	1	VERTICAL DISPLA / SWITCH ASSY	28480	01720 66535
A7C1	0180 0230		CAPACITOR FXD, 1UF + 20% 50VDC TA SOLID	56289	150D106X0050A2
A7C2	0180 0230		CAPACITOR FXD, 1UF + 20% 50VDC TA SOLID	56289	150D106X0050A2
A7C3	0160 2209	1	CAPACITOR FXD, 360PF + 5% 300WVDC MICA	28480	0160 2209
A7C4	0160 3470		CAPACITOR FXD, 01UF +80 20% 50WVDC CER	28480	0160 3470
A7C5	0160 2204		CAPACITOR FXD, 100PF + 5% 300WVDC MICA	28480	0160 2204
A7CR1	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A7CR2	1901 0040	1	DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A7P1	1251 0629	10	CONNECTOR, 10 CONT, MALE, POST TYPE	27264	29 64 1103
A7Q1	1854 0071		TRANSISTOR NPN SI PD 300 MW FT 200MHZ	28480	1854 0071
A7Q2	1854 0071		TRANSISTOR NPN SI PD 300 MW FT 200MHZ	28480	1854 0071
A7R1	0698 3160		RESISTOR 2 37K 1% 125W F TUBULAR	16299	C4 1 8 TO 2371 F
A7R2	0757 0441	1	RESISTOR 8 25K 1% 125W F TUBULAR	24546	C4 1 8 TO 8251 F
A7R3	0757 0273	3	RESISTOR 3 01K 1% 125W F TUBULAR	24546	C4 1 8 TO 3011 F
A7R4	0757 0407	3	RESISTOR 200 OHM 1% 125W F TUBULAR	24546	C4 1 8 TO 201 F
A7R5	0757 0398		RESISTOR 75 OHM 1% 125W F TUBULAR	24546	C4 1 8 TO 75R0 F
A7R6	0757 0398		RESISTOR 75 OHM 1% 125W F TUBULAR	24546	C4 1 8 TO 75R0 F
A7R7	0757 0800	1	RESISTOR 332 OHM 1% 5W F TUBULAR	[illegible]	MF7C1 2 TO 332R F
A7R8	0757 0740	2	RESISTOR 2 21K 1% 25W F TUBULAR	24546	C5 1 4 TO 2211 F
A7R9	0757 0740	2	RESISTOR 2 21K 1% 25W F TUBULAR	24546	C5 1 4 TO 2211 F
A7R10	0683 1825		RESISTOR 1 8K 5% 25W CC TUBULAR	01121	CB1825
A7R11	0684 2211		RESISTOR 220 OHM 10% 25W CC TUBULAR	01121	CB2211
A7R12	0684 2211	1	RESISTOR 220 OHM 10% 25W CC TUBULAR	01121	CB2211
A7S1	3101 0661	1	SWITCH PB 4STA 4PDT .394 IN CTRS 4A	28480	3101 0661
A7U1	1820 0102	1	IC DGTL MC 1013P FLIP-FLOP	04713	MC1013P
A7U2	1820 0142	5	IC DGTL MC 1004P GATE	04713	MC1004P
A7U3	1821 0001		IC LIN CA3046 TRANSISTOR ARRAY	02735	CA3046
A7XA2	1251 3472		CONNECTOR, 8 CONT, FEM, POST TYPE	27264	09 62 3081
A7XU1	1200 0474		SOCKET IC 14 CONT DIP SLDR TERM	28480	1200 0474
A7XU2	1200 0474		SOCKET IC 14 CONT DIP SLDR TERM	28480	1200 0474
A7XU3	1200 0474		SOCKET IC 14 CONT DIP SLDR TERM	28480	1200 0474

See Introduction to this section for ordering information

Table 7-3. Replacement for A18 Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A18	01710 66654	1	ANALOG ASSY	28480	01710 66654
A18C1	0180 1746		CAPACITOR FXD 15UF +-10% 20VDC TA SOLID	56289	1500156X9020B2
A18C2	0180 1745		CAPACITOR FXD 1 5UF +-10% 20VDC TA	56289	1500155X9020A2
A18C3	0180 0230		CAPACITOR FXD 1UF +-20% 50VDC TA SOLID	56289	1500105X0050A2
A18C4	0160 3451		CAPACITOR FXD 01UF +80-20% 100WVDC	28480	0160 3451
A18C5	0150 0069		CAPACITOR FXD 1000PF +100-20% 500 VDC CER	04663	801 010X5GD1027
A18CR1	1901 0040		DIODE SWITCHING 20V MAX VRM 75MA	28480	1901 0040
A18CR2	1901 0040		DIODE SWITCHING 20V MAX VRM 75MA	28480	1901 0040
A18CR3	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR4	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR5	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0047
A18CR6	1901 0040		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0047
A18CR7	1901 0047		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18CR8	1901 0047		DIODE SWITCHING 2NS 30V 50MA	28480	1901 0040
A18Q1	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A18Q2	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A18Q3	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A18Q4	1853 0036		TRANSISTOR PNP SI CHIP PD=310MW	28480	1853 0036
A18Q5	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A18Q6	1854 0215		TRANSISTOR NPN SI PD=310MW FT=300MHZ	04713	SPS 3611
A18Q7	1854 0523		TRANSISTOR NPN SI PD=1W FT=150 MHZ	04713	SS3001
A18Q8	1854 0215		TRANSISTOR NPN SI PD=310 MW FT=30[illegible]	04713	SPS3611
A18R1	0757 0421		RESISTOR 825 OHM 1% .125W F TUBUL[illegible]	24546	C4 1/8 TO 825R F
A18R2	0684 3321		RESISTOR 3.3K 10% .25W CC TUBULAR	01121	CB3321
A18R3	0698 3153		RESISTOR 3.83K 1% .125W F TUBULAR	24546	C4 1/8 TO 3831 F
A18R4	0757 0317		RESISTOR 1.33K 1% .125W F TUBULAR	24546	C4 1/8 TO 1331 F
A18R5	0757 0421		RESISTOR 825 OHM 1% .125W F TUBULAR	24546	C4 1/8 TO 825R F
A18R6	2100 3274		RESISTOR VAR TRMR 10K OHM 10% C	28480	2100 3274
A18R7	0698 3154		RESISTOR 4.22K 1% .125W F TUBULAR	16299	C4 1/8 TO 4221 F
A18R8	2100 3094		RESISTOR VAR TRMR 100K OHM 10% C SIDE ADJ	32997	3006P 1 104
A18R9	0684 2221		RESISTOR FXD 2.2K 10% .25W CC TUBULAR	01121	CB2221
A18R10	2100 3123	1	RESISTOR TRMR 500 10% C SIDE ADJ	04568	89PR500
A18R11	2100 3274		RESISTOR VAR TRMR, 10K OHM 10% C	28480	2100 3274
A18R12	0684 4721		RESISTOR 4.7K 10% .25W CC TUBULAR	01121	CB4721
A18R13	0684 1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A18R14	0684 1031		RESISTOR 10K 10% .25W CC TUBULAR	01121	CB1031
A18R15	0757 0451		RESISTOR 24.3K 1% .125W F TUBULAR	24546	C4 1/8 TO 2432 F
A18R16	0757 0440		RESISTOR 7.5K 1% .125W F TUBULAR	24546	C4 1/8 TO 7501 F
A18R17	0757 0438		RESISTOR 5.11K 1% .125W F TUBULAR	24546	C4 1/8 TO 5111 F
A18R18	0757 0438		RESISTOR 5.11K 1% .125W F TUBULAR	24546	C4 1/8 TO 5111 F
A18R19	0698 3449		RESISTOR 28.7K 1% .125W F TUBULAR	16299	C4 1/8 TO 2872 F
A18R20	0684 1031	1	RESISTOR FXD 10K 10% .25W CC TUBULAR	01121	CB1031
A18R21	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A18R22	0684 4751		RESISTOR 4.7M 10% .25W CC TUBULAR	01121	CB4751
A18R23	0757 0444	1	RESISTOR 12.1K 1% .125W F TUBULAR	24546	C4 1/8 TO 1212 F
A18R24	0757 0442		RESISTOR 10K 1% .125W F TUBULAR	24546	C4 1/8 TO 1002 F
A18R25	0698 4002	1	RESISTOR 5K 1% .125W F TUBULAR	16299	C4 1/8 TO 5001 F
A18R26	0698 0085		RESISTOR 2.61K 1% .125W F TUBULAR	16299	C4 1/8 TO 2611 F
A18R27	0757 0459		RESISTOR 66.2K 1% .125 WF	02995	MF4C 1
A18R28	0698 3155	1	RESISTOR 4.64K 1% .125W F TUBULAR	16299	C4 1/8 TO 4641 F
A18R29	0684 2231		RESISTOR FXD 22K 10% .25W CC TUBULAR	01121	CB2231
A18R30	0684 2221		RESISTOR 2.2K 10% .25W CC TUBULAR	01121	CB2221
A18R31	0698 6600	1	RESISTOR 4.87K 1% .125W F TUBULAR	03888	PME55
A18R32	0757 0487		RESISTOR 825K 1% .125 WF TUBULAR	91637	MFBC, T O
A18R33	0761 0030	1	RESISTOR 22P 5% 1W MO	03412	FP 32
A18R34	0698 4343	1	RESISTOR 100 OHM 1% .125W F TUBULAR	19701	MF4C 1/8 T2 100R B
A18R35	0698 4343	1	RESISTOR 100 OHM 1% .125W F TUBULAR	19701	MF4C1/8 T2 100R B
A18R36	0698 6295	1	RESISTOR 300 OHM 1% .125W F TUBULAR	19701	MF4C1/8 T2 300R B
A18R37	0698 6317	1	RESISTOR 600 OHM 1% .125W F TUBULAR	03888	PME55 1/8 T9 500R B
A18R38	0698 3491	1	RESISTOR 1K 1% .125W F TUBULAR	19701	MF4C1/8 T2 1001 B
A18R39	0698 6348	1	RESISTOR 3K 1% .125W F TUBULAR	19701	MF4C1/8 T9 3001 B
A18R40	0698 6449		RESISTOR 5K 1% .125W F TUBULAR	19701	MF4C1/8 T2 6001 B
A18R41	0698 6360		RESISTOR 10K .1% .125WF TUBULAR	19701	MF4C 1/8 T0 1002 B
A18R42	0698 6977		RESISTOR 30K .1% .125WF	02995	MF4C 1
A18R43	0684 1021		RESISTOR 1K 10% .25W CC TUBULAR	01121	CB1021
A18R44	0757 0442		RESISTOR 10K 1% .125WF TUBULAR	24546	C4 1/8 TO 1002 F
A18R45	1820 0564		RESISTOR 10 OHM 10% .25 WF C	01607	CB1001
A18U1	1820 0217		IC LIN OPERATIONAL AMPLIFIER	28480	1820 0564
A18U2	1826 0086		IC LIN OPERATIONAL AMPLIFIER	07263	776HC
A18U3	1820 0564		IC LIN OPERATIONAL AMPLIFIER	28480	1820 0564
A18U4	1820 0564		IC LIN OPERATIONAL AMPLIFIER	28480	1820 0564
A18U5	1826 0059		IC LM 201A OP AMP	27014	LM201AH
A18U6	1820 0688		TC DGTL, GATE	27014	DM74L20N
A18U7	1820 0696		IC DGTL, TTL LP DUAL D	27014	DM74L74N

See introduction to this section for ordering information

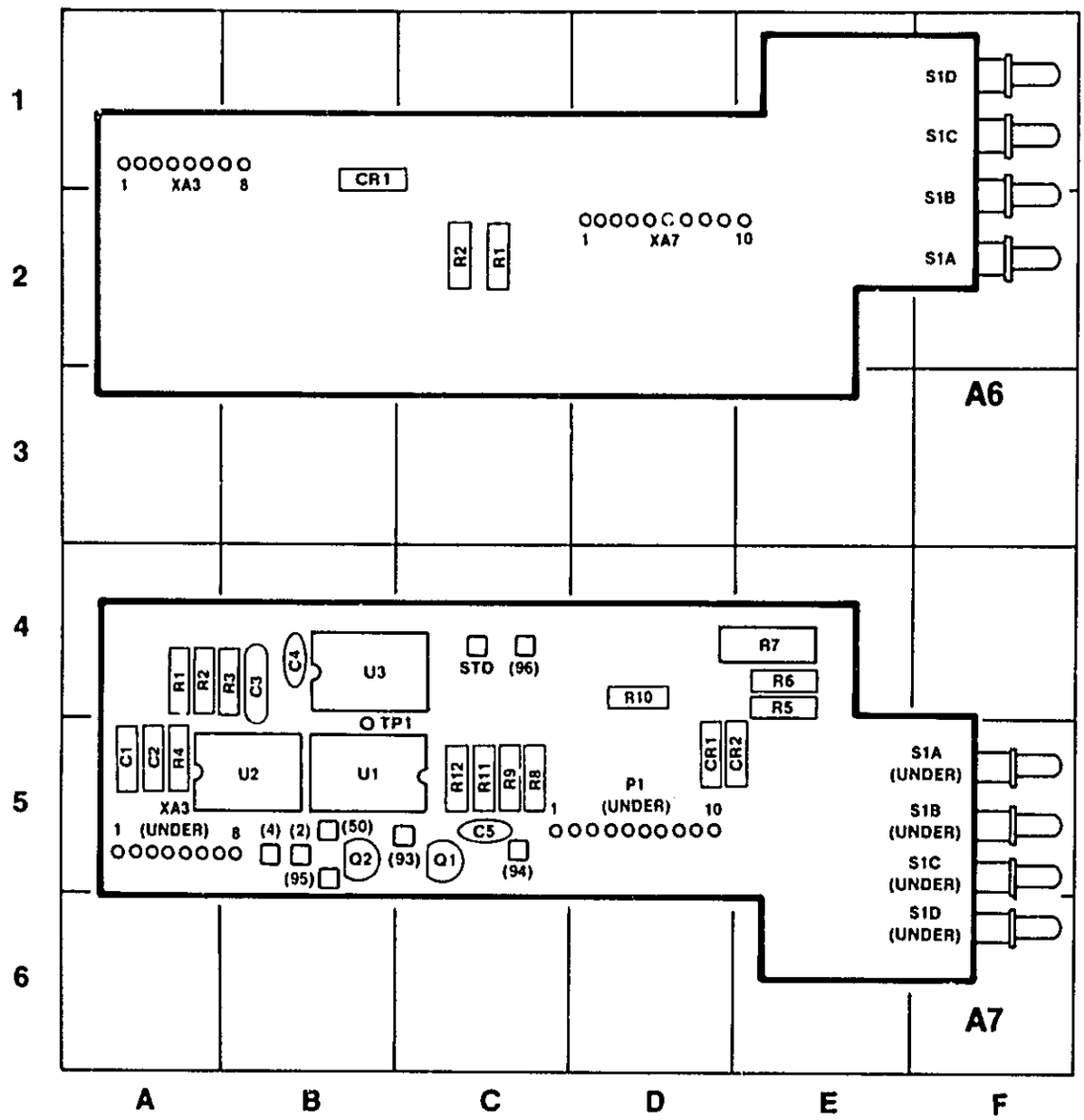
SECTION VIII,

Figure 8-8 (Sheet 1 of 2),
Replace A6 and A7 Component Locator with figure 7-5.

Figure 8-8 (Sheet 2 of 2),
Replace Schematic 5 with figure 7-6.

Figure 8-14 (Sheet 1 of 2),
Replace A18 Component Locator with figure 7-7.

Figure 8-14 (Sheet 2 of 2),
Replace Schematic 11 with figure 7-8.



A6

REF DESIG	GRID LOC
CR1	B-2
R1	C-2
R2	C-2
S1A	F-2
S1B	F-2
S1C	F-2
S1D	F-1
XA3	A-2

A7

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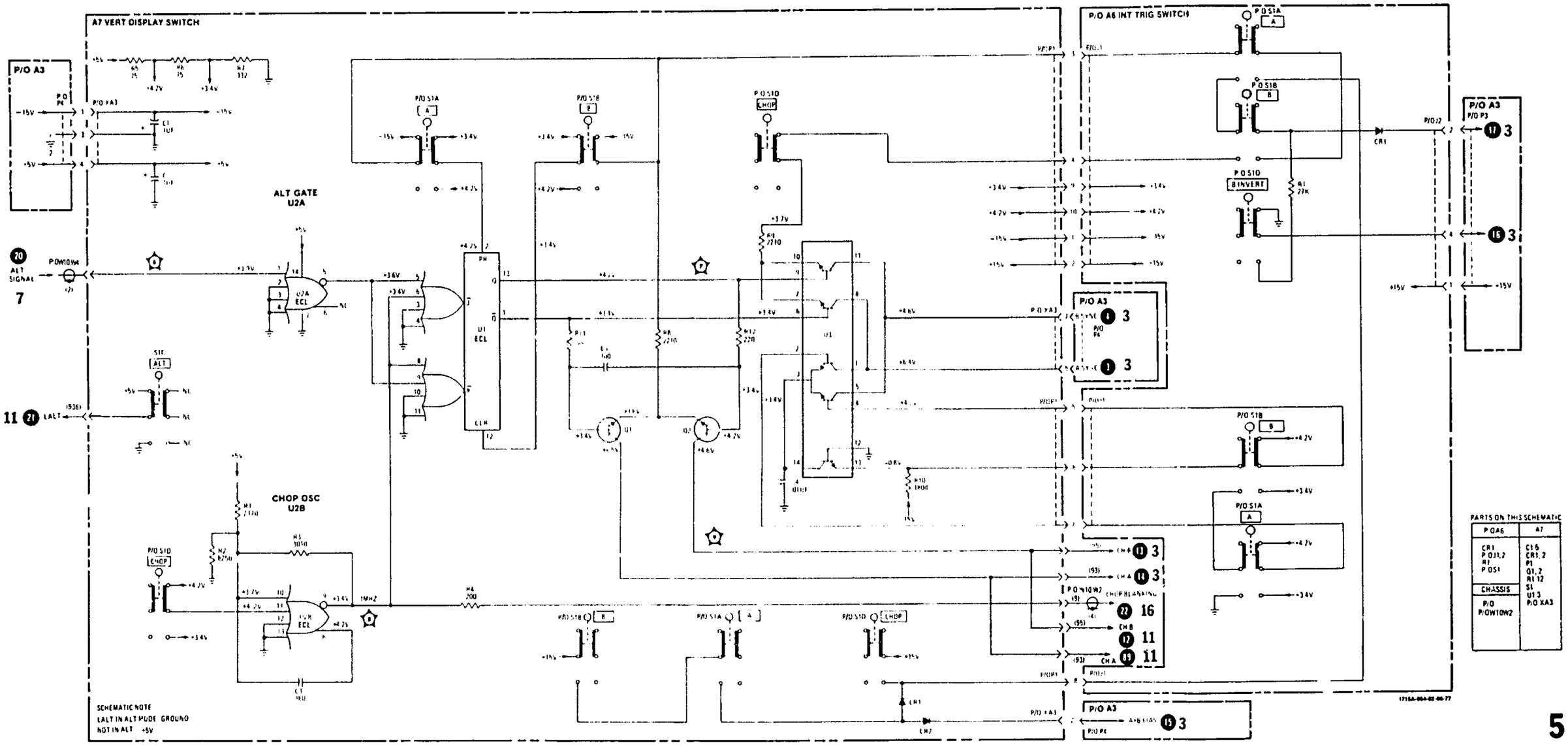
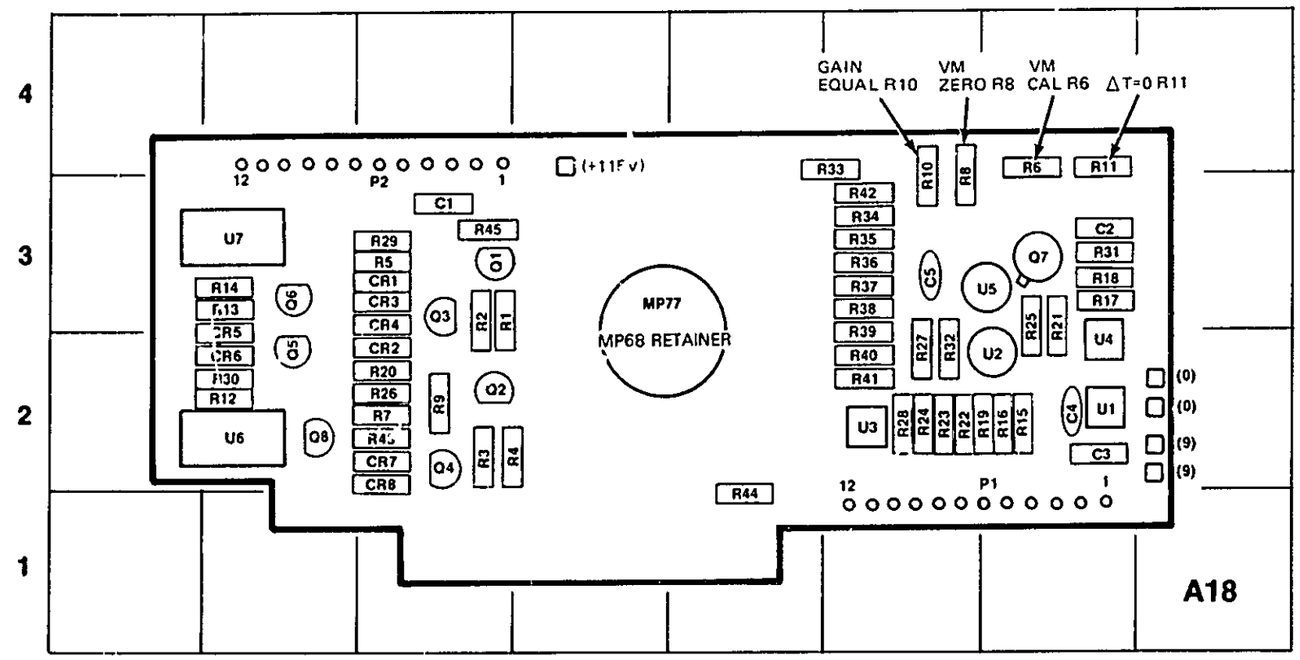
REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-5	R1	A-4	R11	C-5
C2	A-5	R2	A-4	R12	C-5
C3	B-4	R3	B-4	S1A	F-5
C4	B-4	R4	A-5	S1B	F-5
C5	C-5	R5	E-4	S1C	F-5
CR1	D-5	R6	E-4	S1D	F-6
CR2	E-5	R7	E-4	U1	B-5
P1	D-5	R8	C-5	U2	B-5
Q1	C-5	R9	C-5	U3	B-4
Q2	B-5	R10	D-4	XA3	A-5

Figure 7-5. Replacement for A6 and A7 Component Locators



5

Figure 7-6.
Replacement for Schematic 5



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REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	C-3	CR7	C-2	Q8	B-2	R11	G-4	R22	F-2	R33	F-4
C2	G-3	CR8	C-2	R1	C-3	R12	B-2	R23	F-2	R34	F-3
C3	G-2	P1	G-2	R2	C-3	R13	B-3	R24	F-2	R35	F-3
C4	G-2	P2	C-3	R3	C-2	R14	B-3	R25	G-3	R36	F-3
C5	F-3	Q1	C-3	R4	C-2	R15	G-2	R26	C-2	R37	F-3
CR1	C-3	Q2	C-2	R5	C-3	R16	G-2	R27	F-2	R38	F-3
CR2	C-2	Q3	C-3	R6	G-4	R17	G-3	R28	F-2	R39	F-2
CR3	C-3	Q4	C-2	R7	C-2	R18	G-3	R29	C-3	R40	F-2
CR4	C-3	Q5	B-2	R8	F-3	R19	G-2	R30	B-2	R41	F-2
CR5	B-3	Q6	B-3	R9	C-2	R20	C-2	R31	G-3	R42	F-3
CR6	B-2	Q7	B-2	R10	F-3	R21	G-3	R32	F-2	R43	C-2
										R44	E-1
										R45	C-3

Figure 7-7. Replacement for A18 Component Locator

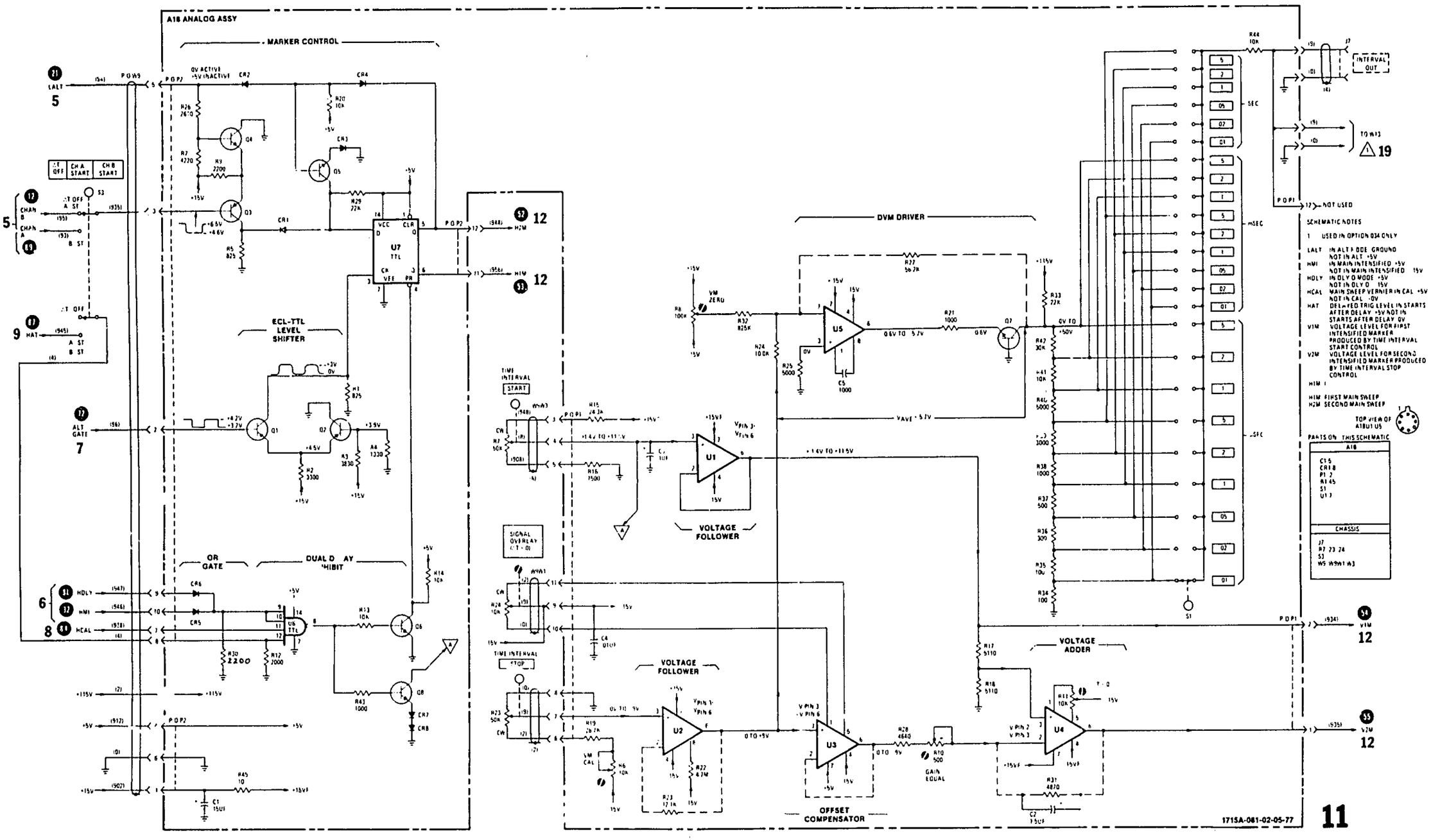


Figure 7-8.
Replacement for Schematic 11
7-11/(7-12 blank)

SECTION VIII

SCHEMATICS AND TROUBLESHOOTING

8-1. INTRODUCTION.

8-2. This section contains schematics, repair information, component-identification illustrations, waveforms, and test conditions. A disassembly procedure for removing the CRT and instrument modules for repair and replacement is also contained in this section.

8-3. PREVENTIVE MAINTENANCE.

8-4. CLEANING. Painted surfaces can be cleaned with a commercial, spray-type window cleaner or with a mild soap and water solution. Excess grease can be removed with a degreaser such as M-180 FREON TF DEGREASER produced by Miller-Stevenson Company

8-5. Corroded spots are best removed with soap and water. Stubborn residues can be removed with a fine abrasive. When using abrasives, be careful that fine particles do not fall into instrument. Such areas should be protected from further corrosion by an application of a silicone resin such as GE DRI-FILM 88.

8-6. SWITCH MAINTENANCE. The pushbutton switches in this instrument are designed for long, trouble-free service. If one of these switches becomes defective, replacement rather than repair is recommended.

8-7 Rotary switches in this instrument can easily be serviced after removal of the assembly on which the switch is mounted. In the case of the TIME/DIV switch, the TIME/DIV switch shaft must be removed. Refer to the paragraphs on repair and replacement in this section for instructions on disassembly of modules in the instrument.

8-8. Conventional rotary switches are serviced by cleaning the contacts with a degreaser such as M-180 FREON TF DEGREASER. The contact surfaces are then lubricated with a lubricant comparable to LUBRIPLATE FML produced by the Fiske Brothers Refining Company. LUBRIPLATE FML is available from the Hewlett-Packard Company (HP Part No. 6040-0305).

CAUTION

Do not clean attenuator switches with any cleaning agent. Attenuator switches have self-cleaning contacts.

8-9. The rotary switches on A9, A11, and A18 can be serviced as follows:

a. Remove TIME/DIV knob and shaft (refer to paragraph 8-17).

b. Remove plug-in assembly (A9, A11, or A18) from A8.

c. Note orientation of slot in rotor section of switch.

d. Remove metal retainer ring uniting male and female sections of rotor switch.

e. Separate two rotor sections.

f. Check contacts on both rotor sections. If contacts show excessive wear, replace rotor section.

g. Check contact area on circuit board. If contact area shows excessive wear, replace circuit board.

h. Clean and lubricate contacts on circuit board and rotors as described in paragraph 8-8.

i. Place rotor sections on circuit board and reinstall retainer ring.

j. Position slotted portion of open rotor section as noted in step c.

k. Reinstall assembly in instrument.

l. Reinstall TIME/DIV shaft and knob assembly.

8-10. REMOVAL AND REPLACEMENT.

8-11. The following paragraphs provide procedures for removal and replacement of assemblies, subassemblies, and components. Special servicing instructions for etched circuit boards are provided in paragraph 8-28. Section VI provides a detailed parts list for use in ordering replacement parts.

8-12. CRT REMOVAL. To remove and replace the CRT, see figure 6-1 and proceed as follows:

WARNING

To prevent personal injury, wear a face mask or goggles when handling the CRT. Wear protective gloves and handle the CRT carefully.

a. Remove top and bottom covers from instrument.

b. Remove rear-panel CRT socket cover MP21.

c. Remove front-panel CRT bezel MP16 by squeezing at midpoint on bottom and rotating outward and upward.

d. Remove CRT filter.

e. Remove four VERT IN wires (gray) from side of CRT neck.

f. Disconnect horizontal input cable W4 (wires (9) and (5)) from CRT neck pins.

g. Disconnect CRT cable connector from gate assembly at A14P2.

h. Disconnect floodgun filament wire (924) from CRT neck pin.

i. Carefully disconnect CRT socket XV1.

j. Remove two CRT shield mounting screws from rear panel of instrument (at MP44).

k. Slide CRT shield toward rear of instrument until shield is clear of front panel.

WARNING

Failure to discharge high voltage can result in severe electrical shock to personnel and damage to the instrument. Do not attempt to remove lead from CRT glass.

l. Disconnect white plastic post-accelerator connector and immediately discharge lead to ground.

m. Carefully remove CRT and shield from instrument.

n. Disconnect remaining wires from CRT neck pins.

o. Loosen CRT clamp MP51.

CAUTION

Be careful when removing CRT from shield, to avoid damage to CRT neck pins and align/ortho coils.

p. Remove CRT from shield.

q. To reinstall CRT, reverse removal procedure.

8-13. ATTENUATOR REMOVAL. To remove attenuator assemblies A1 and A2 from the instrument, proceed as follows:

a. Remove screw that holds channel A attenuator shield to vertical preamplifier assembly A3.

b. Remove screw that holds channel B attenuator shield to A3 and ground lug attached to top of attenuator cover.

c. Unsolder three lead-in wires to A3 from channel A attenuator A1.

d. Unsolder three lead-in wires to A3 from channel B attenuator A2.

e. Remove two screws that hold vertical preamplifier to main deck of instrument.

f. Disconnect sync cable W2 from square-pin connections on horizontal display switch assembly A10.

g. Pull vertical preamplifier toward rear of instrument until A3P1 and A3P2 clear attenuator connectors.

NOTE

A6 and A7 are connected to the underside of vertical preamplifier. They also will move to the rear. When reinstalling, be sure that pushbutton switches are aligned with front-panel holes.

h. Remove vernier, volt/div, and coupling lever from attenuator being removed.

i. Remove retaining hardware from INPUT BNC connector of attenuator being removed.

j. Pull attenuator toward rear of instrument until it clears front panel of instrument.

NOTE

Step j clears the attenuator for required maintenance. If complete removal of the attenuator is desired continue with step k.

k. Remove two screws that hold vernier bracket to attenuator.

l. Slide attenuator from vernier shaft.

m. Remove vernier shaft from vernier.

n. To reinstall attenuators, reverse removal procedure

8-14. VERTICAL PREAMPLIFIER REMOVAL. To remove vertical preamplifier assembly A3, proceed as follows:

a. Remove channel A and B attenuators from preamplifier assembly in accordance with paragraph 8-13, steps a through g.

b. Disconnect plastic connector at A3P5.

c. Remove gate and blanking coaxial cables from A7 (square-pin connectors).

d. Remove two screws that hold delay line cable to vertical preamplifier assembly.

e. Unsolder delay line cable wires at vertical preamplifier assembly.

f. Note orientation of delay line. Red marked side of delay line goes to dot on board assembly.

g. Remove A3, A6, and A7 from instrument.

h. Disconnect ASW (9) and BSW (0) wires from square-pin connectors on A7.

i. Simultaneously pull A6 and A7 from male connectors mounted on A3.

j. To reinstall vertical preamplifier assembly, reverse installation procedure.

8-15. DELAY LINE REMOVAL. To remove delay line assembly A4, proceed as follows:

a. Remove two screws that hold delay line cable to vertical preamplifier assembly A3.

b. Unsolder two wires from end of delay line cable to A3.

c. Note orientation of delay line. Red marked side of delay line goes to dot on board assembly.

d. Remove two screws that hold delay line cable to vertical output amplifier A5.

e. Unsolder two wires from end of delay line cable to A5.

f. Note orientation of delay line. Red marked side of delay line goes to dot on board assembly.

g. Remove two screws that hold delay line bracket MP8 to main deck.

h. Remove delay line assembly from instrument.

i. To install delay line assembly, reverse removal procedure.

8-16. REMOVAL OF ASSEMBLIES IN HORIZONTAL SECTION. The following paragraphs provide information required to remove and replace various assemblies in the horizontal section of the instrument.

8-17. TIME/DIV Switch Removal. To remove the TIME/DIV switches, proceed as follows:

a. Set TIME/DIV controls as follows:

TIME/DIV (main) ..... .1 mSEC
TIME/DIV (delayed) ..... OFF

b. Remove retaining ring MP68 from TIME/DIV shaft (inside front panel of instrument).

c. Pull TIME/DIV shaft out.

d. To reinstall TIME/DIV shaft, reverse removal procedure.

8-18. Main Horizontal Sweep Switch Assembly and Holdoff-Comparator Assembly Removal. To remove horizontal sweep switch assembly A11, proceed as follows:

a. Remove TIME/DIV shaft (paragraph 8-17).

b. Gently rock main horizontal sweep switch assembly A11 and holdoff-comparator assembly A12 while pulling upward to remove from sockets on horizontal sweep assembly A8.

c. Separate A11 from A12 by removing two retaining screws and soldered wire.

d. To reinstall assemblies, reverse removal procedure.

8-19. Delayed Horizontal Sweep Switch Assembly Removal. To remove delayed horizontal sweep switch assembly A9, proceed as follows:

a. Remove TIME/DIV shaft (paragraph 8-17).

b. Gently rock A9, while pulling upward to remove from socket on A8.

c. To reinstall A9, reverse removal procedure.

8-20. Analog Assembly Removal and Replacement. To remove analog assembly A18, proceed as follows:

NOTE

A18 is mounted on horizontal sweep assembly A8 using a spare connector on assembly A8. The connector is used only to physically secure A18. There are no electrical circuits between A18 and A8 through this connector.

a. Remove TIME/DIV shaft (paragraph 8-17).

b. Disconnect cable connectors from A18P1 and A18P2.

c. Gently rock A18, while pulling upward to remove from socket on A8.

d. To reinstall A18, reverse removal procedure.

8-21. Horizontal Sweep Assembly Removal and Replacement. To remove horizontal sweep assembly A8, proceed as follows:

a. Perform paragraphs 8-17 through 8-20.

b. Unsolder flex wire from main EXT ÷ 10 switch, A8S1P.

c. Unsolder flex wire from delayed EXT ÷ 10 switch, A8S1B.

d. Unsolder two ground straps from A8 to chassis ground.

e. Disconnect reset lamp coaxial cable (5) from A8 (square-pin connections).

f. Disconnect line sync wire (6) from A8.

g. Disconnect main trig level wire (903) from A8.

h. Disconnect delay trig level wire (97) from A8.

i. Disconnect start after delay wire (916) from A8.

j. Disconnect plastic connectors at A8P1 and A8P5.

k. Remove two retaining screws at rear edge of A8.

NOTE

Horizontal display switch assembly A10 is mounted on the rear of A8. It must also clear the front panel during the next step.

l. Move A8 toward right rear of instrument until pushbutton controls clear front panel.

m. Disconnect sync cable W2 from assembly A10 (square pin connections).

n. Disconnect plastic connector at A8P4.

o. Disconnect at A10 (square-pin connections), the coaxial cable leading from VERTICAL OUTPUT connector J4.

p. Disconnect horizontal input cable W3 at horizontal output assembly A13 (square-pin connections).

q. Remove assemblies A8 and A10 from instrument.

r. To reinstall A8 and A10, reverse removal procedure.

8-22. Horizontal Display Switch Assembly Removal. To remove horizontal display switch assembly A10, proceed as follows:

a. Perform paragraph 8-21 steps a through q.

b. Unsolder R9 and R10 (connected between A8 and A10) at A10 terminals.

c. Remove three screws that hold A8 and A10 together.

d. To reinstall horizontal display switch assembly, reverse removal procedure.

8-23. REPAIR OF ASSEMBLIES.

8-24. GENERAL. The board assemblies used in this instrument are etched circuit type and have plated through component holes to facilitate replacement of components. Before repairing any board assembly refer to paragraph 8-28 for information covering circuit board repair and recommended soldering equipment.

8-25. The only assemblies not recommended for repair are the attenuator assemblies. The attenuator components are closely mounted, and their interrelationship is critical. The only components recommended for replacement are R1, R2, Q1, Q2, and Q3. These items are socket mounted and easily replaced. If other components fail, replacement of the board assembly is recommended.

8-26. REPLACEMENT OF ATTENUATOR TERMINATION RESISTORS.

CAUTION

Do not attempt to clean attenuator assemblies with any cleaning agent. Always wear protective cotton gloves (such as HP Part Number 8650-0030) while handling the attenuator board assemblies. The board assemblies are extremely susceptible to conduction paths caused by finger prints.

8-27. To replace attenuator termination resistors A1A1R1/R2 and A2A1R1/R2, proceed as follows:

a. Remove two screws holding top cover of attenuator.

b. Slide attenuator cover from attenuator.

c. Remove resistors R1/R2 from attenuator board assembly using long-nosed pliers.

d. Replace resistors R1/R2 reversing above procedure.

CAUTION

If new resistors are to be installed, replace with flameproof type only (HP Part No. 0698-6433). Recompensate attenuator assembly when new resistors are installed.

8-28. CIRCUIT BOARDS.

8-29. The following paragraphs provide information regarding servicing procedures for etched circuit boards, use of heat sinks, and special soldering considerations.

8-30. BOARD CONNECTIONS. Square-pin connectors are identified on circuit boards by the color code of the connecting wire or by the signal name. Connector pins on plugs and jacks are identified by either a numeral or a letter. The letters G, I, O, and Q have been omitted. Table 8-1 shows the types of board connections used in the instrument.

8-31. SERVICING ETCHED CIRCUIT BOARDS. The etched circuit boards have plated-through component holes. This allows components to be removed or replaced by unsoldering or soldering from either side of the board. When removing large components, such as potentiometers, rotate the soldering iron tip from lead to lead while applying pressure to the part to lift it from the board. HP Service Note M-20E contains additional information for repair of etched circuit boards.

8-32. SEMICONDUCTOR REMOVAL AND REPLACEMENT. Figure 8-1 is included to help identify the leads on the common shapes and sizes of semiconductor devices. When removing a semiconductor, use long-nose pliers as a heat sink between the device and the soldering iron. When replacing a semiconductor, ensure sufficient lead length to dissipate the soldering heat by using the same length of exposed lead as used for the original part.

8-33. MOS HANDLING PRECAUTIONS. All MOS devices, to varying degrees, are subject to damage from static charge buildup. Generation of static charges is not the problem, but the accumulation of static charges is. In general, any device not connected directly to ground can accumulate static charges. Electrical discharge can occur to ground or to any item having a lower potential; therefore, handling precautions are recommended for all personnel coming into contact with MOS devices.

8-34. When handling or testing the MOS devices, observe the following precautions:

a. Ground test equipment and tools used in testing or handling MOS devices.

b. Apply no power to board assembly while MOS device is being installed. This permits accumulated static charges on MOS device to be safely removed before power is applied.

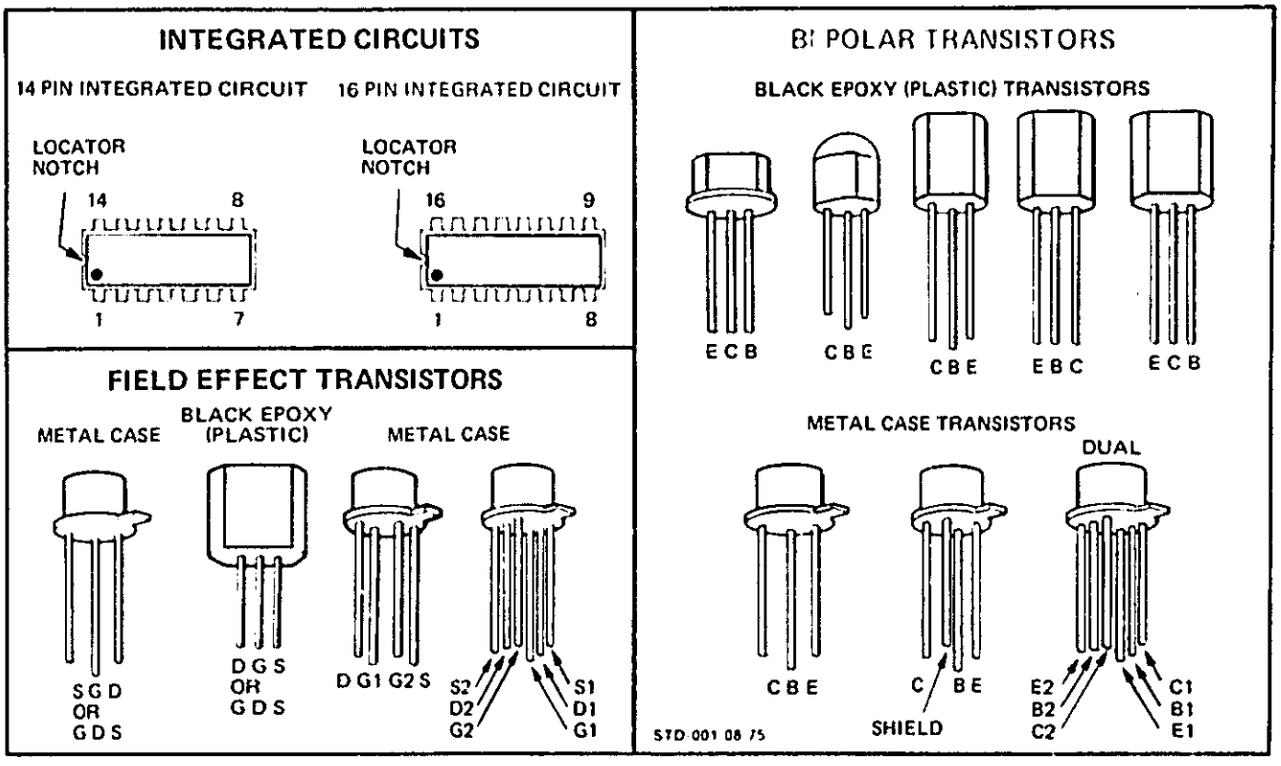
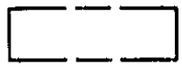


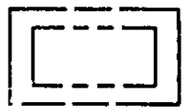
Figure 8-1. Semiconductor Terminal Identification

Table 8-1. Schematic Notes

REFER TO ANSI Y 32.2 AND Y32.14 FOR SCHEMATIC SYMBOLS NOT LISTED IN THIS TABLE.


ETCHED CIRCUIT BOARD


ASSEMBLY


ETCHED CIRCUIT BOARD ON ASSEMBLY

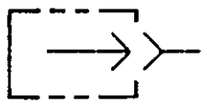
FRONT PANEL MARKING

REAR PANEL MARKING

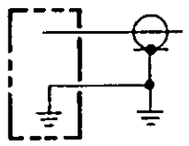
MAIN SIGNAL PATH

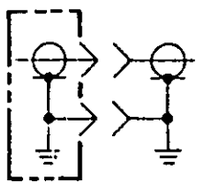
PRIMARY FEEDBACK PATH

SECONDARY FEEDBACK PATH


SINGLE PIN CONNECTOR ON BOARD

PIN OF A PLUG IN BOARD (WITH LETTER OR NUMBER)


COAXIAL CABLE CONNECTED DIRECTLY TO BOARD


COAXIAL CABLE CONNECTED TO SNAP-ON JACK


FRONT PANEL CONTROL

TEST POINT (TP WITH NUMBER)


SCREWDRIVER ADJUSTMENT

WAVEFORM TEST POINT (WITH NUMBER)

COMMON ELECTRICAL POINT (WITH LETTER). NOT NECESSARILY GROUND

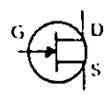
SIGNAL REFERENCE

SCHEMATIC REFERENCE

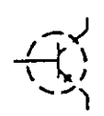
BREAKDOWN DIODE (VOLTAGE REGULATOR)


LIGHT EMITTING DIODE (LED)

TUNNEL DIODE



FIELD EFFECT TRANSISTOR (N TYPE BASE)


CIRCUITS OR COMPONENTS DRAWN WITH DASHED LINES (PHANTOM) SHOW FUNCTION ONLY AND ARE NOT INTENDED TO BE COMPLETE. THE CIRCUIT OR COMPONENT IS SHOWN IN DETAIL ON ANOTHER SCHEMATIC

(925) WIRE COLORS ARE GIVEN BY NUMBERS IN PARENTHESIS USING THE RESISTOR COLOR CODE

(925) IS WHT RED GRN

0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	VIOLET
3	ORANGE	8	GRAY
4	YELLOW	9	WHITE

* OPTIMUM VALUE SELECTED AT FACTORY. TYPICAL VALUE SHOWN. PART MAY HAVE BEEN OMITTED

UNLESS OTHERWISE INDICATED RESISTANCE IN OHMS, CAPACITANCE IN PICOFARADS AND INDUCTANCE IN MICROHENRIES

CW	CLOCKWISE END OF VARIABLE RESISTOR
NC	NO CONNECTION
P/O	PART OF

VF (A)

V	VOLTAGE
F	FILTERED
(A)	FILTER SOURCE

e. When not in use, short all MOS leads. This prevents voltage differences from occurring on leads.

WARNING

When performing step d, never expose personnel directly to hard electrical ground. For safety, place a resistance of at least 100 kilohms between using personnel and hard electrical ground.

d. Do not handle MOS devices by their leads. Before handling any MOS device, personnel should touch electrical ground to discharge accumulated static charges.

e. Avoid use of plastics, rubber, and silk in MOS areas. Do not use any material susceptible to static charge accumulation.

f. Handle circuit boards and modules containing MOS devices in same manner as individual MOS devices. Regardless of configuration, whenever leads of MOS devices are exposed, damage due to static charge buildup can occur.

g. Use conductive, grounded table tops in MOS work area.

h. Humidity in work area should be maintained above 50%. Static charge generation increases exponentially as relative humidity decreases.

8-35. INTEGRATED CIRCUIT REMOVAL AND REPLACEMENT. The integrated circuits (IC's) in this instrument are plug-in types. Remove a plug-in IC with a straight pull away from the board. When replacing an IC, note the mark or notch used for orientation. Component-identification photographs and the IC pin-location diagrams in this manual show the correct orientation.

CAUTION

Unless an integrated circuit has definitely failed, be careful to prevent damage when removing or replacing it.

8-36. ASSEMBLY A5 INTEGRATED CIRCUIT REPLACEMENT. Use the following procedure when replacing (IC's) in vertical output assembly A5:

a. Remove A5 mounting bracket by removing two screws in rear panel and two screws in main deck.

b. Disconnect four gray wires from CRT neck pins (two wires from A5 and two wires from assembly A5A1).

c. Remove A5 and mounting bracket from instrument.

NOTE

The delay line cable remains attached to assembly A5.

d. Disconnect power supply connector J8 from A5P1.

e. Unsolder wire (92) from termination assembly A5A1 at A5.

NOTE

Read next two steps before performing them.

f. Remove four screws that hold A5 to mounting bracket.

g. Separate A5 from mounting bracket. Do not lose yellow plastic insulator (HP Part No. 5080-9670) held captive between gain cell A5U1 (gold colored IC) and mounting bracket.

h. Remove A5U1 from its mounting socket.

i. To remove output amplifier A5U2, remove four screws that hold it to circuit board. (Go to step l.)

j. Replace gain cell A5U1 by matching mark on gain cell leg (solid line) with polarity dot on circuit board.

CAUTION

Do not use lettering on gain cell A5U1 and number "1" marking on socket as a reference.

k. Insert gain cell in socket, but do not push it all the way in to final position. (When circuit board is remounted on bracket, the screws will seat IC to required depth.)

l. Replace A5U2 by matching contacts on circuit board with gold pads on IC.

m. Secure A5U2 by replacing four mounting screws and lock washers.

n. Using Thermalloy Compound (HP Part No. 6040-0239), coat surfaces of both ICs (A5U1 and A5U2) that will come in contact with mounting bracket.

o. Attach yellow plastic insulator to rear of gain cell A5U1.

p. Coat exposed side of yellow plastic insulator with Thermalloy Compound.

q. Carefully feed two gray wires through hole in mounting bracket.

r. Position A5 and mounting bracket so that yellow plastic insulator is properly positioned between A5U1 and mounting bracket.

s. Using four screws, attach A5 to mounting bracket.

NOTE

Be sure that yellow plastic insulator is properly positioned and IC is flat against bracket.

t. Resolder wire (92) from termination assembly A5A1 to A5.

u. Connect power supply connector J8 to A5P1.

v. Insert mounting bracket with A5 assembly into instrument.

w. Start two screws through rear panel into mounting bracket.

x. Start two screws through mounting bracket into main deck of instrument.

y. Tighten lower screw through rear panel and rear screw through mounting bracket to main deck.

z. Tighten two remaining screws.

NOTE

Steps y and z must be followed carefully to ensure that mounting bracket is positioned correctly for lowest possible IC operating temperature.

aa. Reconnect four gray wires to CRT neck pins.

ab. Verify mounting bracket ground clip is making contact with ground shield.

8-37. TROUBLESHOOTING.

WARNING

Read the Safety Summary at the front of this manual before troubleshooting the instrument.

8-38. Two important prerequisites for successful troubleshooting are: (1) understanding how the instrument is designed to operate and (2) knowing the correct use of front-panel controls. Improper control settings or circuit connections can cause apparent malfunctions. Read Section III for an explanation of controls, connectors, and general operating considerations. Read Section IV for explanations of circuit theory.

8-39. If trouble is suspected, visually inspect the instrument. Look for loose or burned components that might suggest a source of trouble. Check to see that

Table 8-2. Assembly Information Index

Assembly No.	Assembly Name	Service Information
A1	Channel A Attenuator	Schematic 1
A2	Channel B Attenuator	Schematic 2
A3	Vertical Preamplifier	Schematic 1, 2, 3
A4	Delay Line	Schematic 3
A5	Vertical Output	Schematic 4
A6	Internal Trigger Switch	Schematic 5
A7	Vertical Display Switch	Schematic 5
A8	Horizontal Sweep	Schematic 7, 9, 13, 14
A9	Delay Sweep Switch	Schematic 10
A10	Horizontal Display Switch	Schematic 6
A11	Main Sweep Switch	Schematic 8
A12	Holdoff-Delay Comparator	Schematic 12
A13	Horizontal Output	Schematic 15
A14	Gate	Schematic 16, 17
A15	HV Power Supply	Schematic 17
A16	HV Multiplier	Schematic 17
A17	LV Power Supply	Schematic 18, 19
A18	Analog Assy	Schematic 11

all circuit board connections are making good contact and are not shorting to an adjacent circuit. If no obvious trouble is found, check the power supply voltages in the instrument. Also check the external power before any extensive troubleshooting.

8-40. DC VOLTAGES. On some of the schematics, dc voltages are indicated for active components (transistors, etc.). Conditions for making these voltage measurements are listed adjacent to the schematics. Since conditions for making measurements may differ from one circuit to another, always check the specific conditions listed.

8-41. INITIAL TROUBLESHOOTING PROCEDURE. Before troubleshooting the Model 1725A in detail, try to perform the adjustment procedures listed in Section V of this manual. Some apparent malfunctions can be corrected by these adjustments; also, the inability to obtain a correct adjustment will often reveal the source of trouble.

8-42. If possible, perform adjustment procedures in listed sequence since the power supplies should be checked first for any malfunction.

8-43. TROUBLE DIAGNOSIS. By use of front-panel controls, note as many symptoms of the malfunction as possible. From the symptoms, it can usually be determined which section (vertical, horizontal, or power supply) is malfunctioning. Normally, the vertical and horizontal sections will not malfunction simultaneously, although symptoms may indicate this to be the case.

8-44. VERTICAL SECTION TROUBLESHOOTING. Although a sweep may not be generated on the CRT, vertical deflection of an input signal on the CRT normally indicates that the vertical section is functioning properly.

8-45. The sync pulse required for internal triggering is developed in the vertical preamplifier and sync amplifier located on horizontal display switch assembly A10. If the instrument does not trigger internally, but triggers properly when an external trigger is applied, the vertical preamplifier section should be checked.

8-46. Due to the low levels of the signal in the preamplifier, signal tracing becomes difficult. When troubleshooting the preamplifier, check dc bias voltages for best results.

8-47. HORIZONTAL SECTION TROUBLESHOOTING. The horizontal section of the instrument consists of the trigger assembly, gate assembly, holdoff-comparator assembly, main and delayed sweep assembly, horizontal preamplifier, and horizontal output assembly. From symptoms derived in paragraph 8-43, check input and output signals of the suspected assembly until the problem is isolated to a particular circuit. Refer to table 8-3 for troubleshooting hints on the horizontal section.

NOTE

Use table 8-3 as a guide only. Slight variations in voltage readings may occur.

8-48. LOW-VOLTAGE POWER SUPPLY TROUBLESHOOTING. The Model 1725A contains seven low-voltage power supplies, two of which are unregulated. The nominal +20 unregulated voltage is used in the HV power supply oscillator circuit. The nominal +15-volt regulated supply provides a reference voltage for the other regulated supplies. Check the output of each regulated supply for a malfunction; a convenient test point is located on each supply. All supplies are regulated to better than ±2%. If a malfunction occurs in the low-voltage supplies, always check the +15-volt supply.

Table 8-3. Troubleshooting Guide - Horizontal Section

The following table is a troubleshooting guide to help analyze the problem under no sweep condition in AUTO mode of operation. Once the sweep is running, individual circuits can be analyzed using schematics and associated waveforms.

Step	Circuit	Test Point	Test Point Measurement	Action
1	Output of Integrators (main-delayed)	Main - A11TP2	1 volt	Go to Step 2.
		Delayed - A9TP2	14 volts	Go to Step 3.
			other	Go to Step 4.
2	Measure Gate	Main - A8TP5	2 volts	Problem in Integrator - troubleshoot.
		Delayed - A8TP9	0 volt	Go to Step 5.

Table 8-3. Troubleshooting Guide - Horizontal Section (Cont'd)

Step	Circuit	Test Point	Test Point Measurement	Action
3	Measure Gate	Main - A8TP5	2 volts	Go to Step 5.
		Delayed - A8TP9	0 volt	Problem in Integrator - troubleshoot.
4	Measure Gate	Main - A8TP5	0 volt or 2 volts	Problem in Integrator - troubleshoot.
		Delayed - A8TP9	other	Problem in sweep control circuit - troubleshoot.
5	Measure Reset input to trigger circuit.	Main - A8TP2	4.3 volts	Go to Step 6.
		Delayed - A8TP7	4.9 volts	Go to Step 5.
			other	Problem in holdoff (main only) or sweep length circuits, rarely in trigger circuits - troubleshoot.
6		Main - A8TP4	+5 volts	Go to Step 7.
			+4 volts	Problem in sweep control circuit - troubleshoot.
		Delayed - A8TP8	+14 volts	Problem in sweep control circuit - troubleshoot.
			+15 volts	Go to Step 8.
7		A8U2 - pin 6	+4.3 volts	Auto problem - check A8U3 and associated circuits.
			+4.9 volts	Problem in A7U2.
8		A8U5 - pin 6	+4.3 volts	Auto problem - check A8U6 and associated circuits.
			+4.9 volts	Problem in A8U5.
9		Main - A8TP4	+4 volts	Go to Step 10.
			+5 volts	Problem in sweep control circuit - troubleshoot
		Delayed - A8TP8	+15 volts	Problem in sweep control circuit - troubleshoot
			+14 volts	Go to Step 11
10		A8U2 - pin 6	+4.3 volts	Problem in A8U2.
			+4.9 volts	Auto problem - check A8U3 and associated circuits.

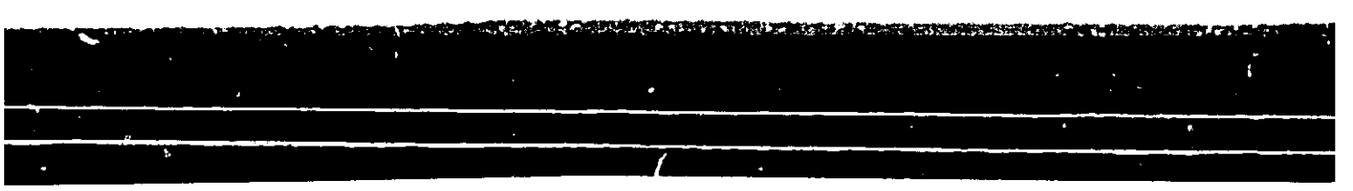


Table 8-3. Troubleshooting Guide - Horizontal Section (Cont'd)

Step	Circuit	Test Point	Test Point Measurement	Action
11		A8U5 - pin 6	+4.3 volts +4.9 volts	Problem in A8U5. Auto problem - check A8U6 and associated circuits.

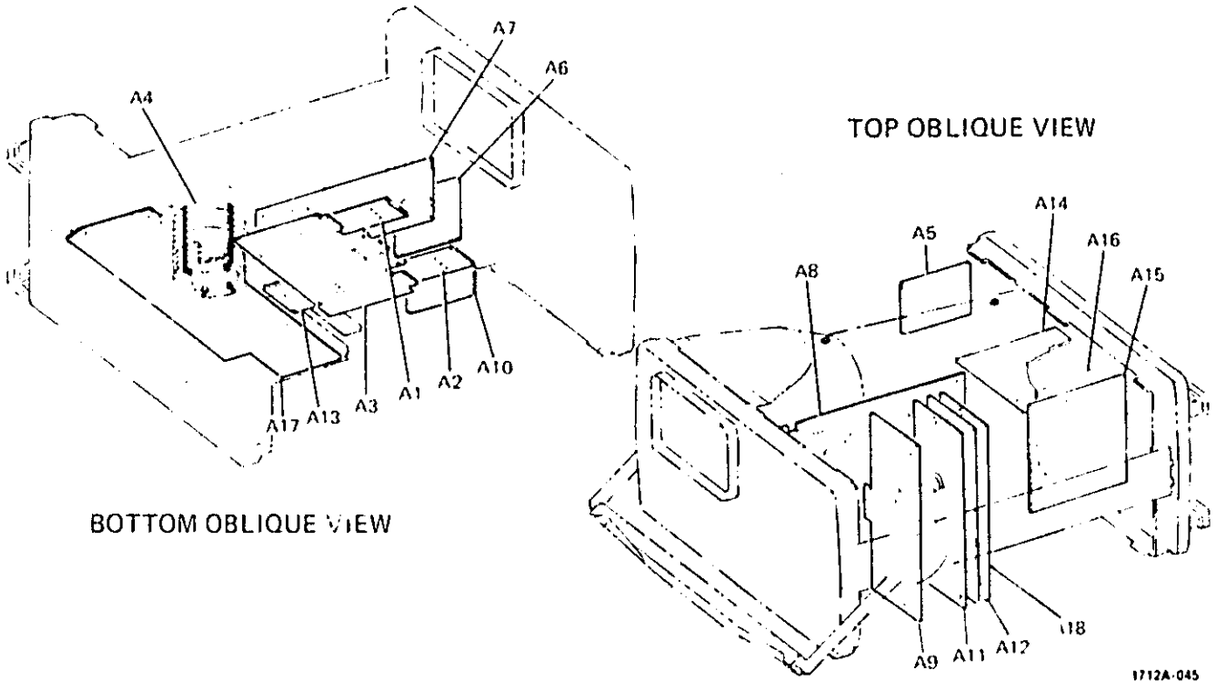


Figure 8-2. Board Assembly Identification

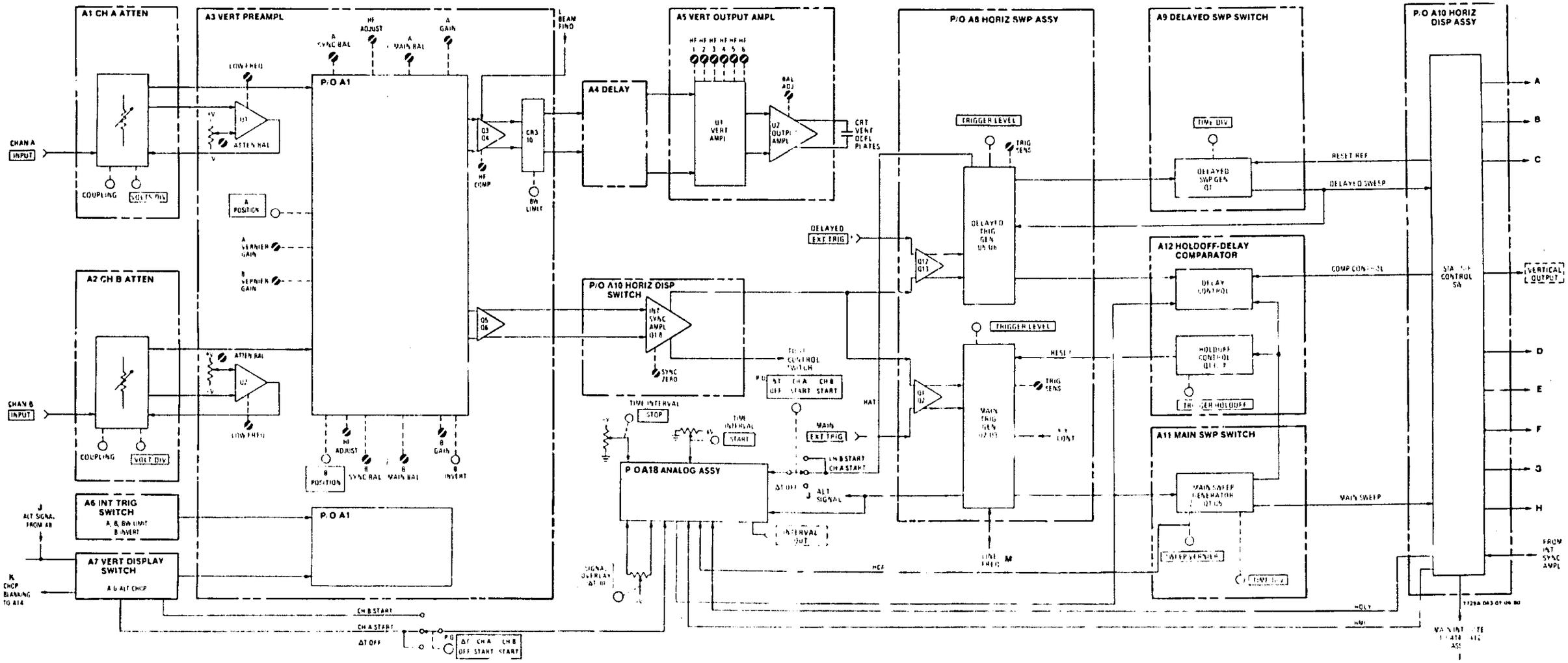


Figure 8-3. Overall Block Diagram (Sheet 1 of 2)

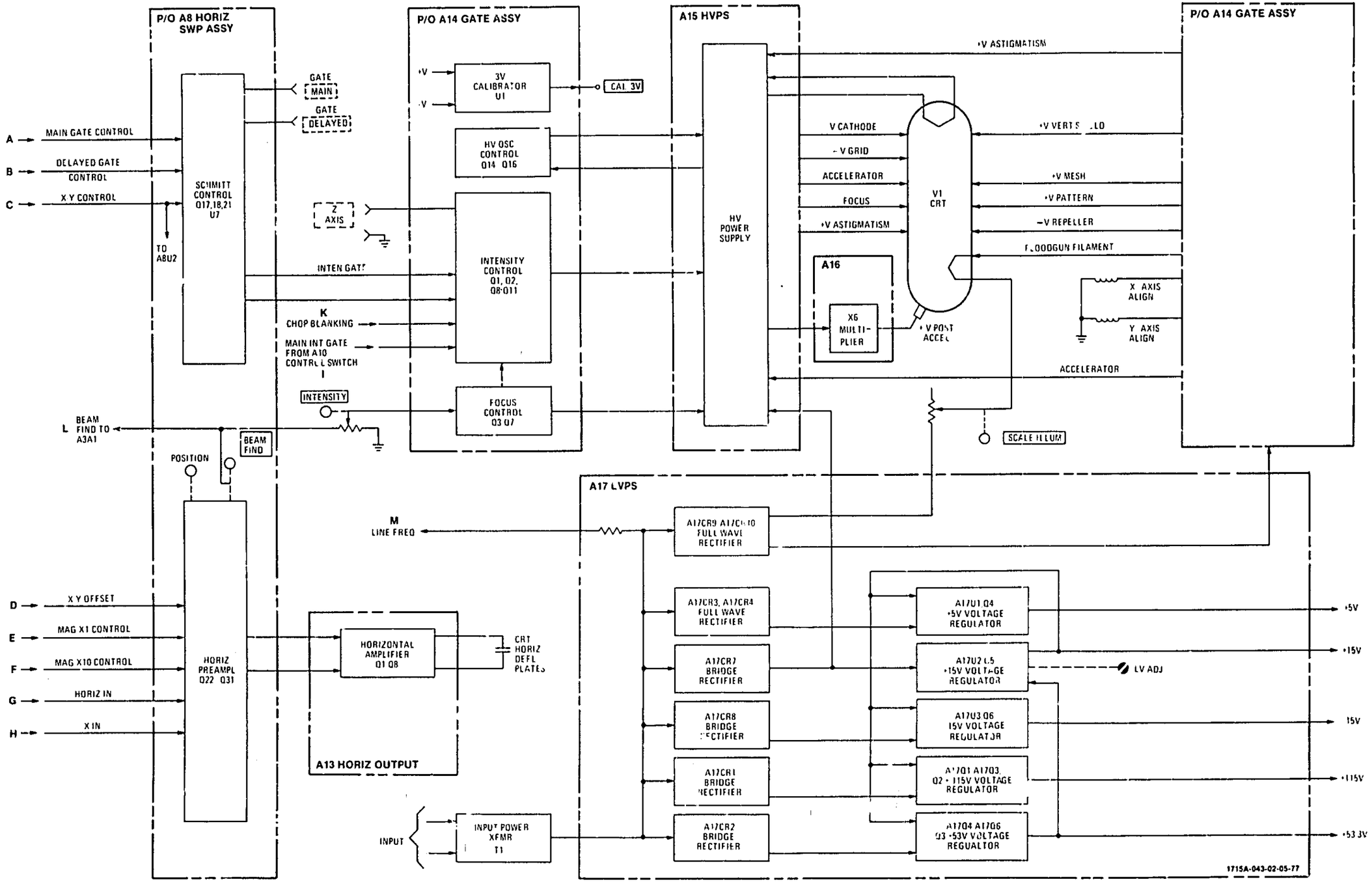
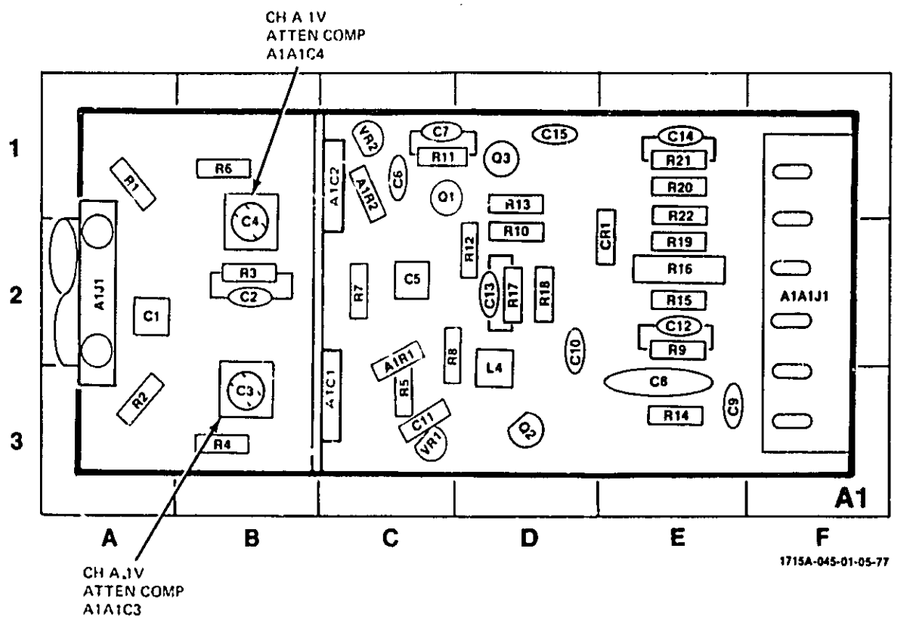


Figure 8-3.
Overall Block Diagram
(Sheet 2 of 2)



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
A1C1	C 3	C8	E 3	Q3	D-1	R11	C 1
A1C2	C 1	C9	E 3	R1	A-1	R12	D 2
A1R1	C 3	C10	D 2	R2	A-3	R13	D-1
A1R2	C 1	C11	C-3	R3	B 2	R14	E-3
C1	A 2	C12	E 2	R4	B 3	R15	E 2
C2	B 2	C13	D 2	R5	C 3	R16	E 2
C3	B 3	C14	E 1	R6	B 1	R17	D 2
C4	B 2	C15	D 1	R7	C-2	R18	D-2
C5	C 2	CR1	D 2	R8	C-2	R19	E 2
C6	C 1	L4	D 2	R9	E 2	R20	E-1
C7	C 1	Q1	C 1	R10	D 2	R21	E-1
		Q2	D 3			R22	E-2
						VR1	C-3
						VR2	C-1

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 1

1. Set front-panel controls in accordance with paragraph 5-13, Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 1

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TIME/DIV (delayed)	10 uSEC
DELAY	5.00
HORIZ DISPLAY	MIXED
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect pulse generator 50-ohm output to Model 1725A channel A INPUT connector.
4. Adjust pulse generator output for four divisions of signal amplitude (.4 V).

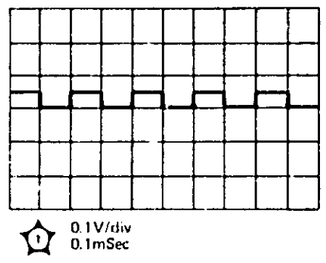


Figure 8-4. Service Information, Channel A Attenuator, Assembly A1 (Sheet 1 of 2)

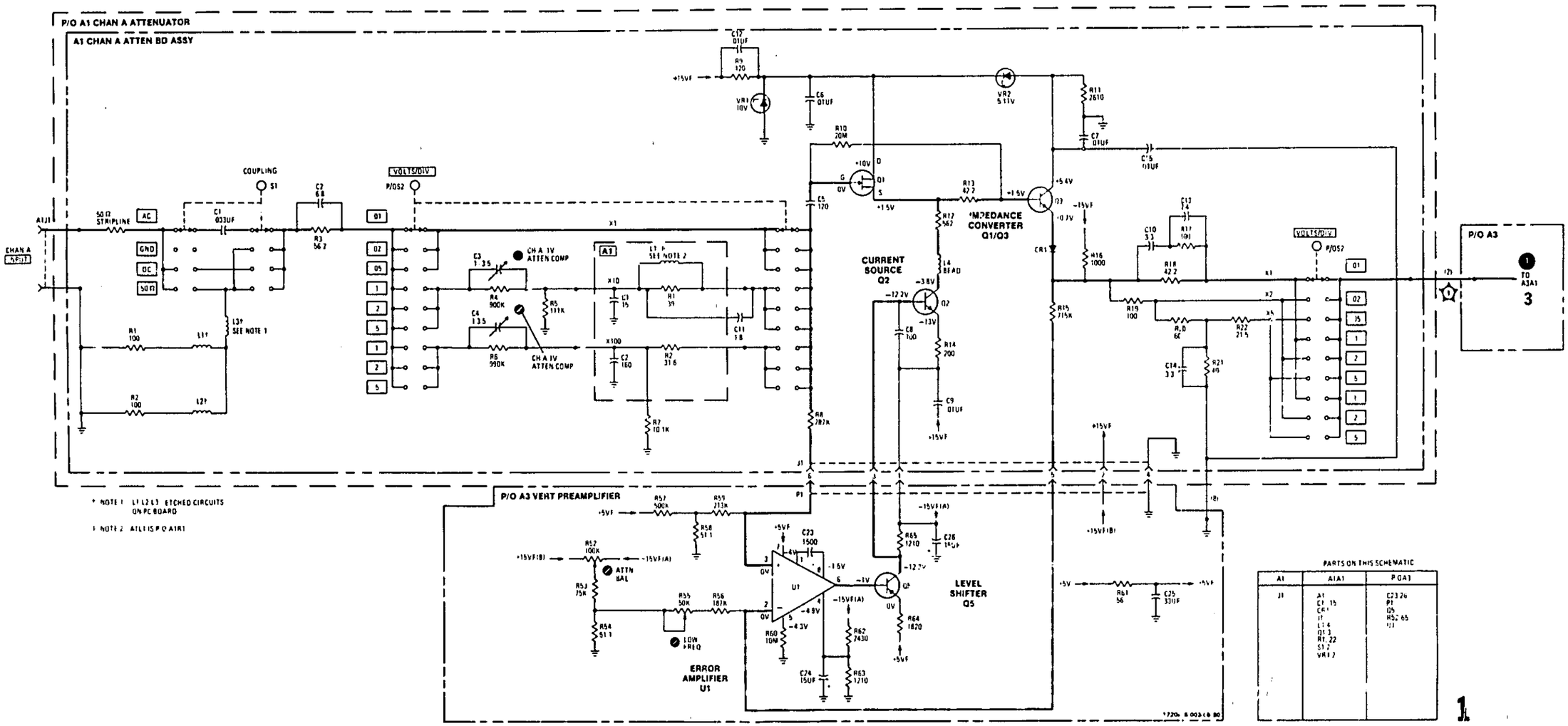
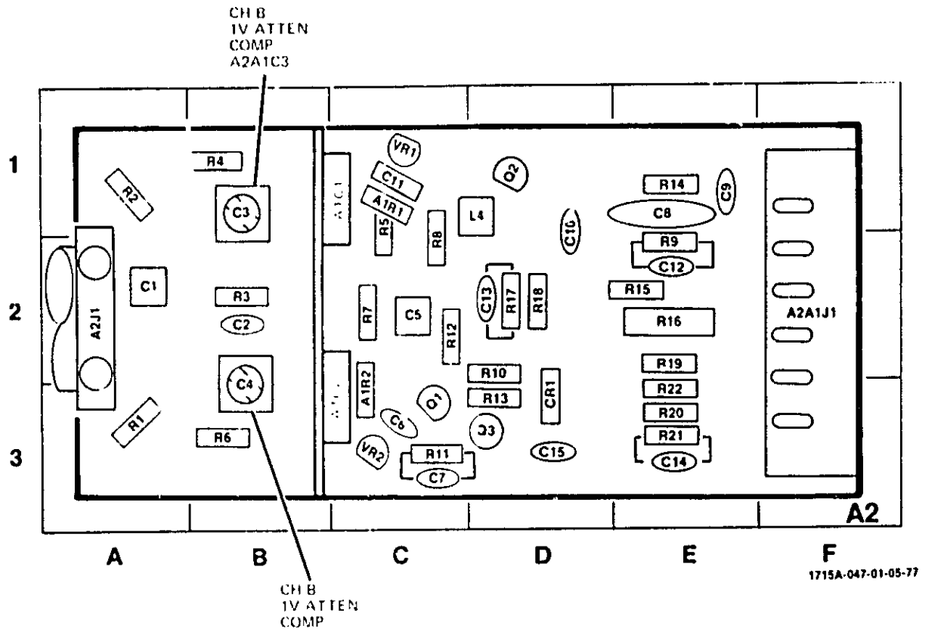


Figure 8-4.
Service Information, Channel A Attenuator, Assembly A1 (Sheet 2 of 2)



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
A1C1	C-1	C9	E-1	R1	A-3	R13	D-3
A1C2	C-3	C10	D-1	R2	A-1	R14	E-1
A1R1	C-1	C11	C-1	R3	B-2	R15	E-2
A1R2	C-3	C12	E-2	R4	B-1	R16	E-2
C1	A-2	C13	D-2	R5	C-1	R17	D-2
C2	B-2	C14	E-3	R6	B-3	R18	D-2
C3	B-1	C15	D-3	R7	C-2	R19	E-2
C4	B-2	CR1	D-3	R8	C-2	R20	E-3
C5	C-2	L4	D-1	R9	E-2	R21	E-3
C6	C-3	Q1	C-3	R10	D-2	R22	E-3
C7	C-3	Q2	D-1	R11	C-3	VR1	C-1
C8	E-1	Q3	D-3	R12	C-2	VR2	C-3

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 2

1. Set front-panel controls in accordance with paragraph 5-13, Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 2

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect pulse generator output to Model 1725A channel A INPUT connector.
4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5 kHz.

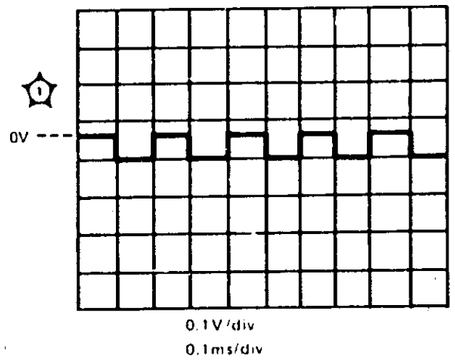


Figure 8-5. Service Information, Channel B Attenuator, Assembly 2 (Sheet 1 of 2)

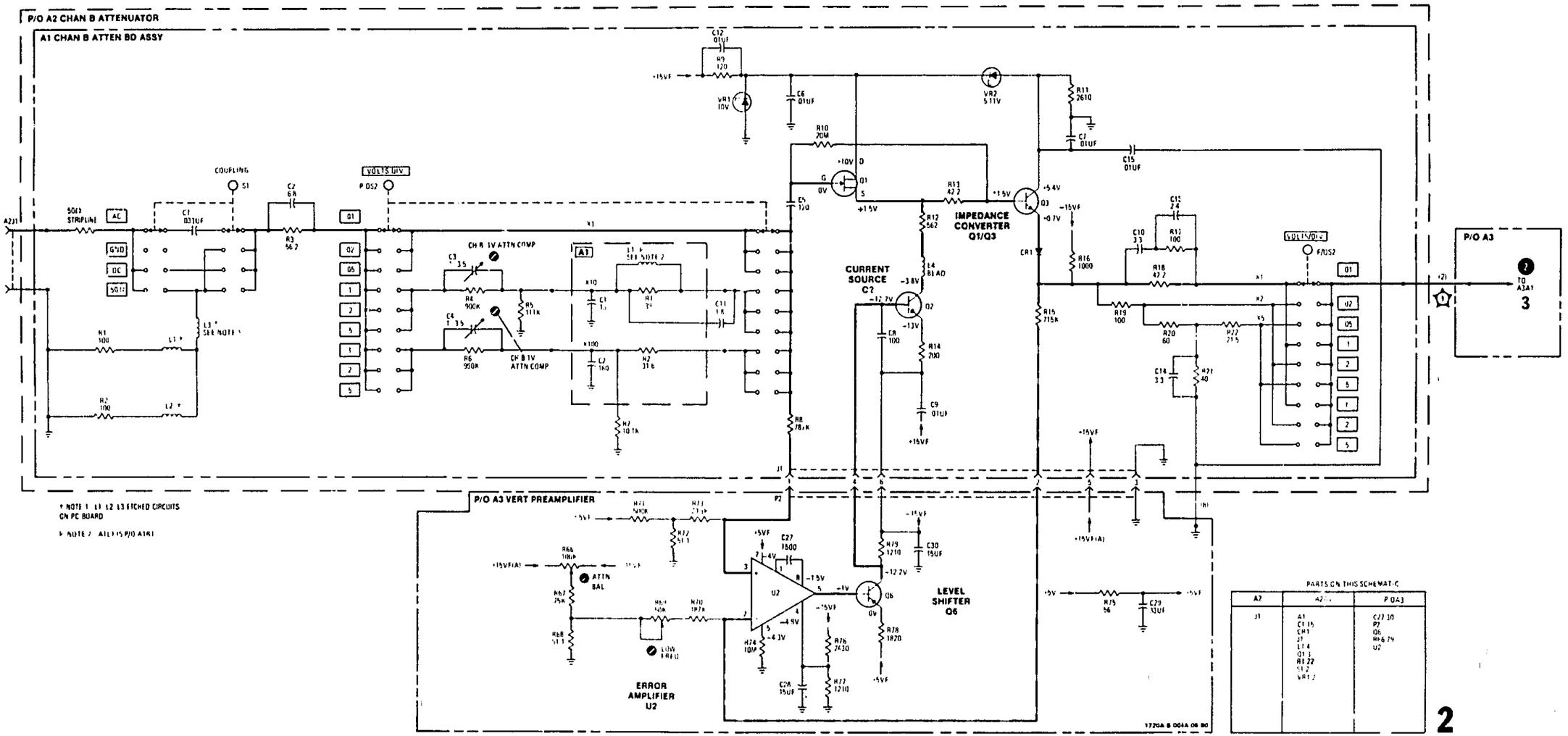
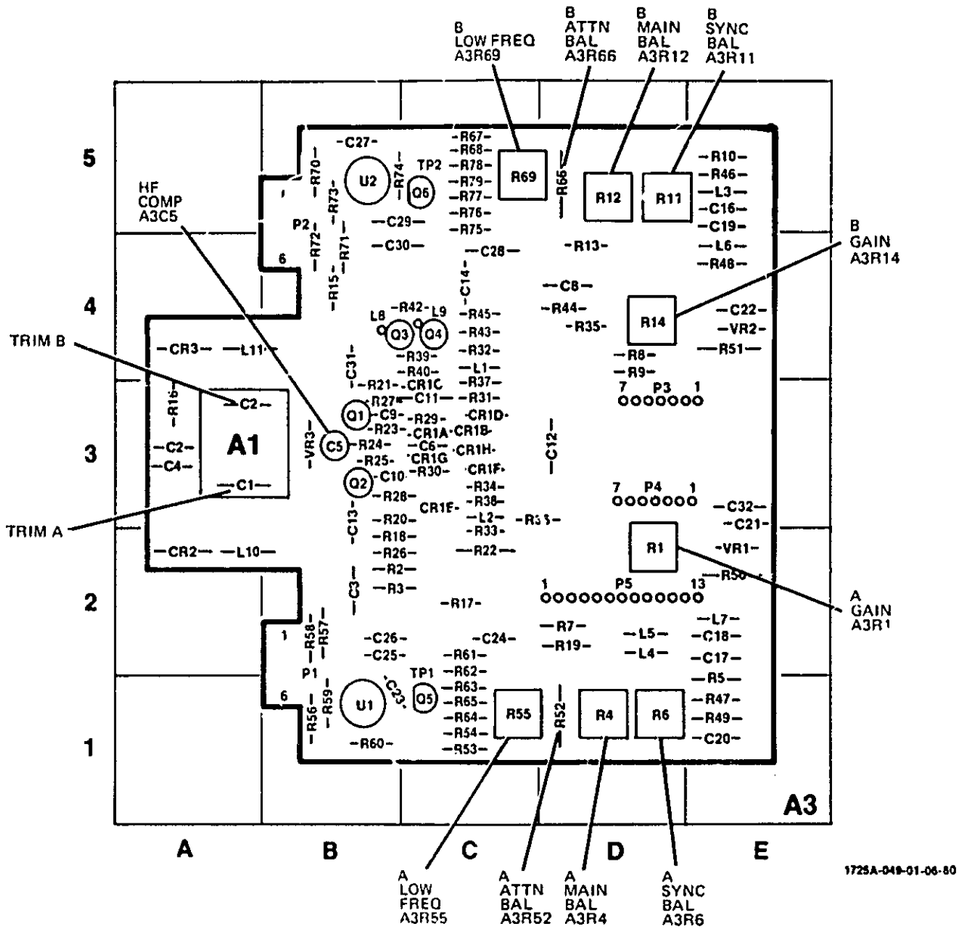


Figure 8-5.
Service Information, Channel B Attenuator, Assembly 2 (Sheet 2 of 2)



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
A1	A-3	C24	C-2	L3	E-5	R2	B-2	R23	B-3	R45	C-4	R66	D-5
C2	A-3	C25	B-2	L4	D-2	R3	B-2	R24	B-3	R46	E-5	R67	C-5
C3	B-2	C26	B-2	L5	D-2	R4	D-1	R25	B-3	R47	E-1	R68	C-5
C4	A-3	C27	B-5	L6	E-4	R5	E-1	R26	B-2	R48	E-4	R69	C-5
C5	B-3	C28	C-4	L7	E-2	R6	D-1	R27	B-3	R49	E-1	R70	B-5
C6	C-3	C29	B-5	L8	B-4	R7	D-2	R28	B-3	R50	E-2	R71	B-4
C8	D-4	C30	B-4	L9	C-4	R8	D-4	R29	C-3	R51	E-4	R72	B-4
C9	B-3	C31	B-4	L10	A-2	R9	D-4	R30	C-3	R52	D-1	R73	B-5
C10	B-3	C32	E-3	L11	A-4	R10	E-5	R31	C-3	R53	C-1	R74	B-5
C11	C-3	CR1A	C-3	P1	B-2	R11	D-5	R32	C-4	R54	C-1	R75	C-5
C12	D-3	CR1B	C-3	P2	B-5	R12	D-5	R33	C-2	R55	C-1	R76	C-5
C13	B-3	CR1C	C-3	P3	D-3	R13	D-4	R34	C-3	R56	B-1	R77	C-5
C14	C-4	CR1D	C-3	P4	D-3	R14	D-4	R35	D-4	R57	B-2	R78	C-5
C16	E-5	CR1E	C-3	P5	D-2	R15	B-4	R36	D-3	R58	B-2	R79	C-5
C17	E-2	CR1F	C-3	Q1	B-3	R16	A-3	R37	C-3	R59	B-1	TP1	C-2
C18	E-2	CR1G	C-3	Q2	B-3	R17	C-2	R38	C-3	R60	B-1	TP2	C-5
C19	E-5	CR1H	C-3	Q3	B-4	R18	B-2	R39	C-4	R61	C-2	U1	B-1
C20	E-1	CR2	A-2	Q4	C-4	R19	D-2	R40	C-4	R62	C-2	U2	B-5
C21	E-3	CR3	A-4	Q5	C-1	R20	B-3	R42	C-4	R63	C-1	VR1	E-2
C22	E-4	L1	C-4	Q6	C-5	R21	B-3	R43	C-4	R64	C-1	VR2	E-4
C23	B-1	L2	C-3	R1	D-2	R22	C-2	R44	D-4	R65	C-1	VR3	B-3

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 3

1. Set front-panel controls in accordance with paragraph 5-13, Section V.

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 3

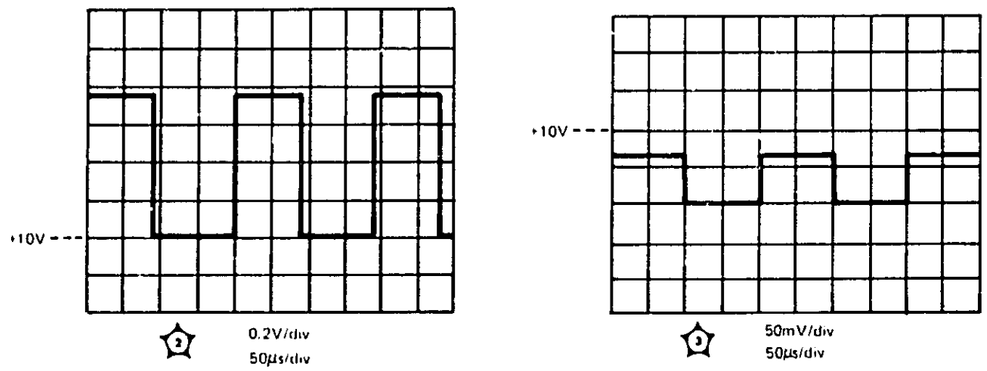
1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator 50-ohm output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5kHz.



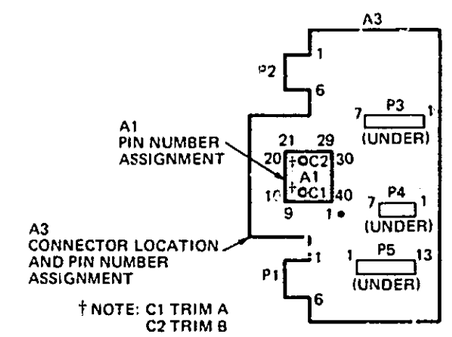


Figure 8-6. Service Information, Vertical Preamplifier, Assembly A3 (Sheet 1 of 2)

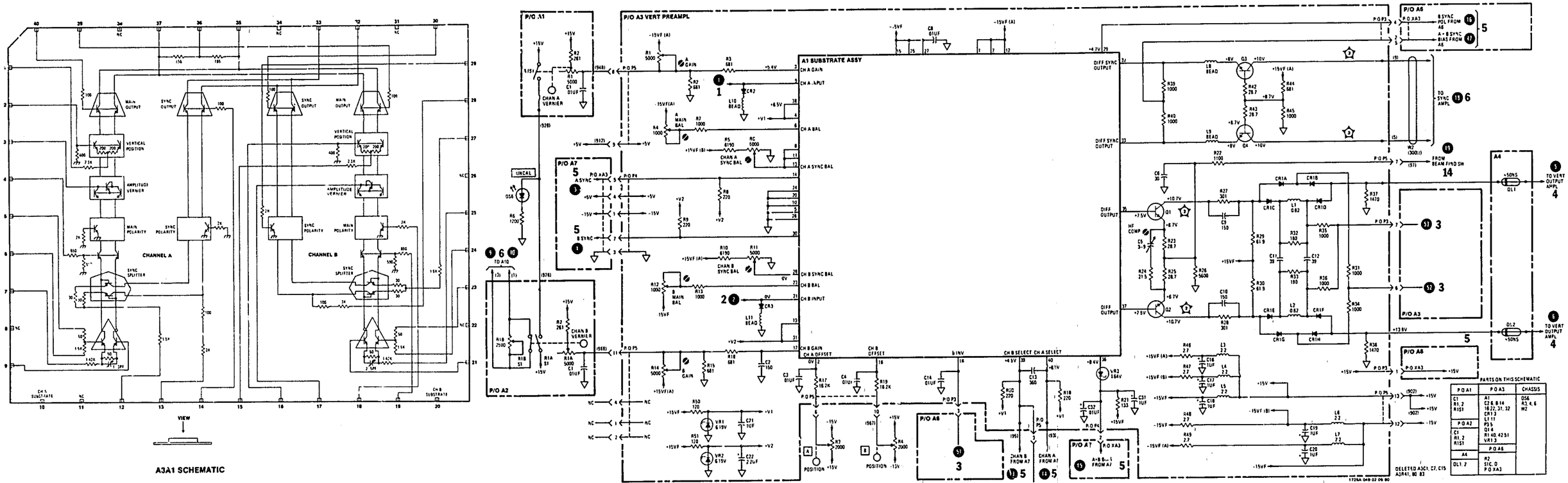
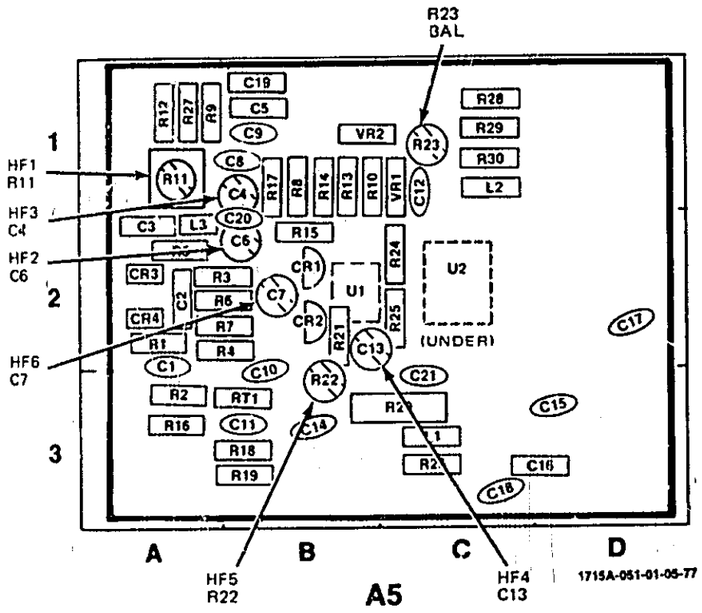


Figure 8-6.
Service Information, Vertical Preamplifier, Assembly A3 (Sheet 2 of 2)



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-2	CR1	B-2	R15	B-2
C2	A-2	CR2	B-2	R16	A-3
C3	A-2	CR3	A-2	R17	B-1
C4	B-1	CR4	A-2	R18	B-3
C5	B-1	L1	C-3	R19	B-3
C6	B-2	L2	C-1	R20	C-3
C7	B-2	L3	A-2	R21	B-2
C8	B-1	R1	A-2	R22	B-3
C9	B-1	R2	A-3	R23	C-1
C10	B-3	R3	A-2	R24	C-2
C11	B-3	R4	A-2	R25	C-2
C12	C-1	R5	A-2	R26	C-3
C13	B-2	R6	A-2	R27	A-1
C14	B-3	R7	A-2	R28	C-1
C15	D-3	R8	B-1	R29	C-1
C16	C-3	R9	A-1	R30	C-1
C17	D-2	R10	B-1	RT1	B-3
C18	C-3	R11	A-1	U1	B-2
C19	B-1	R12	A-1	U2	C-2
C20	B-2	R13	B-1	VR1	C-1
C21	C-3	R14	B-1	VR2	B-1

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 4

1. Set front-panel controls in accordance with paragraph 5-13, Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 4

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect pulse generator output to Model 1725A channel A INPUT connector.
4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5 kHz.

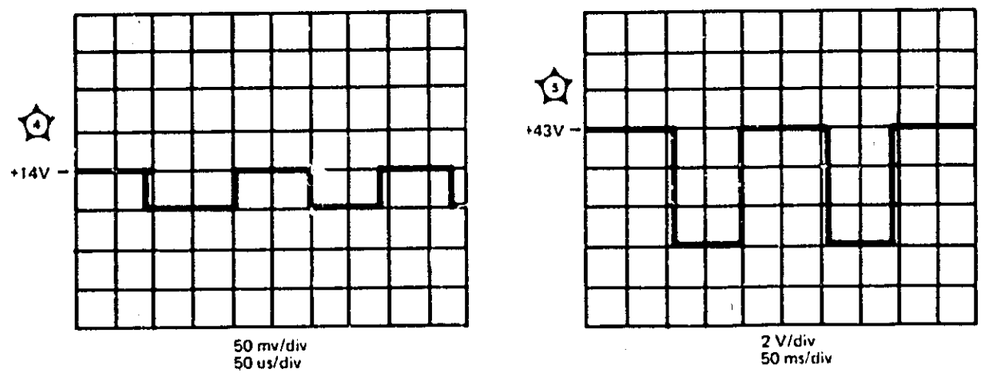


Figure 8-7. Service Information, Vertical Output, Assembly A5 (Sheet 1 of 2)

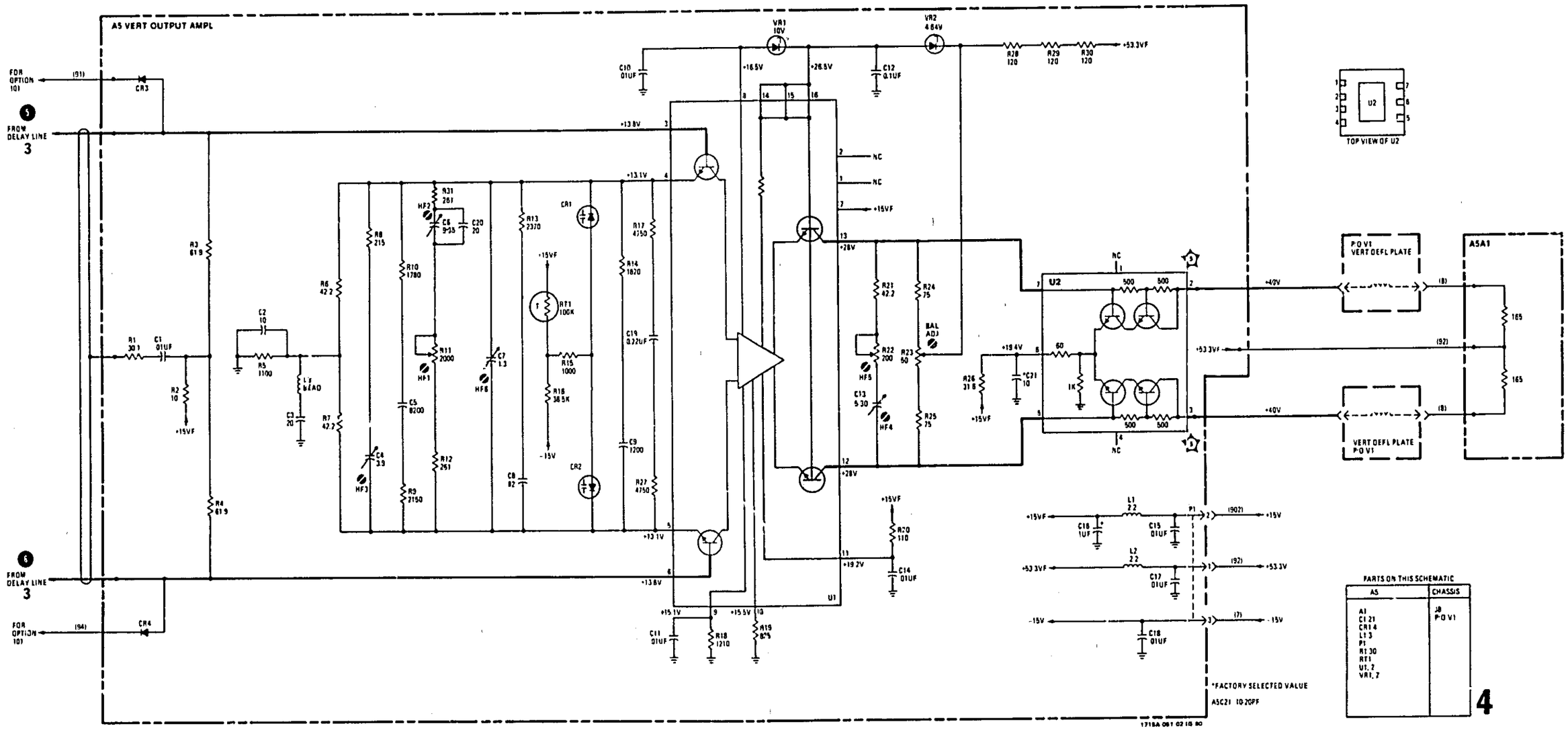
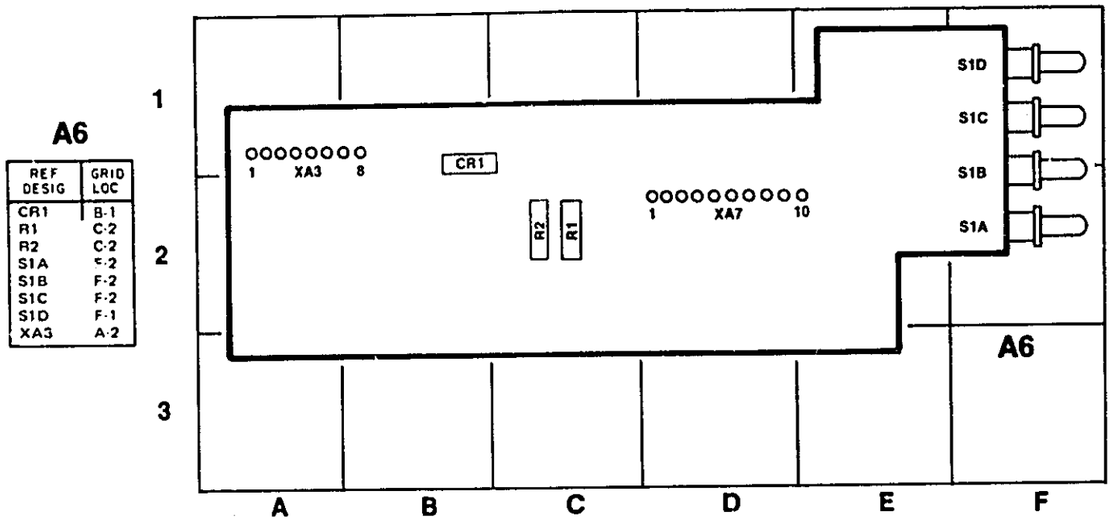
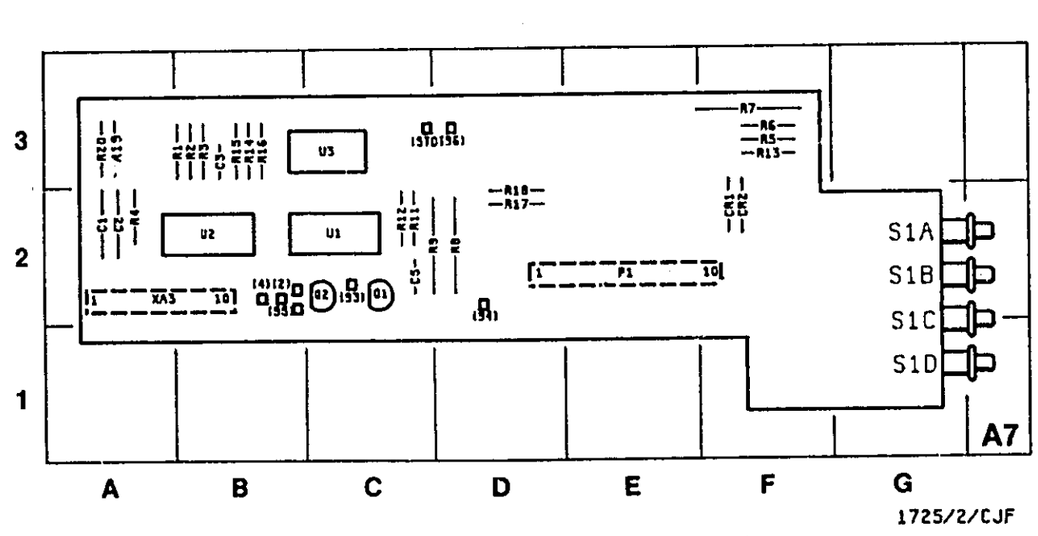


Figure 8-7.
Service Information, Vertical Output, Assembly A5 (Sheet 2 of 2)



REF DESIG	GRID LOC
CR1	B-1
R1	C-2
R2	C-2
S1A	F-2
S1B	F-2
S1C	F-2
S1D	F-1
XA3	A-2



A7

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-2	R4	A-2	R17	D-2
C2	A-2	R5	F-3	R18	D-2
C3	B-3	R6	F-3	R19	A-3
C5	C-2	R7	F-3	R20	A-3
CR1	F-2	R8	D-2	S1A	G-2
CR2	F-2	R9	C-2	S1B	G-2
P1	E-2	R11	C-2	S1C	G-1
Q1	C-2	R12	C-2	S1D	G-1
Q2	C-2	R13	F-3	U1	C-2
R1	A-3	R14	B-3	U2	B-2
R2	B-3	R15	B-3	U3	C-3
R3	B-3	R16	B-3	XA3	A-2

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 5

1. Set front-panel controls in accordance with paragraph 5-13, Section V.
2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 5

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
VOLTS/DIV	see waveforms

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).
3. Connect pulse generator output to Model 1725A channel A INPUT connector.
4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5 kHz.

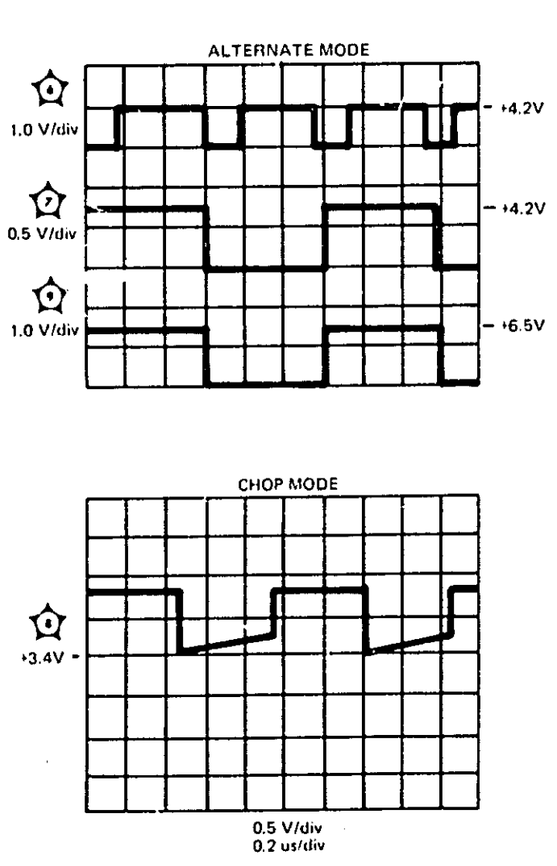
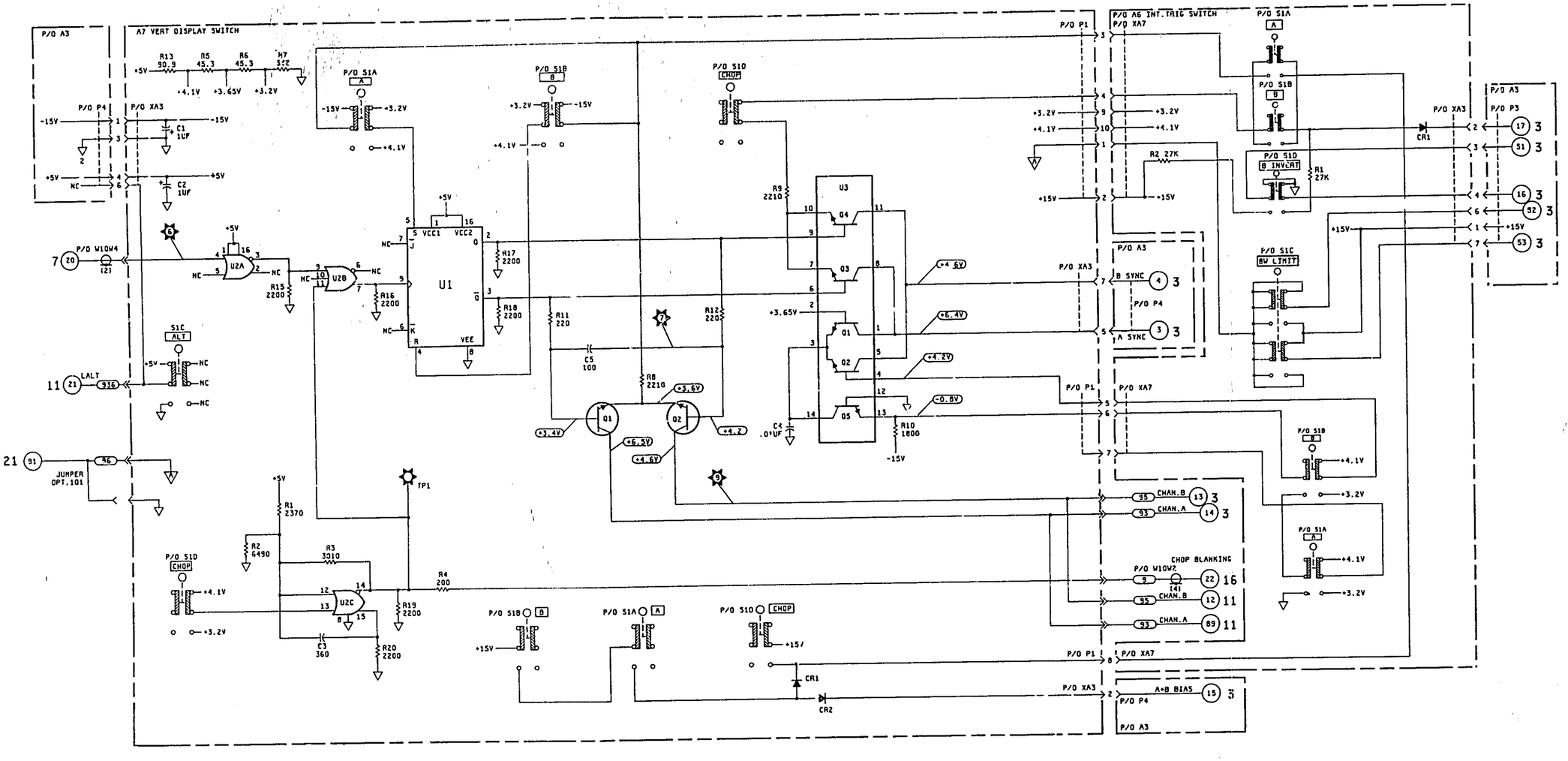


Figure 8-8. Service Information, Display Trigger Switches, Assemblies A6 and A7 (Sheet 1 of 2)



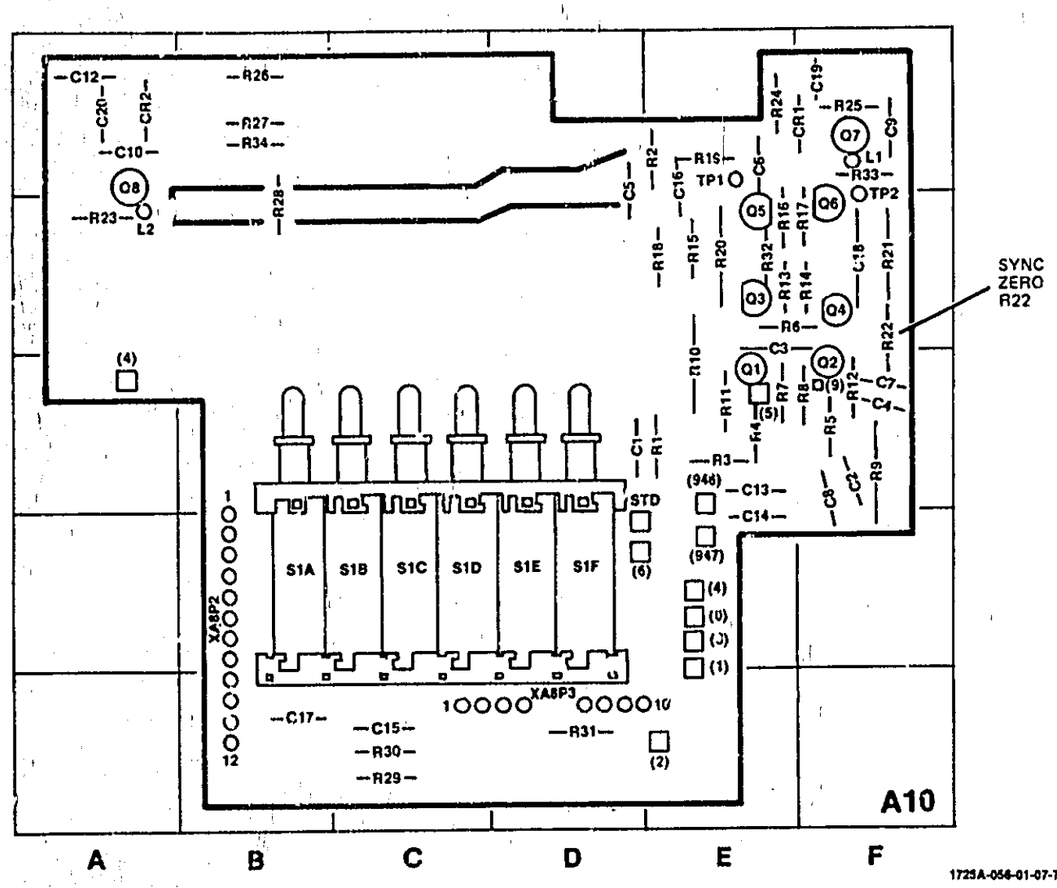
PARTS ON THIS SCHEMATIC

P/O A6	CHASSIS	A7
CR1 R1,2 P/O S1 P/O XA5,XA7	P/O P/O W1,2	C1-5 CR1,2 P1 Q1,2 R1-20 S1 U1-3 P/O XA3

1715A/1725A/17228 001

5

Figure 8-8.
Service Information, Display Trigger Switches, Assemblies A6 and A7 (Sheet 2 of 2)
8-23



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	D-3	C17	B-1	Q8	A-5	R15	E-4	R30	C-1
C2	F-3	C18	F-4	R1	E-3	R16	E-4	R31	D-1
C3	E-4	C19	F-5	R2	E-5	R17	F-4	R32	E-4
C4	F-3	C20	A-5	R3	E-3	R18	E-4	R33	F-5
C5	D-5	CR1	F-5	R4	E-3	R19	E-5	R34	B-5
C6	E-5	CR2	A-5	R5	F-3	R20	E-4	S1A	B-2
C7	F-3	L1	F-5	R6	E-4	R21	F-4	S1B	C-2
C8	F-3	L2	A-4	R7	E-3	R22	F-4	S1C	C-2
C9	F-5	Q1	E-3	R8	F-3	R23	A-4	S1D	C-2
C10	A-5	Q2	F-3	R9	F-3	R24	E-5	S1E	D-2
C12	A-5	Q3	E-4	R10	E-3	R25	F-5	S1F	D-2
C13	E-3	Q4	F-4	R11	E-3	R26	B-5	TP1	E-5
C14	E-2	Q5	E-4	R12	F-3	R27	B-5	TP2	F-4
C15	C-1	Q6	F-4	R13	E-4	R28	B-4	XA8P2	B-2
C16	E-5	Q7	F-5	R14	F-4	R29	C-1	XA8P3	D-1

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 6

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

VERTICAL DISPLAY	X-Y
HORIZ DISPLAY	X-Y
POSITION (horizontal)	centered

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 6

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
VERTICAL DISPLAY	X-Y
HORIZONTAL MODE	X-Y

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5 kHz.

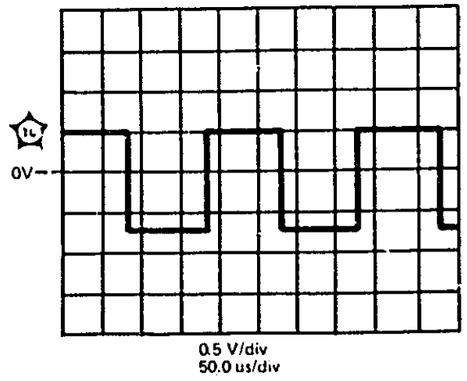


Figure 8-9. Service Information, Horizontal Display Switch Assembly A10 (Sheet 1 of 2)

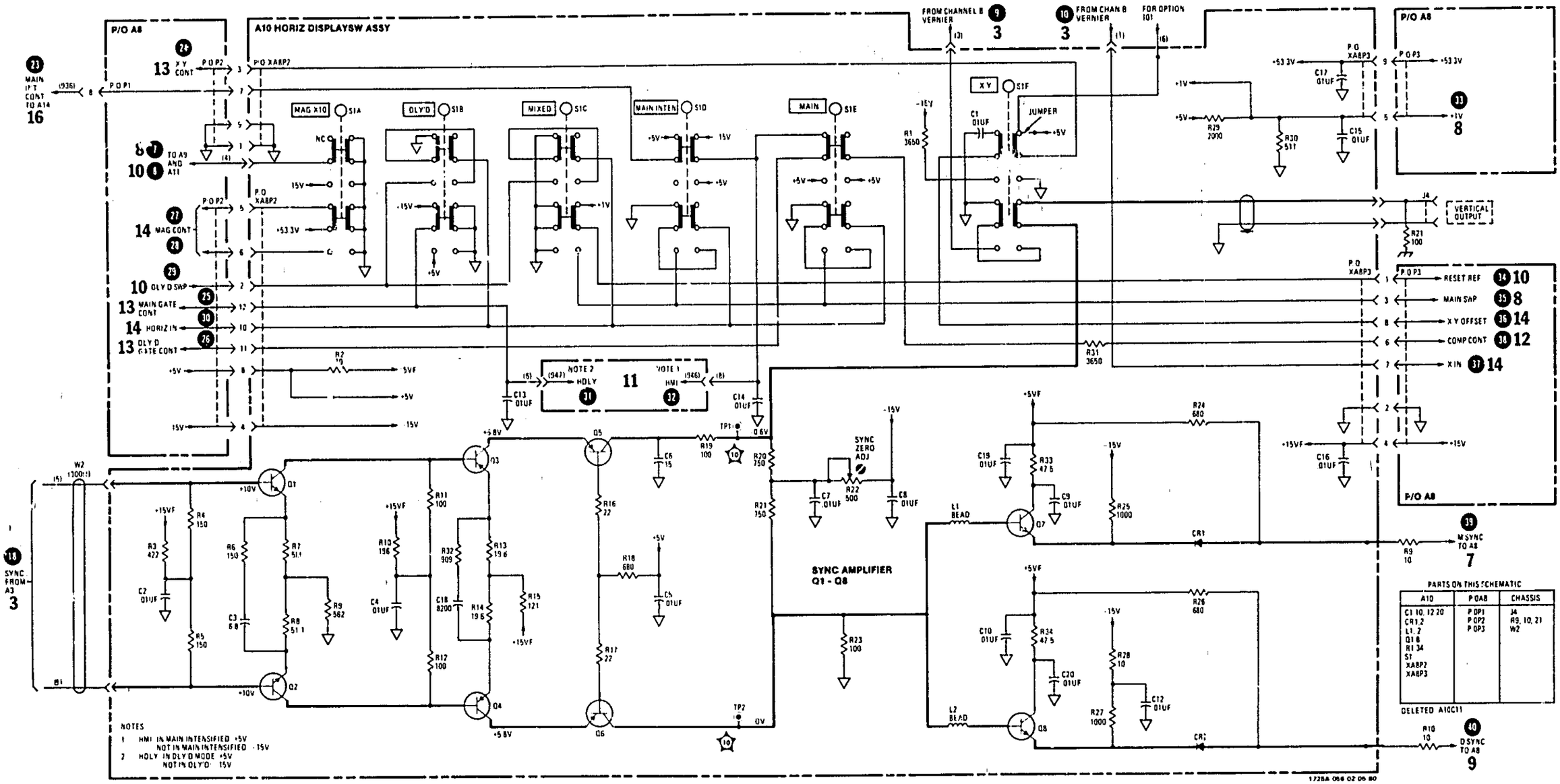
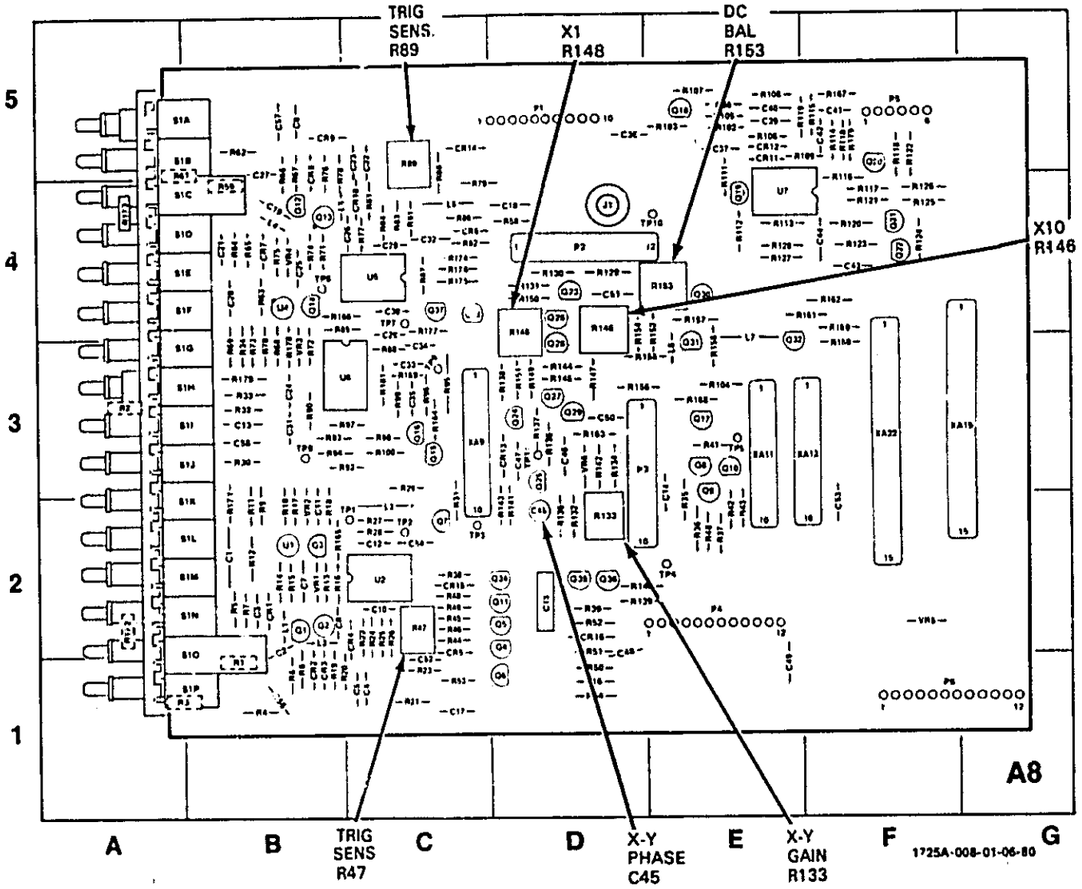


Figure 8-9.
Service Information, Horizontal Display Switch, Assembly A10 (Sheet 2 of 2)



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B 2	C37	E 5	CR15	C 2	Q19	E 4	R16	B 2	R60	D 1	R88	C 3	R122	F 5	R156	D 3	S1K	B 2
C2	B 2	C38	E 5	CR16	D 2	Q20	F 5	R17	B 2	R61	D 2	R89	C 5	R123	F 4	R157	E 4	S1L	B 2
C3	B 2	C39	E 5	J1	D 4	Q21	F 4	R18	B 2	R62	D 2	R90	B 3	R124	F 4	R158	E 3	S1M	B 2
C4	C 1	C40	E 5	L1	B 2	Q22	F 4	R19	B 1	R63	C 1	R91	C 4	R125	F 4	R159	F 3	S1N	B 2
C5	C 1	C41	F 5	L2	B 2	Q23	D 4	R20	B 1	R64	D 1	R92	C 3	R126	F 4	R160	F 4	S1O	B 2
C7	B 2	C42	F 5	L3	C 2	Q24	D 3	R21	C 1	R65	D 4	R93	B 3	R127	E 4	R161	F 4	S1P	B 1
C8	B 2	C43	F 4	L4	B 4	Q25	D 3	R22	C 2	R66	B 4	R94	B 3	R128	E 4	R162	F 4	TP1	C 2
C9	B 5	C44	F 4	L5	C 4	Q26	D 4	R23	C 1	R67	A 5	R95	C 3	R129	D 4	R163	D 3	TP2	C 2
C10	C 2	C45	D 2	L6	C 4	Q27	D 3	R24	C 2	R68	B 5	R96	C 3	R130	D 4	R164	C 3	TP3	C 2
C11	B 2	C46	D 3	L7	E 3	Q28	D 3	R25	C 2	R69	B 4	R97	C 3	R131	D 4	R165	B 2	TP4	E 2
C12	C 2	C47	D 3	L8	E 3	Q29	D 3	R26	C 2	R70	B 4	R98	C 3	R132	D 3	R166	C 4	TP5	E 3
C13	B 3	C48	D 2	P1	D 5	Q30	E 4	R27	C 2	R71	B 4	R99	C 3	R133	D 3	R167	F 5	TP6	B 4
C14	E 3	C49	E 1	P2	D 4	Q31	E 3	R28	C 2	R72	B 3	R100	C 3	R134	D 3	R168	E 3	TP7	C 4
C15	D 2	C50	D 3	P3	D 3	Q32	E 3	R29	C 3	R73	B 3	R101	C 3	R135	D 3	R169	C 3	TP8	B 3
C16	D 1	C51	D 4	P4	E 2	Q33	C 4	R30	B 3	R74	B 4	R102	E 5	R136	D 3	R170	B 3	TP9	C 3
C17	C 1	C52	C 1	P5	F 5	Q34	D 2	R31	C 2	R75	B 4	R103	E 5	R137	D 3	R171	B 2	TP10	E 4
C18	D 4	C53	F 2	P6	F 1	Q35	D 2	R32	B 3	R76	B 5	R104	E 3	R138	D 3	R172	A 4	TP11	D 3
C19	B 4	C54	C 2	Q1	B 2	Q36	D 2	R33	B 3	R77	B 4	R105	E 5	R139	D 2	R173	A 4	U1	B 2
C20	B 4	C55	B 1	Q2	B 2	Q37	C 4	R34	B 3	R78	B 3	R106	E 5	R140	D 2	R174	C 4	U2	C 2
C21	B 4	C57	B 5	Q3	B 2	R1	B 1	R35	E 2	R79	B 3	R107	E 5	R141	C 2	R175	C 4	U4	B 4
C22	C 5	C58	B 3	Q4	D 2	R2	A 3	R36	E 2	R80	B 4	R108	E 5	R142	C 2	R176	C 4	U5	C 4
C23	C 5	CR1	B 2	Q5	D 2	R3	A 1	R37	E 2	R81	B 4	R109	F 5	R143	D 2	R177	C 4	U6	C 3
C24	B 3	CR2	B 1	Q6	D 1	R4	B 1	R38	C 2	R82	B 5	R110	F 5	R144	D 3	R178	B 3	U7	E 4
C25	B 4	CR3	B 1	Q7	C 2	R5	B 2	R39	D 2	R83	C 4	R111	E 4	R145	D 3	R179	F 5	VR1	B 2
C26	C 4	CR4	C 2	Q8	E 3	R6	B 1	R40	E 2	R84	E 2	R112	E 4	R146	D 4	S1A	B 5	VR2	B 2
C27	B 5	CR5	C 2	Q9	E 3	R7	B 2	R41	E 3	R85	C 4	R113	E 4	R147	D 3	S1B	B 5	VR3	B 3
C28	C 5	CR6	C 4	Q10	E 3	R8	B 1	R42	E 2	R86	C 5	R114	F 5	R148	D 4	S1C	B 4	VR4	B 4
C29	4	CR7	B 4	Q11	D 2	R9	B 2	R43	E 2	R87	C 4	R115	F 5	R149	D 3	S1D	B 4	VR5	F 2
C30	C 4	CR8	B 5	Q12	B 4	R10	B 2	R44	C 2	R88	C 4	R116	F 4	R150	D 3	S1E	B 4	VR6	D 3
C31	B 3	CR9	B 5	Q13	B 1	R11	B 2	R45	C 2	R89	C 4	R117	F 4	R151	D 3	S1F	B 4	XA9	C 3
C32	C 4	CR10	C 4	Q14	B 4	R12	B 2	R46	C 2	R84	C 4	R118	F 5	R152	E 4	S1G	B 3	XA11	E 3
C33	C 3	CR11	E 5	Q15	C 3	R13	B 2	R47	C 2	R85	C 4	R119	F 5	R153	E 4	S1H	B 3	XA12	F 3
C34	C 3	CR12	E 5	Q16	C 3	R14	B 2	R48	C 2	R86	C 4	R120	F 4	R154	D 4	S1I	B 3	XA19	G 3
C35	F 3	CR13	D 3	Q17	E 3	R15	B 2	R49	C 2	R87	C 4	R121	F 4	R155	E 3	S1J	B 3	XA22	F 3
C36	D 5	CR14	C 5	Q18	E 5														

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 7

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Sweep Mode	SINGLE
AUTO/NORM	NORM
RESET	armed
TRIGGER LEVEL (main)	cw

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 7

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
TIME/DIV (main)	20 µs/div

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 10 kHz.

5. Waveform timing conditions:

T_0 - Sweep start; position trigger occurs at A8U2 pin 11.
T_1 - Sweep ends; holdoff starts.
T_2 - Holdoff ends; armed starts.
T_3 - Armed ends.

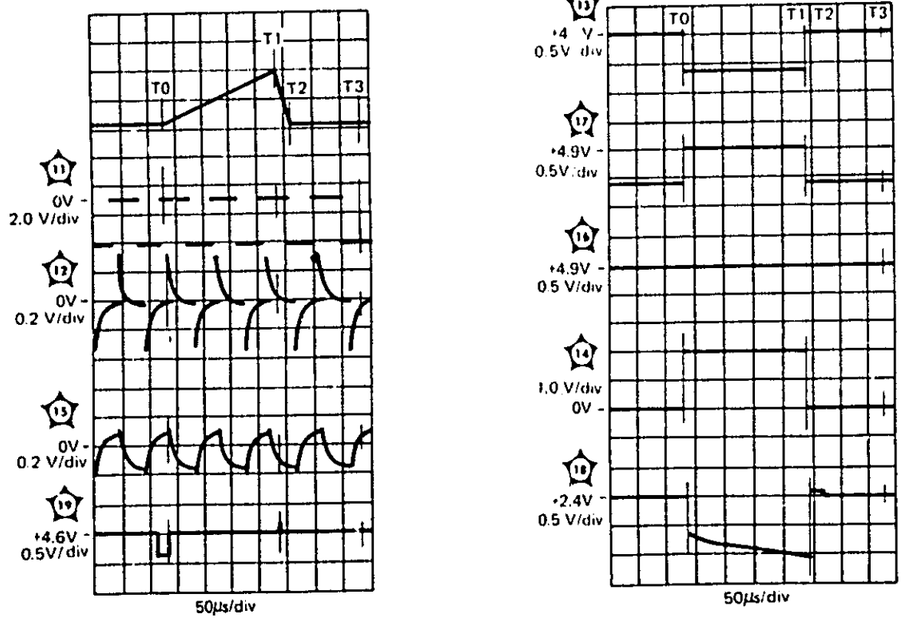


Figure 8-10. Service Information, Main Sweep Trigger, P/O Assembly A8 (Sheet 1 of 2)

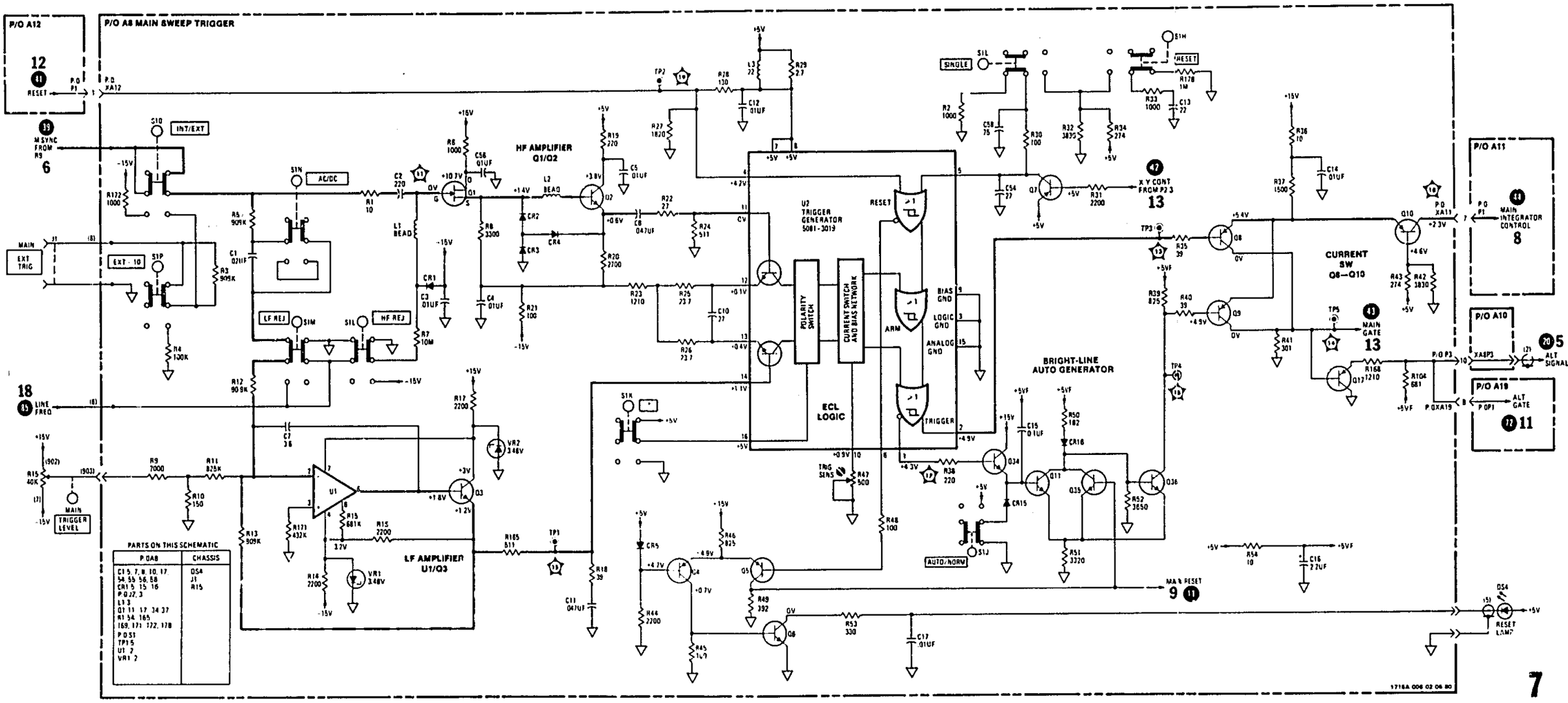
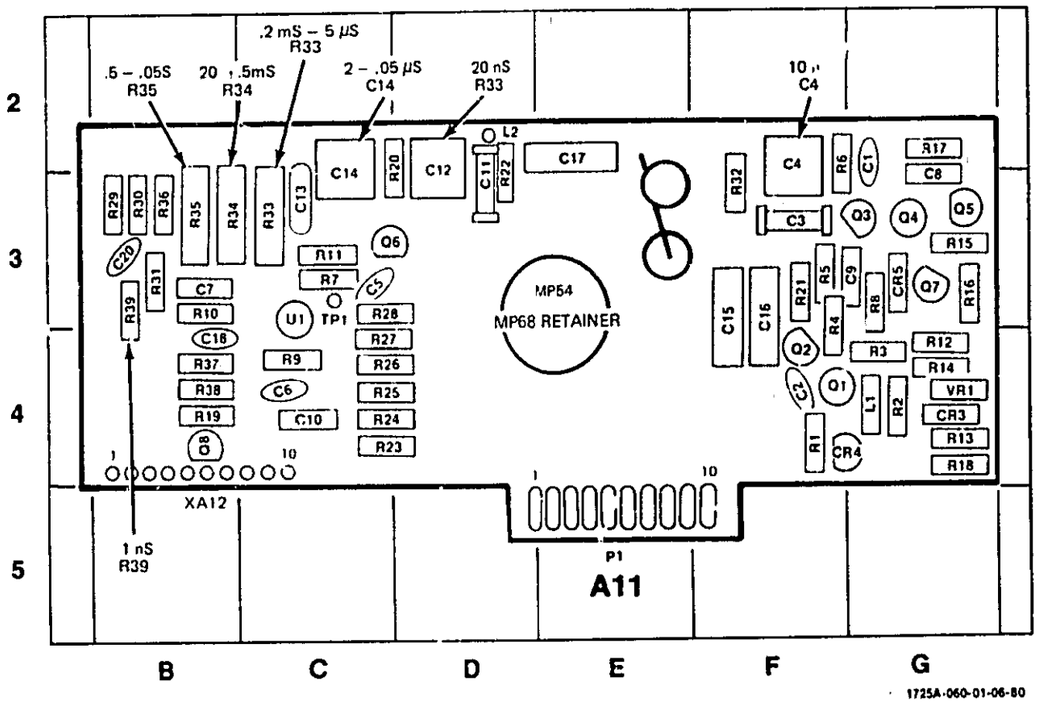


Figure 8-10.
Service Information, Main Sweep Trigger, P/O Assembly A8 (Sheet 2 of 2)
8-27



1725A-060-01-06-80

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	G-3	C12	D-3	CR5	G-3	Q6	C-3	R9	C-4	R20	D-3	R32	F-3
C2	F-4	C13	C-3	L1	G-4	Q7	G-3	R10	B-3	R21	F-3	R33	C-3
C3	F-3	C14	C 3	L2	D-2	Q8	B-4	R11	C-3	R22	D-3	R34	B-3
C4	F-2	C15	F 3	MP53	D-3	R1	F-4	R12	G-4	R23	C-4	R35	B-3
C5	C-3	C16	F-3	MP54	E 3	R2	G-4	R13	G-4	R24	C-4	R36	B-3
C6	C-4	C17	E-2	P1	E-5	R3	G-4	R14	G-4	R25	C-4	R37	B-4
C7	B-3	C18	B-4	Q1	F-4	R4	F-3	R15	G-3	R26	C-4	R38	B-4
C8	G-3	C20	B-3	Q2	F-4	R5	F-3	R16	G-3	R27	C-3	R39	B-3
C9	G-3	CR3	G-4	Q3	G-3	R6	F-3	R17	G-2	H28	C-4	TP1	C-3
C10	C-4	CR4	G-4	Q4	G-3	R7	C-3	R18	G-4	R29	B-3	U1	C-3
C11	D-3			Q5	G-3	R8	G-3	R19	B-4	R30	B-3	VR1	G-4
										R31	B-3	XA12	B-5

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 8

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Sweep Mode	SINGLE
AUTO/NORM	NORM
RESET	armed
TRIGGER LEVEL (main)	cw

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 8

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
TIME/DIV (main)	20 µs/div

2. Set monitor oscilloscope TIME/DIV controls as indicated under waveform(s).

3. Connect pulse generator output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 10 kHz.

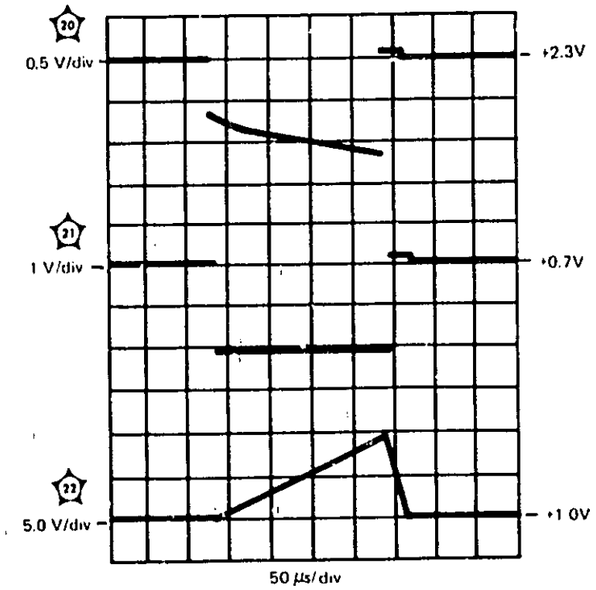


Figure 8-11. Service Information, Main Swecp Integrator, Assembly A11 (Sheet 1 of 2)

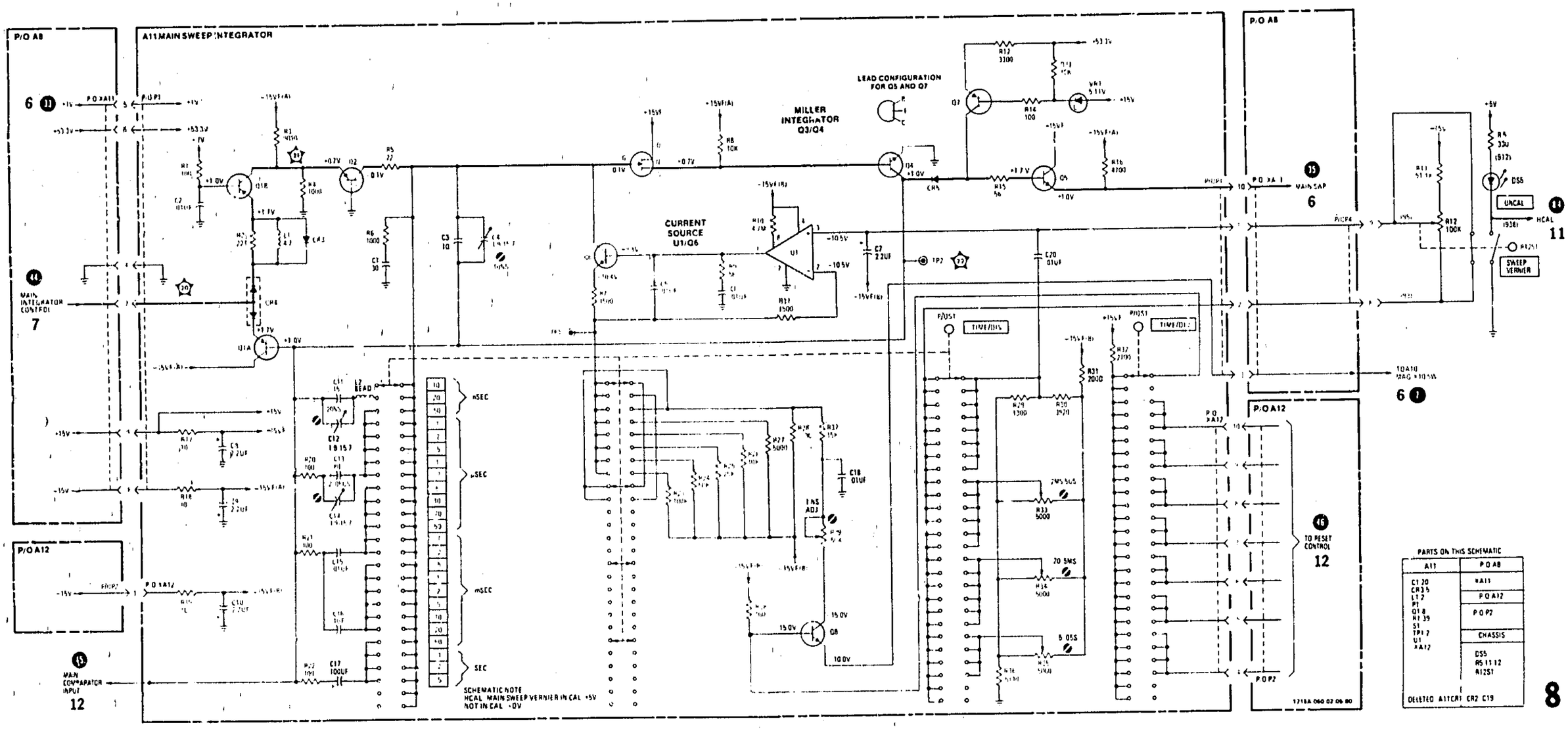
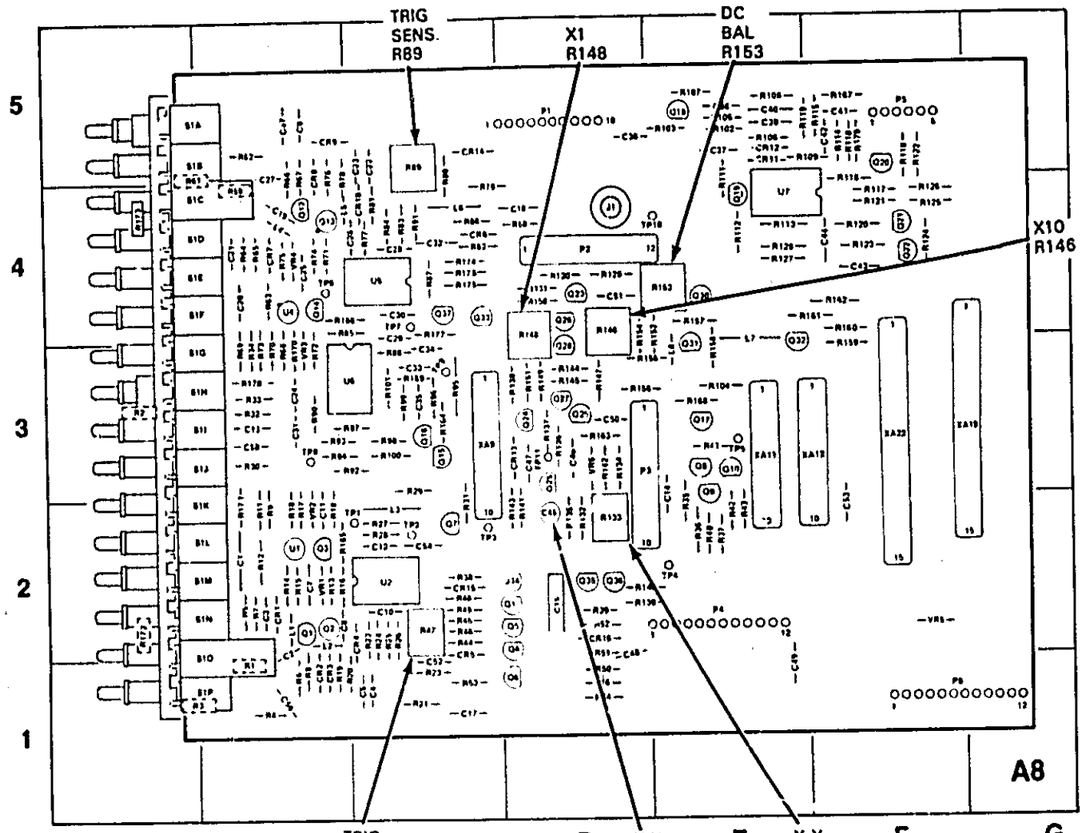


Figure 8-11.
Service Information, Main Sweep Integrator, Assembly A11 (Sheet 2 of 2)



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B 2	C37	E 5	CR15	C 2	Q19	E 4	R16	B 2	R50	D 1	R88	C 3	R122	F 5	R156	D 3	S1K	B 2
C2	B 2	C38	E 5	CR16	D 2	Q20	F 5	R17	B 2	R51	D 2	R89	C 5	R123	F 4	R157	E 4	S1L	B 2
C3	B 2	C39	E 5	J1	D 4	Q21	F 4	R18	B 2	R52	D 2	R90	B 3	R124	F 4	R158	E 3	S1M	B 2
C4	C 1	C40	E 5	L1	B 2	Q22	F 4	R19	B 1	R53	C 1	R91	C 4	R125	F 4	R159	F 3	S1N	B 2
C5	C 1	C41	F 5	L2	B 2	Q23	D 4	R20	B 1	R54	D 1	R92	C 3	R126	F 4	R160	F 4	S1O	B 2
C7	B 2	C42	F 5	L3	C 2	Q24	D 3	R21	C 1	R58	D 4	R93	B 3	R127	E 4	R161	F 4	S1P	B 1
C8	B 2	C43	F 4	L4	B 4	Q25	D 3	R22	C 2	R59	B 4	R94	B 3	R128	E 4	R162	F 4	TP1	C 2
C9	B 5	C44	F 4	L5	C 4	Q26	D 4	R23	C 1	R61	A 5	R95	C 3	R129	D 4	R163	F 3	TP2	C 2
C10	C 2	C45	D 2	L6	C 4	Q27	D 3	R24	C 2	R62	B 5	R96	C 3	R130	D 4	R164	C 3	TP3	C 2
C11	B 2	C46	D 3	L7	E 3	Q28	D 3	R25	C 2	R63	B 4	R97	C 3	R131	D 4	R165	B 2	TP4	E 2
C12	C 2	C47	D 3	L8	E 3	Q29	D 3	R26	C 2	R64	B 4	R98	C 3	R132	D 3	R166	C 4	TP5	E 3
C13	B 3	C48	D 2	P1	D 5	Q30	E 4	R27	C 2	R65	B 4	R99	C 3	R133	D 3	R167	F 5	TP6	B 4
C14	E 3	C49	E 1	P2	D 4	Q31	E 3	R28	C 2	R66	B 5	R100	C 3	R134	D 3	R168	E 3	TP7	C 4
C15	D 2	C50	D 3	P3	D 3	Q32	E 3	R29	C 3	R67	B 5	R101	C 3	R135	D 3	R169	C 3	TP8	B 3
C16	D 1	C51	D 4	P4	F 2	Q33	C 4	R30	B 3	R68	B 3	R102	E 5	R136	D 3	R170	B 3	TP9	C 3
C17	C 1	C52	C 1	P5	F 5	Q34	D 2	R31	C 2	R69	B 3	R103	E 5	R137	D 3	R171	B 2	TP10	E 4
C18	D 4	C53	F 2	P6	F 1	Q35	D 2	R32	B 3	R70	B 3	R104	E 3	R138	D 3	R172	A 2	TP11	D 3
C19	B 4	C54	C 2	U1	B 2	Q36	D 2	R33	B 3	R71	B 4	R105	E 5	R139	D 2	R173	A 4	U1	B 2
C20	B 4	C56	B 1	Q2	B 2	Q37	C 4	R34	B 3	R72	B 3	R106	E 5	R140	D 2	R174	C 4	U2	C 2
C21	B 4	C57	B 5	Q3	B 1	R1	B 1	R35	E 2	R73	B 3	R107	E 5	R141	D 2	R175	C 4	U4	B 4
C22	C 5	C58	B 3	Q4	D 2	R2	A 3	R36	E 2	R74	B 4	R108	E 5	R142	D 3	R176	C 4	U5	C 4
C23	C 5	CR1	B 2	Q5	D 2	R3	A 3	R37	E 2	R75	B 4	R109	F 5	R143	D 2	R177	C 4	U6	C 3
C24	B 3	CR2	B 1	Q6	D 1	R4	B 1	R38	C 2	R76	B 5	R110	F 5	R144	D 3	R178	B 3	U7	E 4
C25	B 4	CR3	B 1	Q7	C 2	R5	B 2	R39	D 2	R77	C 4	R111	E 4	R145	D 3	R179	F 5	VR1	B 2
C26	C 4	CR4	C 2	Q8	E 3	R6	B 1	R40	E 2	R78	B 5	R112	E 4	R146	D 4	S1A	B 5	VR2	B 2
C27	B 5	CR5	C 2	Q9	E 3	R7	B 2	R41	E 3	R79	C 4	R113	E 4	R147	D 3	S1B	B 5	VR3	B 3
C28	C 4	CR6	C 4	Q10	E 3	R8	B 1	R42	E 2	R80	C 5	R114	F 5	R148	D 4	S1C	B 4	VR4	B 4
C29	C 4	CR7	B 4	Q11	D 2	R9	B 2	R43	E 2	R81	C 4	R115	F 5	R149	D 3	S1D	B 4	VR5	F 2
C30	C 4	CR8	B 5	Q12	B 4	R10	B 2	R44	C 2	R82	C 4	R116	F 4	R150	D 4	S1E	B 4	VR6	D 3
C31	B 3	CR9	B 5	Q13	B 4	R11	B 2	R45	C 2	R83	C 4	R117	F 4	R151	D 3	S1F	B 4	XA9	C 3
C32	C 4	CR10	C 4	Q14	B 4	R12	B 2	R46	C 2	R84	C 4	R118	F 5	R152	E 4	S1G	B 2	XA11	E 3
C33	C 3	CR11	E 5	Q15	C 3	R13	B 2	R47	C 2	R85	C 4	R119	F 5	R153	E 4	S1H	B 3	XA12	F 3
C34	C 3	CR12	E 5	Q16	C 3	R14	B 2	R48	C 2	R86	C 4	R120	F 4	R154	D 4	S1I	B 3	XA19	G 3
C35	C 3	CR13	D 3	Q17	E 3	R15	B 2	R49	C 2	R87	C 4	R121	F 4	R155	E 3	S1J	B 3	XA22	F 3
C36	D 5	CR14	C 5	Q18	E 5														

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 9

1. Set front-panel controls in accordance with paragraph 5-13, Section V.

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFROM MEASUREMENT CONDITIONS
SCHEMATIC 9

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIG LEVEL (delayed)	stable display
TIME/DIV (main)	.1 mSEC
TIME/DIV (delayed)	50 µSEC
HORIZ DISPLAY	DLY'D

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveforms(s)

3. Connect pulse generator 50-ohm output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for 5 kHz, four divisions of signal amplitude (0.4 V).

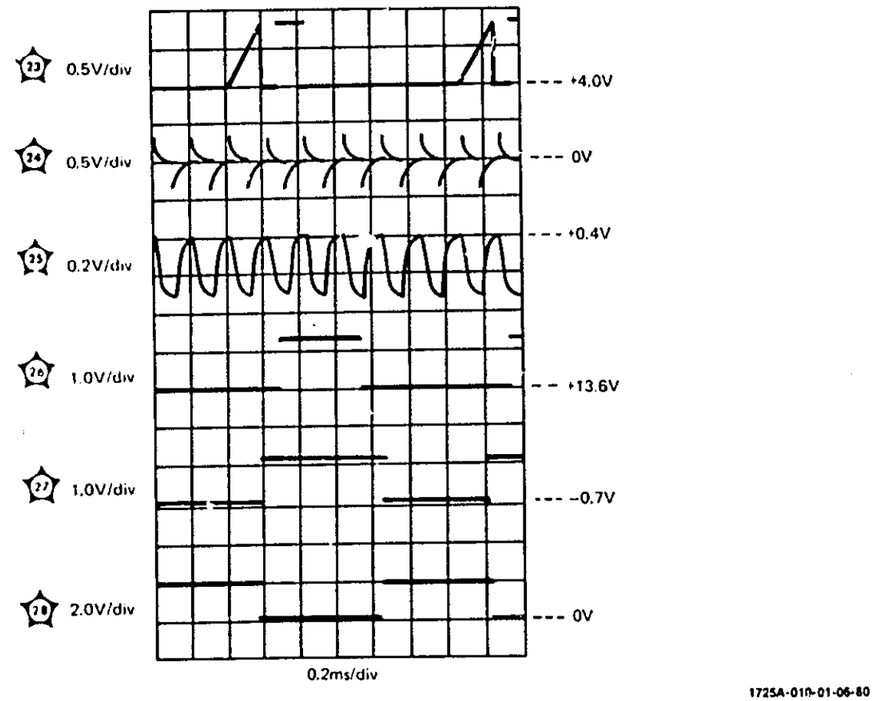


Figure 8-12. Service Information. Delayed Sweep Trigger P/O Assembly A8 (Sheet 1 of 2)

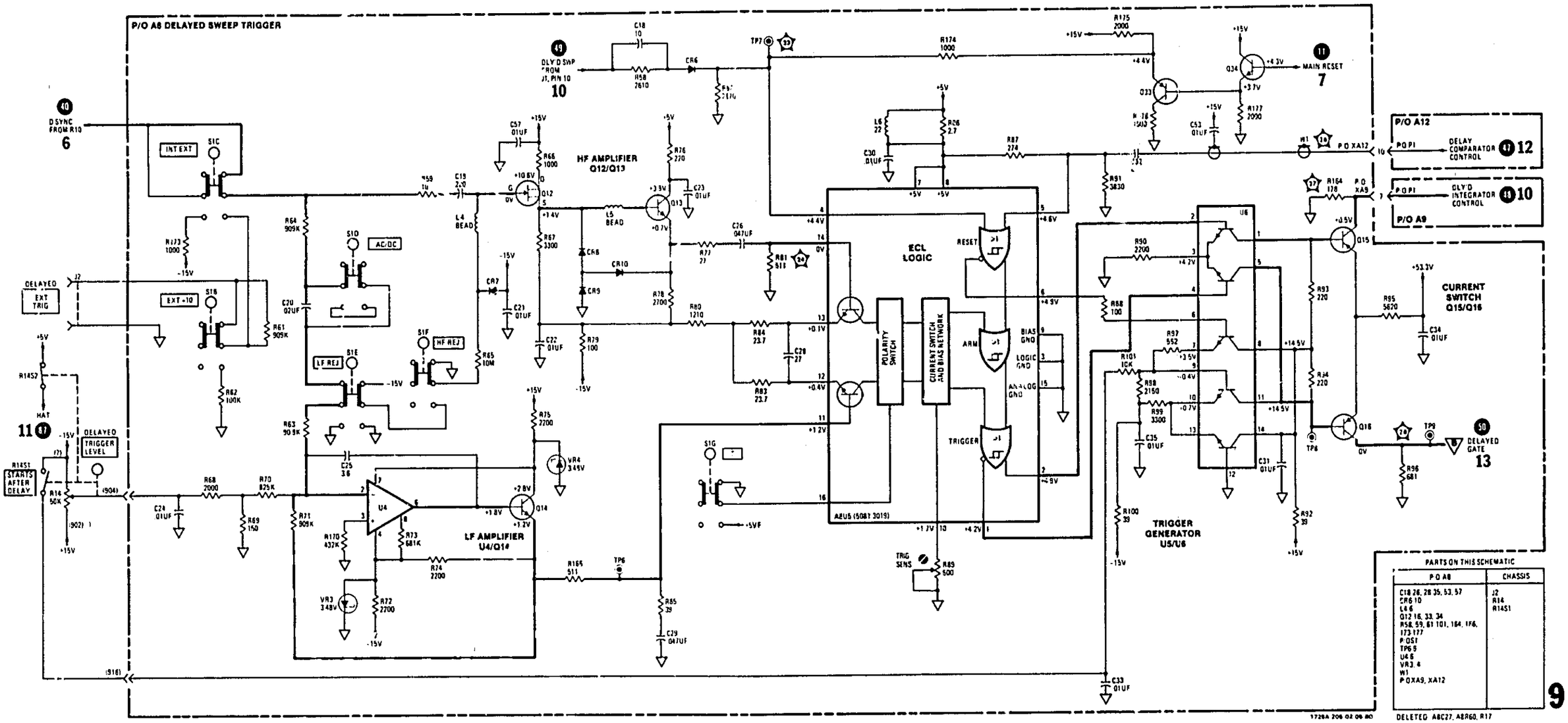


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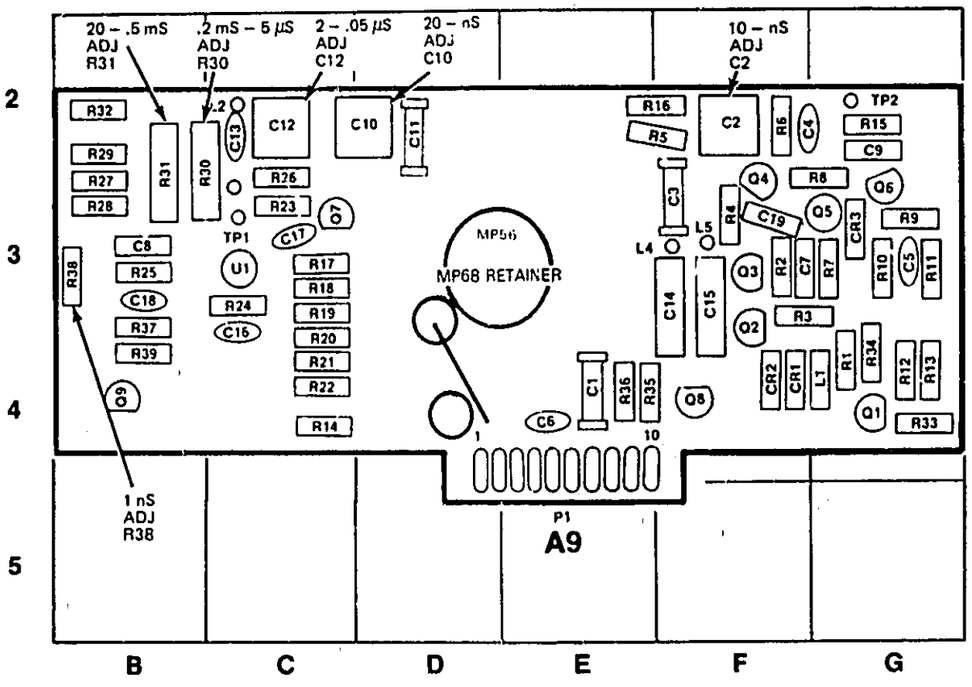
Figure 8-12.
Service Information, Delayed Sweep Trigger, P/O Assembly A8 (Sheet 2 of 2)



1725A-064-01-06-8C

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	E-4	C12	C-2	L1	G-4	Q5	G-3	R8	G-3	R20	C-4	R32	B-2
C2	F-2	C13	C-3	L2	C-2	Q6	G-3	R9	G-3	R21	C-4	R33	G-4
C3	F-3	C14	F-4	L3	C-3	Q7	C-3	R10	G-3	R22	C-4	R34	G-4
C4	F-2	C15	F-4	L4	F-3	Q8	F-4	R11	G-3	R23	C-3	R35	E-4
C5	G-3	C16	C-4	L5	F-3	Q9	B-4	R12	G-4	R24	C-4	R36	E-4
C6	E-4	C17	C-3	MP55	D-3	R1	G-4	R13	G-4	R25	B-3	R37	B-4
C7	F-3	C18	B-3	MP56	D-3	R2	F-3	R14	C-4	R26	C-3	R38	B-3
C8	B-3	C19	F-3	P1	E-E	R3	G-4	R15	G-2	R27	B-3	R39	B-4
C9	G-3	CR1	F-4	Q1	G-4	R4	F-3	R16	E-2	R28	B-3	TP1	C-3
C10	D-2	CR2	F-4	Q2	F-4	R5	F-2	R17	C-3	R29	B-3	TP2	G-2
C11	D-3	CR3	G-3	Q3	F-3	R6	F-2	R18	C-3	R30	B-2	U1	C-3
				Q4	F-3	R7	G-3	R19	C-4	R31	B-3		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 10

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

HORIZ DISPLAY	DLY'D
Sweep Mode	SINGLE
TIME/DIV (delayed)	1 µs
AUTO/NORM	NORM
RESET	armed
TRIGGER LEVEL (main and delayed)	cw

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 10

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
TIME/DIV (main)	0.1 ms/div
TIME/DIV (delayed)	50 µs/div
HORIZ DISPLAY	DLY'D

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5 kHz.

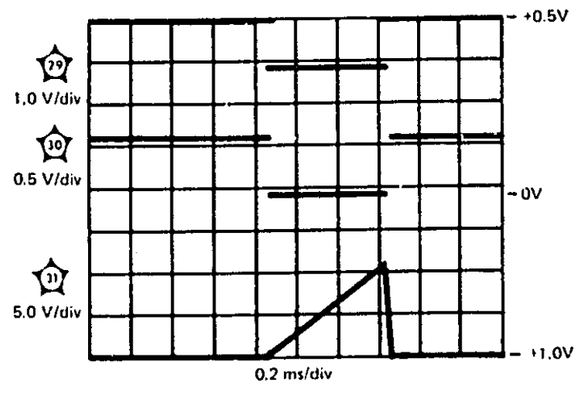


Figure 8-13. Service Information, Delayed Sweep Integrator, Assembly A9 (Sheet 1 of 2)

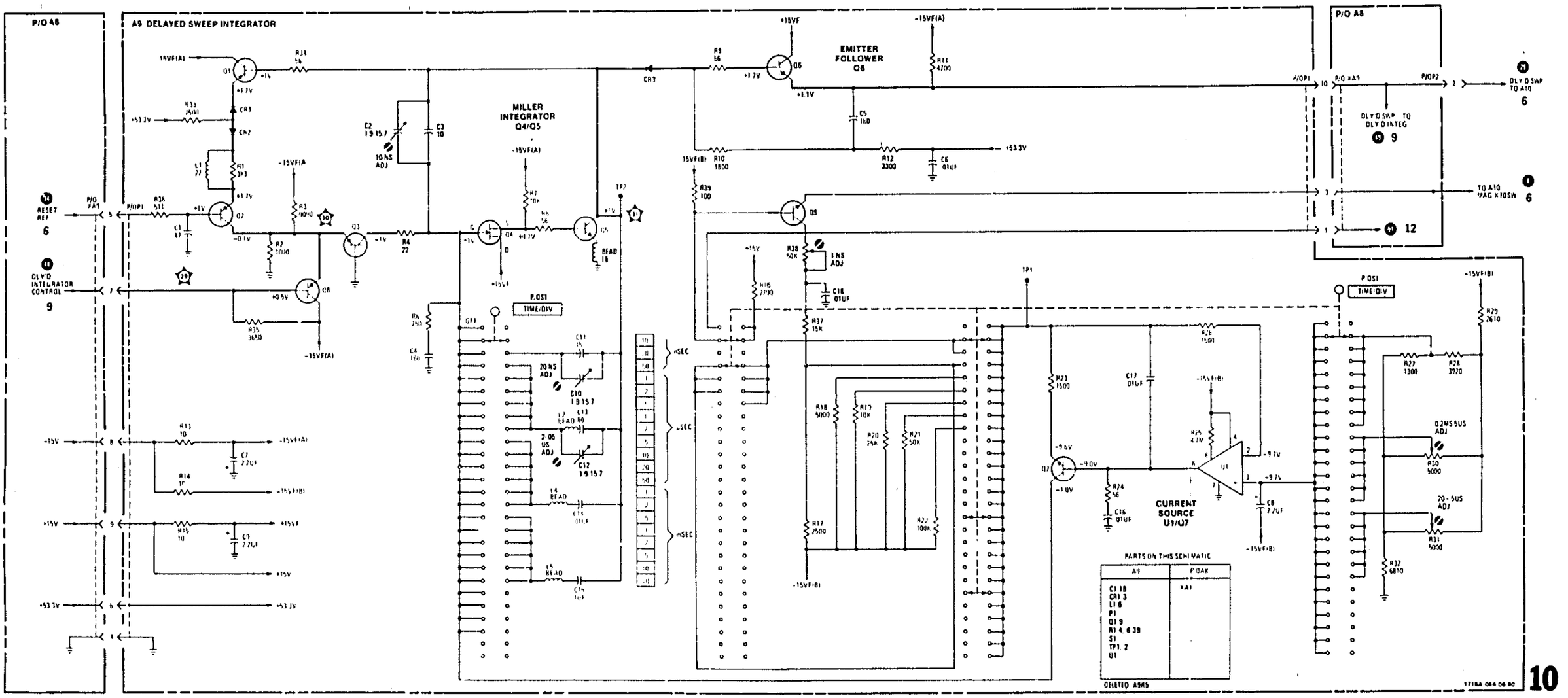
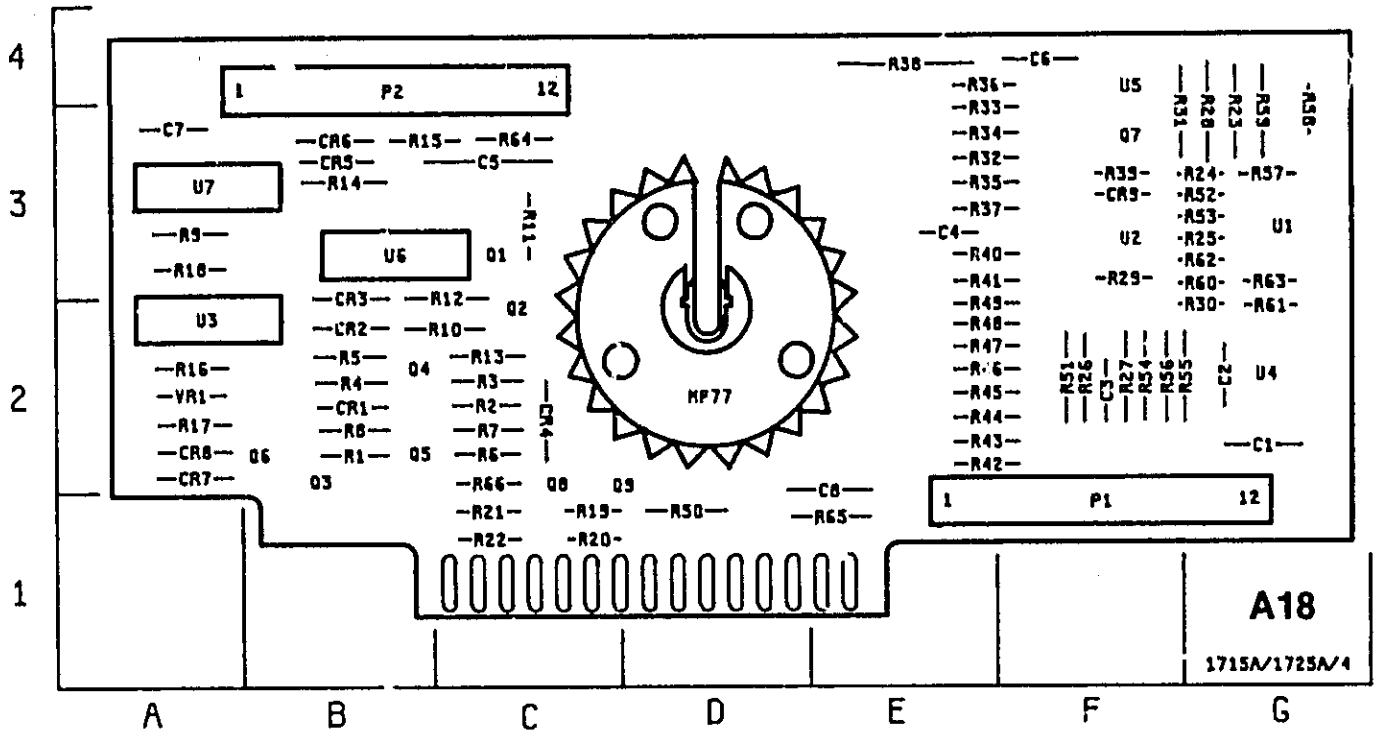


Figure 8-13.
Service Information, Delayed Sweep Integrator, Assembly A9 (Sheet 2 of 2)



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C2	G-2	CR7	A-2	R4	B-2	R21	C-1	R40	E-3	R59	G-4
C3	F-2	CR8	A-2	R5	B-2	R22	C-1	R41	E-3	R60	G-3
C4	E-3	CR9	F-3	R6	C-2	R23	G-4	R42	E-2	R61	G-3
C5	C-3	P1	F-2	R7	C-2	R26	F-2	R43	E-2	R62	G-3
C6	F-4	P2	B-4	R8	B-2	R27	F-2	R44	E-2	R63	G-3
C7	A-3	Q1	C-3	R9	A-3	R28	G-4	R45	E-2	R64	G-3
C8	E-2	Q2	C-2	R10	C-2	R29	F-3	R46	E-2	R65	E-1
C24	G-3	Q3	B-2	R11	C-3	R30	G-3	R47	E-2	R66	C-2
C25	G-3	Q4	B-2	R12	C-2	R31	F-4	R48	E-2	U1	G-3
C52	G-3	Q5	B-2	R13	C-2	R32	E-3	R49	E-2	U2	F-3
C53	G-3	Q6	B-2	R14	B-3	R33	E-4	R50	D-1	U3	A-2
CR1	B-2	Q7	F-3	R15	B-3	R34	E-3	R51	F-2	U4	G-2
CR2	B-2	Q8	C-2	R16	A-2	R35	E-3	R54	F-2	U5	F-4
CR3	B-2	Q9	D-2	R17	A-2	R36	E-4	R55	F-2	U6	B-3
CR4	C-2	R1	B-2	R18	A-3	R37	E-3	R56	F-2	U7	A-3
CR5	B-3	R2	C-2	R19	C-1	R38	E-4	R57	G-3	VR1	A-2

Figure 8-14. Service Information, Analog Assembly A18 (Sheet 1 of 2)

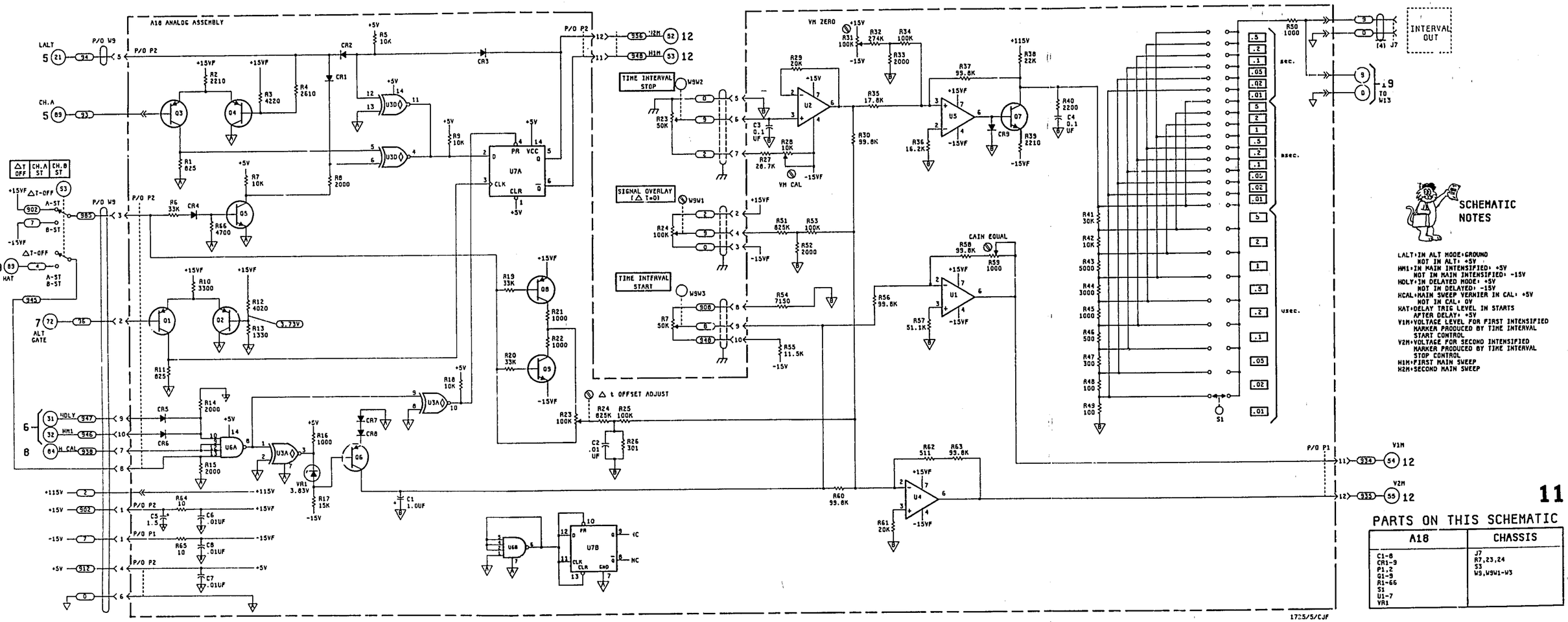

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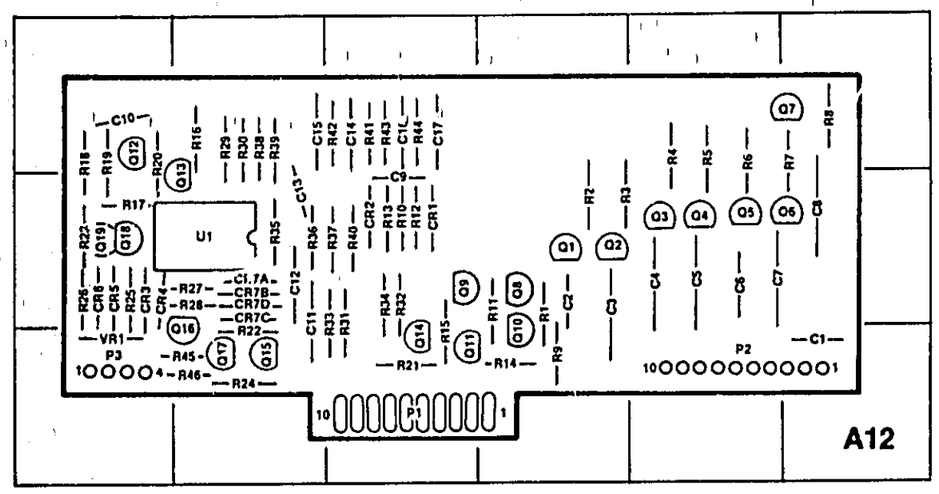
Figure 8-14.
Service Information, Ar alog,
Assembly A18 (Sheet 2 of 2)



1725A-012-01-06-80

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	F-1	C12	B-2	CR6	A-2	Q8	D-2	R1	D-2	R13	C-2	R25	A-2	R37	C-2
C2	D-2	C13	B-2	CR7A	B-2	Q9	C-2	R2	D-2	R14	D-1	R26	A-2	R38	B-3
C3	E-2	C14	C-3	CR7B	B-2	Q10	D-1	R3	E-2	R15	C-1	R27	B-2	R39	B-3
C4	E-2	C15	B-3	CR7C	B-2	Q11	C-1	R4	E-3	R16	B-3	R28	B-2	R40	C-2
C5	E-2	C16	C-3	CR7D	B-2	Q12	A-3	R5	E-3	R17	A-2	R29	B-3	R41	C-3
C6	E-2	C17	C-3	Q1	D-2	Q13	B-3	R6	E-3	R18	A-3	R30	B-3	R42	C-3
C7	F-2	CR1	C-2	Q2	D-2	Q14	C-1	R7	F-3	R19	A-3	R31	C-2	R43	C-3
C8	F-2	CR2	C-2	Q3	E-2	Q15	B-1	R8	F-3	R20	A-3	R32	C-2	R44	C-3
C9	C-2	CR3	A-2	Q4	E-2	Q16	B-2	R9	D-1	R21	C-1	R33	C-2	R45	B-1
C10	A-3	CR4	A-2	Q5	E-2	Q17	B-1	R10	C-2	R22	B-1	R34	C-2	R46	B-1
C11	B-2	CR5	A-2	Q6	F-2	Q18	A-2	R11	D-2	R23	A-2	R35	B-2	U1	B-2
				Q7	F-3	Q19	A-2	R12	C-2	R24	B-1	R36	B-2	VR1	A-1

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 12

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Sweep mode	SINGLE
AUTO/NORM	NORM
RESET	armed
TRIG LEVEL (main)	fully cw
TIME/DIV (delayed)	1 μSEC
INC-DEC	set LED display for 0.500
TIME INTERVAL (DELAY dial)	fully ccw
HORIZ DISPLAY	MAIN INTEN

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 12

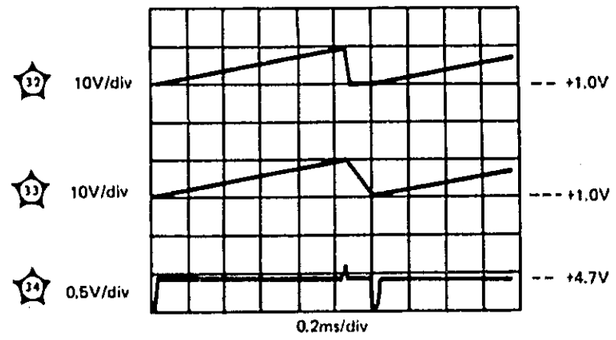
1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

HORIZ DISPLAY	MAIN INTEN
TIME/DIV (delayed)	1 μSEC
INC-DEC	set LED display for 0.500
Coupling (channel A)	50Ω

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator 50-ohm output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for 5 kHz, four division of signal amplitude (0.4 V).



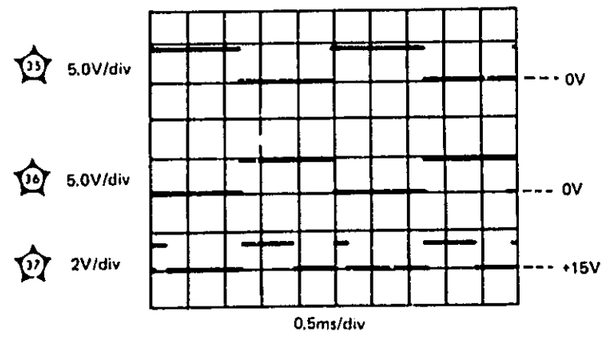


Figure 8-15. Service Information, Holdoff-delayed Comparator, Assembly A12 (Sheet 1 of 2)

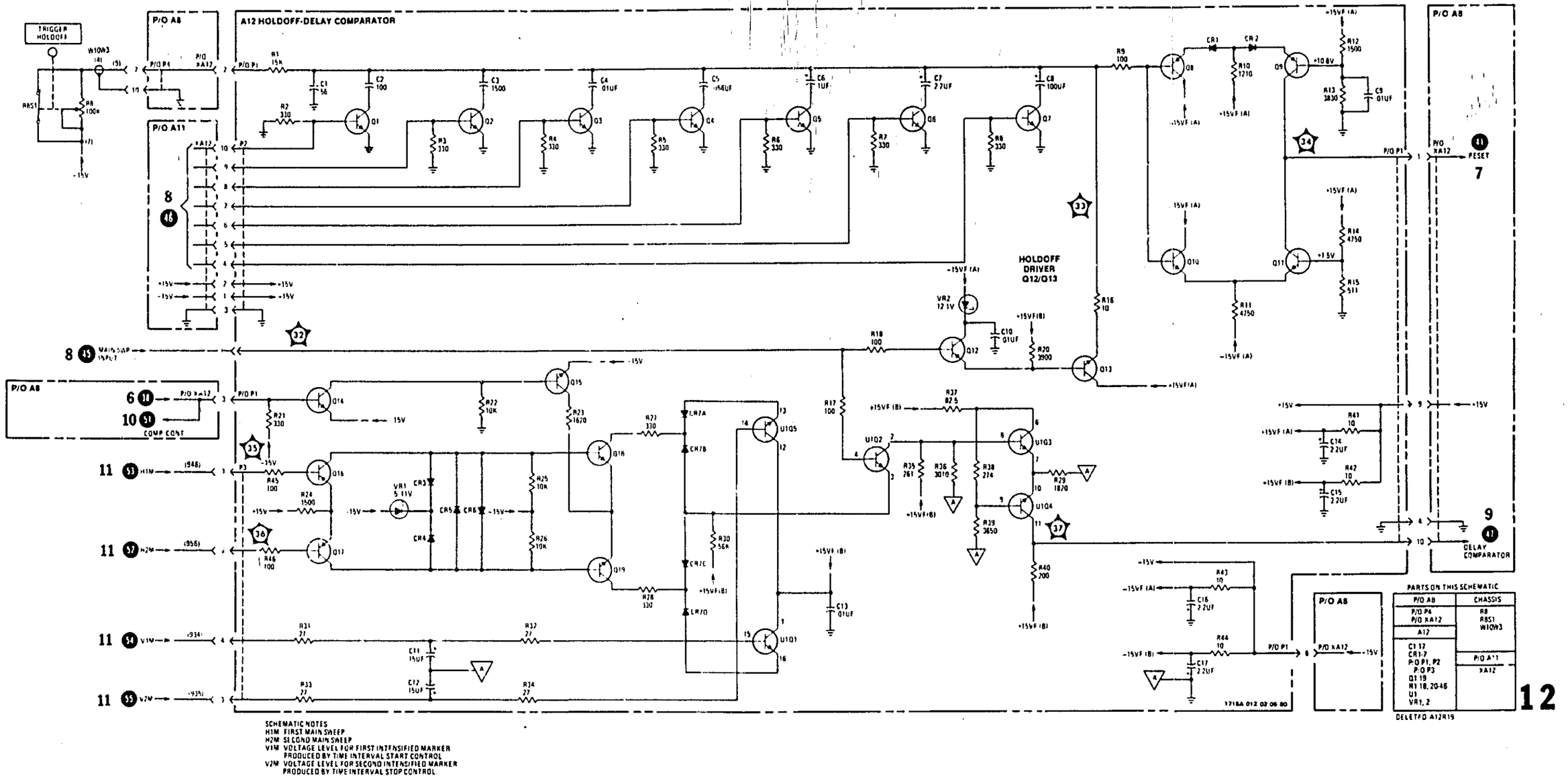


Figure 8-15.
Service Information, Holdoff-delayed Comparator, Assembly A12 (Sheet 2 of 2)

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 13

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Sweep mode	SINGLE
AUTO/NORM	NORM
RESET	armed
TRIG LEVEL (main)	fully cw

2. All voltages are referenced to chassis ground. All indications as nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 13

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIG LEVEL (main)	stable display
HORIZ DISPLAY	MIXED
TIME/DIV (delayed)	10 μSEC
TIME INTERVAL (DELAY dial)	adjust for 5 div delay from leading edge of trace

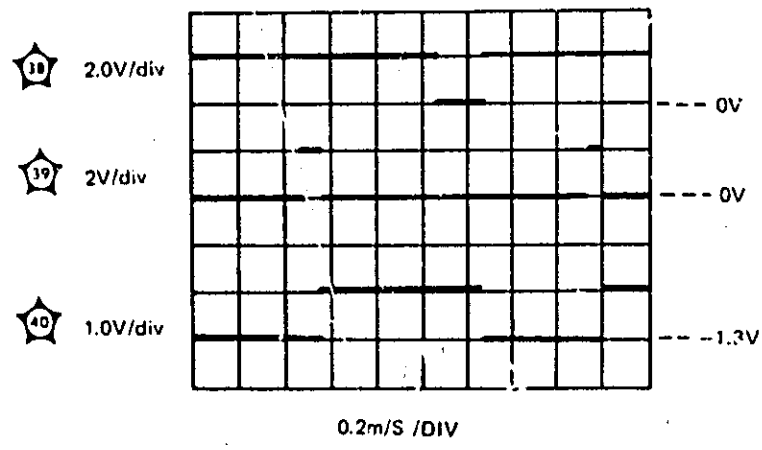
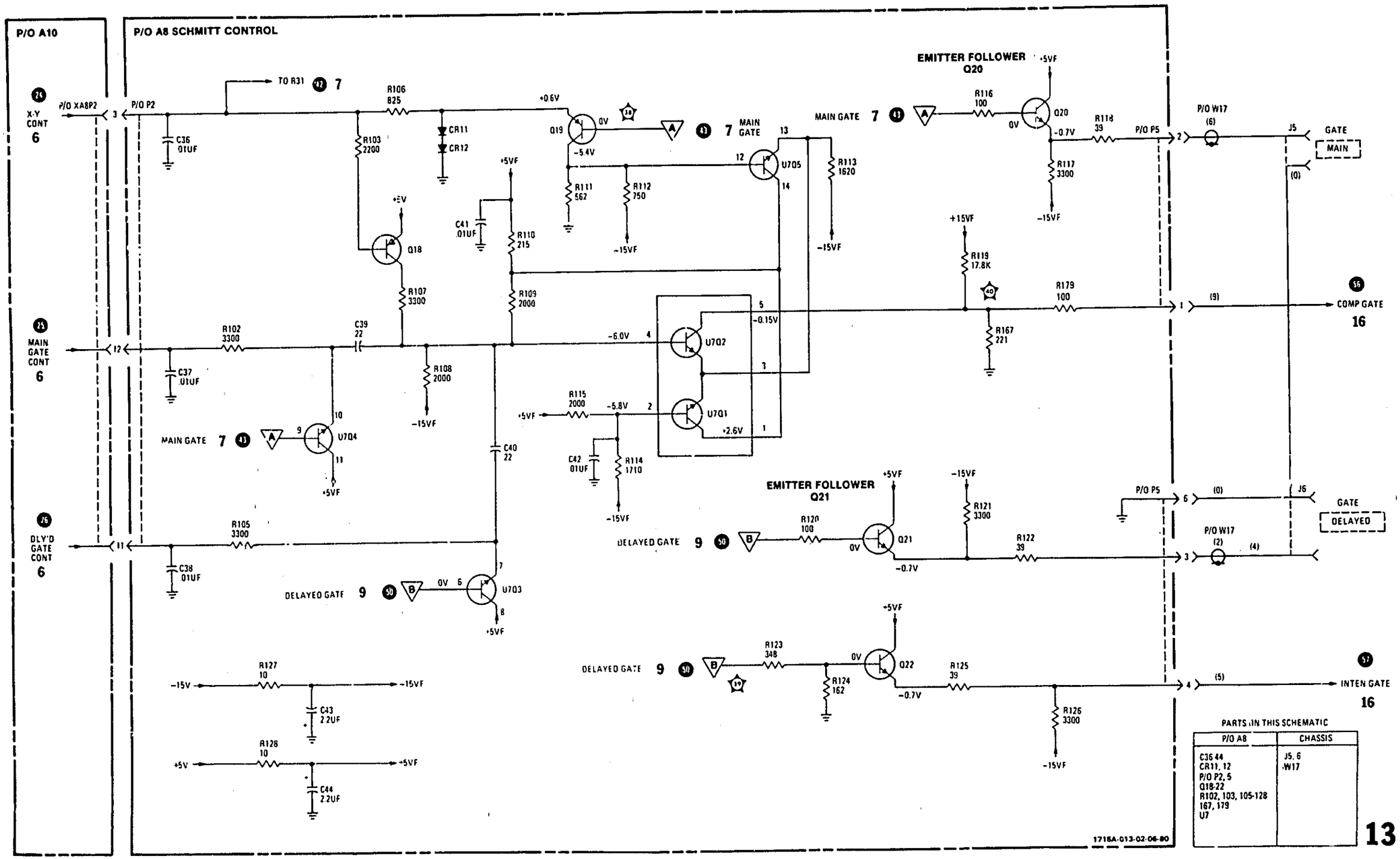


Figure 8-16. Service Information, Schmitt Control, P/O Assembly A8 (Sheet 1 of 2)



PARTS IN THIS SCHEMATIC

P/O A8	CHASSIS
C36 44 CR11, 12 P/O P2, 5 Q18-22 R102, 103, 105-128 167, 179 U7	J5, 6 W17

13

Figure 8-16.
Service Information, Schmitt Control,
P/O Assembly A8 (Sheet 2 of 2)

DC VOTAGE MEASUREMENT CONDITIONS
SCHEMATIC 14

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

VERT DISPLAY	X-Y
HORIZ DISPLAY	X-Y
POSITION (horizontal)	centered

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 14

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIG LEVEL (main)	stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator 50-ohm output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for 5 kHz, four divisions of signal amplitude (0.4 V).

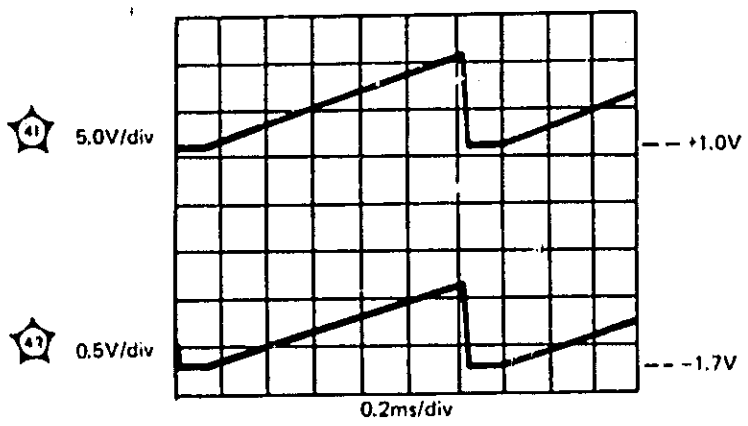


Figure 8-17. Service Information, Horizontal Preamplifier, P/O Assembly A8 (Sheet 1 of 2)

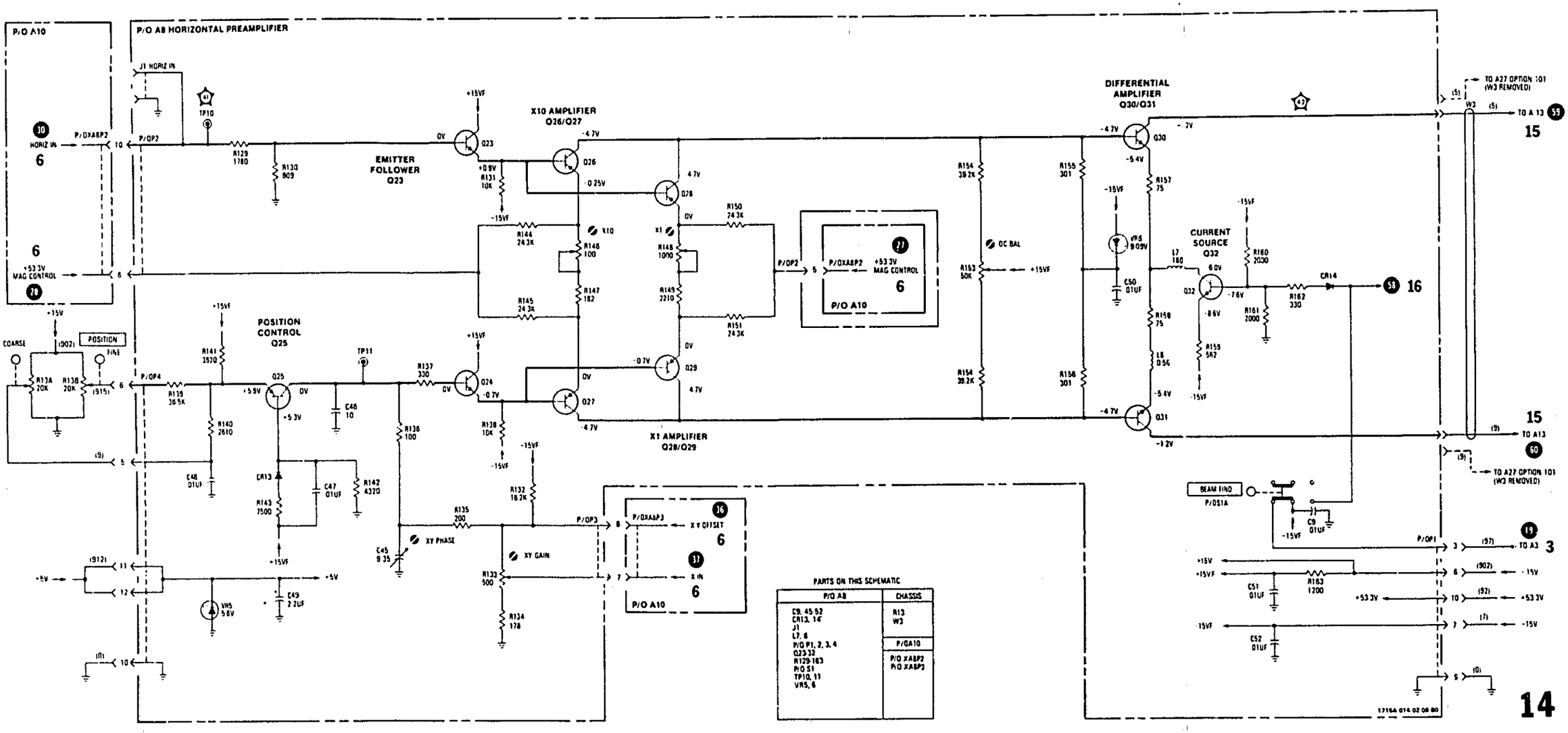
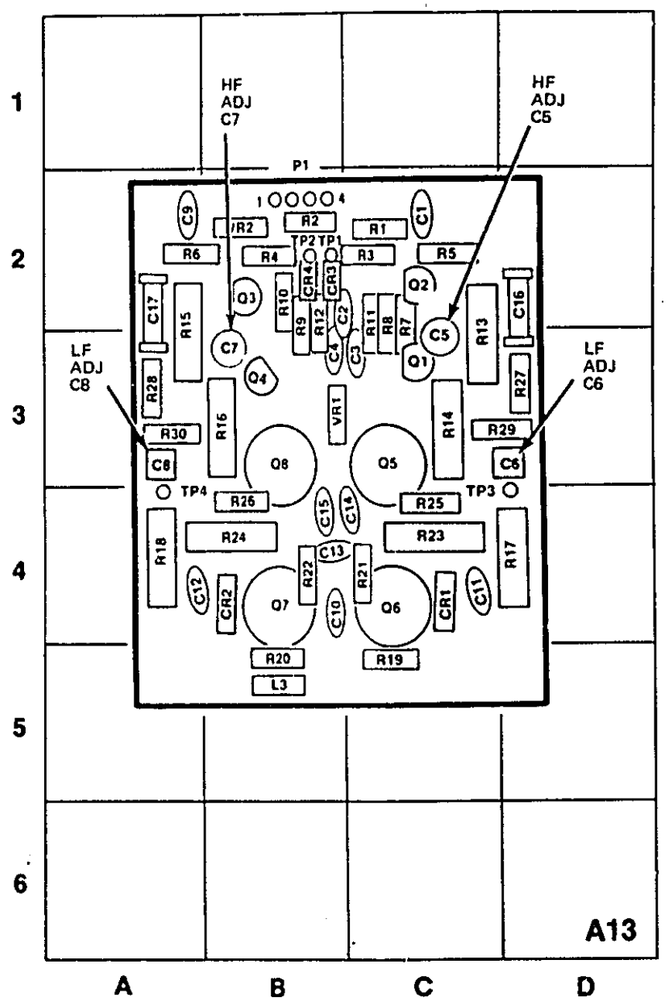


Figure 8-17.
Service Information, Horizontal Preamplifier, P/O Assembly A8 (Sheet 2 of 2)



1715A-072-01-05-77

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	C-2	C12	A-4	L3	B-5	R2	B-2	R13	C-3	R25	C-4
C2	B-2	C13	B-4	P1	B-1	R3	C-2	R14	C-3	R26	B-4
C3	C-3	C14	C-4	Q1	C-3	R4	B-2	R15	A-3	R27	D-3
C4	B-3	C15	B-4	Q2	C-2	R5	C-2	R16	B-3	R28	A-3
C5	C-3	C16	D-2	Q3	B-2	R6	A-2	R17	D-4	R29	D-3
C6	D-3	C17	A-2	Q4	B-3	R7	C-2	R18	A-4	R30	A-3
C7	B-3	CR1	C-4	Q5	C-3	R8	C-2	R19	C-5	TP1	B-2
C8	A-3	CR2	B-4	Q6	C-4	R9	B-2	R20	B-5	TP2	B-2
C9	A-2	CR3	B-2	Q7	B-4	R10	B-2	R21	C-4	TP3	D-4
C10	B-4	CR4	B-2	Q8	B-3	R11	C-2	R22	B-4	TP4	A-4
C11	C-4			R1	C-2	R12	B-2	R23	C-4	VR1	B-3
								R24	B-4		

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 15

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

   VERTICAL DISPLAY ..... X-Y
   HORIZ DISPLAY ..... X-Y
   POSITION (horizontal) ..... centered

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 15

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

   Coupling (channel A) 50Ω
   TRIGGER LEVEL (main) ..... stable display

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 5 kHz.

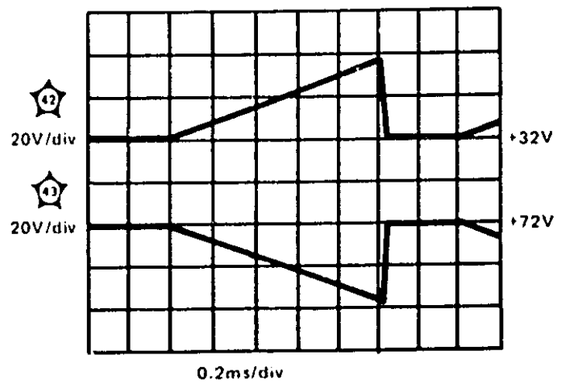


Figure 8-18. Service Information, Horizontal Output Amplifier, Assembly A13 (Sheet 1 of 2)

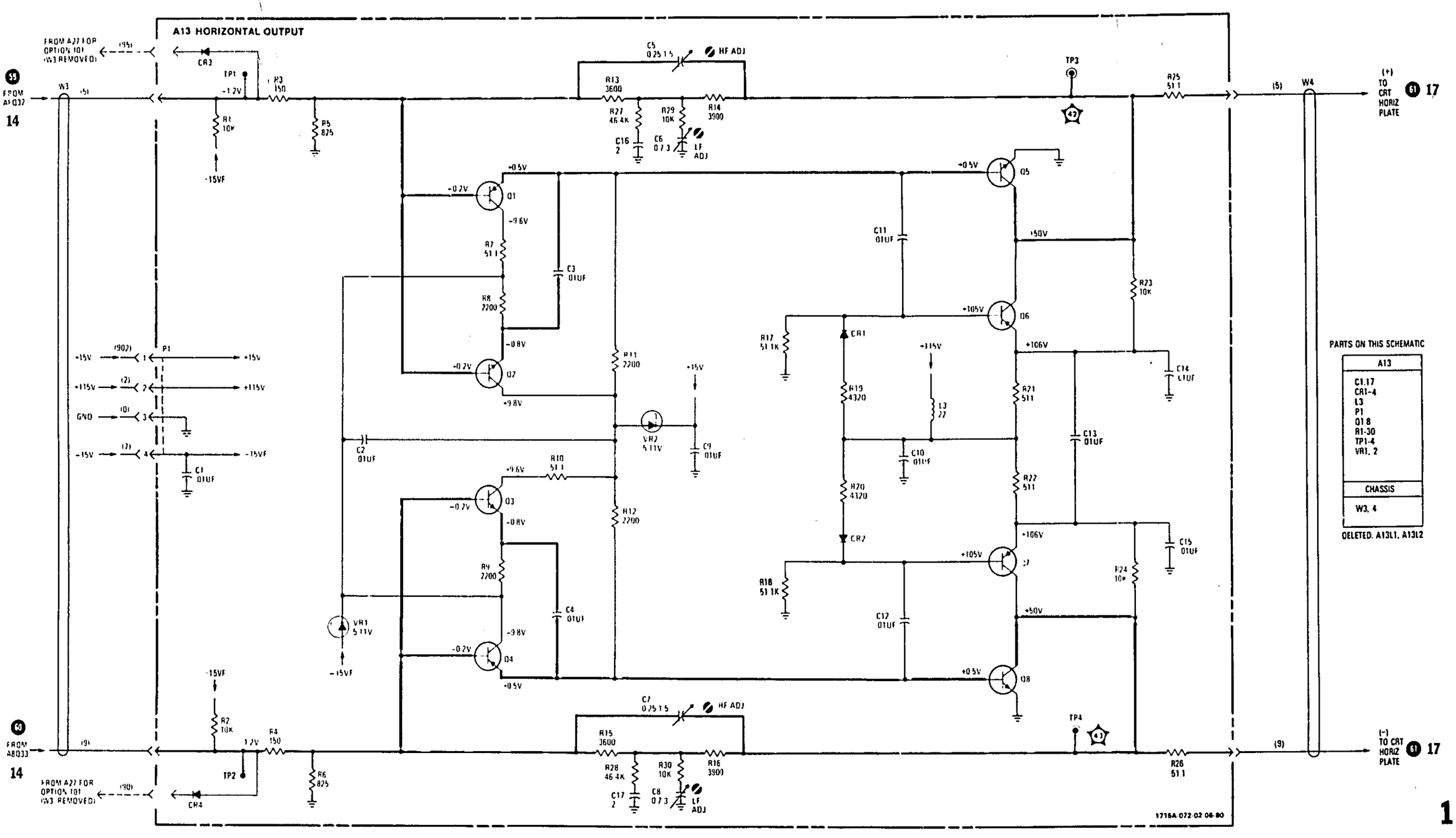


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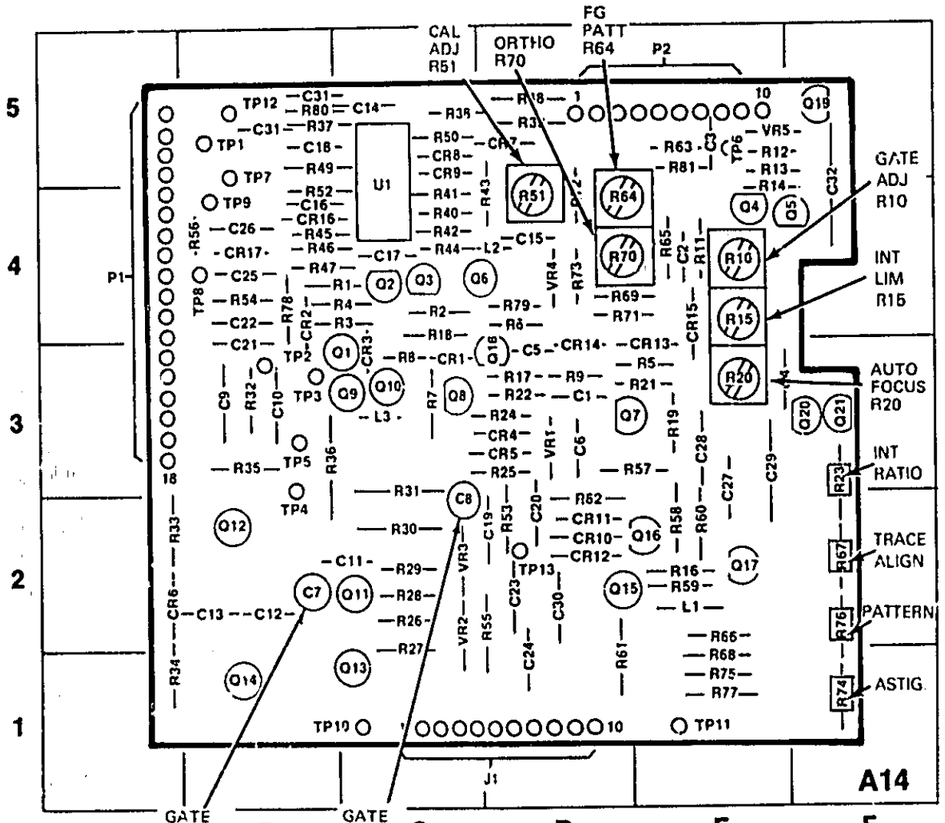
Figure 8-18.
Service Information, Horizontal Output Amplifier, Assembly A13 (Sheet 2 of 2)
8-43



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	D-3	C26	A-4	L1	E-2	R2	B-2	R27	B-2	R52	A-4	R77	E-1
C2	E-4	C27	E-3	L2	D-4	R3	B-4	R28	B-2	R53	D-2	R78	A-4
C3	E-5	C28	E-3	L3	B-3	R4	B-4	R29	B-2	R54	A-4	R79	D-4
C4	E-3	C29	E-3	P1	A-4	R5	E-3	R30	B-2	R55	D-2	R80	A-5
C5	D-3	C30	D-2	P2	E-5	R6	D-4	R31	B-3	R56	B-4	R81	E-5
C6	D-3	C31	A-5	Q1	B-3	R7	B-3	R32	A-3	R57	E-3	TP1	A-5
C7	C-2	C32	F-4	Q2	B-4	R8	C-3	R33	A-2	R58	E-2	TP2	A-2
C8	B-3	CR1	B-3	Q3	B-4	R9	D-3	R34	A-1	R59	E-2	TP3	B-2
C9	B-3	CR2	B-4	Q4	E-4	R10	E-4	R35	A-3	R60	E-2	TP4	B-2
C10	A-3	CR3	B-3	Q5	F-4	R11	E-4	R36	A-3	R61	C-1	TP5	A-3
C11	B-2	CR4	D-3	Q6	D-4	R12	E-5	R37	B-5	R62	D-2	TP6	E-5
C12	B-2	CR5	D-3	Q7	D-3	R13	E-5	R38	C-5	R63	F-5	TP7	A-5
C13	B-2	CR6	A-2	Q8	B-3	R14	E-4	R39	D-5	R64	D-4	TP8	A-4
C14	C-5	CR7	D-5	Q9	B-3	R15	E-4	R40	B-4	R65	E-4	TP9	A-4
C15	D-4	CR8	B-5	Q10	B-3	R16	E-2	R41	D-4	R66	E-1	TP10	B-1
C16	B-4	CR9	B-5	Q11	B-2	R17	D-3	R42	B-4	R67	F-1	TP11	E-1
C17	A-4	CR10	D-2	Q12	B-2	R18	B-4	R43	B-4	R68	E-1	TP12	A-5
C18	B-5	CR11	D-2	Q13	B-1	R19	E-3	R44	B-4	R69	D-3	TP13	D-2
C19	D-2	CR12	D-2	Q14	A-1	R20	E-3	R45	A-4	R70	D-4	U1	B-4
C20	D-2	CR13	E-3	Q15	D-2	R21	E-3	R46	A-4	R71	D-3	VR1	D-3
C21	B-3	CR14	D-3	Q16	E-2	R22	D-3	R47	A-4	R72	D-4	VR2	B-2
C22	B-4	CR15	E-4	Q17	E-2	R23	F-3	R48	D-4	R73	D-3	VR3	B-2
C23	D-2	CR16	B-4	Q18	D-3	R24	D-3	R49	A-5	R74	F-1	VR4	D-4
C24	D-1	CR17	B-4	Q19	F-5	R25	D-3	R50	B-5	R75	E-1	VR5	E-5
C25	B-4	J1	D-1	Q20	F-3	R26	B-2	R51	D-4	R76	F-1		
				Q21	F-3								
				R1	B-4								

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DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 16

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

VERTICAL DISPLAY	X-Y
HORIZ DISPLAY	X-Y
POSITION (horizontal)	off screen
INTENSITY	normal
	maximum ( )

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 16

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

Coupling (channel A)	50Ω
TRIGGER LEVEL (main)	stable display
TIME/DIV (delayed)	20 µs/div
DELAY	5.00
HORIZ DISPLAY	MAIN INTEN

2. Set monitor oscilloscope TIME/DIV and VOLTS/DIV controls as indicated under waveform(s).

3. Connect pulse generator output to Model 1725A channel A INPUT connector.

4. Adjust pulse generator output for four divisions of signal amplitude (.4 V) at 10 kHz.

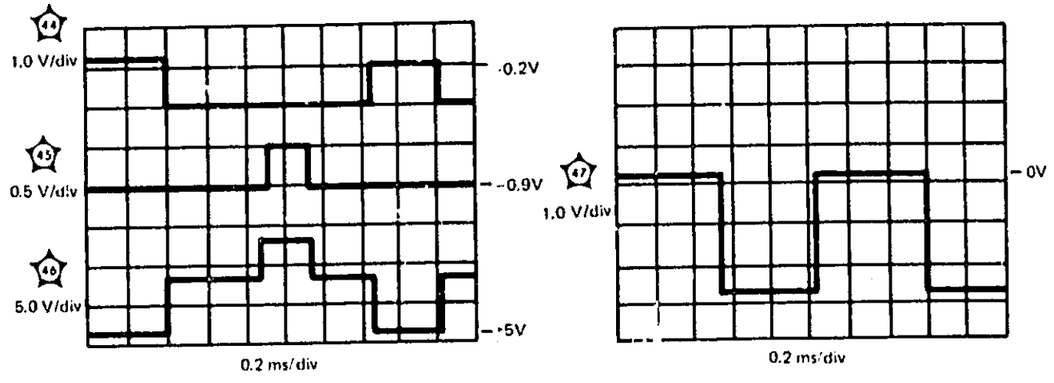


Figure 8-19. Service Information, Gate Control Assembly A14 (Sheet 1 of 2)

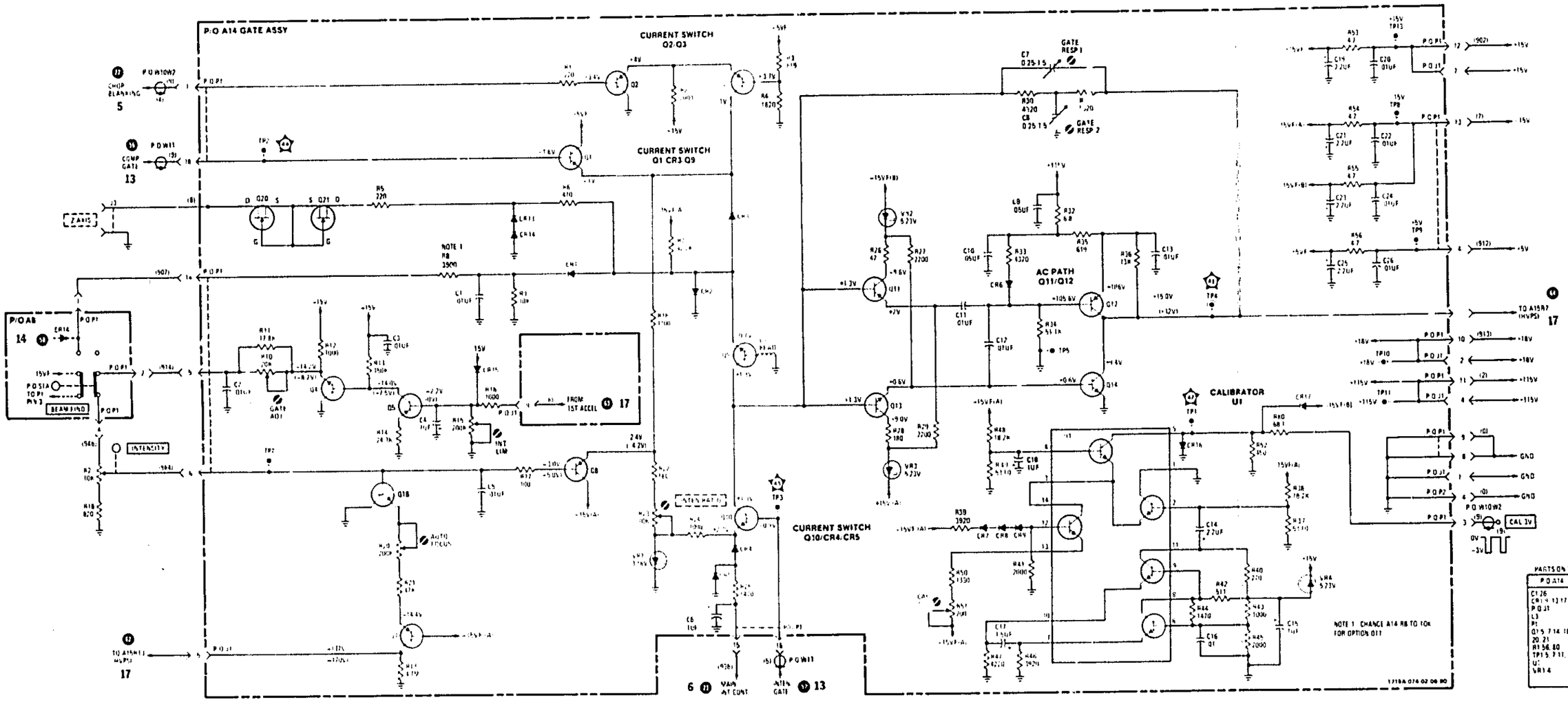
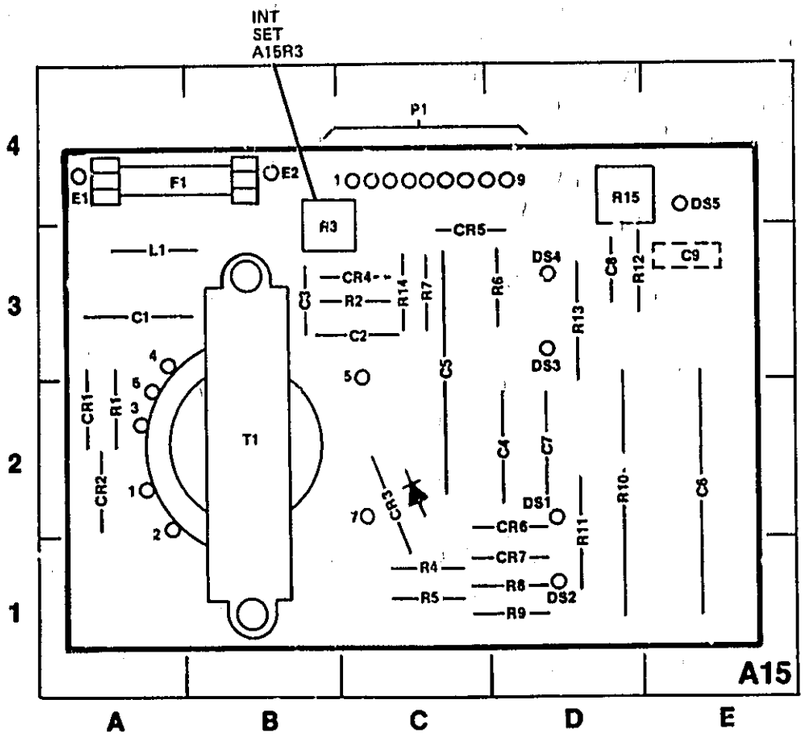


Figure 8-19.
Service Information, Gate Control, Assembly A14 (Sheet 2 of 2)
8-45



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-3	C9	E-3	DS	D-2	L1	A-3	R8	D-1
C2	C-3	CR1	A-2	DS2	D-1	P1	C-4	R9	D-1
C3	B-3	CR2	A-2	DS3	D-3	R1	A-2	R10	D-2
C4	D-2	CR3	C-2	DS4	D-3	R2	C-3	R11	D-2
C5	C-3	CR4	C-3	DS5	E-4	R3	B-4	R12	D-3
C6	E-2	CR5	C-3	E1	A-4	R4	C-1	R13	D-3
C7	D-2	CR6	D-2	E2	B-4	R5	C-1	R14	C-3
C8	D-3	CR7	D-1	F1	A-4	R6	D-3	R15	D-4
						R7	C-3	T1	B-2

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 17

1. Set front-panel controls in accordance with paragraph 5-13, Section V, except as follows:

SCALE ILLUM ..... maximum

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

WAVEFORM MEASUREMENT CONDITIONS
SCHEMATIC 17

1. Set front-panel controls in accordance with paragraph 5-13, Section V.

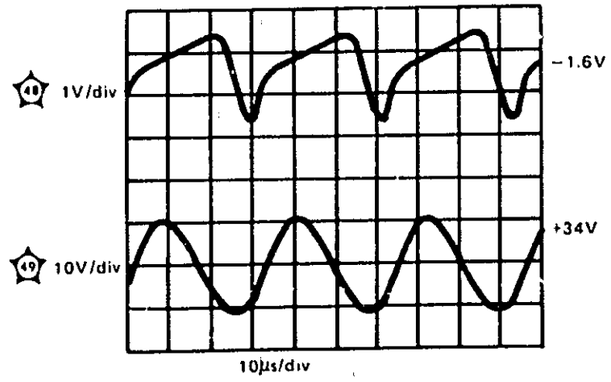


Figure 8-20. Service Information, Gate Assembly and HV Power Supply Assemblies A14 and A15 (Sheet 1 of 2)

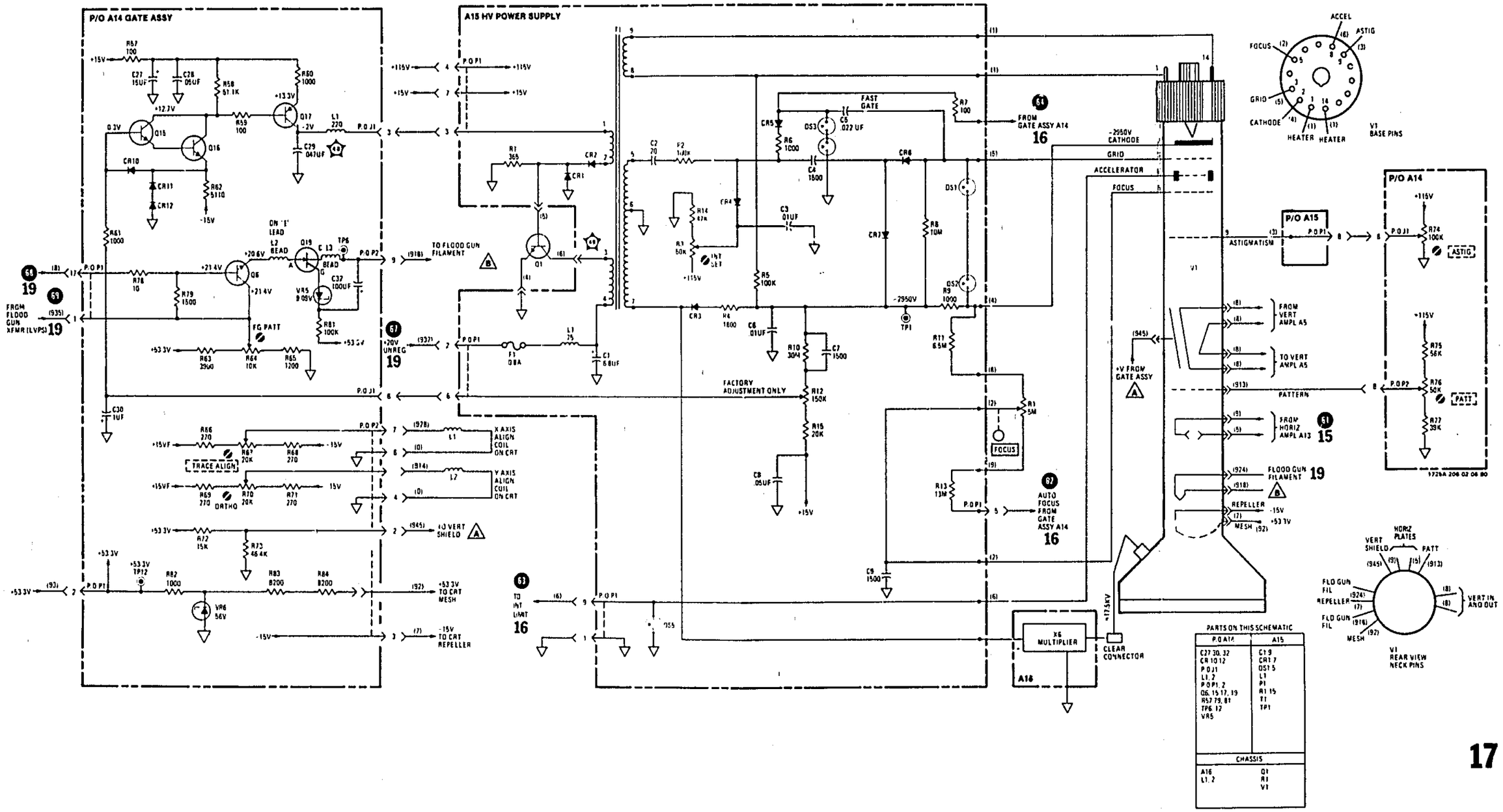
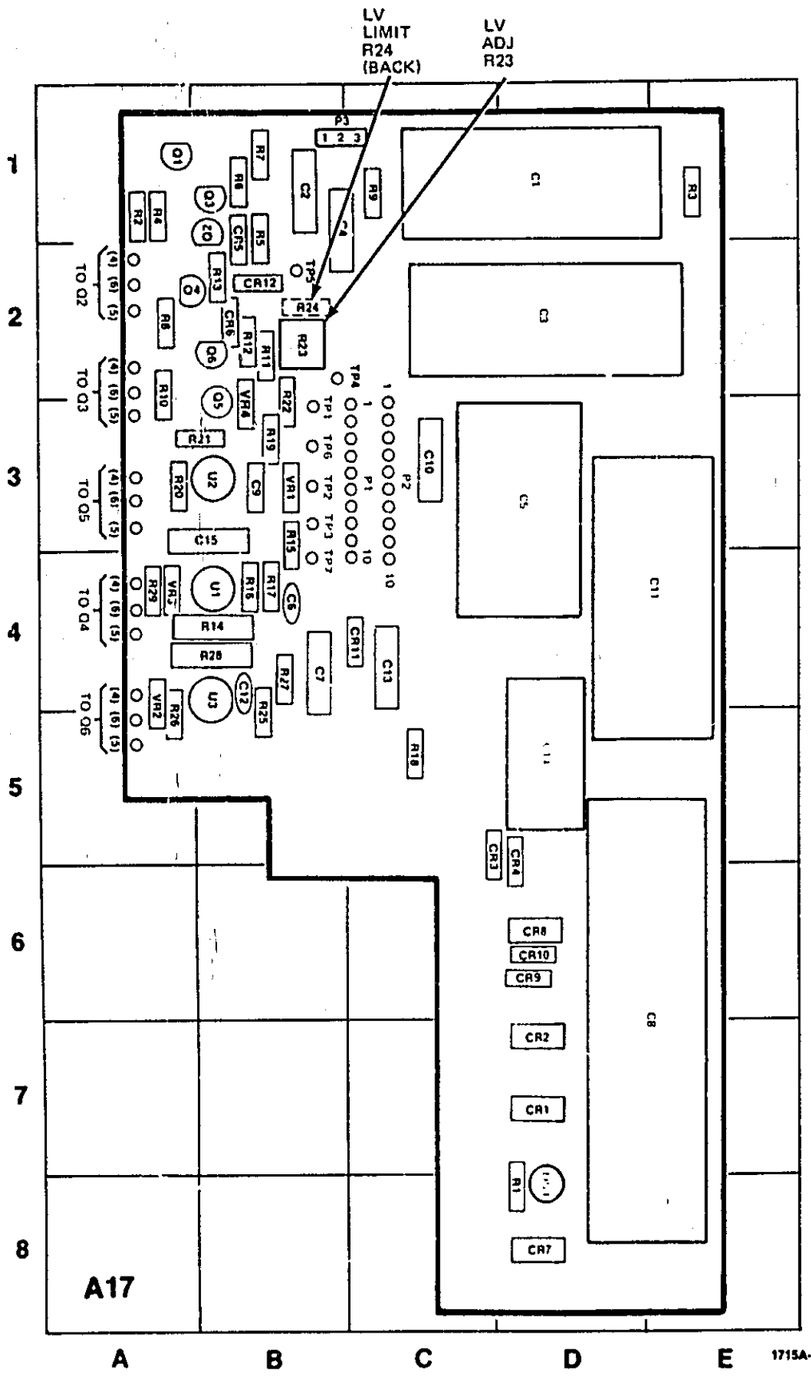


Figure 8-20.
Service Information, Gate Assembly and HV Power Supply, Assemblies A14 and A15 (Sheet 2 of 2)



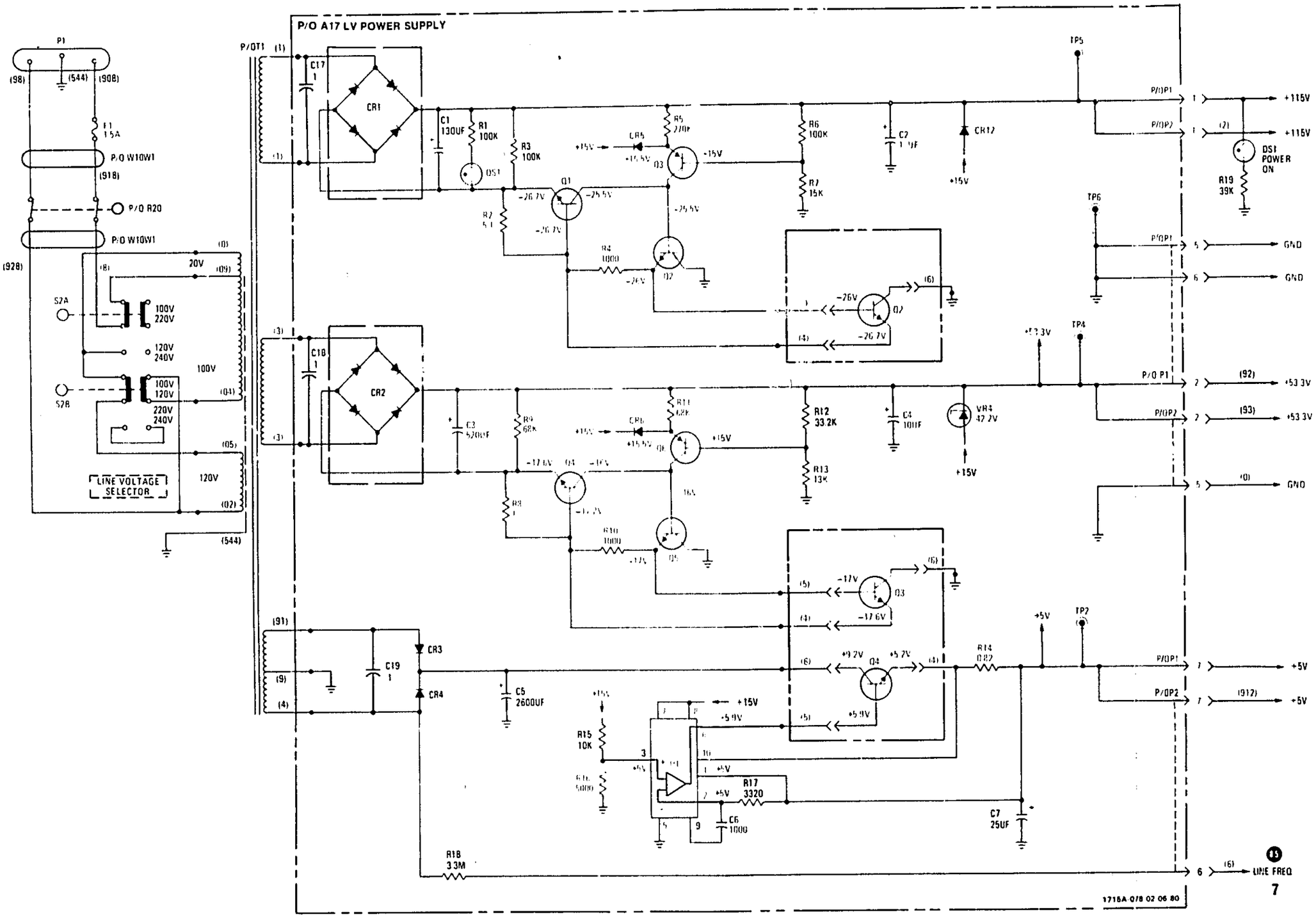
REF DESIG	GRID LOC
C1	D-1
C2	B-1
C3	D-2
C4	C-1
C5	D-3
C6	B-4
C7	B-4
C8	E-6
C9	B-3
C10	C-3
C11	E-11
C12	B-4
C13	C-4
C14	D-5
C15	B-3
CR1	D-7
CR2	D-7
CR3	D-5
CR4	D-5
CR5	B-1
CR6	B-2
CR7	D-8
CR8	D-6
CR9	D-6
CR10	D-6
CR11	C-4
CR12	B-2
DS1	D-8
P1	C-3
P2	C-3
P3	C-1
Q1	A-1
Q2	B-1
Q3	B-1
Q4	B-2
Q5	B-2
Q6	B-2
R1	D-8
R2	A-1
R3	E-1
R4	A-1
R5	B-1
R6	B-1
R7	B-1
R8	A-2
R9	C-1
R10	A-2
R11	B-2
R12	B-2
R13	B-2
R14	B-4
R15	B-4
R16	B-4
R17	B-4
R18	C-5
R19	B-3
R20	B-3
R21	B-3
R22	B-2
R23	B-2
R24	B-2
R25	B-5
R26	A-5
R27	B-4
R28	B-4
R29	A-4
TP1	B-3
TP2	B-3
TP3	B-3
TP4	C-2
TP5	B-2
TP6	B-3
TP7	B-4
U1	B-4
U2	B-3
U3	B-4
VR1	B-3
VR2	A-4
VR3	A-4
VR4	B-2

DC VOLTAGE MEASUREMENT CONDITIONS SCHEMATIC 18

1. Set front-panel controls in accordance with paragraph 5-13, Section V.

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

Figure 8-21. Service Information, Low-voltage Power Supply, Assembly A17 (Sheet 1 of 4)



PARTS ON THIS SCHEMATIC

P/OA17	CHASSIS
C1-7, 17-19 CR1-6, 12 DS1 P/O P1,2 Q1-6 R1-18 TP2, 4, 5 U1 VR4	DS1 P Q2-4 R19 R20S1 S2 P/OT1 W10W1

Figure 8-21.
Service Information, Low-voltage Power Supply, Assembly A17 (Sheet 2 of 4)

DC VOLTAGE MEASUREMENT CONDITIONS
SCHEMATIC 19

1. Set front-panel controls in accordance with paragraph 5-13, Section V.

2. All voltages are referenced to chassis ground. All indications are nominal and 15% variation from those indicated should be considered normal.

1715A-078-03-05-77

Figure 8-21. Service Information, Low-voltage Power Supply, Assembly A17 (Sheet 3 of 4)

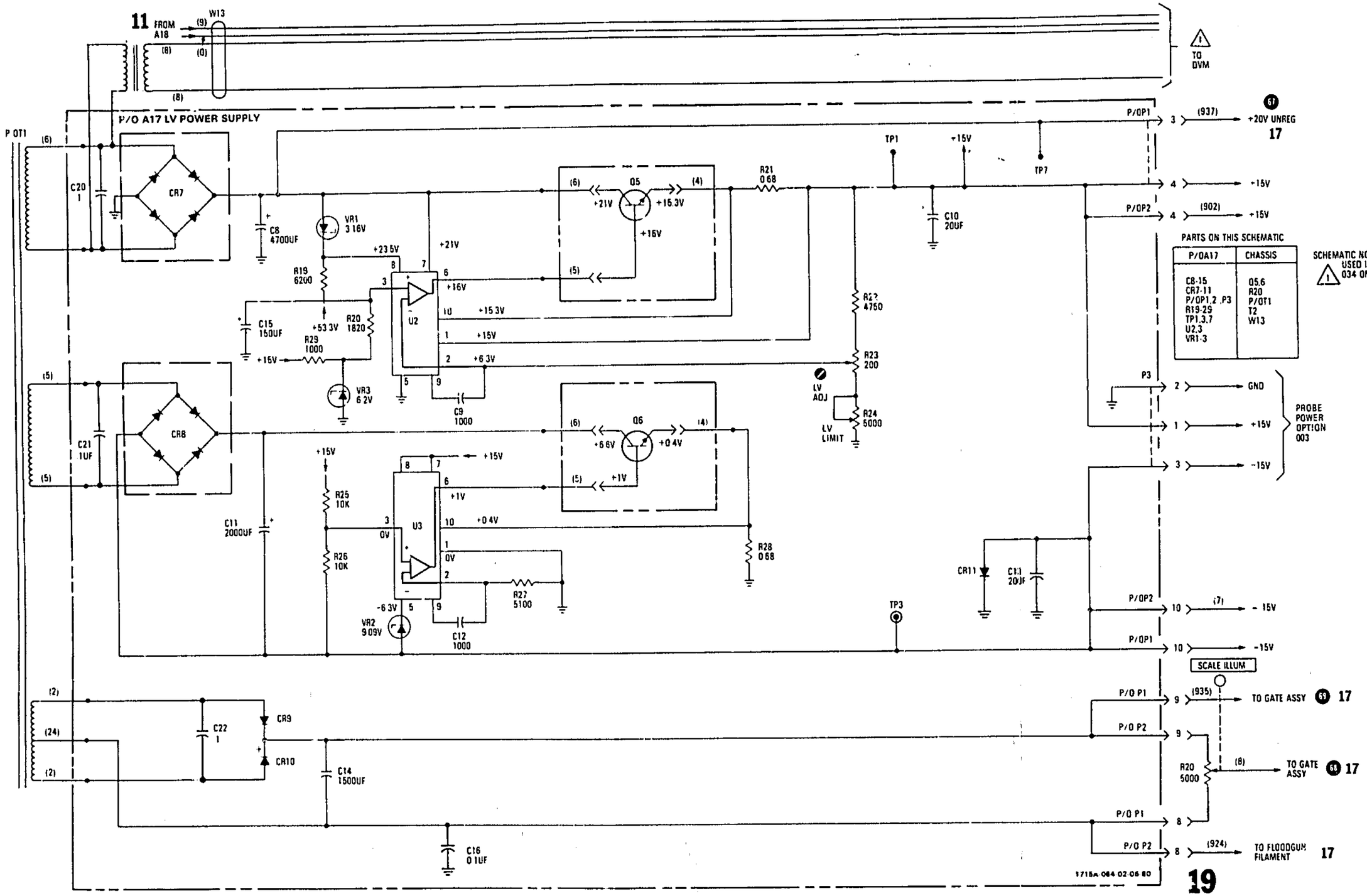


Figure 8-21.
Service Information, Low-voltage Power Supply, Assembly A17 (Sheet 4 of 4)

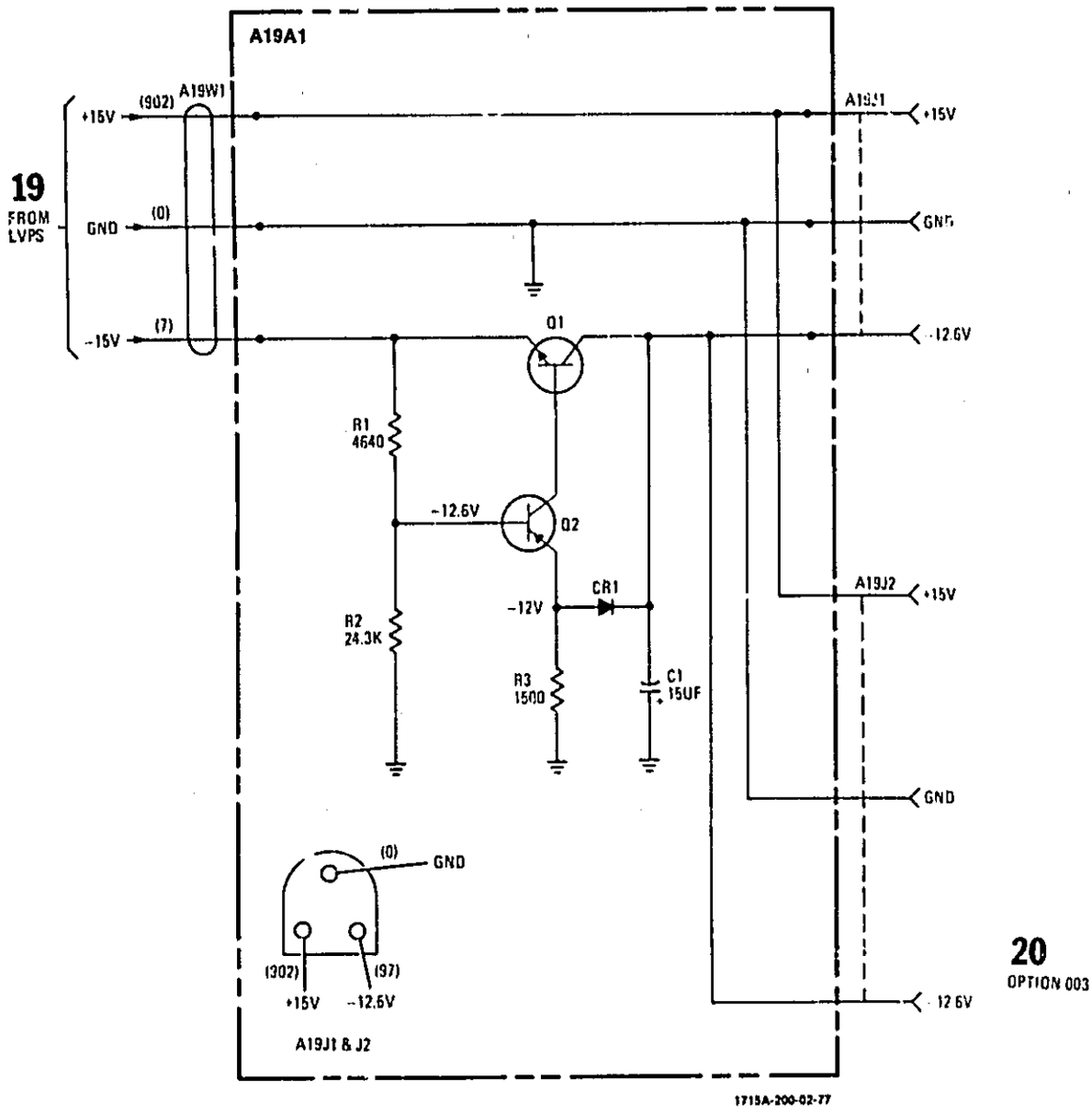
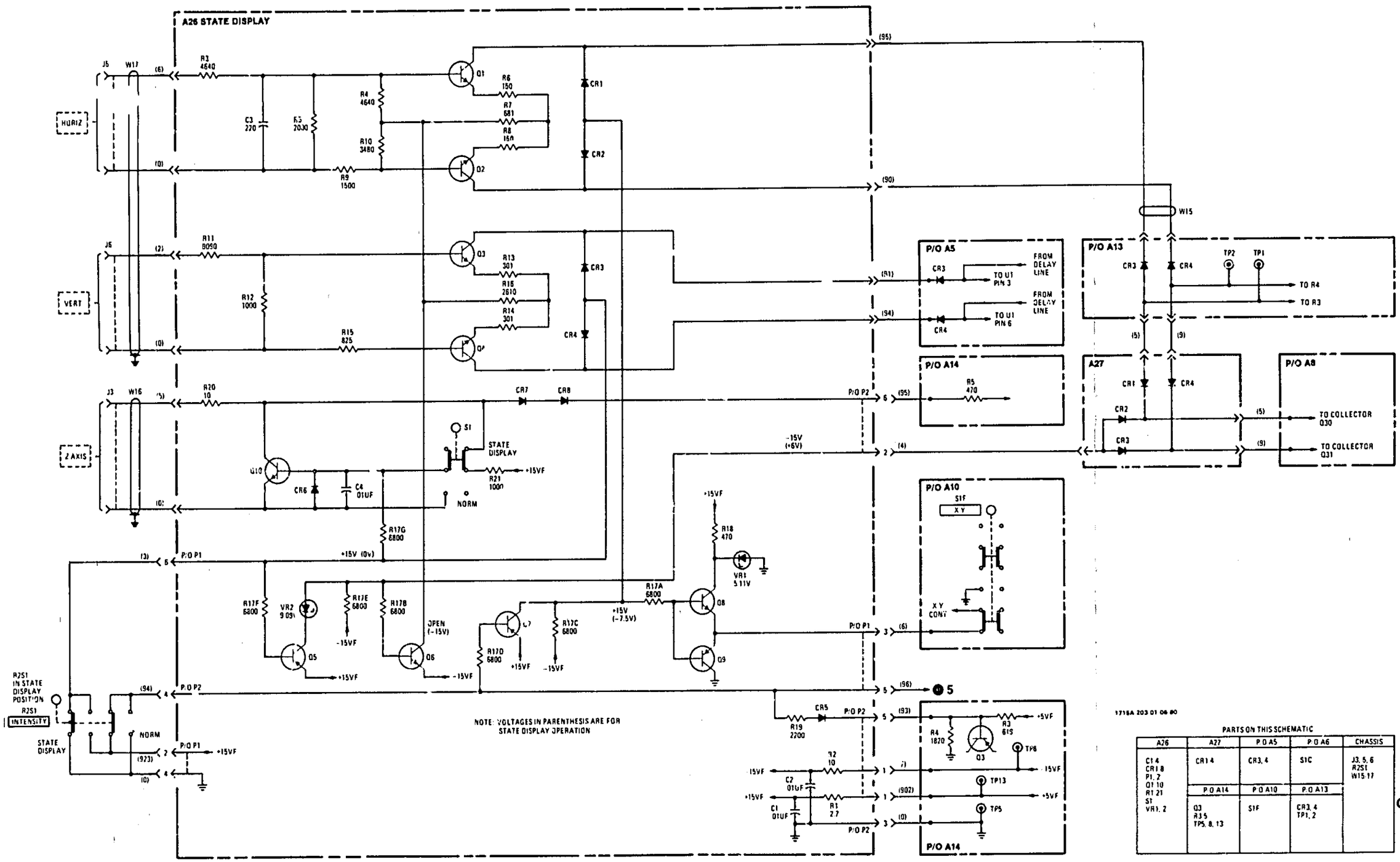


Figure 8-22. Service Information, Option 003 Probe Power



1718A 203 01 06 80

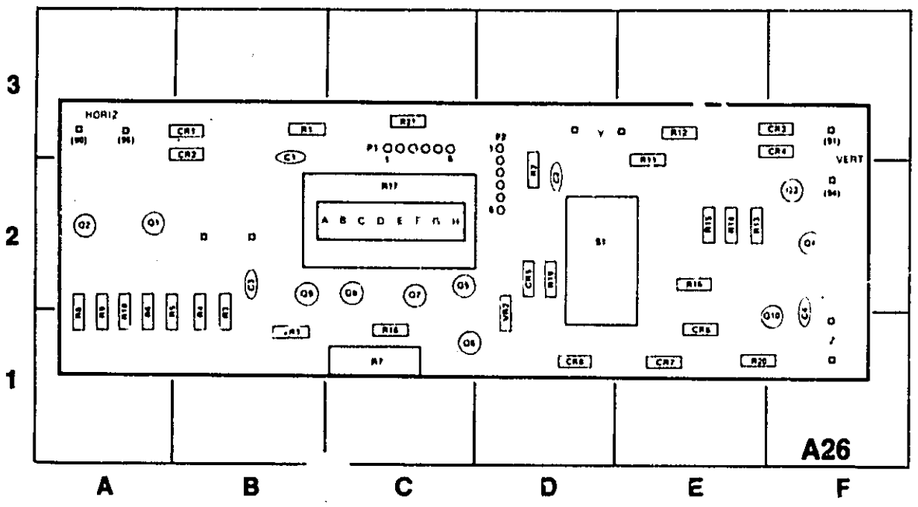
PARTS ON THIS SCHEMATIC

A26	A27	P O A5	P O A6	CHASSIS
C1 4 CR1 8 P1, 2 Q1 10 R1 21 S1 VR1, 2	CR1 4	CR3, 4	S1C	J3, 5, 6 R2S1 W15-17
	P O A14	P O A10	P O A13	
	Q3 R3 5 TP5, 8, 13	S1F	CR3, 4 TP1, 2	

OPTION 101

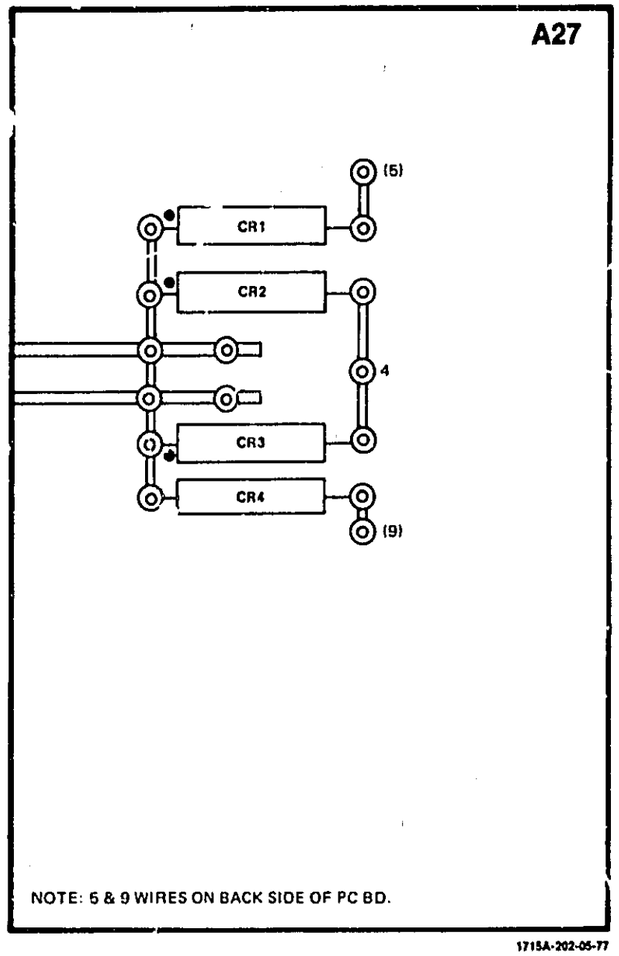
21

Figure 8-23.
Service Information, Option 101 State Display
(Sheet 1 of 2)



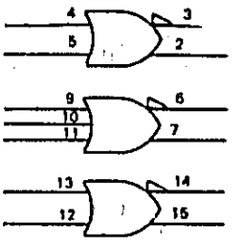
1715A-201-05-77

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	B-1	CR5	D-2	Q3	F-2	R1	B-1	R9	A-3	R17	C-2
C2	D-2	CR6	E-3	Q4	F-2	R2	D-2	R10	A-3	R18	C-2
C3	B-2	CR7	E-3	Q5	C-2	R3	B-3	R11	E-1	R19	D-2
C4	F-2	CR8	D-3	Q6	C-3	R4	B-3	R12	E-1	R20	F-3
CR1	B-1	P1	C-1	Q7	C-2	R5	B-3	R13	E-2	R21	C-1
CR2	B-2	P2	D-1	Q8	C-2	R6	A-3	R14	E-2	VR1	B-3
CR3	F-1	Q1	A-2	Q9	B-2	R7	C-3	R15	E-2	VR2	D-3
CR4	F-1	Q2	A-2	Q10	F-3	R8	A-3	R16	E-2		

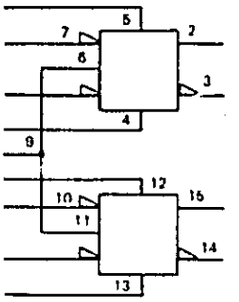


1715A-202-05-77

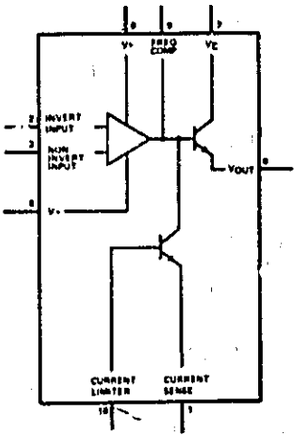
Figure 8-23. Service Information, Option 101 State Display (Sheet 2 of 2)



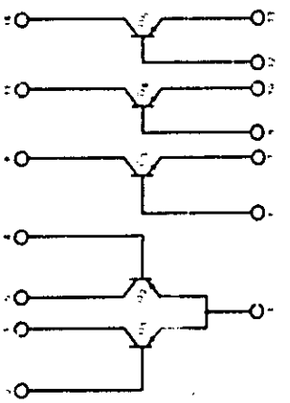
1820–0820



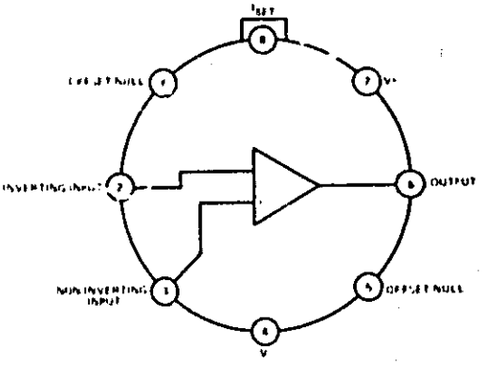
1820–0803



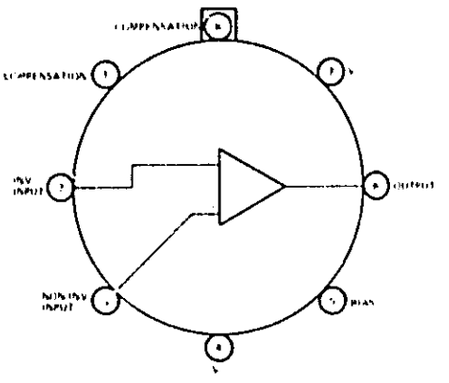
1820–0196



1821–0001



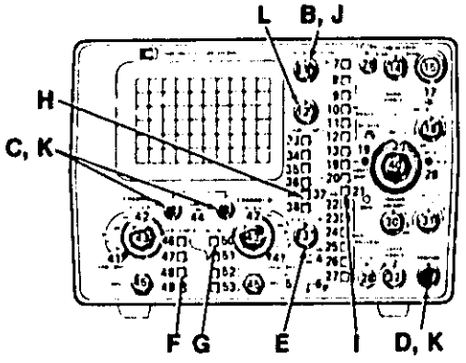
1826–0086 TOP VIEW



1826–0187 TOP VIEW

1725A-081-06-80

Figure 8-24. Model 1725A IC Data



TURN-ON PROCEDURE

A. SET REAR PANEL POWER MODE SWITCH FOR CORRECT POWER SOURCE

B. SET INTENSITY TO MIDRANGE

C. SET POSITION A AND B TO MIDRANGE

D. SET HORIZONTAL POSITION TO MIDRANGE

E. SET LINE SWITCH ON AND ALLOW 5 MINUTE WARMUP

F. SET VERT DISPLAY TO ALT

G. SET INT T. G TO A

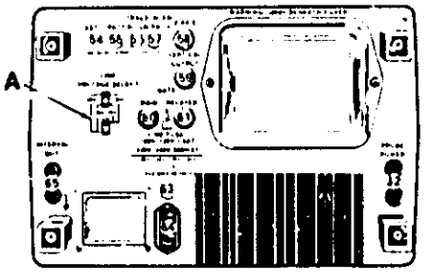
H. SET HORIZ DISPLAY TO MAIN

I. ALL OTHER PUSHBUTTONS DISENGAGED

J. ADJUST INTENSITY FOR NORMAL BRIGHTNESS

K. ADJUST VERTICAL AND HORIZONTAL POSITION CONTROLS TO CENTER TRACE

L. ADJUST FOCUS FOR SHARP TRACE



CONTROLS AND CONNECTORS

CRT AND GENERAL

1. **INTENSITY** CONTROLS BRIGHTNESS OF TRACE
2. **FOCUS** FOCUSES TRACE FOR BEST CRT DISPLAY
3. **LINE SWITCH AND SCALE ILLUM** APPLIES AC POWER TO INSTRUMENT AND CONTROLS BRIGHTNESS OF SCALE ILLUMINATION
4. **LINE LAMP** LIGHTS WHEN LINE SWITCH IS TURNED TO ON POSITION
5. **CAL 3V** ~1 KHZ SQUARE WAVE AT 3 V ±1%
6. ⏚ CHASSIS GROUND CONNECTION FOR EXTERNAL EQUIPMENT
7. **BEAM FIND** RETURNS DISPLAY TO VIEWING AREA

HORIZONTAL

8. **EXT-10** ATTENUATES DELAYED EXTERNAL TRIGGER SIGNAL BY FACTOR OF 10
9. **INT/EXT** SELECTS INTERNAL OR EXTERNAL TRIGGER FOR DELAYED SWEEP
10. **AC/DC** SELECTS COUPLING FOR DELAYED SWEEP TRIGGER
11. **LF REJ** ATTENUATES DELAYED TRIGGER SIGNALS BELOW ~15 KHZ
12. **HF REJ** ATTENUATES DELAYED TRIGGER SIGNALS ABOVE ~15 KHZ
13. + – SELECTS SLOPE OF DELAYED TRIGGER SIGNAL THAT STARTS SWEEP
14. **TIME INTERVAL START** VARIES DELAY TIME INTERVAL BETWEEN START OF MAIN SWEEP AND START OF DELAYED SWEEP
15. **TIME INTERVAL STOP** CONTROLS FOR DECREASING OR INCREASING DELAY TIME INTERVAL BETWEEN TWO EVENTS
16. **SIGNAL OVERLAY** (ΔT=0) ADJUSTMENT FOR NULLING ANALOG AMPLIFIER
17. **TIME INTERVAL MODE SWITCH**

    ΔT OFF TURNS OFF SECOND DELAYED SWEEP MARKER, PROVIDING SINGLE DELAYED SWEEP OPERATION

    A START SETS FIRST DELAYED SWEEP MARKER ON CHANNEL A AND SECOND DELAYED SWEEP MARKER ON CHANNEL B. THIS ALLOWS TIME MEASUREMENT FROM CHANNEL A TO CHANNEL B

    B START REVERSES THE MARKERS, PUTTING FIRST MARKER ON CHANNEL B AND THE SECOND MARKER ON CHANNEL A. THIS ALLOWS TIME MEASUREMENT FROM CHANNEL B TO CHANNEL A
18. **DELAYED TRIGGER LEVEL** SELECTS AMPLITUDE POINT ON DELAYED TRIGGER SIGNAL THAT STARTS DELAYED SWEEP. STARTS AFTER DELAY POSITION AUTOMATICALLY STARTS DELAYED SWEEP AFTER DELAY TIME
19. **RESET** RESETS SWEEP IN SINGLE SWEEP MODE. LIGHT INDICATES WHEN SWEEP IS ARMED
20. **SINGLE** SELECTS SINGLE SWEEP OPERATION
21. **AUTO/NORM**
    AUTO AUTOMATIC SWEEP IN ABSENCE OF TRIGGER SIGNAL
    NORM SWEEP TRIGGERED ONLY BY APPLYING TRIGGER SIGNAL
22. +/– SELECTS SLOPE OF MAIN TRIGGER SIGNAL THAT STARTS SWEEP
23. **HF REJ** ATTENUATES MAIN TRIGGER SIGNALS ABOVE ~15 KHZ
24. **LF REJ** ATTENUATES MAIN TRIGGER SIGNALS BELOW ~15 KHZ
24a. **LINE** LINE TRIGGERING IS SELECTED BY ENGAGING BOTH MAIN HF REJ AND LF REJ SWITCHES SIMULTANEOUSLY
25. **AC/DC** SELECTS COUPLING FOR MAIN SWEEP TRIGGER
26. **INT/EXT** SELECTS INTERNAL OR EXTERNAL TRIGGER FOR MAIN SWEEP
27. **EXT 10** ATTENUATES MAIN EXTERNAL TRIGGER SIGNAL BY FACTOR OF 10
28. **EXT TRIG** BNC CONNECTORS FOR DELAYED AND MAIN EXTERNAL TRIGGER SIGNALS
29. **UNCAL** LIGHT INDICATES WHEN SWEEP VERNIER IS NOT IN CAL DETENT POSITION
30. **TRIGGER HOLDOFF** PROVIDES CONTROL OF TIME BETWEEN SWEEPS FOR TRIGGERING ON COMPLEX DIGITAL WAVEFORMS
31. **TRIGGER LEVEL** SELECTS AMPLITUDE POINT ON MAIN TRIGGER SIGNAL THAT STARTS SWEEP
32. **SWEEP VERNIER** PROVIDES CONTROL OF MAIN SWEEP TIME BETWEEN CALIBRATED POSITIONS OF TIME/DIV SWITCH
33. **MAG X10** IN X10 POSITION, SWEEP IS MAGNIFIED 10 TIMES
34. **DLY'D** SELECTS DELAYED SWEEP MODE FOR DISPLAY
35. **MIXED** SELECTS MIXED SWEEP MODE FOR DISPLAY
36. **MAIN INTEN** INTENSIFIES DELAYED SWEEP PORTION OF DISPLAY
37. **MAIN** SELECTS MAIN SWEEP MODE FOR DISPLAY
38. **X-Y** DISPLAY MODE FOR PROVIDING X AXIS DEFLECTION WITH SIGNAL APPLIED TO CHANNEL B INPUT
39. **DELAYED TIME/DIV** CONTROLS SWEEP TIME IN DLY'D SWEEP MODE
40. **MAIN TIME/DIV** CONTROLS SWEEP TIME IN MAIN SWEEP MODE

VERTICAL

41. **COUPLING** SELECTS CAPACITIVE (AC), DIRECT (DC), OR 50 OHM COUPLING OF INPUT SIGNAL. GND POSITION DISCONNECTS INPUT SIGNAL AND GROUNDS INPUT TO VERTICAL PREAMPLIFIER
42. **VOLTS/DIV** SELECTS VERTICAL DEFLECTION FACTOR FOR CALIBRATED MEASUREMENTS
43. **VERNIER** PROVIDES ADJUSTMENT OF VOLTS/DIV BETWEEN CALIBRATED POSITIONS OF VOLTS/DIV SWITCH
44. **UNCAL** LIGHT INDICATES CHANNEL A OR CHANNEL B VERNIER NOT IN CAL DETENT POSITION
45. **INPUT** BNC CONNECTORS FOR INPUT SIGNALS
46. **VERT DISPLAY A** SELECTS CHANNEL A INPUT SIGNAL FOR DISPLAY
47. **VERT DISPLAY B** SELECTS CHANNEL B INPUT SIGNAL FOR DISPLAY
47a. **A + B** ENGAGING BOTH CHANNEL A AND CHANNEL B VERT DISPLAY SWITCHES SIMULTANEOUSLY RESULTS IN A+B (ALGEBRAIC ADDITION) DISPLAY
48. **ALT** DISPLAYS EACH CHANNEL ON ALTERNATE SWEEPS
49. **CHOP** DISPLAYS EACH CHANNEL BY SWITCHING BETWEEN CHANNELS AT ~1 MHZ RATE
50. **INT TRIG A** SWEEP TRIGGERED ON CHANNEL A INPUT SIGNAL
51. **INT TRIG B** SWEEP TRIGGERED ON CHANNEL B INPUT SIGNAL
51a. **COMP** DISPLAYED MODES TRIGGERED BY DISPLAYED SIGNALS WHEN BOTH INT TRIG A AND INT TRIG B SWITCHES ARE ENGAGED SIMULTANEOUSLY
52. **BW LIMIT** LIMITS BANDWIDTH OF VERTICAL AMPLIFIER TO ~20 MHZ
53. **B INVERT** INVERTS POLARITY OF CHANNEL B INPUT SIGNAL

REAR PANEL

54. **ASTIG** ADJUSTS SHAPE OF CRT SPOT
55. **PATT** ADJUSTS FOR UNIFORM PATTERN OVER CRT VIEWING AREA
56. **TRACE ALIGN** ALIGNS TRACE WITH HORIZONTAL GRATICULE LINE
57. **INTEN RATIO** ADJUSTS INTENSITY OF INTENSIFIED PORTION OF SWEEP IN MAIN INTEN MODE OF OPERATION
58. **Z AXIS** BNC CONNECTOR FOR Z AXIS INPUT
59. **VERTICAL OUTPUT** BNC CONNECTOR FOR VERTICAL OUTPUT
60. **MAIN GATE** BNC CONNECTOR FOR MAIN GATE OUTPUT TO EXTERNAL EQUIPMENT
61. **DELAYED GATE** BNC CONNECTOR FOR DELAYED GATE OUTPUT TO EXTERNAL EQUIPMENT
62. **PROBE POWER** PROVIDES POWER FOR ACTIVE PROBES IF OPTION 02 INSTALLED
63. **LINE FUSE** PROVIDES AC INPUT PROTECTION
64. AC INPUT POWER CONNECTOR
65. **INTERVAL OUT** BANANA JACK CONNECTOR FOR TIME INTERVAL MEASUREMENT VOLTAGE OUTPUT AND POSITION OF TIME DIVISIONS INDICATES TIME INTERVAL IN SECONDS

for

MODEL 1725A OSCILLOSCOPE

August 1977

MANUAL CHANGES

MANUAL IDENTIFICATION

Model Number:	1725A
Date Printed:	June 1980
Part Number:	01725-90902

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections.

Make all appropriate serial number related changes indicated in the tables below.

Serial Prefix or Number	Make Manual Changes
2034A	1
2047A	2
2135A	2 and 3
2147A	2, 3 and 4
2302A	2, 3, 4 and 5
2315A	2, 3, 4, 5 and 6

Serial Prefix or Number	Make Manual Changes
2440A	2,3,4,5,6,7
2510A	2,3,4,5,6,7

▲ NEW ITEM

ERRATA

Page 1-1, paragraph 1-11. OPTIONS.
Add: OPTION 112. This option adds Model 1112A Inverter Power Supply, a portable power source for the Model 1725A.

Page 5-22, paragraph 5-84, steps j and k.
Change: TIME INTERVAL STOP to TIME INTERVAL START.

Page 6-5, Table 6-2, Replaceable Parts.
Change: A6 HP and Mfr Part Number to 01720-66556.
Change: A7 HP and Mfr Part Number to 01720-66557.
Change: E2 HP and Mfr Part Number to 0340-0949.
Change: E3 Description to INSULATOR, IC.
Change: H28 Description to GROMMET-VINYL 0.375-IN-ID.
Change: L2 HP and Mfr Part Number to 01741-66001.

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

HEWLETT PACKARD

Printed in U.S.A.

Page 6-6, Table 6-2. Replaceable Parts.
Change: MP10 HP and Mfr Part Number to 0370-3042.
Change: MP24 HP and Mfr Part Number to 01712-00205.
Change: MP25 HP and Mfr Part Number to 01725-04101.
Change: MP26 HP and Mfr Part Number to 01725-04103.
Change: MP34 Description to SHAFT, DELAYED SWEEP.
Change: MP38 HP and Mfr Part Number to 5041-2625.
Change: MP39 HP and Mfr Part Number to 01720-60603.
Change: MP49 HP and Mfr Part Number to 0370-3043.
Change: MP50 HP and Mfr Part Number to 5020-8788.
Change: MP54 Mfr Part Number to 01720-61902.
Change: MP58 to HP and Mfr Part Number 00180-09104, Qty 1, CLIP, GROUND, Mfr Code 28480.
Change: MP63 HP and Mfr Part Number to 01720-23707.
Change: MP73 HP and Mfr Part Number to 0510-0515.
Change: Q2 HP and Mfr Part Number to 5081-7675.
Change: Q3 to HP and Mfr Part Number 5081-7676, TRANSISTOR NPN SI TO-220AB PD=1.8W.
Change: Q4, Q5, and Q6 to HP and Mfr Part Number 5081-7555, TRANSISTOR NPN SI PD=1.8W, Mfr Code 28480.

Page 6-7, Table 6-2, Replaceable Parts.
Change: R7 and R23 to HP Part Number 2100-1443 and Mfr Part Number 3540S-483-503.
Change: R20 HP and Mfr Part Number to 2100-3975.
Change: W7 Description to CABLE ASSY: HV OSC.
Change: W9W1 HP and Mfr Part Number to 01710-61650.
Change: W9W2 HP and Mfr Part Number to 01710-61651.
Change: W9W3 HP and Mfr Part Number to 01710-61652.
Change: W10W1 Description to CABLE ASSY: 4 COND, POWER.
Change: W10W2 to HP and Mfr Part Number 01722-61611, CABLE ASSY: TWIN COAX, CHOP BLANK AND CAL SIG.
Change: W10W3 to HP and Mfr Part Number 01722-61612, CABLE ASSY:COAX, HOLDOFF.
Change: W10W4 Description to CABLE ASSY: COAX, ALT SIG.
Change: W11 to HP and Mfr Part Number 01722-61613, CABLE ASSY: TWIN LEAD.
Change: W17 Description to CABLE ASSY: MAIN AND DELAYED GATES.
Change: XF1 to Consists of three parts:
FUSEHOLDER CAP, HP and Mfr Part Number 2110-0565,
FUSEHOLDER BODY, HP and Mfr Part Number 2110-0564, and
FUSEHOLDER NUT, HP and Mfr Part Number 2110-0569, Mfr Code 28480.

Page 6-8, Table 6-2, Replaceable Parts.
Add: A3P3 and A3P4, HP and Mfr Part Number 1251-6596, CONNECTOR 7-CONT MALE POST TYPE, Mfr Code 28480.
Add: A3P5, HP and Mfr Part Number 1251-6099, CONNECTOR 8-CONT MALE POST TYPE, Mfr Code 28480.

Page 6-9, Table 6-2, Replaceable Parts.
Change: A3VR1 and A3VR2 to MATCHED PAIR, DOIDE-ZNR 6.19V,5% DO-7 PD=0.4W, HP and Mfr Part Number 5081-7673, Mfr Code 28480.
Change: A5C2 to 10PF (FACTORY SELECTED).

Page 6-10, Table 6-2, Replaceable Parts.
Add: A5P1, HP and Mfr Part Number 1251-6095, CONNECTOR 3-CONT MALE POST TYPE.
Change: A6 HP and Mfr Part Number to 01720-66556.
Change: A6XA3 HP and Mfr Part Number to 1251-4134.
Change: A6XA7 HP and Mfr Part Number to 1251-8110.
Change: A7P1 HP and Mfr Part Number to 1251-8654.
Change: A7XA3 HP and Mfr Part Number to 1251-4134.
Change: A8 Description to HORIZONTAL SWEEP ASSY (A8U2 AND A8U5 INCLUDED).

Page 6-11, Table 6-2, Replaceable Parts.
Change: A8P1 HP and Mfr Part Number to 1251-6139.

Page 6-12, Table 6-2, Replaceable Parts.
Change: A8P2 HP and Mfr Part Number to 1251-6105.
Change: A8P3 HP and Mfr Part Number to 1251-3898.
Change: A8P4 HP and Mfr Part Number to 1251-5635.
Change: A8P5 HP and Mfr Part Number to 1251-3412
Change: A8P6 HP and Mfr Part Number to 1251-5635.
Change: A8Q11 and A8Q34 to HP and Mfr Part Number 1854-0583, TRANSISTOR NPN SI TO-92 PD=310MW, Mfr Code 28480.
Change A8R38 to HP Part Number 0683-4715, RESISTOR 470 OHM 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB4711.
Change: A8U2 and A8U5 Description to ASSY, SUBSTRATE (SUPPLIED WITH A8).

Page 6-13, Table 6-2, Replaceable Parts.
Change: A8R45 to HP Part Number 0757-0393, RESISTOR 47.5 OHM 1% .125W F TC=0±100, Mfr Part Number C4-1/8-TO-47R5-F.
Change: A8R46 to HP Part Number 0698-3447, RESISTOR 422 OHM 1% .125W F TC=0±100, Mfr Part Number C4-1/8-TO-422R-F (FACTORY SELECTED).
Change: A8R49 to HP Part Number 0757-0406, RESISTOR 182 OHM 1% .125W F TC=0±100, Mfr Part Number C4-1/8-TO-182R-F.

Page 6-15 Table 6-2, Replaceable Parts.
Change: A9C13 to HP and Mfr Part Number 0140-0193, CAPACITOR-FXD 82PF ±2% 300WVDC MICA.
Change: A9Q7 and A9Q9 to HP and Mfr Part Number 1854-0583, TRANSISTOR NPN SI TO-92 PD=310MW, Mfr Code 28480.

Page 6-16, Table 6-2, Replaceable Parts.
Change: A10R7 and A10R8 to HP and Mfr Part Number 0757-0276, RESISOR 61.9 OHM 1% .125W F, Mfr Part Number C4-1/8-TO-61R9-F.
Add: A10XA8P2, HP and Mfr Part Number 1251-6108, CONNECTOR 6-CONT FEM POST TYPE, Mfr Code 28480.
Add: A10XA8P3 consists of two parts:
HP and Mfr Part Number 1251-6106, CONNECTOR 4-CONT FEM POST TYPE and
HP and Mfr Part Number 1251-6108, CONNECTOR 6-CONT FEM POST TYPE, Mfr Code 28480.

Page 6-17, Table 6-2, Replaceable Parts.
Change A11Q6 and A11Q8 to HP and Mfr Part Number 1854-0583, TRANSISTOR NPN SI TO-92 PD=310MW, Mfr Code 28480.
Add: A11XA12 consists of two parts:
HP and Mfr Part Number 1251-6106, CONNECTOR 4-CONT FEM POST TYPE and
HP and Mfr Part Number 1251-6108, CONNECTOR 6-CONT FEM POST TYPE, Mfr Code 28480.

Page 6-18, Table 6-2, Replaceable Parts.
Change: A12P2 HP and Mfr Part Number to 1251-3898.
Change: A12P3 HP and Mfr Part Number to 1251-4969.
Change: A12R31 and A12R32 to HP Part Number 0684-2211, RESISTOR 220 OHM 10% .25W CC TUBULAR, Mfr Part Number CB2211,

Page 6-19, Table 6-2, Replaceable Parts.
Change: A13P1 HP and Mfr Part Number to 1251-4969.
Change: A13Q1 Description to TRANSISTOR PNP SI TO-52 PD=360MW, and Mfr Part Number to 1853-0354.
Change: A14C9 and A14C10 HP and Mfr Part Number to 0150-0052.

Page 6-20, Table 6-2, Replaceable Parts.
Delete: A14C31.
Change: A14J1 HP and Mfr Part Number to 1251-6136.
Change: A14P1 to consists of two parts:
HP and Mfr Part Number 1251-5665, CONNECTOR 10-CONT MALE POST TYPE and
HP and Mfr Part Number 1251-6099, CONNECTOR 8-CONT MALE POST TYPE.
Change: A14P2, HP and Mfr Part Number to 1251-5665.
Change A14R8 to HP Part Number 0684-5621, RESISTOR 5.6K 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB5621 (FACTORY SELECTED).

Page 6-21, Table 6-2, Replaceable Parts.
Change: A15C6 to 0.1μF.

Page 6-22, Table 6-2, Replaceable Parts.
Change: A15P1 HP and Mfr Part Number to 1251-3898.
Change: A15T1 HP and Mfr Part Number to 01720-61102.
Change: A17C17 and A17C18 to CAPACITOR-FXD 0.1μF ±20% 600V POLYE, Mfr Part Number 0170-0022.
Change: A17C19 through A17C22 to CAPACITOR-FXD 0.1μF ±20% 50V POLYE, Mfr Part Number 0160-4213.
Change: A17P1 HP and Mfr Part Number to 1251-6139.
Change: A17P2 HP and Mfr Part Number to 1251-6139.
Change: A17P3 HP and Mfr Part Number to 1251-6010.

Page 6-24, Table 6-2, Replaceable Parts.
Change: A18R51 Description to RESISTOR-FXD 825k 1% .125W F TUBULAR (FACTORY SELECTED)
Change: A18U1, A18U2, A18U4, and A18U5 to HP Part Number 1826-0433, IC OP AMP DIP, Mfr Part Number LF356BN.
Add: to PARTS LIST FOR OPTION 003:
KIT, OPT 003 (FIELD INSTALLABLE) HP and Mfr Part Number 01720-69503, Mfr Code 28480
Change: PARTS LIST FOR OPTION 034/035:
MP25 HP and Mfr Part Number to 01725-04108.
W12 HP and Mfr Part Number to 01710-61640.
Change: KIT FOR OPTION 034/035 HP and Mfr Part Number to 01715-69503.

Page 6-25, Table 6-2, Replaceable Parts.
Change: Option 101 A26P1 and A26P2 HP and Mfr Part Number to 1251-6143.
Change: Option 580 MP26 HP and Mfr Part Number to 01725-04105.

Page 8-19, Figure 8-6 (sheet 2 of 2).
Change: signal ⑫ 3 to ⑫ 5.
Change: signal ⑬ 3 to ⑬ 5.
Change: A3 to A6 in box that contains ⑫ and ⑬

Page 8-21, Figure 8-7 (Sheet 2 of 2).
Add: Test Point ④ to signal lines ⑨ and ⑩ from delay line.
Change: A5C2 to 10pF (FACTORY SELECTED).

Page 8-22, Figure 8-8 (Sheet 1 of 2).
Change: XA3 pin 10 to XA3 pin 8 on A7 component locator.

Page 8-25, Figure 8-9 (Sheet 2 of 2).
Change: A10R7 and A10R8 to 61.9 ohms.

Page 8-27, Figure 8-10 (Sheet 2 of 2).
Change: A8C15 to 0.1μF (FACTORY SELECTED).
Change: A8R38 to 470 ohms.
Change: A8R45 to 47.5 ohms.
Change: A8R46 to 422 ohms (FACTORY SELECTED).
Change: A8R49 to 182 ohms.
Change: A8R168 to 1100 ohms.
Change: P/O A19 to P/O A18 in box that contains signal number ⑪ 11.

Page 8-28, Figure 8-11 (Sheet 1 of 2).
Add: MP53 (UNDER) underneath MP68 RETAINER on A11 component locator.

Page 8-31, Figure 8-12 (Sheet 2 of 2).
Change: A8Q34 to A8Q37.

Page 8-32, Figure 8-13 (Sheet 1 of 2).
Add: MP55 (UNDER) underneath MP69 RETAINER on A9 component locator.

Page 8-35, Figure 8-14 (Sheet 2 of 2).
Change: Signal number ⑧ 9 to ⑧ 9 on left side of sheet.
Add: W12 designator to cable going to J7 on upper right corner of sheet.

Page 8-37, Figure 8-15 (Sheet 2 of 2).
Change: A12R31 and A12R33 to 220 ohms.

Page 8-44, Figure 8-19 (Sheet 1 of 2).
Delete: A14C31 from component locator.

Page 8-45, Figure 8-19 (Sheet 2 of 2).
Change: A14R3 to 475 ohms.
Change: A14R4 to 1330 ohms.
Change: A14R8 to 5600 ohms (FACTORY SELECTED)

Page 8-47, Figure 8-20 (Sheet 2 of 2).
Change: A15C6 to 0.1μF.

Page 8-48, Figure 8-21 (Sheet 2 of 4).
Replace: A17 component locator with figure 1 of this manual change sheet.

Page 8-49, Figure 8-21 (Sheet 2 of 4).
Change: A17C17, A17C18, and A17C19 to 0.1μF.

Page 8-51, Figure 8-21 (Sheet 4 of 4).
Change: A17C20 and A17C22 to 0.1μF.
Add: Designator T2 ⚠1 to transformer in upper left corner of sheet.

CHANGE 1

Page 6-5. Table 6-2, Replaceable Parts.
Change: A7 HP and Mfr Part Nos. to 01720-66568 (2 places).

Page 6-10. Replace the A7 Parts List with table 1 of this manual change sheet.

Page 7-6. Table 7-2, Replacement for A7 Parts List.
Delete Table 7-2.

Page 7-8. Figure 7-5, Replacement for A6 and A7 component locators.
Delete figure 7-6.

Page 8-22. Figure 8-8, Sheet 1 of 2.
Replace A6 and A7 component locators with figure 2 of this manual change sheet.

Page 8-23. Figure 8-8, Sheet 2 of 2.
Replace Schematic 5 with figure 3 of this manual change sheet.

CHANGE 2

Page 6-5, Table 6-2, Replaceable Parts.
Change: A7 HP and Mfr Part Number to 01720-66569.

Page 6-8, Table 6-2, Replaceable Parts.
Change: A3C21 to HP Part Number 0180-0229, Qty 4, CAPACITOR-FXD 33UF ±10% 10VDC TA-SOLID, Mfr Code 56289, Mfr Part Number 150D336X901082.
Change: A3C22 to HP part number 0180-0229, CAPACITOR-FXD 33UF ±10% 10VDC TA-SOLID, Mfr Code 56289, Mfr Part Number 150D336X901082.
Change: A3C25 Qty to 0.
Add: A3C33, HP and Mfr Part Number 0160-3443, Qty 2, CAPACITOR-FXD .1UF +80-20% 50WVDC CER, Mfr Code 28480.
Change: A3R26 Qty to 4.

Page 6-9, Table 6-2, Replaceable Parts.
Change: A3R54 Qty to 9.

Add: A3R84, HP Part Number 0683-2215, Qty 2, RESISTOR 220 OHM 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB2215.
Change: A5C12 Qty to 0.

Page 6-10, Table 6-2, Replaceable Parts.
Change: A5L3 Qty to 10.
Change: A7 HP and Mfr Part Number to 01720-66569.
Delete: A7C5.
Add: A7L1, HP Part Number 9170-0029, CORE,MAG,SHIELDING BEAD, .138 OD .047, Mfr Code 02114, Mfr Part Number 56-590-65A2/4A.
Change: A7R5 to HP Part Number 0757-0394, RESISTOR 51.1 OHM 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part Number C4-1/8-TO-51R1-F.
Change: A7R11 to HP Part Number 0683-2225, Qty 2, RESISTOR 2.2K 5% .25W F TUBULAR, Mfr Code 01121, Mfr Part Number CB2225.
Change: A7R12 to HP Part Number 0683-2225, RESISTOR 2.2K 5% .25W F TUBULAR, Mfr Code 01121, Mfr Part Number CB2225.
Change: A7R13 to HP Part Number 0757-0399, Qty 2, RESISTOR 82.5 OHM 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part Number C4-1/8-TO-82R5-F.
Change: A7R15 to HP Part Number 0683-8225, Qty 6, RESISTOR 8.2K 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB8225.
Change: A7R16, A7R17, and A7R18 to HP Part Number 0683-8225, RESISTOR 8.2K 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB8225.
Change: A7R19 and A7R20 to HP Part Number 0684-5621, RESISTOR 5.6K 10% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB5621.
Add: A7R21, HP Part Number 0683-3315, Qty 1, RESISTOR 330 OHM 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB3315.
Add: A7R22 and A7R23, HP Part Number 0683-8225, RESISTOR 8.2K 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB8225.
Add: A7R24, HP Part Number 0683-5605, Qty 2, RESISTOR 56 OHM 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB5605.
Add: A7R25, HP Part Number 0683-5605, RESISTOR 56 OHM 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB5605.
Add: A7R26, HP Part Number 0683-2215, RESISTOR 220 OHM 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB2215.
Add: A7R27, HP Part Number 0683-1025, Qty 4, RESISTOR 1K 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB1025.
Add: A7R28, HP Part Number 0683-1025, RESISTOR 1K 5% .25W CC TUBULAR, Mfr Code 01121, Mfr Part Number CB1025.

Page 6-18, Table 6-2, Replaceable Parts.
Change: A12R37 Qty to 0.

Page 6-22, Table 6-2, Replaceable Parts.
Change: A17R4 Qty to 0.

Page 8-18, Figure 8-6 (sheet 1 of 2).
Replace: A3 component locator with Figure 4 of this manual change sheet.

Page 8-19, Figure 8-6 (sheet 2 of 2).
Change: A3C21 and A3C22 to 33UF.
Add: A3C33, 0.1UF from A3A1 pin 12 to ground.
Add: A3R84, 220 ohms between A3A1 pin 14 and A3R8 connection to ASYNC line.

Page 8-22, Figure 8-8 (sheet 1 of 2).
Replace: A6 and A7 component locators with figure 5 of this manual change sheet.
Change: CHOP MODE waveform test point from  to TP1 

Page 8-23, Figure 8-8 (sheet 2 of 2).
Replace: Schematic 5 with figure 6 of this manual change sheet.

CHANGE 3

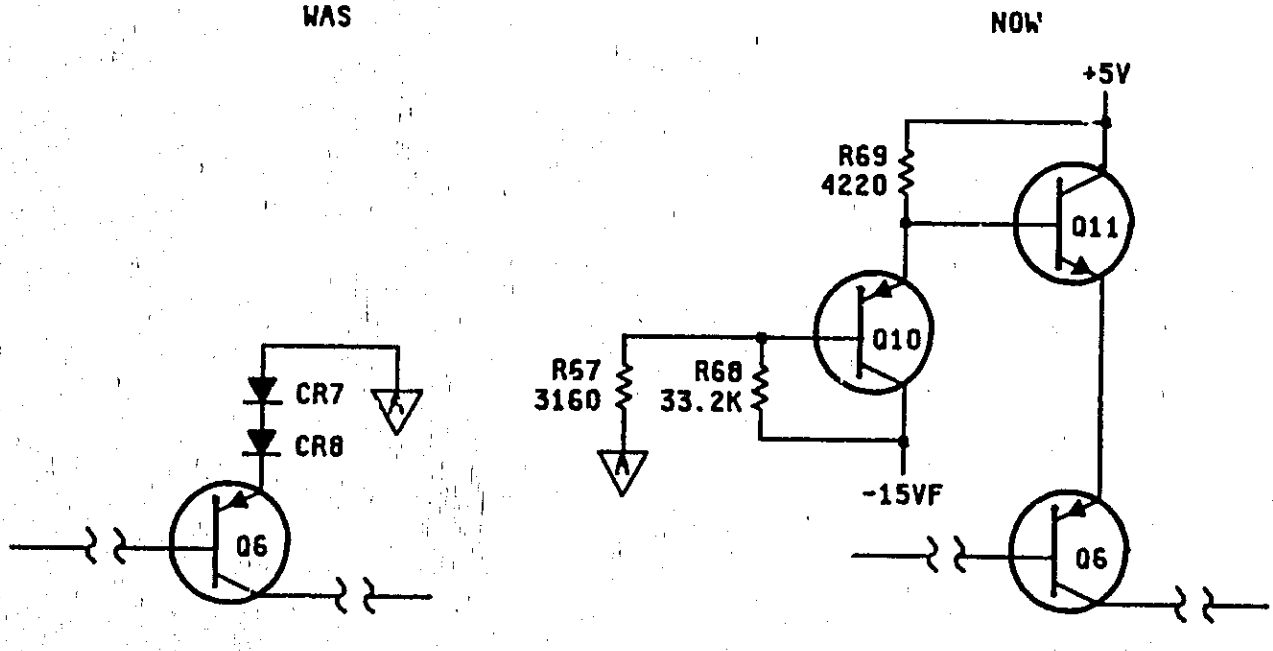
Page 6-5, Table 6-2, Replaceable Parts.
Change: A18 HP and Mfr Part Number to 01710-66568.

Page 6-23, Table 6-2, Replaceable Parts.
Change: A18 HP and Mfr Part Number to 01710-66568.
Delete: A18CR7 and A18CR8.
Add: A18Q10, HP and Mfr Part Number 1853-0036, TRANSISTOR NPN SI PD=310MW FT=250MHZ, Mfr Code 28480.
Add: A18Q11, HP Part Number 1854-0215, TRANSISTOR NPN SI PD=350MW FT=300MHZ, Mfr Code 04713, Mfr Part Number 2N3904.

Page 6-24, Table 6-2, Replaceable Parts.
Add: A18R67, HP Part Number 0757-0279, RESISTOR 3.16K 1% .125W F TC=0±100, Mfr Code 24546, Mfr Part Number C4-1/8-TO-3161-F.
Add: A18R68, HP Part Number 0757-0454, RESISTOR 33.2K 1% .125W F TC=0±100, Mfr Code 24546, Mfr Part Number C4-1/8-TO-3322-F.
Add: A18R69, HP and Mfr Part Number 0698-3154, RESISTOR 4.22K 1% .125W F TC=0±100, Mfr Code 28480.

Page 8-34, Figure 8-14 (Sheet 1 of 2).
Replace A18 component locator with figure 7 of this manual change sheet.

Page 8-35, Figure 8-14 (Sheet 2 of 2).
Make changes to A18Q6 emitter circuitry as shown below



CHANGE 4

Page 6-5, Table 6-2, Replaceable Parts.
Change: J7 to HP and Mfr Part Number 1251-0463, Qty 2, CONNECTOR-BNA SINGLE BLK SLDR-EYE TERM (Attached by H47 and H48).
Add: H47, HP and Mfr Part Number 2950-0007, Qty 2, NUT-HEX-DBL CHAM 5/16-32-THD .09-IN-THK.
Add: H48, HP and Mfr Part Number 2190-0033, Qty 2, WASHER-LK INTL .314-IN-ID.

Page 6-6, Table 6-2, Replaceable Parts.
Change: MP24 HP and Mfr Part Number to 01725-00206.
Change: MP31 HP and Mfr Part Number to 01725-20501.

CHANGE 5

Page 6-5, Table 6-2. Replaceable Parts.
Change: A8 HP and Mfr Part No. to 01722-66541.
Change: A9 HP and Mfr Part No. to 01720-66570.
Change: A11 HP and Mfr Part No. to 01720-66571.

Page 6-7, Table 6-2. Replaceable Parts.
Change: W8 HP and Mfr Part No. to 01720-61644.

Page 6-10, Table 6-2. Replaceable Parts.
Change: A8 HP and Mfr Part No. to 01722-66541.

Page 6-14, Table 6-2. Replaceable Parts.
Change: A8U1 and A8U4 to HP Part No. 1826-0212, IC OP AMP PRGMBL 8-DIP-P PKG, Mfr Code 07263, Mfr Part No. UA776TC.
Change: A8XU1 and A8XU4 to HP and Mfr Part No. 1200-0571, SOCKET-IC 8 CONT DIP-SLDR, Mfr Code 28480.
Change: A9 HP and Mfr Part No. to 01720-66570.

Page 6-15, Table 6-2. Replaceable Parts.
Change: A9U1 to HP Part No. 1826-0212, IC OP AMP PRGMBL 8-DIP-P PKG, Mfr Code 07263, Mfr Part No. UA776TC.
Change: A9XU1 to HP and Mfr Part No. 1200-0571, SOCKET-IC 8 CONT DIP-SLDR, Mfr Code 28480.

Page 6-16, Table 6-2. Replaceable Parts.
Change: A11 HP and Mfr Part No. to 01720-66571.

Page 6-17, Table 6-2. Replaceable Parts.
Add: A11C21, HP and Mfr Part No. 0180-0229, CAPACITOR-FXD 33UF ±10% 10VDC TA.
Change: A11R32 to HP and Mfr Part No. 0757-0735, RESISTOR 1.3K 1% .25W F TC=0±100.
Change: A11U1 to HP Part No. 1826-0212, IC OP AMP PRGMBL 8-DIP-P PKG, Mfr Code 07263, Mfr Part No. UA776TC.
Change: A11XU1 to HP and Mfr Part No. 1200-0571, SOCKET-IC 8 CONT DIP-SLDR, Mfr Code 28480.

Page 8-29, Figure 8-11. Service Sheet 8.
Add: Capacitor A11C21, 33UF, from +1 V line to ground.
Change: A11R32 to 1300 ohms.

CHANGE 6

Page 6-5, Table 6-2. Replaceable Parts.
Change: A8 HP and Mfr Part No. to 01722-66544.

Page 6-10, Table 6-2. Replaceable Parts.
Change: A8 HP and Mfr Part No. to 01722-66544.

Page 6-13, Table 6-2. Replaceable Parts.
Change: A8R45 to HP Part No. 0757-0401, RESISTOR 100 OHM 1% .125W F TC=0±100, Mfr Part No. C4-1/8-TO-101-F.
Change: A8R46 to HP Part No. 0757-0421, RESISTOR 825 OHM 1% .125W F TC=0±100, Mfr Part No. C4-1/8-TO-825R-F.
Change: A8R49 to HP Part No. 0757-0412, RESISTOR 365 OHM 1% .125W F TC=0±100, Mfr Part No. C4-1/8-TO-365R-F.

Page 6-14, Table 6-2. Replaceable Parts.
Add: A8R180, HP Part No. 0757-0406, RESISTOR 182 OHM 1% .125W F TC=0±100, Mfr Part No. C4-1/8-TO-182R-F, Mfr Code 24546.

Page 8-27, Figure 8-10. Service Sheet 7.
Change: A8R45 to 100 ohms.
Change: A8R46 to 825 ohms.
Change: A8R49 to 365 ohms.
Add: A8R180, 182 ohms, from A8Q4-Base to A8Q5-Collector.

▲ CHANGE 7

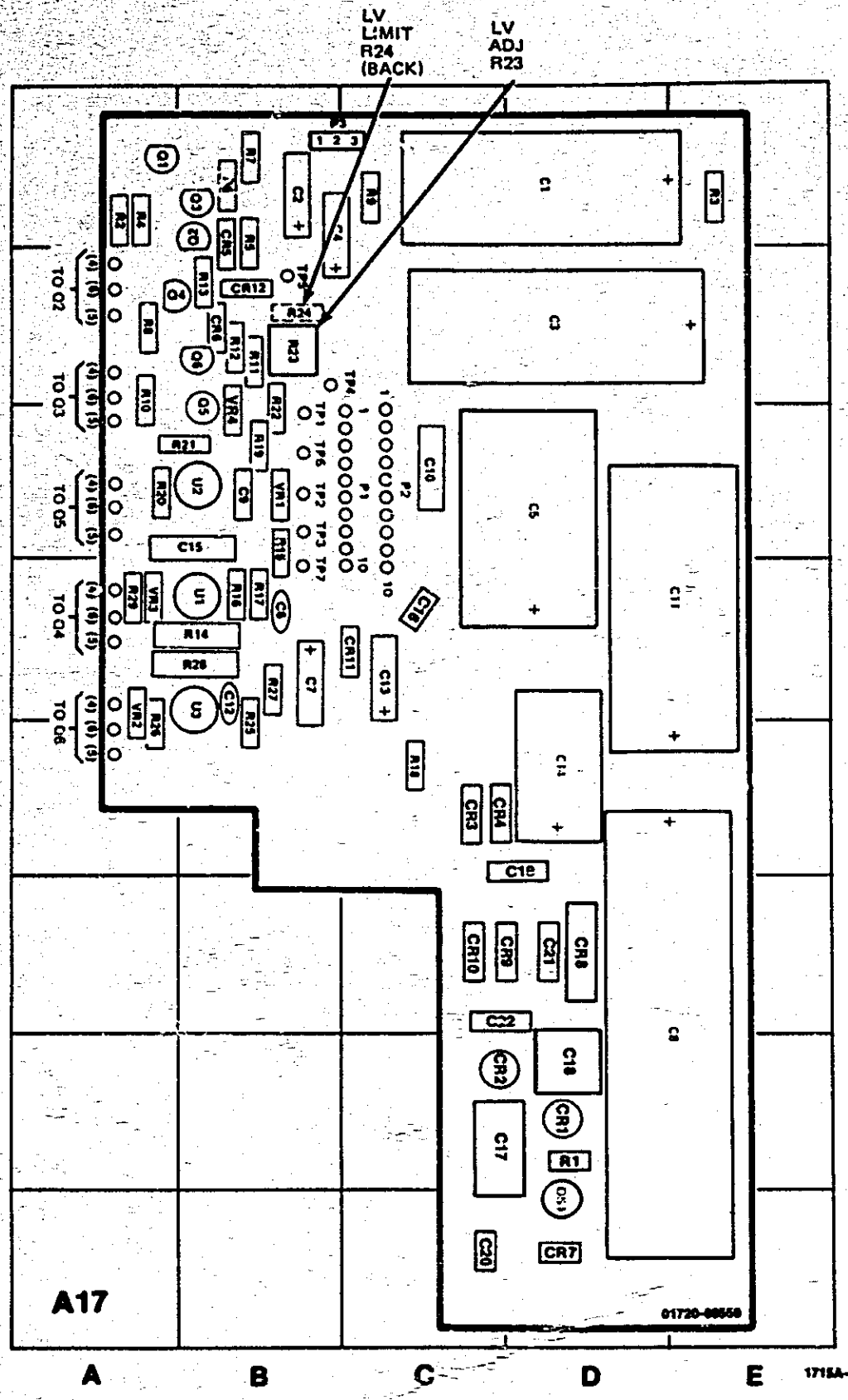
Page 6-5, Table 6-2. Replaceable Parts.
Change: A5 HP and Mfr Part No. to 01720-66573.

Page 6-9, Table 6-2. Replaceable Parts.
Change: A5 HP and Mfr Part No. to 01720-66573.

Page 6-10, Table 6-2. Replaceable Parts.
Change: R26 HP and Mfr Part No. to 0698-3390, CD 6, Qty 1, RESISTOR 19.6 OHM 1% .5W, Mfr Code 28480.
Add: R32 HP and Mfr Part No. 0757-0986, CD 6, Qty 1, RESISTOR 12.1 OHM 1% .5W, Mfr Code 28480.

Page 8-20, A5 COMPONENT LOCATOR.
Move: C18 (D1) to right below R16 (B2).
Add: R32 to right below R26 (C1).

Page 8-21, Figure 8-7.
Change: R26 (to the left of U2) to 19.6.
Add: R32 12.1, in series with R26 and show connected to +15 VF.

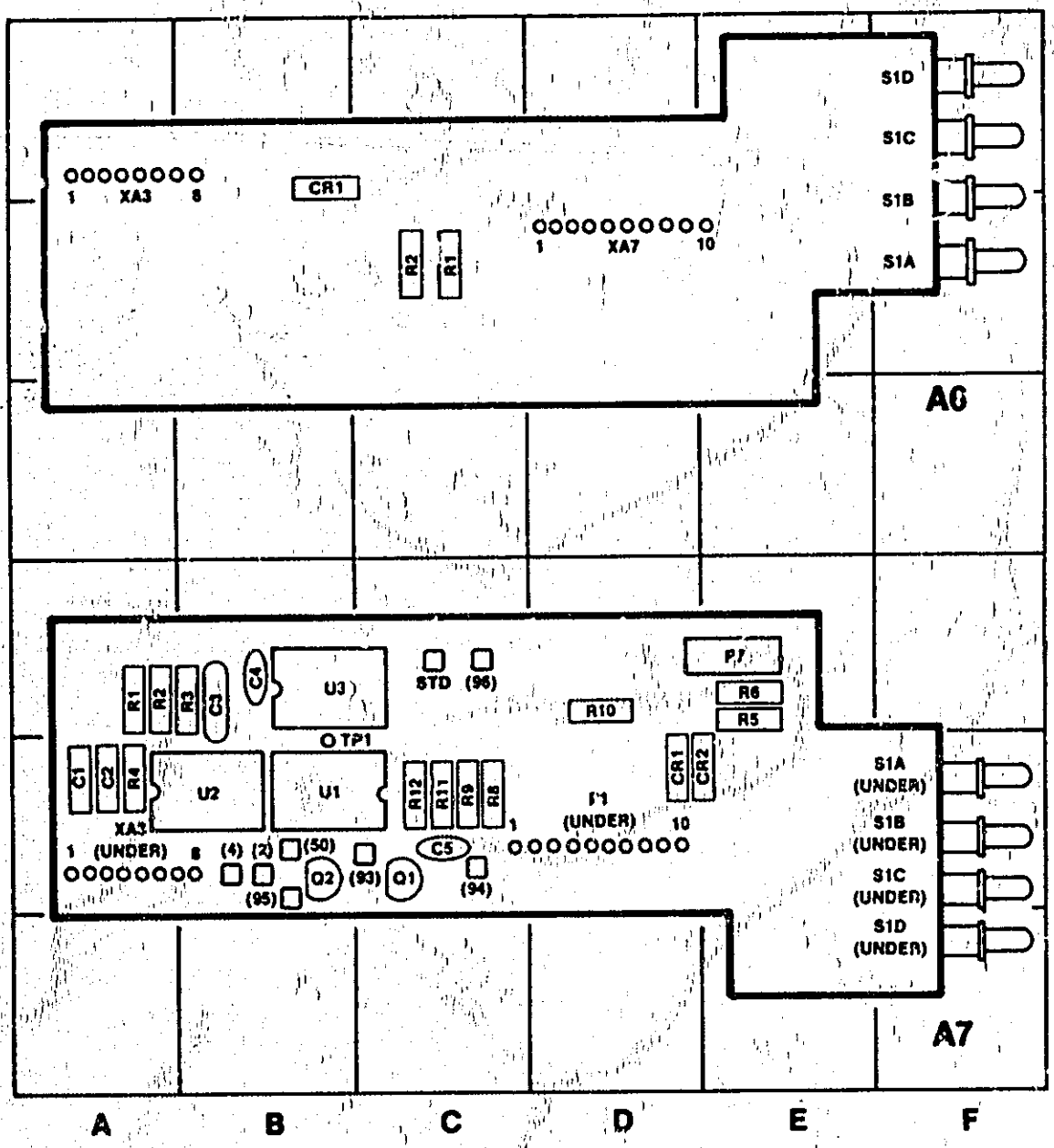


REF DESIG	GRID LOC
C1	D-1
C2	B-1
C3	D-2
C4	C-1
C5	D-3
C6	B-4
C7	B-4
C8	E-6
C9	B-3
C10	C-3
C11	C-4
C12	C-4
C13	C-4
C14	D-5
C15	B-3
C16	C-4
C17	C-7
C18	D-7
C19	C-5
C20	C-8
C21	D-6
C22	C-6
CR1	D-7
CR2	C-7
CR3	C-5
CR4	C-5
CR5	B-1
CR6	B-2
CR7	D-8
CR8	D-6
CR9	C-6
CR10	C-4
CR11	B-2
CR12	D-8
DS1	B-2
P1	C-3
P2	C-3
P3	C-1
Q1	A-1
Q2	B-1
Q3	B-1
Q4	B-2
Q5	B-2
Q6	D-7
R1	A-1
R2	E-1
R3	A-1
R4	A-1
R5	B-1
R6	B-1
R7	B-1
R8	A-2
R9	C-1
R10	A-2
R11	B-2
R12	B-2
R13	B-2
R14	B-4
R15	B-4
R16	B-4
R17	B-4
R18	C-5
R19	B-3
R20	B-3
R21	B-3
R22	B-2
R23	B-2
R24	B-2
R25	B-5
R26	A-5
R27	B-4
R28	B-4
R29	A-4
TP1	B-3
TP2	B-3
TP3	B-3
TP4	C-2
TP5	B-2
TP6	B-3
TP7	B-4
U1	B-4
U2	B-3
U3	B-4
VR1	B-3
VR2	A-4
VR3	A-4
VR4	B-2

Figure 1. Replacement for A17 Component Locator

Table 1. Replacement for A7 Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7	01720-66568	1	VERTICAL DISPLAY SWITCH ASSY	28480	01720-66568
A7C1	0180-0230		CAPACITOR-FXD, 1UF +-20% 50VDC TA-SOLID	56289	1500106X0050A2
A7C2	0180-0230		CAPACITOR-FXD, 1UF +-20% 50VDC TA-SOLID	56289	1500106X0050A2
A7C3	0160-2209	1	CAPACITOR-FSC, 360PF +-5% 300WVDC MICA	28480	0160-2209
A7C4	0160-3470		CAPACITOR-FXD, .01UF +80-20% 50WVDC CER	28480	0160-3470
A7C5	0160-2204		CAPACITOR-FXD, 100PF +-5% 300WVDC MICA	28480	0160-2204
A7CR1	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A7CR2	1901-0040		DIODE-SWITCHING 2NS 30V 50MA	28480	1901-0040
A7P1	1251-6554	1	CONNECTOR, 10-CONT, MALE, POST TYPE	28480	1251-6554
A7Q1	1854-0071	10	TRANSISTOR NPN SI PD = 300MW FT = 200MHZ	28480	1854-0071
A7Q2	1854-0071		TRANSISTOR NPN SI PD = 300MW FT = 200MHZ	28480	1854-0071
A7R1	0698-3150		RESISTOR 2.37K 1% .125W F TUBULAR	16299	C4-1/8-TO-2371-F
A7R2	0757-0441	1	RESISTOR 8.25K 1% .125W F TUBULAR	24546	C4-1/8-TO-8251-F
A7R3	0757-0279	3	RESISTOR 3.01K 1% .125W F TUBULAR	24546	C4-1/8-TO-3011-F
A7R4	0757-0407	3	RESISTOR 200 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-201-F
A7R5	0757-0396		RESISTOR 75 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-75R0-F
A7R6	0757-0396		RESISTOR 75 OHM 1% .125W F TUBULAR	24546	C4-1/8-TO-75R0-F
A7R7	0757-0809	1	RESISTOR 332 OHM 1% .5W F TUBULAR	19701	MF7C1/2-TO-332R-F
A7R8	0757-0740	2	RESISTOR 2.21K 1% .25W F TUBULAR	24546	C5-1/4-TO-2211-F
A7R9	0757-0740		RESISTOR 2.21K 1% .25W F TUBULAR	24546	C5-1/4-TO-2211-F
A7R10	0683-1825	2	RESISTOR 1.8K 5% .25W CC TUBULAR	01121	CB 1825
A7R11	0684-2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A7R12	0684-2211		RESISTOR 220 OHM 10% .25W CC TUBULAR	01121	CB2211
A7S1	3101-0661	1	SWITCH-PB 4STA 4POT .394 IN-CTRS .4A	28480	3101-0661
A7U1	1820-0102	1	IC DGTL MC 1013P FLIP-FLOP	04713	MC1013P
A7U2	1820-0142	1	IC DGTL MC 1004P GATE	04713	MC1004P
A7U3	1821-0001	5	IC LIN CA3046 TRANSISTOR ARRAY	02735	CA3046
A7XA3	1251-4134		CONNECTOR, 8-CONT, FEM, POST TYPE	28480	1251-4134
A7XU1	1200-0474		SOCKET-IC 14-CONT DIP SLDR TERM	28480	1200-0474
A7XU2	1200-0474		SOCKET-IC 14-CONT DIP SLDR TERM	28480	1200-0474
A7XU3	1200-0474		SOCKET-IC 14-CONT DIP SLDR TERMS	28480	1200-0474



1715A-654-01-05-77

A6

REF DESIG	GRID LOC
CR1	B-2
R1	C-2
R2	C-2
S1A	F-2
S1B	F-2
S1C	F-2
S1D	F-1
XA3	A-2
XA7	D-2

A7

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-5	R1	A-4	R11	C-5
C2	A-5	R2	A-4	R12	C-5
C3	B-4	R3	B-4	S1A	F-5
C4	B-4	R4	A-5	S1B	F-5
C5	C-5	R5	E-4	S1C	F-5
CR1	D-5	R6	E-4	S1D	F-6
CR2	E-5	R7	E-4	U1	B-5
P1	D-5	R8	C-5	U2	B-5
Q1	C-5	R9	C-5	U3	B-4
Q2	B-5	R10	D-4	XA3	A-5

Figure 2. Replacement for A6 and A7 Component Locators

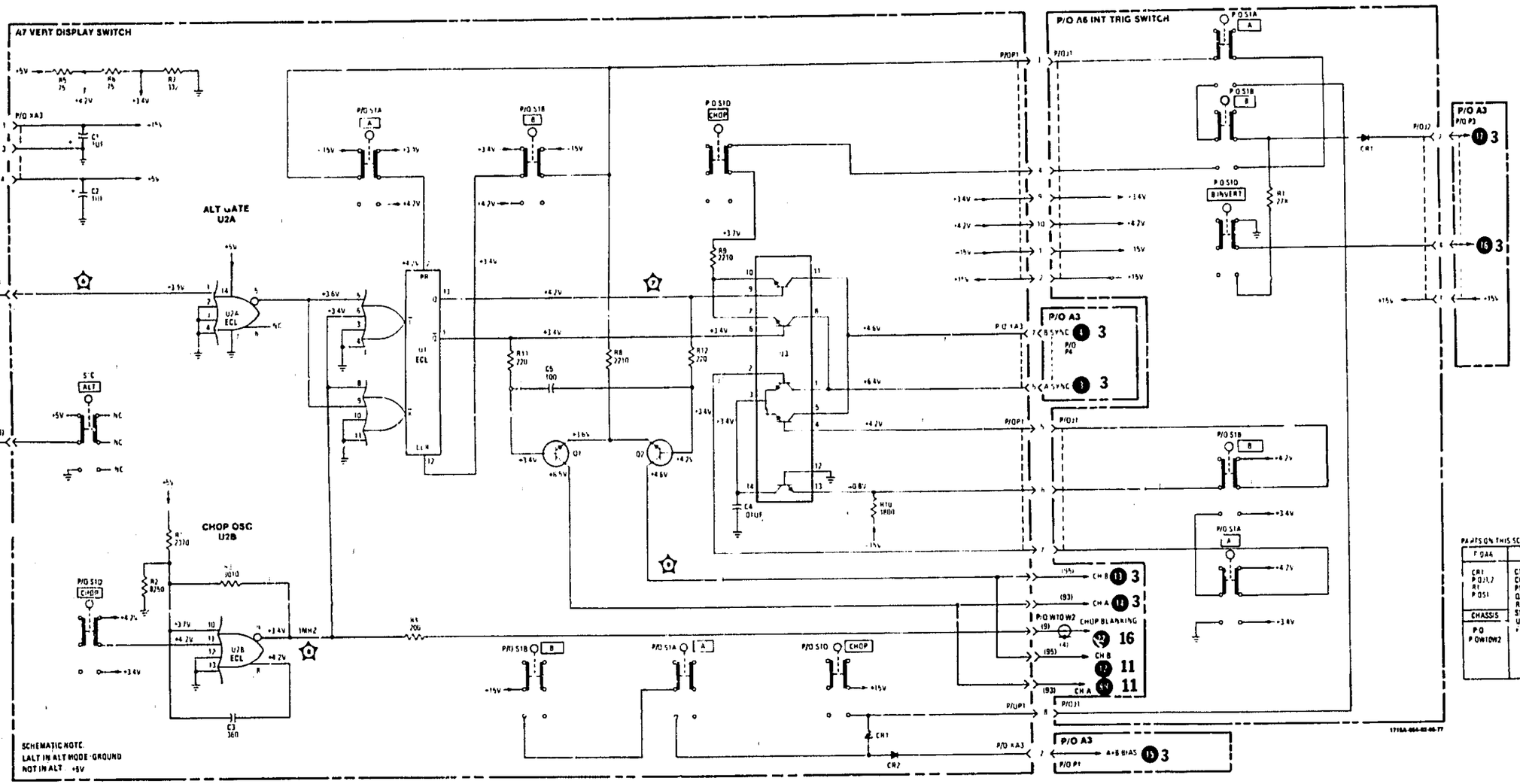
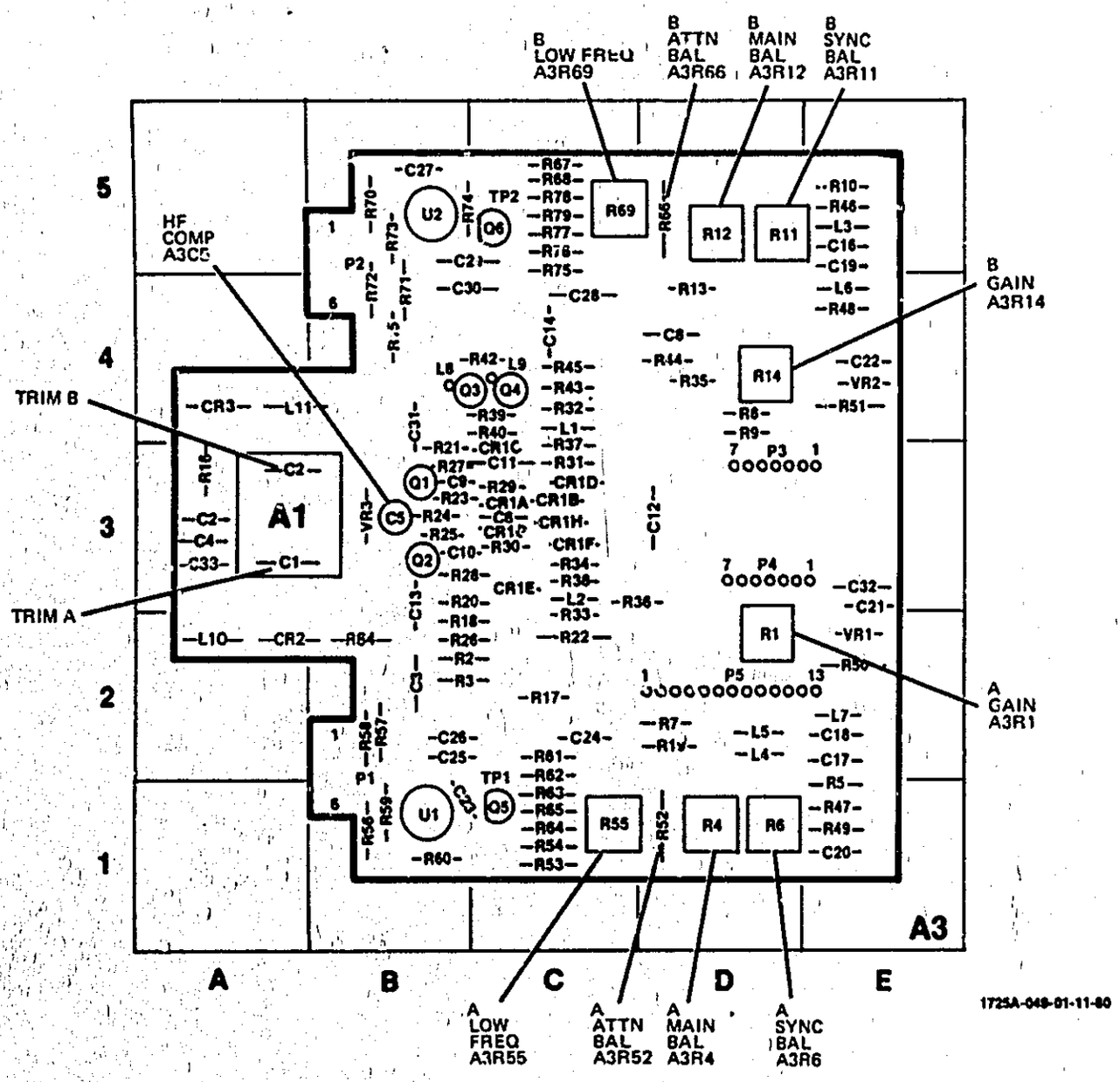


Figure 3.
Replacement for Schematic 5



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
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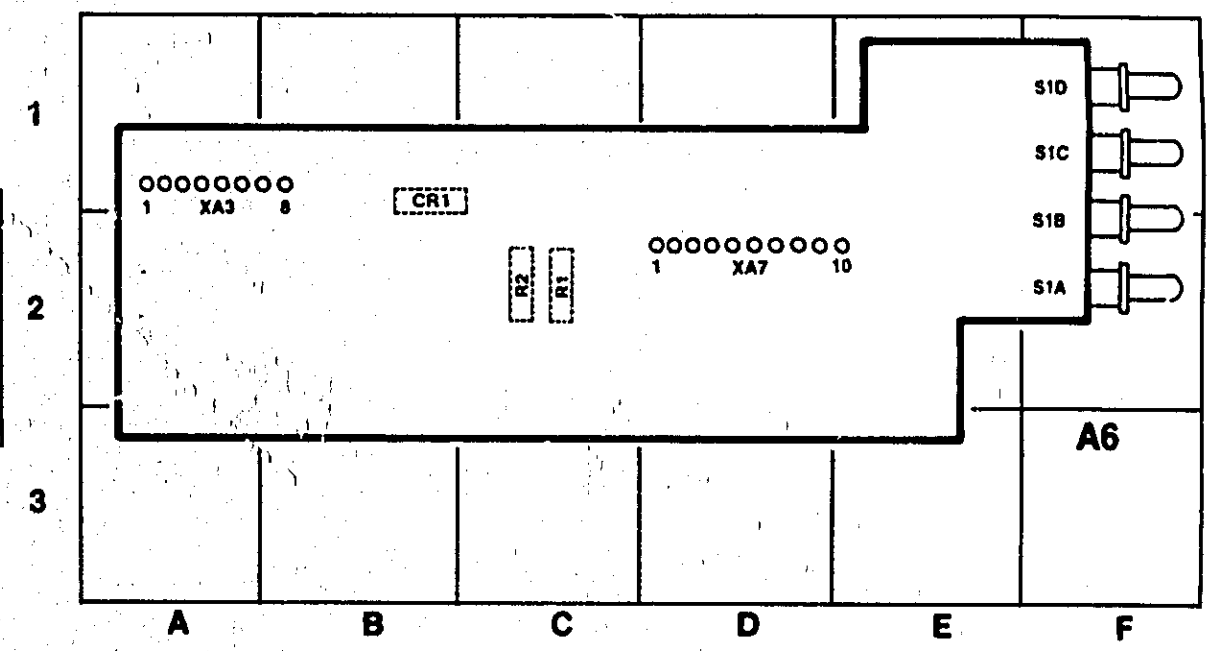
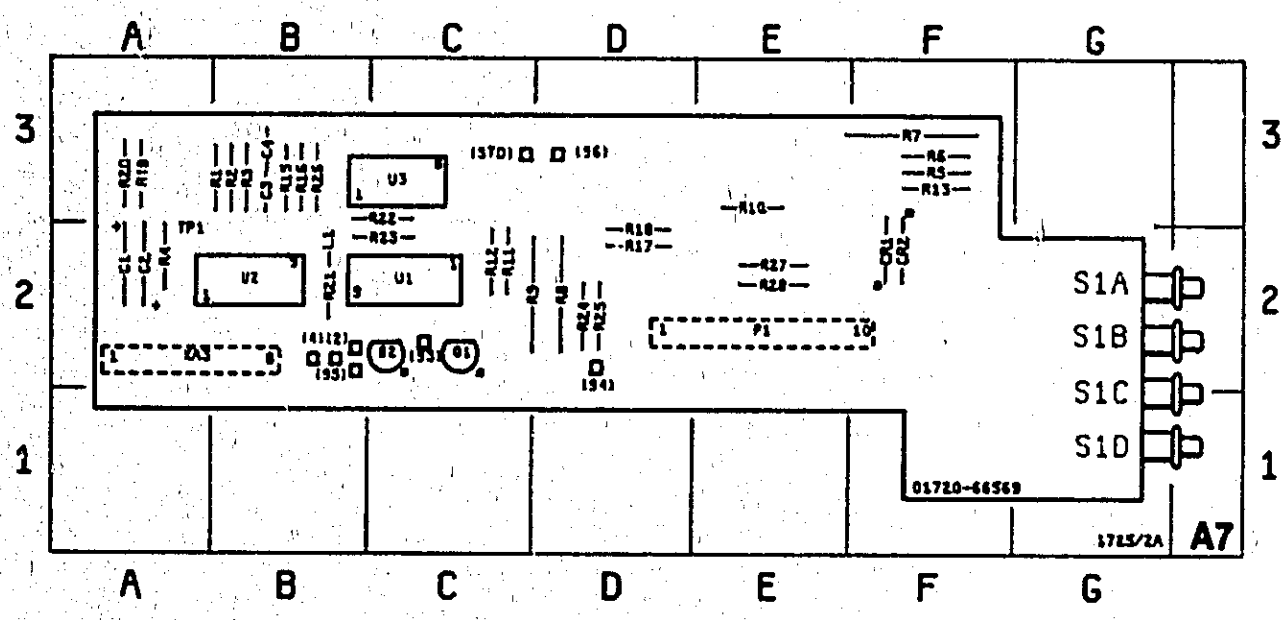
C2	A-3	C25	B-2	L4	D-2	R3	B-2	R24	B-3	R46	E-5	R67	C-5
C3	B-2	C26	B-2	L5	D-2	R4	D-1	R25	B-3	R47	E-1	R68	C-5
C4	A-3	C27	B-5	L6	E-4	R5	E-1	R26	B-2	R48	E-4	R69	C-5
C5	B-3	C28	C-4	L7	E-2	R6	D-1	R27	B-3	R49	E-1	R70	B-5
C6	C-3	C29	B-5	L8	B-4	R7	D-2	R28	B-3	R50	E-2	R71	B-4
C8	D-4	C30	B-4	L9	C-4	R8	D-4	R29	C-3	R51	E-4	R72	B-4
C9	B-3	C31	B-4	L10	A-2	R9	D-4	R30	C-3	R52	D-1	R73	B-5
C10	B-3	C32	E-3	L11	A-4	R10	E-5	R31	C-3	R53	C-1	R74	B-5
C11	C-3	C33	A-3	P1	B-2	R11	D-5	R32	C-4	R54	C-1	R75	C-5
C12	D-3	CR1A	C-3	P2	B-5	R12	D-5	R33	C-2	R55	C-1	R76	C-5
C13	B-3	CR1B	C-3	P3	D-3	R13	D-4	R34	C-3	R56	B-1	R77	C-5
C14	C-4	CR1C	C-3	P4	D-3	R14	D-4	R35	D-4	R57	B-2	R78	C-5
C15	E-5	CR1D	C-3	P5	D-2	R15	B-4	R36	D-5	R58	B-2	R79	C-5
C17	E-2	CR1E	C-3	Q1	B-3	R16	A-3	R37	C-3	R59	B-1	R84	B-2
C18	E-2	CR1F	C-3	Q2	B-3	R17	C-2	R38	C-3	R60	B-1	TP1	C-2
C19	E-5	CR1G	C-3	Q3	B-4	R18	B-2	R39	C-4	R61	C-2	TP2	C-5
C20	E-1	CR1H	C-3	Q4	C-4	R19	D-2	R40	C-4	R62	C-2	U1	B-1
C21	E-3	CR2	A-2	Q5	C-1	R20	B-3	R42	C-4	R63	C-1	U2	B-5
C22	E-4	CR3	A-4	Q6	C-5	R21	B-3	R43	C-4	R64	C-1	VR1	E-2
C23	B-1	L1	C-4	R1	D-2	R22	C-2	R44	D-4	R65	C-1	VR2	E-4
		L2	C-3									VR3	B-3

Figure 4. Replacement for A3 Component Locator

A6

REF DESIG	GRID LOC
CR1	B-1
R1	C-2
R2	C-2
S1A	F-2
S1B	F-2
S1C	F-2
S1D	F-1
XA3	A-2
XA7	D-2





A7

REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	A-2	R3	B-3	R15	B-3	R26	B-3
C2	A-2	R4	A-2	R16	B-3	R27	E-2
C3	B-3	R5	F-3	R17	D-2	R28	E-2
C4	B-3	R6	F-3	R18	D-2	S1A	G-2
CR1	F-2	R7	F-3	R19	A-3	S1B	G-2
CR2	F-2	R8	D-2	R20	A-3	S1C	G-1
L1	B-2	R9	C-2	R21	B-2	S1D	G-1
P1	E-2	R10	E-3	R22	C-2	U1	C-2
Q1	C-2	R11	C-2	R23	C-2	U2	B-2
Q2	C-2	R12	C-2	R24	D-2	U3	C-3
R1	A-3	R13	F-3	R25	D-2	XA3	A-2
R2	B-3						

Figure 5. Replacement for A6 and A7 Component Locators

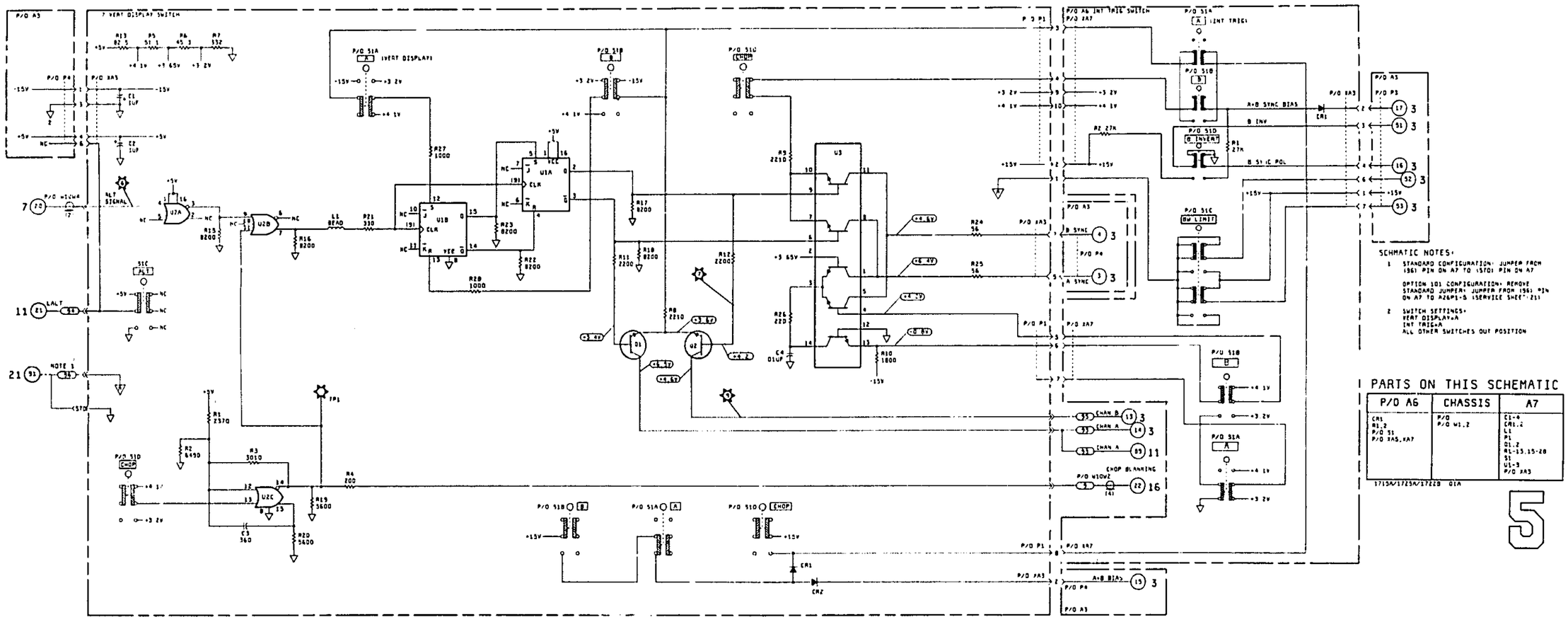
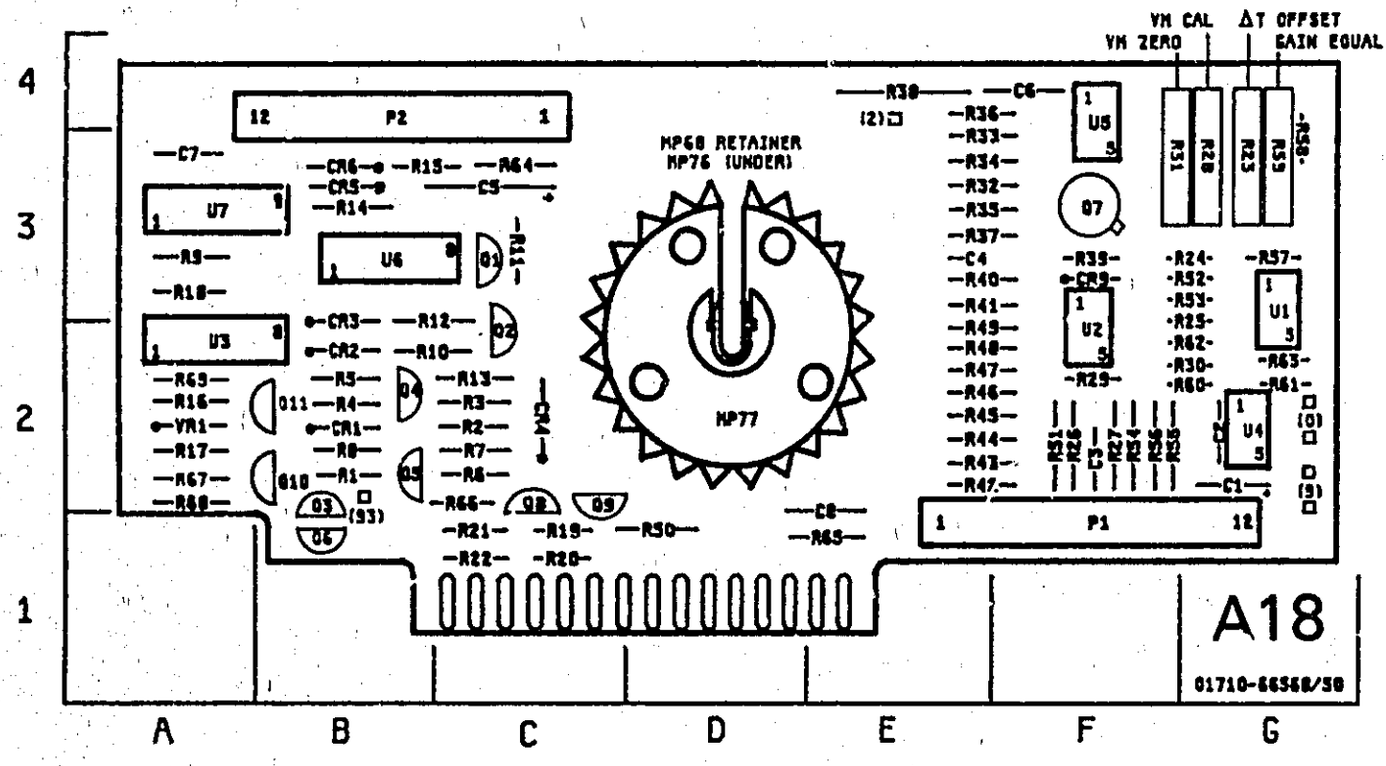


Figure 6.
Replacement for Schematic 5



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	G-2	CR8	A-2	R4	B-2	R22	C-1	R42	E-2	R60	G-3
C2	G-2	CR9	F-3	R5	B-2	R23	G-4	R43	E-2	R61	G-3
C3	F-2	P1	F-2	R6	C-2	R26	F-2	R44	E-2	R62	G-3
C4	E-3	P2	B-4	R7	C-2	R27	F-2	R45	E-2	R63	G-3
C5	C-3	Q1	C-3	R8	B-2	R28	G-4	R46	E-2	R64	C-3
C6	F-4	Q2	C-2	R9	A-3	R29	F-3	R47	E-2	R65	E-1
C7	A-3	Q3	B-2	R10	C-2	R30	G-3	R48	E-2	R66	C-2
C8	E-2	Q4	B-2	R11	C-3	R31	F-4	R49	E-2	R67	A-2
C24	G-3	Q5	B-2	R12	C-2	R32	E-3	R50	D-1	R68	A-2
C25	G-3	Q6	B-1	R13	C-2	R33	E-4	R51	F-2	R69	A-2
C52	G-3	Q7	F-3	R14	B-3	R34	E-3	R52	G-3	U1	G-3
C53	G-3	Q8	C-2	R15	B-3	R35	E-3	R53	G-3	U2	F-3
CR1	B-2	Q9	D-2	R16	A-2	R36	E-4	R54	F-2	U3	A-2
CR2	B-2	Q10	B-2	R17	A-2	R37	E-3	R55	F-2	U4	G-2
CR3	B-2	Q11	B-2	R18	A-3	R38	E-4	R56	F-2	U5	F-4
CR4	C-2	R1	B-2	R19	C-1	R39	F-3	R57	G-3	U6	B-3
CR5	B-3	R2	C-2	R20	C-1	R40	E-3	R58	G-4	U7	A-3
CR6	B-3	R3	C-2	R21	C-1	R41	E-3	R59	G-4	VR1	A-2
CR7	A-2										

Figure 7. Replacement for A18 Component Locator