Errata

Title & Document Type:	**5526A Laser Measurement System OP/SRV**
Manual Part Number:	**05526-90051**
Serial Prefixes:	**1828A**
Revision Date:	**November 1978**

HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies.

Changes to this Manual

No changes have been made to this manual. All pages are scanned at 300 DPI or greater.

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LASER MEASUREMENT SYSTEM

5526A

INCLUDING

LASER HEAD
Model Number 5500C
Serial Prefix: 1828A

LASER DISPLAY UNIT
Model Number 5505A
Serial Prefix: 1828A

This manual applies directly to the units with serial prefixes given above. For units with lower serial prefixes, see Section IX of this manual. A Manual Changes sheet should be included with this manual to give errata and describe instruments with later serial prefixes.

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HEWLETT hp PACKARD

CERTIFICATION

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

WARRANTY AND ASSISTANCE

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

Service contracts or 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.

LASER TUBE WARRANTY CLAIM

SHIPPING INSTRUCTIONS

1. Carefully wrap the tube in 1/4 inch thick cotton batting or other soft padding material.
2. Wrap the above in heavy kraft paper.
3. Pack wrapped tube in a rigid container which is at least 4 inches larger than the tube in each dimension.
4. Surround the tube with at least 4 inches of packed excelsior or similar shock absorbing material; be sure the packing is tight all around the tube.

FROM: DATE _____

COMPANY _____

ADDRESS _____

For additional information, contact:

NAME _____

COMPANY _____

ADDRESS _____

1. HP INSTRUMENT a. MODEL _____

   b. SERIAL NO _____

2. TUBE SERIAL NO. _____
3. Is defective tube original? YES _____ NO _____
4. Date purchased (if available) _____
5. Describe nature and/or symptoms of trouble _____

   _____

   _____

6. Describe operating environment (i.e., temperature, humidity, etc.).

   _____

   _____

7. Remarks _____

   _____

   _____

SERVICE

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

WARNING

HIGH VOLTAGES ARE GENERATED WITHIN THE LASER HOUSING. THE COVER OF THE MODEL 5500C LASER IS PROVIDED WITH AN INTERLOCK TO PREVENT ACCIDENTAL ACCESS TO VOLTAGES. FOR SAFETY, THERE ARE NO HIGH VOLTAGES ON THE INTER-CONNECTING CABLE.

CAUTION

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

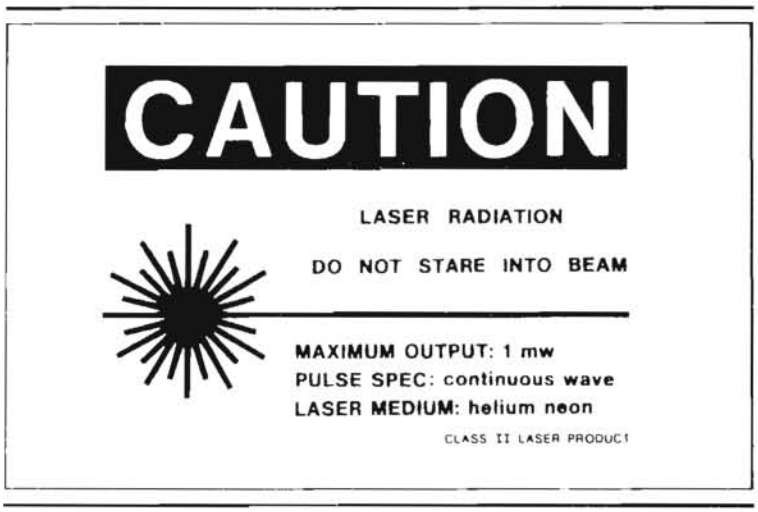
Capacitors inside the instruments may still be charged even if the instruments have been disconnected from their source of supply.

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

Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

SAFETY PRECAUTIONS

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



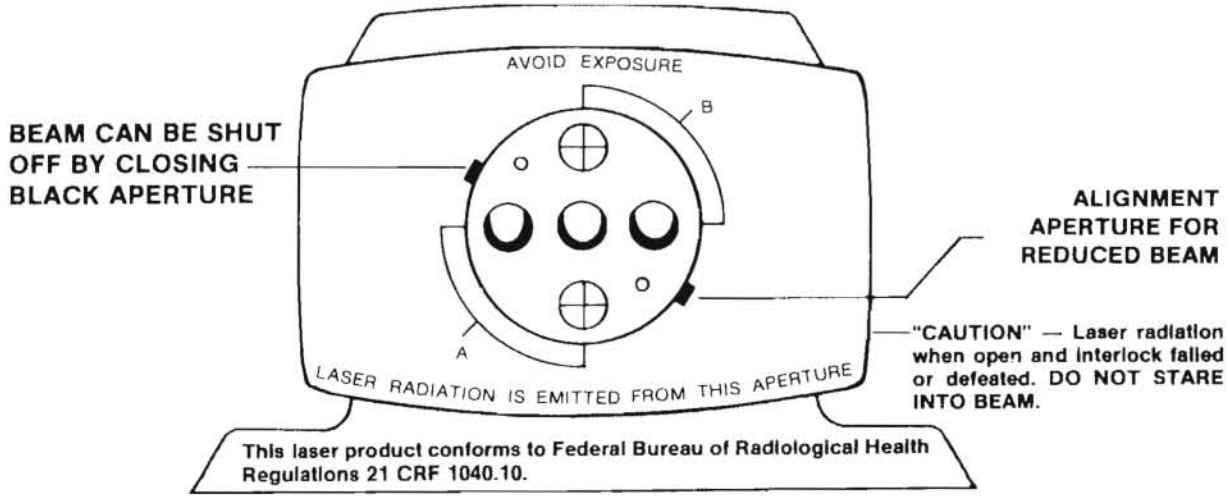


TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

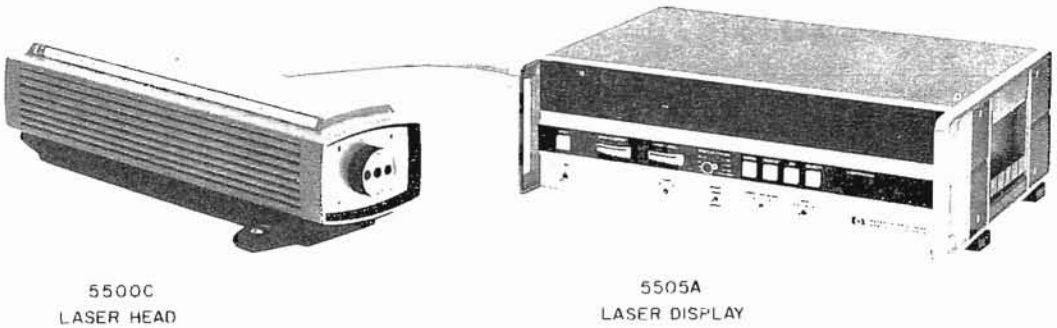
TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

Figure 1-1. 5526A Laser Measurement System



SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This section provides general information for the 5526A Laser Measurement System. Instrument physical, functional, and interface characteristics are given. The 5526A System consists of the 5500C Laser Head, 5505A Laser Display, and a 15-foot interconnecting cable as shown in Figure 1-1. One or more options are required with the 5526A System to make measurements.

1-3. PURPOSE

1-4. The purpose of the Laser Measurement System is to provide accurate indications of distance and velocity. Three distance measuring modes are provided: Normal, Smooth, and X10. The Smooth mode uses digital filtering to suppress jitter of the rightmost display digit in a vibration environment. The X10 mode provides additional filtering and resolution extension. Distance may be measured in English units (inches), metric units (millimeters), or quarter wavelengths (interference fringes) of the laser light. Manual compensation for velocity of light in air and workpiece temperature may be entered by front-panel switches. Velocity in units-per-second or units-per-minute can be displayed. Self-check features are incorporated to verify proper operation of all digital circuits and aid in trouble isolation.

1-5. INSTRUMENT IDENTIFICATION

1-6. Hewlett-Packard uses two systems of instrument identification. In the first system, 2-section, 8-digit identification-serial numbers (000-00000) are used on the units. The 3-digit identification portion is used to identify the equipment series. The 5-digit serial number portion is unique to each instrument. In the second system, 2-section, 10-character identification-serial numbers (0000A00000) are used. The 4-digit identification portion is used to identify the equipment series. The letter indicates assembly plant location. The 5-digit serial number portion is a serial number unique to each instrument. The serial number for the 5500C Laser Head is on the bottom of the instrument. The 5505A Laser Display serial number is on the rear panel. The serial prefixes for the 5500C and 5505A may be different (a serial number is not used for the 5526A system). Include both complete serial numbers, model numbers, and instrument names in correspondence about your instruments.

1-7. EQUIPMENT SUPPLIED

1-8. Equipment supplied with the 5526A system is shown in Table 1-1.

Table 1-1. Equipment Supplied

Description	HP Part No.
Laser Head	5500C
Laser Display	5505A
Detachable Power Cord, 7½ ft. (231 cm)	8120-1378
15-ft. Interconnecting Cable	05500-60025
Fuse: 1 5 A, 250 V (for 230 Vac operation)	2110-0043

1-9. ACCESSORY EQUIPMENT AVAILABLE

1-10. Equipment available for use with the 5526A System is shown in Tables 1-2 and 6-1. In addition to the accessories listed, several options are available (refer to Section VII). Any item on the option lists may be ordered as an accessory unless discontinued as indicated in Section VII.

1-11. The 5510A Automatic Compensator may be used with the 5526A System to eliminate manual compensation for velocity of light changes and material temperature variations. Temperature sensors with higher accuracy are available for use with the 5510A. A multiplexer option allows use of the 5510A with up to three 5505A Display Units for multi-axis interferometry. Various combining and transit cases are available for the equipment. A tripod may be used with the 5500C Laser Head. Extender boards are available to assist in troubleshooting.

Table 1-2. Accessory Equipment Available

Description	HP Model No.
Automatic Compensator	5510A
Automatic Compensator with Higher Accuracy Material Temperature Sensor	H05-5510A
Multiplexer	K15-5510A
Combining Case	C14-1052A
Beam Bender/Alignment Mirror	10551A
Barometer/Thermometer Kit	10560A
Extra Material Temperature Sensor	10563A
Higher Accuracy Material Temperature Sensor	H01-10563A
Tripod	10580A
Transit Case for 5500C	9211-1586
Transit Case for 5505A	9211-1587
Transit Case for 5510A	9211-1738
Extender Board, 15-pin	5060-0049
Extender Board, 22-pin	5060-0630
Extender (XA14), 52-pin	K01-5505A
Rack Mount Kit	05505-60048

1-11. AVAILABLE OPTIONS

1-12. The 5526A Laser Measurement System is available with several optional assemblies which modify the capabilities of the basic system. These options are described in Section VII. At least one of the options is required before measurements can be made.

1-13. SPECIFICATIONS

1-14. The specifications for the 5526A Laser Measurement System are listed in Table 1-3.

Table 1-3. Specifications

PERFORMANCE

ACCURACY:
English: 0.5 millionth per inch ±1 count in last digit.
Metric: 0.5 micron per metre ±2 counts in last digit.

RESOLUTION:
Normal and **Smooth** Modes Least Count:
Imperial: 0.000,01 inch
Metric: 0,1 micron (0,000.1 mm)
X10 Mode Least Count:
Imperial: 0.000,001 inch
Metric: 0,01 micron (0,000.01 mm)

RANGE: Up to 700 feet (213 meters) depending on conditions.

TOLERABLE SIGNAL LOSS: 95%.

MAXIMUM MEASURING VELOCITY: 720 in./min. (0,3 meter/sec).

VELOCITY MEASUREMENT ACCURACY: ±0.01 in./min. (±0,000.004 m/sec).

LASER: Zero warm-up time. Automatic tuning.

VELOCITY OF LIGHT COMPENSATION: A combined factor is derived from tables and fed in via front panel thumbwheel switches. (Can be supplied by 5510A Automatic Compensator.) Multiplication factor technique ensures that fringe count data is unaffected by compensation and that zero datum is not lost.

MATERIAL THERMAL EXPANSION COMPENSATION: A factor, in parts per million, derived from material temperature and coefficient of expansion is combined with VOL compensation factor for manual entry. (Also can be supplied by 5510A.)

OPERATING

DISPLAY: 9 digits with appropriate decimal point, and + or - sign. Nonsignificant leading zeros are blanked.

UNITS:
Distance Modes: inches, millimeters, λ/4
Velocity Mode: inches/second; inches/minute, mm/second, mm/minute

DISPLAY OVERFLOWS:
Normal and Smooth Modes:
3,100 inches (258 feet)
79,000 mm (79m)
500,000,000 λ/4
X10 Mode:
620 inches (51 feet)
10,000 mm (10m)
100,000,000 λ/4

ERROR INDICATION: Beam interruption, overspeed and tuning error. Display goes to zero and light flashes.

RESET: Pushbutton reset to zero.

ALIGNMENT: Three-point suspension, adjustable rear foot, and beam alignment meter make for simple alignment.

TEST CIRCUITS: Front panel, pushbutton operated test circuits verify that all counting and computing circuits are operating properly.

INPUTS: Automatic velocity of light compensation or remote manual VOL compensation.
Connector: 50-pin Blue Ribbon
Auxiliary: Remote front panel controls, i.e., Reset, Manual Print, Normal, Smooth, X10, Velocity, Tuning Error, Beam Interrupt Error.
Connector: 24-pin Blue Ribbon

OUTPUTS: BCD output for printer, computer, Fourier Analyzer, etc.
Connector: 50-pin Blue Ribbon
Analog output for special options such as Auto Error Plotting.
Connector: 2 BNC types
Timed contact closure for automatic NC test advance, or periodic data recording applications.
Connector: Dual banana

AUTO TIMED PRINT AND/OR AUTO N/C ADVANCE: Contact Closure Rate: 6 to 100 accurately timed points/NC steps per minute.

ENVIRONMENTAL:
Instrument Operating:
Temperature: +32° to +130°F (0° to 55°C)
Relative Humidity: 0 to 95%
Vibration: Tested to withstand 0.010 inch (0.25 mm) peak-to-peak excursion at 10—55 Hz 15 min. on each of 3 orthogonal axes.

POWER REQUIREMENTS: 115 or 230 volts ±10%; 48-66 Hz; 200 VA maximum

OVERALL DIMENSIONS:
Laser Display: 5.53 in. high × 16.75 in. wide × 13.25 in. deep (141 mm × 436 mm × 337 mm)
Laser Head: 5.00 in. high × 7.00 in. wide × 20.70 in. long (127 mm × 178 mm × 526 mm)

WEIGHT:
Laser Display: 24 lb (10,9 kg)
Laser Head: 17 lb (7,8 kg)

1-15. 5526A LASER MEASUREMENT SYSTEM PUBLICATIONS

1-16. The 5526A Laser Measurement System is described by a series of publications. An index of all publications is available. Write to:

HEWLETT-PACKARD
5301 Stevens Creek Boulevard
Santa Clara, California 95050

Ask for "Laser Interferometer Publications Index".

SECTION II

INSTALLATION

2-1. INTRODUCTION

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

2-3. UNPACKING AND INSPECTION

2-4. If the shipping container is damaged, ask that the carrier's agent be present when the instrument is unpacked. Inspect the instrument for damage such as dents, scratches, broken knobs, etc. If the instrument is damaged or fails to operate properly, notify the carrier and the nearest Hewlett-Packard sales and service office immediately. A list of sales and service offices is at the back of this manual. Keep the shipping carton and packing material for the carrier's inspection. The Hewlett-Packard sales and service office will arrange for repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

2-5. STORAGE AND SHIPMENT

2-6. The following information regarding packaging and environmental conditions is given to ensure proper care of your instrument during storage or reshipment.

2-7. Packaging

2-8. To protect valuable electronic equipment during storage or shipment, always use the best packaging methods available. Your Hewlett-Packard sales and service office can provide packing material similar to that used for original factory packaging. In many cities, contract packers can provide dependable custom packaging on short notice. Two of the more common packaging methods are as follows:

a. RUBBERIZED HAIR. Cover painted surfaces of instrument with protective wrapping paper. Pack instrument securely in strong corrugated container (350 lbs./sq. inch bursting test) with 2-inch rubberized hair pads placed along all sides of the instrument. Insert fillers between pads and container to make a snug fit.

b. EXCELSIOR. Cover painted surfaces of instrument with protective wrapping paper. Pack instrument in strong corrugated container (350 lbs./sq. inch bursting test) with a layer of excelsior about 6 inches thick packed firmly against all surfaces of instrument.

2-9. Environment

2-10. Conditions during storage and shipment should normally be limited as follows:

a. Maximum altitude: 25,000 feet (7,6 km).

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

c. Minimum temperature: -40°C (-40°F).

2-11. INSTALLATION

2-12. The following paragraphs describe the interconnections to other equipment and how to install the options in the basic instrument.

2-13. INSTALLATION CONSIDERATIONS

2-14. The 5500C Laser Head is designed for clamping to a machine tool or for bench operation. A rear height adjustment simplifies alignment.

WARNING

High voltage is present inside the 5500C. To protect personnel, an interlock switch disables the instrument when the top cover is removed. No hazardous voltages are present on the interconnecting cable.

The 5505A Display Unit may be located up to 15 feet away from the 5500C Laser Head. The instrument is ready for operation as shipped from the factory. Additional parts necessary for rack mounting are packaged with the instrument.

2-15. RACK MOUNTING THE DISPLAY

2-16. To convert for rack installation, refer to Figure 2-1 and follow these steps:

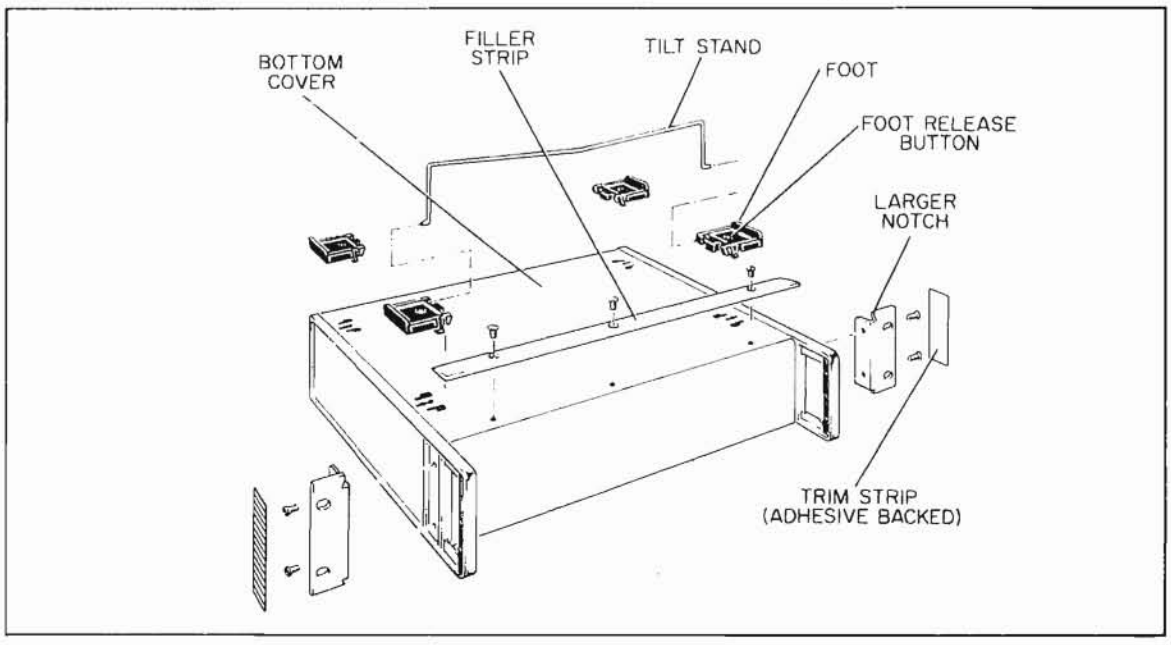
a. Remove feet (press foot-release button, slide foot toward center of instrument, and lift off) and tilt stand.

b. Remove adhesive-backed trim strips at front end of sides.

c. Attach filler strip along bottom edge of front panel.

d. Attach flanges to front end of sides (larger corner notch toward bottom of instrument). The 5505A unit is now ready to mount in standard rack.

Figure 2-1. Conversion for Rack Mounting



2-17. POWER REQUIREMENTS

2-18. The 5526A requires 200 volt-amperes, maximum, at 115/230V ac. Line frequency must be between 48 and 66 Hz. Power for 5500C operation is supplied by the 5505A.

2-19. INPUT/OUTPUT SIGNALS

2-20. Signals between the 5500C and 5505A are shown in Table 2-1. Signals provided for use with a 5055A Digital Recorder are shown in Table 2-2. Signals provided for use with the 5510A Automatic Compensator are shown in Table 2-3. Table 2-4 indicates signals provided at the AUXiliary connector for remote control or status. The RECORDER output signals are conditioned by an optional board which plugs into XA14 of the 5505A (Option 002, 004, etc.). The TIMER connector provides a closed circuit when the print circuits in the 5505A are actuated.

Table 2-1. 5505A Laser (J1) Connector

PIN*	INPUT	OUTPUT	SIGNAL	LEVEL	DESCRIPTION (INTERNAL TERMINATION)
A	X		GND	0V	Chassis (A1-5 and E)
B	X		DOP A		Doppler Channel Data (A1-B)
C		X	+5V	+5V dc	Supply Voltage (A12-B-3 and C)
D	X		LOCK A		Laser Tuning Data (A12-B-H)
E		X	HV CONT		Laser Anode Voltage Control (A12-A-2)
F	X		REF TRIP		Reference Signal Amplitude (A1-T)
G		X	-15V	-15V dc	Supply Voltage (A12-A-15)
H	X		BEAM AL		Doppler Signal Amplitude (A1-H)
J	X		PZT MON		PZT Supply Amplitude (A12-B-D)
K	X		REF A		Reference Channel Data (A1-W)
L	X		GND	0V	Chassis (A1-1,3,18,20,22,A,C,V,X, and Z)
M	X		REF B		Reference Channel Data (A1-Y)
N	X		DOP B		Doppler Channel Data (A1-D)
R	X		LOCK B		Laser Tuning Data (A12-B-R)
S	X		LASER I		Laser Current Amplitude (A12-B-6)
T		X	+15V	+15V dc	Supply Voltage (A12-B-4)
U		X	PZT CONT		PZT Control for Auto Laser Tuning (A12-B-N)

**Pin numbers on 5500C connectors (J1 and J2) identical to 5505A laser connector (J1).*

Table 2-2. 5055A PRINTER (J2) Connector (Mating Connector Amphenol 57-0980 or HP Part No. 1251-0086)

Function (Internal Termination)	Signal	Level	Pin	Internal Termination
Units 1	0D1	TTL	1	A10-B-16
Units 2	0D2	TTL	2	A10-B-T
Units 4	0D4	TTL	26	A10-B-17
Units 8	0D8	TTL	27	A10-B-S
Tens 1	1D1	TTL	3	A10-B-P
Tens 2	1D2	TTL	4	A10-B-R
Tens 4	1D4	TTL	28	A10-B-14
Tens 8	1D8	TTL	29	A10-B-13
Hundreds 1	2D1	TTL	5	A10-B-9
Hundreds 2	2D2	TTL	6	A10-B-8
Hundreds 4	2D4	TTL	30	A10-B-J
Hundreds 8	2D8	TTL	31	A10-B-7
Thousands 1	3D1	TTL	7	A10-B-B
Thousands 2	3D2	TTL	8	A10-B-3
Thousands 4	3D4	TTL	32	A10-B-C
Thousands 8	3D8	TTL	33	A10-B-2
Ten Thousands 1	4D1	TTL	9	A10-A-14
Ten Thousands 2	4D2	TTL	10	A10-A-R
Ten Thousands 4	4D4	TTL	34	A10-A-15
Ten Thousands 8	4D8	TTL	35	A10-A-13
Hundred Thousands 1	5D1	TTL	11	A10-A-11
Hundred Thousands 2	5D2	TTL	12	A10-A-M
Hundred Thousands 4	5D4	TTL	36	A10-A-12
Hundred Thousands 8	5D8	TTL	37	A10-A-L
Millions 1	6D1	TTL	13	A10-A-9
Millions 2	6D2	TTL	14	A10-A-K
Millions 4	6D4	TTL	38	A10-A-10
Millions 8	6D8	TTL	39	A10-A-J
Ten Millions 1	7D1	TTL	15	A10-A-7
Ten Millions 2	7D2	TTL	16	A10-A-H
Ten Millions 4	7D4	TTL	40	A10-A-8
Ten Millions 8	7D8	TTL	41	A10-A-F
Hundred Millions 1	8D1	TTL	17	A10-A-4
Hundred Millions 2	8D2	TTL	18	A10-A-D
Hundred Millions 4	8D4	TTL	42	A10-A-5
Hundred Millions 8	8D8	TTL	43	A10-A-2
Plus or Minus Sign (Error HIGH forces Pin 19 HIGH)	9D1	TTL	19	A10-A-B
+5V Supply (2-bit of Printer Data Column 10)	+5V	+5V	20	A12-B-3,C
No Connection	---	---	21	----------
Positive Printer Inhibit (HIGH)	+PR INH	TTL	22	A2-A-D
Positive Print Command to Printer (HIGH)	+PR COMMAND	TTL	23	A2-B-K
Negative Reference to Printer (0V)	PRINT REF-	GND	24	A12-A-1,A
Positive Reference to Printer (+5V)	PRINT REF+	+5V	25	A12-B-3,C
Error Indication (4-bit of Printer Data Column 10) when HIGH	ERROR	TTL	44	A7-A-F
+5V Supply (8-bit of Printer Data Column 10)	+5V	+5V	45	A12-B-3,C
No Connection	---	---	46-49	----------
Ground	GND	0V	50	A12-A-1,A

Table 2-3. 5505A COMPENSATOR (J3) Connector (Mating Connector Amphenol 57-30500-375 or HP Part No. 1251-0086)

Pin	Signal*	Internal Termination	Function
1	GND	A12-A-1,A	Ground
2	+5V	A12-B-3,C	+5V Supply
3	T EXT	A7-A-13	External Program T-Bit
4	V EXT	A7-A-5	External Program V-Bit
5	E PRG SEL	A7-A-L	External Program Select
6	C TRG EBL	AB-A-9	Compensator Trigger Enable
7	E1	A5-A-8	1-Bit
8	E2	A5-A-5	2-Bit
9	E4	A5-A-P	4 Bit — Inputs from External Register
10	E8	A5-A-R	8-Bit
11	SHIFT E	A5-B-15	Clock Pulses for Register Shifting
12	ACOMP B1	A9-B-10	1-Bit
13	ACOMP B2	A9-B-9	2-Bit
14	ACOMP B4	A9-B-8	4-Bit — Inputs from External Compensator
15	ACOMP B8	A9-B-2	8-Bit
16	ACOMP EBL	A9-A-15	Remote Compensator Enable
17	PROG COMPL	A7-A-P	Program Complete Pulse
18	GEN ST 2	A5-B-J	Generate Start 2 at T-1
19	EB	A6-A-F	E-Register into Adder Enable
20	----	----------	No Connection
21	MULT COMP	A6-A-15	Multiply by Compensator Output
22	SIGN E	A6-A-8	E-Register Sign
23	SIGN X	A6-A-4	X-Register Sign
24	----	----------	No Connection
25	+15V	A12-B-4	+15V Supply
26	GND	A12-A-1,A	Ground (Chassis)
27	+5V	A12-B-3,C	+5V Supply
28	U EXT	A7-A-14	External Program U-Bit
29	W EXT	A7-B-1	External Program W-Bit
30	E PRG LST	A7-A-K	External Program Last Step Input
31	COMP TRIG	A8-A-11	External Compensator Trigger
32	X1	A4-B-J	1-Bit
33	X2	A4-B-C	2-Bit
34	X4	A4-B-D	4-Bit — Outputs of X-Register
35	X8	A4-B-F	8-Bit
36	COMP CLOCK	A8-B-5	Compensator Clock Pulse Output
37	ACOMP D0	A9-B-L	1st Digit
38	ACOMP D1	A9-B-12	2nd Digit
39	ACOMP D2	A9-B-M	3rd Digit — Compensator Multiplier Digit Enable
40	ACOMP D3	A9-B-N	4th Digit
41	AR STP CP	A6-B-12	Arithmetic Step Complete Output
42	----	----------	No Connection
43	----	----------	No Connection
44	ERROR TRIP	A1-16	Beam Interrupt or Overspeed Trigger
45	CK OR VEL	A8-A-6	Check or Velocity Mode
46	CHECK MODE	A8-A-13	Check Mode
47	UPDATE	A2-B-5	Normal Mode (Up date)
48	X10	A8-A-8	X10 Mode
49	SMOOTH	A8-A-11	Smooth Mode
50	-15V	A12-A-15	-15V Supply

Note: All signals are TTL level.

**Refer to the mnemonics dictionary in Section IV for descriptions of these signals.*

Table 2-4. 5505A AUX (J4) Connector (Mating Connector Amphenol 57-30240 or HP Part No. 1251-0293)

Pin	Input	Output*	Signal	Level	Internal Termination	Function
1	X		GND	0V	A12-A-1,A	Ground (Chassis)
2	X		A TRIG EBL	TTL	A8-A-10	Auxiliary Trigger Enable
3	X		S EXT MEAS	TTL	A2-A-E	Auxiliary Trigger
4	X		MAN PRINT	TTL	A2-B-B	Select Manual Print
5	X		RETUNE IN	TTL	A12-B-12	Laser Tuning
6	X		SET NORM	TTL	A8-B-L	Select Normal Mode
7	X		SET X10	TTL	A8-B-N	Select X10 Mode
8			----------	-----	----------	No Connection
9		X	TUNE ER	TTL	A7-A-B	Laser Tuning Error
10		X	ERROR	TTL	A7-A-F	Error Indication (Except Tune Error)
11		X	10 Hz	TTL	A8-A-2	10 Hz Clock Pulse
12		X	+5V	+5V	A12-B-3,C	+5V Supply
13		X	GND	0V	A12-A-1,A	Ground (Chassis)
14	X		RESET SW	TTL	A2-A-14	Select Reset Button
15		X	+15V	+15V	A12-B-4	+15V Supply
16		X	-15V	-15V	A12-A-15	-15V Supply
17	X		S SMOOTH	TTL	A8-B-11	Select Smooth Mode
18	X		SET VEL	TTL	A8-B-P	Select Velocity Mode
19			----------	-----	----------	No Connection
20		X	BEAM AL	-----	A1-H	Doppler Amplifier Output
21-24			----------	-----	----------	No Connection

**Refer to the mnemonics dictionary in Section IV for descriptions of these signals.*

SECTION III

HOW TO OPERATE

3-1. INTRODUCTION

3-2. The 5526A Laser Measurement System measures distances with one millionth of an inch resolution. The wavelength of helium-neon gas laser light is the standard of measurement.

3-3. OPERATING MODES

3-4. The 5526A Laser Measurement System has two modes of operation, distance measurement and velocity measurement. The distance measurement mode can be read out in millimeters, ¼ wavelengths (of light), or inches. The velocity measurement mode can be read out in the same units-per-second or units-per-minute.

3-5. CONTROLS/INDICATORS

3-6. Figure 3-1 shows the front panel operating controls and indicators. Figure 3-2 shows rear panel controls and connectors.

3-7. OPERATING PROCEDURES

3-8. Perform the following operating procedures.

a. Set LINE SELECTOR switch to desired operating voltage using small flat-blade screwdriver.

b. Verify that fuse rating is compatible with line voltage selected (2.5A, 250V for 115V ac or 1.5A, 250V for 230V ac).

c. Interconnect 5500C Laser Head and 5505A Display Unit with 15-foot cable. Make connection to 5500C right-hand connector, as viewed from rear of laser head.

d. Connect ac line cord to 5505A and ac outlet.

e. Set 5505A power switch to ON position.

f. Place 10565A Remote Interferometer in front of 5500C laser head. Place 10550B Reflector Assembly in front of interferometer so that return light beam is reflected into lower aperture, as viewed from front of 5500C.

g. BEAM ALIGNMENT meter should indicate in green region.

h. Use TUNE switch to center LASER TUNING meter (green region).

i. Depress RESET PUSHBUTTON.

j. Select desired operating mode. 5526A is now ready for bench operation. Refer to 5526A Operating Manual for fixturing. Refer to Section V for In-Cabinet Performance Check.

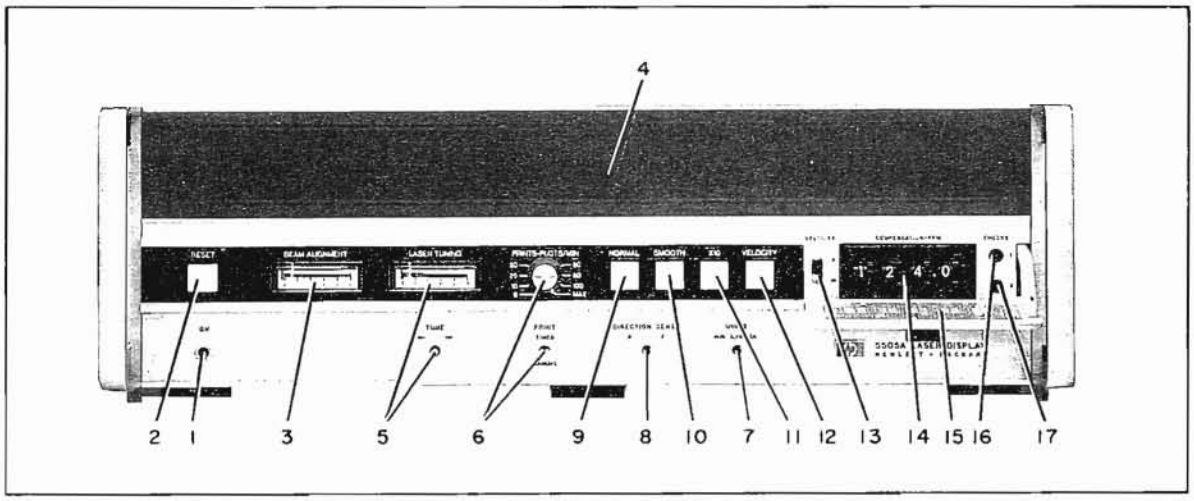
CAUTION

To avoid possible damage to the display circuits, always make certain that power is not applied when connecting the laser/display cable. Also, do not remove the cable while power is applied.

NOTE

When two display units are used, power must be applied to both units simultaneously.

Figure 3-1. Front Panel Operating Controls and Indicators



1. **SYSTEM POWER SWITCH:** In ON position provides primary power to system.

2. **RESET PUSHBUTTON:** Provides dual function as error indication and system reset button. Begins flashing when any of the following error conditions occur:
   a. Laser reflector has been moved faster than display tolerance of 1-foot per second.
   b. **BEAM ALIGNMENT** meter is in red range, indicating loss of reflected beam from misalignment, attenuation, or interruption.
   c. **LASER TUNING** meter is in red range, indicating manual retuning is required.

   Depressing the **RESET** button resets the counters and display to zero so that measurements can resume.

3. **BEAM ALIGNMENT METER:** Indicates signal strength of reflected beam through the return port. Alignment of the laser reflector should be such that meter reading is maximized in the green area. Beam power loss greater than 95% corresponds to red area of meter, and causes RESET button to flash.

4. **DISPLAY READOUT PANEL:** Contains 10 display tubes consisting of a ± sign and 9 numeral positions to indicate distance and velocity measurements. The nine numeral display tubes can each show any one of the ten arabic digits (1, 2, 3, 4, 5, 6, 7, 8, 9 or 0). They also display decimal points or commas as appropriate while indicating measurement in inches, millimeters, or quarter wavelengths. Decimal point and comma display tubes can be interchanged to accommodate English or Metric convention, as preferred. Zeros to left of most significant digit are normally blanked. Insignificant digits to right of least significant digit are also blanked.

4a. On the right-hand side of the display readout panel, five symbols (mm — $\lambda/4$ — in — /sec — /min) can appear. The mm, $\lambda/4$ or in symbols appear when the UNITS switch is set to mm, $\lambda/4$, or in, respectively. The /sec or /min symbols appear when the VELOCITY button is pressed. The position of the VELOCITY s-m slide switch (behind the COMPENSATION door) determines which symbol (/sec or /min) is displayed. At the upper or "s" position the "/sec" symbol will appear, and at the lower or "m" position the "/min" symbol will appear.

5. **LASER TUNING METER AND TUNE SWITCH:** Meter indicates state of automatic laser tuning circuit. Green area in center represents ideal tuning. Switch permits right or left meter movement via manual override of tuning circuit, and is used to return meter reading to the green area, if necessary. Use of switch alters the laser cavity length and therefore causes loss of any measurement being displayed.

6. **PRINTS-PLOTS/MIN AND PRINT SWITCHES:** Rotary switch selects rate of accessory printer or plotter, or enables sequential contact closures (at the rear panel) for the rate selected; toggle switch provides momentary contact closure each time placed to **MANUAL** position.

7. **UNITS SWITCH:** Selects measurement units in millimeters, quarter wavelengths or inches (symbols mm, $\lambda/4$, in) for display. May be used to show readout of the same measurement in all three units successively without loss of data. (Measurements displayed in quarter wavelengths are not compensated for velocity of light in air.) One of the three symbols "mm, $\lambda/4$, or in" will appear on the right side of the display panel.

8. **DIRECTION SENSE SWITCH:** Defines directional movements of the Reflector in all measurement modes as evidenced by the "+" or "−" indicator. When switch is set to F (forward), movement of the Reflector away from the laser is defined as positive (+). When set to R (reverse), the same movement is defined as negative (−).

MODE PUSHBUTTONS (Items 9 through 12): One of four pushbuttons is lighted at any time to indicate measurement mode. Modes can be changed by depressing any button during or after measurement, without loss of data. Commas and decimal points are placed automatically in accordance with mode.

9. **NORMAL PUSHBUTTON:** Selects normal display mode; instrument appears in this mode after each turn-on. Display is 5 digits to the right of the decimal in inches, or 4 digits in millimeters; overflows at 258 feet or 79 meters.

10. **SMOOTH PUSHBUTTON:** Same as **NORMAL** mode except used in environments subject to vibration. Right-most digits of display are electronically filtered to show average position.

11. **X10 PUSHBUTTON:** Same as **SMOOTH** mode except displays resolution greater by an order of magnitude; decimal point is shifted one position to the left, displaying 6 digits to the right in inches, or 5 digits in millimeters. Overflows at 50 feet or 10 meters.

12. **VELOCITY PUSHBUTTON:** Indicates rate of reflector movement at up to 12 inches per second or 300 millimeters per second. Does not cause loss of distance data or reference point of previous modes.

13. **VELOCITY SWITCH:** Selects velocity mode units per second (s position) or per minute (m position) in VELOCITY mode. One of two symbols (/sec or /min) is illuminated on the right side of the panel to match the switch position.

14. **COMPENSATION-PPM THUMBWHEELS:** Number from compensation chart is entered to offset effects of temperature, humidity, and barometric pressure on velocity of light in air. Also accepts number to compensate for temperature of object measured. Refer to HP 5525 Compensation Factor Handbook.

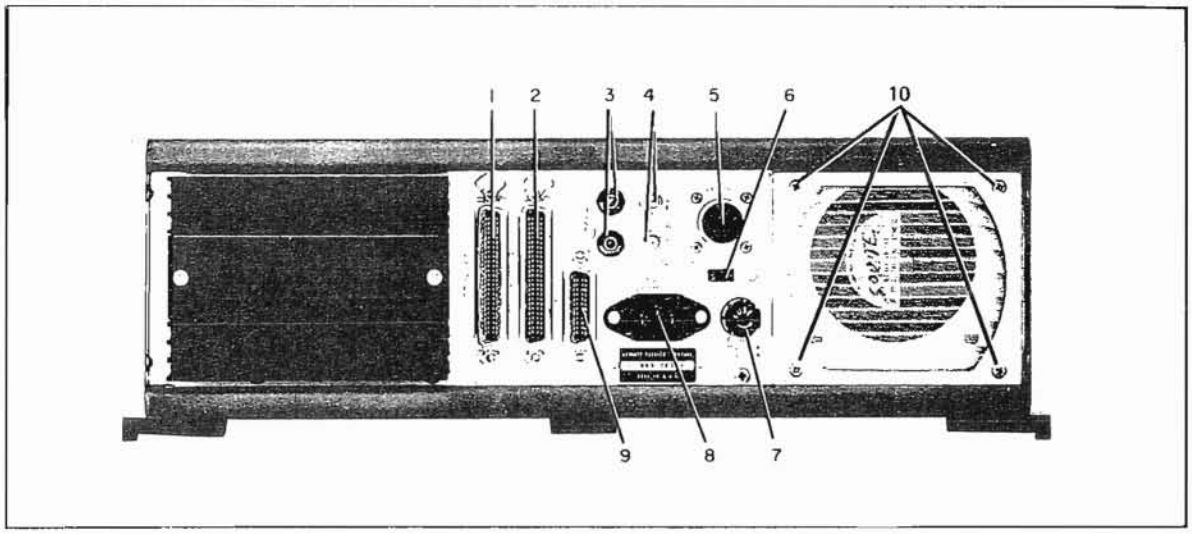
15. **AIR COMPENSATION TABLE:** Abbreviated table used to derive gross compensation number within about 10 PPM accuracy.

CHECKS 1 AND 2 SWITCHES: Perform a self-check of the counting and computing circuits. Number displayed should coincide with test number shown in **AIR COMPENSATION TABLE**, bottom line. Previous distance data or reference points are lost when using the CHECKS switches.

16. **CHECKS 1 SWITCH:** Causes the number 6230230 to be read out in inches of 15824785 in millimeters. Causes 999 followed by the 4-place number on the thumbwheels to be displayed in quarter wavelengths. (If **DIRECTION SENSE** set to R, numbers are preceded by " ".) Check numbers of 6230231 and 15824787 may occur with some 5526A systems. See paragraph 4-51 for explanation.

17. **CHECKS 2 SWITCH:** Causes counters to reverse and the opposite polarity sign to be displayed.

Figure 3-2. Rear Panel Controls, Connectors, and Maintenance Points



1. **PRINTER CONNECTOR:** Provides BCD output of number being displayed. Used in conjunction with accessory HP Model 5055A Digital Recorder.

2. **COMPENSATION CONNECTOR:** Permits input of number required to compensate for atmospheric variations and workpiece temperature. Used with accessory HP Model 5510A Compensator.

3. **TIMER JACKS:** Provides floating contact closure for use in stepping a numerically controlled machine, for example. Rate governed by front panel **PRINTS-PLOT/MIN** switch.

4. **RECORDER CONNECTORS:** Provides error plotting output for driving accessory HP Model 7035A X-Y Recorder, or equivalent, to graphically display machine positioning errors.

5. **LASER CONNECTOR:** Provides interconnection with Laser Head using 15-foot cable provided.

6. **SELECTOR SWITCH:** Permits selection of 115 or 230V ac to match primary power source.

7. **FUSE RECEPTACLE:** Contains 2.5A fuse for 115V ac operation or 1.5A fuse for 230V ac operation.

8. **115V/230V AC RECEPTACLE:** Provides connection (with power cord supplied) to either 115V ac or 230V ac primary source.

9. **AUX CONNECTOR:** Provides various status signal outputs and control signal inputs for remote programming.

10. **AIR FILTER RETAINING SCREWS:** Air filter maintenance is described at the end of this section.

3-9. OPERATOR MAINTENANCE

3-10. Operator maintenance procedures for the laser interferometer system are listed below:

CAUTION

Remove the electric line power cable from the laser measurement system before starting any maintenance procedures.

a. **Line Fuse.** If the line fuse blows and there are no other signs of trouble, replace the fuse. Connect power and check the system. If the fuse blows again, notify your qualified laser electronics technician or contact your Hewlett-Packard sales and service office.

NOTE

Check that the position of the back panel line voltage SELECTOR switch (Item 6 in Figure 3-2) is in the correct position (115V or 230V) corresponding to your available power.

b. **Air Filter.** Inspect and clean the air filter if necessary. (Figure 3-2, item 10, shows the screws to remove for cleaning the filter.) Remove the filter and clean it by blowing compressed air through it from the inside out. If the filter is too dirty to clean with air, wash it in hot water and mild detergent. Dry the filter before re-installing it.

c. **Light Bulbs.** See Figure 3-1, items 2, 7, 8, 9, and 10. These light bulbs are replaceable by pulling the pushbutton off from the front. The description and part number of these bulbs is in the parts list of Section VI. On the right hand side of the display readout five symbols are illuminated by five separate bulbs. To replace these bulbs, remove the 5505A top cover and turn the bulb back spring contact just enough to replace the bulb.

d. **Power Cord.** If the laser measurement system will not operate (no panel lights), check the power cord at both ends. Make sure it is plugged into the 5505A display unit and the correct power receptacle at the other end. (Plug an electric lamp into the power receptacle to be sure power is present.)

e. **Cleaning.** The 5526A laser system units must be kept clean. Use clean low pressure air to blow dust out of the units.

SECTION IV

THEORY OF OPERATION

4-1. SECTION CONTENTS

4-2. This section describes the following subjects in the order listed:

NOTE

Reference material is near the end of this section.

a. System block diagram
b. Laser head block diagram
c. Receiver assembly
d. Display unit block diagram
e. Normal mode
f. Smooth mode
g. X10 mode
h. Velocity mode
i. Check mode
j. Assemblies operation
   - 5500C Laser Head Assemblies
     - A1 Connector Board
     - A2 Laser Assembly
     - A3 Driver Board
     - A4 Power Supply Board
     - A5 Receiver Assembly
   - 5505A Laser Display Unit Assemblies
     - A1 Analog Board
     - A2 Clock Board
     - A3 R-Register Board
     - A4 X-Register Board
     - A5 Adder Board
     - A6 Algorithm Board
     - A7 Program Board
     - A8 Function Board
     - A9 Multiplier Board
     - A10 D-Register Board
     - A11 Display Board
     - A12 Regulator Board
     - A13 Annunciator Board
     - A14 Accessory Boards

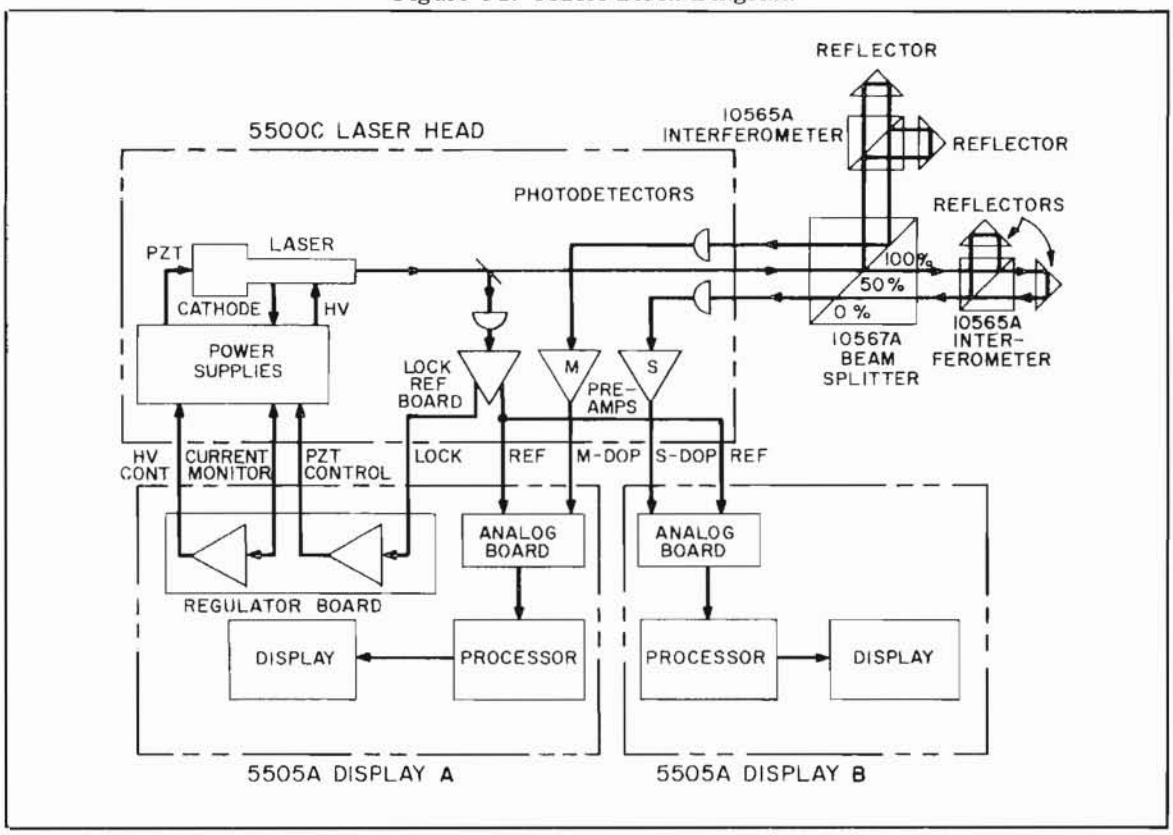
k. MNEMONIC dictionary
l. Electronic logic (logic gate symbols)
m. Integrated circuit descriptions

4-3. SYSTEM BLOCK DIAGRAM DESCRIPTION

4-4. A simplified block diagram of the 5526A Laser Measurement System is shown in Figure 4-1. For detailed block diagrams of the 5500C Laser Head and 5505A Display Unit, refer to Figures 8-15 and 8-28.

4-5. The laser tube supplies a light beam with components of two frequencies. Part of the light beam is sampled and applied to the reference detector which provides the lock and reference signals. The remainder of the light beam is sent to the interferometer(s). Either a single or dual-channel interferometer system can be configured, depending on the options selected for the 5526A system. Figure 4-1 illustrates the dual-channel interferometer configuration. The light beam is split and directed to two remote interferometers with appropriate reflectors. When a reflector is moved, relative to its interferometer, the return light beam frequency will be doppler

Figure 4-1. 5526A Block Diagram



shifted. The return light beams are directed to doppler detectors and preamplifiers which provide the doppler signals for the 5505A display units.

4-6. The reference and doppler signals are converted to logic pulses, doubled in frequency and applied to separate counters. The processor logic within the 5505A determines the difference between the contents of the two counters. This difference is multiplied by appropriate unit conversion factors and displayed as distance (reflector travel). The mode control logic and front-panel pushbuttons allow a variety of averaging and velocity modes of operation. Velocity of light and workpiece temperature compensation can be entered manually or may be supplied automatically by a remote unit (5510A Automatic Compensator).

4-7. In a single-channel system, only one display unit is required, and the interferometer may be mounted inside the 5500C, or outside, depending on the application. When a dual-channel system is configured, two display units are required: an A and a B display unit. In the dual-channel system, the A display unit is used to complete the tuning and laser current control loops. The lock signals are used to control the PZT voltage, which controls the laser frequencies. When this tuning loop is operating within its normal limits, both laser frequencies will be of equal amplitude. The laser current loop operates by sensing laser cathode current and adjusting the laser anode voltage until the current coincides with a preset value.

4-8. 5500C LASER HEAD PRINCIPLES

4-9. A block diagram of the 5500C Laser Head is shown in Figure 8-15. Two light beam signals at different frequencies are produced in the A2 Laser Assembly by Zeeman splitting of the main spectral line. The main spectral line of helium-neon is 6328Å (632.8 nm). An axial magnetic field is applied to the laser tube (A2V1) by a permanent magnet to produce the Zeeman effect. The laser tube output is a light beam composed of two frequencies—F1 with right circular polarization, and F2 with left circular polarization. F1 and F2 are separated by approximately 2 MHz. Line center is virtually midway between the displaced lines, so proper cavity tuning can be assured by adjusting for equal intensities of the two signals. The light

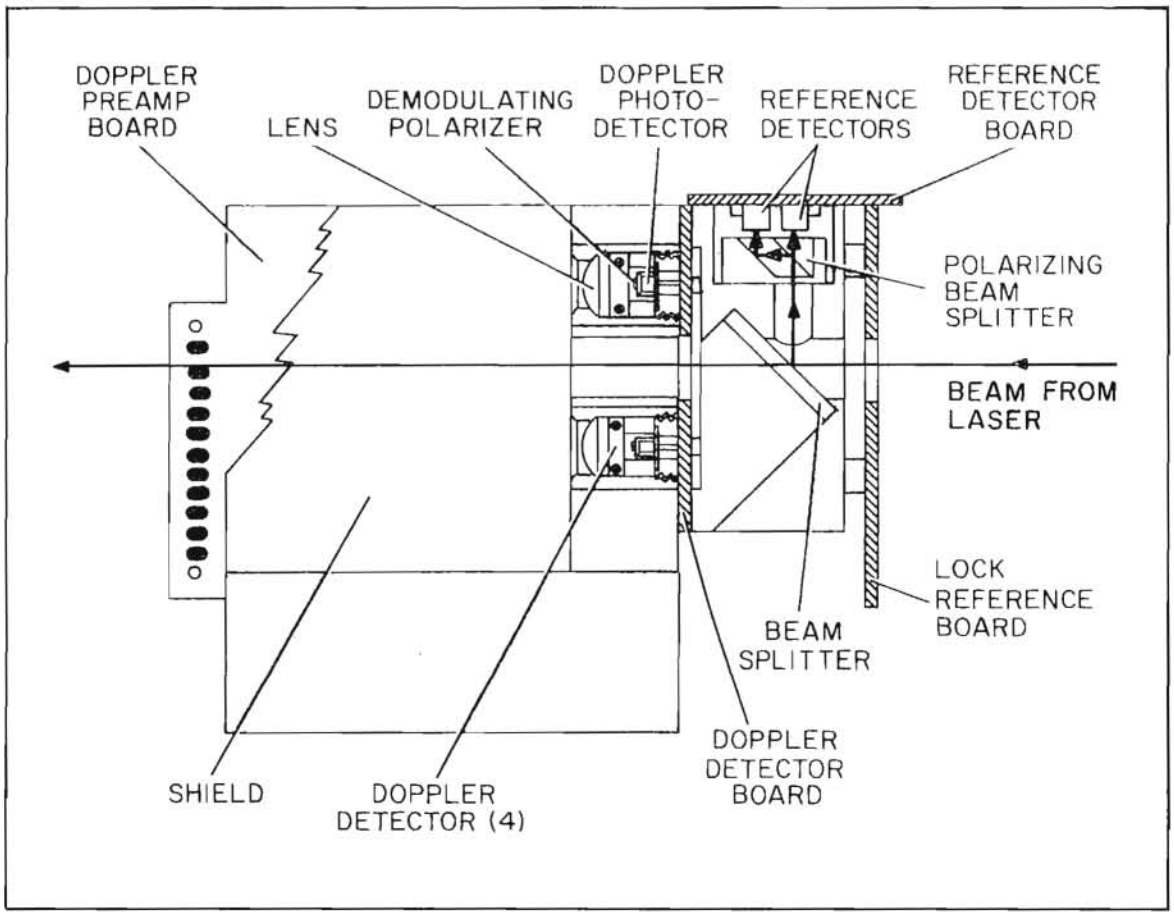
beam from A2V1 passes through an assembly consisting of a quarter-wave and half-wave plate; each plate is tilted and rotated with respect to the light beam axis. This assembly converts the polarization of the two frequency components from left and right circular to linear orthogonal (the two frequency components are 90-degrees apart in space) and rotates them so that they are in the vertical and horizontal planes.

4-10. The light beam from the laser tube has a diameter of approximately 0.04 inches. After polarization conversion, the beam passes through a collimating telescope which expands the beam diameter. An aperature at the output of the telescope restricts the collimated beam diameter to approximately 0.3 inches. The light beam from the A2 Laser Assembly is applied to the A5 Receiver Assembly.

4-11. Receiver and Interferometer

4-12. Within the receiver (shown in Figure 4-2), a portion of the light beam is sampled by a non-polarizing beam splitter which diverts approximately 20-percent of the light intensity to a reference detector assembly. Within the reference detector assembly, the light beam sample is divided by a polarizing beam splitter. The outputs of the polarizing beam splitter are applied to two, separate reference photodetectors. The polarizing beam splitter is rotated 30-degrees from the axes of polarization so that both frequency components appear at each detector. (One detector receives component F1 with a small F2 component; the other detector receives component F2 with a small F1 component.) The reference frequency is produced when the two frequencies, F1 and F2, interfere. The outputs of the photodetectors (F2-F1) have a frequency of approximately 2 MHz and are applied to the A5A8 Lock Reference Board. The dc component of the output is used to develop the lock signal, and the ac component is used to develop the reference signal.

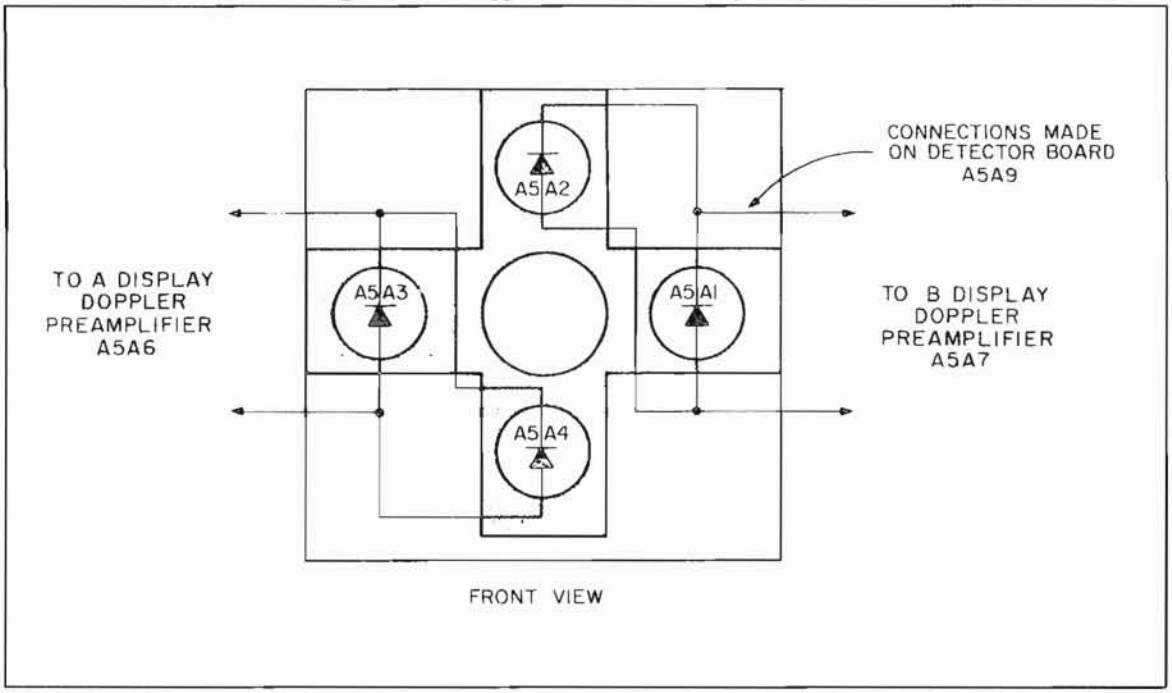
Figure 4-2. Receiver Detail View



4-13. The main light beam from the 5500C is transmitted to one or two interferometers. As shown in Figure 8-15, light from the 5500C enters the interferometer in which a polarizing beam splitter separates the two frequency components, allowing one component to pass through undeflected and the other component to be deflected by 90-degrees. When a fixed reflector is mounted in one of these paths, it becomes the "reference path" against which the other "measurement path" is compared. At a point in the interferometer the two light beams recombine to form the return light beam. The return light beam consists of the "reference path" component (F1) and the "measurement path" component (F2+ΔF). The ΔF term is produced by doppler shift of component F2 when the measurement reflector moves relative to the interferometer.

4-14. The return light beam is applied to one of four doppler detector assemblies, connected as shown in Figure 4-3. Within the particular doppler detector assembly used, the return beam is optically demodulated and applied to a photodetector. The output of the doppler detector (ΔF) is within the frequency range of 100 kHz to 5 MHz and is applied to one of two doppler preamplifiers. When a dual-channel configuration is used, two return light beams are applied to a pair of doppler detectors which results in an input to each doppler preamplifier (ΔF and ΔF').

Figure 4-3. Doppler Detector Wiring Diagram



4-15. When a single-channel configuration is used, any port may be used by the return light beam. The particular port used by the return light beam will depend on remote interferometer orientation. If the interferometer is mounted within the A5 Receiver Assembly, port 4 will always be used by the return beam. The outputs of A5A3 and A5A4 are connected in parallel through doppler detector board A5A9 and applied to the input of the display A doppler preamplifier A5A6. The doppler signal output from preamplifier A5A6 passes through the A1 Interlock Board and is routed to the 5505A Display Unit through the right-hand connector (as viewed from the rear of the 5500C). The A1 Interlock Board also allows ports 1 and 2 to be used for the return beam when the A1S1 MODE switch is set to N (normal). In this case, the signal from A5A1 and A5A2 is amplified by display B preamplifier A5A7 and routed through the A1 Connector Board to the 5505A Display Unit through the left-hand connector (as viewed from the rear of the 5500C).

4-16. When a dual-channel configuration is used, one beam is received by either port 1 or 2, and the second beam is received by either port 3 or 4. The two resultant signals are amplified

by the doppler preamplifiers and routed through the A1 Connector Board to the display A and display B units. When the A1S1 MODE switch is set to N (normal), the display units will indicate individual reflector travel. When the MODE switch is set to D (differential), the display A unit indicates reflector travel, and the display B unit indicates differential reflector travel, i.e., the difference between the distances traveled by the two reflectors.

4-17. Laser Automatic Frequency Control

4-18. The laser beam center frequency depends on the laser cavity length, which changes during and after warmup. To compensate for cavity length changes, an electronic tuning loop is used to vary the mirror spacing. The reference photodetector outputs are connected to the A5A8 Lock Reference Board which provides the LOCK signals. The LOCK signals indicate the relative dc amplitudes of the two frequency components of the laser beam. The LOCK signals are applied to the 5505A Display Unit which provides a PZT CONT signal for the A4 Power Supply Board. The PZT output from A4 varies between 0 and 2,000V dc. This voltage is applied to the piezo-electric transducer (PZT) within the laser tube. If the laser line center frequency drifts, the amplitude of the two optical components will be unequal. This causes a loop error voltage which varies the voltage on the PZT wafer so that the rear mirror position is corrected. The change in the mirror spacing returns the laser to line center frequency.

4-19. Laser Automatic Current Control

4-20. When the 5526A power is initially turned on, the laser anode voltage (HV) from A7 rises toward 11,000 dc. When the laser tube begins to discharge and draw current, the anode voltage falls to its normal operating value of 1,200V dc. The operating voltage is controlled by the laser current loop. The laser tube current flows from the cathode through a 1,000-ohm resistor on the A3 Interconnect Board to ground. The voltage drop across the resistor is compared to a preset value in the A1 Connector Board. The difference between the actual and preset values produces the LASER I signal for the 5505A Display Unit. The 5505A supplies the HV CONT signal, which is inversely proportional to the LASER I signal. The loop error voltage controls supply A4, such that the anode voltage is varied to maintain the preset laser tube current.

4-21. 5505A LASER DISPLAY UNIT PRINCIPLES

4-22. A block diagram of the 5505A Display Unit is shown in Figure 8-29. The diagram may be unfolded for reference while reading the following paragraphs. The Doppler and Reference signals from the 5500C are amplified by identical channels within the A1 Analog Board. The amplified signal in each channel is applied to a Schmitt trigger. The Schmitt trigger output is differentiated and gated in such a way as to double the frequency: 4 MHz for the reference channel and 4 3 MHZ for the doppler channel. The DOPPLER COUNT output from A1 is applied to the A4 X-Counter/Register. The REFERENCE COUNT output from A1 is applied to the A3 R-Counter/Register. The amplitudes of the Doppler and Reference signals are detected in the 5500C and used to drive a level threshold detector in A1. If the reference or doppler beam intensity decreases (approximately 18 dB) to the preset level threshold, an ERROR TRIP signal occurs. This will occur is the beam is interrupted from dirt or condensation on the optical components, excessive Reflector to Laser separation, or atmospheric attenuation of the beam (air turbulence). The BEAM AL (doppler amplitude) signal is monitored by the front-panel BEAM ALIGNMENT meter.

4-23. The DOPPLER COUNT frequency is compared to an internal standard in the frequency limit detector. If the Doppler frequency is too high or too low (excessive Reflector slew rate), an ERROR TRIP signal is produced. When ERROR TRIP occurs, the RESET lamp will flash at a 2.5 Hz rate and an ERROR signal is generated for an external digital recorder. The ERROR signal also resets the R and X-Registers to zero, so that the display is zero.

4-24. If the laser tuning drifts into the upper or lower LASER TUNING meter red-line areas, a TUNE TRIP signal is produced. The display does not reset to zero immediately, but the RESET lamp will flash. When the RESET pushbutton is depressed, the Error and Tuning Latch logic in the A7 Program Board will reset. The RESET lamp will be extinguished, and the RESET signal will clear the R and X-Registers so that zero is displayed. Operating the TUNE switch produces the same results as depressing the RESET pushbutton. The TUNE switch is used to manually override the automatic laser tuning loop described in paragraph 4-18. If consistent and considerable drift in the LASER TUNING meter indication were observed, the TUNE switch allows tuning to a higher or lower initial reading. This allows longer operation and measurement before a TUNE TRIP signal occurs.

4-25. Operating Modes

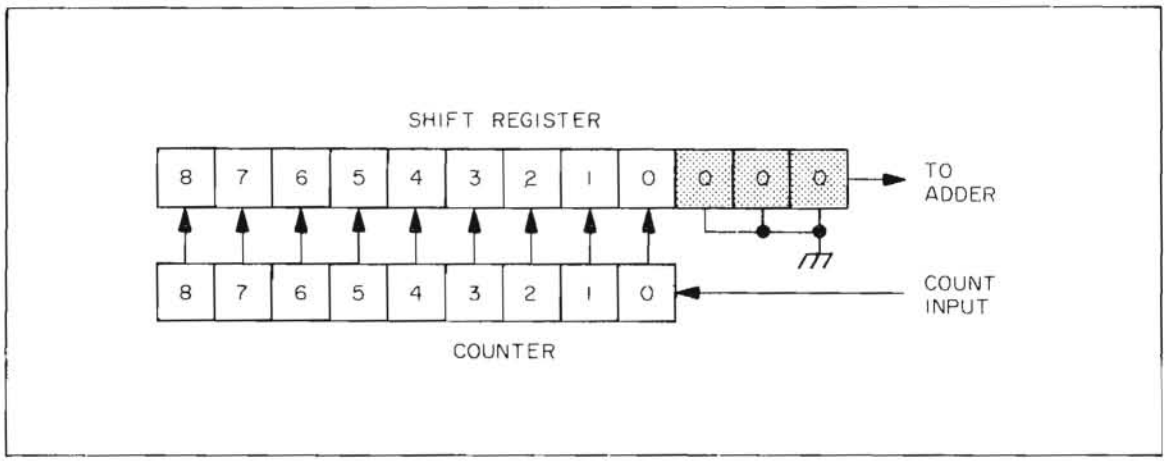
4-26. The operating mode for the 5526A is determined by the display unit front-panel pushbuttons: NORMAL, SMOOTH, X10, VELOCITY, CHECK 1, and CHECK 2. The Velocity mode is also affected by the VELOCITY switch position. The Mode Decode logic in the A8 Function Board supplies signals to the Lamp Drivers which operate the mode lamps (part of front-panel pushbuttons). The Mode Decode logic also determines which program is in operation and the program recycle rate. START PROGRAM pulses initiate the programs generated by the A7 Program Board. The programs are stored in a Program Read Only Memory (ROM). A START ARITH STEP signal from A7 loads the first 4-bit instruction code (T, U, V, W) from A7 into the Instruction Register in the A6 Algorithm Board. After A6 has executed the instruction, an ARITH STEP COMPLETE signal advances the Program Step Counter in A7. This process continues until the program is completed. Within A6, the instructions are decoded. Gating control signals XA, CA, etc. are used to control flow of data between the R, X, and D-registers. The signals also control addition and subtraction in the A5 Adder Board.

4-27. Data in the A3 and A4 Counters are sampled and transferred to the A3 and A4 Shift Registers upon command from A6 (SAMPLE and TRANSFER). The difference between the number of "fringes" (quarter-wavelengths) stored in the two registers is determined by A5 and A6. The results are multiplied by a velocity of light or workpiece temperature compensation number (set on front-panel thumbwheel switches) and by a unit conversion multiplier. Multiplication is performed using A5, A6 and the A9 Multiplier Board. The unit conversion multipliers are stored in the $\lambda/4$ ROM in A9. The front-panel UNITS switch determines the multiplier that is used. The final results of the program are transferred from the Shift Register in A10 to Buffer Storage and on to the A11 Display Board. Insignificant trailing zero blanking in the Velocity mode is automatically provided in A10 under control of the Blanking and Decimal Point logic in A9. Leading zero suppression is normally provided, but may be disabled by removing a strap on the A10 D-Register Board. The sign of the displayed data may be reversed by the DIRECTION SENSE switch.

4-28. When the PRINT switch is set to TIMED, a PRINT signal is produced by A8 at a rate determined by the PRINTS-PLOTS/MIN switch. The CLOCK input to A8 is divided to produce required PRINT rates. When the PRINTS-PLOTS/MIN switch is set to MAX, the PRINT rate is the same as the program recycle rate. The PRINT signal is used to provide a +PR COMMAND signal for a Digital Recorder and to provide a relay contact closure (TIMER jack). When the MAX position is used, the relay is disabled. The print logic in the A2 Clock Board can also be operated by using the monentary-contact MANUAL position of the PRINT switch. A2 contains the 10 MHz crystal oscillator which serves as the internal frequency standard when S1 is set to INT. An external standard input will be accepted when S1 is set to EXT. The Fast Slew Detector in A2 monitors the display digit 2 data (3rd display digit from right) and provides an UPDATE signal if the Reflector slew rate exceeds a predetermined threshold (500 fringes in 0.5 seconds). The UPDATE signal alters the program when SMOOTH or X10 modes are selected so that the averaging feature of these modes is temporarily inhibited. This process compensates for the long time constant of the SMOOTH and X10 modes, so that the display does not lag the true distance excessively. SMOOTH and X10 modes display average position which has little meaning for a rapidly moving target (averaging is defeated for a rapidly moving target).

4-29. NORMAL. When the NORMAL pushbutton is depressed, the A8 Function Board generates a $\overline{\text{START PROG}}$ pulse. A latch in A8 will keep the NORMAL pushbutton illuminated. The $\overline{\text{START PROG}}$ pulse frequency determines the program recycle rate: 200/sec with UNITS switch set to $\lambda/4$, or 200/sec with UNITS set to in or mm. The programs for the Normal mode are shown in Table 4-1. The A7 Instruction Skip Logic is used to replace stored instructions with IDLE. Notice that when the UNITS switch is set to $\lambda/4$, the MULT CMPN and MULT $\lambda/4$ instructions are replaced by IDLE. In other words, the compensation number set by S18 has no effect when $\lambda/4$ is selected, and the display will indicate fringes directly without requiring a units conversion. During the first program step, the $\overline{\text{SAMPLE}}$ and TRANSFER signals enable the Pause Clutch in the X and R-Register Boards. In each Register Board, nine digits of BCD data are transferred from the Counter to a twelve-digit Shift Register. The Shift Register stores the data from the Counter in left-justified format, and the three least significant digits are hardwired to be zeros as shown in Figure 4-4.

Figure 4-4. Counter to Register Data Transfer



4-30. The SAMPLE instruction also causes the SIGN X and SIGN R flip-flops in the A6 Algorithm Board to reset. These flip-flops function as one-bit sign registers for A3 and A4.

4-31. The next instruction to be executed is SPECIAL SUBTRACT, which is a two-cycle instruction. During the first cycle, gating control signals RB and CA are generated by A6. The data stored in the X-Register will be shifted into A5 by $\overline{\text{SHIFT X}}$ pulses (refer to A5 operation). Data stored in the R-Register are shifted into A5 by $\overline{\text{SHIFT R}}$ pulses. Within A5, X-data are complemented and added to R-data, one bit at a time. The adder output data are reloaded into the X-Register. At the end of the first cycle, the X-Register contains R + Xc. Xc is the nines-complement of X (difference between each digit of X and the number 9). A $\overline{\text{C STRB}}$ signal enables the Special Subtract Logic in A2 prior to the second cycle. This logic detects the value of the most significant digit of the X-Register data (XMSD). If the most significant digit of R + Xc is between 0 and 4, a $\overline{\text{SET CARRY}}$ signal is produced to set the A5 Carry flip-flop. If XMSD is between 5 and 9, a $\overline{\text{CLR CARRY}}$ signal is produced to reset the A5 Carry flip-flop. During the second cycle when $\overline{\text{SET CARRY}}$ is produced, gating control signal $\overline{\text{XA}}$ allows R + Xc from the X-Register to be shifted into the A5 Adder Board. The R + Xc data will be added to the carry (C=1). The result - [1 + (R + Xc)] will be reloaded into the X-Register. The SIGN X flip-flop in A6 will be toggled because C=1. When $\overline{\text{CLR CARRY}}$ is produced, gating control signal CA allows R + Xc to be complemented again to produce (R + Xc)c. This result is then reloaded into the X-Register. Since C=0, the SIGN X flip-flop in A6 is not affected. Two examples of SPECIAL SUBTRACT are shown in Table 4-2. In example 1, X is first complemented (999-783) to provide Xc = 216. Then R + Xc is produced (254). Since XMSD = 2, a carry is produced. The final sum is - [1 + (254)] = -255. In example 2, XMSD = 7, so a carry is not produced. The final sum is + [0 + (999-737)] = 262.

4-32. Program steps 2 through 7 are used to transfer the R-Register contents to the D-Register for temporary storage. The R-Register contents are replaced by zero. Effectively, a R ← -D operation is provided as shown in Table 4-3. During execution of the X —— R instruction, gating control signals XR = $\overline{RR}$ and RB are produced by A6. The XR = $\overline{RR}$ signal allows data from the X-Register to be transferred through A5 to the R-Register using 12 $\overline{SHIFT\ X}$ pulses. The RB signal allows data from the R-Register to be transferred through the adders in A5 (R + 0) to the X-Register using 12 $\overline{SHIFT\ R}$ pulses. Register sign information is swapped in the A6 SIGN X and SIGN R flip-flops. During execution of X —— D, gating control signal DB is produced. This allows 12 $\overline{SHIFT\ D}$ pulses to occur which transfer the X-Register data to the D-Register. Signal DB also allows the D-Register data to be transferred via A5 to the X-Register. Register sign information is swapped in the A6 SIGN X and SIGN D flip-flops.

Table 4-1. Normal and Smooth Mode Programs

PROGRAM STEP	X ÷ 4		in or mm	
	INSTRUCTION	T U V W	INSTRUCTION	T U V W
0	SAMPLE	L L H H	SAMPLE	L L L H
1	SPECIAL SUBTRACT	H H H L	SPECIAL SUBTRACT	H H H L
2	IDLE	H H H H	IDLE	H H H H
3	X — R	L L L H	X — R	L L L H
4	IDLE	H H H H	IDLE	H H H H
5	IDLE	H H H H	IDLE	H H H H
6	X — D	L H H L	X — D	L H H L
7	X — R	L L L H	X — R	L L L H
10	SUBTRACT	H H L L	SUBTRACT	H H L L
11	$X \div 10^n$	L H H H	$X \div 10^n$	L H H H
12	ADD	H H L H	ADD	H H L H
13	X — R	L L L H	X — R	L L L H
14	RESET X	L L L L	RESET X	L L L L
15	ADD	H H L H	ADD	H H L H
16	X - -D	L H H L	X — D	L H H L
17	IDLE	H H H H	RESET X	L L L L
20	IDLE	H H H H	MULT CMPN	H L L H
21	X — R	L L L H	X — R	L L L H
22	IDLE	H H H H	RESET X	L L L L
23	IDLE	H H H H	MULT X 4	H L H H
24	DISPLAY X	L H L L	DISPLAY X	L H L L
25	X — D	L H H L	X — D	L H H L

4-33. Program steps 10 through 12 do not alter the register data. Step 10 is a SUBTRACT instruction. If X and R have opposite signs, gating control signals $\overline{XA}$ and RB are produced. A single-cycle addition occurs: -255 + 0 = -255. Notice that the R-Register contained zero, so the X-Register contents are unchanged. If the sign of X and R are equal, gating control signals CA and RB are produced. A two-cycle subtraction occurs: X = 262, Xc = (999-262) = 737, R + Xc = (0 + 737) = 737, (R + Xc)c = (999-737) = 262. The sign information is stored in the A6 SIGN X flip-flop during the subtraction. As shown, the SUBTRACT instruction does not affect the data, because the R-Register contents are zero. Step 11 is a $X \div 10^n$ instruction, where n = 0 for Normal mode. A6 produces a DIVIDE signal for the Shift Timing Generator in A5 and an $\overline{XA}$ gating control signal. Since Normal mode is selected, the number of $\overline{SHIFT\ X}$ pulses is unchanged. Twelve $\overline{SHIFT\ X}$ pulses recirculate the X-Register contents via A5. Step 12 is an ADD instruction, which is the same as SUBTRACT with the sign rule reversed. If the sign of X and R are equal, a single-cycle addition occurs: (262 + 0) = 262. If the signs are opposite, a two-cycle subtraction occurs: X = -255, Xc = (999-255) = 744, R + Xc = (0 + 744) = 744, (R + Xc)c = (999-744) = -255.

Table 4-2. SPECIAL SUBTRACT Examples

OPERATION	EXAMPLE 1	EXAMPLE 2
Initial Conditions	X = 783 R = 038	X = 783 R = 521
Complement X-Data	X_c = 216 R = 038	X_c = 216 R = 521
Add	$R + X_c$ = 254	$R + X_c$ = 737
XMSD Rule	$\overline{\text{SET CARRY}}$ (C = 1)	$\overline{\text{CLR CARRY}}$ (C = 0)
Add	$-[C + (R + X_c)] = -255$	$+[C + (R + X_c)_c] = 262$

4-34. Steps 13 through 16 transfer data as shown in Table 4-4. Step 13 interchanges X and R-Register contents as previously described. Step 14, RESET X, resets the A6 SIGN X flip-flop and provides 12 $\overline{\text{SHIFT X}}$ pulses to clear the X-Register.

Table 4-3. Normal Program Segment 2—7

INSTRUCTION	X	R	D
IDLE	-255	038	000
X—R	038	-255	000
X—D	000	-255	038
X—R	-255	000	038

Table 4-4. Normal Program Segment 13—16

INSTRUCTION	X	R	D
Step 12	255	000	038
X—R	000	-255	038
RESET X	000	255	038
ADD	-255	-255	038
X—D	038	-255	-255

4-35. Step 15 is an ADD instruction. Since the signs of R and X are opposite, a two-cycle subtraction occurs. Using the example shown in Table 4-4, X = 0 and R = -255. Xc = (999-0) = 999, Xc + R = 254 plus a carry, -[C + (R + Xc)] = -[1 + 254] = -255. This instruction has provided a non-destructive transfer of R → X. Step 16 interchanges X and D-Register data as previously described.

4-36. When the Normal λ/4 program is running, steps 17 through 25 transfer data as shown in Table 4-5. Notice that the original R-Register data has been restored. Step 24, DISPLAY X, is identical to X—D except that a $\overline{\text{DISPLAY X}}$ signal is generated by A6. The Transfer D Logic in A2 uses $\overline{\text{DISPLAY X}}$ to produce $\overline{\text{TRANS D}}$ (refer to A2 OPERATION). The $\overline{\text{TRANS D}}$ signal allows the D-Register contents to be displayed.

4-37. When the NORMAL in/mm program is running, steps 17, 18, 22, and 23 are multiplication instructions as shown in Table 4-6. C represents the compensation multiplier, and L represents the units conversion multiplier.

4-38. Step 17, RESET X, clears the X-REGISTER. Step 18, MULT CMPN, multiplies the R-Register contents by the compensation number and stores the results in the X-Register. XA, $\overline{\text{ONE SH R}}$, RB, $\overline{\text{MULTIPLY}}$, and MULT COMP are produced by A6. Signal $\overline{\text{ONE SH R}}$ shifts the R-Register contents one bit to the right so that the most significant digit is zero. This prevents X-Register overflow when the full product is generated. $\overline{\text{MULTIPLY}}$ and MULT COMP set up the A9 Multiplier Board. Multiplication is accomplished by repeated addition and shifting, as shown in Figure 4-5 and Table 4-7.

Table 4-5. Normal λ/4 Program Segment 17—25

INSTRUCTION	X	R	D	DISPLAY
IDLE	038	-255	-255	000
X—R	-255	038	-255	000
DISPLAY X	-255	038	-255	-255
X—R	-255	038	-255	-255

4-39. In the example shown in Table 4-7, the multiplier is 9,991,312. Assume that the number stored in the R-Register is 255. At $\overline{\text{GEN ST 2}}$, an INCR M DIG pulse advances the Bit Counter in A9 to 1. Gating control signals XA and RB allow the X and R-Register contents to be shifted into the A5 Adder by $\overline{\text{SHIFT X}}$ and $\overline{\text{SHIFT R}}$ pulses. Since X = 0000

and R = 0255, the sum of 0255 is loaded into the X-Register. At the next GEN ST 2 pulse a second INCR M DIG pulse advances the A9 Bit Counter to 2. Since the digit 2 was set on S18D, the A9 Comparator produces a MULT EQU signal for A6. Since X = 0255 and R = 0255, the sum of 0510 is loaded into the X-Register. At the next GEN ST 2 pulse, a ONE SH X pulse is produced instead of INCR M DIG. The contents of the X-Register (0510) are shifted one bit to the right. Gating control signal RB is inhibited, so the X-Register contents are recirculated via A5. ONE SH X also advances the A9 Digit Counter to state 1 (2nd multiplier digit) and resets the Bit Counter. At GEN ST 2, an INCR M DIG pulse advances the Bit Counter in A9 to 1. Since X = 0051 and R = 0255, the sum of 0306 is loaded into the X-Register. At the next GEN ST 2 pulse, a ONE SH X pulse is produced to shift the X-data and advance the A9 Digit Counter to state 2 (3rd multiplier digit) The process continues as shown in Table 4-7 until a MULT CMPL signal from A9 terminates multiplication. MULT CMPL is produced when MULT EQU occurs during Digit Counter state 6 (7th multiplier digit). The first three digits of the compensation multiplier are always nines. The last four digits are determined by S18 or by an external device (HP5510A).

Table 4-6. Normal in/mm Program Segment 17—25

INSTRUCTION	X	R	D	DISPLAY
Step 16	038	-255	-255	000
RESET X	000	-255	-255	000
MULT CMPN	(-255)(C)	-255	-255	000
X—R	-255	(-255)(C)	-255	000
RESET X	000	(-255)(C)	-255	000
MULT λ/4	(-255)(C)(L)	(-255)(C)	-255	000
DISPLAY X	-255	(-255)(C)	(-255)(C)(L)	(-255)(C)(L)
X—D	(-255)(C)(L)	(-255)(C)	-255	(-255)(C)(L)

4-40. Step 19 is an X—R instruction that transfers the compensation product to the R-Register. Step 20, RESET X clears the X-Register. Step 21 is the MULT λ/4 instruction, which multiplies the R-Register contents by the unit conversion multiplier and stores the results in the X-Register. The unit conversion multiplier for in. is 6,230,231. For mm the multiplier is 15,824,787. The multipliers are stored in a read only memory in A9 and are determined by the UNITS switch. Multiplication is identical to that previously described for MULT CMPN. Step 22, DISPLAY X will display the X-Register contents.

4-41. Step 23, X—D, restores the X-Register contents. Only the nine most significant digits are displayed. The data in the X-Register is truncated by one digit, as shown in Table 4-7.

Table 4-7. Multiplication Example

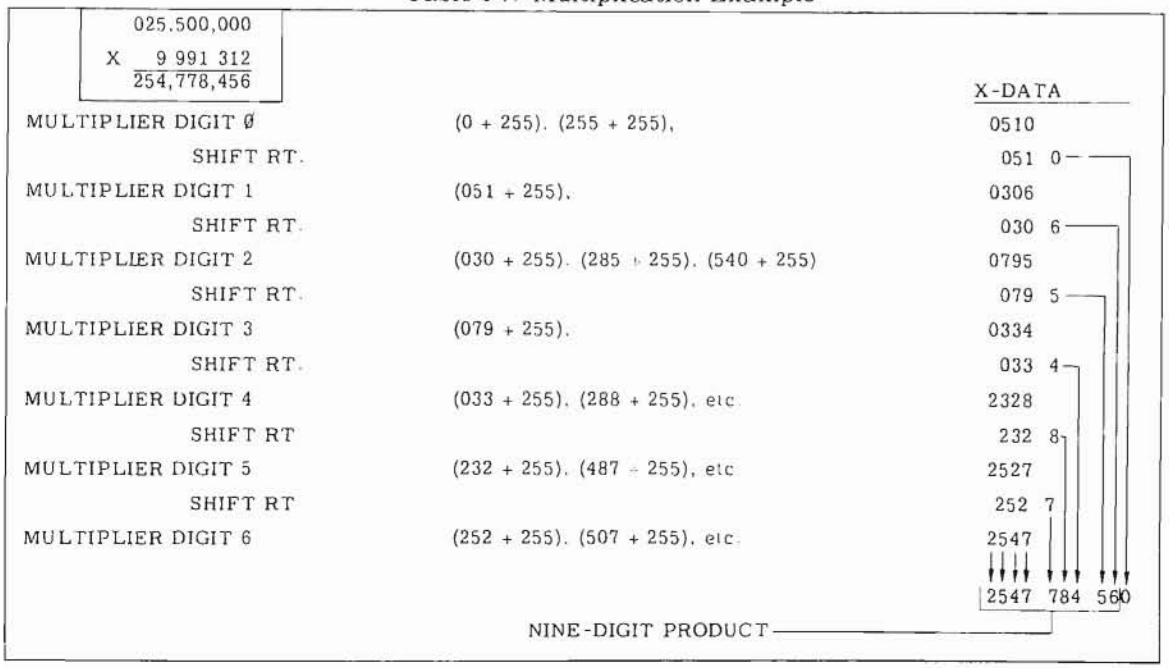
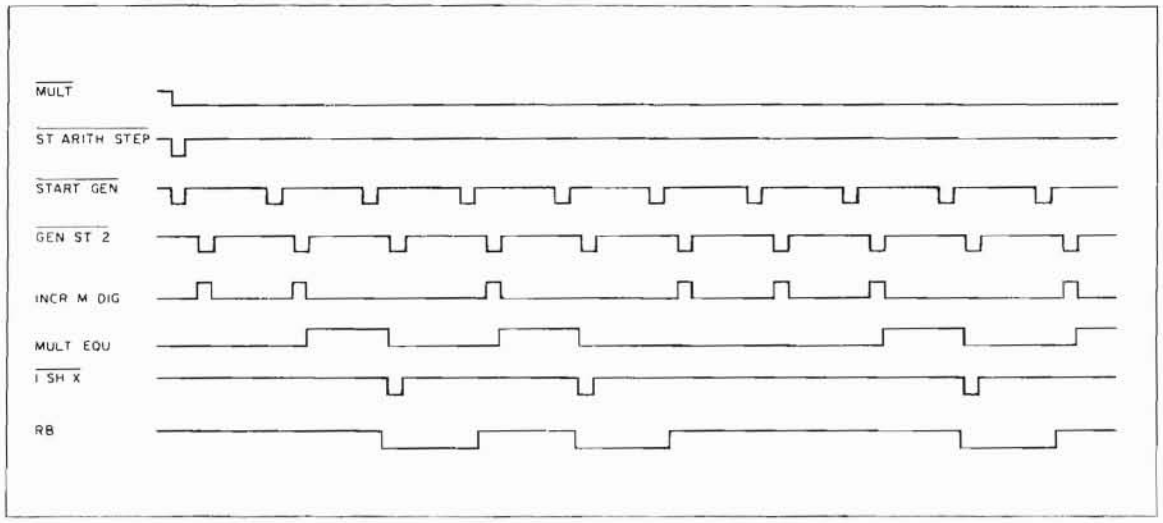


Figure 4-5. Partial Multiplication



4-42. SMOOTH. When the SMOOTH pushbutton is depressed, the A8 Function Board generates a SMOOTH signal and a START PROG pulse. A latch in A8 will keep the SMOOTH pushbutton illuminated. The program recycle rate is less than 2000/sec for $\lambda/4$ and less than 200/sec for in. or mm. The programs for Smooth Mode are the same as Normal mode (refer to Table 4-1). Operation of the 5526A in Smooth Mode differs from Normal only in execution of $X \div 10^n$ (step 11).

4-43. The $\overline{\text{SMOOTH}}$ signal is detected by the A5 Adder Board. When $X \div 10^n$ is executed, a $\overline{\text{DIVIDE}}$ signal is produced. The $\overline{\text{DIVIDE}}$ and $\overline{\text{SMOOTH}}$ signals cause the Shift Timing Generator in A5 to provide 14 $\overline{\text{SHIFT X}}$ pulse, instead of 12, as shown in Figure 4-6. This shifts the X-Register contents two digits to the right (-255 becomes -00255). A division by 100 is produced (n = 2 in the $X \div 10^n$ instruction).

4-44. The Smooth mode provides an averaging function. Table 4-8 shows the data path through the Smooth program. The results of the previous sample (Da) are added to .01 (Dx-Da), where Dx equals the current sample value. This process is equivalent to low-pass filtering of the sampled input data.

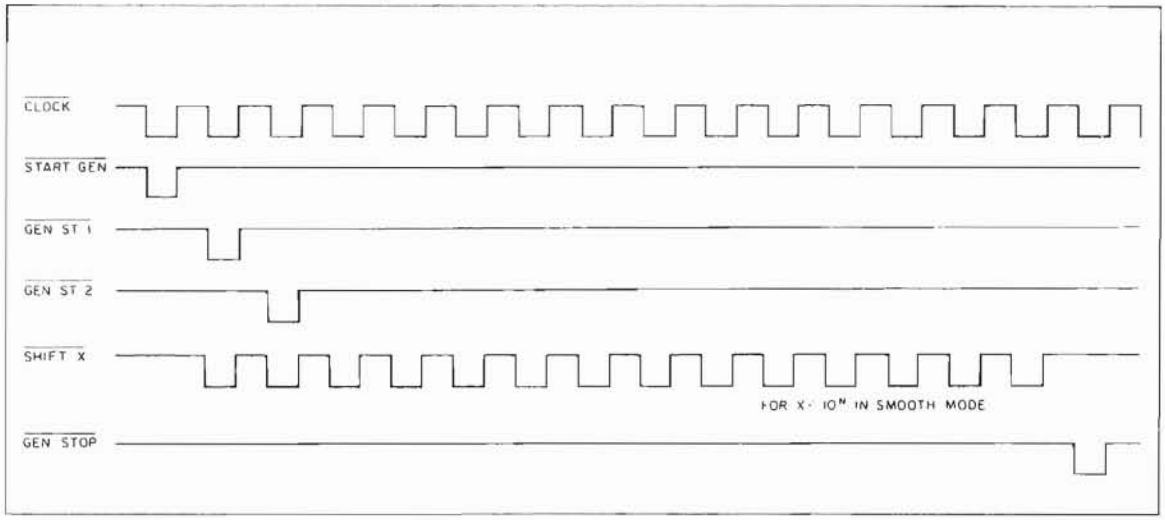
Table 4-8. Smooth Data Path

STEP	INSTRUCTION	X	R	D
0	SAMPLE	700	400	255
1	SPECIAL SUBTRACT	300 (Dx)	400	255
3	X — R	400	300	255
6	X — D	255	300	400
7	X — R	300	255	400
10	SUB	045 (Dx-Da)	255	400
11	$X \div 10^n$	000 45 .01 (DX-DA)	255	400
12	ADD	255 45 Da + .01 (Dx-Da)	255	400
13	X — R	255	255 45	400
14	RESET X	000	255 45	400
15	ADD	255 45	255 45	400
16	X — D	400	255 45	255 45
21	X — R	255 45	400	255 45
24	DISPLAY X	255 45	400	255 45
25	X — D	255 45	400	255 45

Da from preceding sample

Display = Da + .01 (Dx-Da) 255 450

Figure 4-6. Shift Timing Smooth Mode



4-45. X10. When the X10 pushbutton is depressed, the A8 Function Board generates a X10 signal and a START PROG pulse. A latch in A8 will keep the X10 pushbutton illuminated. The program recycle rate is 200/sec for λ/4, in, or mm. The programs for X10 mode (Table 4-9) differ from Normal mode in three places: (1) step 2 is 10X instead of IDLE, (2) in step 11 ($X \div 10^n$), n = 3, and (3) the program loops from step 16 to step 0 eight times.

Table 4-9. X10 Mode Programs

PROGRAM STEP	λ/4		in or mm	
	INSTRUCTION	TUVW	INSTRUCTION	TUVW
0	SAMPLE	LLHH	SAMPLE	LLHH
1	SPECIAL SUBTRACT	HHHL	SPECIAL SUBTRACT	HHHL
2	10X	LLHL	10X	LLHL
3	X—R	LLLH	X—R	LLLH
4	IDLE	HHHH	IDLE	HHHH
5	IDLE	HHHH	IDLE	HHHH
6 LOOP	X—D	LHHL	LOOP X—D	LHHL
7 8	X—R	LLLH	8 X—R	LLLH
10 TIMES	SUBTRACT	HHLL	TIMES SUBTRACT	HHLL
11	$X \div 10^n$	LHHH	$X \div 10^n$	LHHH
12	ADD	HHLH	ADD	HHLH
13	X—R	LLHH	X—R	LLLH
14	RESET X	LLLL	RESET X	LLLL
15	ADD	HHLH	ADD	HHLH
16	X⟷D	LHHL	X⟷D	LHHL
17	IDLE	HHHH	RESET X	LLLL
20	IDLE	HHHH	MULT CMPN	HLLH
21	X—R	LLLH	X—R	LLLH
22	IDLE	HHHH	RESET X	LLLL
23	IDLE	HHHH	MULT λ/4	HLHH
24	DISPLAY X	LHLL	DISPLAY X	LHLL
25	X—D	LHHL	X—D	LHHL

4-46. In step 2, instruction 10X is executed. Signal 10X is generated by A6 so that the Shift Timing, Generator in A5 provides 11 SHIFT X pulses, instead of 12 (refer to Figure 4-7). Gating control signal XA allows the X-Register contents to recirculate via A5. The X-data are shifted one bit to the left (multiplied by 10). In step 11, instruction $X \div 10^n$ is executed. The DIVIDE and X10 signals cause the Shift Timing Generator in A5 to provide 15 SHIFT X pulses, instead of 12, as shown in Figure 4-8. This shifts the X-Register contents three digits to the right. A division by 1000 is produced (n = 3 in the $X \div 10^n$ instruction). When the X⟷D instruction in step 16 has been executed the A7 X10 Loop Control flip-flop will set. This resets the A7 Program Step Counter to step 0. The A7 Program Loop Counter is advanced to 1. The program loops eight times, until the Program Loop Counter allows continuation to step 17.

Figure 4-7. Shift Timing — 10X Instruction

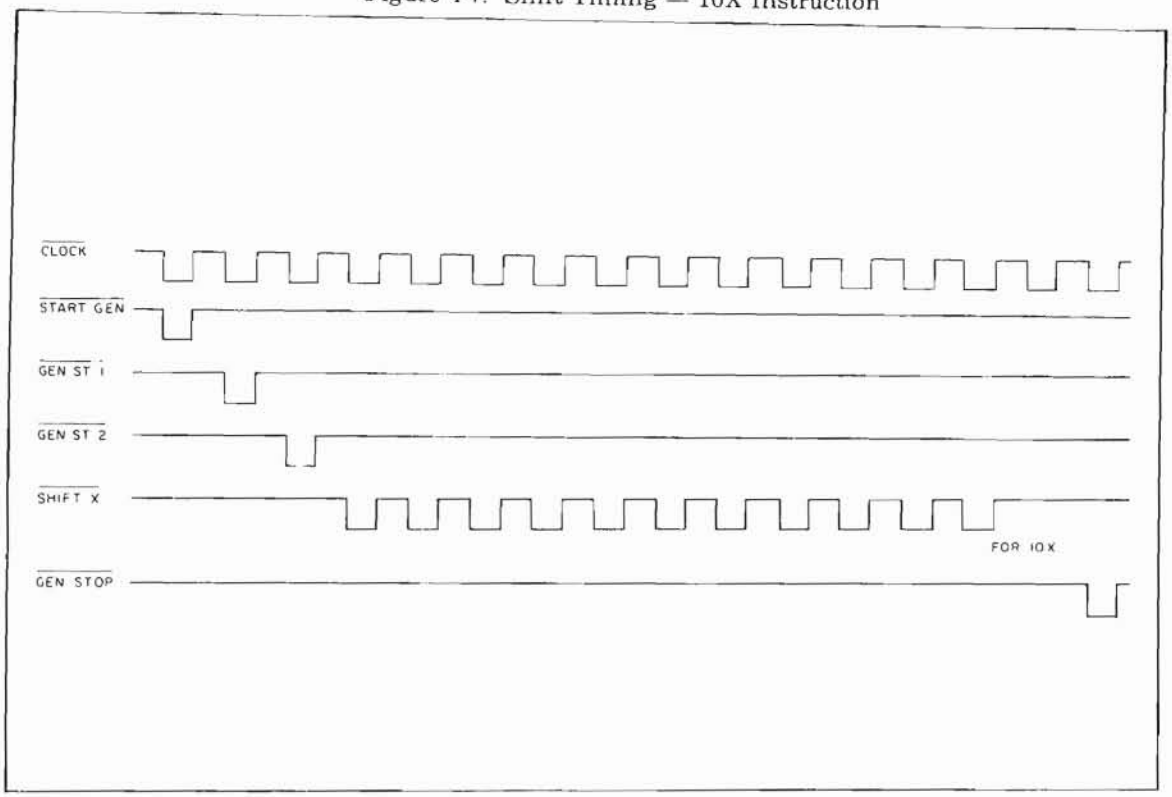
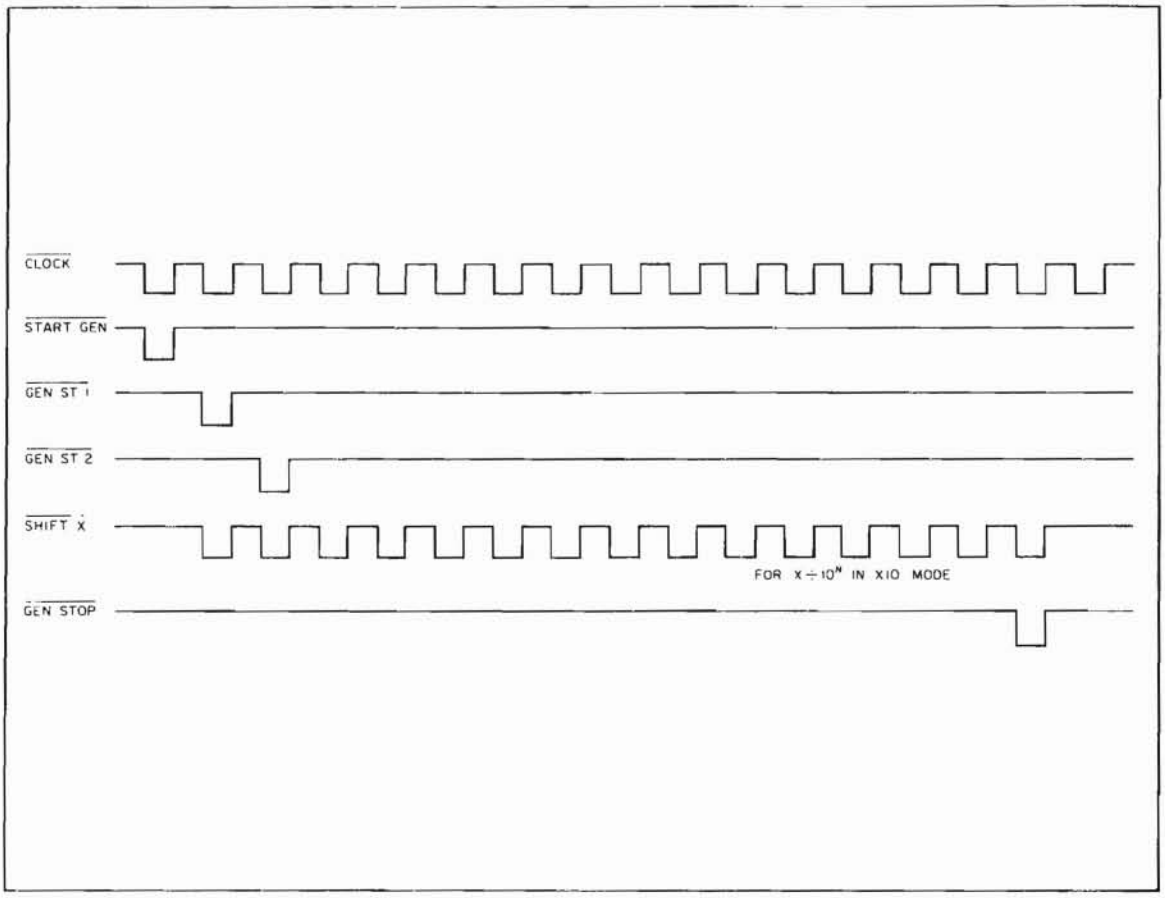


Figure 4-8. Shift Timing — $X \div 10^n$ Instruction



4-47. The X10 mode provides a weighted average of nine samples. The displayed value is multiplied by ten, and the decimal point is shifted one place to the right. Table 4-10 shows the data path through the last sample segment of the X10 program. The results of the previous sample (Da) are added to .001 (10Dx-Da), where Dx equals the current sample value.

Table 4-10. X10 Data Path

STEP	INSTRUCTION	X	R	D
0	SAMPLE	007 000 000 000	005 000 000 000	019 997 000 000 ← Da from 7th loop
1	SPEC. SUBT.	002 000 000 000 [Dx]	005 000 000 000	019 997 000 000
2	10X	020 000 000 000 [10Dx]	005 000 000 000	019 997 000 000
3	X→R	005 000 000 000	020 000 000 000	019 997 000 000
6	X→D	019 997 000 000	020 000 000 000	005 000 000 000
7	X→R	020 000 000 000	019 997 000 000	005 000 000 000
		[10Dx-Da]		
10	SUBTRACT	000 003 000 000	019 997 000 000	005 000 000 000
		[.001(10Dx-Da)]		
11	X ÷ 10^n	000 000 003 000	019 997 000 000	005 000 000 000
		[Da + .001(10Dx-Da)]		
12	ADD	019 997 003 000	019 997 000 000	005 000 000 000
13	X→R	019 997 000 000	019 997 003 000	005 000 000 000
14	RESET X	000 000 000 000	019 997 003 000	005 000 000 000
15	ADD	019 997 003 000	019 997 003 000	005 000 000 000
16	X→D	005 000 000 000	019 997 003 000	019 997 003 000
21	X→R	019 997 003 000	005 000 000 000	019 997 003 000
24	DISPLAY X	019 997 003 000	005 000 000 000	019 997 003 000
25	X→D	019 997 003 000	005 000 000 000	019 997 003 000

Display Da + .001(10Dx-Da) [X1999700.3]

X = Blank Digit

4-48. VELOCITY. When the VELOCITY pushbutton is depressed, the A8 Function Board generates a $\overline{\text{VEL MODE}}$ signal and a $\overline{\text{START PROG}}$ pulse. A latch in A8 will keep the VELOCITY pushbutton illuminated. If the VELOCITY switch is set to s, A8 produces a VEL SEC signal, and the /sec display will light. If the VELOCITY switch is set to m, a VEL MIN signal is produced, and the /min display will light. The program recycle rate is 10/sec when s is selected and 100/min when m is selected. The programs for Velocity mode are shown in Table 4-11. The $\overline{\text{VEL MODE}}$ signal alters the timing of the $\overline{\text{TRANS D}}$ signal (refer to A2 OPERATION). The VEL SEC and VEL MIN signals control the A9 Blanking Logic (refer to A9 OPERATION).

Table 4-11. Velocity Mode Programs

PROGRAM STEP	λ/4		in or mm	
	INSTRUCTION	TUVW	INSTRUCTION	TUVW
0	SAMPLE	LLHH	SAMPLE	LLHH
1	SPECIAL SUBTRACT	HHHL	SPECIAL SUBTRACT	HHHL
2	IDLE	HHHH	IDLE	HHHH
3	X→R	LLLH	X→R	LLLH
4	RESET X	LLLL	RESET X	LLLL
5	ADD	HHLH	ADD	HHLH
6	X→D	LHHL	X→D	LHHL
7	X→R	LLLH	X→R	LLLH
10	SUBTRACT	HHLL	SUBTRACT	HHLL
11	X ÷ 10^n	LHHH	X ÷ 10^n	LHHH
12	IDLE	HHHH	IDLE	HHHH
13	X→R	LLLH	X→R	LLLH
14	IDLE	HHHH	IDLE	HHHH
15	IDLE	HHHH	IDLE	HHHH
16	IDLE	HHHH	IDLE	HHHH
17	IDLE	HHHH	RESET X	LLLL
20	IDLE	HHHH	MULT CMPN	HLLH
21	X→R	LLLH	X→R	LLLH
22	IDLE	HHHH	RESET X	LLLL
23	IDLE	HHHH	MULT λ/4	HLHH
24	DISPLAY X	LHLL	DISPLAY X	LHLL
25	X→D	LHHL	X→D	LHHL

4-49. The instructions used in the Velocity mode program were previously described. Step 11, $X \div 10^n$, has no effect (n = 0) as shown in Table 4-12. The Velocity mode provides Dn - Dn-1, where Dn = current sample and Dn-1 = previous sample. Dn-Dn-1 is the time rate of change of distance, or velocity. The last instruction of any program is X —→D (step 25). The current displayed value will be stored in the D-Register. This value becomes Dn-1 for the Velocity program anytime that the VELOCITY pushbutton is depressed.

Table 4-12. Velocity Data Path

STEP	INSTRUCTION	X	R	D
0	SAMPLE	007	005	D_{n-1}
1	SPEC. SUBT.	002	005	D_{n-1}
3	X- -R	005	002	D_{n-1}
4	RESET X	000	002	D_{n-1}
5	ADD	002	002	D_{n-1}
6	X—D	D_{n-1}	002	002
7	X—R	002	D_{n-1}	002
10	SUBTRACT	002-D_{n-1}	D_{n-1}	002
11	$X \div 10^n$	002-D_{n-1}	D_{n-1}	002
13	X—R	D_{n-1}	002-D_{n-1}	002
21	X—R	002-D_{n-1}	D_{n-1}	002
24	DISPLAY X	002-D_{n-1}	D_{n-1}	002-D_{n-1}
25	X—D	002-D_{n-1}	D_{n-1}	002-D_{n-1}

DISPLAY = $D_n - D_{n-1}$ = [002-D_{n-1}]

4-50. CHECK. When the CHECKS 1 or CHECKS 2 pushbuttons are depressed, a CHECK MODE signal is produced by the A8 Function Board. A $\overline{\text{RESET SW}}$ signal is also produced, which causes the A2 Clock Board to generate a $\overline{\text{RESET}}$ pulse. The $\overline{\text{RESET}}$ pulse resets the counters in A3 and A4; the A7 Trip Logic will also reset (RESET lamp turns OFF). Depressing the CHECKS 1 pushbutton results in a $\overline{\text{CHECK X}}$ signal, which holds the A3 R-Register Board in a reset state. The Check mode programs shown in Table 4-13 are used to check the X-Register. Depressing the CHECKS 2 pushbutton results in a $\overline{\text{CHECK R}}$ signal, which holds the A4 X-Register in a reset state. The R-Register is checked by the Check Mode programs. The program recycle rate is 1/sec.

Table 4-13. Check Mode Programs

PROGRAM STEP	λ/4		in or mm	
	INSTRUCTION	TUVW	INSTRUCTION	TUVW
0	SAMPLE	LLHH	SAMPLE	LLHH
1	SPECIAL SUBTRACT	HHHL	SPECIAL SUBTRACT	HHHL
2	IDLE	HHHH	IDLE	HHHH
3	X—R	LLLH	X—R	LLLH
4	RESET X	LLLL	RESET X	LLLL
5	ADD	HHLH	ADD	HHLH
6	X—D	LHHL	X—D	LHHL
7	X—R	LLLH	X—R	LLHH
10	SUBTRACT	HHLL	SUBTRACT	HHLL
11	$X \div 10^n$	LHHH	$X \div 10^n$	LHHH
12	IDLE	HHHH	IDLE	HHHH
13	X—R	LLLH	X—R	LLLH
14	IDLE	HHHH	IDLE	HHHH
15	IDLE	HHHH	IDLE	HHHH
16	IDLE	HHHH	IDLE	HHHH
17	RESET X	LLLL	IDLE	HHHH
20	MULT CMPN	HLLH	IDLE	HHHH
21	IDLE	HHHH	IDLE	HHHH
22	IDLE	HHHH	RESET X	LLLL
23	IDLE	HHHH	MULT λ/4	HLHH
24	DISPLAY X	LHLL	DISPLAY X	LHLL
25	X—D	LHHL	X—D	LHHL

4-51. When the UNITS switch is set to $\lambda/4$, the appropriate Register Board (A3 or A4) will count the 10 MHz input pulses. The results of step 1 (SPECIAL SUBTRACT) will be positive (X–0) when CHECKS 1 is depressed or negative (0-R) when CHECKS 2 is depressed. The results are multiplied by the compensation number to produce 999XXXX, where XXXX equals the 4-digit number set by S18. When the UNITS switch is set to in, the results are multiplied by the $\lambda/4$ number to produce 6230230. When UNITS is set to mm, the results are multiplied by a different $\lambda/4$ number to produce 15824785.. If 5505A Laser Display Unit has Serial No. 1132A00485 or below, the $\lambda/4$ numbers are slightly different and produce an indication of 6230231 when UNITS switch is at in or 15824787 with UNITS switch at mm.

4-52. Notice that the sign of the displayed value is + if CHECKS 1 is depressed and - if CHECKS 2 is depressed. This is true when the DIRECTION SENSE switch is set to F. If the DIRECTION SENSE switch is set to R, the signs will reverse.

4-53. Updating Logic

4-54. The updating logic in the A2 Clock Board will be enabled when any of the following conditions occurs during operation:

a. Any pushbutton depressed (NORMAL, SMOOTH, X10, VELOCITY, RESET, CHECKS 1 or CHECKS 2)

b. UNITS switch position changed

c. TUNE switch operated

d. Laser reflector slew rate exceeds approximately 0.006 in/sec.

Conditions a, b, and c result in 10 msec of updating. Condition d results in 500 msec of updating. The UPDATE signal produced by A2 alters the program which is currently running. Step 11, the $X \div 10^n$ instruction, is replaced by IDLE. The two modes that are affected by updating are SMOOTH and X10. In any of the Smooth or X10 programs, the $X \div 10^n$ (n = 2 or 3) instruction is bypassed so that the display does not lag the actual distance by an excessive amount. The updating feature compensates for the long time constant inherent in the averaging modes.

4-55. External Programming

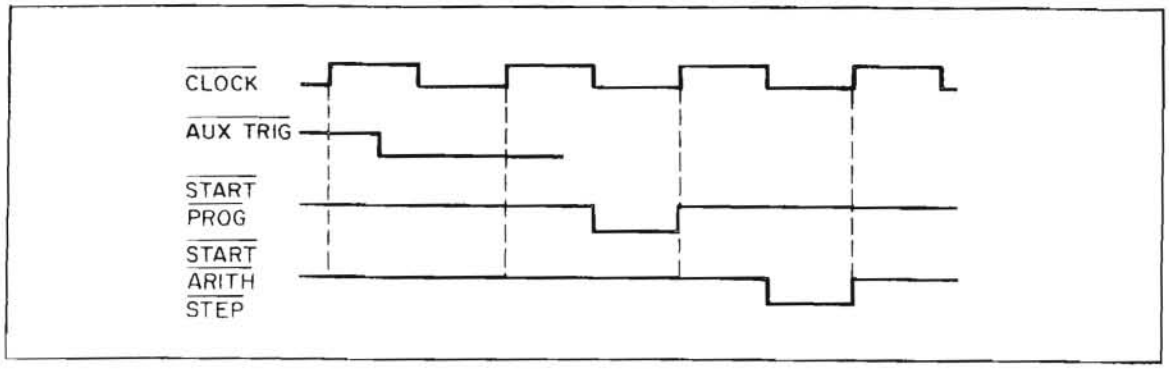
4-56. Referring to the 5505A Block Diagram (Figure 8-29), connector J3 is used for external programming and connector J4 is used for auxiliary mode control. The following external programming features are available:

a. **Program initiation.** When $\overline{\text{COMP TRIG}}$ is applied and $\overline{\text{C TRIG EBL}}$ is LOW, a $\overline{\text{START PROG}}$ pulse will be generated by the A8 Function Board. This function may also be controlled via J4 by applying an $\overline{\text{S EXT MEAS}}$ signal when $\overline{\text{A TRIG EBL}}$ is LOW. Figure 4-9 illustrates the timing of the START PROG pulse for an external trigger input.

b. **External program selection.** When $\overline{\text{E PRG SEL}}$ is applied the hardwired internal A7 program is disabled. The A8 Program Select Logic is enabled so that external instructions can be applied. When the program is complete, an $\overline{\text{E PGM LST}}$ signal is applied to terminate the program and a PROG COMPL signal will be generated.

c. **External instructions.** External 4-bit instructions are applied on the $\overline{\text{T EXT}}$, $\overline{\text{U EXT}}$, $\overline{\text{V EXT}}$, and $\overline{\text{W EXT}}$ lines. Programming examples are shown in paragraph 4-29 through 4-52. Notice that some operations require multiple instructions: to perform R→D, do X→R, X→D, X→R; to perform R→X, do RESET X, ADD. A new instruction, X→E, can be used with an external (E) register. X-data and SHIFT E pulses are supplied to an external device. E-data are loaded into the X-Register via A5. Refer to A6 OPERATION for further programming information.

Figure 4-9. External Program Timing



4-57. When an automatic compensation unit (5510A) is used with the 5526A, data are interchanged via W4J3. During program operation the velocity of light or workpiece temperature compensation numbers can be supplied from the remote unit. This eliminates the necessity of using the front-panel thumbwheel switches.

4-58. DESCRIPTIONS OF ASSEMBLIES IN THE 5526A LASER MEASUREMENT SYSTEM

4-59. In the following paragraphs the individual assemblies of the 5500C Laser Head and the 5505A Display Unit are described.

4-60. 5500C LASER HEAD ASSEMBLY DESCRIPTIONS

4-61. A1 Connector Board

4-62. The A1 Connector Board contains the connectors used for interfacing the 5500C to 5505A Laser Display Units A and B. Connector J1 is used for the A display unit, and J2 is used for B display unit connections. For single-channel operation, either display unit may be connected. Thus, any of the four input ports may be used by the return light beam with the appropriate 5500C turret positioning and connector board connections. The doppler A and B signals from A5A6 and reference A and B signals from A5A8 are routed through J1 to the A display unit. J2 provides the doppler signals from A5A7 to the B display unit. The measurement reference signals, applied to the B display unit, are controlled by Mode Switch S2. When S2 is in the N (Normal) position, the reference A and B signals are used as measurement references for the B display unit. With S2 in the D (differential) position, the doppler A and B signals are used as measurement references for the B display unit. This arrangement allows the B display to show relative displacement between the A and B channels.

4-63. The difference amplifier, consisting of A1Q1 and A1Q2, is basically a comparator circuit which is used to control laser tube current. LASER CURRENT ADJUST A1R4 sets the operating current level of the laser tube by providing a reference input to A1Q1. The other comparator input to A1Q2 is a voltage level which is proportional to laser tube current. A1R4 is adjusted for the appropriate voltage measurement at LASER CURRENT; test point "TP" on A1 (i.e. the input to A1Q2). Once set, any change in laser current results in a comparator error input. This causes a change in the conduction of A1Q1. The resulting LASER I output signal change is applied to the Regulator Board A12 in the controlling 5505A display unit and ultimately controls the laser tube high voltage. The change in high voltage results in proportional change in laser tube current which nulls the comparator error signal at the input to A1Q2.

4-64. Normally, the B display unit is used only to process the B doppler and reference measurement signals. The A display unit, in addition to processing the A doppler and A reference measurement signals, provides tuning control, laser current control, and operating voltages for the 5500C. The B display units provide these functions only when the A display unit is not connected in the system. When the A display is connected, +15 Vdc derived from that display, forward biases A1Q3. The resulting conduction of A1Q3 transfers approximately -14 Vdc to the anodes of A1CR7 and A1CR8, reverse biasing these diodes. The diodes then appear as open circuits that block the B display Lock (A) and Lock (B) signal path to the 5500C. Light-emitting-diode A1CR12 will be lighted when the laser beam is on.

4-65. A2 Laser Assembly

4-66. The laser tube contains a plasma cavity with internal mirrors. The rear mirror is mounted against a piezo-electric wafer (PZT) which forms part of the electronic tuning loop. All laser tube elements are encased in a glass envelope through which are brought the cathode, anode, and PZT leads. The output of the laser passes through a quarter and half-wave plate assembly, beam-expanding telescope, aperture, and into the A5 Receiver Assembly.

4-67. A3 Interconnect Board

4-68. A3 provides interconnections between the power supplies (A4 and A7) and Connector Board A1. Because of the high voltages generated by A4 and A7, and to turn off the laser light, an interlock switch A3S1 is included to disable the power supplies when the 5500C top cover is removed. A3R1 develops a voltage proportional to the laser tube current and supplies it to A1 as the LI Monitor signal.

4-69. A7 High Voltage Power Supply

4-70. The A2 High Voltage Power Supply consists of an oscillator and a high voltage multiplier circuit. The oscillator is activated when -15 volts is supplied via safety switch A3S1. Oscillation is maintained by internal switching transistors that alternately drive magnetic core transformer T1 in and out of saturation at a rate that depends on the amount of voltage delivered by series regulator Q1. Higher drive voltage results in a higher oscillator frequency and a higher peak-to-peak amplitude. Less voltage reduces oscillator frequency and amplitude. The typical oscillator output range is 12.5 kHz at 50 volts (peak-to-peak) to 25 kHz at 125 volts (peak-to-peak). The oscillator output signal determines the amount of high voltage dc output that is produced by the high voltage multiplier circuit.

4-70a. The high voltage multiplier consists of voltage doubler circuits that are wired in series to produce a net high voltage output of up to 10K Vdc. This variable output is applied to the anode of the laser tube to control tube current. The high voltage circuit responds to a variation in cathode current by providing a change in anode high voltage. This high voltage change brings laser tube current back to the appropriate level.

4-70b. A4 PZT Power Supply

4-70c. The PZT Power Supply operates in a manner similar to the High Voltage Power Supply and consists of an oscillator and one voltage doubler. This power supply responds to control input by providing a dc output that varies from 1 to 2 kV. This output directly controls the laser tube PZT, and ultimately causes equalization of the laser beam f and f frequency components.

4-71. A5 Receiver Assembly

4-72. A5A6 AND A5A7 DOPPLER PREAMPLIFIERS. The two doppler preamplifiers are identical. The photodetector outputs are connected in parallel and used to drive the trans-resistance stage. This stage consists of a cascode circuit (Q1, Q2), bootstrap circuit (Q3), emitter follower (Q4), and feedback components R2 and C5. The ac component of the photo-detector output flows through the feedback components, R2 and C5; this is a low-impedance path. The cascode circuit is designed to have a high open-loop gain, and this is accomplished by the bootstrap circuit. The open-loop gain of the cascode circuit is proportional to the transconductance of Q2 and the circuit load resistance (R4 and R5). When the load current through Q1 starts to increase, feedback through Q3 and C4 limits the load current, which effectively increases the cascode load resistance. The output of Q4 drives limiting amplifier U1, which has a gain of 60 to 70 dB. Transistor Q7 is a level shifter, with a voltage gain of 2.5, which drives U2. U2 is connected as a differential line driver which supplies logic pulses to the 5505A Display Unit. CR6 through CR8 are clamp diodes to prevent damage to U2.

4-73. The output from Q4 is also routed to the beam alignment circuit. The signal is applied to a second cascode stage consisting of Q5 and Q6. Capacitors provide roll-off at frequencies of 150 kHz and 5 MHz. Resistor R13 is used to control the gain of the cascode stage. The output from Q5 is connected to peak detector U3. Operating voltages for peak detector U3 and the cascode stage are determined by zener diodes CR3 and CR1. The output of U3 is connected to a logrithmatic amplifier consisting of U4 and associated zener diodes CR4 and CR5. This circuit uses a nonlinear array of diodes to provide a 3-step, piecewise approximation of a

logrithmatic response. The BEAM ALIGNMENT signal is approximately equal to the logarithm of the input to U4 so that the BEAM ALIGNMENT meter indicates decibels of change. Transistor Q8 is used to allow the output level of U4 to vary up to the +15V dc operating voltage. This provision allows the BEAM ALIGNMENT meter to read full-scale with maximum output from U4.

4-74. A5A8 LOCK REFERENCE BOARD. The Lock Reference Board consists of a reference signal preamplifier, frequency lock circuit, and reference trip circuit. The reference signal preamplifier is identical to the doppler preamplifier, previously described. Transistors Q1 and Q2 comprise the cascode circuit, with Q3 used for isolation in the bootstrap circuit. Transistor Q5 is the emitter follower which drives limiting amplifier U2. Transistor Q8 is a level shifter which is connected to differential line driver U3. Zener diode CR1 is used to provide +12V dc for this circuit. The output of U2 is rectified by transistor Q7 and is used as the REFERENCE TRIP signal. The reference circuit amplifies the ac component of the photodetector output, so the REFERENCE TRIP signal indicates the amplitude of this component.

4-75. The outputs from the reference photodetectors are connected to the differential inputs of amplifier U1 Capacitor C3 is used for balancing the input to U1. The single-ended output from U1 is connected to a differential amplifier (Q4 and Q6) which provides the differential LOCK output. Feedback components R11, R12, and balance resistor R16 cause the input voltage seen by amplifier U1 to remain constant. Therefore, the differential LOCK output voltage is inversely porportional to the photodetector output currents. Capacitors C14 and C15 provide noise filtering for the LOCK output.

4-76. 5505A LASER DISPLAY UNIT ASSEMBLY DESCRIPTIONS

4-77. Assemblies in the 5505A Laser Display Unit are described in the following paragraphs. Schematic diagrams and photos of each assembly are in Section VIII.

4-78. A1 Analog Board

4-79. AMPLIFIERS. Identical amplifier circuits are provided for doppler and reference signals. Only the doppler channel amplifier will be described. The differential signal DOP A/DOP B is applied to a bandpass filter which is balanced with respect to ground. The output from the filter is connected to differential amplifier Q1, Q2. The current source for the differential amplifier is Q7. The output from the differential amplifier is connected to emitter follower Q5. From Q5, the signal is coupled to operational amplifier U7. CR1 provides +6V to operate U7. The signal from U7 is routed through emitter follower Q9 to the Schmitt Trigger (Q11, Q13). Diode CR3 provides temperature compensation for the Schmitt Trigger. The output of the Schmitt Trigger drives the Frequency Doubler. The signal at TP3 is inverted by U1B, differentiated by C32, R75, and used to disable U1D. The output of U1B is also applied to U1A, differentiated by C33, R76, and used to disable U1D. The effect of this circuit is to provide two narrow pulses for each Schmitt Trigger output pulse. The output from U1D is the COUNT DOP signal at twice the input frequency.

4-80. ERROR LOGIC. The BEAM AL signal is applied to R65 is series with BEAM ALIGNMENT meter M1. The BEAM AL signal has a range of 0 to +15V, so +15V will supply 1 mA to M1 for full-scale deflection. A marginal signal is defined as +3V (corresponds to red/green line on M1) and should trigger Q15, Q17 to provide an $\overline{\text{ERROR TRIP}}$ signal. R66 and C28 filter the input to Q15 to provide some noise immunity. R77 and R81 are a voltage divider to set the trigger level of Q15 emitter at +3.6V. When BEAM AL drops below +3V, Q15 turns ON, Q17 turns ON, and $\overline{\text{ERROR TRIP}}$ = LOW. The REF TRIP signal is routed to an identical circuit (Q16, Q18), except that it is not metered. If either amplitude signal decreases below +3V, $\overline{\text{ERROR TRIP}}$ is produced. The Slew Rate Detector compares the COUNT DOP frequency to a 100 kHz standard frequency. The 100 kHz signal is differentiated by C10, R11 to supply a 200 nsec pulse, which resets U4 and U5 to zero. COUNT DOP is divided by six in U4. When the third COUNT DOP pulse arrives at the U4 BD input, the ZD output goes HIGH to set the U3C/U3B latch. The ZD output of U4 is also connected to the Decade Counter.

When the Decade Counter output equals nine (HLLH), U2A and U2D are enabled to set the U3D/U3A latch. The 100 kHz signal is also differentiated by C4, R9 and routed to U2C. If U2C is enabled by U2B, $\overline{\text{ERROR TRIP}}$ is produced. This occurs for two conditions: (1) number of COUNT DOP pulses is too low in 6 μsec sample period (<3 COUNT DOP pulses, ZD output of U4 stays LOW, the U3C/U3B latch remains reset, U2B enabled, U2C enabled), or (2) number of COUNT DOP pulses is too high in 6 μsec sample period (≥54 COUNT DOP pulses, U5 output enables U2A and U2D to set the U3D/U3A latch, U2B enabled, U2C enabled).

4-81 A2 Clock Board

4-82. 10 MHz OSCILLATOR. Q3 and associated components form an oscillator whose frequency is determined by Y1. C6 and C8 provide coarse and fine tuning of the oscillator. The oscillator voltage is applied through a capacitive divider (C10, C11) to amplifier Q13. The 10 MHz output from Q13 is inverted by U1C to provide the 10 MHz signal. The 10 MHz signal also is supplied to the Time Base Decade (U8) via U1B and U1D. The 1 MHz output from the Decade is inverted by U1A to form $\overline{\text{1 MHz}}$. This signal is selected by S1 when set to INT. When S1 is set to EXT, an external clock input from J9 is used by the 5505A. If U13B is enabled (during count pulse removal process, see A3 OPERATION), the internal $\overline{\text{1 MHz}}$ signal will be disabled (U1B disabled).

4-83. UPDATE LOGIC. An UPDATE signal will be produced for any of four conditions: (1) $\overline{\text{RESET}}$ signal occurs, (2) BUTTON signal occurs, (3) S2 switch position changed during operation, (4) fast slew logic enabled. The $\overline{\text{RESET}}$ signal enables a pulse stretcher (U7C,B) which enables U5D. The pulse stretcher maintains UPDATE = HIGH for approximately 10 μsec. If BUTTON occurs (any front panel button depressed), U4D, U14C, U7D enable the pulse stretcher. Normally, one input to U13A will be LOW, so that the gate is disabled. If S2 is switched, U13A will momentarily enable, as the switch moves between positions. This will also produce UPDATE via U14C.

4-84. The last condition for producing an UPDATE signal happens when the slew rate (fringe frequency) is excessive. If $\overline{\text{D2B8}}$ is LOW during the TRANSFER pulse, U15D, U15A are enabled. Q5, Q7, and Q9 turn ON and C7 is rapidly discharged. When TRANSFER = LOW, U15A is disabled, Q5, Q7, and Q9 turn OFF, and C7 charges through R25, R26 until the Schmitt Trigger (Q10, Q12) trips. The Schmitt Trigger will trip approximately 0.5 seconds after C7 begins charging. While C7 is charging, U14B is armed. If TRANSFER and $\overline{\text{D2B4}}$ are HIGH, and $\overline{\text{D2B2}}$ = LOW, U14A, U15C, and U14B are enabled. Q1 will turn OFF, which turns Q2, Q4, and Q6 ON. Notice that this circuit is identical to the Q5, Q7, Q9 circuit: C5 is discharged and recharges through R20, R21 until Q8, Q11 trips. While C5 is charging, U5C and U5D are enabled to produce UPDATE = HIGH for approximately 0.5 seconds.

4-85. INITIAL MODE SELECT LOGIC. When the 5505A POWER switch is turned ON, the +5V supply voltage will rise until U4D is enabled to provide a $\overline{\text{SET NORM}}$ signal. This ensures that the Normal mode is selected initially. As C19 charges through R65 to +5V, U4D is disabled, and $\overline{\text{SET NORM}}$ goes HIGH. When POWER is turned OFF, CR4 allows C19 to rapidly discharge.

4-86. SPECIAL SUBTRACT LOGIC. When $\overline{\text{C STRB}}$ is received, U12B and U12D are armed. If the X-Register most significant digit is between 0 and 4, U12B is enabled, and $\overline{\text{SET CARRY}}$ is produced. If the X-Register most significant digit is between 5 and 9, U12D is enabled, and $\overline{\text{CLR CARRY}}$ is produced.

4-87. TRANSFER D LOGIC. There are three different conditions for production of $\overline{\text{TRANS D}}$, corresponding to the following modes: (1) Velocity (/min), (2) Velocity (/sec), and (3) all other modes (refer to timing diagram). In order to enable U13C, $\overline{\text{DISPLAY X}}$ must enable U11B, CLOCK must occur, U11A must be disabled, U11C must be enabled, and one of the U10A, B, or D gates must be enabled. When Velocity (/min) is selected, $\overline{\text{TRANS D}}$ is produced when CLOCK, GEN1 and T10/11 all occur (U9D, U9A, U10D, U11D, U13C enabled). When Velocity (/sec) is selected, $\overline{\text{TRANS D}}$ is produced when CLOCK, GEN1 and T12/13 occur (U9D, U9C, U10B, U11D, U13C enabled). In all other modes, $\overline{\text{TRANS D}}$ is produced when CLOCK and T14 both occur (U10A, U11D, U13C enabled). There are two ways to disable this logic: (1) [$\overline{\text{XDTH}}$ × $\overline{\text{RDTH}}$] enables U11A, disables U11B and U13C, or (2) +PR INH turns Q16 ON, disables U11C, U11D, and U13C.

4-88. EXT TRIGGER LOGIC. $\overline{\text{S EXT MEAS}}$ is applied to a pulse stretcher which maintains $\overline{\text{CL AUX TG}}$ = LOW for approximately 10 msec.

4-89. RESET LOGIC. When $\overline{\text{RESET SW}}$ occurs, the Reset Pulse Stretcher maintains $\overline{\text{RESET}}$ = LOW for approximately 10 msec. If MANUAL TUNE RESET occurs, C14 will be rapidly discharged to trip the Q14, Q15 Schmitt Trigger and enable U3A. The Reset Pulse Stretcher is enabled until C14 charges through R43, R45 to the point where Q14, Q15 trips again and disables U3A. The delay provided by C14, R43, R45 is approximately 4 sec. CR1 provides a rapid discharge path for C14, when 5505 POWER is turned OFF. Notice that when U3A is enabled, U7A is enabled. The Relay Pulse Stretcher will be disabled via U5B to prevent a relay click when POWER is turned ON or when the laser is manually tuned.

4-90. PRINT LOGIC. When S13 is used to supply $\overline{\text{MAN PRINT}}$, the Print Switch Stretcher provides a delay of approximately 10 msec to enable U4A, U6D, turn Q19 OFF, and provide a +PR COMMAND. Additionally, U6C enables the Relay Pulse Stretcher, which enables the Relay Driver (Q17, Q18) for approximately 250 μsec. Relay K1 is enabled to provide a contact closure at J7. When a PRINT pulse arrives, the Print Pulse Stretcher provides an approximately 60 μsec pulse to enable U6D (provides +PR COMMAND). If RLY INHIB = LOW, U6B will also enable to enable U6C (provides K1 contact closure). CR3, R61, and C17 prevent a relay click when POWER is turned OFF.

4-91. A3, A4 R and X Counter-Register Boards

4-92. The R and X counter-registers, A3 and A4, are identical. Operating information is provided for A3 (R-Counter/Register), which differs from A4 in signal names only.

4-93. COUNTER. The nine-decade counter consists of U1—U9. The counter is reset to zero via U21B by any of the following signals: $\overline{\text{RESET}}$, $\overline{\text{XR ZERO}}$, $\overline{\text{CHECK X}}$. Normally, CHECK MODE = LOW and $\overline{\text{SAMPLE}}$ = HIGH. COUNT REF pulses will be gated through U25F and U30A into the counter. If CHECK MODE = HIGH, 10 MHz pulses are gated by U25A, instead of COUNT REF pulses. $\overline{\text{SAMPLE}}$ = HIGH holds the Pause flip-flop in a reset state. The counter will count to maximum and then overflow to zero; this process continues until $\overline{\text{SAMPLE}}$ = LOW occurs.

4-94. PAUSE CLUTCH. The Pause flip-flop (U31) and Deacde Counter (U10) along with some associated gates, form the Pause Clutch (Count Pulse Remover) which allows carry propagation through the entire counter. When $\overline{\text{SAMPLE}}$ = LOW, the reset input to the pause flip-flop and Decade Counter are disabled (refer to timing diagram). When TRANSFER = HIGH occurs, the 0.5 μsec pulse is differentiated to produce a 50 nsec pulse that resets the Decade Counter to zero. The ZD output from the Decade Counter reverses the inputs to the Pause flip-flop (J = HIGH, K = LOW). The next input pulse (COUNT REF or 10 MHz) will clock the Pause flip-flop to a set state. The Q output arms U30B and makes R PAUSE = HIGH. The Q output disables U30A (counter input disabled). Each time an input pulse occurs, U30B will be enabled, and the Decade Counter will advance. When the Decade Counter reaches state 4, the ZC output will go HIGH. The PR CLEAR bus is enabled to reset the Shift Register to zero. When the Decade Counter reaches state 8, the ZD output will reverse (J = LOW, K = HIGH) and U21C will be armed. The next input pulse will enable U21C, to preset the Shift Register. The input pulse also clocks the Pause flip-flop to a reset state (R PAUSE goes LOW, U30B disabled, and U30A enabled). This ends the count pulse removal process and the counter input is again enabled.

4-95. SHIFT REGISTER. The 12-digit BCD storage/shift register consists of U12—19 and U26—U29. The register functions in a serial shift or parallel load (PRESET) mode. When PR1 inputs are LOW, the serial shift mode is enabled. F-data in 4-bit BCD format are loaded into U12—U15. Data overflow from the outputs to the U16—U19 inputs. Data overflow from U16—U19 outputs to U26—U29 inputs. Negative logic input data is inverted by U24 so that data is stored in positive logic form in the register. Output R-data is sent to A5 as positive logic. Each individual register is a 4-bit device, so 12 digits of storage are provided for the 4-bit BCD word. If $\overline{\text{ONE SH R}}$ is LOW, U30C and the common Clock input are enabled to provide a one-bit shift of data in the register. When $\overline{\text{SHIFT R}}$ pulses occur, U30C is enabled so that data are shifted through the register (left to right on the schematic).

When the PR1 inputs are HIGH, during the count pulse removal process, the serial shift mode is disabled. Data will not actually be loaded (parallel load mode enabled) until U21C enables U11A at the end of the count pulse removal process. At this time, the data contained in the Counter are loaded in 4-bit BCD format into the Shift Register (1A—1D inputs). The three least significant digits are zero (1B, 1C, 1D wired LOW). The Shift Register is then returned to the serial input mode so that the new data may be manipulated. Notice that when $\overline{\text{SHIFT R}}$ occurs, F-data are loaded into Quad Latch U23. The outputs are $\overline{\text{XMSD1}}$ — $\overline{\text{XMSD8}}$, used by A2 Special Subtract Logic.

4-96. DISPLAY TRANSFER INHIBIT LOGIC. U21A, U25B—D, U22, and U11B are used to produce $\overline{\text{RDTH}}$ during check mode. This signal prevents display of a bizarre check number. When U1 contains 0 (LLLL) or 5 (LHLH), U25D(6) will be HIGH and Q2 turns ON. Since CHECK MODE is HIGH, Q1 turns ON to enable U22A. U11B will be enabled when CHECK MODE = HIGH, U1 contains 0 or 5, and U2 contains 0.

4-97. A5 Adder Board

4-98. ADDERS. The first adder (U13) forms the binary sum of two 4-bit BCD words (A1, A2, A3, A4 and B1, B2, B3, B4). The output of the first adder becomes the B-input to the second adder (U21). The U5A, U12A, U12B logic produces an output when the output from the first adder is >9 (10 to 15, or C4 = LOW). This output from U12B is used to make the A-word for the second adder equal to BCD 6, so that the output from the second adder is in decimal form. The adders are negative logic inputs and outputs so the example below uses 0 and 1, instead of LOW and HIGH, to avoid confusion.

FIRST ADDER	DECIMAL	BCD
A-WORD	6	0 1 1 0
B-WORD	7	1 1 1 0
Σ-WORD	13	1 0 1 1
C4	0	0
		1 2 4 8

SECOND ADDER	DECIMAL	BCD
A-WORD	6	0 1 1 0
B-WORD	13	1 0 1 1
Σ-WORD	3	1 1 0 0
C4	1	1
		1 2 4 8

Notice that the carry output from the second adder represents tens (1) and the Σ-word represents units (3). The BCD 13 has been converted to decimal 13. Either the >9 detect logic or C4 output from U21 will enable U4B to arm the Carry flip-flop (U14B). When SHIFT X occurs, the Carry flip-flop will be set (CARRY = HIGH), if U4B is enabled, or reset (CARRY = LOW), if U4B is disabled. Signals $\overline{\text{SET CARRY}}$ and $\overline{\text{CLR CARRY}}$ are used to set or reset the Carry flip-flop during the SPECIAL SUBTRACT instruction. When CARRY = HIGH, Cin for the first adder is enabled.

4-99. The A-word for the first adder is gated by U18—U20. E-data are loaded when EB = HIGH. D-data are loaded when DB = HIGH. R-data are loaded when RB = HIGH. The B-word for the first adder is gated by U1 and U2. When $\overline{\text{XA}}$ and $\overline{\text{SHIFT 12}}$ are both LOW, U3D enables U1 and U2 so that X-data are loaded. When CA = HIGH, U1 and U2 load the nines-complement of the X-data. To obtain the nines-complement, U3C, U4A, U4D, U5B, U6D, and U12C are used. Table 4-14 shows the Boolean expressions and their simplified forms produced by the logic.

Table 4-14. Boolean Expressions

INPUT	NINES-COMPLEMENT LOGIC OUTPUT		
	ORIGINAL EXPRESSION	SIMPLIFIED FORM	LOCATION
X1	$\overline{X1}$	$\overline{X1}$	U2(1)
X2	X2	X2	U2(4)
X4	$\lvert X2 \cdot \overline{(X2 \cdot X4)}\rvert + \lvert X4 \cdot \overline{(X2 \cdot X4)}\rvert$	$X2\overline{X4} + \overline{X2}X4$	U1(5)
X8	$\lvert \overline{X8} \cdot \overline{(X2 \cdot X4)}\rvert \cdot \overline{\lvert (X2\overline{X4} + \overline{X2}X4)\rvert}$	X2X4X8	U1(9)

4-100. For example, suppose the X-word is 5 (HLHL). The complement logic provides 9-5 = 4 (LLHL) as its output. The 1st bit is inverted, and the 2nd bit is unchanged. The 3rd bit is HIGH because X2 = X4. The last bit is LOW because X2, X4, and X8 are not all LOW.

4-101. When XR = $\overline{RR}$ is HIGH, X-data are gated through U10, U11 to become F-data. When XR = $\overline{RR}$ and $\overline{SHIFT\ 12}$ are both LOW, U12D is enabled so that R-data are gated through U10, U11 to become F-data.

4-102. SHIFT TIMING GENERATOR. When $\overline{START\ GEN}$ occurs, U22A is enabled to clock the Start/Restart flip-flop (U14A) to a set state. U22C is enabled, and U22D is armed. When the next $\overline{CLOCK}$ pulse occurs, U22D is enabled to advance the Shift Timing Counter from state 15 (HHHH) to 0 (LLLL). As shown in the Shift Timing table (4-15), the Start/Restart flip-flop is reset at state 0. The table indicates what signals are produced as the Shift Timing Counter is advanced by CLOCK. The table shows gating for all instructions except $X \div 10^n$, 10X, and SAMPLE, which are described separately. Signal $\overline{SHIFT\ 12}$ = LOW from state 2 through 13. One $\overline{SHIFT\ X}$, SHIFT X, and $\overline{SHIFT\ R}$ pulse is produced for each state from 2 through 13 (refer to Figure 4-10 timing diagram). If DB = HIGH, a $\overline{SHIFT\ D}$ pulse is produced for each $\overline{SHIFT\ X}$ pulse. If EB = HIGH, a $\overline{SHIFT\ E}$ pulse is produced for each $\overline{SHIFT\ X}$. Notice that GEN 1 is produced each time the ZA output from the Shift Timing Counter is HIGH.

4-103. When instruction 10X is executed, signal 10X = HIGH enables U25C at state 13. The U9C gate will be disabled so that $\overline{SHIFT\ X}$ and SHIFT X will not occur at state 13. Only 11 pulses will occur during this instruction (equivalent to shifting the X-data left by one bit). When SAMPLE is executed, U25B, $\overline{SHIFT\ R}$, U9C, $\overline{SHIFT\ X}$, and SHIFT X are all disabled. When $X \div 10^n$ is executed, there are three possible cases, based on the mode selected. For NORMAL, both $\overline{SMOOTH}$ and $\overline{X10}$ are HIGH, so DIVIDE has no effect on the number of shift pulses. If SMOOTH is selected, U17C and U9A will enable U8B during state 0 and 1. Two additional $\overline{SHIFT\ X}$ and SHIFT X pulses occur. If X10 is selected, U17C and U9A will enable U8B during state 0 and 1. U16B and U17D will also enable U8B during state 14. Three additional $\overline{SHIFT\ X}$ and SHIFT X pulses occur.

4-104. A6 Algorithm Board

4-105. The primary purpose of the Algorithm Board is to decode the instruction word (T U V W) stored in U21. One-bit sign registers for X, R, and D are also provided. Instructions and their codes are shown in Table 4-16.

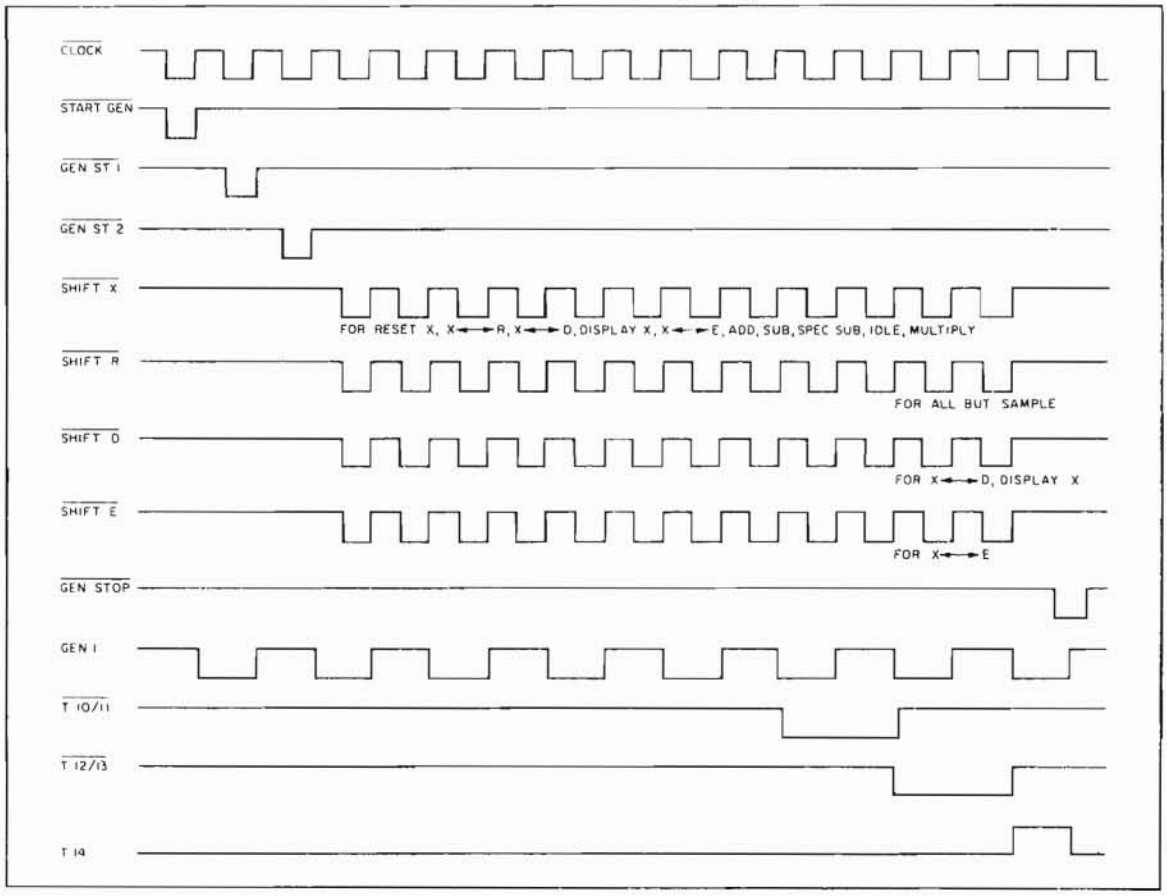
Table 4-15. Shift Timing Table

U23		LOGIC	DB HIGH	EB HIGH
STATE	OUTPUT			
0	LLLL	U7C, U22B, U6A, Reset Start Restart F/F, U24D, $\overline{GEN\ START\ 1}$		
1	HLLL	U7C, U16C, U24A, $\overline{GEN\ START\ 2}$, GEN 1		
2	LHLL	U24C, $\overline{SHIFT\ 12}$; U8C, U8B, U9C, $\overline{SHIFT\ X}$, U6C, SHIFT X; U6B, U25B $\overline{SHIFT\ R}$	U17B, $\overline{SHIFT\ D}$	U25A, $\overline{SHIFT\ E}$
3 THRU 9	HHLL THRU HLLH	SAME AS STATE 2 GEN 1 EACH ODD NUMBERED STATE	SAME AS STATE 2	SAME AS STATE 2
10	LHLH	SAME AS STATE 2 ALSO, U8A, $\overline{T10\ T11}$	SAME AS STATE 2	SAME AS STATE 2
11	HHLH	SAME AS STATE 2 ALSO, U8A, $\overline{T10\ T11}$; GEN 1	SAME AS STATE 2	SAME AS STATE 2
12	LLHH	SAME AS STATE 2 ALSO, U7B, $\overline{T12\ T13}$	SAME AS STATE 2	SAME AS STATE 2
13	HLHH	SAME AS STATE 2 ALSO, U7B, $\overline{T12\ T13}$; GEN 1	SAME AS STATE 2	SAME AS STATE 2
14	LHHH	U7A, U16A, T14; U24B, GEN STOP		
15	HHHH	U7A, U16D, U6E Disables U22C, U22D, Shift Timing Counter, Arms U22A		

Table 4-16. TUVW Instructions and Codes

INSTRUCTION	T	U	V	W
RESET X	L	L	L	L
X → R	L	L	L	H
10X	L	L	H	L
SAMPLE	L	L	H	H
DISPLAY X	L	H	L	L
X → E	L	H	L	H
X → D	L	H	H	L
X ÷ 10^n	L	H	H	H
NOT USED	H	L	L	L
MULT CMPN	H	L	L	H
NOT USED	H	L	H	L
MULT X/4	H	L	H	H
SUBTRACT	H	H	L	L
ADD	H	H	L	H
SPECIAL SUBTRACT	H	H	H	L
IDLE	H	H	H	H

Figure 4-10. Shift Timing Diagram



4-106. The instruction word will be loaded into the Instruction Register during the $\overline{\text{ST ARITH STEP}}$ pulse. $\overline{\text{ST ARITH STEP}}$ also enables U22A, U23B, to cause a $\overline{\text{START GEN}}$ pulse. The signs of the X, R, and D words are stored in U8—U10. SIGN D or $\overline{\text{SIGN D}}$ is selected by S5. SIGN X is routed to an external device via W4J3 for the X←→E instruction. SIGN E is returned via W4J3 for the X←→E instruction. U1B is used to decode the states of the SIGN X and SIGN R flip-flops. When the flip-flop contents are equal, U1B(8) = HIGH; when the signs are opposite, U1B(8) = LOW. U1A is used to control CA and $\overline{\text{XA}}$ selection during ADD, SUBTRACT, and SPECIAL SUBTRACT. U1A output ($\overline{\text{TRUE SUBTRACT}}$) is determined by U1B. The Sign Routing Logic is used to control interchange of information between the SIGN flip-flops.

4-107. SINGLE-CYCLE INSTRUCTION. If the T-bit of the instruction word is LOW, the instruction will always be executed in one cycle. IDLE is also a single-cycle instruction. Table 4-17 indicates which gates are enabled (X), armed (+), and disabled (0) at $\overline{\text{ST ARITH STEP}}$, $\overline{\text{GEN ST 2}}$, and $\overline{\text{GEN STOP}}$.

4-108. RESET X
The SIGN X F/F is reset to SIGN X = HIGH

4-109. X←→R
RB and XA = $\overline{\text{RR}}$ allow the X and R-Register contents to be interchanged. If SIGN X ≠ SIGN R, the signs are interchanged.

4-110. 10X
A 10X command is produced for A5.

4-111. SAMPLE
$\overline{\text{SAMPLE}}$ and TRANSFER pulses are produced for A3 and A4. The SIGN X and SIGN R F/F's are reset to SIGN X = SIGN R = HIGH.

4-112. DISPLAY X
$\overline{\text{DISPLAY X}}$ is produced. If SIGN X ≠ SIGN D, the signs are interchanged.

4-113. X←→E
EB allows the X-Register contents to be interchanged with an External Register's contents. If SIGN X ≠ SIGN E, the signs are interchanged.

4-114. X←→D
DB allows the X and D-Register contents to be interchanged. If SIGN X ≠ SIGN D, the signs are interchanged.

4-115. X÷ 10^n
A DIVIDE command is produced for A5.

4-116. IDLE
No operation occurs.

4-117. MULTI-CYCLE INSTRUCTION
If the T-bit of the instruction word is HIGH, the instruction may require more than one cycle (except for IDLE). Refer to Table 4-18 and flow charts (Figures 4-11 through 4-13) for details.

Table 4-17. Single Cycle Instructions

INSTRUCTIONS	CODE (TUVW)	ST ARITH STEP		GEN ST 2		GEN STOP		COMMENTS
RESET X	LLLL	U20B, U19C, U18B, U16C	X	U16A, U16D, SIGN X F/F = RESET	X	U7A, ARITH STEP COMPL	X	
		SIGN X F/F (K=HIGH)	+					
X—R	LLLH	U19B; U20A, U11D, XR=RR; U5B, U12B, U5A, RB	X	U16A, U16D, SIGN X F/F; SIGN R F/F	X	U7A, ARITH STEP COMPL	X	IF SIGN X & SIGN R ARE OPPOSITE, THEY ARE INTERCHANGED VIA U17A, U16B, U18D, U16C
		U17A, U18D; SIGN R F/F	+					
10X	LLHL	U20B, U19A, 10X U13A, U3D, U2B, XA	X			U7A, ARITH STEP COMPL	X	
SAMPLE	LLHH	U20C, U11C, U4D, U4C, SAMPLE; U5B, U12B, U5A, RB	X	U22B, U2A, RESET SIGN X & SIGN R F/F's, U3A, TRANSFER	X	SECOND CYCLE F/F = SET; U7A, ARITH STEP COMPL	X	TRANSFER PULSE WIDTH SAME AS GEN ST 2
		U2A; SECOND CYCLE F/F	+			U7A, U5A, RB=LOW	0	
DISPLAY X	LHLL	U13B, U12C, U4A, DB DISPLAY X	X	U16A, U16D, SIGN X F/F; SIGN D F/F	X	U7A, ARITH STEP COMPL	X	IF SIGN X & SIGN D ARE OPPOSITE, THEY ARE INTERCHANGED VIA U17C, U16B; U18C, U16C.
		U17C, U18C; SIGN D F/F	+					
X—E	LHLH	U20A, U11A, EB	X	U16A, U16D, SIGN X F/F	X	U7A, ARITH STEP COMPL	X	IF SIGN X & SIGN E ARE OPPOSITE, THEY ARE INTERCHANGED VIA U17B, U16B; U18A, U16C.
		U17B, U18A	+					
X—D	LHHL	U13B, U12C, DB	X	U16A, U16D, SIGN X F/F, SIGN D F/F	X	U7A, ARITH STEP COMPL	X	IF SIGN X & SIGN D ARE OPPOSITE, THEY ARE INTERCHANGED VIA U17C, U16B; U18C, U16C.
		U17C, U18C, SIGN D F/F	+					
X ÷ 10^n	LHHH	U20C, U11B, DIVIDE U13A, U3D, U2B, XA	X			U7A, ARITH STEP COMPL	X	
IDLE	HHHH					U7A, ARITH STEP COMPL	X	

4-118. MULT CMPN

SIGN R is changed to equal SIGN X. RB and XA allow repeated addition for each INCR M DIGIT pulse. When MULT EQU occurs, ONE SH X shifts the X-Register contents and the repeated addition commences for the next digit. When this operation is completed a MULT CMPL signal ends the sequence. Between 0 and 15 INCR M DIGIT pulses may occur. Seven ONE SH X pulses occur, corresponding to seven multiplier digits.

4-119. MULT λ/4

This instruction is identical to MULT CMPN except that U5D, MULT LBDA is produced instead of U5C, MULT COMP.

4-120. SUBTRACT

There are two different cases for this instruction based on SIGN X and SIGN R. If SIGN X ≠ SIGN R, the operation to be performed is actually single-cycle addition: X - (-R) = X + R, denoted Case I. If SIGN X = SIGN R, the operation is true subtraction: X-R, denoted Case II. Case II is a two-cycle operation. The first cycle produces RB and CA. The second cycle produces XA if CARRY = HIGH or CA if CARRY = LOW.

4-121. ADD

This instruction is identical to SUBTRACT except that the sign rule is reversed. If SIGN X = SIGN R, a single cycle addition occurs. If SIGN X ≠ SIGN R, a two-cycle subtraction occurs.

4-122. SPECIAL SUBTRACT

This instruction is a two-cycle subtraction which produces a C STRB pulse at the end of the first cycle.

Table 4-18. Multi-cycle Instructions

INSTRUCTION	CODE (TUVW)	CYCLE	ST ARITH STEP		GEN ST 1		GEN ST 2		GEN STOP	
MULT CMPN	HLLH	1	U22D, U6B, ONE SH R U19B, U13A; U5B, U12B, U5A, RB, U13C, MULTIPLY, U15E, U5C, MULT COMP	x	Assume MULT EQU - LOW for first cycle (not multiplying by zero)		U22C, INCR M DIG; U16A, U16D SIGN X F F, U3D, U2B, XA	x	U23A, U23B START GEN	x
			U17A, U18D; U2B; U23A, multiply digit advance F F	•						
		LAST BIT -1	MULT EQU - HIGH		Multiply digit advance F F = SET	x	U7C ONE SH X	x	U23A, U23B START GEN	x
					U7C	•				
					U22C; U7D, U5A, RB	o				
		LAST DIGIT	MULT EQU = HIGH MULT CMPL = LOW		———		———		U7A, ARITH STEP COMPL	x
			U7A	•						
SUBTRACT (CASE I)	HHLL	1	U13A; U13D U12A, U12D, U4B, U16B, U16C U12B, U5A, RB; U3D, U2B, XA	x	———		———		U7A, ARITH STEP COMPL	x
SUBTRACT (CASE II, CARRY - LOW)	HHLL	1	U13D, U12A, U12D U4B, U16B, U16C, U12B, U5A, RB, U1A (TRUE SUB), U3C, CA, U23A	x	———		———		Second Cycle F F - SET, U23B, START GEN	x
			Second cycle F F; U23B	•					U23A, RB	o
									U7A	
		2	CA = HIGH RB - LOW		———		———		U7A, ARITH STEP COMPL	x
SUBTRACT (CASE II, CARRY HIGH	HHLL	1	U13A; U13D, U12A U12D, U4B, U16B, U16C, U12B, U5A, RB, U1A (TRUE SUB) U3C CA U23A	x					Second cycle F F - SET; U23B, START GEN	x
			U2B; Second cycle F F; SIGN X F F; U6A, U23B	•					U23A RB	o
									U7A	
		2	RB - LOW		U6A, U16D, Toggle SIGN X F F, U3D U2B, XA	x			U7A, ARITH STEP COMPL	x
SPECIAL SUBTRACT (CARRY - LOW)	HHHL	1	U13D, U12A U12D U4B, U16B U16C U4C, U3B, U12B, U5A, RB; U1A, TRUE SUB) U3C U23A, CA	x					U6C C STRB; U23B, START GEN Second cycle F F - SET	x
									U7A	•
			Second cycle F F U6C, U23B	-					U7D U5A RB	o
		2	CA HIGH RB - LOW						U7A, ARITH STEP COMPL	x
SPECIAL SUBTRACT (CARRY - HIGH)	HHHL	1	U13A; U13D, U12A, U12D, U4B, U16B U16C U4C U3B, U12B U5A, RB; U1A, (TRUE SUB) U3C, U23A, CA	x					U6C, C STRB; U23B, START GEN Second cycle F F - SET	x
									U7A	•
			U2B; SIGN X F F Second cycle F F U6C; U6A, U23B	-					U7D U5A RB	o
		2	RB - LOW		U6A U16D, Toggle SIGN X F F U3D U2D XA	x			U7A, ARITH STEP COMPL	x

Figure 4-11. MULT CMPN Flow Chart

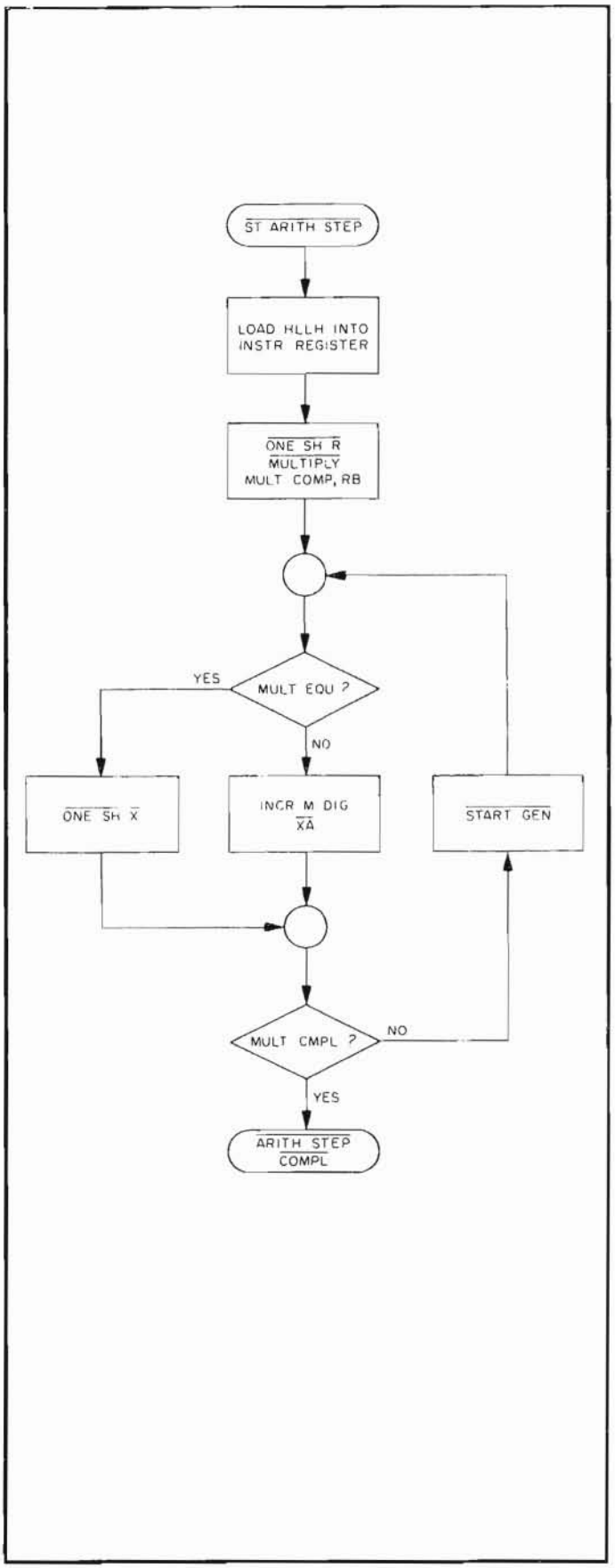


Figure 4-12. SUBTRACT Flow Chart

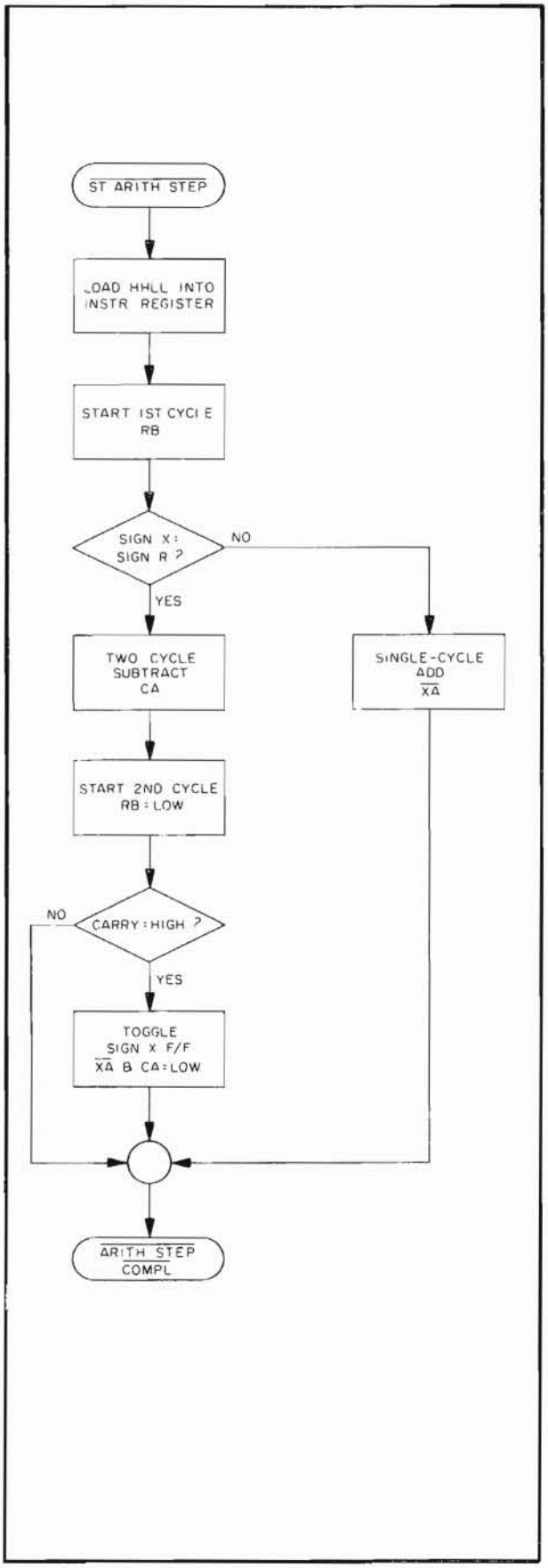
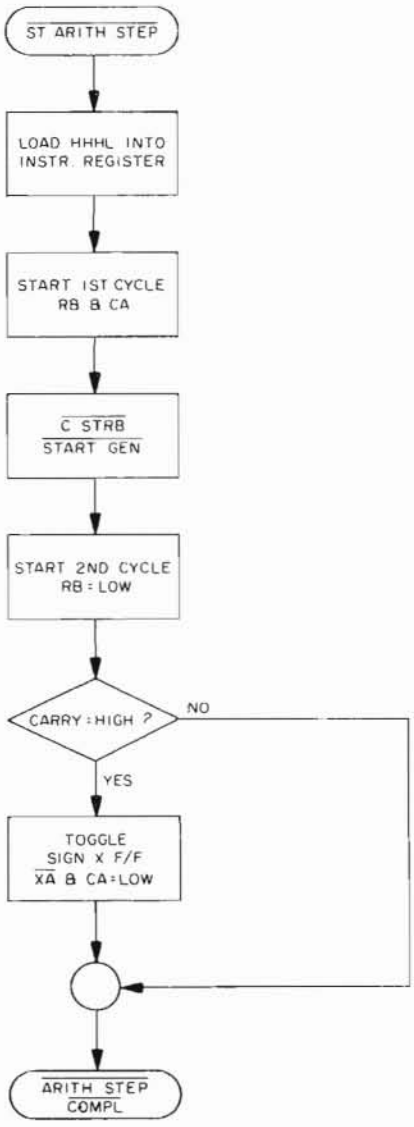


Figure 4-13. SPECIAL SUBTRACT Flow Chart



4-123. A7 Program Board

4-124. PROGRAM CONTROL. When a START PROG signal arrives from A8, the X10 Program Loop Counter (U11) and Program Step Counter (U3A, U5) will be reset via U12F, U10A, and U12C. START PROG also clocks the Start Arithmetic flip-flop (U2) to a set state via U20A (refer to timing diagram Figure 4-14). When the next CLOCK pulse occurs, U20C is enabled to produce ST ARITH STEP, reset the X10 Loop Control flip-flop (U3B), and enable U20A. U20A clocks the Start Arithmetic flip-flop to a reset state. The Program Step Counter is now at the first step of the program. Each time an ARITH STEP COMPL pulse arrives, the Program Step Counter will be advanced and U20B, U20A clock U2 to provide a ST ARITH STEP pulse. The Program Control table shows the state of U5 and U3A as the counter advances. Initially, Decoder 0 (U7) is enabled (D input = LOW) by U4C. When the ZD output of U5 goes HIGH, Decoder 1 (U8) is enabled by U4A. When U5 changes from 15 (HHHH) to 0 (LLLL), U3A will clock to a set state, and Decoder 2 (U9) is enabled by U4B.

NOTE

The program step numbers use the decoder designation number for the first digit and the decoder output line number for the second digit.

The encoding logic and resultant instruction code for each program step is shown in Table 4-19. The Instruction Skip Logic is used to force IDLE to occur when certain mode/unit combinations occur. The Internal/External Program Select Logic allows an external program (T EXT - W EXT) to be loaded when E PRG SEL = LOW. E PRG SEL = LOW also enables U12A, U24D to disable the internal portion of the U23 gating logic. When program step 16 is reached, U13B is armed. Operation of this circuit is described in a separate paragraph. When program step 27 is reached, U21C is enabled if E PRG SEL = HIGH. When the final ARITH STEP COMPL pulse arrives from A6, U13D will be enabled (armed by U21C) to produce PROG COMPL. U20B is disabled by U21C, so a ST ARITH STEP pulse does not occur at this final step. If E PRG SEL = LOW, U21B will be armed. When E PRG LST arrives, U21B will be enabled; PROG COMPL will occur, and ST ARITH STEP will be inhibited as previously described.

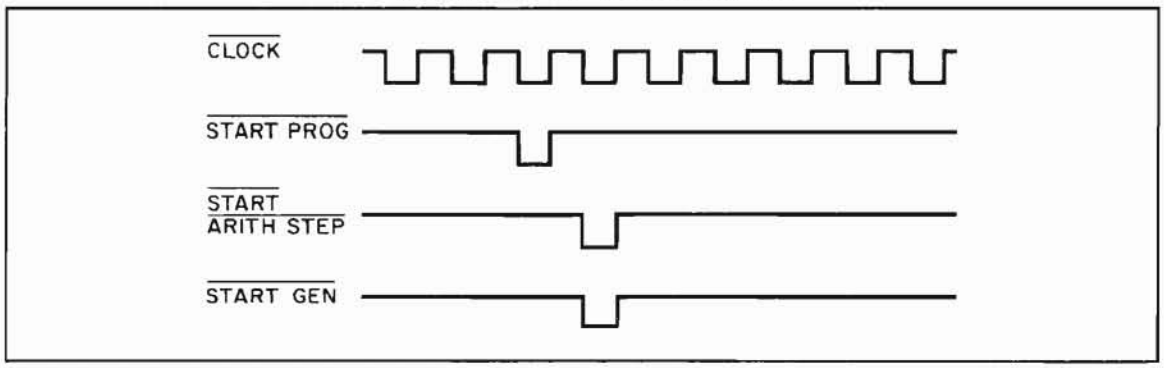
4-125. X10 PROGRAM LOOP. If X10 = LOW, a special program loop will be initiated at program step 16. At step 16, U13B will be enabled to arm the X10 Loop Control flip-flop (U3B). When ARITH STEP COMPL arrives at the end of step 16, the X10 Loop Control flip-flop will clock to a set state. U10A, U12C are enabled to reset the Program Step Counter to step 00. The X10 Program Loop Counter remains at state zero. The program step that is encoded is step 00 instead of step 17. Each time step 16 is reached, the X10 Program Loop Counter advances until the ZD output goes HIGH (at count 8). The last sequence from step 00 to step 16 occurs, but U13B is now disabled so the next program step is 17. The program actually steps from 00 through 16 a total of nine times before advancing from 17 to 25 to complete the program.

4-126. TRIP LOGIC. When RESET occurs, the Error Latch (U19C, D) and Tune Latch (U19A,B) will be reset. U4D will be disabled which resets the ÷ 4 flip-flops (U1), disables Q1, and makes RESET LAMP = LOW (RESET lamp OFF). When either latch is set, the 10 Hz input will be divided by 4 which turns Q1 ON and makes RESET LAMP = HIGH at a 2.5 Hz rate. ERROR TRIP = LOW sets the Error Latch so that ERROR = HIGH. TUNE TRIP = LOW sets the Tune Latch so that TUNE ER = HIGH. When ERROR = HIGH, XR ZERO = LOW except when CHECK MODE = HIGH (turns Q2 ON, Q3 OFF, XR ZERO = HIGH).

Table 4-19. Program Control

PROGRAM STEP COUNTER				DECODING LOGIC	INSTRUCTION CODE	INSTRUCTION NAME
STEP	U5	U3A	DECODER			
00	LLLL	RESET	U4C, U7	U16, U14B, U23A; U27, U24B, U23B	LLHH	SAMPLE
01	HLLL	RESET	U4C, U7	U26, U14F, U22A; U16, U14B, U23A; U25, U24A, U22B	HHHL	SPECIAL SUBTRACT
02	LHLL	RESET	U4C U7	$\overline{X10}$ - HIGH. U14C, U6C, U14A, U24D, U23	HHHH	IDLE
				X10 - LOW. U16, U14B, U23A	LLHL	10X
03	HHLL	RESET	U4C, U7	U27, U24B, U23B	LLLH	X — R
04	LLHL	RESET	U4C, U7	$\overline{CH\ OR\ VEL}$ - HIGH. U15B, U6B, U14A, U24D, U23	HHHH	IDLE
				$\overline{CH\ OR\ VEL}$ - LOW.	LLLL	RESET X
05	HLHL	RESET	U4C U7	$\overline{CH\ OR\ VEL}$ - HIGH. U15B, U6B, U14A, U24D, U23	HHHH	IDLE
				$\overline{CH\ OR\ VEL}$ - LOW. U26, U14F, U22A; U17B, U24A, U22B, U24B, U23B	HHLH	ADD
06	LHHL	RESET	U4C, U7	U16, U14B, U23A; U25, U24A, U22B	LHHL	X — D
07	HHHL	RESET	U4C, U7	U27, U24B, U23B	LLLH	X — R
10	LLLH	RESET	U4A, U8	U26, U14F, U22A; U25, U24A, U22B	HHLL	SUBTRACT
11	HLLH	RESET	U4A, U8	UPDATE = HIGH. U24C, U15D, U14A, U24D, U23	HHHH	IDLE
				UPDATE = LOW. U16, U14B, U23A; U17B, U24A, U22B, U24B, U23B	LHHH	X ÷ 10^n
12	LHLH	RESET	U4A, U8	$\overline{CH\ OR\ VEL}$ - LOW. U17A, U6D, U14A, U24D, U23	HHHH	IDLE
				$\overline{CH\ OR\ VEL}$ = HIGH. U26, U14F, U22A; U17B, U24A, U22B, U24B, U23B	HHLH	ADD
13	HHLH	RESET	U4A, U8	U27, U24B, U23B	LLLH	X — R
14	LLHH	RESET	U4A U8	$\overline{CH\ OR\ VEL}$ - LOW. U17A, U6D, U14A, U24D, U23	HHHH	IDLE
				$\overline{CH\ OR\ VEL}$ - HIGH.	LLLL	RESET X
15	HLHH	RESET	U4A U8	$\overline{CH\ OR\ VEL}$ - LOW. U17A, U6D, U14A, U24D, U23	HHHH	IDLE
				$\overline{CH\ OR\ VEL}$ - HIGH. U26, U14F, U22A; U17B, U24A, U22B, U24B, U23B	HHLH	ADD
16	LHHH	RESET	U4A, U8	$\overline{CH\ OR\ VEL}$ - LOW. U17A, U6D, U14A, U24D, U23	HHHH	IDLE
				$\overline{CH\ OR\ VEL}$ - HIGH. U16, U14B, U23A; U25, U24A, U22B	LHHL	X — D
17	HHHH	RESET	U4A, U8	|CHECK MODE $\overline{FRINGES}$| · |CHECK MODE $\overline{FRINGES}$| U18A, U15A, U14A, U24D, U23	HHHH	IDLE
				|CHECK MODE $\overline{FRINGES}$| · |CHECK MODE $\overline{FRINGES}$|	LLLL	RESET X
20	LLLL	SET	U4B, U8	|CHECK MODE $\overline{FRINGES}$| · |CHECK MODE $\overline{FRINGES}$| U18A, U15A, U14A, U24D, U23	HHHH	IDLE
				|CHECK MODE $\overline{FRINGES}$| · |CHECK MODE $\overline{FRINGES}$| U26, U14F, U22A; U27, U24B, U23B	HLLH	MULT CPMN
21	HLLL	SET	U4B, U8	CHECK MODE = HIGH. U18C, U15C, U14A, U24D, U23	HHHH	IDLE
				CHECK MODE = LOW U27, U24B, U23B	LLLH	X — R
22	LHLL	SET	U4B U8	$\overline{FRINGES}$ = LOW. U18B, U6A, U14A, U24D, U23	HHHH	IDLE
				FRINGES - HIGH.	LLLL	RESET X
23	HHLL	SET	U4B, U8	$\overline{FRINGES}$ = LOW. U18B, U6A, U14A, U24D, U23	HHHH	IDLE
				$\overline{FRINGES}$ - HIGH. U26, U14F, U22A; U16, U14B, U23A; U27, U24B, U23B	HLHH	MULT X 4
24	LLHL	SET	U4B, U8	U25, U24A, U22B	LHLL	DISPLAY X
25	HLHL	SET	U4B, U8	U16, U14B, U23A; U25, U24A, U22B; U18D, Program Complete logic.	LHHL	X — D

Figure 4-14. A7 Timing Diagram



4-127. A8 Function Board

4-128. MODE ENCODING. Each time that a front-panel mode button or check button is depressed, the U21 Decoder will be set to one of six states, determined by U18, U19, U27, U28. The gates which are enabled (X) and disabled (0) are shown in Table 4-20, Mode Encode Logic, in the decoder input column. Notice that the disabled gates latch the enabled gates, so that the Decoder state is unchanged when the associated pushbutton is released. The three latches (U19A/B, U28A/B, and U27A/B) determine the A, B, and C inputs to the Decoder. U18's output is differentiated by C1, R37 to make the D input to the Decoder momentarily HIGH when a button is pushed; this provides a small delay in the Decoder output to prevent noise on $\overline{\text{CHECK X}}$ and $\overline{\text{CHECK R}}$. Gates and signals that are enabled and disabled by the Decoder output are shown in the table. Signals $\overline{\text{UPDATE 1}}$ and $\overline{\text{UPDATE 2}}$ also enable U18, if they are used.

4-129. PROGRAM TIMING. The CLOCK signal (1 MHz with S1 set to INT) is used to drive the Time Base Divider. U2 provides a 100 kHz output. U1 provides a 10 kHz signal for U3. U3 divides the 10 kHz signal by 5 to provide a 2 kHz output. U10 provides a 200 Hz output. U3 divides the 200 Hz signal by 2 to provide a 100 Hz output. U4 provides both 50 Hz and 10 Hz outputs. The 50 Hz signal is divided by three in U5 to produce a 50/3 Hz signal (equal to 1000/min). The Time Base Select Logic is used to determine the program recycle rate as shown in Table 4-21, Program Timing. For CHECK 1 and CHECK 2, the 10 Hz signal is gated through U7A to U9B where it is divided by ten.

4-130. The resultant 1 Hz signal is gated by U8A. The Time Base Select Logic output passes through U13C, U13D, U15, and U14C to form START PROG. U15 and U14C synchronize $\overline{\text{START PROG}}$ with the CLOCK signal. If either $\overline{\text{C TRG EBL}}$ or $\overline{\text{A TRG EBL}}$ are LOW, U14D will disable U13C. In this case, program timing will be controlled by $\overline{\text{CL AUX TG}}$ or $\overline{\text{COMP TRIG}}$:

$$[\overline{\text{CL AUX TG}}] \times [\overline{\text{A TRG EBL}}] \rightarrow \text{U22A, U22C, U13B, U13D.}$$

$$[\overline{\text{COMP TRIG}}] \times [\overline{\text{C TRG EBL}}] \rightarrow \text{U22D, U22C, U13B, U13D.}$$

Table 4-20. A8 Mode Encode Logic

MODE ENCODE LOGIC						
MODE	DECODER INPUT		CODE	STATE	DECODER OUTPUT	
	LOGIC				LOGIC	
NORMAL	U19B; U18, BUTTON; U28A; U27A	x	H L L L	1	Q3, NORM LAMP; U23A, U24C, U24D, U24A	x
	U19A; U28B; U27B	o			U14A	o
SMOOTH	U19A; U28B; U18, BUTTON; U27A	x	L H L L	2	Q1, SMOOTH LAMP, $\overline{\text{SMOOTH}}$; U23B, U24C, U24D, U24A	x
	U19B; U28A; U27B	o			U14A	o
X10	U19B; U28B; U18, BUTTON; U27A	x	H H L L	3	Q2, X10 LAMP; $\overline{\text{X10}}$; U23B, U24C, U24D, U24A	x
	U19A; U28A; U27B	o			U14A	o
CHECKS 1	U19A; U28A; U18, BUTTON; U27B	x	L L H L	4	$\overline{\text{CHECK X}}$; U14B, CHECK MODE, U24B, U14A, $\overline{\text{RESET SW}}$	x
	U19B; U28B; U27A	o			U24A	o
CHECKS 2	U19B, U28A; U18, BUTTON; U27B	x	H L H L	5	$\overline{\text{CHECK R}}$; U14B, CHECK MODE, U24B, U14A, $\overline{\text{RESET SW}}$	x
	U19A; U28B; U27A	o			U24A	o
VELOCITY (/SEC)	U19A, U28B, U18, BUTTON; U27B	x	L H H L	6	Q4, VEL LAMP; VEL MODE; U23A, U24C, U24D, U24A; U20D, VEL SEC, Q6, V SEC LAMP	x
	U19B, U28A, U27A	o			U14A	o
VELOCITY (/MIN)	U19A, U28B, U18, BUTTON; U27B	x			Q4, VEL LAMP; VEL MODE; U23A, U24C, U24D, U24A; U20C, VEL MIN, Q5, V MIN LAMP	x
	U19B, U28A, U27A	o			U14A	o

Table 4-21. A8 Program Timing Table (1 MHz Clock)

MODE	LOGIC	DIVIDER FREQ.	RECYCLE RATE
NORMAL (FRINGES)	U20A, U12B	2000 Hz	2000/SEC
NORMAL (IN,MM), SMOOTH, X10	U20B, U12A	200 Hz	200/SEC
VELOCITY (/SEC)	U20D, U12C	10 Hz	10/SEC
VELOCITY (/MIN)	U20C, U12D	50/3 Hz	1000/MIN
CHECK 1, CHECK 2	U25B, U16A, U7A, U14B, U8A	1 Hz	1/SEC

4-131. PRINT LOGIC. When S13 is set to TIMED, signal $\overline{\text{AUTO PR}}$ = LOW, and S4 is enabled. Table 4-22, Print Logic, shows how the print rate is developed for each S4 position. The outputs of U8B,C, or D are synchronized by U6. When $[\overline{\text{DISPLAY X}}]\cdot[\overline{\text{GEN STOP}}]$ occurs, U26A and U23C are enabled. PRINT is produced via U23D. When $\overline{\text{AUTO PR}}$ = HIGH, S4 is disabled, U13A enabled, and U6A held in a reset state to disable the PRINT signal. If U14B is disabled (not in CHECK mode), U26B is enabled to reset U9B and U11 to a count of nine.

Table 4-22. A8 Print Logic

PRINT RATE (S4)	DIVIDER FREQ.	LOGIC
MAX	———	U22B, RLY INHIB, U17A, Set U6A. PRINT rate controlled by $[\overline{\text{DISPLAY X}}] \cdot [\overline{\text{GEN STOP}}]$ rate.
100	1000/MIN	U25D, U16B; U7A, U9B (÷10), U8B at 100/MIN
60	10/SEC	U25D, U16A; U7A, U9B (÷10), U8B at 1/SEC = 60/MIN
50	1000/MIN	U25A, U16B; U7A, U9B (÷10), U11 (÷2), U17C, U8C at 50/MIN
30	10/SEC	U25A, U16A; U7A, U9B (÷10), U11 (÷2), U17C, U8C at 0.5/SEC = 30/MIN
20	1000/MIN	U16B, U17D, U26C, U17F; U7A, U9B (÷10), U7B, U11 (÷5), U17E, U8D at 20/MIN
10	1000/MIN	U16B, U25C, U26C, U17F; U7A, U9B (÷10), U11 (÷2), U17C, U7B, U11 (÷5), U17E, U8D at 10/MIN
6	10/SEC	U16A, U25C, U26C, U17F; U7A, U9B (÷10), U11 (÷2), U17C, U7B, U11 (÷5), U17E, U8D at 0.1/SEC = 6/MIN

4-132. A9 Multiplier Board

4-133. MULTIPLIER LOGIC. Initially, the Bit and Digit Counters (U24 and U16) are reset to zero by $\overline{\text{MULTIPLY}}$ = HIGH. When A6 provides $\overline{\text{MULTIPLY}}$ = LOW, the Counters are enabled. The Decoder (U8) provides a single line output representing the Digit Counter state. The Decode Logic (Table 4-24) indicates which gates are enabled (X) and armed (+). When a MULT $\lambda/4$ instruction is being executed, MULT LBDA enables U2D and arms U2C, U10A, U10D. S2 enables one of the gates. The Decode Logic table (4-24) indicates which gates are enabled and which Comparator gates are armed.

4-134. Each INCR M DIG pulse advances the Bit Counter until its negative-logic outputs enable the Comparator (U22), as shown below in Table 4-23. The Comparator output is MULT EQU.

Table 4-23. Bit Counter-Decoded Inputs

BIT COUNTER STATE	DECODED INPUTS			
	U23C(9)	U23B(5)	U23D(12)	U23A(2)
0	HIGH	HIGH	HIGH	HIGH
1	HIGH	HIGH	HIGH	LOW
2	HIGH	HIGH	LOW	HIGH
3	HIGH	HIGH	LOW	LOW
4	HIGH	LOW	HIGH	HIGH
5	HIGH	LOW	HIGH	LOW
6	HIGH	LOW	LOW	HIGH
7	HIGH	LOW	LOW	LOW
8	LOW	HIGH	HIGH	HIGH
9	LOW	HIGH	HIGH	LOW
10	LOW	HIGH	LOW	HIGH
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
15	LOW	LOW	LOW	LOW

4-135. After MULT EQU occurs, a $\overline{\text{ONE SH X}}$ pulse advances the Digit Counter. Seven states (0—6) are used. Notice that when MULT EQU is produced at the end of Decoder state 6, U21B is enabled to produce $\overline{\text{MULT CMPL}}$.

4-136. When a MULT CMPN instruction is being executed, MULT COMP enables U3D and either U2A or U2B. If $\overline{\text{A COMP EBL}}$ = HIGH (external compensator not used), the compensation number set by S18 will be used as the multiplier for Decoder states 0—3. S18 deck 0—3 will be enabled by $\overline{\text{ACOMP D0}}$ — $\overline{\text{ACOMP D3}}$. U19 and U20 gate the 4-bit BCD word for each S18 deck through the armed gates shown in the Decode Logic table to the Comparator. If $\overline{\text{A COMP EBL}}$ = LOW (automatic compensator in use), the ACOMP B1 — ACOMP B8 4-bit BCD word from the external compensator will be gated through the armed gates to the Comparator. $\overline{\text{ACOMP D0}}$ — $\overline{\text{ACOMP D3}}$ inform the external compensator of the Decoder state.

4-137. By examination of the Decode Logic, shown in Table 4-24, the multipliers for various units can be determined:

INCHES — 6,230,230
MM — 15,824,785
FRINGES — 10,000,000
COMPENSATION — 9,99X,XXX
[4-digit compensation number]

Table 4-24. Multiplier Decode Logic

DECODER STATE	MULT LUDA						MULT COMP			
	INCHES		MM		FRINGES		ACOMP EBL - HIGH		ACOMP EBL - LOW	
0		X	U4A, U13D; U6A, U15D	X			U12B; U12A; U14C; U14B	1	U11B; U13A; U14D; U15A	1
	U23A	1					ACOMP D0	X	ACOMP D0	X
			U23B; U23D; U23A	1						
1	U5, U13C; U7B, U15C	X	U4B, U11D	X			U12B; U12A;	1	U11B; U13A;	1
	U23D, U23A	1	U23C	1			U14C; U14B		U14D; U15A	
							ACOMP D1	X	ACOMP D1	
2	U5 U13C	X	U4A, U13D; U6B U14A; U6A U15D	X			U12B; U12A; U14C; U14B	1	U11B; U13A; U14D, U15A	1
	U23D	1	U23B; U23D; U23A	1			ACOMP D2	X	ACOMP D2	X
3			U4A U13D;	X			U12B; U12A; U14C; U14B	1	U11B; U13A; U14D; U15A	1
			U23B	1			ACOMP D3	X	ACOMP D3	X
4	U5, U13C; U7B, U15C	X	U6B, U14A	X			U7A, U15D, U12C			
	U23D; U23A	1	U23A	1			U23A; U23C			1
5	U5, U13C	X	U4B, U11D	X			U7A, U15D, U12C			X
	U23D	1	U23C	1			U23A; U23C			1
6	U3B U12D; U5, U13C	X	U4B, U11D; U4A, U13D; U6B, U14A; U6A, U15D	X	U21A, U13B U11A	X	U7A, U15D, U12C			X
	U23B; U23D	1	U23C; U23B; U23D; U23A	1	U21B; U23D; U23C	1	U23A; U23C			1

4-138. DECIMAL & BLANKING. The Decimal and Blanking table (4-25) indicates which gates are enabled (X) and which signals are true (HIGH) for various operating modes and switch positions. Disabled gates that produce B5 and B6 are indicated by (0).

Table 4-25. Decimal and Blanking

MODE	UNITS SWITCH (S2) POSITION					
	INCHES		MM		FRINGES	
NORMAL & SMOOTH	U18B, U1C, U1B, DP5 U9C U18C, C2, U17B	X	U9E, U1A U17C DP4 U9B U18D, C1	X	U9A, B6; U17B, B5	0
	U9A, B6	0	U9A B6; U17B B5	0		
X10	U17D DP6 C3 U17B	X	U9E, U1D U1B DP5 U9C U18C, C2, U17B	X	U17A DP0	X
			U9A B6	0	U9A B6; U17B, B5	0
CHECK 1 & CHECK 2	U9A B6; U17B B5	0	U9A B6; U17B B5	0	U9A B6; U17B B5	0
VELOCITY (SEC)	U18B, U1C, U1B, DP5, U17B; U9D, B0	X	U9E U1A U17C DP4; U9D, B0	X	U10B BZ0; U9D B0	X
	U9A, B6	0	U9A, B6; U17B B5	0	U9A B6; U17B B5	0
VELOCITY (MIN)	U18B U1C U1B DP5, U17B; U9D B0; B1	X	U9F U1A, U17C DP4; U9D B0; B1	X	U10B BZ0; U9D B0; U10C BZ1	
	U9A, B6	0	U9A, B6; U17B B5	0	U9A B6; U17B B5	

4-139. A10 D-Register Board

4-140. SHIFT REGISTER. The 12-digit BCD shift register consists of U5, U6, U7, U8, U11, U12, U13, U14, U16, U17, U25, and U26. The Mode Command inputs are all wired LOW, so the serial shift mode is always enabled. X-data from A4 are converted to negative logic by U15D, U29C, U15C, and U15F. The data, in 4-bit BCD format, are loaded into U11, U12, U13, U14. Overflow data from the D outputs are loaded into U26, U17, U16, U25. The output data are converted to positive logic by U40C, U40B, U15A, and U15B and sent to A5 as D-data. When $\overline{\text{SHIFT D}}$ pulses are received, U4D enables the common Clock input so that data are shifted through the register. The A, B, C, and D-outputs of the register are routed to buffer storage, via the blanking logic.

4-141. BLANKING LOGIC. When a $\overline{\text{TRANS D}}$ pulse arrives, the C inputs to the 9-digit buffer register and the clock input to the Sign Buffer are enabled. Data from the shift register and SIGN D SW from S5 will be loaded at this time. Data for digits 0, 1, and 2 are loaded via the Trailing-Digit Blanking Logic. Data for digits 3 and 4 are loaded directly. Data for digits 5, 6, 7, and 8 are loaded via the Leading-Zero Blanking Logic. The Blanking table (4-26) indicates the effect of the various blanking signals on the buffer register (and displayed digit, for reference). The jumper between A and B at U21B output is normally installed so that leading zeros are automatically blanked. If digit 8 is a zero (HHHH) at the shift register output, U21B is enabled, U22 is disabled, and HHHH is supplied to the U31 buffer (leading display digit will blank). If digits 8 and 7 are both zero, U21B and U21A enable U23B and U15E. U20 will be disabled, and HHHH is supplied to the U32 buffer (the two leading display digits will blank). The blanking logic extends to digit 5 (if digits 8 through 5 are all zero, the four leading display digits are blanked). Notice that when B6 = LOW, the blanking logic for digit 6 is disabled, and when B5 = LOW, the blanking logic for digit 5 is disabled. If the jumper between "A" and "B" is removed, the Leading-Zero Blanking Logic is disabled. Data for digits 5—8 are then loaded directly into the buffer register.

Table 4-26. Blanking

SIGNAL	GATES		BUFFER			
	ENABLED	DISABLED	#	DIGIT	INPUT	DISPLAY DIGIT
BZ0	U40A	U9C, D U10C, D U24	U39	0	H H H H	ZERO
B0	U40 U9C, D U10C, D	U0A, B U10A, B	U39	0	L L L L	BLANK
BZ1	U40E			1&2	H H H H	ZERO
B1	U40F U18C, D U19C, D U27C, D U28C, D	U27A, B U28A, B U18A, B U19A, B	U37 U38	1&2	L L L L	BLANK
B5	U24A (see text)	U34	U34	5	H H H H	BLANK
B6	U24 (see text)	U33	U33	6	H H H H	BLANK

4-142. BUFFER REGISTER. As previously noted, data are loaded into the Sign Buffer (U30) and Buffer Register (U5, U6, U7, U8, U11, U12, U13, U14, U16, U17, U25 and U26) when $\overline{\text{TRANS D}}$ occurs. If SIGN D SW = HIGH, the Sign Buffer clocks to a set state, and PLUS is produced. If SIGN D SW = LOW, the Sign Buffer clocks to a reset state, MINUS is produced, and U24C is enabled to make 9D1 = HIGH. U24C will also be enabled when ERROR is received. The A11 Display Board requires negative logic inputs. In the case of digits 0—2, negative logic data are inverted twice and enter U37, U38 and U39 as negative logic data. The non-inverted outputs from U37, U38 and U39 provide negative logic data to A11. The inverted outputs provide positive logic data for A14 and a remote digital recorder. For digits 3 and 4, negative logic data enter U35 and U36 directly. The non-inverted outputs from U35 and U36 provide negative logic data for A11 and A14. Positive logic data is supplied to the remote digital recorder. For digits 5, 6, 7 and 8, negative logic data are inverted and stored in U31, U32, U33 and U34 as positive logic. The inverted outputs from U31, U32, U33, U34 provide negative logic data for A11 and A14. Positive logic data are supplied to a remote digital recorder.

4-143. A11 Display Board

4-144. The negative logic inputs to the BCD to Decimal Decoder/Drivers (U0—U8) are used to enable the display tubes. The +175V drives the tubes through ballast resistors. BCD data are decoded to provide a low impedance path to ground for the corresponding digit. When the input word is 10—15, none of the decoder outputs is enabled, so a blanked display results. Decimal point inputs are used to turn on Q3-Q5, Q9 which provide low impedance paths to ground for DS6—DS0. Similarly, PLUS and MINUS are used to turn on Q1 or Q2 to provide low impedance paths for DS9.

4-145. A12 Regulator (Power Supply) Board

4-146. The regulator board has several functional sections which are named and described here.

4-147. LOW VOLTAGE RECTIFIER. Diodes CR1, 2, 3, and 4 are a bridge rectifier for the low voltage regulated and non-regulated power supplies. The rectifier input is 36 volts rms from T1 on the chassis.

4-148. +15-VOLT REGULATOR. Power from the low voltage rectifier is regulated to +15 volts by U1 controlling Q8 on the chassis. Potentiometer R12 sets the exact +15 volts (see Section V). Transistor Q4 with CR7 and CR10 are an overvoltage clamp, preventing the +15 volts from rising too high if regulator U1 fails.

4-149. +5-VOLT REGULATOR. Power from the chassis low voltage rectifier (CR1—2) is regulated by U3 controlling the chassis-mounted Q3—Q4 darlington pair. Potentiometer R2 sets the exact +5 volts (see Section V). Transistor Q5 with CR8 are an overvoltage driver controlling CR3 on the chassis to prevent excessive voltage if the regulator, U3—Q3—Q4, fails.

4-150. -15-VOLT REGULATOR. Power from the low voltage rectifier is regulated by U1 controlling Q3 and Q6 which control Q7 on the chassis. Potentiometer R6 sets the exact -15 volts (see Section V). Transistor Q1 with CR5 and CR9 are a -15 volt overvoltage clamp protection.

4-151. LASER HIGH VOLTAGE DRIVER. The LASER I signal from the interferometer unit is the difference between nominal and actual laser tube current. This signal controls Q2 which drives Q6 on the chassis. Q6 produces the HV CONT signal for the laser tube.

4-152. +175-VOLT REGULATED POWER SUPPLY. Alternating current (170 volts rms) from chassis mounted T1 is rectified by CR117, 118, 119, and 120. This direct current voltage is regulated by transistors Q114, Q115 and chassis mounted Q1.

4-153. INTEGRATOR (U6) PZT CONTROL (Q110, Q111, Q109). The PZT CONT signal to the PZT power supply (5500C assembly A4U2) is controlled by the signal at U6(2). The output of U6 is amplified by Q110, Q111 and Q109. Transistor Q109 drives chassis mounted emitter-follower Q2 which produces the PZT CONT signal. The input signal to U6 can be any one of four signals:

a. Manual +TUNE signal through Q107
b. Manual -TUNE signal through Q105
c. PZT auto centering signal through Q116
d. Lock error signal through U10-U9-U11-Q112

4-154. PZT MANUAL TUNE. The display unit front panel tune ← → switch (S3) allows the PZT voltage to be raised or lowered to tune the laser frequency up or down. The display unit front panel LASER TUNING meter indicates the PZT voltage. If the meter needle is near the center of the green area, the laser tube mirrors are at the correct spacing.

4-155. The manual TUNE switch when actuated grounds one of two lines from A12 (B-10 or B-J). The two lines are connected to U5C (inputs 10 and 11) to control Q113 which switches off current switch Q112, the lock error signal current switch. This prevents automatic tuning of the PZT from the lock circuit.

4-156. When the TUNE switch is actuated the grounded line either switches Q108-Q107 ON so the -15-volt supply is connected to U6(2), or the grounded line switches Q106-Q105 ON so the +15-volt supply is connected to U6(2).

4-157. PZT MONITOR. The PZT voltage is monitored through R100, filtered by C101, and amplified by U12. The U12(6) output is two times the PZT monitor voltage. (Zero to 2000 volts variation on the PZT corresponds with zero to two volts change at U12(3) input which produces zero to four volts change at U12(6) output.) From the U12(6) output R103 passes current to the front panel LASER TUNING meter.

4-158. TUNING TRIP THRESHOLD. The amplified PZT monitor signal from U12(6) is connected to amplifiers U7(2) and U8(3) which are used as comparators to determine the tuning trip threshold. The high trip threshold is sensed by U7, and the low trip threshold is sensed by U8. The outputs of these two amplifiers (used open loop) are OR'ed together in the output driver stage by CR101. (The signal output could be taken from either U7(6) or U8(6); U7 was chosen arbitrarily.) The U7(6) signal is TUNE TRIP.

4-159. LASER TUNE AND PZT CONTROL. When laser system power is switched on a pulse stretcher, U5A and U5B, is switched on by R108-C102. Pin 6 of U5B is held low by the pulse stretcher. The voltage at U5A pin 13 slowly rises toward 5 volts, but when 1.4 volts is reached, the pulse stretcher switches off.

4-160. While the pulse stretcher is on and U5B(6) is low, Q104 is switched on which switches Q116 on. This circuit tunes the PZT voltage to approximately the middle of its range when power is first switched on. This is PZT auto centering.

4-161. LOCK CONTROL OF PZT. The two differential lock signals, LOCK A and LOCK B are received at A12 pins B-R and B-H. Each signal is applied to the non-inverting input of a buffer amplifier, LOCK A to U10 and LOCK B to U9. The outputs of U10 and U9 are applied to the inputs of U11 used as an inverter-differential amplifier. The U11 output is a bipolar ground-referenced signal proportional to the voltage difference between the two lock signals with the common mode removed. This is a signal proportional to the laser frequency error signal. At the output of U11 resistor R151 is factory-selected to set the correct PZT frequency stabilization loop gain. If the laser is off frequency the level and polarity of the U11 output signal will be applied to U6 through Q112 to bring the laser back to the correct frequency.

4-162. PZT VOLTAGE LIMITER. The amplified PZT monitor voltage at U12(6) is connected to the base of Q101 which with Q102 is a differential comparator to limit the maximum PZT voltage to 2000 volts.

4-163. RESET. A signal to reset the arithmetic unit can be produced from Q103 in three ways. Transistor Q100 will drive Q103 to produce the reset signal if a LOW or ground is applied to the cathode of CR103, CR104 or CR105. CR103 has a LOW when the power is first switched on and the pulse stretcher U5A-U5B is on (U5B(6) is LOW). The manual TUNE ← → switch applies a ground to either CR104 or CR105 when it is pushed right or left.

4-164. Power Wiring & A13

4-165. POWER SYSTEM. Line voltage is supplied to T1 via F1, W6S15, and S16. When S16 is set to 115V, the T1 primaries are connected in parallel. When S16 is set to 230V, they are in series. Blower motor B1 is always supplied with 115V. T1 has three secondary windings, supplying 170V rms, 36V rms, and 15V rms. The 15V rms is full-wave rectified by CR1, CR2 and filtered by C1. Current from this supply flows into the +5V two-stage regulator via F2. The regulator is driven by A12, which supplies the control voltage to the base of Q3. When the control voltage changes, current through Q3 changes which changes the voltage drop across R1. This voltage drop controls the current through series regulator Q4. R2 is used to provide a voltage drop for A12 overcurrent sensing. CR3 and C4 are part of the +5V crowbar circuit on A12. Both Q2 and Q6 are power transistors that are part of A12 circuits. Q7 is the series regulator for the -15V two-stage regulator. Current from A12Q6 flows through R3

to develop a voltage drop which controls current through Q7. F3 fuses the -15V supply and C2 is the filter capacitor for the -30V supply line. Q8 is the series regulator for the +15V supply. The regulator is driven by A12, which supplies the control voltage to the base of Q8. F4 fuses the +15V supply and C3 is the filter capacitor for the +30V supply line. Q1 is the regulator driver for the +175V two-stage regulator. The Q1 base voltage is controlled by zener diodes on A12. Q1 current flows through A12R71 to control series regulator A12Q22.

4-166. A13 OPERATION. +5V for A13 is filtered by C1 and supplied to current limiting resistors R1—R4. Q1—Q5 are lamp drivers for DS1—DS5 (part of front-panel switches). Q6—Q7 are lamp drivers for DS4—DS5. The UNITS switch S2 controls DS1—DS3 directly.

4-167. Receptacle XA14, Accessory Boards

4-168. Either of two optional accessory boards may be put in XA14, the accessory receptacle of the display unit. Refer to Section VII for descriptions of these options.

4-169. MNEMONICS DICTIONARY

4-170. A dictionary of signal mnemonics is contained in Table 4-27. The dictionary provides a listing of all signals used in the 5526A Laser Measurement System.

Table 4-27. 5526A Laser Measurement System Mnemonic Dictionary

Mnemonic	Description
A TRIG EBL	Auxiliary Trigger Enable
ACOMP Bn	Automatic Compensation Bit (n=1,2,4,8)
ACOMP Dk	Automatic Compensation Multiplier Digit (k=0-3)
ACOMP EBL	Automatic Compensation Enable
ANALOG GND	A14 Board Analog Ground
ARITH STEP COMPL	Arithmetic Step Complete
AUTO PR	Automatic Print
An	Adder Output Bit (n=1,2,4,8)
BEAM AL	Beam Alignment Meter Signal
BUTTON	Button (Mode select button depressed)
BZ0, BZ1	Blank to Zero the 0, or 1 and 2 Display Digit
B0, B1, B5, B6	Blank to Blank the 0,1, and 2, 5, or 6 Display Digit
C STRB	Carry Strobe
C TRIG EBL	Compensation Trigger Enable
CA	Load-Nines-Compliment of X-Register into Adder (A-word)
CARRY	Carry
CHECK MODE	Check Mode
CHECK R	Check R-Register
CHECK X	Check X-Register
CK 1 SET	Check 1 Set (Select Check 1 Mode)
CK 2 SET	Check 2 Set (Select Check 2 Mode)
CK OR VEL	Check or Velocity Mode
CL AUX TG	Clean Auxiliary Trigger
CLOCK	Master Clock
CLR CARRY	Clear Carry Flip-Flop
COMP CLOCK	Compensation Unit Clock
COMP DkBn	Manual Compensation Section (k=0-3) Bit (n=1,2,4,8)
COMP TRIG	Compensation Trigger
COUNT DOP	Doppler Counter Input
COUNT REF	Reference Counter Input
C1 3	Comma 1,2, or 3
DB	Load Display Register into Adder (B-input)
DISP A DOP A, DISP A DOP B	Display A
DISP B DOP A, DISP B DOP B	Display B
DISPLAY X	Display X-Register
DIVIDE	Divide
DOP A, DOP B	Doppler Signal A and B
DPO,DP3-DP6	Decimal Point 0,3-6
D2B2, D2B4, D2B8	Output Bit 2,4 or 8 from Digit Two of D-Register
Dn	D-Register Output Bit (n=1,2,4,8)
E PGM LST	External Program Last Step
E PGM SEL	External Program Select
EB	Load External Register into Adder (B-input)
ERROR	Error
ERROR TRIP	Error Trip
En	External Register Output Bit (n=1,2,4,8)
FRINGES	λ/4 selected units
Fn	R-Register Input Bit (n=1,2,4,8)
GEN1	Generate 1
GEN ST 1, GEN ST 2	Generate Start 1 and 2
GEN STOP	Generate Stop
HV CONT	High-Voltage Control
HV PRI(1), HV PRI(2)	High-Voltage Primary Drive
INCHES	Inches selected units
INCR M DIG	Increment Multiplier Digit
LASER I	Laser Current
LI MON	Laser Current Monitor
LOCK A, LOCK B	Lock Circuit Outputs
MAN PRINT	Manual Print Switch
MANUAL TUNE RESET	Manual Tune Reset
MAX PRINT	Maximum Print Rate

Table 4-27. 5526A Laser Measurement System Mnemonic Dictionary (Continued)

Mnemonic	Description	Mnemonic	Description
MINUS	Minus Sign	RESET LAMP	Reset Lamp Command
$\overline{\text{MM}}$	Millimeters selected unit	$\overline{\text{RESET LP}}$	Reset Lamp Return
MODE	Mode Lamps Supply	$\overline{\text{RESET SW}}$	Reset Switch
$\overline{\text{MULT CMPL}}$	Multiplication Complete	RLY INHIB	Relay Inhibit
MULT COMP	Multiply Compensation	Rn	R-Register Output Bit (n=1,2,4,8)
MULT EQU	Multiplier Digit Equal		
MULT LBDA	Multiply Lambda		
$\overline{\text{MULTIPLY}}$	Multiply	$\overline{\text{S EXT MEAS}}$	Start External Measurement
$\overline{\text{NORMAL LP}}$	Normal Lamp Return	$\overline{\text{S SMOOTH}}$	Set Smooth (Select Smooth Mode)
NORM LAMP	Normal Lamp Enable	$\overline{\text{SAMPLE}}$	Sample
$\overline{\text{ONE SH R}}$	One Bit Shift (R-Register)	SCR GATE	Silicon Control Rectifier Gate
$\overline{\text{ONE SH X}}$	One Bit Shift (X-Register)	$\overline{\text{SET CARRY}}$	Set Carry Flip-Flop
PLUS	Plus Sign	$\overline{\text{SET NORM}}$	Set Normal (Select Normal Mode)
+ PR INH	Print Inhibit	$\overline{\text{SET VEL}}$	Set Velocity (Select Velocity Mode)
PRINT	Print	$\overline{\text{SET X10}}$	Set X10 (Select X10 Mode)
PRINT REF +	Positive Printer Reference	$\overline{\text{SHIFT D}}$	Shift D-Register
PRINT REF –	Negative Printer Reference	$\overline{\text{SHIFT E}}$	Shift External Register
PROG COMPL	Program Complete	$\overline{\text{SHIFT R}}$	Shift R-Register
+ PR COMMAND	Positive Print Command	$\overline{\text{SHIFT X}}$	Shift X-Register
PZT CONT	Piezo-electric Transducer Control	SIGN D	D-Register Sign Positive
PZT MON	Piezo-electric Transducer Monitor	SIGN E	External Register Sign
PZT PRI(1), PZT PRI(2)	Piezo-electric Transducer Primary Drive	SIGN R	R-Register Sign Positive
PZT TUNE –, +	Piezo-electric Transducer Tune – and +	SIGN X	X-Register Sign Positive
R PAUSE	R-Register Pause	$\overline{\text{SMOOTH}}$	Smooth Mode
RB	Load R-Register into Adder (B-input)	SMOOTH LAMP	Smooth Lamp Command
$\overline{\text{RDTH}}$	R-Register Display Transfer Inhibit	$\overline{\text{SMOOTH LP}}$	Smooth Lamp Return
REF TRIP	Reference Amplitude	$\overline{\text{ST ARITH STEP}}$	Start Arithmetic Step
REF A, REF B	Reference Signal A and B	$\overline{\text{START GEN}}$	Start Shift Timing Generator
RELAY	Relay Enable	$\overline{\text{START PROGRAM}}$	Start Program
RESET	Reset Command	T	T Instruction Bit
		$\overline{\text{T EXT}}$	External T Instruction Bit

Table 4-27. 5526A Laser Measurement System Mnemonic Dictionary (Continued)

Mnemonic	Description	Mnemonic	Description
$\overline{\text{TRANS D}}$	Transfer D	X PAUSE	S-Register Pause
TRANSFER	Transfer Counter to Register Command	$\overline{\text{XA}}$	Load X-Register into Adder (A-word)
TUNE +, -	Tune + or - Command	$\overline{\text{XDTH}}$	X-Register Display Transfer Inhibit
TUNE ER	Tune Error	$\overline{\text{XMSDn}}$	X-Register Most Significant Digit (n=2,4,8)
$\overline{\text{TUNE TRIP}}$	Tune Trip	XR=$\overline{\text{RR}}$	Load X-Register into R-Register or Recirculate R-Register
$\overline{\text{T10/T11}}$	T10/T11 Timing Pulse	$\overline{\text{XR ZERO}}$	X- and R-Counter Forced Zero
$\overline{\text{T12/T13}}$	T12/T13 Timing Pulse	Xn	X-Register Output Bit (n=1,2,4,8)
T14	T14 Timing Pulse	$\overline{\text{X10}}$	X10 Mode
U	U Instruction Bit	X10 LAMP	X10 Lamp Command
$\overline{\text{U EXT}}$	External U Instruction Bit	$\overline{\text{X10 LP}}$	X10 Lamp Return
UPDATE	Update Command	Y	Y-Axis Output (Analog)
V	V Instruction Bit	$\overline{\text{6/MIN}}$-$\overline{\text{100/MIN}}$	Print Rate Switch Position
$\overline{\text{V EXT}}$	External V Instruction Bit	10X	Multiply by Ten Instruction
V MIN LAMP	Velocity Minutes Lamp	10 Hz	10 Hz Clock
V SEC LAMP	Velocity Seconds Lamp	100 Hz	100 Hz Clock
VEL LAMP	Velocity Lamp Command	200 Hz	200 Hz Clock
$\overline{\text{VEL LP}}$	Velocity Lamp Return	2 KHz	2 KHz Clock
VEL MIN	Velocity Minutes Command	100 KHz	100 KHz Clock
$\overline{\text{VEL MODE}}$	Velocity Mode	$\overline{\text{1 MHz}}$	1 MHz Clock
VEL SEC	Velocity Seconds Command	10 MHz	10 MHz Clock
$\overline{\text{VEL SW M}}$	Velocity Minutes Switch	0Dn-8Dn	Digit 0-8 Output Bit (n=1,2,4,8)
$\overline{\text{VEL SW S}}$	Velocity Seconds Switch		
W	W Instruction Bit		
$\overline{\text{W EXT}}$	External W Instruction Bit		
X	X-Axis Output (Analog)		

4-171. ELECTRONIC LOGIC

4-172. The 5526A Laser Measurement System uses the binary system of electronic logic. In a binary system two states can exist, and any two symbols can represent the states. Commonly used symbols are: 1 and 0, and HIGH and LOW (abbreviated H and L) for the two states.

4-173. Logic Circuit Elements

4-174. Electronic logic circuits use a few basic elements: gates, flip-flops, and inverters. Figure 4-15 shows symbols and condition tables for the gate elements.

4-175. AND and OR GATES. The AND gate output is high if all inputs are high. AND gates may have two or more input lines.

4-176. The OR gate output is high if one or more inputs are high. An OR gate may also have two or more inputs.

4-177. NAND and NOR GATES (INVERSION). A circle at a logic symbol indicates inversion or NOT function. A circle at the output of an AND gate indicates a low output when the gate is activated. (The output is low if all inputs are high.) This is a NOT-AND gate or NAND gate, and the logic diagram symbol is shown in Figure 4-15D.

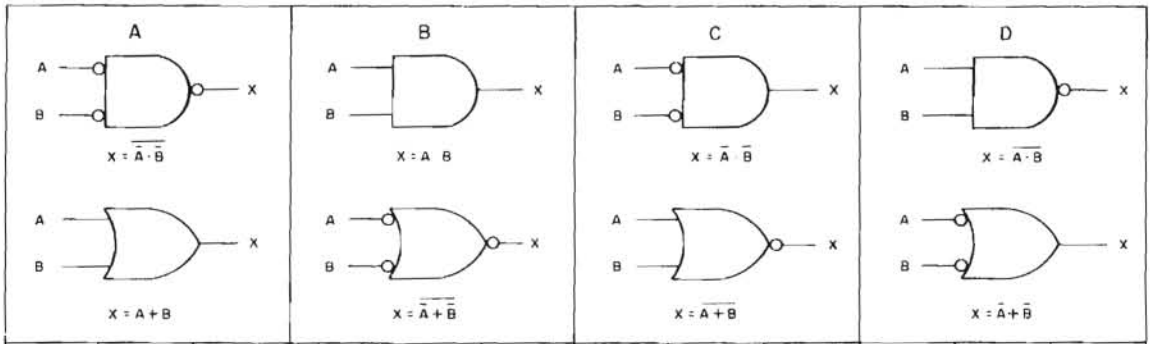
4-178. A circle at the output of an OR gate indicates the output is low if the gate is activated. (The output is low if any or all inputs are high. The output is high only if all inputs are low.) This is a NOT-OR gate or NOR gate, and the logic diagram symbol is shown in Figure 4-15C.

4-179. EXCLUSIVE NOR GATE. The two-input EXCLUSIVE NOR gate output will be low (gate activated) if the inputs are different (H-L or L-H).

4-180. The output will be high if the inputs are the same (H-H or L-L).

4-181. GATE EQUALITY. Each gate form has a functional equivalent except the exclusive OR and NOR gates. Figure 4-15 shows each pair of identical function gate symbols together with the condition tables and Boolean formulas. For example: a two-input AND gate is functionally equal to a NOR gate with inverted inputs.

Figure 4-15. Gate Symbols and Logic Comparisons



A	B	X	A	B	X	A	B	X	A	B	X
H	H	H	H	H	H	H	H	L	H	H	L
H	L	H	H	L	L	H	L	L	H	L	H
L	H	H	L	H	L	L	H	L	L	H	H
L	L	L	L	L	L	L	L	H	L	L	H

4-182. Integrated Circuits

4-183. Integrated circuits used in the 5526A Laser Measurement System are shown in Figure 4-16. Packages which implement standard logic functions are described in Table 4-28. Other packages are described in the following paragraphs. All I.C. packages are shown as viewed from the top.

4-184. The Decade Counter is shown in Figure 4-16B. The A input is divided by two and appears as the ZA output. The BD input is divided by five and appears as the ZD output. If ZA is connected to BD input, the A input will be divided by ten and appear at the ZD output. The Z outputs represent the positive-logic BCD version of the stored count. The counter will advance on the negative-going transition of the input pulse. When both R0 inputs are HIGH, the counter will reset to zero. When both R9 inputs are HIGH, the counter will reset to nine.

4-185 The Divide by Twelve package is shown in Figure 4-16C. The A input is divided by two and appears as the ZA output. The BC input is divided by six and appears at the ZD output. If ZA is connected to BC input, the A input will be divided by twelve and appear at the ZD output. The Z outputs represent a special positive-logic version of the stored count. The counter will advance on the negative transition of the input pulse. When both R0 inputs are HIGH, the counter will reset to zero.

4-186. The dual J-K Master-Slave Flip/Flop package is shown in Figure 4-16I. When both inputs are LOW, the clock has no effect. When the J input is HIGH, the negative clock transition will set Q HIGH. When the K input is HIGH, the negative clock transition will cause $\overline{Q}$ to go HIGH. When both inputs are HIGH, the flip/flop will change state (toggle) with each negative transition of the clock input. A LOW R input will override other inputs and reset the Q output LOW. The Q and $\overline{Q}$ outputs are always opposite in level.

4-187. The Dual J-K Flip/Flop with preset and clear inputs is shown in Figure 4-16J. This flip/flop is the same as that previously described, except that individual R and S inputs are provided. A LOW R input will override other inputs and reset the flip/flop (Q = LOW). A LOW S input will override other inputs and set the flip/flop (Q = HIGH).

4-188. The Dual D flip/flop is shown in Figure 4-16K. The Q output will assume the same state as the D input at the positive transition of the C input. The Q output is always opposite in level to the Q output. If the R input is LOW, the Q output will go LOW regardless of the D and C inputs. If the S input is LOW, the Q output will go HIGH regardless of the D and C inputs.

4-189. The Display Driver is shown in Figure 4-16L. The negative-logic 4-bit BCD input controls the state of one of 10 high-voltage transistors (part of IC package), used to drive display tubes. When a high-voltage transistor is enabled, a low resistance path to ground is provided for the display tube cathode. Each of the six unused states (10—15) will turn off all output transistors (blank display).

4-190 The 4-Bit Binary Counter is shown in Figure 4-16M. The A input is divided by two and appears as the ZA output. The B input is divided by eight and appears as the ZD output. If ZA is connected to B input, the A input will be divided by 16 and appear at the ZD output. The Z outputs represent the positive logic BCD version of the stored count. The counter will advance on the negative transition of the input pulse. When both R0 inputs are HIGH, the counter will reset to zero.

4-191. The 4-Bit Buffer Storage is shown in Figure 4-16N. The 4-bit BCD input will be gated into the buffer when G1 is enabled by a LOW or open circuit. The non-inverted output (ZA, ZB, ZC, ZD) is equal to the input (IZ, IB, IC, ID) when G1 is LOW or open. The inverted output ($\overline{ZA}$, $\overline{ZB}$, $\overline{ZC}$, $\overline{ZD}$) is enabled when G2 is HIGH. When G2 is LOW, the inverted output is all HIGH.

4-192. The Blanking Decade Counter package is shown in Figure 4-16O. The counter has two reset states determined by the reset control input. If the reset control is LOW, a HIGH reset pulse will set the counter to LLLL (blank). If the reset control is HIGH, a HIGH reset pulse will set the counter to HHHH (zero). The negative logic outputs are shown on the timing diagram.

Table 4-28. Standard Logic Functions

Figure Letter	Function	Logic	Boolean Equation
A	NAND	Positive	$Z = A \times B$
D	AND-OR-INVERT	Positive	$Z = [A \times B] + [C \times D]$
E	NAND	Positive	$Z = A \times B \times C$
F	NAND	Positive	$Z = A \times B \times C \times D$
G	NAND	Positive	$Z = A \times B \times C \times D \times E \times F \times G \times H$
H	AND-OR-INVERT	Positive	$Z = [A \times B] + [C \times D] + [E \times F] + [G \times H]$
P	AND	Positive	$Z = A \times B$
Q	OR, NOR	Positive	$Z = A \times B \times C \times D$
R	INVERTER	Positive	$Z = A$
BB	NOR	Positive	$Z = A + B$
DD	AND	Positive	$Z = A \times B$
EE	AND-OR-INVERT	Positive	$Z = [A \times B \times C \times D] + [E \times F \times G \times H] + [X]$

4-193. The Voltage Regulator package is shown in Figure 4-16S. Operating voltage is applied between V+ and V-. Vref is an internally generated reference voltage. Vout is the output voltage connection. VC is the connection to the internal series-pass transistor collector. Both inverting and non-inverting inputs are provided. Feedback elements may be connected between these inputs and the Frequency Compensation terminal. Current Sense and Limit connections are also provided.

4-194. The Divide by Sixteen package (4-bit ripple counter) is shown in Figure 4-16T. The negative-logic 4-bit BCD output is shown in the table. The ÷ 16 output will go HIGH on count 8 and LOW on count 16 or reset. A HIGH Reset signal will set all outputs HIGH (zero). The counter will advance on the positive transition of the input pulse.

4-195. The 4-Line to 10-Line Decoder is shown in Figure 4-16U. The positive-logic 4-bit BCD input is converted to the negative-logic decimal output. Each of the last six inputs (10—15) will produce an all-HIGH output.

4-196. The Operational Amplifier package is shown in Figure 4-16V. The amplifier can be used as a summing amplifier, with slew rates of 10V/μsec and bandwidths of 3.5 MHz, or as a comparator, with differential inputs up to ±30V.

4-197. The Up/Down Presettable Decade Counter package is shown in Figure 4-16W. A number between 0 to 9 may be preset and then the decade will count either up or down from this value. The preset count will be set according to the truth table when the preset input goes HIGH. The up and down count inputs should be inhibited by a HIGH when enabling preset. The decade can be reset to zero by applying a HIGH to the reset input while the up and down count inputs are HIGH (inhibited). A LOW input to a count input will change the state of the decade (up or down); the unused count input must be inhibited by a HIGH.

4-198. The 6-Bit Serial/Parallel Shift Register is shown in Figure 4-16X. When the Mode Command signal is HIGH, the unit functions in a parallel shift configuration: data are loaded on the I1-I6 lines (positive logic): When the Mode Command signal is LOW, the unit functions in a series shift configuration: data are loaded on the Serial Input, and shifting occurs on the negative Clock transition. Output data (Z1-Z6) are positive logic. A HIGH Reset pulse resets the Z outputs to all LOW (zero).

4-199. The Quadruple Bistable Latch is shown in Figure 4-16Y. For each latch, the Q output will assume the same state as the D input as long as the C input is HIGH. When C goes LOW, the latch stores the D input data (at the time of the negative C transition) until C goes HIGH. Q is always opposite $\overline{Q}$ in level. A common clock is provided for the A, B and C, D latches.

4-200. The J-K Master-Slave Flip/Flop is shown in Figure 4-16Z. Operation is similar to an ordinary J-K flip/flop, where J = J1 × J2 × J3 and K = K1 × K2 × K3. When the C input goes HIGH, information is loaded into the master section. When C goes LOW, information is transferred to the output.

4-201. The 4-Bit Binary Full Adder package is shown in Figure 4-16AA, with its truth table. The adder adds two 4-bit binary numbers (A1, A2, A3, A4, and B1, B2, B3, B4) and a carry-in (Cin) to produce their sum (Σ1, Σ2, Σ3, Σ4) and a carry-out (C4). The inputs A1, A2, B1, B2, and Cin determine Σ1, Σ2, and the internal carry (C2). The inputs A3, A4, B3, B4, and internal carry C2 determine Σ3, Σ4, and C4. Both inputs and outputs are negative logic.

4-202. The 4-Bit Shift Register package is shown in Figure 4-16CC. The register may be used as a right shift, serial-in/serial-out device or as a dual-source, parallel-to-serial converter. In serial mode, data are applied to SER IN. Data are clocked through the register on the positive transition of the CLOCK input. When the PR CLEAR input is HIGH, the register is reset to zero. Parallel data are loaded from either of two preset inputs (1A, 1B, 1C, 1D or 2A, 2B, 2C, 2D). When PR1 is HIGH, the 1A, 1B, 1C, 1D data are loaded. When PR2 is HIGH, the 2A, 2B, 2C, 2D data are loaded.

4-203. The Time Base Decade is shown in Figure 4-16FF. The 1820-0412 count frequency is 2.5 MHz. The 1820-0413 count frequency is 12.5 MHz. The count will advance on the positive transition of the IN signal. Carry and Gated Outputs are negative logic. The gated output will be enabled when Gate Control is LOW. Both outputs represent IN/10. A HIGH R0 input will reset the decade to zero. A HIGH R9 input will reset the decade to nine.

4-204. The first type of Wideband Amplifier is shown in Figure 4-16GG. The amplifier has a typical bandwidth of 16 MHz with 53 dB gain at 5 MHz. Typical AGC range is 33 dB. An internal limiter diode is provided which may be connected to the limiter terminals.

4-205. The Dual J-K flip/flop package is shown in Figure 4-16HH. The flip/flop is the same as previously described except for a direct set input. A LOW S input will override other inputs and set the Q output HIGH.

4-206. The second type of Wideband Amplifier is shown in Figure 4-16II. The amplifier has a frequency range of 100 kHz to 20 MHz with 75 dB gain at 4.5 MHz. External bypass capacitors are required.

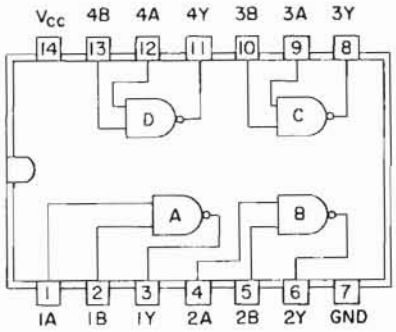
4-207. The Voltage Comparator/Buffer is shown in Figure 4-16JJ. The comparator has a voltage gain of 40V/mV and can drive a digital load directly.

4-208. The second type of Operational Amplifier is shown in Figure 4-16KK. The amplifier can be used as a summing amplifier or comparator. External balance terminals are not provided.

4-209. The third type of Operational Amplifier is shown in Figure 4-16LL. It is similar to that described in paragraph 4-208.

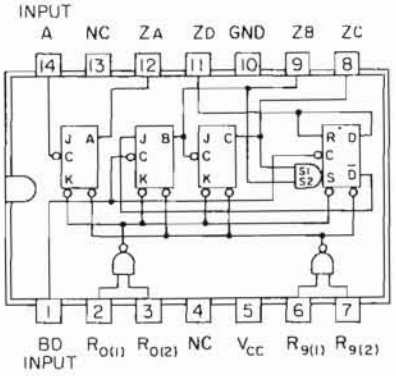
4-210. The Dual J-K, Edge-Triggered Flip/Flop is shown in Figure 4-16NN. The flip/flop functions as previously described except for the clock inputs. When C goes HIGH, inputs are enabled. When C goes LOW, outputs are enabled (data transferred).

Figure 4-16A. Integrated Circuit Configurations



QUADRUPLE 2-INPUT POSITIVE NAND GATE
1820-0054, 1820-0269, 1820-0370

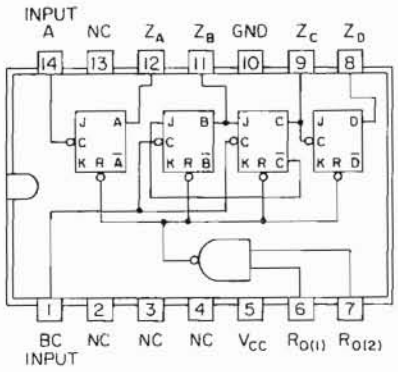
B



COUNT	OUTPUT			
	Z_A	Z_B	Z_C	Z_D
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H

DECADE COUNTER
1820-0055

C

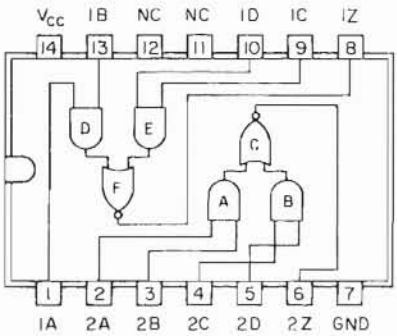


TRUTH TABLE
(SEE NOTES 1&2)

COUNT	OUTPUT			
	Z_A	Z_B	Z_C	Z_D
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	L	L	H
7	H	L	L	H
8	L	H	L	H
9	H	H	L	H
10	L	L	H	H
11	H	L	H	H

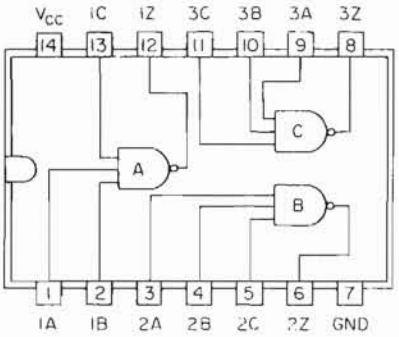
DIVIDE BY TWELVE
1820-0056

D



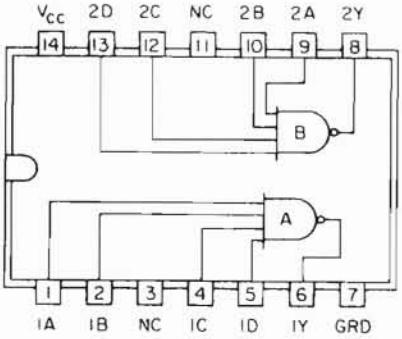
DUAL 2-WIDE 2-INPUT AND-OR-INVERT GATE
1820-0063, 1820-0377, 1820-0378

E



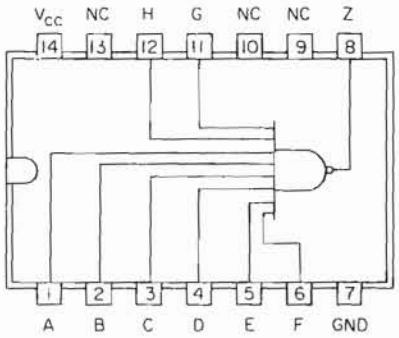
TRIPLE 3-INPUT NAND GATE
1820-0068, 1820-0371

F



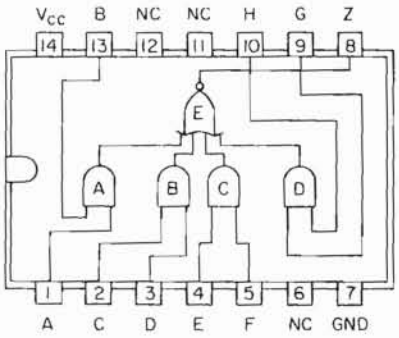
DUAL 4-INPUT NAND GATE
1820-0069, 1820-0376

G



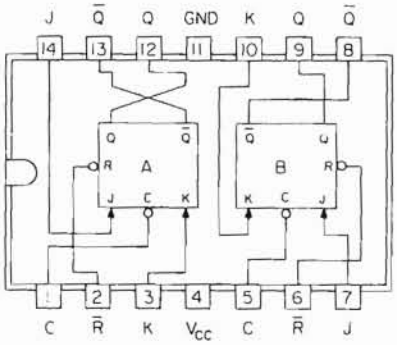
8-INPUT NAND GATE
1820-0070

H



4-WIDE 2-INPUT AND-OR-INVERT GATE
1820-0074

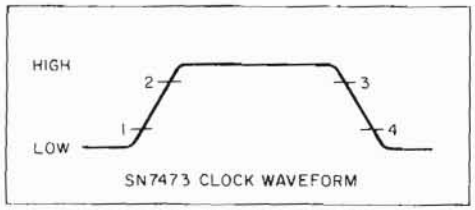
I



TRUTH TABLE
(EACH FLIP-FLOP)

t_n		t_{n+1}
J	K	Q
0	0	Q_n
0	1	0
1	0	1
1	1	$\overline{Q}_n$

NOTES
1 t_n = BIT TIME BEFORE CLOCK PULSE
2 t_{n+1} = BIT TIME AFTER CLOCK PULSE
3 POSITIVE LOGIC:
LOW INPUT TO CLEAR SETS Q TO LOGICAL 0 REGARDLESS OF CLOCK STATE

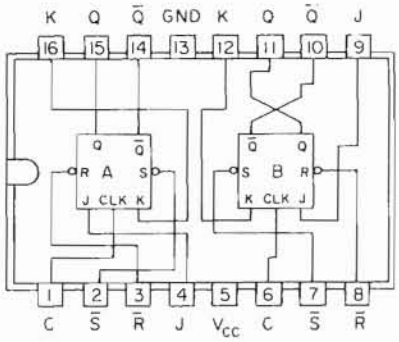


SN7473 CLOCK WAVEFORM

1 ISOLATE SLAVE FROM MASTER
2 ENTER INFORMATION FROM J AND K INPUTS TO MASTER
3 DISABLE J AND K INPUTS
4 TRANSFER INFORMATION FROM MASTER TO SLAVE

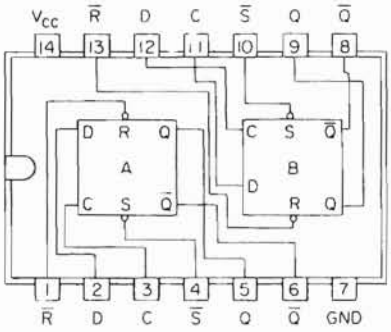
DUAL J-K MASTER-SLAVE FLIP/FLOP
1820-0075

J



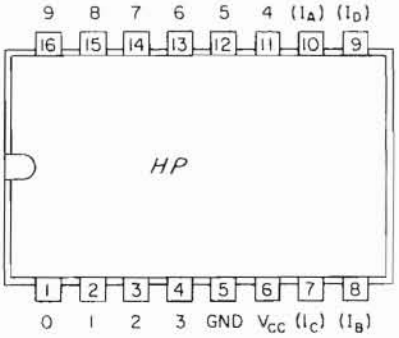
DUAL J-K FLIP/FLOP WITH PRESET & CLEAR
1820-0076

K



DUAL D-TYPE EDGE-TRIGGERED FLIP/FLOP
1820-0077

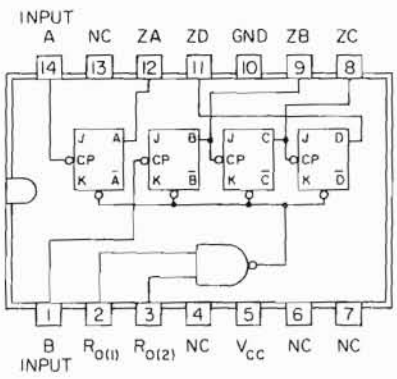
L



$I_A(1)$	$I_B(2)$	$I_C(4)$	$I_D(8)$	"ON" OUTPUT
H	H	H	H	0
L	H	H	H	1
H	L	H	H	2
L	L	H	H	3
H	H	L	H	4
L	H	L	H	5
H	L	L	H	6
L	L	L	H	7
H	H	H	L	8
L	H	H	L	9
BCD 10-15				NONE

DISPLAY DRIVER
1820-0092

M



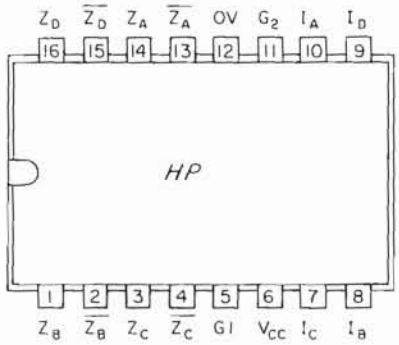
(SEE NOTES 1 & 2)

COUNT	OUTPUT			
	Z_D	Z_C	Z_B	Z_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

NOTES
1 OUTPUT A CONNECTED TO INPUT B
2 TO RESET ALL OUTPUTS TO LOGICAL 0 BOTH $R_{0(1)}$ AND $R_{0(2)}$ INPUTS MUST BE AT LOGICAL 1
3 POSITIVE LOGIC
SEE TRUTH TABLE

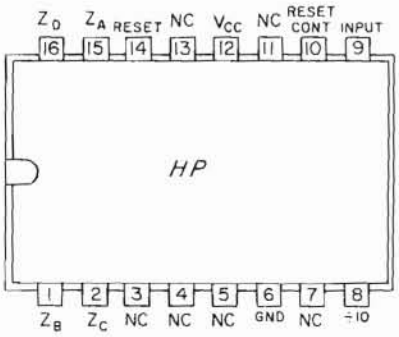
4-BIT BINARY COUNTER
1820-0099

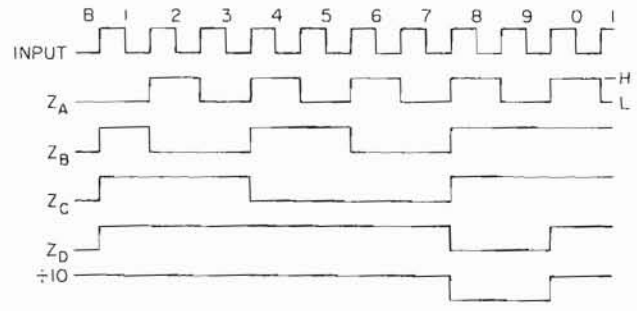
N



4-BIT BUFFER STORAGE
1820-0116

O

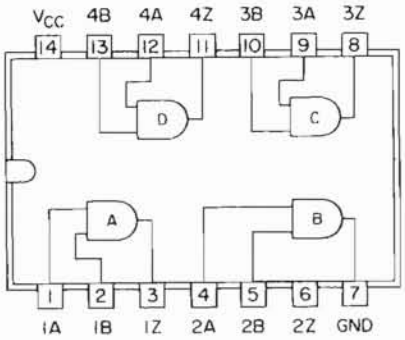




NEGATIVE LOGIC 1 = LOW
0 = HIGH

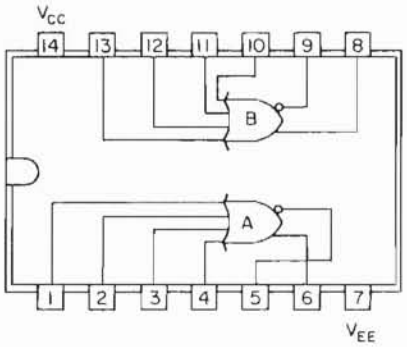
BLANKING DECADE COUNTER
1820-0117, 1820-0119

P



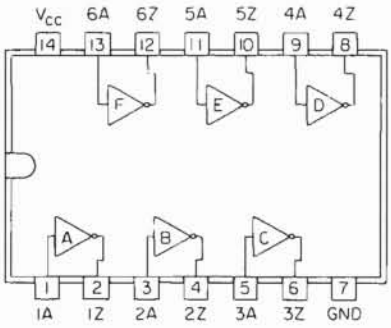
QUADRUPLE 2-INPUT AND GATE
1820-0141

Q



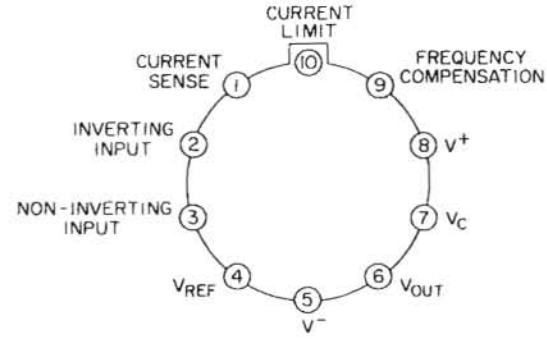
ECL DUAL 4-INPUT OR, NOR GATE
1820-0142

R



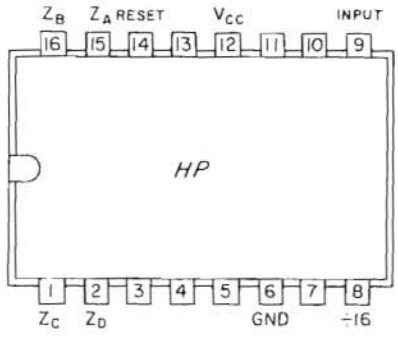
HEX INVERTER
1820-0174, 1820-0424

S



VOLTAGE REGULATOR
1820-0196

T



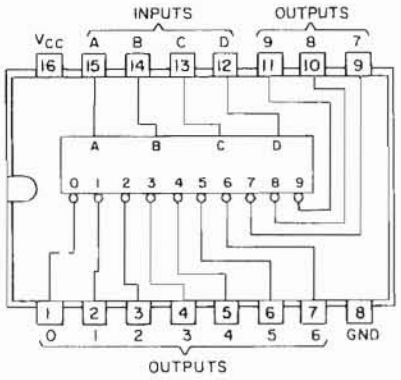
TRUTH TABLE

IN	A	B	C	D
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H
10	L	H	L	H
11	H	H	L	H
12	L	L	H	H
13	H	L	H	H
14	L	H	H	H
15	H	H	H	H

THE ÷16 OUTPUT WILL GO HIGH ON COUNT 8 AND LOW ON COUNT 16 OR RESET

DIVIDE BY 16 COUNTER
1820-0209

U

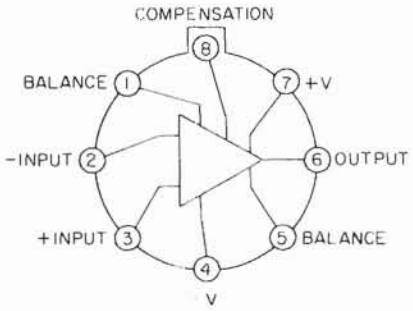


TRUTH TABLE

BCD INPUT					DECIMAL OUTPUT								
D	C	B	A		0	1	2	3	4	5	6	7	8	9
0	0	0	0		0	1	1	1	1	1	1	1	1	1
0	0	0	1		1	0	1	1	1	1	1	1	1	1
0	0	1	0		1	1	0	1	1	1	1	1	1	1
0	0	1	1		1	1	1	0	1	1	1	1	1	1
0	1	0	0		1	1	1	1	0	1	1	1	1	1
0	1	0	1		1	1	1	1	1	0	1	1	1	1
0	1	1	0		1	1	1	1	1	1	0	1	1	1
0	1	1	1		1	1	1	1	1	1	1	0	1	1
1	0	0	0		1	1	1	1	1	1	1	1	0	1
1	0	0	1		1	1	1	1	1	1	1	1	1	0
1	0	1	0		1	1	1	1	1	1	1	1	1	1
1	0	1	1		1	1	1	1	1	1	1	1	1	1
1	1	0	0		1	1	1	1	1	1	1	1	1	1
1	1	0	1		1	1	1	1	1	1	1	1	1	1
1	1	1	0		1	1	1	1	1	1	1	1	1	1
1	1	1	1		1	1	1	1	1	1	1	1	1	1

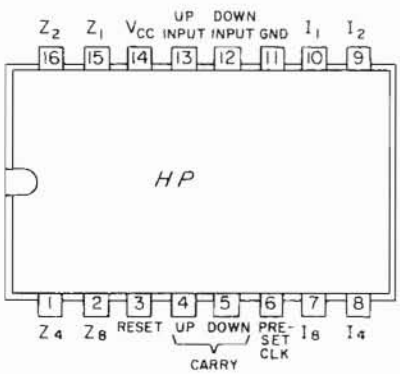
4-LINE TO 10-LINE DECODER
1820-0214

V



OPERATIONAL AMPLIFIER
1820-0223

W



DECADE CAN BE PRESET TO ANY STATE WITH PRESET INPUTS I_1 THRU I_8 PRESET CLOCK TRIGGERS PRESET INPUT

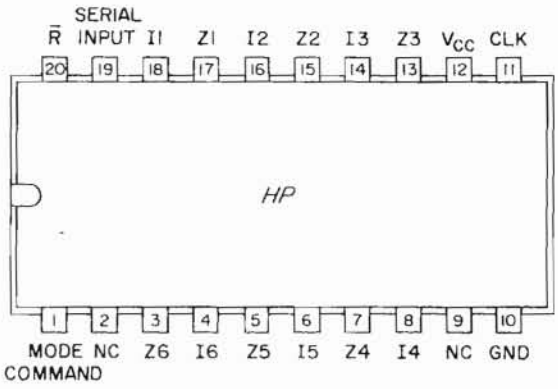
PRESET BCD INPUTS (I_1 THRU I_8) AND BCD OUTPUTS (Z_1 THRU Z_8) ARE NEGATIVE LOGIC.

UP-DOWN INPUTS AND CARRY ARE NEGATIVE LOGIC.

HIGH RESET INPUT DRIVES BCD OUTPUT TO 0000.

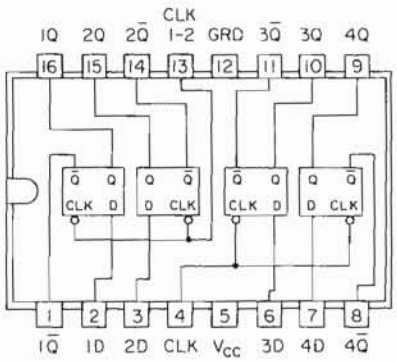
UP/DOWN PRESETTABLE DECADE COUNTER
1820-0237

X



6-BIT SERIAL/PARALLEL SHIFT REGISTER
1820-0295

Y

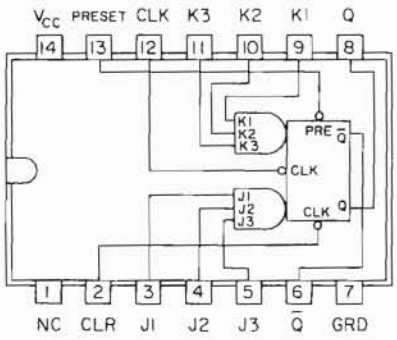


TRUTH TABLE (EACH LATCH)		
t_n	t_{n+1}	
D	Q	$\bar{Q}$
1	1	0
0	0	1

NOTES
1 t_n = BIT TIME BEFORE CLOCK PULSE
2 t_{n+1} = BIT TIME AFTER CLOCK PULSE

QUADRUPLE BISTABLE LATCH
1820-0301

Z



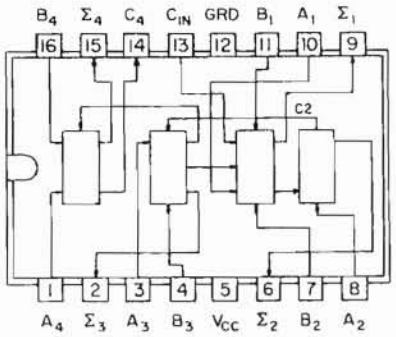
TRUTH TABLE

t_n		t_{n+1}
J	K	Q
0	0	Q_n
0	1	0
1	0	1
1	1	$\bar{Q}_n$

NOTES
1 J = J1 · J2 · J3
2 K = K1 · K2 · K3
3 t_n = BIT TIME BEFORE CLOCK PULSE
4 t_{n+1} = BIT TIME AFTER CLOCK PULSE

J-K MASTER-SLAVE FLIP/FLOP
1820-0304, 1820-0387

AA

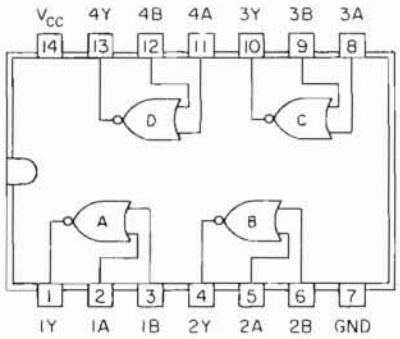


4-BIT BINARY FULL ADDER
1820-0305

TRUTH TABLE

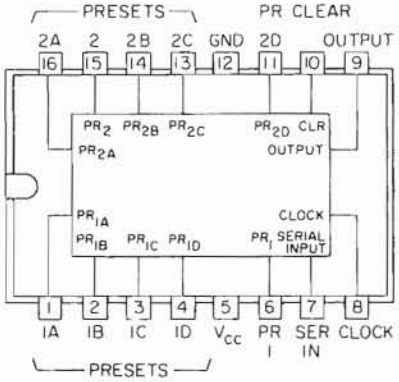
INPUT				OUTPUT					
				WHEN C_{IN} = L			WHEN C_{IN} = H		
				WHEN C2 = L			WHEN C2 = H		
A_1 / A_3	B_1 / B_3	A_2 / A_4	B_2 / B_4	Σ_1 / Σ_3	Σ_2 / Σ_4	C_2 / C_4	Σ_1 / Σ_3	Σ_2 / Σ_4	C_2 / C_4
L	L	L	L	L	L	L	H	L	L
H	L	L	L	H	L	L	L	H	L
L	H	L	L	H	L	L	L	H	L
H	H	L	L	L	H	L	H	H	L
L	L	H	L	L	H	L	H	H	L
H	L	H	L	H	H	L	L	L	H
L	H	H	L	H	H	L	L	L	H
H	H	H	L	L	L	H	H	L	H
L	L	L	H	L	H	L	H	H	L
H	L	L	H	H	H	L	L	L	H
L	H	L	H	H	H	L	L	L	H
H	H	L	H	L	L	H	H	L	H
L	L	H	H	L	L	H	H	L	H
H	L	H	H	H	L	H	L	H	H
L	H	H	H	H	L	H	L	H	H
H	H	H	H	L	H	H	H	H	H

BB



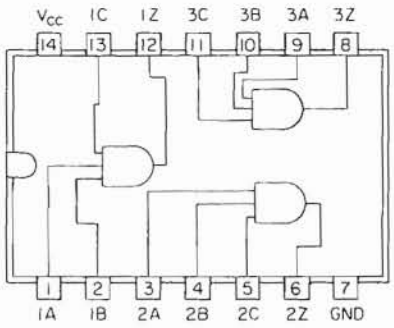
QUADRUPLE 2-INPUT NOR GATE
1820-0328

CC



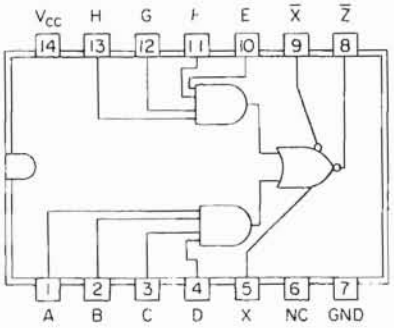
4-BIT SHIFT REGISTER
1820-0366

DD



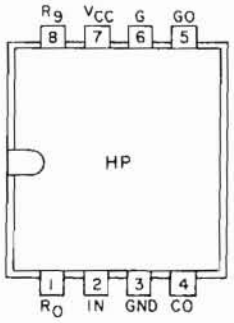
TRIPLE 3-INPUT AND GATE
1820-0372

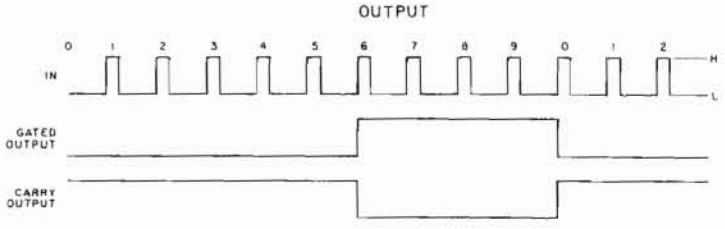
EE



DUAL 4-WIDE AND-OR-INVERT GATE
1820-0382

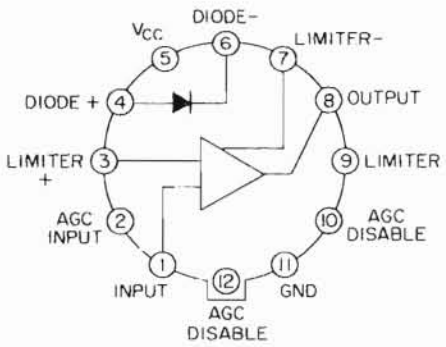
FF





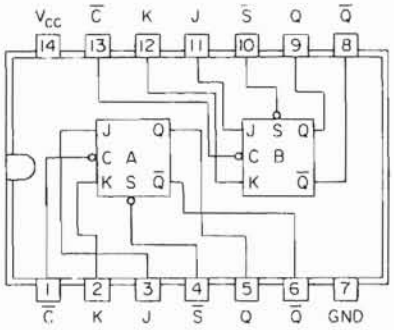
TIME BASE DECADE
1820-0412, 1820-0413

GG



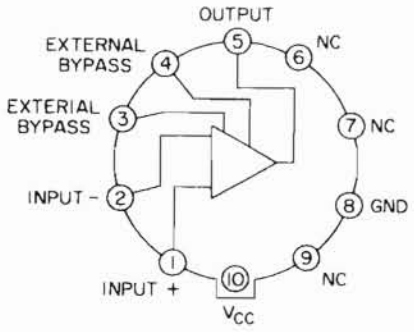
WIDEBAND AMPLIFIER
1820-0433

HH



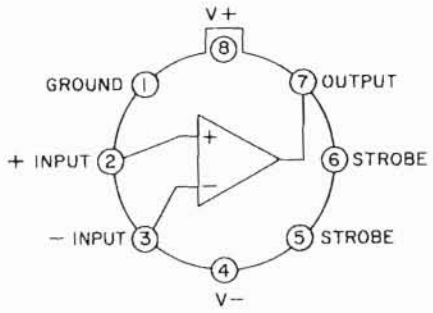
DUAL J-K FLIP/FLOP
1820-0451

II



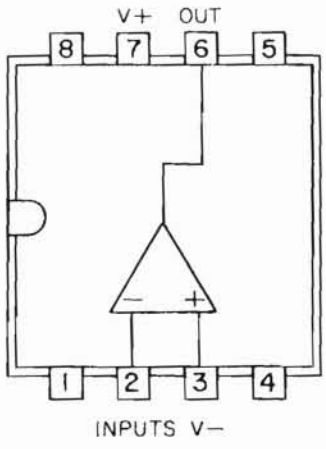
WIDEBAND AMPLIFIER
1820-0474

JJ



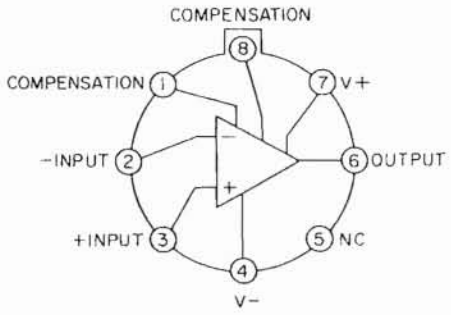
VOLTAGE COMPARATOR/BUFFER
1820-0475

KK



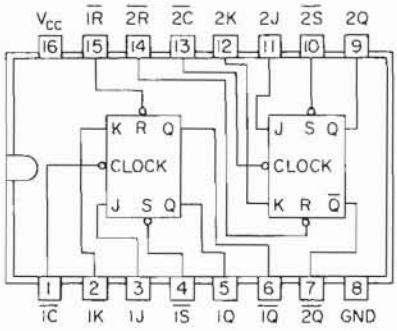
OPERATIONAL AMPLIFIER
1820-0493

LL



OPERATIONAL AMPLIFIER
1820-0035

MM



DUAL J-K, EDGE-TRIGGERED, FLIP/FLOP
1820-0629

SECTION V

MAINTENANCE

5-1. INTRODUCTION

5-2. This section contains assembly designations, preventive maintenance, in-cabinet performance checks, adjustment procedure, recommended test equipment, troubleshooting procedure, and repair information.

5-3. ASSEMBLY DESIGNATIONS

5-4. Tables 5-1 and 5-2 list the designations, name, and Hewlett-Packard part number of assemblies used in the 5500C Laser Head and 5505A Laser Display Unit.

Table 5-1. 5500C Laser Head Assembly Identification

Assembly	Name	HP Part No.
A1	Connector Board	05500-60207
A2	Laser Assembly	05500-60033
A3	Driver Board	05500-60204
A4	Power Supply Board	05500-60203
A5	Receiver Assembly	----------
A6	Cover Plate Assembly	05500-60041

Table 5-2. 5505A Laser Display Unit Assembly Identification

Assembly	Name	HP Part No.
A1	Analog Board	05505-60001
A2	Clock Board	05505-60002
A3	R-Register Board	05505-60034
A4	X-Register Board	05505-60034
A5	Adder Board	05505-60005
A6	Algorithm Board	05505-60006
A7	Program Board	05505-60007
A8	Function Board	05505-60058
A9	Multiplier Board	05505-60049
A10	D-Register Board	05505-60010
A11	Display Board	05505-60011
A12	Power Supply Board	05505-60012
A13	Annunciator Board	05505-60013
A14	*	*

*A14 Board name and HP part number vary with 5526A Option number (see Section VII).

5-5. PREVENTIVE MAINTENANCE

5-6. Preventive maintenance for the 5526A Laser Measurement System consists of a few basic housekeeping procedures performed as required to prevent performance degradation. The air filter on the rear panel of the 5505A should be examined for dust buildup. Vacuum clean or wash in soap and warm water as required to allow free air circulation. For general cleaning, remove oil, dust, dirt, etc., by wiping laser components with cloth dampened with alcohol.

5-7. To clean optical surfaces, brush dust from surface with a lens brush or a loosely wadded optical lens cleaning tissue. Using a flat tissue, gently wipe surface with a circular motion. If finger prints or other smudges are to be removed, moisten tissue with alcohol and wipe with a circular motion.

5-8. RECOMMENDED TEST EQUIPMENT

5-9. Test equipment recommended for troubleshooting calibration is listed in Table 5-3. Test equipment having equivalent characteristics may be substituted for the equipment listed.

Table 5-3. Recommended Test Equipment

Instrument Type	Required Characteristics	Recommended Type	Troubleshooting	System Adjustment
Multimeter	+300V dc, 300V ac; 100,000 ohms/volt	HP 412A	X	X
VTVM	+100V dc range, 10 MΩ input impedance	HP 410B	X	
HV Probe	Compatible with VTVM. +15 kV range.	HP 11044A	X	
Power Supply	+10V, 200 mA	HP 721A	X	X
Oscilloscope	20 MHz bandwidth	HP 180A	X	X
Dual Trace Plug-in	5 mV/cm dual channel	HP 1801A	X	X
Time Base Plug-in	0.1 μsec/cm main sweep	HP 1820A	X	X
Pulse Generator	+5V peak, 0.5 μsec, 1 MHz rate.	HP 222A	X	X
Logic Probe	Compatible with TTL logic levels	HP 10525A	X	
Digital Voltmeter	4 significant digits	HP 3439A	X	
DVM Plug-in	+1 mV to 10V. Compatible with DVM.	HP 3443A	X	
Pull-up Resistor	10 kΩ, ±10% ¼ watt	—	X	
Coupling Capacitor	0.001 μF, 50 WVDC	—	X	
Hex keys	#6, #8, and #10	—		X
Screwdriver	Pozi-driv	Stanley 2951		X
Socket Wrench	11/32-inch Hex	—		X
Screwdriver	⅛" non-metallic	GC5003		X
Screwdriver	1/16" Flat Blade	—		X
Frequency Standard	1 part in 10^6 stability, 1 MHz	HP 5245L		X

5-10. IN-CABINET PERFORMANCE CHECK

5-11. The performance check given in Table 5-4 can be used to verify proper operation of the Laser Measurement System. The performance check may be used for incoming inspection, periodic certification, troubleshooting, or post-repair certification. The numbers in the Abnormal column of Table 5-4 refer to Figure 5-23, Troubleshooting Tree. Refer to appropriate block in Figure 5-23 if difficulty is encountered during the performance check. All display indications shown in parenthesis should be used if zero suppression has been defeated.

Table 5-4. In-Cabinet Performance Check

Step	Operation	Normal Indication	Abnormal Indication
1	Visually check components for obvious faults		
2	Check line fuse	a. 2.5 AT for 115V ac operation b. 1.5 AT for 230V ac operation	
3	Check position of rear-panel ac LINE switch and set to 115 or 230 as desired.		
4	On Display, set power switch to OFF.		
5	Connect ac power cord to proper outlet.		
6	Connect laser/display interconnecting cable between 5505A Display Unit and 5500C Laser Head connector J1 (right-hand connector, as viewed from rear of 5500C).		
7	Set UNITS switch to "in".		
8	Set power switch to ON.	a. RESET light comes on and begins flashing in 3 to 5 seconds. b. NORMAL pushbutton lights. c. Six (9) of the numerical displays light. d. Sign (+ or -) lights. e. in indicator lights. f. Cooling fan is audible.	 6 1
9	Press SMOOTH pushbutton.	a. NORMAL pushbutton goes out. b. SMOOTH pushbutton lights. c. Display reads: 0.00000 (0000.00000). d. + or - sign is lit.	 5 4 13
10	Press X10 pushbutton.	a. SMOOTH pushbutton goes out. b. X10 pushbutton lights. c. Display reads: 0.000000 (000.000000). d. + or - sign is lit.	5 5 13
11	Press VELOCITY pushbutton.	a. X10 pushbutton goes out. b. VELOCITY pushbutton lights. c. /sec or /min indicator lights. d. Display reads: 0.0000 or 0.00 (0000.0000 or 0000.00).	5 5 6 4

Table 5-4. In-Cabinet Performance Check (Cont'd)

Step	Operation	Normal Indication	Abnormal Indication
12	Behind COMPENSATION door change VELOCITY switch	a. Indicator light changes to /sec or /min (to agree with position of VELOCITY switch).	6
		b. VELOCITY pushbutton remains on.	5
		c. Display reads: 0.00 or 0.0000 (0000.00 or 0000.0000).	4
13	Press NORMAL pushbutton.	a. VELOCITY pushbutton goes out.	5
		b. NORMAL pushbutton lights.	5
14	Set UNITS switch to "λ/4".	a. in indicator goes out.	6
		b. λ/4 indicator lights.	6
		c. Display reads: 00000 (000000000).	4
15	Press SMOOTH pushbutton.	a. NORMAL pushbutton goes out.	5
		b. Display unchanges.	4
16	Press X10 pushbutton.	a. SMOOTH pushbutton goes out.	5
		b. Display reads: 0000.0 (00000000.0).	4
17	Press VELOCITY pushbutton.	a. X10 pushbutton goes out.	5
		b. Display reads: 00000 (000000000).	4
18	Set VELOCITY switch to "m".	a. /min indicator lights.	6
		b. Display unchanged.	4
19	Set VELOCITY switch to "s".	a. /min indicator goes out.	6
		b. /sec indicator lights.	6
		c. Display unchanged.	4
20	Press NORMAL pushbutton.	a. VELOCITY pushbutton goes out.	5
		b. NORMAL pushbutton lights.	5
		c. /sec indicator goes out.	6
		d. Display unchanged.	4
21	Set UNITS switch to "mm".	a. λ/4 indicator goes out.	6
		b. mm indicator lights.	6
		c. Display reads: 0.0000 (00000.0000).	4
22	Press SMOOTH pushbutton.	a. NORMAL pushbutton goes out.	5
		b. SMOOTH pushbutton lights.	5
		c. Display unchanged.	4
23	Press X10 pushbutton.	a. SMOOTH pushbutton goes out.	5
		b. X10 pushbutton lights.	5
		c. Display reads: 0.00000 (0000.00000).	4
24	Press VELOCITY pushbutton.	a. X10 pushbutton goes out.	5
		b. VELOCITY pushbutton lights.	5
		c. /sec indicator lights.	6
		d. Display reads: 0.000 (00000.000).	4
25	Set VELOCITY switch to "m".	a. /sec indicator goes out.	6
		b. /min indicator lights.	6
		c. Display reads: 0.0 (00000.0).	4

Table 5-4. In-Cabinet Performance Check (Cont'd)

Step	Operation	Normal Indication	Abnormal Indication
26	Move DIRECTION SENSE back and forth to F and R several times.	a. Sign indicator changes from + to - and vice versa. b. Display unchanged.	13 4
27	Momentarily depress PRINT switch to MANUAL.	Audible "click" of the relay	16B
28	Set PRINTS-PLOT/MIN switch to MAX.	NONE	
29	Set PRINT switch to TIMED.	NONE (relay quiet)	
30	Set PRINTS-PLOT/MIN switch to each position: 100, 60, 50, 30, 20, 10, and 6, and using a watch, time each position. Set PRINT switch to off (center position).	Relay clicks at the *approximate* rate-per-minute that sweep-second hand indicates.	16B
31	Set DIRECTION SENSE to F.	Sign is +.	13
32	Behind COMPENSATION door, momentarily press and release CHECKS 1 switch.	Display reads: +15824785 (+015824785) in approximately 2 seconds.*	12B
33	Momentarily press and release CHECKS 2 switch.	Display reads: -15824785 (-015824785) in approximately 2 seconds.*	12B
34	Set UNITS switch to "in".	a. mm indicator goes out. b. in indicator lights. c. Display reads: -6230230 (-006230230) in approximately 1 second.*	6 6 12B
35	Momentarily press and release CHECKS 1 switch.	Display reads: +6230230 (+006230230) in approximately 2 seconds.*	12B
36	Momentarily press and release CHECKS 2 switch.	Display reads: -6230230 (-006230230) in approximately 2 seconds.*	12B
37	Set COMPENSATION PPM thumbwheel switches to read 999.9.	Same	
38	Set UNITS switch to "λ/4".	a. in indicator goes out. b. λ/4 indicator lights. c. Display reads: -9999999 (-009999999) in approximately 2 seconds.	6 6 12B
39	Momentarily press and release CHECKS 1 switch.	Display reads +9999999 (+009999999) in approximately 2 seconds.	12B
40	Momentarily press and release CHECKS 2 switch.	Display reads: -9999999 (-009999999) in approximately 2 seconds.	12B

*If numbers in display are 15824787 and 6230231, see paragraph 4-51.

Table 5-4. In-Cabinet Performance Check (Cont'd)

Step	Operation	Normal Indication	Abnormal Indication
41	Set the COMPENSATION thumbwheels to read 000.0, then progressively change them to read 888.8.	Display reads: -9990000 for 1st setting progressively through -9998888. e.g. . . . -9990000 (-009990000) -9991111 (-009991111) -9992222 (-009992222) -9993333 (-009993333) -9994444 (-009994444) -9995555 (-009995555) -9996666 (-009996666) -9997777 (-009997777) -9998888 (-009998888)	12B
		a. Observe steady beam of light emitting from laser (use piece of paper).	7B
		b. Observe LASER TUNING meter reads in green area.	7
		c. RESET pushbutton is flashing.	9
42	Set UNITS switch to "in" to press NORMAL pushbutton.		
43	Push TUNE switch alternately toward each arrow. Stop with meter reading in green area.	LASER TUNING meter needle moves in direction of TUNE switch movement.	7B
44	Place interferometer and reflector in front of laser beam aperature and adjust their positions until the return light beam is centered in the lower beam aperture.	a. On Display unit, BEAM ALIGNMENT meter reads in the green area. b. Display reads zero. c. RESET pushbutton is flashing.	8
45	Press RESET pushbutton.	a. Display reads: 0.00000 (0000.00000) (extreme right position may fluctuate due to vibrations).	4
		b. RESET pushbutton goes out.	10
46	Remove reflector.	a. BEAM ALIGNMENT meter reads in the red area.	8
		b. RESET pushbutton begins flashing.	9B
		c. Display reads zero.	
47	Reposition reflector and press RESET pushbutton.	a. Display reads: 0.00000 (0000.00000).	4
		b. RESET pushbutton goes out.	10
		c. BEAM ALIGNMENT meter reads in green area.	8
		d. LASER TUNING meter reads in green area.	7
48	Press TUNE switch to left until LASER TUNING meter needle is in red.	a. RESET begins flashing in approximately 4 seconds.	7
		b. Display resets to zero.	
		c. BEAM ALIGNMENT meter needle is in red (may not stay in red).	8
		NOTE A lock point in the red is required to achieve the normal indications of steps a, b, and c. Since laser temperature affects lock point, not all lasers may lock in red region, in which case proceed to step 51.	

Table 5-4. In-Cabinet Performance Check (Cont'd)

Step	Operation	Normal Indication	Abnormal Indication
49	Press TUNE switch to right until LASER TUNING meter reads approximately 3.	a. BEAM ALIGNMENT meter reads approximately 8. b. Display reads: 0.00000 (0000.00000). c. RESET goes out.	8 4 10
50	Set COMPENSATION PPM thumbwheels to 999.9. While observing display, move retroreflector 1-inch (±0.001). Use a known gage block or micrometer.	a. Display reads between: 0.99900 (0000.99900) and 1.00100 (0001.00100). (This test is not for Laser accuracy. This test checks the Laser for complete proper operation.)	12
51	Set UNITS switch to "mm".	Display reads between: 25.3746 (00025.3473) and 25.4254 (00025.4254).	12
52	Set UNITS switch to "λ/4".	Display reads between: 160668 (000160668) and 160347 (000160347).	12
53	Set UNITS switch to "in" and COMPENSATION PPM to: 000.0.	Note that display decreases by 0.001 inches.	12
54	Lightly tap table or laser housing.	Observe display right-most digit jitters.	
55	Press SMOOTH pushbutton.	Observe display stabilizes (smooths).	15B
56	Move retroreflector 1/2-inch or more.	Observe that smoothing is defeated during retroreflector movement and display again stabilizes (smooths) when retroreflector stops.	15
57	Press VELOCITY pushbutton.	a. Display reads: 0.00 (0000.00). b. /min indicator lights (previously set in step 24).	4
58	Slide retroreflector several inches then back again.	a. Observe that display is displaying the speed (in inches per minute) of retroreflector movement. b. Display returns to reading of: 0.00 (0000.00) when retroreflector stops. NOTE If retroreflector is moved too fast (faster than 12 inches-per-second) the RESET pushbutton begins flashing.	
59	Set VELOCITY switch to "s".	a. /sec indicator lights. b. Display reads 0.0000 (0000.0000).	6 4
60	Repeat steps 44 through 59 with interferometer and retroreflector positioned such that the return light beam is centered in the left beam aperature, as viewed from front of 5500C. (Turrent must be rotated 90 degrees.) Then proceed to step 61.		
61	Set power switch to OFF position.		
62	Disconnect interconnecting cable from 5500C connector J1 and reconnect to connector J2 (left-hand connector, as viewed from rear of 5500C).		
63	Set power switch to ON position.		

Table 5-4. In-Cabinet Performance Check (Cont'd)

Step	Operation	Normal Indication	Abnormal Indication
64	Repeat steps 44 through 59 with interferometer and retroreflector positioned such that the return light beam is centered in the right beam aperature, as viewed from front of 5500C. Then proceed to step 65.		
65	Repeat steps 44 through 59 with interferometer and retroreflector positioned such that the return light beam is centered in the upper beam aperature. (Turrent must be rotated 90 degrees.) Then proceed to step 66.		
66	Set power switch to OFF position.		

5-12. PERFORMANCE TEST CARD

5-13. The Performance Test Card, Table 5-5, lists performance tests of Table 5-4 to verify Laser Measurement System operation and blank spaces to be filled in by test personnel for record purposes. Periodic repetitions of these tests with recorded results will help repair technicians judge the performance of a particular system. It is recommended that the Performance Test Card be used to check the condition of the Laser Measurement System when it is received from the Hewlett-Packard factory.

5-14. REMOVAL AND REPLACEMENT INSTRUCTIONS

5-15. 5500C LASER HEAD

5-16. Covers

5-17. To remove top cover use a #8 hex key to remove four screws securing cover to end caps. Pull up on cover until it clears the end caps. An interlock switch disables the high voltage when the top cover is removed.

WARNING

USE EXTREME CAUTION WHEN OPERATING LASER WITH INTERLOCK DEFEATED. UP TO 11,000 VOLTS MAY BE PRESENT AT LASER ANODE. UP TO 2,000 VOLTS MAY BE PRESENT AT PZT CONNECTION.

5-18. To remove rear cover plate use pozi-driv screwdriver to remove four screws that secure cover plate to rear end cap. To remove bottom cover plate use pozi-driv screwdriver to remove eight screws that secure cover plate to base. To replace the top, rear and bottom covers — reverse the removal procedures.

NOTE

The louvers in the laser head top cover should be at the rear to ventilate the laser tube. Some units of Model 5500C do NOT have louvers in the cover.

PERFORMANCE TEST CARD

Hewlett-Packard Model 5526A
Laser Measurement System
HP 5500C Serial Number _____
HP 5505A Serial Number _____

Tests Performed by _____

Date _____

Table 5-5. 5526A Performance Test Card

	Description	Step	Check
1.	Visual Inspection	1	_____ Satisfactory
2.	Line Fuse and Switch	2—5	_____ 2.5 AT for 115V ac _____ 1.5 AT for 230V ac
3.	Initial Turn-on	6—7	_____ RESET light flashing _____ NORMAL pushbutton on _____ Six (9) Display digits on _____ Sign (+ or -) on _____ "in" indicator on _____ Blower operating
4.	SMOOTH Check (inches)	8	_____ SMOOTH pushbutton on _____ Display reads 0.0000 (0000.00000) _____ Sign (+ or -) on
5.	X10 Check (inches)	9	_____ X10 pushbutton on _____ Display reads 0.000000 (000.000000) _____ Sign (+ or -) on
6.	VELOCITY Check (inches)	10	_____ VELOCITY pushbutton on _____ /sec or /min indicator on _____ Display reads 0.0000 or 0.00 (0000.0000 or 0000.00)
	Change VELOCITY switch	11	_____ /min or /sec indicator on _____ Display reads 0.00 or 0.0000 (0000.00 or 0000.0000)
7.	NORMAL Check (λ/4)	12—13	_____ NORMAL pushbutton on _____ λ/4 indicator on _____ Display reads 00000 (000000000)
8.	SMOOTH Check (λ/4)	14	_____ SMOOTH pushbutton on _____ Display reads 00000 (000000000)
9.	X10 Check (λ/4)	15	_____ X10 pushbutton on _____ Display reads 0000.0 (00000000.0)
10.	VELOCITY Check (λ/4)	16	_____ VELOCITY pushbutton on _____ Display reads 00000 (000000000)
	Set VELOCITY to "m"	17	_____ /min indicator on
	Set VELOCITY to "s"	18	_____ /sec indicator on _____ Display reads 00000 (000000000)
11.	NORMAL Check (mm)	19—20	_____ NORMAL pushbutton on _____ "mm" indicator on _____ Display reads 0.0000 (00000.0000)
12.	SMOOTH Check (mm)	21	_____ SMOOTH pushbutton on _____ Display reads 0.0000 (00000.0000)

Table 5-5. 5526A Performance Test Card (Cont'd)

	Description		Step	Check
13.	X10 Check (mm)		22	_____ X10 pushbutton on
				_____ Display reads 0.00000 (0000.00000)
14.	VELOCITY Check (mm)		23	_____ VELOCITY pushbutton on
				_____ /sec indicator on
				_____ Display reads 0.000 (00000.000)
	Set VELOCITY to "m"		24	_____ /min indicator on
				_____ Display reads 0.0 (00000.0)
15.	DIRECTION SENSE		25	_____ Sign changes
				_____ Display reads 0.0 (00000.0)
16.	PRINT Check			
	MANUAL		26	_____ Relay click audible
	TIMES (MAX)		27	_____ Relay silent
	TIMED (100)		28—29	_____ ≈ 100 clicks/sec
	TIMES (60)			_____ ≈ 60 clicks/sec
	TIMED (50)			_____ ≈ 50 clicks/sec
	TIMED (30)			_____ ≈ 30 clicks/sec
	TIMED (20)			_____ ≈ 20 clicks/sec
	TIMED (10)			_____ ≈ 10 clicks/sec
	TIMED (6)			_____ ≈ 6 clicks/sec
	DIRECTION SENSE to F		30	_____ Sign is +
17.	CHECKS 1 (mm)		31	_____ Display reads +15824785* (+015824785)
18.	CHECKS 2 (mm)		32	_____ Display reads -15824785* (-015824785)
	UNITS to in		33	_____ in indicator on
				_____ Display reads -6230230* (-006230230)
19.	CHECKS 1 (inches)		34	_____ Display reads +6230230* (+006230230)
20.	CHECKS 2 (inches)		35	_____ Display reads -6230230* (-006230230)
	UNITS TO λ/4		36—37	_____ λ/4 indicator on
				_____ Display reads -9999999 (-009999999)
21.	CHECKS 1 (λ 4)		38	_____ Display reads +9999999 (+009999999)
22.	CHECKS 2 (λ/4)		39	_____ Display reads -9999999 (-009999999)
	COMPENSATION	000.0	40	_____ Display reads -9990000 (-009990000)
		111.1		_____ Display reads -9991111 (-009991111)
		222.2		_____ Display reads -9992222 (-009992222)
		333.3		_____ Display reads -9993333 (-009993333)
		444.4		_____ Display reads -9994444 (-009994444)
		555.5		_____ Display reads -9995555 (-009995555)
		666.6		_____ Display reads -9996666 (-009996666)
		777.7		_____ Display reads -9997777 (-009997777)
		888.8		_____ Display reads -9998888 (-009998888)
23.	System Turn-on		41—44	_____ Laser beam present
				_____ LASER TUNING reads 1—9
				_____ RESET pushbutton flashing
24.	TUNE Check		45	_____ LASER TUNING tracks TUNE switch

*Numbers displayed may be 15824787 and 6230231 if instrument serial number is 1132A00485 or below. See paragraph 4-51.

Table 5-5. 5526A Performance Test Card (Cont'd)

	Description	Step	Check
25.	BEAM ALIGNMENT Check #1	46	_____ BEAM ALIGNMENT reads 3—10 _____ Display reads zero _____ RESET pushbutton flashing
	Press RESET	47	_____ Display reads 0.00000 (0000.00000) _____ RESET pushbutton off
	Remove retroreflector	48	_____ BEAM ALIGNMENT reads 0—2 _____ RESET pushbutton flashing _____ Display reads zero
	Install retroreflector and Press RESET	49	_____ Display reads 0.00000 (0000.00000) _____ RESET pushbutton off _____ BEAM ALIGNMENT reads 3—10 _____ LASER TUNING reads 1—9
	Press TUNE (→)	50	_____ RESET pushbutton flashing _____ Display resets to zero
	Press TUNE (←)	51	_____ BEAM ALIGNMENT reads ≈ 8 _____ Display reads 0.00000 (0000.00000) _____ RESET pushbutton off
26.	COMPENSATION Check #1	52	_____ Display reads 0.99900—1.00100 (0000.99900—0001.00100)
	UNITS to mm	53	_____ Display reads 25.3746—25.4254 (00025.3746—00025.4254)
	UNITS to λ/4	54	_____ Display reads 160668—160347 (000160668—000160347)
	(000.0) UNITS to in	55	_____ Display decreases by 0.001 inches
27.	SMOOTH Check #1	56	_____ Display right digit jitters
	Press Smooth	57	_____ Display right digit stable
	Move retroreflector	58	_____ Smoothing defeated
28.	VELOCITY Check #1	59	_____ Display reads 0.00 (0000.00) _____ /min indicator on
	Move retroreflector	60	_____ Speed displayed
	Stop retroreflector		_____ Display reads 0.00 (0000.00)
	Set VELOCITY to "s"	61	_____ /sec indicator on _____ Display reads 0.0000 (0000.0000)
29.	CHECK #2	62	_____ All indications correct
30.	CHECK #3	66	_____ All indications correct
31.	CHECK #4	67	_____ All indications correct

5-19. Connector Board (A1). See Figure 5-1.

5-20. To remove the connector board proceed as follows:

a. Remove top and rear covers.

b. Use 11/32-inch socket wrench to remove four nuts attaching rear end cap to vibration mounts.

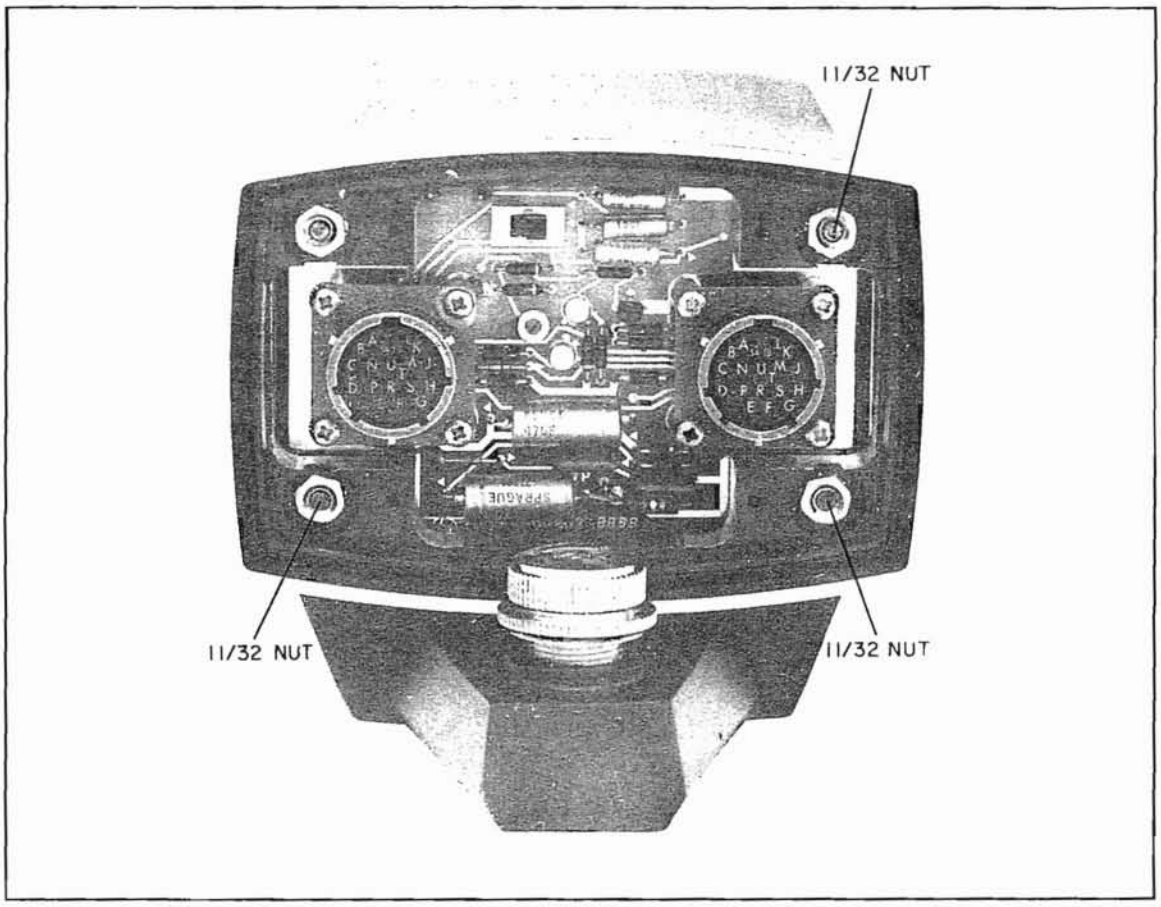
c. Pull rear end cap back to gain access to connector retainer screws (cable slack is provided).

d. Remove two pozi-driv screws that attach connector J3 to connector board.

e. Remove two remaining pozi-driv screws that attach connector board to rear end cap. Separate connector board from rear end cap.

f. To replace connector board, reverse the removal sequence.

Figure 5-1. A1 Connector Board Removal



5-21. LASER ASSEMBLY (A2)

5-22. To remove the laser assembly proceed as follows:

a. Remove top and bottom covers.

b. Carefully unscrew the high voltage connector from anode and short high voltage lead to magnet strap to discharge high voltage supply (refer to Figure 5-2).

c. Remove cathode connection by pulling connection away from laser tube (refer to Figure 5-3).

d. Use #10 hex key to remove four screws holding laser assembly to base. Screws are accessible from bottom of the 5500C (refer to Figure 5-4).

e. Remove PZT connection by pulling connection away from laser tube (refer to Figure 5-3). The laser assembly can now be removed.

CAUTION

Because the laser assembly is both expensive and fragile, extreme caution should be taken to avoid damaging the glass laser tube.

f. Carefully work the laser assembly out of the 5500C.

g. Carefully remove the replacement laser assembly from its carton and examine it for any damage. The laser assembly is fully aligned and factory-sealed. No adjustments are required either before or during installation.

h. Connect PZT lead to rear of laser tube (push-on).

i. Carefully position the laser assembly into the 5500C. If necessary, carefully pull wires aside until the assembly is seated on the base.

j. Connect cathode and anode leads.

Figure 5-2. A2 Laser Assembly Anode Connection

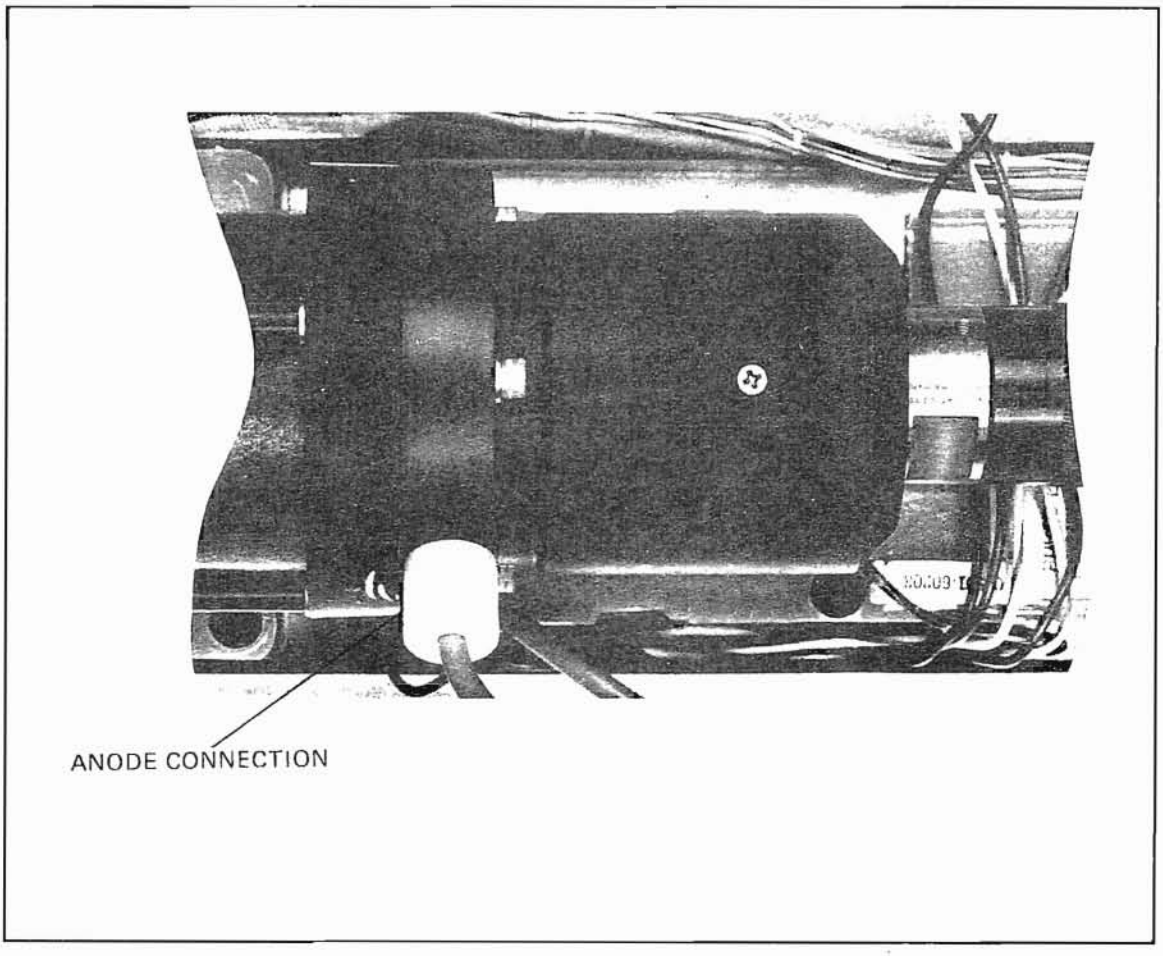
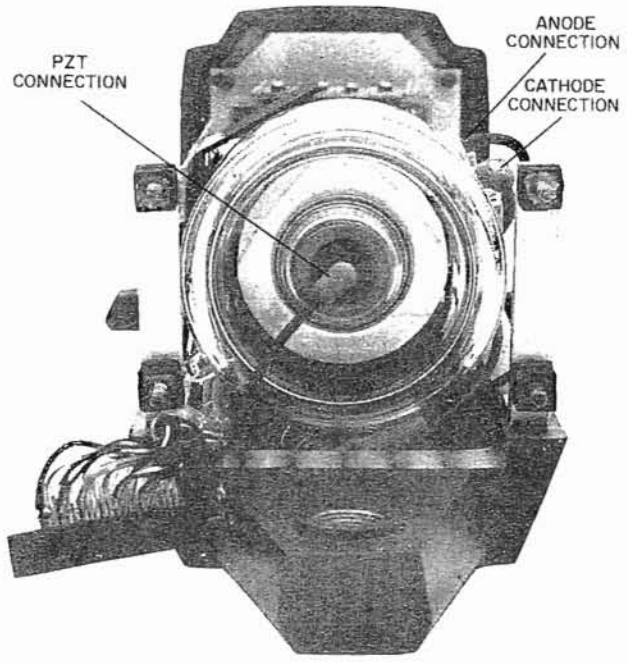


Figure 5-3. A2 Laser Assembly Connections



5-23. Driver Board (A3). See Figure 5-5.

5-24. To remove the driver board proceed as follows:

a. Remove 5500C top cover.

b. Remove four pozi-drive screws attaching driver board to mounting brackets.

c. Remove two screws attaching connector W1P3 to J5 on driver board. Remove driver board.

d. To replace driver board, reverse the removal sequence.

5-25. PZT Power Supply (A4). See Figure 5-6.

5-26. To remove the power supply, proceed as follows:

a. Remove top cover.

b. Use #10 hex key to remove four screws holding laser assembly to base. Screws are accessible from the bottom of 5500C.

c. Remove laser tube assembly from laser head.

d. Remove three screws holding PZT supply to base. Remove wires from interconnect board A3.

e. To replace power supply board, reverse the removal procedure.

5-26a. HV Power Supply (A7). See Figure 5-6.

5-26b. To remove the power supply, proceed as follows:

a. Remove top cover.

b. Use #10 hex key to remove four screws holding laser assembly to base. Screws are accessible from the bottom of 5500C.

c. Remove laser tube assembly from laser head.

d. Remove two screws holding HV supply to base. Remove wires from interconnect board A3.

e. To replace power supply board, reverse the removal procedure.

5-27. Receiver Assembly (A5).

5-28. To remove the receiver assembly proceed as follows:

a. Remove top and bottom covers.

b. Remove receiver shield by removing four pozi-drive screws which attach receiver shield flange to base of 5500C.

c. If interferometer is installed in receiver assembly, perform step d. If interferometer is not installed, proceed to step e.

d. Remove the two #6 screws that attach the interferometer to the base and remove interferometer (refer to Figure 5-6).

e. Turn the 5500C over and remove the four pozi-drive screws that attach the receiver to the base. Hold the receiver in place while removing the screws. Remove receiver (cable slack is provided). Refer to Figure 5-6.

f. Remove two pozi-drive screws securing connector W1P4 for lock reference board and connectors W1P5 and W1P6 for doppler preamplifier board. The receiver assembly is now separated from the main cable assembly (W1). Refer to Figure 5-5 and 8-11.

g. To replace receiver assembly, reverse the removal sequence.

Figure 5-5. A3 and A5 Removal

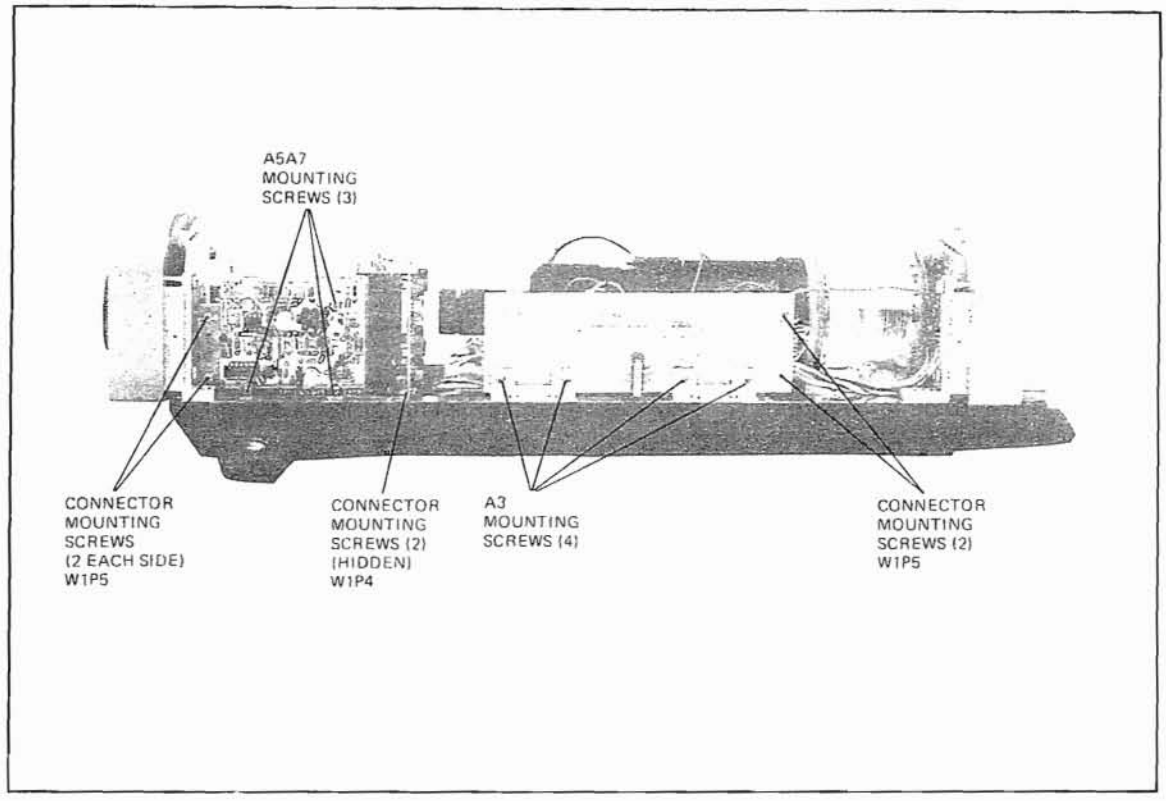
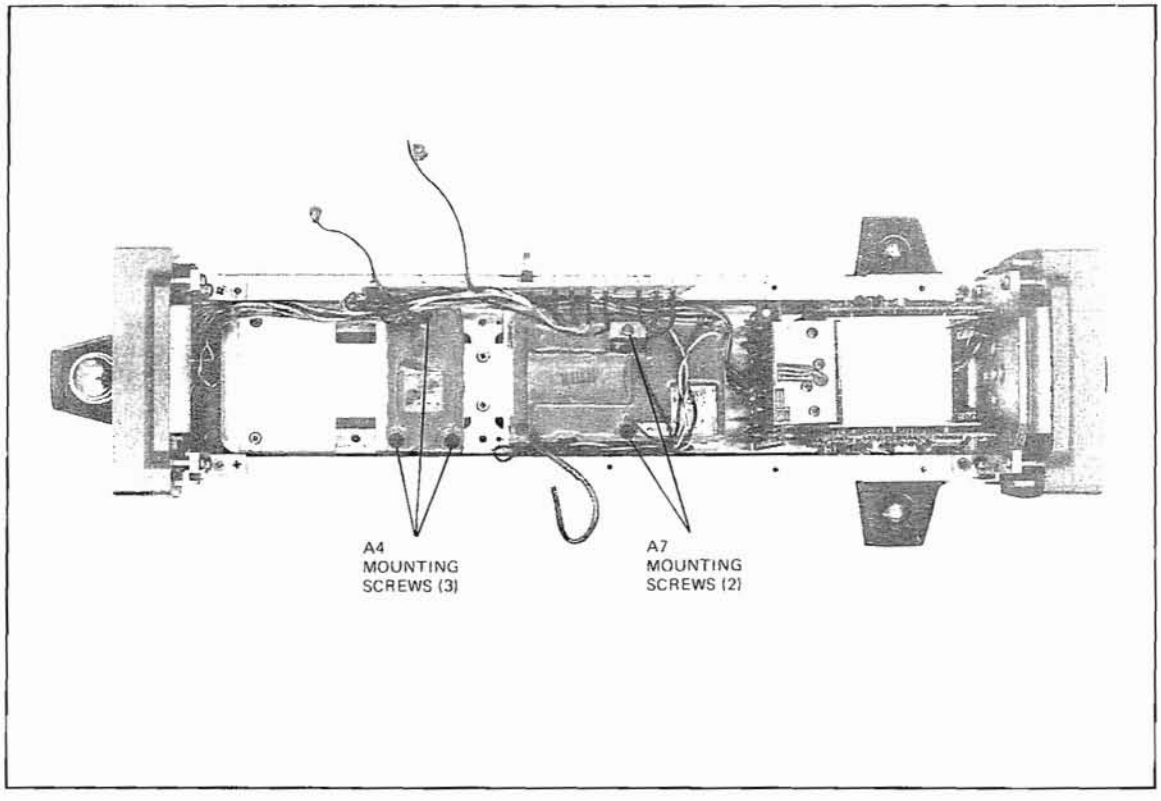


Figure 5-6. A4 and A7 Removal



5-29. Doppler Detector Assemblies (A5A1-A5A4). See Figures 5-7 and 5-8.

5-30. To remove any doppler detector assembly proceed as follows:

a. Remove top and bottom covers.

b. Remove A5 Receiver Assembly as described in paragraph 5-28.

c. Remove A5A5 Reference Detector Assembly as described in paragraph 5-32.

d. Remove A5A6 and A5A7 Doppler Preamplifier boards as described in paragraph 5-34.

e. Remove A5A8 Lock Reference Board as described in paragraph 5-36.

f. Remove four pozi-driv screws that attach lock reference holder to doppler detector holder (refer to Figure 5-7). Separate these two units to gain access to A5A9 Doppler Detector Board.

g. Carefully separate A5A9 Doppler Detector Board (refer to Figure 5-8) from detector holder.

h. Unsolder two leads to defective doppler detector assembly and separate from doppler detector board.

i. To replace doppler detector assembly, reverse the removal sequence.

Figure 5-7. Receiver Disassembly View #1

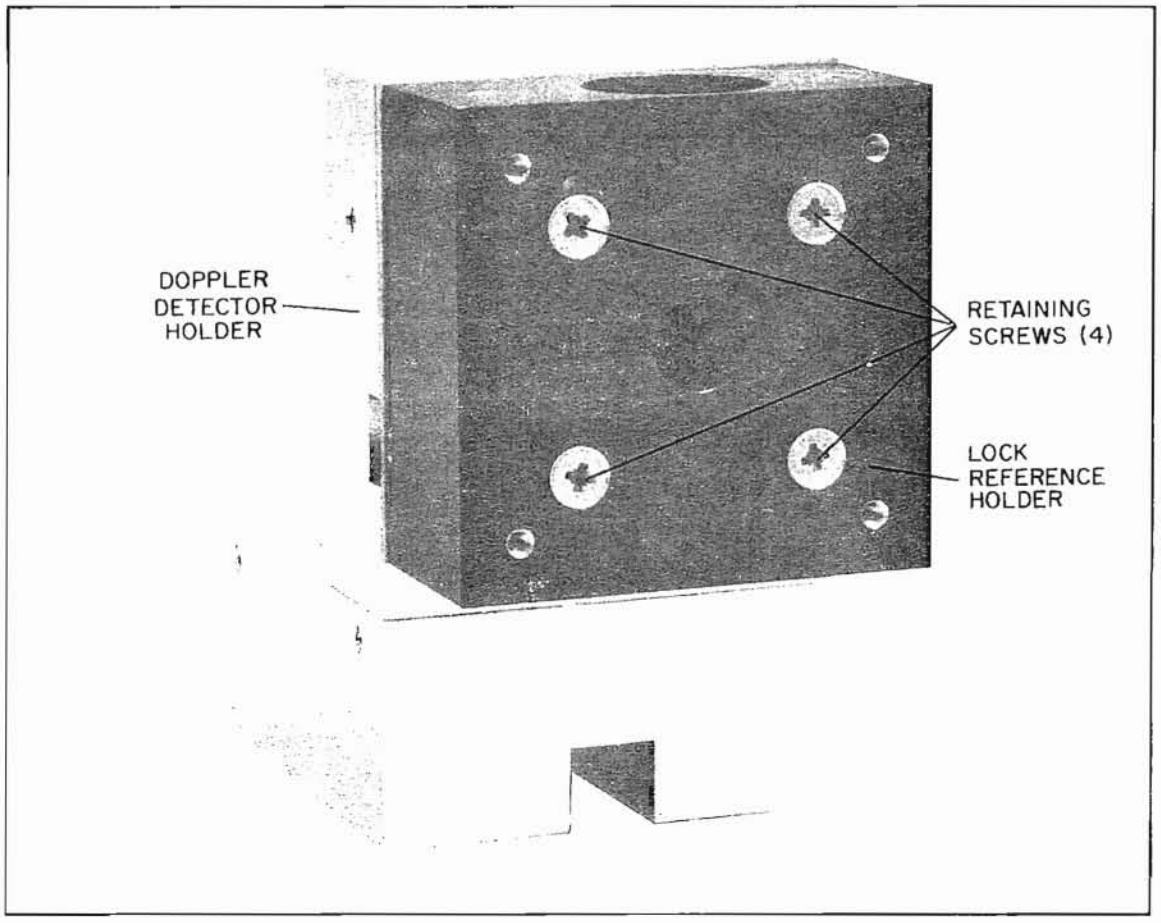
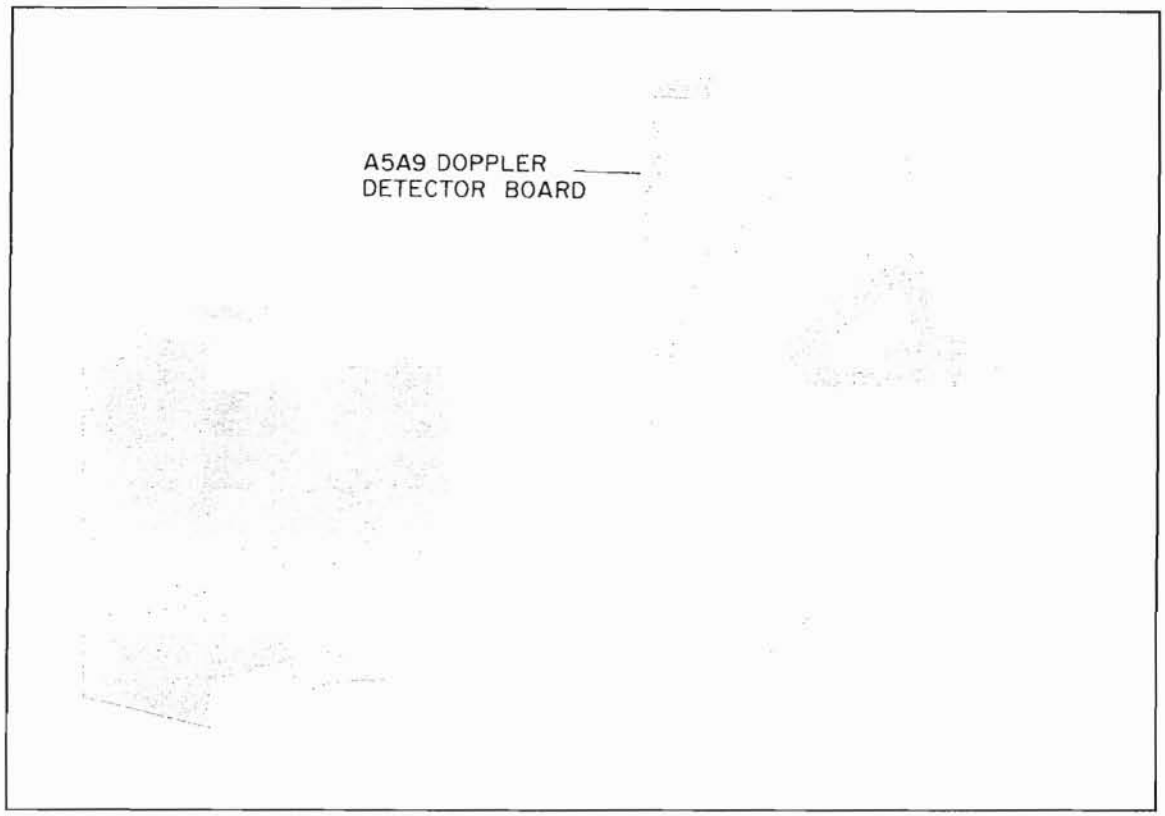


Figure 5-8. Receiver Disassembly View #2



5-31. Reference Detector Assembly (A5A5). See Figure 5-9.

5-32. To remove the reference detector assembly proceed as follows:

a. Remove 5500C top cover.

b. Remove receiver shield cover, secured by four pozi-drive screws to sides of receiver shield.

c. Remove two outer pozi-drive screws attaching reference detector assembly to lock reference holder.

d. Carefully pull reference detector assembly up until it disengages from lock reference board and lock reference holder.

e. To replace the reference detector assembly, reverse the removal sequence.

5-33. Doppler Preamplifier Boards (A5A6 and A5A7).

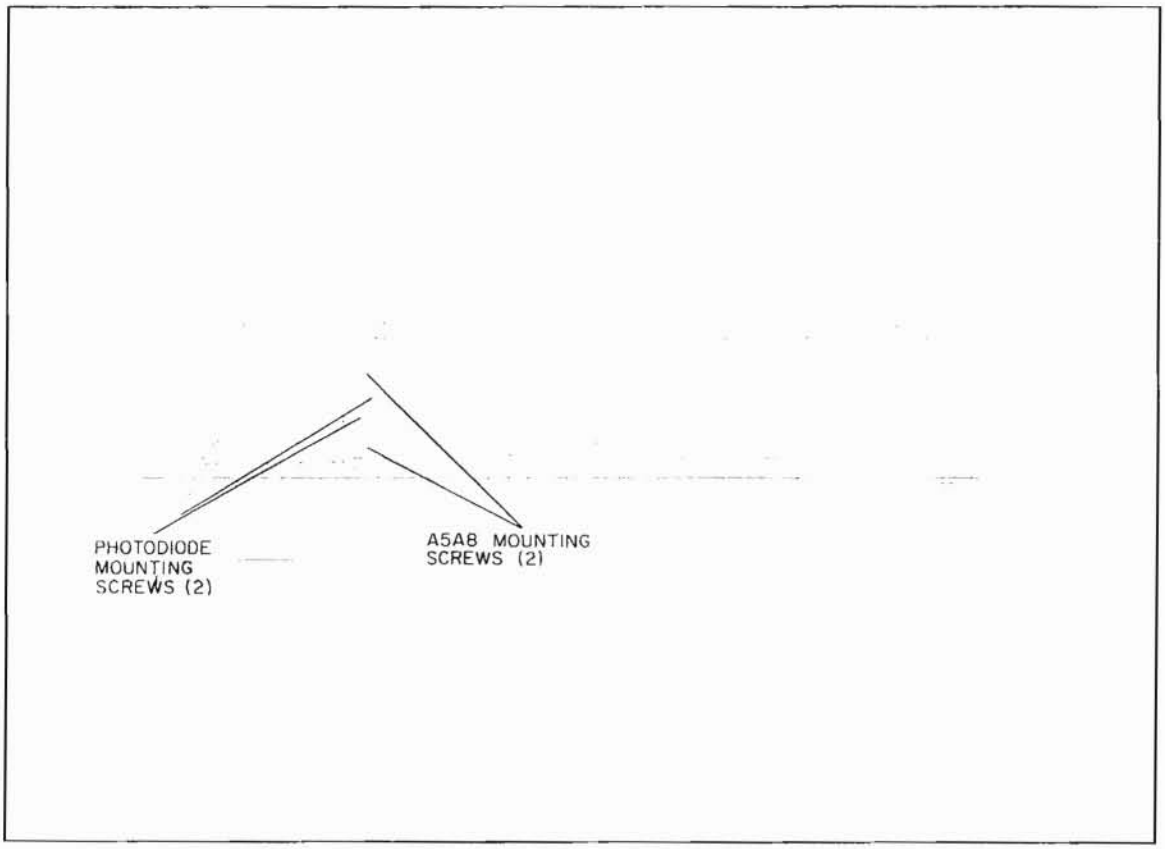
5-34. To remove either doppler preamplifier board proceed as follows:

a. Remove 5500C top cover.

b. Remove receiver shield by removing four pozi-drive screws which attach receiver shield flange to base of 5500C.

c. If interferometer is installed in receiver assembly, perform step d. If interferometer is not installed, proceed to step e.

Figure 5-9. A5A8 Reference Detector Removal



5-34. To remove either doppler preamplifier board proceed as follows: (Continued)

d. Remove the two #6 screws that attach the interferometer to the base and remove interferometer (refer to Figure 5-6).

e. Remove two pozi-drive screws attaching connector W1P5 or W1P6 to preamplifier (refer to Figure 5-5 and 8-11).

f. Remove pozi-driv screws attaching the preamplifier and its shield to receiver assembly (refer to Figure 5-5).

g. Remove preamplifier and shield.

h. To replace the preamplifier, reverse the removal sequence.

5-35. Lock Reference Board (A5A8).

5-36. To remove the lock reference board proceed as follows:

a. Remove A5 Receiver Assembly as described in paragraph 5-28.

b. Remove A5A5 Reference Detector Assembly as described in paragraph 5-32.

c. Remove four pozi-drive screws attaching lock reference board to holder. Remove lock reference board.

d. To replace the lock reference board, reverse the removal sequence.

5-37. 5505A LASER DISPLAY UNIT ASSEMBLY REMOVAL AND REPLACEMENT INSTRUCTIONS

5-38. Covers

5-39. To remove top or bottom covers, use pozi-driv screwdriver to remove two screws that secure covers to side frames. Pull back on covers and remove.

WARNING

USE CAUTION WHEN TOP COVER IS REMOVED. VOLTAGES OF 175 VOLTS ARE PRESENT ON A10 AND A11 BOARDS.

5-40. Lamps

5-41. To replace lamp in A13 Annunciator Board, swing spring clip to one side and remove lamp. Replace with T1-3/4, 6V, 0.20 amp. midget flange lamp (HP Part No. 2140-0039). To replace lamp in front panel pushbutton switch, pull forward on white pushbutton to remove. Replace with T1-3/4, 6V, 0.20 amp. midget flange (HP Part No. 2140-0039).

5-42. Replace Fuses. See Figure 8-8.

5-43. Remove A12 Board to provide access to F2, F3, and F4. Replace F2 with 10A, 250V, ceramic body fuse (HP Part No. 2110-0051). Replace F3 and F4 with 3A, 125V, Slow Blow fuse (HP Part No. 2110-0003). Fuse F1 is accessible at rear panel. Replace with 2.5A, 250V fuse (HP Part No. 2110-0015) for 115V ac operation. Replace with 1.5A, 250V fuse (HP Part No. 2110-0043) for 230V ac operation.

5-44. A10 and A11 Boards. See Figure 8-6.

5-45. Using pozi-driv screwdriver, remove two screws securing A11 Board to brackets. Remove A10 and A11 boards as a unit. A10 can then be separated from A11. Display tube part numbers are shown in Table 5-6.

Table 5-6. Display Tubes (Standard Instrument)

Reference Designation	Description	HP Part No.
A11DS 0 thru 8	Electron Tube, 10 digit, w/decimals	1970-0035
A11DS9	Electron Tube, Plus and Minus Signs	1970-0047

5-46. REPAIR INSTRUCTIONS

5-47. Printed Circuit Component

5-48. Component lead holes in the circuit boards have plated-through walls to ensure good electrical contact between conductors on opposite sides of the board. To prevent damage to the plating and the replacement component, apply heat sparingly, and work carefully.

5-49. Replacing Integrated Circuits

5-50. Following are two recommended methods of replacing integrated circuits:

a. SOLDER GOBBLER. This is the best method. Solder is removed from board by a soldering iron with a hollow tip connected to a vacuum source.

b. CLIP-OUT. This method should be used only as a last resort. Clip the leads as close to the case as possible. With a soldering iron and long nose pliers, carefully remove the wires from each hole. Then clean the holes.

5-51. 5500C LASER HEAD ASSEMBLY REPAIR INSTRUCTIONS

5-52. Connector Board (A1) and Driver Board (A3).

5-53. To replace components associated with the connector board, remove the board by following the procedure given in paragraph 5-20. To replace components associated with the driver board, remove the board by following the procedure given in paragraph 5-24. Transistors A3Q1 and A3Q2 should be covered by insulation to prevent accidental short-circuits. Transistors A3Q3 and A3Q4 are mounted on a heat sink; ensure that insulator (tab pointing up) and spacers (between heat sink and board) are correctly installed after servicing.

5-54. Laser Assembly (A2)

5-55. The laser assembly is a non-repairable item. The entire assembly must be replaced if the laser tube (A2V1) is defective. Refer to paragraph 5-22 for replacement instructions. Before attributing a failure to the laser assembly, eliminate all other possible sources: A1, A3, A4, A5A8, and 5505A A12 board.

5-56. Power Supply Board (A4)

5-57. The power supply board is a non-repairable item, with the exception of resistor A4R1. The entire assembly must be replaced if the A4U1 High Voltage Supply Assembly or A4U2 PZT Doubler Assembly is defective. Refer to paragraph 5-26 for replacement instructions.

5-58. Receiver Assembly (A5)

5-59. REPAIRABLE ASSEMBLIES. The following assemblies within the receiver assembly are considered repairable. Paragraph numbers for removal procedures are given parenthentically after the assembly.

a. A5A5 Reference Detector Assembly (para. 5-32).

b. A5A6, A5A7 Doppler Preamplifier boards (para. 5-34).

c. A5A8 Lock Reference Board (para. 5-36).

5-60. The photodetector diodes (CR1, CR2) within the A5A5 Reference Detector Assembly may be replaced by removing the two pozi-driv screws that attach the photodiode mount to the retainer board (refer to Figure 5-9). The mount and board can then be separated to allow the photodiodes to be unsoldered from the board (refer to Figure 8-6 for detailed view).

5-61. REPLACEABLE ASSEMBLIES AND COMPONENTS. The following items within the receiver assembly are considered non-repairable. They must be replaced as assemblies. Paragraph numbers for applicable removal procedures are given parenthentically after the item.

a. A5A1-A5A4 Doppler Detector Assemblies (para. 5-30).
b. Lock reference holder, containing beam splitter (para. 5-30).
c. Reference detector photodiode mount, containing polarizing beam splitter (para. 5-32 and 5-60).

5-62. 5505A LASER DISPLAY UNIT ASSEMBLIES REPAIR INSTRUCTIONS

5-63. Q1—Q3, CR1—CR3 Replacement

5-64. Referring to Figure 5-10, remove right rear side cover. Remove A12 Board and rear board support.

WARNING

USE CAUTION WHEN TROUBLESHOOTING THIS CIRCUIT AS THE CASE (COLLECTOR) OF Q1 IS AT +250V WITH RESPECT TO CHASSIS.

R1 and C4 are accessible from inside of cabinet (Figure 5-11). Figure 5-13B,C,D shows installation details of components mounted on bracket. To replace Q1—Q3 or CR3 remove four pozi-driv screws that secure bracket to side frame. Apply silicone grease (HP Part No. 8500-0269) to both sides of insulator before reinstalling semiconductor devices.

Figure 5-10. Outer Right Side Rear of Cabinet

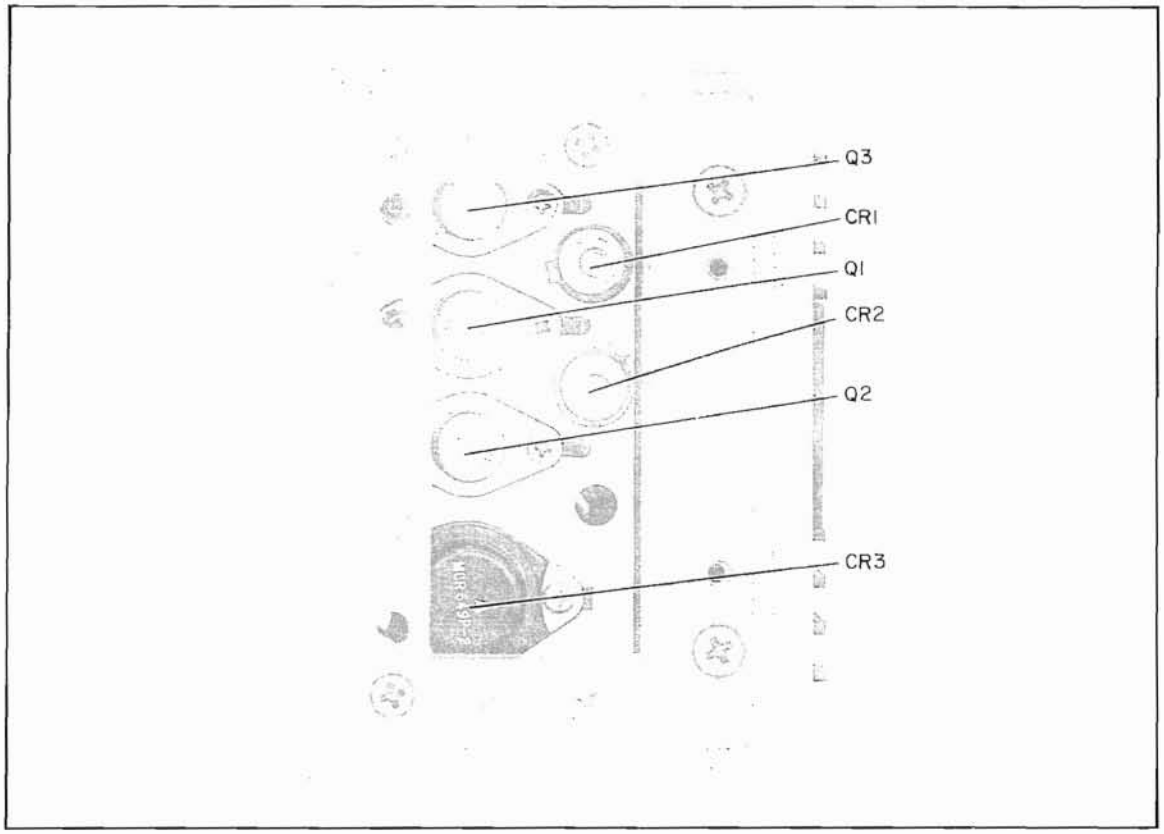
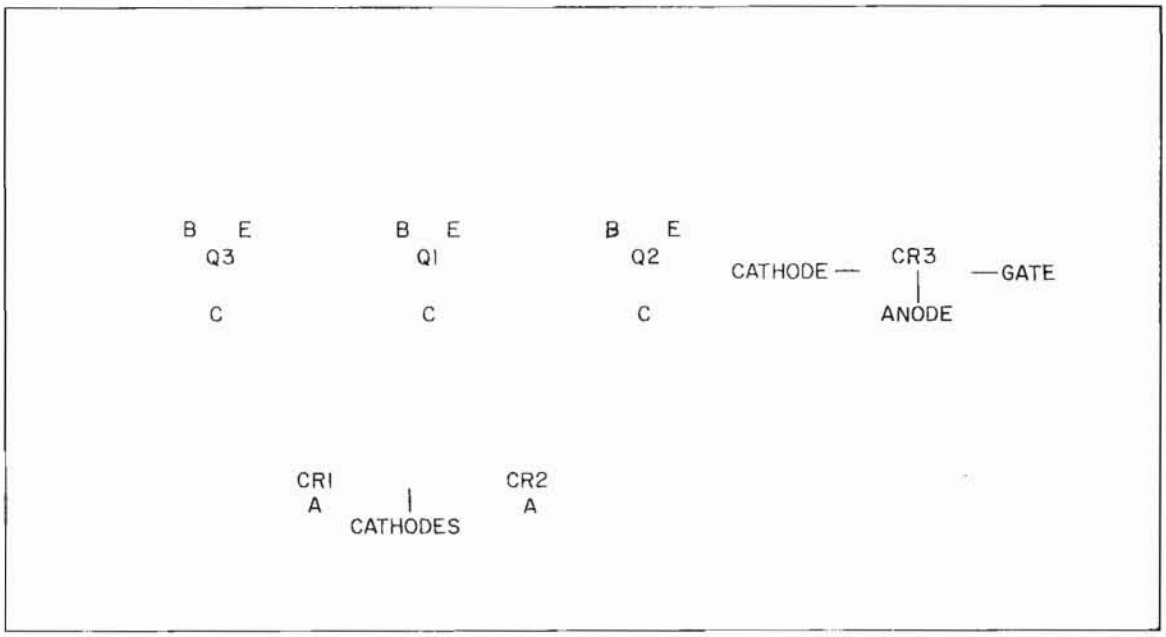


Figure 5-11. Semiconductors Q1, Q2, Q3, CR1, CR2 and CR3 Terminals



5-65. Q4, Q6—Q8 Replacement

5-66. Remove two pozi-driv screws that secure heat sink to rear panel. Tilt heat sink out as shown in Figure 5-12 to gain access to R3. Transistors are installed in sockets as shown in Figure 5-13A. Apply silicone grease (HP Part No. 8500-0269) to insulator before installing new transistor.

Figure 5-12. Heat Sink Extended

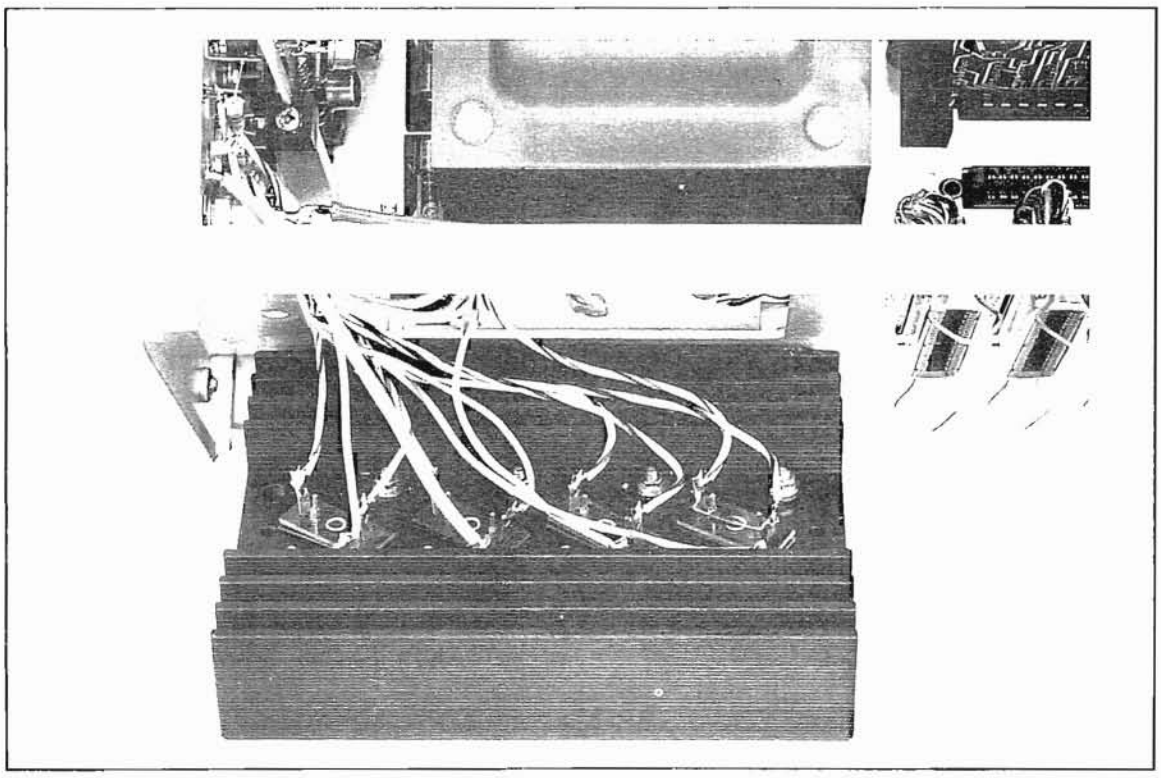
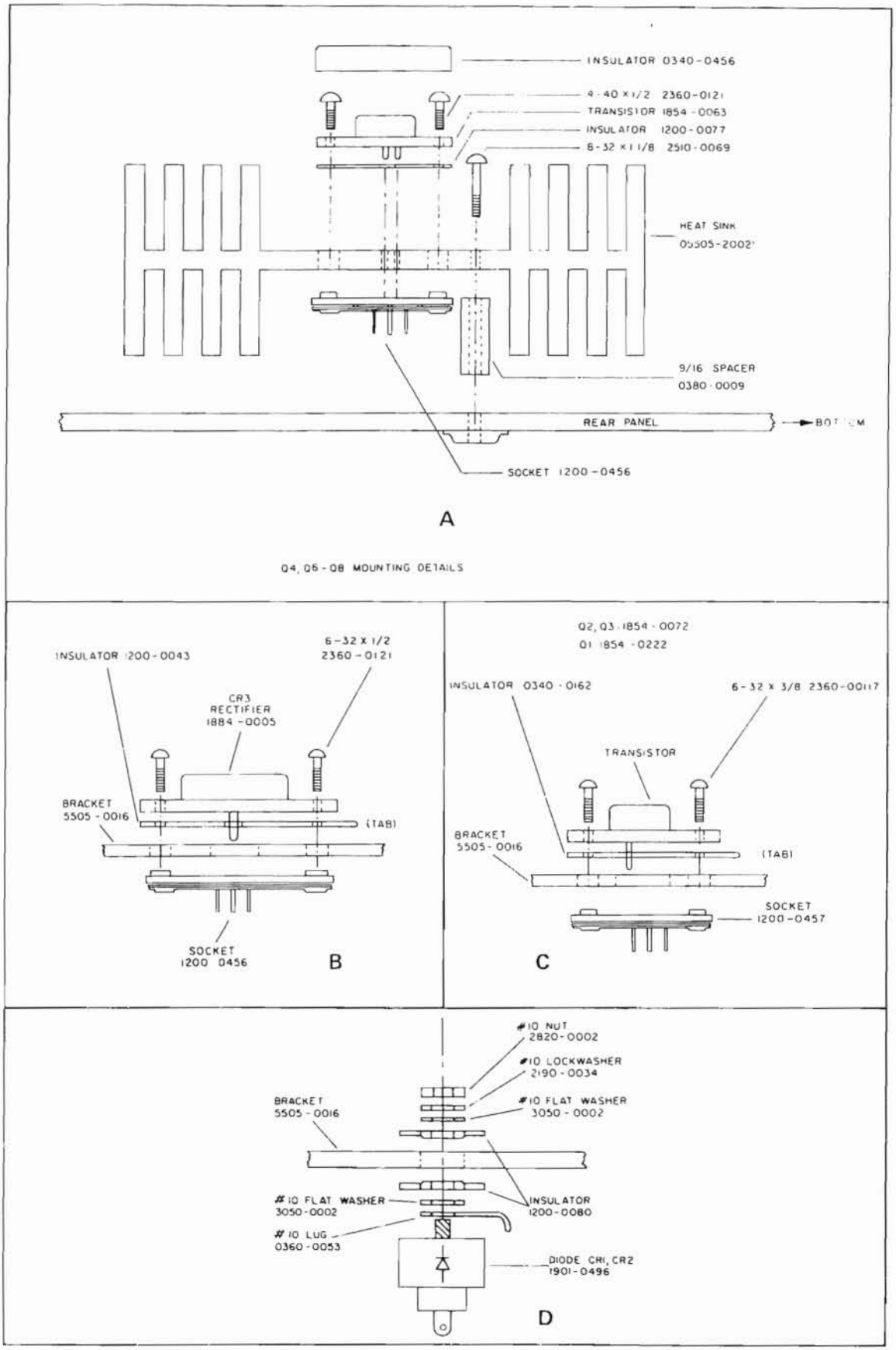


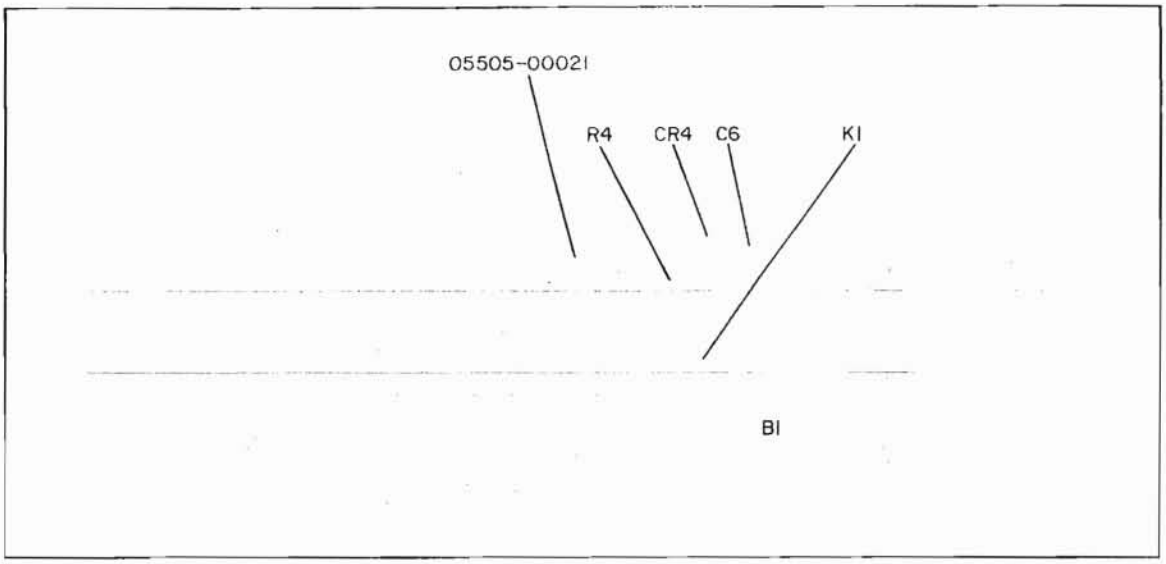
Figure 5-13A,B,C,D. Details of Transistor and Rectifier Mounting



5-67. Relay (K1)

5-68. Figure 5-14 is a detailed view of the print relay and components associated with it. Remove left rear side cover to gain access to bracket mounting screws. Blower (B1) may be removed to provide component access.

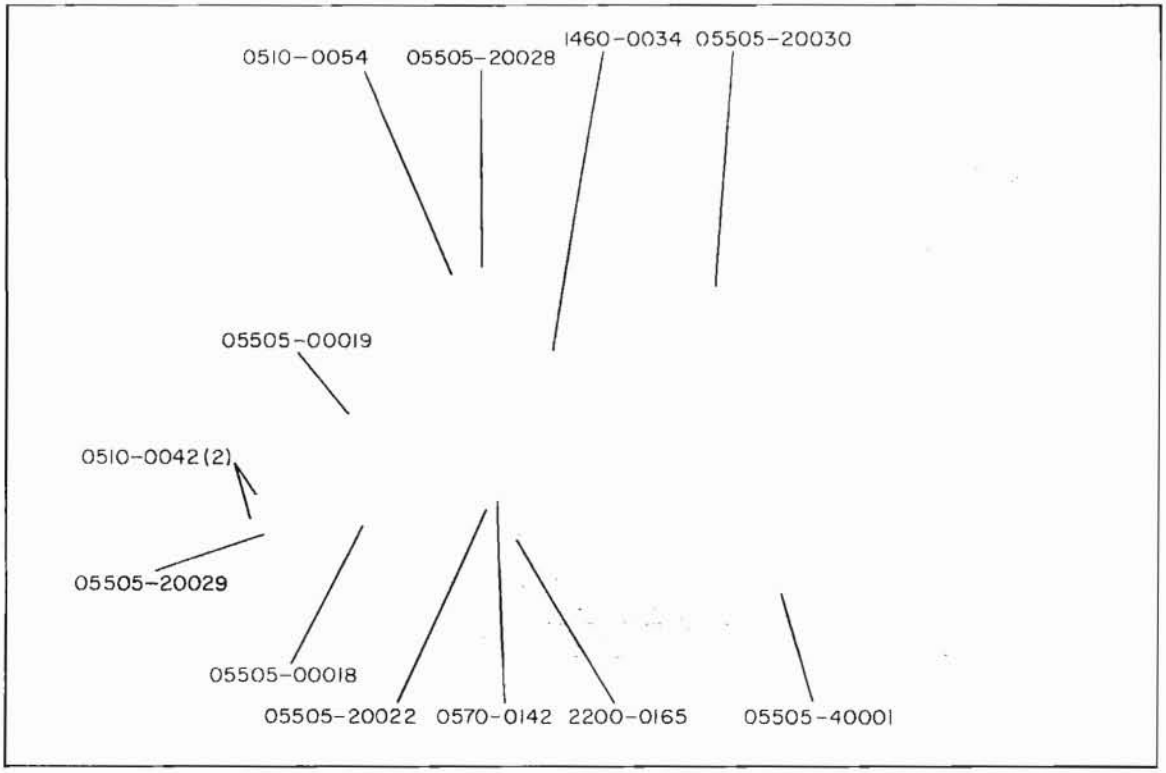
Figure 5-14. Print Relay Details



5-69. Compensation Door Mechanism

5-70. Mechanical parts associated with door linkage are shown in Figure 5-15. Refer to Figure 6-1 for door build-up.

Figure 5-15. Details of Compensation Door Mechanism



5-71. BOARD EXCHANGE PROGRAM

5-72. In the event that a Hewlett-Packard customer does not wish to troubleshoot to the component level, a board exchange program is available. The program is advantageous when the customer wishes to reduce instrument down-time. The customer need only troubleshoot to an assembly level to identify a defective board; the board or assembly is then replaced. Defective boards or assemblies are returned to Hewlett-Packard for repair and exchange credit. For details about the board exchange program for the 5526A, contact your nearest Hewlett-Packard Sales and Service office (listed in back of this manual).

5-73. TROUBLESHOOTING

5-74. Laser Measurement System troubleshooting procedures (how to find defective assemblies or components) are given in the following paragraphs. Troubleshooting is given for all assemblies of the Laser Head and the Laser Display Unit. The troubleshooting tree diagrams should be used first to locate the area of the trouble and then the specific assembly troubleshooting paragraph(s) can be used to find the defective component.

5-75. Troubleshooting Tree Diagrams

5-76. The troubleshooting tree diagrams are located at the end of this section (Figure 5-23). Use them to locate the cause of a defect.

5-77. Typical Troubleshooting Waveforms

5-78. The typical waveforms, referenced in the following paragraphs, are shown in Figure 5-16A and 5-16B.

5-79. 5500C LASER HEAD ASSEMBLY

WARNING

USE EXTREME CAUTION WHEN TROUBLESHOOTING 5500C. UP TO 11,000 VOLTS MAY BE PRESENT AT LASER ANODE. UP TO 2,000 VOLTS MAY BE PRESENT AT PZT CONNECTION.

5-80. Individual assembly troubleshooting instructions for the 5500C are given in the following paragraphs.

5-81. A1 Connector Board

5-82. Continuity checks will isolate most of the defective components on the connector board. The laser current comparator circuit may be checked with a voltmeter. Monitor A1Q1 base voltage, while rotating A1R4 over its full range. Base voltage should vary between approximately +2.4 and +8.1 Vdc.

5-83. A3 Driver Board

5-84. Use oscilloscope to check waveforms at Q1 or Q2 collector, Q3 or Q4 collector, and Q5 or Q6 collector. Improper waveforms will indicate which circuit is defective. Troubleshoot isolated circuit to find defective component.

WARNING

USE EXTREME CAUTION WHEN TROUBLESHOOTING 5500C. UP TO 11,000 VOLTS MAY BE PRESENT AT LASER ANODE. UP TO 2,000 VOLTS MAY BE PRESENT AT PZT CONNECTION.

5-85. A5A6, A5A7 Doppler Preamplifier Boards

5-86. If both the DOP SIG and BEAM AL signals are incorrect, check for +12 ± 1V dc at junction of R15, R17. If voltage is incorrect, check zener diode CR7, and series resistors R27 and R32. If only the doppler output is incorrect, proceed as follows:

a. Check waveform at Q4 emitter; if incorrect, troubleshoot transresistance stage (Q1—Q4 and feedback components).

b. Check waveform at U1(5); if incorrect, troubleshoot limiting amplifier stage (U1).

c. Check waveform at Q7 collector; if incorrect, troubleshoot level shifter stage (Q7).

d. If DOP SIG outputs are incorrect, troubleshoot differential line driver (U2, CR6—CR8).

5-87. If only the BEAM AL output is incorrect, proceed as follows:

a. Check waveform at Q5 collector; if incorrect, troubleshoot cascode stage (Q5 and Q6).

b. Check voltage at U3(7); if voltage cannot be adjusted to 150 millivolts by R13, troubleshoot peak detector stage (U3 and CR2).

c. If BEAM AL output cannot be adjusted to -700 millivolts by R12, troubleshoot logrithmatic amplifier and level shifter stage (U4, Q8, CR4, and CR5).

5-88. A5A8 Lock Reference Board

5-89. If the LOCK signal outputs are incorrect (should be about -5V dc) proceed as follows:

a. Check resistor R27.

b. Check amplifier U1, differential amplifier stage (Q4 and Q6) and feedback components (R11, R12, and R16). Inputs U1(2) and U1(3) are normally about -400 millivolts.

5-90. If the REF SIG outputs are incorrect proceed as follows:

a. Check for +12 ±1V dc at collector of Q3; if incorrect, check zener diode CR1 and resistor R37.

b. Check waveform at Q5 emitter; if incorrect, troubleshoot transresistance stage (Q1—Q3 and Q5, and feedback components).

c. Check waveform at U2(5); if incorrect, troubleshoot limiting amplifier stage (U2).

d. Check waveform at Q8 collector; if incorrect, troubleshoot level shifter stage (Q8).

e. If REF SIG outputs are incorrect; troubleshoot differential line driver (U3, CR2—CR4).

f. If REF TRIP output is incorrect, troubleshoot level detector stage (Q7).

Figure 5-16A. 5526A Typical Waveforms

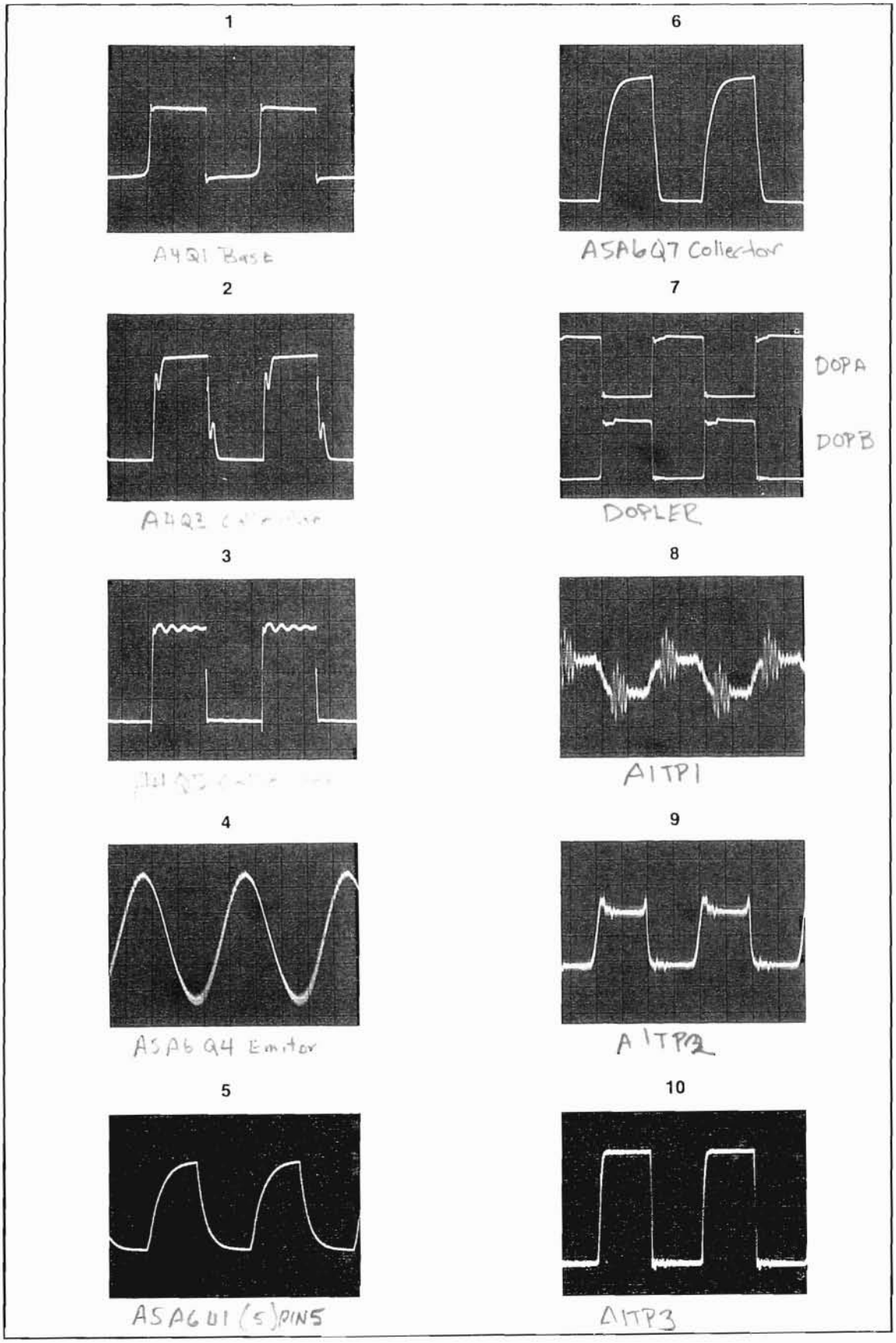
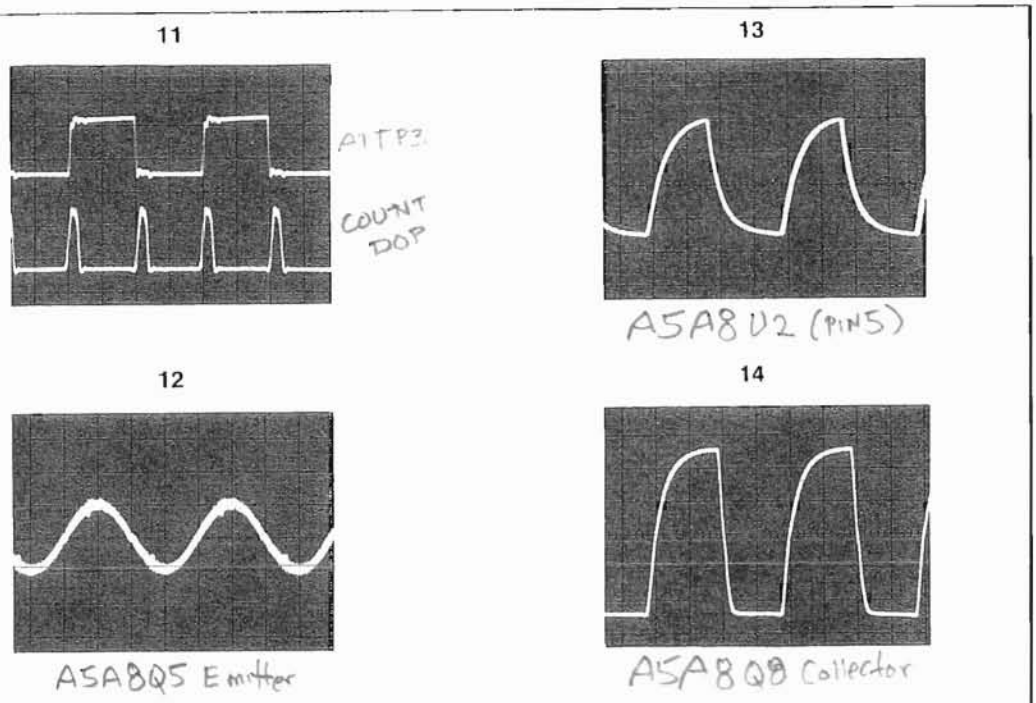


Figure 5-16B. 5526A Typical Waveforms (Continued)



Waveform Number	Signal Name	Oscilloscope Settings					
		Sens V/CM	Coupling	Slope	Sweep	Trigger	Magnifier
1	A4Q1 Base	0.1	AC	—	20 μs	INT	X1
2	A4Q3 Coll.	1	AC	—	20 μs	INT	X1
3	A4Q5 Coll.	0.2	AC	—	20 μs	INT	X1
4	A5A6Q4 Emitter	0.1	AC	—	0.5 μs	INT	X5
5	A5A6U1(5)	0.05	AC	—	0.5 μs	INT	X5
6	A5A6Q7 Coll.	0.05	AC	—	0.5 μs	INT	X5
7	DOP A, DOP B	0.1	AC	—	0.5 μs	ALT-B TRIG	X5
8	A1TP1 (5505A)	0.01	AC	+	0.5 μs	INT	X5
9	A1TP2 (5505A)	0.05	AC	—	0.5 μs	INT	X5
10	A1TP3 (5505A)	0.1	AC	—	0.5 μs	INT	X5
11U	A1TP3 (5505A)	0.2	AC	—	0.5 μs	ALT-B TRIG	X5
11L	COUNT DOP (5505A)	0.2	AC	—	0.5 μs	ALT-B TRIG	X5
12	A5A8Q5 Emitter	0.005	AC	—	0.5 μs	INT	X5
13	A5A8U2(5)	0.05	AC	—	0.5 μs	INT	X5
14	A5A8Q8 Coll.	0.05	AC	—	0.5 μs	INT	X5

5-91. 5505A LASER DISPLAY UNIT ASSEMBLY TROUBLESHOOTING

5-92. Following are the individual assembly troubleshooting instructions for the Laser Display Unit.

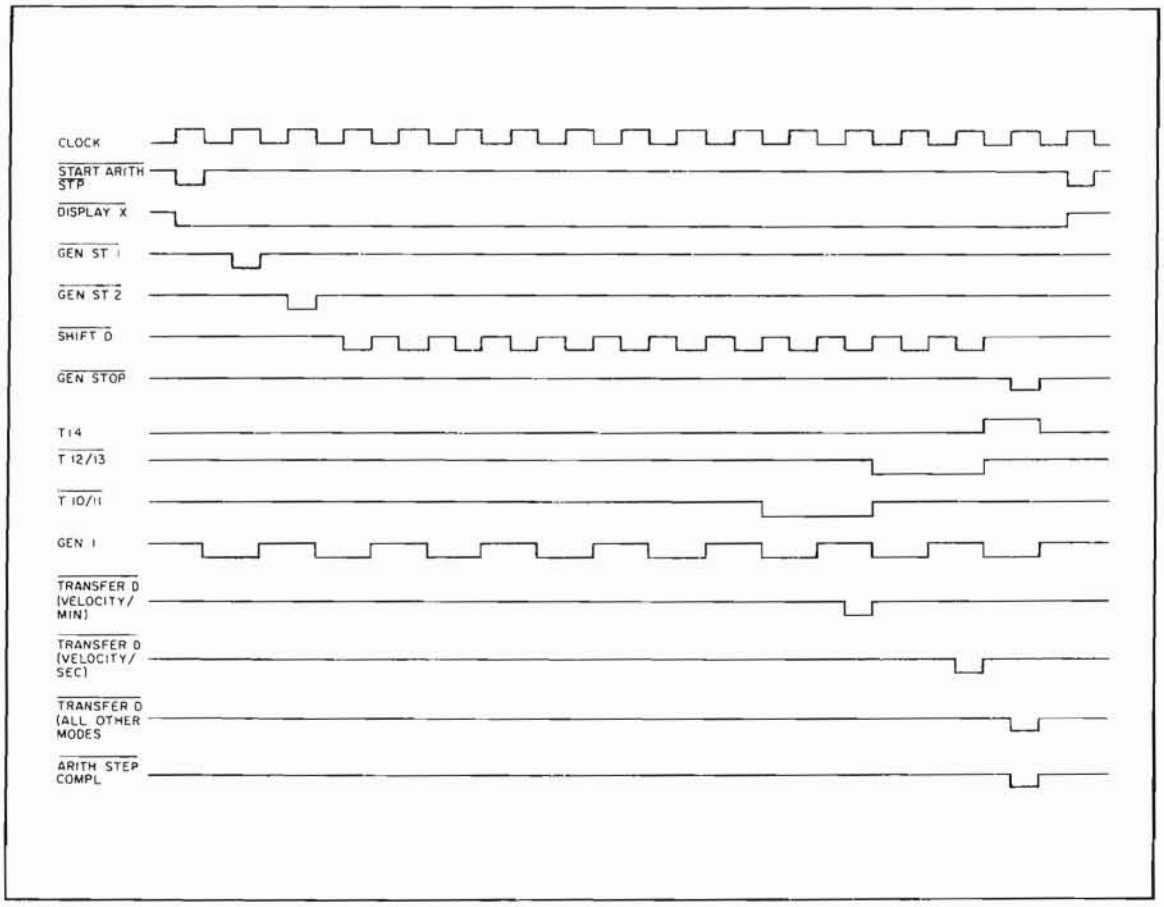
5-93. A1 Analog Board

5-94. Check differential input signal waveforms (frequency approximately 1.5 MHz). Check dc voltage at TP1 and TP4 (should be +3.25V). Check waveforms at TP2 and TP6. Check output signal waveform (should be twice the input frequency). Refer to Figure 5-16 for correct waveforms.

5-95. A2 Clock Board

5-96. Use oscilloscope to check for 10 MHz output (A2-A-9) and 1 MHz output (A2-A-8). Check logic outputs (UPDATE, $\overline{\text{TRANS D}}$, etc.) for presence of pulses with Logic Probe. Failure of logic output can be checked by removing the board that drives the circuit and providing correct input levels, manually. Refer to $\overline{\text{DISPLAY X}}$ and $\overline{\text{TRANS D}}$ Timing Diagram, Figure 5-17, for correct $\overline{\text{TRANS D}}$ waveforms.

Figure 5-17. Timing Diagram of $\overline{\text{DISPLAY X}}$ and $\overline{\text{TRANS D}}$

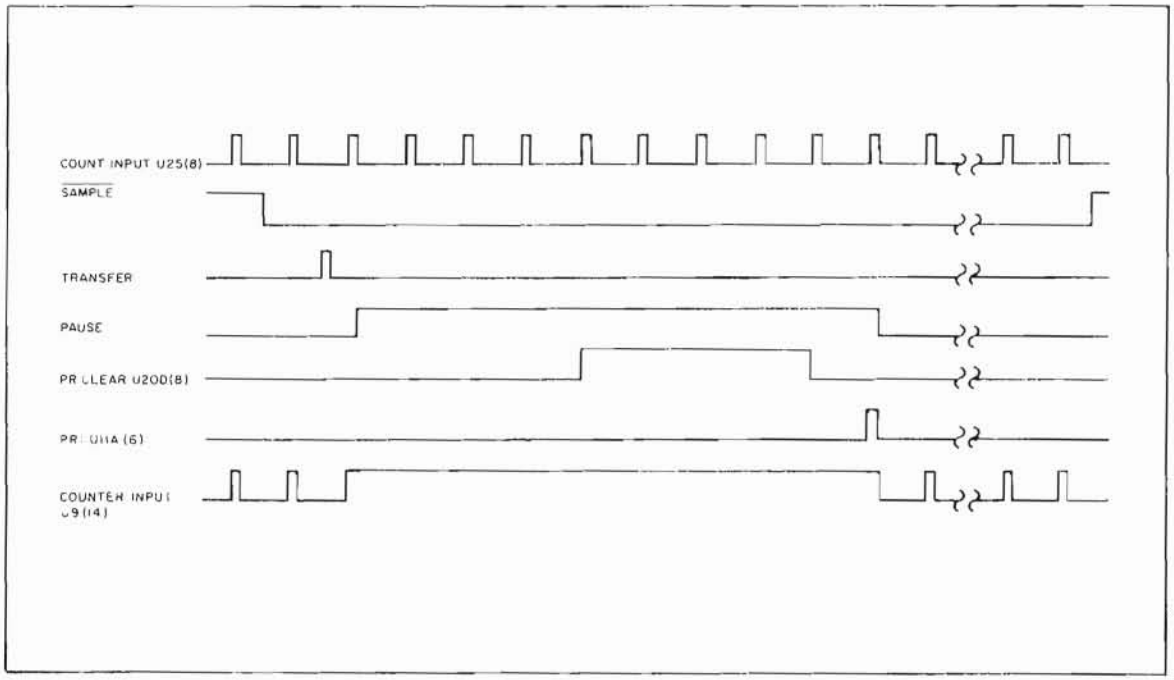


5-97. A3, A4, R And X Registers

5-98. In Check Mode (CK2 for A3, CK1 for A4), use oscilloscope to check Counter for 10 MHz input at U9(14). Trace signal through Counter with oscilloscope (frequency should be divided by 10 in each decade). Check PAUSE and the PR1 input to the Shift Register using oscilloscope. To check operation of the Shift Register, remove A5 Adder Board from its socket. Supply a

4-bit positive logic input word by grounding appropriate pins. Supply external SHIFT pulses to pin B-L to shift the input word through the Register. SHIFT pulses may be generated by first connecting a 10 kΩ resistor from pin B-L to +5V (pin B-R) and then supplying pulses through a 0.001 μF capacitor to pin B-L. Monitor Register states with Logic Probe. Use Logic Probe to check Display Transfer Inhibit Logic. Refer to Figure 5-18 for correct waveforms.

Figure 5-18. A3, A4 Timing Diagram



5-99. A5 Adder Board

5-100. To check operation of Shift Timing Generator, connect oscilloscope to GEN1, GEN2, GEN4, GEN8 and observe waveforms. Oscilloscope should be externally triggered from START GEN, while 5505A is set to CHECKS Mode (1 or 2). Compare all outputs to appropriate timing diagrams to determine if output pulse sequences are correct. Verify that correct sequence and number of pulses are produced for different modes.

5-101. To check nines-complement logic, remove A4 X-Register Board from socket and switch S1 to EXT to disable clock signal. Ground U3D(12), A5-A-11, and A5-A-F. Supply positive logic 4-bit word to X1, X2, X4, X8 and observe negative logic 4-bit B-word at U13. Remove ground connection to A5-A-11 and replace with +5V; the complement of the previous B-word should be observed. To check adders, ground the A-word inputs to U13 and observe output of U13 and U21 for numbers ≤9 and >9. The Shift Timing Table and diagram are in Section IV.

5-102. A6 Algorithm Board

5-103. Check output signals with Logic Probe while operating in the failed mode. Refer to mode programs to determine which instructions should be executed; then refer to Instruction tables to determine which signals should occur. Once a defective output is discovered, trace through gates listed in the tables to isolate defects.

5-104. An alternate method is to ground W4J3-5 ($\overline{\text{E PRG SEL}}$) and W4J4-2 ($\overline{\text{A TRG EBL}}$). An external program can be generated by grounding W4J3-3, 28, 4, 29 ($\overline{\text{T EXT}}$, $\overline{\text{U EXT}}$, $\overline{\text{V EXT}}$, $\overline{\text{W EXT}}$) to produce the appropriate instruction code. Grounding W4J4-3 ($\overline{\text{S EXT MEAS}}$) will generate a program start command (causes one program step execution). Observe output lines with Logic Probe. When this method is used the correct program sequence must be followed (refer to paragraphs 4-55, 56). To generate a two-cycle subtraction, perform RESET X and then SUBTRACT. For a two-cycle addition, perform RESET X; then force a sign change by grounding

W4J3-22 (SIGN E) and performing X- -E before performing ADD. A slow-speed external clock can be supplied by a pulse generator, so that GEN ST 1 and GEN ST 2 can be observed during execution of a two-cycle instruction.

5-105. Flow charts for MULT CMPN, SUBTRACT, and SPECIAL SUBTRACT and the instruction tables are in Section IV.

5-106. A7 Program Board

5-107. For single mode failure, check generation of IDLE instruction at U14A. For X10 mode failure check U3B, U11, U13B, and U12D. For complete mode failure, check ST ARITH STEP, U2, and U20 gates. Also check for varying T, U, V, and W outputs with Logic Probe. Failure of the read only memory and Program Step Counter can be checked by removing the A6 Algorithm Board from its socket, grounding W4J4-2 (A TRG EBL), and supplying +5V through a 10 kΩ resistor to A7-A-M (ARITH STEP COMPL). Connect a pulse generator to A7-A-M through a 0.001 μF capacitor. Ground W4J4-3 (S EXT MEAS) to generate a program start command (resets Program Step Counter to state zero). Single-pulse the A7-A-M input to advance the counter. Observe T, U, V, W outpuzs and compare levels to those shown in the Program Control Table (in Section IV).

5-108. A8 Function Board

5-109. For complete mode failure, use oscilloscope to check CLOCK, Time Base Divider, and Synchronizer (U15). For single mode failures, use Logic Probe to check encoding logic (Mode Encoding Logic Table) and Time Base Select Logic. For PRINT output failure, use Logic Probe to check gates shown in Print Logic Table (see Section IV). For failure to reset when entering and leaving Check mode, check U24, U23A, and U23B.

5-110. A9 Multiplier Board

5-111. Remove A6 Algorithm Board from socket, ground A9-B-P (MULTIPLY = LOW resets Digit and Bit Counters), and connect A2-A-12 (CL AUX TG) to A9-B-13 (INCR M DIG). Each time A2-A-E (S EXT MEAS) is grounded the Bit Counter will advance, so the counter output can be checked. To check the Digit Counter and multiplier decode logic (see table), disconnect wire from A9-B-13 and reconnect to A9-B-15 (ONE SH X). Monitor decode logic outputs with Logic Probe. To check Comparator, step Bit Counter and Digit Counter so that comparator inputs are equal. Observe MULT EQU signal level.

5-112. For single mode failure, check enable lines from U2C, U10A, and U10D. For failure to multiply by compensation, check enable lines from MULT COMP and U2B. Also, check compensation decode logic. For failure of decimal point, comma, or blanking logic, use Logic Probe to check gates shown in appropriate table. (See Section IV.)

5-113. A10 D-Register Board

5-114. To check operation of Shift Register, remove the A5 Adder Board from its socket. Supply a 4-bit positive logic input word to X1, X2, X4, X8 by grounding appropriate pins. Supply external SHIFT D pulses to A10-A19 to shift the input word through the Register. SHIFT D pulses may be generated by first connecting a 10 kΩ resistor from A10-A-19 to +5V (A10-B-21) and then supplying pulses through a 0.001 μF capacitor to A10-A-19. Monitor Register states with Logic Probe. Use Logic Probe to trace Shift Register outputs through blanking logic to Buffer inputs (refer to Table 5-7 Digit Blanking). To provide a display of the Buffer contents, remove A2 Clock Board from its socket and ground A10-A-W. (TRANS D) between external SHIFT D pulses.

WARNING

USE EXTREME CAUTION WHEN TROUBLESHOOTING THIS ASSEMBLY AS +175 VDC IS PRESENT AT MANY POINTS ON A10 AND A11 BOARDS.

Table 5-7. Digit Blanking

SIGNAL	GATES		BUFFER			
	ENABLED	DISABLED	#	DIGIT	INPUT	DISPLAY DIGIT
BZ0	U40	U9C, U9D, U10C, U10D	U39	0	H H H H	ZERO
B0	U40D, U9C, U9D, U10C, U10D	U10A, U10B, U9A, U9B	U39	0	L L L L	BLANK
BZ1	U40E	U27C, U27D	U37, U38	1 & 2	H H H H	ZERO
B1	U40F, U27C, U27D, U18C, U18D, U19C, U19D, U28C, U28D	U27A, U27B U18A, U18B	U37, U38	1 & 2	L L L L	BLANK
B5	(see text) U24A	U34	U34	5	H H H H	BLANK
B6	(see text) U24B	U33	U33	6	H H H H	BLANK

5-115. A11 Display Board

5-116. The Display Board should be checked by entering the Check Mode (CK1 or CK2) and monitoring the decoder inputs with a Logic Probe. The outputs should be monitored with a VTVM (enabled digit output — +2V, disabled digit voltage— +90V).

WARNING

USE EXTREME CAUTION WHEN TROUBLESHOOTING THIS ASSEMBLY AS +175V IS PRESENT AT MANY POINTS ON A10 AND A11 BOARDS.

5-117. A12 Power Supply Board

5-118. Check output voltages with a VTVM. Voltages near ±0.7V indicate an overcurrent condition in one of the regulated supplies. If a regulated output is at zero volts, check fuse (F2, F3, F4) and regulators (board and chassis-mounted transistors). Notice that +15V is required before +5V will be produced, and +5V is required before -15V will be produced. If +5V output is absent but +15V output is produced, check chassis-mounted CR1, CR2 ouzput (should be +9V). If +30V or -30V output is low, check CR1—CR4. If the HV CONT signal is absent, check Q2 and chassis-mounted Q6. If +175V output is incorrect, check CR11—CR15, CR17—CR18, Q22, and chassis-mounted Q1.

WARNING

USE EXTREME CAUTION WHEN CHECKING TRANSISTOR Q1. THE CASE (COLLECTOR) IS AT +250V DC WITH RESPECT TO CHASSIS.

5-119. To check operation of laser tuning circuit, disconnect cable from 5500C and measure voltage at C15 (should be approximately -6V). With cable reconnected, operate TUNE switch: lower position should decrease C15 voltage and raise position should increase C15 voltage. If automatic tuning is inoperative, check LOCK waveforms before troubleshooting, A12 (refer to 5500C A5A8 TROUBLESHOOTING).

CAUTION

DO NOT EXCEED +5V BETWEEN A12-B-D AND CHASSIS, OR A12 MAY BE DAMAGED.

5-120. Power Wiring and A13 Board

5-121. Refer to A12 TROUBLESHOOTING for regulator and tuning components. Use VTVM to check T1 primary and secondary voltages. Use VTVM to troubleshoot A13. Refer to Section III for lamp replacement procedures.

WARNING

USE EXTREME CAUTION WHEN CHECKING TRANSISTOR Q1. THE CASE (COLLECTOR) IS AT +250V WITH RESPECT TO CHASSIS.

5-122. ADJUSTMENT PROCEDURE

5-123. Portions of the adjustment procedure must be performed after disassembly, repair or replacement of critical assemblies. The Adjustment Procedures given in this section may be used for periodic certification of the 5526A Laser Measurement System. When these procedures are performed it should be followed by an In-Cabinet Performance Check to verify proper operation.

5-124. All of the following adjustment procedures assume that all outer covers and plates have been removed from the 5500C Laser Head and 5505A Display Unit.

5-125. 5505A Laser Display Unit, Power Supply Adjustment (Figure 5-19)

5-126. To adjust the power supply proceed as follows:

a. Set 5505A Display Unit power switch to off position.

b. Connect dc voltmeter to XA12-B-4 (return to chassis). Set voltmeter RANGE to +30V.

c. Set 5505A power switch to ON position.

d. Adjust A12R12 (+15V ADJUST) so that voltmeter reads +15.0V ± 0.3V.

e. Disconnect voltmeter from XA12-B-4 and reconnect to XA12-B-3. Set voltmeter RANGE to +10V.

f. Adjust A12R2 (+5V ADJUST) so that voltmeter reads +5.0V ± 0.1V.

g. Disconnect voltmeter from XA12-B-3.

h. Set voltmeter RANGE to -30V (POLARITY to -) and connect voltmeter to XA12-A15.

i. Adjust A12R6 (-15V ADJUST) so that voltmeter reads -15.0V ± 0.3V.

j. Set 5505A power switch to off position and disconnect voltmeter.

k. Connect the vertical input of the oscilloscope to each of the terminals in steps c, f, and i, above; and adjust the oscilloscope to measure noise and ripple. The maximum allowable noise or ripple is 0.35V peak-to-peak.

5-127. 5505A Laser Display Unit Clock Frequency Adjustment (Figure 5-19)

5-128. To adjust the clock frequency proceed as follows:

a. Set 5505A COMPENSATION-PPM thumbwheel switches to 999.9. Set UNITS switch to $\lambda/4$ position.

b. Set S1 to EXT (S1 is accessible when top cover is removed).

c. Connect pulse generator output to EXT CLOCK connector J9.

d. Connect frequency standard 1 MHz output to pulse generator EXT TRIG INPUT. Set pulse generator RATE to EXT.

e. Set 5505A power switch to ON position.

f. Using oscilloscope, adjust pulse amplitude to 4V peak and pulse width to 0.5 μsec.

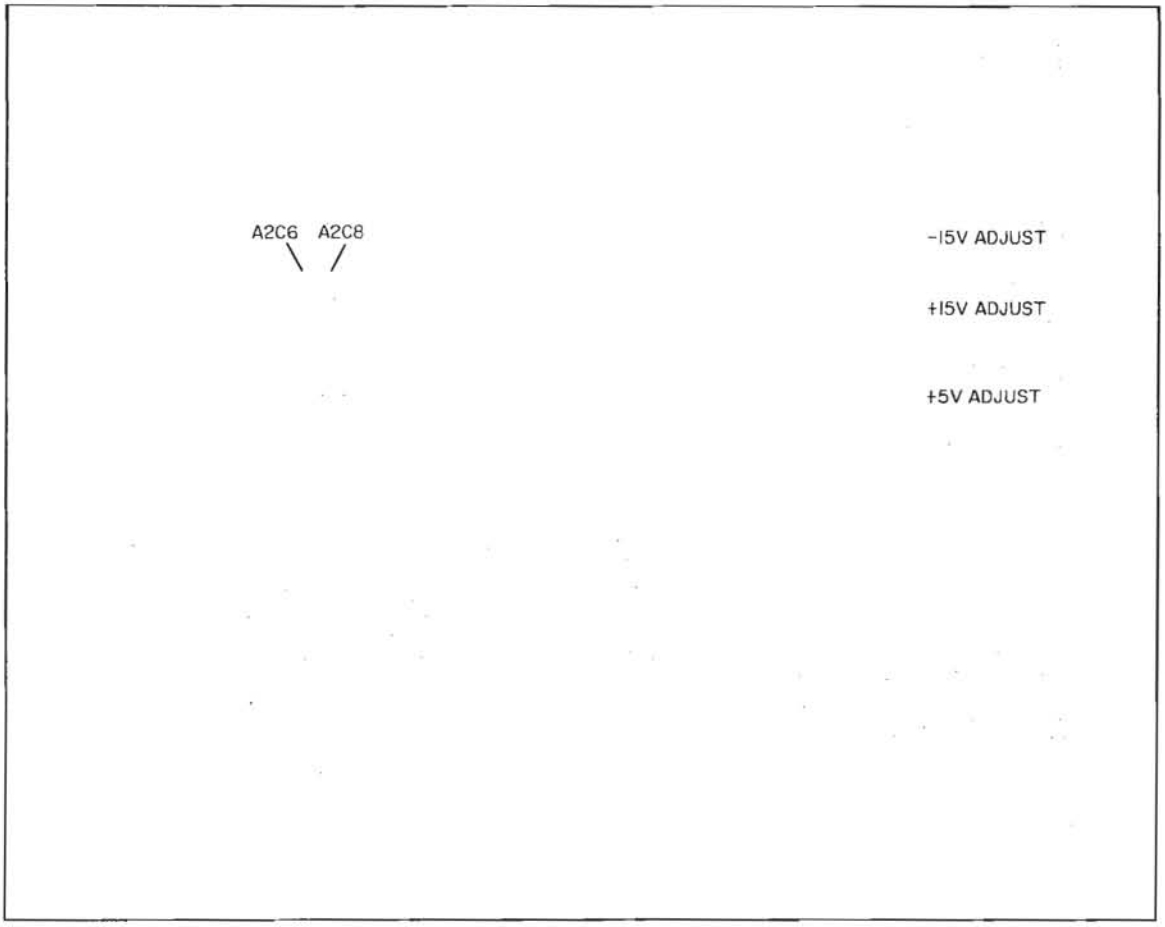
g. Depress CHECKS 1 pushbutton.

h. Using non-metallic screwdriver, adjust A2C6 and A2C8 until display indicates +9999999.

i. Set S1 to INT. Disconnect all test equipment.

j. Set 5505A power switch to off position.

Figure 5-19. Power Supply and Clock Adjustments



5-129. 5500C Laser Current Adjustment (Figures 5-20 and 5-21)

WARNING

USE EXTREME CAUTION WHEN ADJUSTING 5500C. UP TO 11,000 VOLTS MAY BE PRESENT AT LASER ANODE. UP TO 2,000 VOLTS MAY BE PRESENT AT PZT CONNECTION.

5-130. Normally, this adjustment is required only when a new A2 Laser Assembly is installed. To set the laser current proceed as follows:

a. Set 5505A Display Unit power switch to off position.

b. Disconnect interconnecting cable from 5500C Laser Head.

c. Remove 5500C rear cover plate.

d. Reconnect interconnecting cable to 5500C connector J1.

e. Remove 5500C top cover and receiver shield. Disable interlock switch A4S1.

f. Connect voltmeter negative lead to frame ground and positive lead to A1TP1. Set voltmeter RANGE switch to 10V dc.

g. Connect oscilloscope probe to emitter of Q4 on master doppler preamplifier board (A5A6). Connect probe ground lead to 5500C frame ground. Set oscilloscope controls as follows:

VOLTS/DIV	0.1
INPUT	AC
TIME/DIV	0.5 μsec, X5 MAGNIFY
TRIGGER CONTROLS	NORM, INT, +, DC

h. Set 5505A power switch to ON position.

i. Position interferometer and reflector in front of 5500C so that return beam is directed to lower aperture.

j. Rotate A1R4 (LI ADJ) cw until laser tube starts flashing. Note voltmeter reading just before tube begins to flash.

k. Rotate A1R4 ccw while observing oscilloscope display. Note voltmeter reading corresponding to best signal-to-noise ratio (least noise on observed waveform).

l. Set A1R4, subject to the following conditions:
   1) Voltmeter reading must be less than +5V dc.
   2) Voltmeter reading must be at least 0.3V dc above the value noted in step j.
   3) A1R4 should be adjusted for best signal-to-noise ratio within the above limits. Typically, this voltage will be about +3.5V dc.

n. Set 5505A power switch to off position. Disconnect test equipment, enable interlock switch A4S1, and replace shield and covers.

Figure 5-20. Laser Current Adjustment

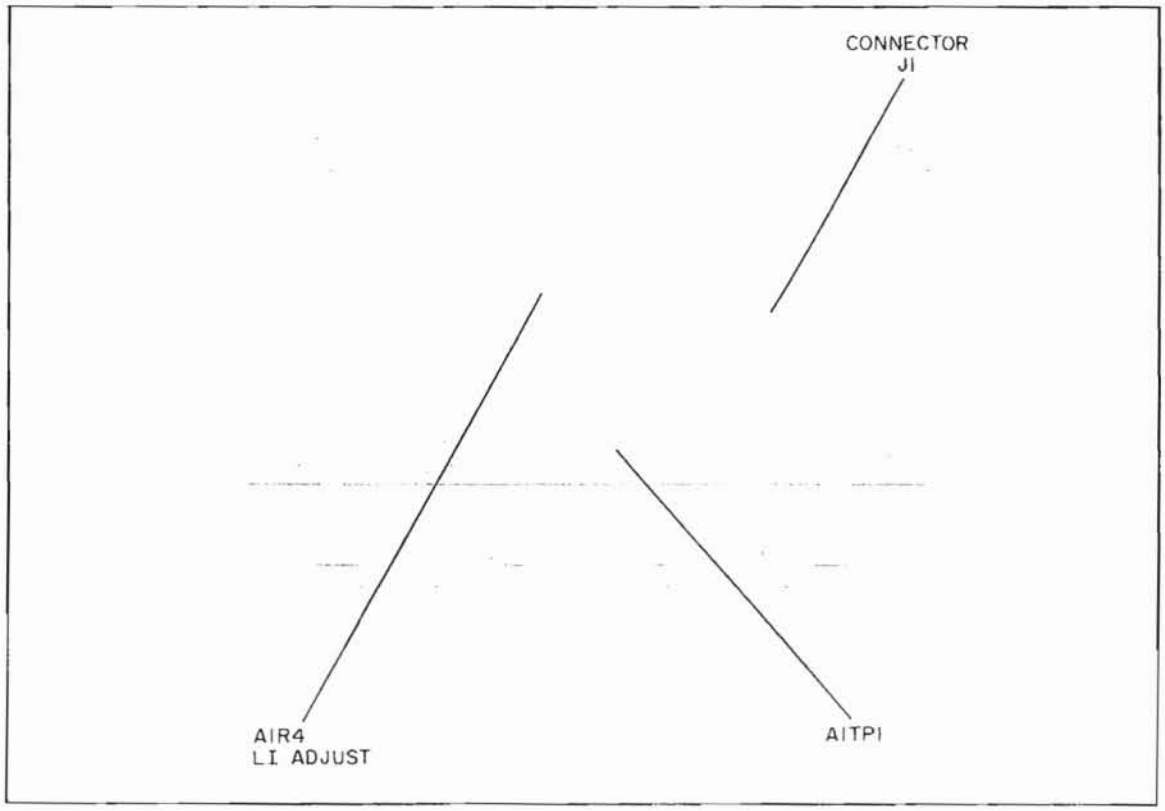
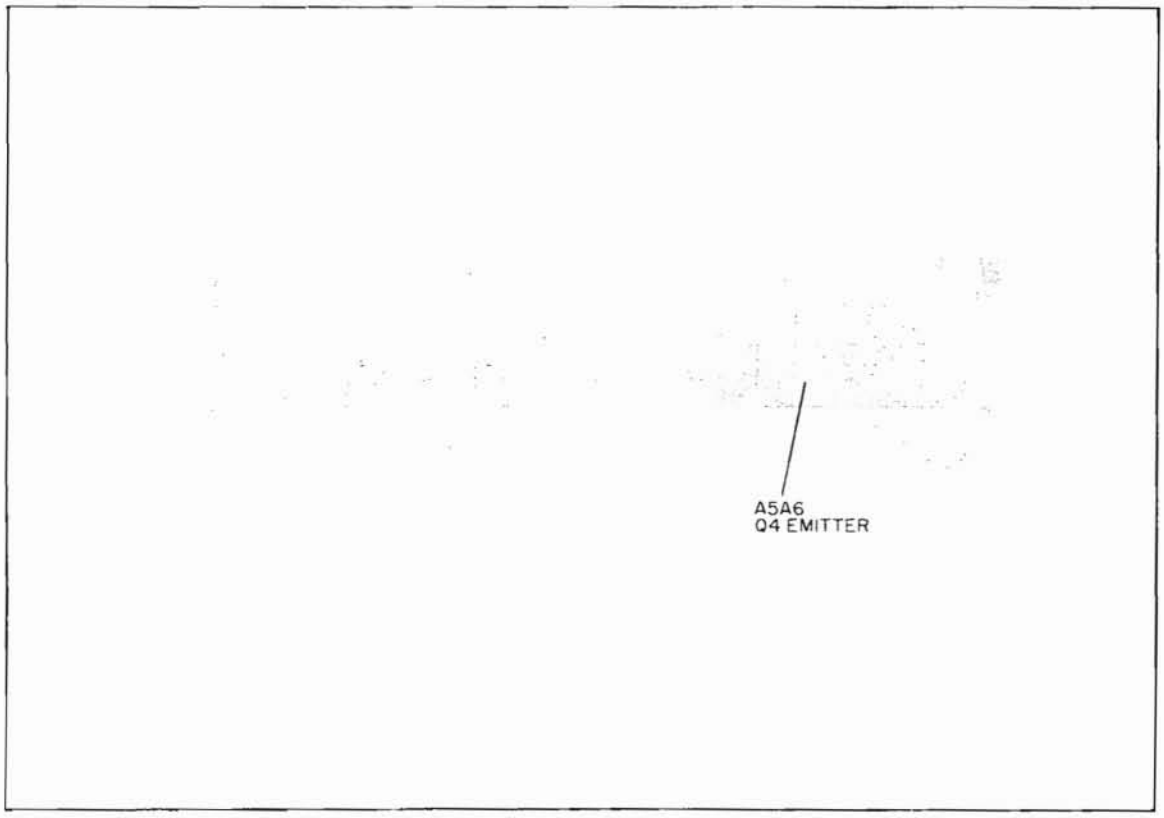


Figure 5-21. Doppler Monitor Connection



5-131. 5500C Lock Reference Balance Adjustment (Figure 5-22)

WARNING

USE EXTREME CAUTION WHEN ADJUSTING 5500C. UP TO 11,000 VOLTS MAY BE PRESENT AT LASER ANODE. UP TO 2,000 VOLTS MAY BE PRESENT AT PZT CONNECTION.

5-132. Normally, this adjustment is required only after repairing or replacing the A5A8 Lock Reference Board. To make this adjustment proceed as follows:

a. Set 5505A power switch to off position.

b. Remove 5500C top cover and defeat interlock switch A4S1.

c. Connect oscilloscope probe to REF A (pin K) or REF B (pin M) at unused 5500C connector (J1 or J2). Set oscilloscope controls as follows:

VOLTS/DIV	0.1
INPUT	AC
TIME/DIV	0.5 μsec
TRIGGER	NORM, INT, +, DC
MAGNIFIER	X10

d. Set 5505A power switch to ON position.

e. Position interferometer and reflector in front of 5500C so that return beam is directed to lower aperture.

f. Adjust oscilloscope HORIZ. POSITION control so that displayed waveform shifts to the left until the last transition is centered on the screen.

g. Adjust A5A8R16 (BALANCE) so that the last transition displayed moves as far as possible to the left on the screen. This indicates maximum reference frequency, which is the correct operating value.

NOTE

Do not remove the receiver shield for this adjustment. Variable resistor A5A8R16 is accessible through a hole in the top of the shield cover (near the A2 Laser Assembly).

h. Set 5505A power switch to off position. Disconnect test equipment, enable interlock switch A4S1, and replace top cover.

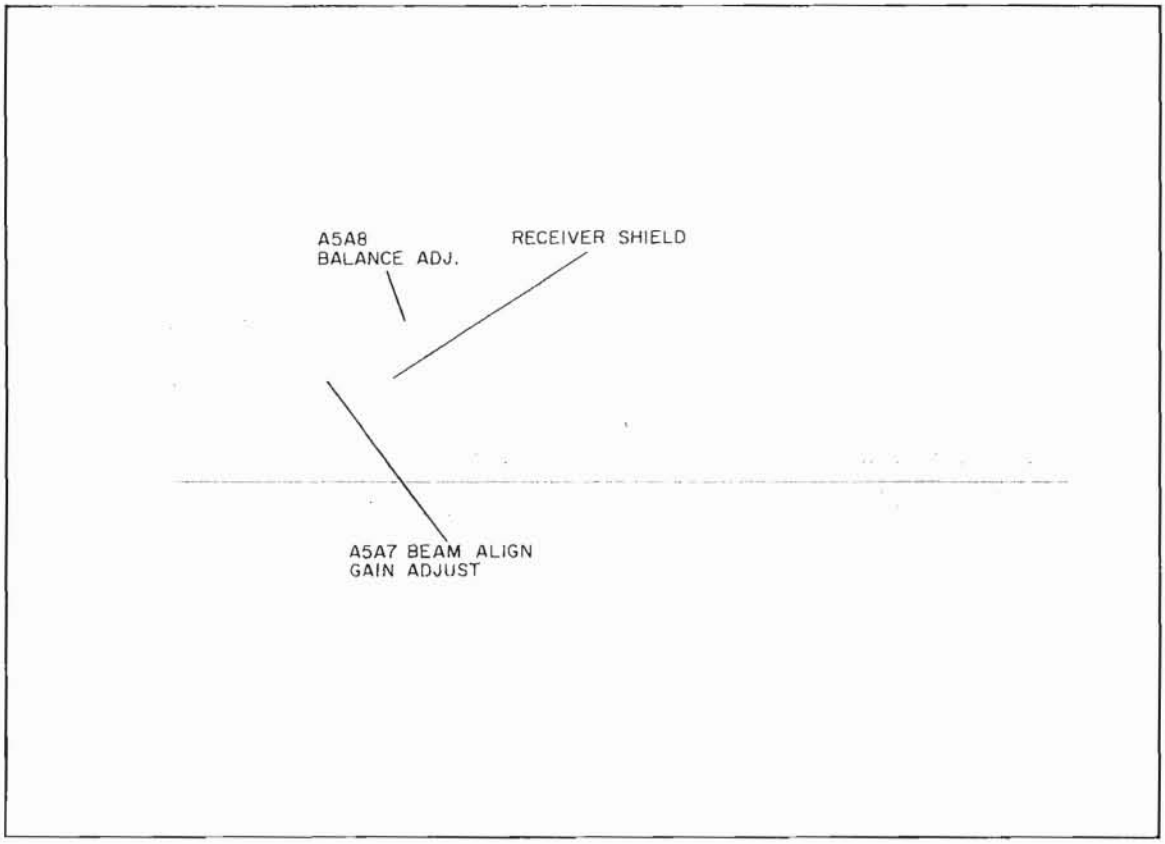
5-133. 5500C Laser Beam Polarization Adjustment

5-134. The A2 Laser Assembly is fully aligned when shipped with the 5500C or as a replacement assembly. Normally, no field adjustment for polarization is required. If it is suspected that improper polarization of the beam exists, contact your nearest Hewlett-Packard Sales and Service Office for information.

NOTE

This adjustment requires special tools and test equipment. Do not remove cover plate from A2 Laser Assembly.

Figure 5-22. BALANCE and GAIN Adjustments



5-135. 5500C Beam Alignment Gain Adjustment (Figure 5-22)

WARNING

USE EXTREME CAUTION WHEN ADJUSTING 5500C. UP TO 11,000 VOLTS MAY BE PRESENT AT LASER ANODE. UP TO 2,000 VOLTS MAY BE PRESENT AT PZT CONNECTION.

5-136. To adjust the level of the BEAM AL signals proceed as follows:

NOTE

Use 5500C connector J1 (right-hand connector, as viewed from rear).

a. Set 5505A Display Unit power switch to off position.

b. Remove 5500C top cover and disable interlock switch A4S1.

c. Remove receiver shield and connect oscilloscope probe to emitter of Q4 on master doppler preamplifier board (A5A6, Figure 5-21). Connect probe ground lead to 5500C frame ground. Set oscilloscope controls as follows:

VOLTS/DIV	0.1
INPUT	AC
TIME/DIV	0.5 μsec, X5 MAGNIFY
TRIGGER CONTROLS	NORM, INT, +, DC

d. Set 5505A power switch to ON position.

e. Position interferometer and reflector in front of 5500C so that return beam is directed to lower aperture. Adjust interferometer and reflector positions for maximum amplitude of displayed waveform.

f. Adjust A5A6R12 (DISPLAY A GAIN) until BEAM ALIGNMENT meter reads 9.5.

g. Set 5505A power switch to off position.

NOTE

Use 5500C connector J2 (left-hand connector, as viewed from rear).

h. Move oscilloscope probe to emitter of Q4 on display B doppler preamplifier (A5A7).

i. Set 5505A power switch to ON position.

j. Re-orient interferometer and reflector so that return beam is directed to right or upper aperture (position turrent as required). Adjust positions for maximum amplitude of displayed waveform.

k. Adjust A5A7R12 (DISPLAY B GAIN) until BEAM ALIGNMENT meter reads 9.5.

l. Set 5505A power switch to off position.

m. Disconnect oscilloscope, replace receiver shield, enable interlock switch A4S1, and replace 5500C top cover.

SECTION VI

PARTS LIST

6-1. INTRODUCTION

6-2. This section contains information for ordering replacement parts. Tables 6-1 through 6-3 list parts in alphanumerical order of their reference designators and provide the following information about each part:

a. Hewlett-Packard part number.
b. Description of part (see abbreviations below).
c. Total quantity used in the instrument (the first time that the part appears in the list, the total quantity of that part number is printed).
d. Typical manufacturer of the part in a five-digit code (see list of manufacturers in Table 6-4).
e. Manufacturer's part number.

6-3. ORDERING INFORMATION

6-4. To obtain replacement parts, address order or inquiry to your local Hewlett-Packard Sales and Service office (see lists at rear of this manual for addresses). Identify parts by their Hewlett-Packard part number. To obtain a part that is not listed, include:

a. Instrument model number.
b. Instrument serial number.
c. Description of the part.
d. Function and location of the part.

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)			S-B	slow-blow
BE CU	beryllium copper	HZ	hertz	NPN	negative-positive-negative	SCR	screw
BH	binder head					SE	selenium
BP	bandpass	IF	intermediate freq	NRFR	not recommended for field replacement	SECT	section(s)
BRS	brass	IMPG	impregnated			SEMICON	semiconductor
BWO	backward wave oscillator	INCD	incandescent	NSR	not separately replaceable	SI	silicon
		INCL	include(s)			SIL	silver
CCW	counter-clockwise	INS	insulation(ed)			SL	slide
CER	ceramic	INT	internal	OBD	order by description	SPG	spring
CMO	cabinet mount only			OH	oval head	SPL	special
COEF	coefficient	K	kilo = 1000	OX	oxide	SST	stainless steel
COM	common	LH	left hand	P	peak	SR	split ring
COMP	composition	LIN	linear taper	PC	printed circuit	STL	steel
COMPL	complete	LK WASH	lock washer	PF	picofarads = 10^{-12} farads	TA	tantalum
CONN	connector	LOG	logarithmic taper			TD	time delay
CP	cadmium plate	LPF	low pass filter	PH BRZ	phosphor bronze	TGI	toggle
CRT	cathode-ray tube			PHL	Phillips	THD	thread
CW	clockwise	M	milli = 10^{-3}	PIV	peak inverse voltage	TI	titanium
		MEG	meg = 10^{6}	PNP	positive-negative-positive	TOL	tolerance
DEPC	deposited carbon	MET FLM	metal film			TRIM	trimmer
DR	drive	MET OX	metallic oxide	P/O	part of	TWT	traveling wave tube
ELECT	electrolytic	MFR	manufacturer	POLY	polystyrene	U	micro = 10^{-6}
ENCAP	encapsulated	MHZ	mega hertz	PORC	porcelain		
EXT	external	MINAT	miniature	POS	position(s)	VAR	variable
F	farads	MOM	momentary	POT	potentiometer	VDCW	dc working volts
FH	flat head	MOS	metal ozide substrate	PP	peak-to-peak		
FIL H	fillister head	MTG	mounting	PT	point	W/	with
FXD	fixed	MY	"mylar"	PWV	peak working voltage	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	ground(ed)	NI PL	nickel plate			W/O	without

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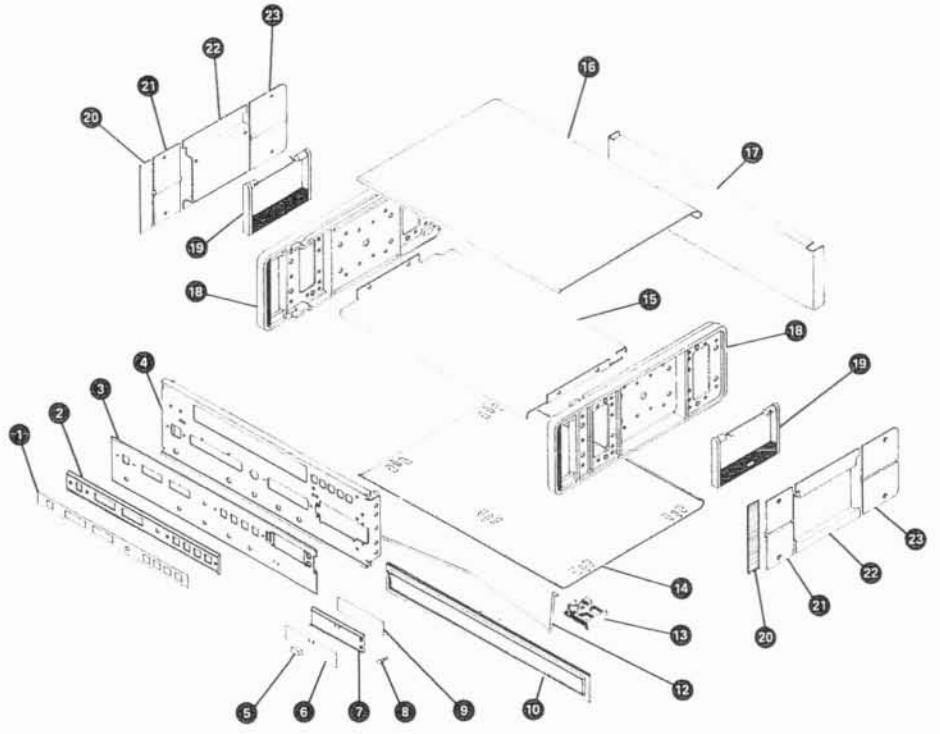
Figure 6-1. 5505A Display Unit Illustrated Cabinet Parts Breakdown



Item No.	Description	HP Part No.
1	Front Label	05505-00023
2	Trim Strip	05505-00008
3	Front Panel Trim	05505-00004
4	Front Panel	05505-00003
5	Knob	05505-20026
6	Front Door Label	05505-00023
7	Door	05505-20023
8	Hinge Stud	05505-20024
9	Instruction Label	05505-00031
10	Window	05505-80007
11	Not Assigned	----------
12	Tilt Stand	1490-0030
13	Foot	5060-0767
14	Bottom Cover	05505-00006
15	Chassis	05505-00001
16	Top Cover	05505-00005
17	Rear Panel	05505-00002
18	Side Frame Assembly	5060-0731
19	Handle Assembly	5060-0222
20	Plate (Trim Strip)	5000-0051
21	Front Side Cover	5000-8599
22	Handle Assembly Retainer	5060-8737
23	Rear Side Cover	5000-8597

Table 6-1. 5526A Laser Measurement System Accessories

HP Product Number	Description
5510A	Automatic Compensator
10550B	Reflector Mount
10551A	Beam Bender/Alignment Mirror
10555A	Error Plotting Output (Includes 05505-60040 circuit board)
10556A	Laser Reflector
10557A	Turning Mirror
10558A	Beam Bender
10559A	Reflector Mount
10560A	Barometer/Thermometers Kit
10565B	Remote Interferometer
10567A	Beam Splitter
10569A	Quad/Pulse Output (Includes 05505-60042 circuit board)
10579A	Straightness Adapter
10580A	Laser Tripod
10581A	Phase Mirror Converter
10634A	Storage Case, Wood (for linear interferometer)
10635A	Storage Case, Wood (for angular interferometer)
10690A	Short-Range Straightness Interferometer
10691A	Long-Range Straightness Interferometer
C07-5055A/002	Digital Recorder/input cable assembly
K05-5505A	Modified Resolution Board
K03-10565A	Non-Contact Converter Kit (for K03-10565A)
K08-10565A	Non-Contact Converter Kit (for K03-10565A)
K04-59995A	Resolution Extender (formerly K02-5525A)
K07-59995A	Remote Control Module
9211-1586	5500C Transit Case
9211-1587	5505A Transit Case
9211-1738	5510A Transit Case

Table 6-2. 5500C Laser Head Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
Sec 9-3					
A1	05500-60207	1	BOARD ASSEMBLY, CONNECTOR	28480	05500-60207
A1C1	0180-0097	2	CAPACITOR-FXD 47UF+-10% 35VDC TA	0420J	150D476X903582
A1C2	0180-0097		CAPACITOR-FXD 47UF+-10% 35VDC TA	0420J	150D476X903582
A1C3	0180-1746	2	CAPACITOR-FXD 15UF+-10% 20VDC TA	0420J	150D156X902082
A1C4	0180-0106	5	CAPACITOR-FXD 68UF+-20% 6VDC TA	0420J	150D686X000682
A1C5	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	0420J	150D156X902082
A1C6	0160-0127	7	CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1C7	0160-0127		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A1CR1	1901-0028	7	DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A1CR2	1901-0028		DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A1CR3	1901-0028		DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A1CR4	1901-0028		DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A1CR5	1901-0028		DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A1CR6	1901-0028		DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A1CR7	1901-0040	7	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR9	1902-3036	1	DIODE-ZNR 3.16V 5% DO-7 PD=.4W TC=-.064%	0203G	BZ 10939-38
A1CR10	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR12	1990-0485	1	LED-VISIBLE LUM-INT=800UCD IF=30MA-MAX	28480	1990-0485
A1J1	1251-3140	2	CONNECTOR:CIRCULAR	28480	1251-3140
A1J2	1251-3140		CONNECTOR:CIRCULAR	28480	1251-3140
A1J3			NSR, PART OF A1		
A1Q1	1854-0071	2	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A1Q2	1854-0071	2	TRANSISTOR NPN SI PD = 300MW FT = 200MHZ	28480	1854-0071
A1Q3	1853-0071	2	TRANSISTOR PNP SI PD 300MW FT 200MHZ	28480	1854-0071
A1Q4	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A1R1	0757-0944	2	RESISTOR 6.8K 2% .125W F TC=0+-100	0329B	C4-1/8-T0-6801-G
A1R2	0757-0907	5	RESISTOR 200 2% .125W F TC=0+-100	0329B	C4-1/8-T0-201-G
A1R3	0757-0939	1	RESISTOR 4.3K 2% .125W F TC=0+-100	0329B	C4-1/8-T0-4301-G
A1R4	2100-2497	1	RESISTOR-TRMR 2K 10% C TOP-ADJ 1-TRN	73138	62-207-1
A1R5	0757-0948	13	RESISTOR 10K 2% .125W F TC=0+-100	0329B	C4-1/8-T0-1002-G
A1R6	0757-0972	1	RESISTOR 100K 2% .125W F TC=0+-100	0329B	C4-1/8-T0-1002-G
A1R7	0757-0955	4	RESISTOR 20K 2% .125W F TC=0+-100	0329B	C4-1/8-T0-2002-G
A1R8	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	0329B	C4-1/8-T0-1002-G
A1R9	0812-0040	1	RESISTOR .27 5% .5W PW TC=0+-300	04678	BWN20-1/2-27/100-J
A1R10	0757-0472	3	RESISTOR 200K 1% .125W F TC=0+-100	0329B	C4-1/8-T0-2003-F
A1R11	0698-5426	1	RESISTOR 10K 10% .125W CC TC=-350/+857	0160G	BB1031
A1R12	0698-5174	1	RESISTOR 200 5% .125W CC TC=-330/+800	0160G	BB2015
A1S1			NOT ASSIGNED		
A1S2	3101-1273	1	SWITCH-SL DPDT-NS SUBMIN 2A 120VAC PC	28480	3101-1273
	05000-20017	1	SPACER, LED	28480	05000-20017
A2	05500-60033	1	LASER ASSEMBLY	28480	05500-60033
	1000-0239	1	TELESCOPE	28480	1000-0239
	2200-0171	2	SCREW-MACH 4-40 .75-IN-LG 82 DEG	28480	2200-0171
	05500-00044	1	COVER, ADJUSTMENT	28480	05500-00044
	05500-20052	1	SLEEVE	28480	05500-20052
	05500-20056	1	SLEEVE, NUT	28480	05500-20056
	05500-20115	1	END CAP, MAGNET	28480	05500-20115
	05500-20121	1	APERATURE, TELESCOPE	28480	05500-20121
	05500-20122	1	MOUNT, TELESCOPE	28480	05500-20122
	05500-20123	2	RING, SUPPORT	28480	05500-20123
	05500-20127	2	YOKE, LASER MOUNT	28480	05500-20127
	05500-20131	2	CLAMP, MOUNTING	28480	05500-20131
A2V1	5080-8613	1	GLASS LASER	28480	5080-8613
A2A1	05500-60036	1	PLATE ASSEMBLY, 1/4 AND 1/2 WV	28480	05500-60036
	0516-0035	6	SCREW-MACH 000-120 .125-IN-LG 82 DEG	28480	0516-0035
	0516-0037	2	SCREW-MACH 00-90 .075-IN-LG FIL-HD-SLT	28480	0516-0037
	0900-0040	2	"O" RING, 0.500" ID	0000J	OBD
	0905-0145	2	SEALED RING 0.801" ID	83251	2-19-N219-7
	1000-0236	1	PLATE, QUARTER WAVE	28480	1000-0236
	1000-0248	1	PLATE	28480	1000-0248
	3030-0149	4	SCREW-SET 0-80 .094-IN-LG SMALL CUP-PT	28480	3030-0149
	3030-0399	4	SCREW-SET 4-48 .156-IN-LG CONE-PT STL	28480	3030-0399
	05500-00043	1	BACKPLANE, TILT BARREL	28480	05500-00043
	05500-20016	2	KNOB, 1/4W	28480	05500-20016
	05500-20025	2	SPRING, LOCK	28480	05500-20025
	05500-20030	2	MOUNTING, ROTATE PLATE	28480	05500-20030
	05500-20031	2	RETAINER, 1/4W	28480	05500-20031
	05500-20105	2	BARREL, TILT	28480	05500-20105
	05500-20107	2	CAM, TILT	28480	05500-20107

See introduction to this section for ordering information

Table 6-2. 5500C Laser Head Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	05500-20125	2	HOLDER, TILT BARREL	28480	05500-20125
A3	05500-60154		INTERCONNECT BD	28480	05500-60154
A3R1	0757-0924	1	RESISTOR FXD 1K 2% .125W	28480	0757-0924
A3W1	05500-60021	1	CABLE ASSY, 1K 2%, .125W	28480	05500-60021
A4	05501-60203	1	PZT SUPPLY BOARD ASSEMBLY (NON-REPARIABLE)	28480	05501-60203
A5			RECEIVER ASSEMBLY, ORDER INDIVIDUAL PART		
	1000-0302	1	BEAM SPLITTER	28480	1000-0302
	2200-0175	6	SCREW-MACH 4-40 1.25-IN-LG 82 DEG	28480	2200-0175
	05500-00040	2	SHIELD, PREAMPLIFIER	28480	05500-00040
	05500-00045	2	RETAINER, POLAR	28480	05500-00045
	05500-00046	4	POLAR, DEMOD	28480	05500-00046
	05500-20128	1	HOLDER, LOCAL, REF	28480	05500-20128
	05500-20129	1	HOLDER, DOPPLER DETECTOR	28480	05500-20129
	05500-20134	1	BASE, RECEIVER	28480	05500-20134
	05500-60032	4	DETECTOR ASSEMBLY WITH PHOTODIODE	28480	05500-60032
A5A1CR1	1990-0414	4		28480	1990-0414
		2	NOT RECOMMENDED FOR FIELD REPLACEMENT		
	05500-60032		DETECTOR ASSEMBLY WITH PHOTODIODE	28480	05500-60032
A5A2CR1	1990-0414			28480	1990-0414
			NOT RECOMMENDED FOR FIELD REPLACEMENT		
	05500-60032		DETECTOR ASSEMBLY WITH PHOTODIODE	28480	05500-60032
A5A3CR1	1990-0414			28480	1990-0414
			NOT RECOMMENDED FOR FIELD REPLACEMENT		
A5A4	05500-60032		DETECTOR ASSEMBLY WITH PHOTODIODE	28480	05500-60032
A5A4CR1	1990-0414			28480	1990-0414
			NOT RECOMMENDED FOR FIELD REPLACEMENT		
A5A5	05500-60035	1	REFERENCE DETECTOR ASSEMBLY (SERIES 1644	28480	05500-60035
	1000-0288	1	BEAM SPLITTER	28480	1000-0288
	05500-20133	1	MOUNT, PHOTODIODE	28480	05500-20133
A5A5CR1 A5A5CR2	05500-80003	1	PHOTODIODE, SI (MATCHED PR, FOR CR1 & 2) (SEE CR1)	28480	05500-80003
A5A5A1	05500-60206	1	BOARD ASSEMBLY, RETAINER	28480	05500-60206
	0340-0781	2	INSULATOR-XSTR ACETAL	28480	0340-0781
	1251-3174	3	CONTACT-CONN U/M-POST-TYPE MALE HWRP	0138J	85931-6

Table 6-2. 5500C Laser Head Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5A6	05500-60200	2	BOARD ASSEMBLY, DOP PREAMPLIFIER	28480	05500-60200
A5A6C1	0160-3879	19	CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C2	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C3	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C4	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C5	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C6	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C7	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C8	0160-2534	2	CAPACITOR-FXD 300PF +-1% 300VDC MICA0+70	28480	0160-3879
A5A6C9	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C10	0160-3060	7	CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A5A6C11	0160-2534		CAPACITOR-FXD 300PF +-1% 300VDC MICA0+70	28480	0160-2534
A5A6C12	0180-0155	12	CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A6C13	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C14	0160-0127		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A5A6C15	0160-3878	2	CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A5A6C16	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A5A6C17	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A5A6C18	0160-0987	2	CAPACITOR-FXD 12PF +-5% 500VDC	28480	0160-0987
A5A6C19	0180-0291	1	CAPACITOR-FXD 1UF+-10% 35VDC TA	0420J	150D105X9035A2
A5A6C20	0160-3879		CAPACITOR-FXD .01UF +-20% 100 VDC CER	28480	0160-3879
A5A6C21	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A5A6C22	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A6C23	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A5A6C24	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A6C25	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A6C26	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A6C27	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A5A6C28	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A6CR1	1902-3182	3	DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	0223G	FZ7268
A5A6CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5A6CR3	1902-3182		DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	0223G	FZ7268
A5A6CR4	1902-0025	1	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	0223G	FZ7260
A5A6CR5	1902-0041	1	DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	0203G	BZ 10939-98
A5A6CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5A6CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5A6CR8	1902-0579	2	DIODE-ZNR 5.11V 5% DO-15 PD=1W TC=-.009%	28480	1902-0579
A5A6Q1	1854-0092	8	TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A6Q2	1855-0081	1	TRANSISTOR J-FET 2N5245 N-CHAN D-MODE SI	0169M	2N5245
A5A6Q3	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A6Q4	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A6Q5	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A6Q6	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A6Q7	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5A6Q8	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5A6R1	0757-0964	3	RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A5A6R2	0757-0952	3	RESISTOR 15K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1502-G
A5A6R3	0757-0472		RESISTOR 200K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2003-F
A5A6R4	0757-0933	12	RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R5	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R6	0757-0943		RESISTOR 6.2K 2% 125W F TC = 0 + – 100	03292	C4-1/8-TO-6201-G
A5A6R7	0757-0936		RESISTOR 3.3K 2% 125W F TC = 0 + – 100	03292	C4-1/8-TO-3301-G
A5A6R8	0757-0942	2	RESISTOR 5.6K 2% .125W F TC=0+-100	03298	C4-1/8-T0-5601-G
A5A6R9			NOT ASSIGNED		
A5A6R10	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A6R11	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R12	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A5A6R13	2100-2031	1	RESISTOR-TRMR 50K 10% C TOP-ADJ 1-TRN	73138	62-212-1
A5A6R14	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A6R15	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A6R16	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R17	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A5A6R18	0757-0955		RESISTOR 20K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2002-G
A5A6R19	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A6R20	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	03298	C4-1/8-T0-201-G
A5A6R21	0757-0916	1	RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G
A5A6R22	0757-0928	2	RESISTOR 1.5K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1501-G
A5A6R23	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R24	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R25	0757-0952		RESISTOR 15K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1502-G
A5A6R26	0757-0940	5	RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A5A6R27	0757-0926	2	RESISTOR 1.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1201-G
A5A6R28	0683-4705	1	RESISTOR 47 5% .25W FC TC=-400/+500	01607	CB4705
A5A6R29	0757-0897	2	RESISTOR 75 2% .125W F TC=0+-100	03298	C4-1/8-T0-75R0-G
A5A6R30	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	03298	C4-1/8-T0-201-G

See introduction to this section for ordering information

Table 6-2. 5500C Laser Head Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5A6R31	0757-0900	9	RESISTOR 100 2% .125W F TC=0+-100	03298	C4-1/8-T0-101-G
A5A6R32	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	03298	C4-1/8-T0-101-G
A5A6R33	0683-4705		RESISTOR 47 5% .25W FC TC=-400/+500	0160G	CB4705
A5A6R34	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A6R35	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A6R36	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	03298	C4-1/8-T0-101-G
A5A6R37	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A6R38	0757-0927	1	RESISTOR 1.3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1301-G
A5A6R39	0757-0930	1	RESISTOR 1.8K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1801-G
A5A6R40	0757-0917	1	RESISTOR 510 2% .125W F TC=0+-100	03298	C4-1/8-T0-511-G
A5A6R41	0757-0944		RESISTOR 6.8K 2% .125W F TC=0+-100	03298	C4-1/8-T0-6801-G
A5A6R42	0683-1005	3	RESISTOR 10 5% .25W FC TC=-400/+500	0160G	CB1005
A5A6R43	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	0160G	CB1005
A5A6R44	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	0160G	CB1005
A5A6R45	0683-4705		RESISTOR 47 5% .25W FC TC=-400/+500	0160G	CB4705
A5A6U1	1820-0474	2	IC WIDEBAND AMPL	01924	CA3012
A5A6U2	1820-0424	2	IC INV TTL H HEX 1-INP	0223G	74H04PC
A5A6U3	1820-0475	1	IC COMPARATOR	0340F	LM306H
A5A6U4	1820-0493	1	IC OP AMP	0340F	LM307N
A5A7	05500-60200		BOARD ASSEMBLY, PREAMP (SAME AS A5A6)	28480	05500-60200
A5A8	05500-60201	1	BOARD ASSEMBLY, LOCAL REFERENCE	28480	05500-60201
A5A8C1	0160-2020	2	CAPACITOR-FXD 910PF +-5% 100VDC MICA 0+70	28480	0160-2020
A5A8C2	0160-3879		CAPACITOR-FXD 01UF +-20% 100 VDC CER	28480	0160-3879
A5A8C3	0160-2020		CAPACITOR-FXD 910PF +-5% 100VDC MICA 0+70	28480	0160-2020
A5A8C4	0160-3879			28480	0160-3879
A5A8C5	0160-3878		CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A5A8C6	0160-0127		CAPACIOTR-FXD 01UF +- 20% 25 VDC CER	28480	0160-0127
A5A8C7	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A8C8	0160-3879		CAPACITOR-FXD 01UF +- 20% 100 VDC CER	28480	0160-3879
A5A8C9	0160-3879		CAPACITOR-FXD 01UF +- 20% 100 VDC CER	28480	0160-3879
*A5A8C10	0160-3879		CAPACITOR-FXD 01UF +- 20% 100 VDC CER	28480	0160-3879
A5A8C11	0160-0127		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A5A8C12	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A5A8C13	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A8C14	0160-0127		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A5A8C15	0160-0127		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A5A8C16	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A5A8C17	0160-0987		CAPACITOR-FXD 12PF +-5% 500VDC	28480	0160-0987
A5A8C18	0160-0127		CAPACITOR-FXD 1UF +-20% 25VDC CER	28480	0160-0127
A5A8C19	0160-3879		CAPACITOR-FXD 01UF +- 20% 100 VDC CER	28480	0160-3879
A5A8C20	0160-3879		CAPACITOR-FXD 01UF +- 20% 100 VDC CER	28480	0160-3879
A5A8C21	0160-3879		CAPACITOR-FXD 01UF +- 20% 100 VDC CER	28480	0160-3879
A5A8C22	0160-3060	1	CAPACITOR-FXD 01UF +- 20% 25 VDC TA	28480	0160-3060
A5A8C23	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A8C24	0160-3879		CAPACITOR-FXD 01UF +- 20% 25 VDC CER	28480	0160-3879
A5A8C25	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A8C26	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A5A8C27	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A8C28	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A5A8C29	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	0420J	150D225X0020A2
A5A8CR1	1902-3182		DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	0223G	FZ7268
A5A8CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5A8CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5A8CR4	1902-0579		DIODE-ZNR 5.11V 5% DO-15 PD=1W TC=-.009%	28480	1902-0579
A5A8Q1	1855-0062	1	TRANSISTOR J-FET N-CHAN D-MODE SI	28480	1855-0062
A5A8Q2	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A8Q3	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A8Q4	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5A8Q5	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5A8Q6	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5A8Q7	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5A8Q8	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5A8R1	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A5A8R2	0757-0472		RESISTOR 200K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2003-F
A5A8R3	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A5A8R4	0757-0955		RESISTOR 20K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2002-G
A5A8R5	0757-0955		RESISTOR 20K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2002-G
A5A8R6	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A8R7	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A8R8	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2401-G
A5A8R9	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A5A8R10	0757-0942		RESISTOR 5.6K 2% .125W F TC=0+-100	03298	C4-1/8-T0-5601-G

See introduction to this section for ordering information

Table 6-2. 5500C Laser Head Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5A8R11	0683-8245	1	RESISTOR 820K 5% .25W FC TC=-800/+900	0160G	C88245
A5A8R12	0683-2035	1	RESISTOR 20K 5% .25W FC TC=-400/+800	0160G	C82035
A5A8R13	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	0329B	C4=1/8-T0-101-G
A5A8R14	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1002-G
A5A8R15	0757-0937	1	RESISTOR 3.6K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-3601-G
A5A8R16	2100-3359	1	RESISTOR-TRMR 2M 20% C SIDE-ADJ 1-TRN	73138	72-155-0
A5A8R17	0757-0923	1	RESISTOR 910 2% .125W F TC=0+-100	0329B	C4=1/8-T0-911-G
A5A8R18	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	0329B	C4=1/8-T0-101-G
A5A8R19	0757-0933		RESISTOR 2.4K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-2401-G
A5A8R20	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-4701-G
A5A8R21	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	0329B	C4=1/8-T0-101-G
A5A8R22	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-4701-G
A5A8R23	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	0329B	C4=1/8-T0-201-G
A5A8R24	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-4701-G
A5A8R25	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1002-G
A5A8R26	0757-0910	1	RESISTOR 270 2% .125W F TC=0+-100	0329B	C4=1/8-T0-271-G
A5A8R27	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	0329B	C4=1/8-T0-101-G
A5A8R28	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	0329B	C4=1/8-T0-101-G
A5A8R29	0757-0928		RESISTOR 1.5K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1501-G
A5A8R30	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1002-G
A5A8R31	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-4701-G
A5A8R32	0757-0952		RESISTOR 15K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1502-G
A5A8R33	0757-0976	1	RESISTOR 150K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1502-G
A5A8R34	0757-0926		RESISTOR 1.2K 2% .125W F TC=0+-100	0329B	C4=1/8-T0-1201-G
A5A8R35	0757-0897		RESISTOR 75 2% .125W F TC=0+-100	0329B	C4=1/8-T0-75R0-G
A5A8R36	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	0329B	C4=1/8-T0-201-G
A5A8R37	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	0329B	C4=1/8-T0-101-G
A5A8R38	0683-2005		RESISTOR 20 5% .25W FC TC=-400/+500	0160G	C82005
A5A8U1	1826-0035	1	IC OP AMP	0340F	LM308AH
A5A8U2	1820-0474		IC WIDEBAND AMPL	0192A	CA3012
A5A8U3	1820-0424		IC INV TTL H HEX 1-INP	0223G	74H04PC
A5A9	05500-60205	1	BOARD ASSEMBLY, DETECTOR	28480	05500-60205
A5A9	1251-1934	1	CONNECTOR-8GL CONT SKT .025-IN-BSC-BZ	0138J	85866-4
A6	05500-60041	1	PLATE ASSEMBLY, COVER	28480	05500-60041
A6MP1	1410-0075	3	BEARING;BALL	0000J	OBD
A6MP2	1460-0146	1	SPRING-CPR8N .146-IN-OD .312-IN-LG SST	28480	1460-0146
A6MP3	2200-0147	2	SCREW-MACH 4-40 .5-IN-LG PAN-MD-POZI	28480	2200-0147
A6MP4	3030-0018	1	SCREW-SET 4-40 .25-IN-LG FLAT-PT ALY STL	28480	3030-0018
A6MP5	3050-0911		WASHER-SPR CRVD NO. 8 .165-IN-ID	28480	3050-0911
A6MP6	05500-00051	1	FACE PLATE, FRONT	28480	05500-00051
A6MP12	05500-00053	1	APERTURE, CLOSED	28480	05500-00053
A6MP8	05500-20120	1	SPACER, APERATURE	28480	05500-20120
A6MP9	05500-20137	2	SPACER, TARGET	28480	05500-20137
A6MP10	05500-20138	1	PLATE, TARGET	28480	05500-20138
A6MP11	05500-20139	1	APERATURE, ALIGNMENT	28480	05500-20139
A6W1	05500-6044	1	CABLE ASSEMBLY, MAIN WITH CONNECTOR	28480	05500-6044
A6W1	1251-3183	1	CONNECTOR 21-PIN	28480	1251-3183
A6W1	1251-3182	3	CONNECTOR 10-PIN	06928	C404-010
A6W1	1251-3184	1	CONNECTOR 10-PIN	06928	C401-010
A6W1	1251-3182		CONNECTOR 10-PIN	06928	C404-010
A6W1	1251-3182		CONNECTOR 10-PIN	06928	C404-010
A6W1	1251-3182		CONNECTOR 10-PIN	06928	C404-010
			MISCELLANEOUS PARTS		
	0570-0180	4	SCREW-SKT HD CAP 2-56 .25-IN-LG ALY STL	28480	0570-0180
	1410-0966	3	BALL;BEARING TYPE 0.875" DIA	28480	1410-0966
	0380-0005	4	SPACER 312L .181 DIA	28480	0380-0005
	6960-0071	1	PLUG HOLE	95760	BP 1-3/8
	7120-3731	2	LABEL, INFO	28480	7120-3731
	05500-00012	1	SPRING, RETAINER	28480	05500-00012
	05500-00024	2	BRACKET, PC BOARD	28480	05500-00024
	05500-00052	1	FACEPLATE, REAR	28480	05500-00052
A6Z10	05500-00037	1	SHIELD, RECEIVER	28480	05500-00037
	05500-00038	1	COVER, SHIELD	28480	05500-00038
	05500-00041	2	NAMEPLATE, COVER	28480	05500-00041
	05500-00047	2	BRACE, REAR COVER	28480	05500-00047
	05500-00048	1	BRACE, FRONT COVER	28480	05500-00048
	05500-20061	2	NUT, LOCK	28480	05500-20061
	05500-20066	1	NUT, ADJUST LOCK	28480	05500-20066
	05500-20067	1	SCREW, ADJUST	28480	05500-20067
	05500-20124	2	ENDCAP, HOUSING	28480	05500-20124
	05500-20136	1	BABE, LABER	28480	05500-20136
	05500-60022	1	COVER ASSY	28480	05500-60022
	05500-80002	1	LABEL, HP/DATE	28480	05500-80002
	7120-5180	1	LABEL, CAUTION	28480	7120-5180
A7	05501-60208		BOARD ASSY. HV SUPPLY -NON-REPAIRABLE	28480	05501-60208

Table 6-3. 5505C Laser Display Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	05505-60001	1	BOARD ASSEMBLY, ANALOG	28480	05505-60001
A1C1	0180-0106	8	CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A1C2	0180-0210	5	CAPACITOR-FXD 3.3UF+-20% 15VDC TA	0420J	150D335X0015A2
A1C3	0180-0210		CAPACITOR-FXD 3.3UF+-20% 15VDC TA	0420J	150D335X0015A2
A1C4	0160-0153	3	CAPACITOR-FXD 1000PF +-10% 200VDC POLYE	0420J	292P10292
A1C5	0140-0159	4	CAPACITOR-FXD 3000PF +-2% 300VDC MICA	72136	DM19F302G0300WV1CR
A1C6	0140-0159		CAPACITOR-FXD 3000PF +-2% 300VDC MICA	72136	DM19F302G0300WV1CR
A1C7	0140-0159		CAPACITOR-FXD 3000PF +-2% 300VDC MICA	72136	DM19F302G0300WV1CR
A1C8	0140-0159		CAPACITOR-FXD 3000PF +-2% 300VDC MICA	72136	DM19F302G0300WV1CR
A1C9	0160-0737	4	CAPACITOR-FXD 29.3PF +-.5PF 500VDC	28480	0160-0737
A1C10	0160-2204	9	CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A1C11	0160-0737		CAPACITOR-FXD 29.3PF +-.5PF 500VDC	28480	0160-0737
A1C12	0160-0737		CAPACITOR-FXD 29.3PF +-.5PF 500VDC	28480	0160-0737
A1C13	0160-0737		CAPACITOR-FXD 29.3PF +-.5PF 500VDC	28480	0160-0737
A1C14	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A1C15	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A1C16	0180-2125	4	CAPACITOR-FXD 15UF+-5% 20VDC TA	0420J	150D156X5020B2
A1C17	0180-2125		CAPACITOR-FXD 15UF+-5% 20VDC TA	0420J	150D156X5020B2
A1C18	0180-2125		CAPACITOR-FXD 15UF+-5% 20VDC TA	0420J	150D156X5020B2
A1C19	0180-2125		CAPACITOR-FXD 15UF+-5% 20VDC TA	0420J	150D156X5020B2
A1C20	0180-1743	5	CAPACITOR-FXD .1UF+-10% 35VDC TA	0420J	150D104X9035A2
A1C21	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	0420J	150D104X9035A2
A1C22	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A1C23	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A1C24	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	0420J	150D104X9035A2
A1C25	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	0420J	150D104X9035A2
A1C26	0160-2197	2	CAPACITOR-FXD 10PF +-5% 300VDC	28480	0160-2197
A1C27	0160-2197		CAPACITOR-FXD 10PF +-5% 300VDC	28480	0160-2197
A1C28	0160-0153		CAPACITOR-FXD 1000PF +-10% 200VDC POLYE	0420J	292P10292
A1C29	0160-0153		CAPACITOR-FXD 1000PF +-10% 200VDC POLYE	0420J	292P10292
A1C30	0180-0210		CAPACITOR-FXD 3.3UF+-20% 15VDC TA	0420J	150D335X0015A2
A1C31	0180-0210		CAPACITOR-FXD 3.3UF+-20% 15VDC TA	0420J	150D335X0015A2
A1C32	0160-2326	4	CAPACITOR-FXD 150PF +-5% 300VDC MICA0+70	28480	0160-2326
A1C33	0160-2326		CAPACITOR-FXD 150PF +-5% 300VDC MICA0+70	28480	0160-2326
A1C34	0160-2326		CAPACITOR-FXD 150PF +-5% 300VDC MICA0+70	28480	0160-2326
A1C35	0160-2326		CAPACITOR-FXD 150PF +-5% 300VDC MICA0+70	28480	0160-2326
A1CR1	1902-0049	3	DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	0223G	FZ7240
A1CR2	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	0223G	FZ7240
A1CR3	1901-0040	20	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1L1	9100-1664	4	COIL-MLD 1MH 5% Q=70 .215DX.56LG	02178	22-1312-30J
A1L2	9100-1664		COIL-MLD 1MH 5% Q=70 .215DX.56LG	02178	22-1312-30J
A1L3	9100-1664		COIL-MLD 1MH 5% Q=70 .215DX.56LG	02178	22-1312-30J
A1L4	9100-1664		COIL-MLD 1MH 5% Q=70 .215DX.56LG	02178	22-1312-30J
A1L6	9140-0155	3	COIL-MLD 28UH 1% Q=60 .156DX.375LG	28480	9140-0155
A1L7	9140-0155		COIL-MLD 28UH 1% Q=60 .156DX.375LG	28480	9140-0155
A1L8	9140-0155		COIL-MLD 28UH 1% Q=60 .156DX.375LG	28480	9140-0155
A1Q1	1854-0019	15	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q2	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q3	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q4	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q5	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q6	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q7	1854-0210	17	TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A1Q8	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A1Q9	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q10	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q11	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q12	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q13	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q14	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A1Q15	1853-0010	11	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A1Q16	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A1Q17	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A1Q18	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A1R1	0698-3435	4	RESISTOR 38.3 1% .125W F TC=0+-100	03298	C4-1/8-T0-38R3-F
A1R2	0698-3435		RESISTOR 38.3 1% .125W F TC=0+-100	03298	C4-1/8-T0-38R3-F
A1R3	0698-3435		RESISTOR 38.3 1% .125W F TC=0+-100	03298	C4-1/8-T0-38R3-F
A1R4	0698-3435		RESISTOR 38.3 1% .125W F TC=0+-100	03298	C4-1/8-T0-38R3-F
A1R5	0757-0280	16	RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R6	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R7	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R8	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R9	0757-0914	3	RESISTOR 390 2% .125W F TC=0+-100	03298	C4-1/8-T0-391-G
A1R10	0757-0932	6	RESISTOR 2.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2201-G
A1R11	0757-0932		RESISTOR 2.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2201-G
A1R12	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R13	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R14	0683-1005	7	RESISTOR 10 5% .25W FC TC=-400/+500	01602	CB1005
A1R15	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R16	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	01602	CB1005
A1R17	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R18	0757-0384	4	RESISTOR 20 1% .125W F TC=0+-100	0299E	MF4C1/8-T0-20R0-F
A1R19	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	0299E	MF4C1/8-T0-20R0-F
A1R20	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	0299E	MF4C1/8-T0-20R0-F
A1R21	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	0299E	MF4C1/8-T0-20R0-F
A1R22	0698-3443	4	RESISTOR 287 1% .125W F TC=0+-100	03298	C4-1/8-T0-287R-F
A1R23	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	03298	C4-1/8-T0-287R-F
A1R24	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	03298	C4-1/8-T0-287R-F
A1R25	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	03298	C4-1/8-T0-287R-F
A1R26	0698-3432	4	RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F
A1R27	0698-3432		RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F
A1R28	0698-3432		RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F
A1R29	0698-3432		RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F
A1R30	0757-0918	8	RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R31	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R32	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R33	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R34	0757-0931	8	RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A1R35	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R36	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A1R37	0757-0932		RESISTOR 2.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2201-G
A1R38	0757-0932		RESISTOR 2.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2201-G
A1R39	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A1R40	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	01602	CB1005
A1R41	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	01602	CB1005
A1R42	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R43	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R44	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R45	0757-0918		RESISTOR 560 2% .125W F TC=0+-100	03298	C4-1/8-T0-561-G
A1R46	0757-0917	2	RESISTOR 510 2% .125W F TC=0+-100	03298	C4-1/8-T0-511-G
A1R47	0757-0917		RESISTOR 510 2% .125W F TC=0+-100	03298	C4-1/8-T0-511-G
A1R48	0757-0912	4	RESISTOR 330 2% .125W F TC=0+-100	03298	C4-1/8-T0-331-G
A1R49	0757-0912		RESISTOR 330 2% .125W F TC=0+-100	03298	C4-1/8-T0-331-G
A1R50	0757-0904	2	RESISTOR 150 2% .125W F TC=0+-100	03298	C4-1/8-T0-151-G
A1R51	0757-0904		RESISTOR 150 2% .125W F TC=0+-100	03298	C4-1/8-T0-151-G
A1R52	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A1R53	0757-0914		RESISTOR 390 2% .125W F TC=0+-100	03298	C4-1/8-T0-391-G
A1R54	0683-2005	2	RESISTOR 20 5% .25W FC TC=-400/+500	01602	CB2005
A1R55	0757-0914		RESISTOR 390 2% .125W F TC=0+-100	03298	C4-1/8-T0-391-G
A1R56	0683-2005		RESISTOR 20 5% .25W FC TC=-400/+500	01602	CB2005
A1R57	0757-0897	2	RESISTOR 75 2% .125W F TC=0+-100	03298	C4-1/8-T0-75R0-G
A1R58	0757-0897		RESISTOR 75 2% .125W F TC=0+-100	03298	C4-1/8-T0-75R0-G
A1R59	0757-0916	6	RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G
A1R60	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G
A1R61	0757-0952	1	RESISTOR 15K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1502-G
A1R62	0683-1205	2	RESISTOR 12 5% .25W FC TC=-400/+500	01602	CB1205
A1R63	0683-1205		RESISTOR 12 5% .25W FC TC=-400/+500	01602	CB1205
A1R64	0757-0928	2	RESISTOR 1.5K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1501-G
A1R65	0757-0952		RESISTOR 15K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1502-G
A1R66	0757-0972	4	RESISTOR 100K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A1R67	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A1R68	0757-0928		RESISTOR 1.5K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1501-G
A1R69	0757-0911	2	RESISTOR 300 2% .125W F TC=0+-100	03298	C4-1/8-T0-301-G
A1R70	0757-0911		RESISTOR 300 2% .125W F TC=0+-100	03298	C4-1/8-T0-301-G
A1R71	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	01602	CB1005
A1R72	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	01602	CB1005
A1R73	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A1R74	0757-0972		RESISTOR 100K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A1R75	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G
A1R76	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G
A1R77	0757-0940	10	RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A1R78	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A1R79	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G
A1R80	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	03298	C4-1/8-T0-471-G

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R81	0757-0948	31	RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A1R82	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A1R83	0757-0915	4	RESISTOR 430 2% .125W F TC=0+-100	03298	C4-1/8-T0-431-G
A1R84	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	03298	C4-1/8-T0-431-G
A1R85	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	03298	C4-1/8-T0-431-G
A1R86	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	03298	C4-1/8-T0-431-G
A1R87	0757-0964	14	RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A1U1	1820-0370	3	IC GATE TTL H NAND QUAD 2-INP	02236	74H00PC
A1U2	1820-0269	20	IC GATE TTL NAND QUAD 2-INP	02236	7403PC
A1U3	1820-0328	29	IC GATE TTL NOR QUAD 2-INP	02236	7402PC
A1U4	1820-0056	1	IC CNTR TTL DIV-X-12 ASYNCHRO	0169H	SN7492AN
A1U5	1820-0055	15	IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A1U6	1820-0370		IC GATE TTL H NAND QUAD 2-INP	02236	74H00PC
A1U7	1820-0433	2	IC DIFF AMPL	0192A	CA3023
A1U8	1820-0433		IC DIFF AMPL	0192A	CA3023
A2	05505-60002	1	BOARD ASSEMBLY, CLOCK	28480	05505-60002
A2C1	0180-0291	1	CAPACITOR-FXD 1UF+-10% 35VDC TA	0420J	150D105X9035A2
A2C2	0160-2207	1	CAPACITOR-FXD 300PF +-5% 300VDC MICA0+70	28480	0160-2207
A2C3	0150-0093	2	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0150-0093
A2C4	0160-2201	2	CAPACITOR-FXD 51PF +-5% 300VDC	28480	0160-2201
A2C5	0160-3060	4	CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A2C6	0121-0180	1	CAPACITOR-V TRMR-CER 15-60PF 200V PC-MTG	73899	DV11PR60Q
A2C7	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A2C8	0121-0099	1	CAPACITOR-V TRMR-CER 2-8PF 350V PC-MTG	73899	DV11PR8A
A2C9	0180-0228	5	CAPACITOR-FXD 22UF+-10% 15VDC TA	0420J	150D226X9015B2
A2C10	0160-2201		CAPACITOR-FXD 51PF +-5% 300VDC	28480	0160-2201
A2C11	0140-0234	1	CAPACITOR-FXD 500PF +-1% 300VDC MICA0+70	72136	DM15F501F0300WV1C
A2C12	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	0420J	150D226X9015B2
A2C13	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	0420J	150D104X9035A2
A2C14	0180-0160	1	CAPACITOR-FXD 22UF+-20% 35VDC TA	0420J	150D226X0035B2
A2C15	0180-0137	2	CAPACITOR-FXD 100UF+-20% 10VDC TA	0420J	150D107X0010B2
A2C16	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	0420J	150D226X9015B2
A2C17	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A2C18	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	0420J	150D226X9015B2
A2C19	0180-0137		CAPACITOR-FXD 100UF+-20% 10VDC TA	0420J	150D107X0010B2
A2C20	0150-0093		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0150-0093
A2C21	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
A2CR1	1901-0028	2	DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A2CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR4	1901-0028		DIODE-PWR RECT 400V 750MA DO-29	0271C	MP493
A2L1	9140-0129	1	COIL-MLD 220UH 5% Q-65 .155DX.375LG	02178	15-1315-20J
A2Q1	1854-0019		TRANSISTOR NPN SI TO-18 PD-360MW	28480	1854-0019
A2Q2	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q3	1854-0019		TRANSISTOR NPN SI TO-18 PD-360MW	28480	1854-0019
A2Q4	1853-0010		TRANSISTOR PNP SI TO-18 PD-360MW	28480	1853-0010
A2Q5	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q6	1853-0012	10	TRANSISTOR PNP 2N2904A SI TO-39 PD-600MW	0169H	2N2904A
A2Q7	1853-0010		TRANSISTOR PNP SI TO-18 PD-360MW	28480	1853-0010
A2Q8	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q9	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD-600MW	0169H	2N2904A
A2Q10	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q11	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q12	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q13	1854-0019		TRANSISTOR NPN SI TO-18 PD-360MW	28480	1854-0019
A2Q14	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q15	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q16	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q17	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2Q18	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD-600MW	0169H	2N2904A
A2Q19	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD-500MW	02036	2N2222
A2R1	0757-0924	11	RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R2	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R3	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R4	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R5	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R6	0757-0901	3	RESISTOR 110 2% .125W F TC=0+-100	03298	C4-1/8-T0-111-G
A2R7	0757-0943	1	RESISTOR 6.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-6201-G
A2R8	0683-1005		RESISTOR 10 5% .25W FC TC=-400/+500	01606	CB1005
A2R9	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R10	0757-0963	1	RESISTOR 43K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4302-G

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2R11	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A2R12	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R13	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R14	0683-1015	1	RESISTOR 100 5% .25W FC TC=-400/+500	01602	CB1015
A2R15	0757-0935	8	RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A2R16	0757-0912		RESISTOR 330 2% .125W F TC=0+-100	03298	C4-1/8-T0-331-G
A2R17	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R18	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A2R19	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R20	0683-3355	2	RESISTOR 3.3M 5% .25W FC TC=-900/+1100	01602	CB3355
A2R21	0683-3345	2	RESISTOR 330K 5% .25W FC TC=-800/+900	01602	CB3345
A2R22	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R23	0683-1065	2	RESISTOR 10M 5% .25W FC TC=-900/+1100	01602	CB1065
A2R24	0683-1065		RESISTOR 10M 5% .25W FC TC=-900/+1100	01602	CB1065
A2R25	0683-3355		RESISTOR 3.3M 5% .25W FC TC=-900/+1100	01602	CB3355
A2R26	0683-3345		RESISTOR 330K 5% .25W FC TC=-800/+900	01602	CB3345
A2R27	0757-0465	14	RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A2R28	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A2R29	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R30	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A2R31	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R32	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A2R33	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R34	0757-0919	2	RESISTOR 620 2% .125W F TC=0+-100	03298	C4-1/8-T0-621-G
A2R35	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R36	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R37	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R38	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R39	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R40	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R41	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A2R42	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A2R43	0757-0469	2	RESISTOR 150K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1503-F
A2R44	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A2R45	0757-0952		RESISTOR 15K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1502-G
A2R46	0683-1255	1	RESISTOR 1.2M 5% .25W FC TC=-900/+1100	01602	CB1255
A2R47	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R48	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R49	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R50	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R51	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R52	0757-0944	2	RESISTOR 6.8K 2% .125W F TC=0+-100	03298	C4-1/8-T0-6801-G
A2R53	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R54	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R55	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R56	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A2R57	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R58	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R59	0757-0932		RESISTOR 2.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2201-G
A2R60	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R61	0757-0469		RESISTOR 150K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1503-F
A2R62	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A2R63	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R64	0757-0945	1	RESISTOR 7.5K 2% .125W F TC=0+-100	03298	C4-1/8-T0-7501-G
A2R65	0683-2715	1	RESISTOR 270 5% .25W FC TC=-400/+600	01602	CB2715
A2R66	0757-0932		RESISTOR 2.2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2201-G
A2R67	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R68	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R69	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1002-G
A2R70	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A2R71	0757-0086	1	RESISTOR 51 2% .25W F TC=0+-100	03418	C5-1/4-T0-51R0-G
A2R72	0757-0919		RESISTOR 620 2% .125W F TC=0+-100	03298	C4-1/8-T0-621-G
A2R73	0757-0912		RESISTOR 330 2% .125W F TC=0+-100	03298	C4-1/8-T0-331-G
A2U1	1820-0370		IC GATE TTL H NAND QUAD 2-INP	02232	74H00PC
A2U2	1820-0269		IC GATE TTL NAND QUAD 2-INP	02232	7403PC
A2U3	1820-0269		IC GATE TTL NAND QUAD 2-INP	02232	7403PC
A2U4	1820-0269		IC GATE TTL NAND QUAD 2-INP	02232	7403PC
A2U5	1820-0054	32	IC GATE TTL NAND QUAD 2-INP	02232	7400PC
A2U6	1820-0328		IC GATE TTL NOR QUAD 2-INP	02232	7402PC
A2U7	1820-0269		IC GATE TTL NAND QUAD 2-INP	02232	7403PC
A2U8	1820-0413	3	IC DIVR TTL DECD	28480	1820-0413
A2U9	1820-0328		IC GATE TTL NOR QUAD 2-INP	02232	7402PC
A2U10	1820-0269		IC GATE TTL NAND QUAD 2-INP	02232	7403PC
A2U11	1820-0328		IC GATE TTL NOR QUAD 2-INP	02232	7402PC
A2U12	1820-0054		IC GATE TTL NAND QUAD 2-INP	02232	7400PC
A2U13	1820-0068	7	IC GATE TTL NAND TPL 3-INP	02232	7410PC
A2U14	1820-0054		IC GATE TTL NAND QUAD 2-INP	02232	7400PC
A2U15	1820-0328		IC GATE TTL NOR QUAD 2-INP	02232	7402PC

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2Y1	0410-0130	1	CRYSTAL:QUARTZ 10 MHZ	28480	0410-0130
	1200-0199	1	SOCKET-XTAL 2-CONT HC-6/U DIP-SLDR	0551H	8000-DG2
A3	05505-60034	1	BOARD ASSEMBLY, COUNTER REGISTER (SERIES 1108A)	28480	05505-60034
A3C1	0140-0146	1	CAPACITOR-FXD 82PF +-5% 300VDC	72136	DM15E820J0300WV1CR
A3Q1	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02037	2N2222
A3Q13	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02037	2N2222
A3R1	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A3R2	0757-0901		RESISTOR 110 2% .125W F TC=0+-100	03298	C4-1/8-T0-111-G
A3R3	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A3R4	0757-0901		RESISTOR 110 2% .125W F TC=0+-100	03298	C4-1/8-T0-111-G
A3R5	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A3R6	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A3R7	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A3R8	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A3R9	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A3R10	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1001-G
A3U1	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U2	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U3	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U4	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U5	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U6	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U7	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U8	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U9	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U10	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A3U11	1820-0376	1	IC BFR TTL H NAND DUAL 4-INP	02237	74H40PC
A3U12	1820-0366	12	IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U13	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U14	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U15	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U16	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U17	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U18	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U19	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U20	1820-0424	2	IC INV TTL H HEX 1-INP	02237	74H04PC
A3U21	1820-0371	1	IC GATE TTL H NAND TPL 3-INP	02237	74H10PC
A3U22	1820-0328		IC GATE TTL NOR QUAD 2-INP	02237	7402PC
A3U23	1820-0301	11	IC LCH TTL D-TYPE 4-BIT	02237	7475PC
A3U24	1820-0424		IC INV TTL H HEX 1-INP	02237	74H04PC
A3U25	1820-0378	1	IC GATE TTL H AND-OR-INV DUAL 2-INP	02237	74H51PC
A3U26	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U27	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U28	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U29	1820-0366		IC SHF-RGTR TTL R-S PRL-IN SERIAL OUT	0169H	SN7494N
A3U30	1820-0372	1	IC GATE TTL H AND TPL 3-INP	02237	74H11PC
A3U31	1820-0387	1	IC FF TTL H J-K M/S PULSE PRESET/CLEAR	0169H	SN74H72N
A4			SAME AS A3, USE PREFIX A4		
A5	05505-60005	1	BOARD ASSEMBLY, ADDER	28480	05505-60005
A5R1	0698-4254	25	RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A5R2	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A5R3	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A5R4	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A5R5	0698-4278	88	RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A5U1	1820-0063	11	IC GATE TTL AND-OR-INV DUAL 2-INP	02237	7451PC
A5U2	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02237	7451PC
A5U3	1820-0328		IC GATE TTL NOR QUAD 2-INP	02237	7402PC
A5U4	1820-0054		IC GATE TTL NAND QUAD 2-INP	02237	7400PC
A5U5	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02237	7451PC
A5U6	1820-0174	11	IC INV TTL HEX 1-INP	02237	7404PC
A5U7	1820-0068		IC GATE TTL NAND TPL 3-INP	02237	7410PC
A5U8	1820-0068		IC GATE TTL NAND TPL 3-INP	02237	7410PC
A5U9	1820-0068		IC GATE TTL NAND TPL 3-INP	02237	7410PC
A5U10	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02237	7451PC
A5U11	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02237	7451PC
A5U12	1820-0328		IC GATE TTL NOR QUAD 2-INP	02237	7402PC
A5U13	1820-0305	2	IC ADDR TTL FULL ADDER 4-BIT	0169H	SN7483AN
A5U14	1820-0076	2	IC FF TTL J-K PULSE PRESET/CLEAR DUAL	02237	7476PC
A5U15	1820-0174		IC INV TTL HEX 1-INP	02237	7404PC

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5U16	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A5U17	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A5U18	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A5U19	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A5U20	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A5U21	1820-0305		IC ADDR TTL FULL ADDER 4-BIT	0160H	SN7483AN
A5U22	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A5U23	1820-0099	3	IC CNTR TTL BIN ASYNCHRO NEG-EDGE-TRIG	0340F	DM7493N
A5U24	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A5U25	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A6	05505-60006	1	BOARD ASSEMBLY, ALGORITHM	28480	05505-60006
A6U1	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02230	7451PC
A6U2	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A6U3	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A6U4	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A6U5	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A6U6	1820-0068		IC GATE TTL NAND TPL 3-INP	02230	7410PC
A6U7	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A6U8	1820-0304	5	IC FF TTL J-K M/S PULSE PRESET/CLEAR	02030	MC7472P
A6U9	1820-0304		IC FF TTL J-K M/S PULSE PRESET/CLEAR	02030	MC7472P
A6U10	1820-0304		IC FF TTL J-K M/S PULSE PRESET/CLEAR	02030	MC7472P
A6U11	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A6U12	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A6U13	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A6U14	1820-0075	5	IC FF TTL J-K PULSE CLEAR DUAL	02230	7473PC
A6U15	1820-0174		IC INV TTL HEX 1-INP	02230	7404PC
A6U16	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A6U17	1820-0074	3	IC GATE TTL AND-OR-INV 2-INP	02230	7454PC
A6U18	1820-0074		IC GATE TTL AND-OR-INV 2-INP	02230	7454PC
A6U19	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A6U20	1820-0068		IC GATE TTL NAND TPL 3-INP	02230	7410PC
A6U21	1820-0301		IC LCH TTL D-TYPE 4-BIT	02230	7475PC
A6U22	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A6U23	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02230	7451PC
A7	05505-60007	1	BOARD ASSEMBLY, PROGRAM	28480	05505-60007
A7Q1	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02030	2N2222
A7Q2	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02030	2N2222
A7Q3	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02030	2N2222
A7R1	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A7R2	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R3	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R4	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R5	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R6	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R7	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R8	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R9	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R10	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R11	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R12	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R13	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R14	0698-4239	1	RESISTOR 220 5% .125W F TC=0+-100	03298	C4-1/8-T0-220R-J
A7R15	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R16	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A7R17	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A7R19	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7R20	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A7U1	1820-0075		IC FF TTL J-K PULSE CLEAR DUAL	02230	7473PC
A7U2	1820-0304		IC FF TTL J-K M/S PULSE PRESET/CLEAR	02030	MC7472P
A7U3	1820-0075		IC FF TTL J-K PULSE CLEAR DUAL	02230	7473PC
A7U4	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A7U5	1820-0099		IC CNTR TTL BIN ASYNCHRO NEG-EDGE-TRIG	0340F	DM7493N
A7U6	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A7U7	1820-0214	5	IC DCDR TTL BCD-TO-DEC 4-TO-10-LINE	0340F	DM7442N
A7U8	1820-0214		IC DCDR TTL BCD-TO-DEC 4-TO-10-LINE	0340F	DM7442N
A7U9	1820-0214		IC DCDR TTL BCD-TO-DEC 4-TO-10-LINE	0340F	DM7442N
A7U10	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02230	7451PC
A7U11	1820-0099		IC CNTR TTL BIN ASYNCHRO NEG-EDGE-TRIG	0340F	DM7493N
A7U12	1820-0174		IC INV TTL HEX 1-INP	02230	7404PC
A7U13	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A7U14	1820-0174		IC INV TTL HEX 1-INP	02230	7404PC
A7U15	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7U16	1820-0070	6	IC GATE TTL NAND 8-INP	02233	7430PC
A7U17	1820-0069	12	IC GATE TTL NAND DUAL 4-INP	02233	7420PC
A7U18	1820-0054		IC GATE TTL NAND QUAD 2-INP	02233	7400PC
A7U19	1820-0054		IC GATE TTL NAND QUAD 2-INP	02233	7400PC
A7U20	1820-0068		IC GATE TTL NAND TPL 3-INP	02233	7410PC
A7U21	1820-0269		IC GATE TTL NAND QUAD 2-INP	02233	7403PC
A7U22	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02233	7451PC
A7U23	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02233	7451PC
A7U24	1820-0328		IC GATE TTL NOR QUAD 2-INP	02233	7402PC
A7U25	1820-0070		IC GATE TTL NAND 8-INP	02233	7430PC
A7U26	1820-0070		IC GATE TTL NAND 8-INP	02233	7430PC
A7U27	1820-0070		IC GATE TTL NAND 8-INP	02233	7430PC
A8	05505-80058	1	BOARD ASSEMBLY, FUNCTION	28480	05505-80058
A8Q1	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02033	2N2222
A8Q2	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02033	2N2222
A8Q3	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02033	2N2222
A8Q4	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02033	2N2222
A8Q5	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02033	2N2222
A8Q6	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	02033	2N2222
A8R1	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R2	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R3	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R4	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R5	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R6	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R7	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R8	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R9	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R10	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R11	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R12	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R13	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R14	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R15	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R16	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R17	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R18	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R19	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R20	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R21	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R22	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R23	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R24	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R25	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R26	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R27	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R28	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R29	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R30	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R31	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R32	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R33	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R34	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R35	0698-4261	3	RESISTOR 2K 5% .125W F TC=0+-100	03298	C4-1/8-T0-2001-J
A8R36	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R37			NOT ASSIGNED		
A8R38	0698-4261		RESISTOR 2K 5% .125W F TC=0+-100	03298	C4-1/8-T0-2001-J
A8R39	0698-4261		RESISTOR 2K 5% .125W F TC=0+-100	03298	C4-1/8-T0-2001-J
A8R40	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R41	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R42	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R43	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R44	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R45	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R46	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R47	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A8R48	0698-4246	6	RESISTOR 470 5% .125W F TC=0+-100	03298	C4-1/8-T0-470R-J
A8R49	0698-4246		RESISTOR 470 5% .125W F TC=0+-100	03298	C4-1/8-T0-470R-J
A8R50	0698-4246		RESISTOR 470 5% .125W F TC=0+-100	03298	C4-1/8-T0-470R-J
A8R51	0698-4246		RESISTOR 470 5% .125W F TC=0+-100	03298	C4-1/8-T0-470R-J
A8R52	0698-4246		RESISTOR 470 5% .125W F TC=0+-100	03298	C4-1/8-T0-470R-J
A8R53	0698-4246		RESISTOR 470 5% .125W F TC=0+-100	03298	C4-1/8-T0-470R-J
A8R54	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8R55	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8R56	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A8U1	1820-0412	2	IC DIVR TTL DECD	28480	1820-0412
A8U2	1820-0412		IC DIVR TTL DECD	28480	1820-0412
A8U3	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A8U4	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A8U5	1820-0075		IC FF TTL J-K PULSE CLEAR DUAL	02230	7473PC
A8U6	1820-0076		IC FF TTL J-K PULSE PRESET/CLEAR DUAL	02230	7476PC
A8U7	1820-0063		IC GATE TTL AND-OR-INV DUAL 2-INP	02230	7451PC
A8U8	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A8U9	1820-0413		IC DIVR TTL DECD	28480	1820-0413
A8U10	1820-0413		IC DIVR TTL DECD	28480	1820-0413
A8U11	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A8U12	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A8U13	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A8U14	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A8U15	1820-0075		IC FF TTL J-K PULSE CLEAR DUAL	02230	7473PC
A8U16	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A8U17	1820-0214		IC DCDR TTL BCD-TO-DEC 4-TO-10-LINE	0340F	DM7442N
A8U18	1820-0070		IC GATE TTL NAND 8-INP	02230	7430PC
A8U19	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A8U20	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A8U21	1820-0174		IC INV TTL HEX 1-INP	02230	7404PC
A8U22	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A8U23	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A8U24	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A8U25	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A8U26	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A8U27	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A8U28	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A9	05505-60049	1	BOARD ASSEMBLY, MULTIPLIER	28480	05505-60049
A9R1	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R2	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R3	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R4	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R5	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R6	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R7	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R8	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R9	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R10	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R11	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R12	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R13	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R14	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R15	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R16	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R17	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R18	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R19	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R20	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R21	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R22	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R23	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R24	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A9R25	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A9R26	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A9R27	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A9R28	0698-4254		RESISTOR 1K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1001-J
A9U1	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A9U2	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A9U3	1820-0054		IC GATE TTL NAND QUAD 2-INP	02230	7400PC
A9U4	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A9U5	1820-0070		IC GATE TTL NAND 8-INP	02230	7430PC
A9U6	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A9U7	1820-0069		IC GATE TTL NAND DUAL 4-INP	02230	7420PC
A9U8	1820-0214		IC DCDR TTL BCD-TO-DEC 4-TO-10-LINE	0340F	DM7442N
A9U9	1820-0174		IC INV TTL HEX 1-INP	02230	7404PC
A9U10	1820-0328		IC GATE TTL NOR QUAD 2-INP	02230	7402PC
A9U11	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A9U12	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A9U13	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A9U14	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC
A9U15	1820-0269		IC GATE TTL NAND QUAD 2-INP	02230	7403PC

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9U16	1820-0055		IC CNTR TTL DECD SYNCHRO POS-EDGE-TRIG	0340F	DM7490AN
A9U17	1820-0328		IC GATE TTL NOR QUAD 2-INP	0223G	7402PC
A9U18	1820-0328		IC GATE TTL NOR QUAD 2-INP	0223G	7402PC
A9U19	1820-0069		IC GATE TTL NAND DUAL 4-INP	0223G	7420PC
A9U20	1820-0069		IC GATE TTL NAND DUAL 4-INP	0223G	7420PC
A9U21	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A9U22	1820-0074		IC GATE TTL AND-OR-INV 2-INP	0223G	7454PC
A9U23	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A9U24	1820-0209	1	IC CNTR TTL BIN 4-BIT	28480	1820-0209
A9U25	1820-0328		IC GATE TTL NOR QUAD 2-INP	0223G	7402PC
A10	05505-60010	1	BOARD ASSEMBLY, "D" REGISTER	28480	05505-60010
A10R1	0683-1035	2	RESISTOR 10K 5% .25W FC TC=-400/+700	0160G	CB1035
A10U1	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U2	1820-0069		IC GATE TTL NAND DUAL 4-INP	0223G	7420PC
A10U3	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U4	1820-0539	1	IC BFR TTL NAND QUAD 2-INP	0169H	SN7437N
A10U5	1820-0599	16	IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U6	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U7	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U8	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U9	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U10	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U11	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U11	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U12	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U12	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U13	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U13	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U14	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U14	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U15	1820-0174		IC INV TTL HEX 1-INP	0223G	7404PC
A10U19	1820-0174		IC INV TTL HEX 1-INP	0223G	7404PC
A10U16	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U17	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U18	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U19	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U20	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U21	1820-0069		IC GATE TTL NAND DUAL 4-INP	0223G	7420PC
A10U22	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U23	1820-0328		IC GATE TTL NOR QUAD 2-INP	0223G	7402PC
A10U24	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U25	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U26	1820-0599		IC SHF-RGTR TTL L R=8 PRL-IN PRL OUT	0340F	DM74L95N
A10U27	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U28	1820-0054		IC GATE TTL NAND QUAD 2-INP	0223G	7400PC
A10U29	1820-0174		IC INV TTL HEX 1-INP	0223G	7404PC
A10U30	1820-0304		IC FF TTL J-K M/S PULSE PRESET/CLEAR	0203G	MC7472P
A10U31	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U32	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U33	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U34	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U35	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U36	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U37	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U38	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U39	1820-0301		IC LCH TTL D-TYPE 4-BIT	0223G	7475PC
A10U40	1820-0174		IC INV TTL HEX 1-INP	0223G	7404PC
A10XA11	1250-2428	1	CONNECTOR:PC BOARD	28480	1250-2428
A11	05505-60011	1	BOARD ASSEMBLY, DISPLAY	28480	05505-60011
A11D81	1970-0035	8	TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766	9	SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11D82	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11D83	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11D84	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11D85	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11D86	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A11DS7	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11DS8	1970-0035		TUBE-ELECTRON IND-ALPHANUMERIC	28480	1970-0035
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11DS9	1970-0047	1	TUBE-ELECTRON IND-ALPHA	0512D	BS442A
	1200-0766		SOCKET-TUBE 14-CONT NIXIE DIP-SLDR	0512D	SK196
A11Q1	1854-0365	6	TRANSISTOR NPN SI PD=310MW FT=60MHZ	0223G	833307
A11Q2	1854-0365		TRANSISTOR NPN SI PD=310MW FT=60MHZ	0223G	833307
A11Q3	1854-0365		TRANSISTOR NPN SI PD=310MW FT=60MHZ	0223G	833307
A11Q4	1854-0365		TRANSISTOR NPN SI PD=310MW FT=60MHZ	0223G	833307
A11Q5	1854-0365		TRANSISTOR NPN SI PD=310MW FT=60MHZ	0223G	833307
A11Q6			NOT ASSIGNED		
A11Q7			NOT ASSIGNED		
A11Q8			NOT ASSIGNED		
A11Q9	1854-0365		TRANSISTOR NPN SI PD=310MW FT=60MHZ	02228	833307
A11R1	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R2	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R3	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R4	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R5	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R6	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R7	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R8	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R9	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R10	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R11	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R12	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R13			NOT ASSIGNED		
A11R14			NOT ASSIGNED		
A11R15	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R16			NOT ASSIGNED		
A11R17			NOT ASSIGNED		
A11R18	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R19			NOT ASSIGNED		
A11R20			NOT ASSIGNED		
A11R21	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11R22	0698-4278		RESISTOR 10K 5% .125W F TC=0+-100	03298	C4-1/8-T0-1002-J
A11U1	1820-0092	9	IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U2	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U3	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U4	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U5	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U6	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U7	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A11U8	1820-0092		IC DCDR TTL= BCD-TO-DEC 4-TO-10-LINE	28480	1820-0092
A12	05505-60012	1	BOARD ASSEMBLY, POWER SUPPLY	28480	05505-60012
A12C1	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A12C2	0160-3060		CAPACITOR-FXD .1UF +-20% 25VDC CER	28480	0160-3060
A12C3	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C4	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C5	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C6	0180-0101	1	CAPACITOR-FXD 1.8UF+-10% 35VDC TA	0420J	150D185X9035B2
A12C7	0180-0374	2	CAPACITOR-FXD 10UF+-10% 20VDC TA	0420J	150D106X9020B2
A12C8	0180-0098	2	CAPACITOR-FXD 100UF+-20% 20VDC TA	0420J	150D107X0020B2
A12C9	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	0420J	150D106X9020B2
A12C10	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	0420J	150D226X9015B2
A12C11	0180-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	0420J	150D107X0020B2
A12C12	0180-0138	1	CAPACITOR-FXD 100UF+100-10% 40VDC AL	28480	0180-0138
A12C13	0180-0210		CAPACITOR-FXD 3.3UF+-20% 15VDC TA	0420J	150D335X0015A2
A12C14-		1			
A12C99			NOT ASSIGNED		
A12C100	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C101	0180-0230	2	CAPACITOR-FXD 1UF+-20% 50VDC TA	0420J	150D105X0050A2
A12C102			NOT ASSIGNED		
A12C103	0180-1714	2	CAPACITOR-FXD 330UF+-10% 6VDC TA	0420J	150D337X9006B2
A12C104	0160-0128	2	CAPACITOR-FXD 2.2UF +-20% 50VDC CER	28480	0160-0128
A12C105	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C106	0160-0128		CAPACITOR-FXD 2.2UF +-20% 50VDC CER	28480	0160-0128
A12C107	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C108	0180-0379	1	CAPACITOR-FXD 5UF+50-10% 350VDC AL	0420J	34D505F350EJ4
A12C109	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204
A12C110	0160-2204		CAPACITOR-FXD 100PF +-5% 300VDC MICA0+70	28480	0160-2204

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12CR1	1901-0418	4	DIODE-PWR RECT 400V 1.5A	0203G	BR1846-12
A12CR2	1901-0418		DIODE-PWR RECT 400V 1.5A	0203G	BR1846-12
A12CR3	1901-0418		DIODE-PWR RECT 400V 1.5A	0203G	BR1846-12
A12CR4	1901-0418		DIODE-PWR RECT 400V 1.5A	0203G	BR1846-12
A12CR5	1902-3214	2	DIODE-ZNR 16.2V 2% DO-7 PD=.4W TC=+.066%	0223G	FZ7480
A12CR6	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	0223G	FZ7240
A12CR7	1902-3214		DIODE-ZNR 16.2V 2% DO-7 PD=.4W TC=+.066%	0223G	FZ7480
A12CR8	1902-3082	1	DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC= 023%↑	02763	CD 35610
A12CR9	1884-0018	2	THYRISTOR-SCR 2N4186 VRRM=200	0203G	2N4186
A12CR10	1884-0018		THYRISTOR-SCR 2N4186 VRRM=200	0203G	2N4186
A12CR11-A12CR100			NOT ASSIGNED		
A12CR101	1902-3070	1	DIODE-ZNR 4.22V 5% DO-7 PD=.4W TC=-.038%	0203G	BZ 10939-74
A12CR102	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR103	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR104	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR105	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR106	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR107	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR108	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR109	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR110	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR111	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR112	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR113	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR114	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR115	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR116	1902-0175	1	DIODE-ZNR 100V 5% DO-15 PD=1W TC=+.083%	0203G	BZ-11213-428
A12CR117	1901-0036	4	DIODE-HV RECT 1KV 600MA DO-29	0271C	MP496
A12CR118	1901-0036		DIODE-HV RECT 1KV 600MA DO-29	0271C	MP496
A12CR119	1901-0036		DIODE-HV RECT 1KV 600MA DO-29	0271C	MP496
A12CR120	1901-0036		DIODE-HV RECT 1KV 600MA DO-29	0271C	MP496
A12CR121	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR122	1901-0040		DIODE-SWITCHING 30V 50MA 2N8 DO-35	28480	1901-0040
A12CR123	1902-0067	1	DIODE-ZNR 11.5V 5% DO-7 PD=.4W TC=+.063%	0223G	FZ7266
A12CR124			NOT ASSIGNED		
A12CR125	1902-3182	1	DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	0223G	FZ7268
A12Q1	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q2	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q3	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q4	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q5	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q6	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q7-A12Q99			NOT ASSIGNED		
A12Q100	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A12Q101	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q102	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q103	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q104	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q105	1855-0020	4	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A12Q106	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q107	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A12Q108	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q109	1853-0012		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW	0169H	2N2904A
A12Q110	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A12Q111	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A12Q112	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A12Q113	1853-0010		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0010
A12Q114	1854-0232	1	TRANSISTOR NPN SI TO-39 PD=1W FT=15MHZ	28480	1854-0232
A12Q115	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A12Q116	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A12Q117	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A12R1	0757-0420	2	RESISTOR 750 1% .125W F TC=0+-100	03298	C4-1/8-T0-751-F
A12R2	2100-1757	2	RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN	0374D	3345W-W50-501
A12R3	0698-0084	2	RESISTOR 2.15K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2151-F
A12R4	0757-0428	2	RESISTOR 1.62K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1621-F
A12R5	0757-0939	1	RESISTOR 4.3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4301-G
A12R6	2100-1757		RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN	0374D	3345W-W50-501
A12R7	0757-0274	3	RESISTOR 1.21K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1213-F
A12R8	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A12R9	0757-0401	5	RESISTOR 100 1% .125W F TC=0+-100	03298	C4-1/8-T0-101-F
A12R10	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1621-F

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12R11	0757-0936	2	RESISTOR 3.3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3301-G
A12R12	2100-1758	1	RESISTOR-TRMR 1K 5% WW SIDE-ADJ 1-TRN	03740	3345W-W50-102
A12R13	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	03298	C4-1/8-T0-751-F
A12R14	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A12R15	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A12R16	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A12R17	0758-0015	2	RESISTOR 220 5% .25W F TC=0+-100	03418	CB-1/4-T0-221-J
A12R18	0757-0442	12	RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R19	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A12R20	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1213-F
A12R21	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	03298	C4-1/8-T0-101-F
A12R22	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	03298	C4-1/8-T0-101-F
A12R23	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2151-F
A12R24	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	03298	C4-1/8-T0-101-F
A12R25	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A12R26	0757-0938	2	RESISTOR 3.9K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3901-G
A12R27	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A12R28	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A12R29			NOT ASSIGNED		
A12R30	0811-1661	2	RESISTOR .39 5% 2W PW TC=0+-800	04678	BWH2-39/100-J
A12R31	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	03298	C4-1/8-T0-101-F
A12R32	0757-0394	1	RESISTOR 51.1 1% .125W F TC=0+-100	03298	C4-1/8-T0-51R1-F
A12R33	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1213-F
A12R34	0811-1661		RESISTOR .39 5% 2W PW TC=0+-800	04678	BWH2-39/100-J
A12R35					
A12R99			NOT ASSIGNED		
A12R100	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A12R101	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R102	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R103	0757-0938		RESISTOR 3.9K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3901-G
A12R104	0757-0948		RESISTOR 6.8K 2% .125W F TC=0+-100	03298	C4-1/8-T0-6801-G
A12R105	0757-0407	1	RESISTOR 200 1% .125W F TC=0+-100	03298	C4-1/8-T0-201-F
A12R106	0757-0953	1	RESISTOR 16K 2% .125W F TC=0+-100	03298	C4-1/8-T0-1602-G
A12R107	0757-0283	5	RESISTOR 2K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2001-F
A12R108	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R109	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2001-F
A12R110	0757-0962	1	RESISTOR 39K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3902-G
A12R111	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R112	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R113			NOT ASSIGNED		
A12R114			NOT ASSIGNED		
A12R115			NOT ASSIGNED		
A12R116			NOT ASSIGNED		
A12R117			NOT ASSIGNED		
A12R118	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R119	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R120	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A12R121	0757-0443	1	RESISTOR 11K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1102-F
A12R122	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2001-F
A12R123	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2001-F
A12R124	0757-0935		RESISTOR 3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3001-G
A12R125	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R126	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1001-F
A12R127	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R128	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R129	0757-0482	3	RESISTOR 511K 1% .125W F TC=0+-100	0552D	CMF-55-1
A12R130	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R131	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R132	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R133	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R134	0757-0482		RESISTOR 511K 1% .125W F TC=0+-100	0552D	CMF-55-1
A12R135	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R136	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R137	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R138	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R139	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R140	0757-0936		RESISTOR 3.3K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3301-G
A12R141	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R142	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2001-F
A12R143	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R144	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A12R145	0757-0940		RESISTOR 4.7K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4701-G
A12R146	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R147	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R148	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R149	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12R130	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12R131	0757-0969	1	RESISTOR 75K 2% .125W F TC=0+-100	03298	C4-1/8-T0-7502-G
A12R132	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R133	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R134	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R135	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R136	0758-0050	1	RESISTOR 39K 5% .25W F TC=0+-100	03418	C5-1/4-T0-3902-J
A12R137	0683-1505	1	RESISTOR 15 5% .25W FC TC=-400/+500	0160G	CB1505
A12R138	0757-0462	1	RESISTOR 75K 1% .125W F TC=0+-100	03298	C4-1/8-T0-7502-F
A12R139	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R140	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1003-F
A12R141	0758-0101	1	RESISTOR 150K 5% .25W F TC=0+-100	03418	C5-1/4-T0-1503-J
A12R142	0683-1055	2	RESISTOR 1M 5% .25W FC TC=-800/+900	0160G	CB1055
A12R143	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	0160G	CB1055
A12R144	0757-0959	1	RESISTOR 30K 2% .125W F TC=0+-100	03298	C4-1/8-T0-3002-G
A12R145	0757-0482		RESISTOR 511K 1% .125W F TC=0+-100	05520	CMF-55-1
A12R146	0757-0472	1	RESISTOR 200K 1% .125W F TC=0+-100	03298	C4-1/8-T0-2003-F
A12R147	0757-0964		RESISTOR 47K 2% .125W F TC=0+-100	03298	C4-1/8-T0-4702-G
A12R148	0757-0931		RESISTOR 2K 2% .125W F TC=0+-100	03298	C4-1/8-T0-2001-G
A12R149	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	03298	C4-1/8-T0-1002-F
A12U1	1820-0196	3	IC 723 V RGLTR	0223G	723MC
A12U2	1820-0196		IC 723 V RGLTR	0223G	723MC
A12U3	1820-0196		IC 723 V RGLTR	0223G	723MC
A12U4			NOT ASSIGNED		
A12U5	1820-0587	1	IC GATE TTL L NAND TPL 3-INP	0340F	DM74L10N
A12U6	1820-0478	1	IC 308 OP AMP	0379D	LM308
A12U7	1820-0223	6	IC 301 OP AMP	0379D	LM301A
A12U8	1820-0223		IC 301 OP AMP	0379D	LM301A
A12U9	1820-0223		IC 301 OP AMP	0379D	LM301A
A12U10	1820-0223		IC 301 OP AMP	0379D	LM301A
A12U11	1820-0223		IC 301 OP AMP	0379D	LM301A
A12U12	1820-0223		IC 301 OP AMP	0379D	LM301A
A13	05505-60013	1	BOARD ASSEMBLY, ANNUNCIATOR	28480	05505-60013
A13C1	0180-1714		CAPACITOR-FXD 330UF+-10% 6VDC TA	0420J	1500337X900682
A13DS1	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
A13DS2	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
A13DS3	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
A13DS4	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
A13DS5	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
A13Q1	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13Q2	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13Q3	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13Q4	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13Q5	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13Q6	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13Q7	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	0203G	2N2222
A13R1	0683-0565	2	RESISTOR 5.6 5% .25W FC TC=-400/+500	0160G	CB56G5
A13R2	0683-0565		RESISTOR 5.6 5% .25W FC TC=-400/+500	0160G	CB56G5
A13R3	0683-0335	2	RESISTOR 3.3 5% .25W FC TC=-400/+500	0160G	CB33G5
A13R4	0683-0335		RESISTOR 3.3 5% .25W FC TC=-400/+500	0160G	CB33G5

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			CHASSIS & MISCELLANEOUS PARTS		
B1	3160-0088	1	FAN-TBAX 35-CFM 115V 50/60-HZ 1.665-THK	28480	3160-0088
	3150-0037	1	FILTER-AIR EXP-AL 3.875-WD 4.5-LG	28480	3150-0037
	3150-0212	1	FILTER-AIR 20 PORES/IN FOAM 3.75-WD	28480	3150-0212
C1	0180-1968	1	CAPACITOR-FXD .018UF+75-10% 15VDC AL	28480	0180-1968
	0180-0078	1	CLAMP-CAP 2.062-DIA STL	0420J	4586-28
C2	0180-2197	2	CAPACITOR-FXD 4000UF+75-10% 30VDC AL	0420J	36D402G030AB2C
	1210-0013	2	CLAMP-CAP 1.375-DIA STL	0420J	4586-97A
C3	0180-2197		CAPACITOR-FXD 4000UF+75-10% 30VDC AL	0420J	36D402G030AB2C
	1210-0013		CLAMP-CAP 1.375-DIA STL	0420J	4586-97A
C4	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	0420J	150D606X0006B2
C5	0180-0159	1	CAPACITOR-FXD 220UF+-20% 10VDC TA	0420J	150D227X0010B2
C6	0150-0012	1	CAPACITOR-FXD .01UF +-20% 1KVDC CER	0420J	C023A102J103M838
C7	0160-0161	3	CAPACITOR-FXD .01UF +-10% 200VDC POLYE	0420J	292P10392
C8	0160-0161		CAPACITOR-FXD .01UF +-10% 200VDC POLYE	0420J	292P10392
C9	0180-0230		CAPACITOR-FXD 1UF+-20% 50VDC TA	0420J	150D105X0050A2
C10	0160-0161		CAPACITOR-FXD .01UF +-10% 200VDC POLYE	0420J	292P10392
C11	0160-4439	2	CAPACITOR-FXD 4700PF +-20% 250VAC(RMS)	28480	0160-4439
C12	0160-4439	2	CAPACITOR-FXD 4700PF +-20% 250VAC(RMS)	28480	0160-4439
CR1	1901-0496	2	DIODE-PWR RECT 100V 12A DO-4	0203G	MR1121
	1200-0080	3	INSULATOR-DIO ALUMINUM MO-ANDZ	28480	1200-0080
CR2	1901-0496		DIODE-PWR RECT 100V 12A DO-4	0203G	MR1121
	1200-0080		INSULATOR-DIO ALUMINUM MO-ANDZ	28480	1200-0080
CR3	1884-0005	1	THYRISTOR-SCR VRRM-50	0203G	MCR649P-2
	1200-0043	2	INSULATOR-XSTR ALUMINUM	0473G	322047
	1200-0456	5	SOCKET-XSTR 2-CONT TO-3	91833	4602
CR4	1901-0049	1	DIODE-PWR RECT 50V 750MA DO-29	0271C	MP498
F1	2110-0015	1	FUSE 2.5A 250V SLO-BLO 1.25X.25 UL	0448J	MDX 2-1/2
	2110-0043	1	FUSE 1.5A 250V FAST-BLO 1.25X.25 UL IEC	0470C	31201.5
F2	2110-0051	1	FUSE 10A 250V MDM-BLO 1.25X.25 UL IEC	0470C	314010
	1400-0008	3	FUSEHOLDER-BLOCK 15A 250V 1-FU	28480	1400-0008
F3	2110-0003	2	FUSE 3A 250V FAST-BLO 1.25X.25 UL IEC	0470C	312003.
	1400-0008		FUSEHOLDER-BLOCK 15A 250V 1-FU	28480	1400-0008
F4	2110-0003		FUSE 3A 250V FAST-BLO 1.25X.25 UL IEC	0470C	312003.
	1400-0008		FUSEHOLDER-BLOCK 15A 250V 1-FU	28480	1400-0008
J1			NOT ASSIGNED		
J2			NOT ASSIGNED		
J3			NOT ASSIGNED		
J4			NOT ASSIGNED		
J5	1250-0083		CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	0331F	28JR-130-1
J6	1250-0083		CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	0331F	28JR-130-1
J7	1510-0037	1	BINDING POST SGL THD-8TUD BLU	28480	1510-0037
	0340-0099	1	INSULATOR-BDG POST ABS	28480	0340-0099
	0340-0100	1	INSULATOR-BDG POST ABS	28480	0340-0100
J8	0960-0444	1	POWER MODULE-UNFILTERED	28480	0960-0444
	1250-0083	9	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	0331F	28JR-130-1
	1250-0083		CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	0331F	28JR-130-1
K1	0490-0859	1	RELAY 2C 24VDC-COIL 2A 120VAC	28480	0490-0859
L1	9140-0137	1	COIL-MLD 1MH 5% Q-60 .19DX.44LG SRF-3MHZ	02178	19-1331-35J
M1	1120-0140	1	METER10-1 DC MA	28480	1120-0140
M2	1120-1524	1	METER10-1 MA	28480	1120-1524
MP1	2950-0054	1	NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK	28480	2950-0054
Q1	1854-0222	1	TRANSISTOR NPN SI TO-66 PD-15W FT-10MHZ	0203G	MD2252
	1200-0456		SOCKET-XSTR 2-CONT TO-3	91833	4602
	0340-0140	3	INSULATOR-XSTR ALUMINUM	28480	0340-0140
Q2	1854-0072	2	TRANSISTOR NPN 2N3054 SI TO-66 PD-25W	0192A	2N3054
	1200-0456		SOCKET-XSTR 2-CONT TO-3	91833	4602
	0340-0140		INSULATOR-XSTR ALUMINUM	28480	0340-0140
Q3	1854-0072		TRANSISTOR NPN 2N3054 SI TO-66 PD-25W	0192A	2N3054
	1200-0456		SOCKET-XSTR 2-CONT TO-3	91833	4602
	0340-0140		INSULATOR-XSTR ALUMINUM	28480	0340-0140
Q4	1854-0063	4	TRANSISTOR NPN 2N3055 SI TO-3 PD-115W	28480	1854-0063
	1200-0456		SOCKET-XSTR 2-CONT TO-3	91833	4602
	1200-0457	1	SOCKET-XSTR 2-CONT TO-66	91833	4611
	1200-0077	4	INSULATOR;TRANSISTOR, MICA	1603G	#112
	1200-0080		INSULATOR-DIO ALUMINUM MO-ANDZ	28480	1200-0080
	1200-0043		INSULATOR-XSTR ALUMINUM	0473G	322047
Q5			NOT ASSIGNED		
Q6	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD-115W	28480	1854-0063
	1200-0044	3	SOCKET-XSTR 2-CONT TO-3	97913	L8T1502-3
	1200-0077		INSULATOR;TRANSISTOR, MICA	1603G	#112
Q7	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD-115W	28480	1854-0063
	1200-0044		SOCKET-XSTR 2-CONT TO-3	97913	L8T1502-3
	1200-0077		INSULATOR;TRANSISTOR, MICA	1603G	#112

See introduction to this section for ordering information

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
Q8	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0063
	1200-0044		SOCKET-XSTR 2-CONT TO-3	97913	LST1502-3
	1200-0077		INSULATOR:TRANSISTOR, MICA	16039	#112
R1	0758-0024	2	RESISTOR 100 5% .25W F TC=0+-100	03418	C5-1/4-T0-101-J
R2	0811-2864	1	RESISTOR .07 3% 12W PW TC=0+-90	05520	RH-10
R3	0758-0015		RESISTOR 220 5% .25W F TC=0+-100	03418	C5-1/4-T0-221-J
R4	0758-0024		RESISTOR 100 5% .25W F TC=0+-100	03418	C5-1/4-T0-101-J
R5	0683-1025	1	RESISTOR 1K 5% .25W FC TC=-400/+600	01607	CB1025
R6	0683-1035		RESISTOR 10K 5% .25W FC TC=-400/+700	01607	CB1035
S1	3101-1593	1	SWITCH-SL DPDT-NS MINTR 1A 125VAC	28480	3101-1593
S2	3101-1284	1	SWITCH-TGL SUBMIN DP3T NS 2A 250VAC	28480	3101-1284
S3	3101-1319	1	SWITCH-TGL SUBMIN SPDT NS 5A 115VAC	28480	3101-1319
S4	3100-2904	1	SWITCH:ROTARY	28480	3100-2904
	0370-1101	1	KNOB-BASE-PTR 1/2 OBP .125-IN-ID	28480	0370-1101
S5	3101-0163	1	SWITCH-TGL SUBMIN SPDT NS 5A 115VAC	02398	Z-11
S6	3101-0715	5	SWITCH-PB SPDT-DB MOM 2A 125VAC	28480	3101-0715
	0590-0765	5	NUT-KNRLD-R 1/4-40-THD .078-IN-THK	95146	MODEL N-1A
	2140-0039	10	LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
	3101-1317	5	LENS-CAP-PB TRL WHITE; .50-IN SQ; FOR	97564	C156 0A-WW-M1
S7	3101-0715		SWITCH-PB SPDT-DB MOM 2A 125VAC	28480	3101-0715
	0590-0765		NUT-KNRLD-R 1/4-40-THD .078-IN-THK	95146	MODEL N-1A
	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
	3101-1317		LENS-CAP-PB TRL WHITE; .50-IN SQ; FOR	97564	C156 0A-WW-M1
S8	3101-0715		SWITCH-PB SPDT-DB MOM 2A 125VAC	28480	3101-0715
	0590-0765		NUT-KNRLD-R 1/4-40-THD .078-IN-THK	95146	MODEL N-1A
	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
	3101-1317		LENS-CAP-PB TRL WHITE; .50-IN SQ; FOR	97564	C156 0A-WW-M1
S9	3101-1261	2	SWITCH-PB SPDT MOM 1A 115VAC	02398	P8121
	3101-0851	2	CAP-PB BLACK; .2-IN DIA; .155-IN L; FOR	28480	3101-0851
S10	3101-1261		SWITCH-PB SPDT MOM 1A 115VAC	02398	P8121
	3101-0851		CAP-PB BLACK; .2-IN DIA; .155-IN L; FOR	28480	3101-0851
S11	3101-0715		SWITCH-PB SPDT-DB MOM 2A 125VAC	28480	3101-0715
	0590-0765		NUT-KNRLD-R 1/4-40-THD .078-IN-THK	95146	MODEL N-1A
	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
	3101-1317		LENS-CAP-PB TRL WHITE; .50-IN SQ; FOR	97564	C156 0A-WW-M1
S12	3101-0715		SWITCH-PB SPDT-DB MOM 2A 125VAC	28480	3101-0715
	0590-0765		NUT-KNRLD-R 1/4-40-THD .078-IN-THK	95146	MODEL N-1A
	2140-0039		LAMP-INCAND 328 6VDC 200MA T-1-3/4-BULB	0000I	328
	3101-1317		LENS-CAP-PB TRL WHITE; .50-IN SQ; FOR	97564	C156 0A-WW-M1
S13	3101-0850	1	SWITCH-TGL SUBMIN SPDT NS 2A 250VAC/DC	02398	7107P
S14	3101-1541	1	SWITCH-SL DPDT-NS MINTR 1A 125VAC	28480	3101-1541
S15			NOT ASSIGNED (W6S15)		
T1	9100-3001	1	TRANSFORMER	28480	9100-3001
W1	05505-60014	1	CABLE ASSEMBLY, MAIN	28480	05505-60014
W2	05505-60015	1	CABLE, PANEL	28480	05505-60015
W3	05505-60016	1	CABLE, THUMBWHEEL	28480	05505-60016
	3100-2664	1	SWITCH, THUMBWHEEL (S10)	28480	3100-2664
W4	05505-60017	1	CABLE, AMP	28480	05505-60017
	1251-0087	1	CONNECTOR 50-PIN F MICRO RIBBON	0587I	57-40500-375
	1251-0292	1	CONNECTOR 24-PIN F MICRO RIBBON	0587I	57-40240
W5	05505-60045	1	CABLE, LASER	28480	05505-60045
	1251-2796	1	CONNECTOR 18-PIN F CIRC PT	77820	PT02A-14-18S(005)
W6	05505-60019	1	CABLE, AC LINE	28480	05505-60019
W6S15	3101-2269	1	SWITCH-TGL SUBMIN DPDT NS 2A 250VAC	28480	3101-2269
W7	05505-60020	1	CABLE ASSEMBLY (OPTION 010)	28480	05505-60020
W8	8120-1378	1	CABLE ASSY 18AWG 3-CNDCT JGK-JKT .25-OD	28480	8120-1378
XA1	1251-0233	2	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	04500	251-22-30-261
XA2	1251-0159	9	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA3	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA4	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA5	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA6	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA7	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA8	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA9	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA10	1251-0233		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	04500	251-22-30-261
XA11			NOT ASSIGNED		
XA12	1251-0159		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	04500	251-15-30-261
XA13			NOT ASSIGNED		
XA14	1251-2339	1	CONNECTOR-PC EDGE 26-CONT/ROW 2-ROWS	95238	600-121-26XA

Table 6-3. 5505A Laser Display Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			MISCELLANEOUS PARTS		
	1460-0034	1	SPRING-EXT .188-IN-OD MUW	28480	1460-0034
	05326-00008	1	INSULATOR	28480	05326-00008
	05505-00009	1	BRACKET, LEFT	28480	05505-00009
	05505-00010	1	BRACKET, RIGHT	28480	05505-00010
	05505-00012	1	BRACKET	28480	05505-00012
	05505-00013	1	PLATE	28480	05505-00013
	05505-00014	1	BRACKET	28480	05505-00014
	05505-00015	1	BRACKET	28480	05505-00015
	05505-00016	1	BRACKET, TRANSISTOR	28480	05505-00016
	05505-00018	1	LINK	28480	05505-00018
	05505-00019	1	LINK	28480	05505-00019
	05505-00020	1	SPACER	28480	05505-00020
	05505-00021	1	PLATE, MOUNTING, RELAY	28480	05505-00021
	5060-8737	1	HANDLE, RETAINER	28480	5060-8737
	05500-60025	1	INTERCONNECTING CABLE	28480	05500-60025
	05505-20021	1	HEAT SINK	28480	05505-20021
	05505-20022	1	ARM	28480	05505-20022
	05505-20023	1	DOOR	28480	05505-20023
	05505-20024	1	HINGE, STUD	28480	05505-20024
	05505-20025	1	BAR, SUPPORT	28480	05505-20025
	05505-20026	1	KNOB	28480	05505-20026
	05505-20027	1	SPACER	28480	05505-20027
	05505-20028	1	STUD	28480	05505-20028
	05505-20029	1	PIN	28480	05505-20029
	05505-20031	1	SUPPORT	28480	05505-20031
	5060-0222	1	HANDLE ASSEMBLY, SM SIDE	28480	5060-0222
	5060-0731	1	FRAME ASSY:5 X 11 FM	28480	5060-0731
	5060-0767	1	FOOT ASSY:FM	28480	5060-0767
	05505-00001	1	CHASSIS, MAIN	28480	05505-00001
	05505-00002	1	PANEL, REAR	28480	05505-00002
	05505-00003	1	PANEL, FRONT	28480	05505-00003
	05505-00004	1	TRIM, FRONT PANEL	28480	05505-00004
	05505-00005	1	COVER, TOP	28480	05505-00005
	05505-00006	1	COVER, BOTTOM	28480	05505-00006
	05505-00008	1	TRIM STRIP	28480	05505-00008
	05505-00022	1	LABEL, FRONT	28480	05505-00022
	05505-00023	1	LABEL	28480	05505-00023
	05505-00024	1	LABEL, FRONT PANEL DOOR (F)	28480	05505-00024
	05505-00032	1	LABEL, FRONT PANEL DOOR (C)	28480	05505-00032
	5000-8599	1	COVER, FRONT SIDE	28480	5000-8599
	5000-8597	1	COVER, REAR SIDE	28480	5000-8597
	05505-60048	1	KIT, RACK MOUNT	28480	05505-60048
	1490-0030	1	TILT STAND 3-IN-W 13.75-IN-LG SST	28480	1490-0030
	HP 11001A	3	CABLE ASSEMBLY, BNC TO DUAL BANANA (FOR OPTION 010 ONLY)	28480	HP 11001A
	~~0460-0778~~	~~1~~	~~FOAM-POLYESTER~~	~~28480~~	~~0460-0778~~
	~~05505-00034~~	~~1~~	~~SUPPORT-NIXIE~~	~~28480~~	~~05505-00034~~

See introduction to this section for ordering information

Table 6-4. 5500C and 5505A Manufacturers Code List

5500C

Mfr. No.	Manufacturer Name	Address	Zip Code
0138J	Amp Inc.	Harrisburg, PA	17101
0160G	Allen-Bradley Co.	Milwaukee, WI	53204
0169H	Texas Instruments, Inc., Semiconductor Component Div.	Dallas, TX	75231
0192A	RCA Corp., Solid State Division	Somerville, NJ	
0203G	Motorola Semiconductor Products	Phoenix, AZ	85008
06928	Teledyne Kinetics	Solana Beach, CA	92075
0223G	Fairchild Semiconductor Division	Mountain View, CA	94040
08555	William H. Brewster, Jr., Inc.	Fairfield, NJ	07006
0271C	General Instrument Corp., Semiconductor Prod. Group	Hicksville, NY	
0329B	Corning Glass Works (Bradford)	Bradford, PA	
0340F	National Semiconductor Corp.	Santa Clara, CA	
28480	Hewlett-Packard Company, Corporate Headquarters	Palo Alto, CA	94304
0420J	Sprague Electric Co.	North Adams, MA	01247
73138	Beckman Instruments, Inc., Helipot Division	Fullerton, CA	92634
0467B	TRW Inc., Philadelphia Division	Philadelphia, PA	
95760	Protective Closures Co., Inc.	Buffalo, NY	14207
8325I	No M/F description for this Mfg. Number		
9017I	No M/F description for this Mfg. Number		

Table 6-4 continued on next page.

Table 6-4. 5500C and 5505A Manufacturers Code List (continued)

5505A

Mfr. No.	Manufacturer Name	Address	Zip Code
0000I	GTE Sylvania Miniature Light Products	Hillsboro, NH	03244
0160G	Allen-Bradley Co.	Milwaukee, WI	53204
0169H	Texas Instruments Inc., Semiconductor Component Div.	Dallas, TX	75231
0192A	RCA Corp., Solid State Division	Somerville, NJ	08876
03888	KDI Pyrofilm Corp.	Whippany, NJ	07981
0203G	Motorola Semiconductor Products	Phoenix, AZ	85008
0217B	Airco Speer Elek Div Air Rdcn Co.	Nogales, AZ	
0223G	Fairchild Semiconductor Division	Mountain View, CA	94040
0239B	C and K Components, Inc.	Watertown, MA	
0271C	General Instrument Corp., Semiconductor Prod. Group	Hicksville, NY	
0299E	Mepco/Electra Corp.	Mineral Wells, TX	
0329B	Corning Glass Works (Bradford)	Bradford, PA	
0331F	Specialty Connector Co., Inc.	Indianapolis, IN	
0340F	National Semiconductor Corp.	Santa Clara, CA	
0341B	Corning Glass Works (Wilmington)	Wilmington, NC	
28480	Hewlett-Packard Company, Corporate Headquarters	Palo Alto, CA	94304
0374D	Bourns Inc., Trimpot Products Division	Riverside, CA	
0379D	Advanced Micro Devices, Inc.	Sunnyvale, CA	
0420J	Sprague Electric Co.	North Adams, MA	01247
0448J	Bussman Mfg., Division of McGraw-Edison Co.	St. Louis, MO	63017
0450G	TRW Electronic Components, Cinch Division	Elk Grove Village, IL	
72136	Electro Motive Corp., Sub IEC	Willimantic, CT	06226
73899	JFD Electronics Corp.	Brooklyn, NY	11219
0467B	TRW Inc., Philadelphia Division	Philadelphia, PA	
0470C	Littelfuse, Inc.	Des Plaines, IL	60016
0473G	TRW Electronic Components, Cinch-Monadnock Div.	City of Industry, CA	
77820	Bendix Corp., Electronic Component Division	Sidney, NY	13838
0505G	Switchcraft, Inc.	Chicago, IL	60630
0512D	Burroughs Corp., Electronic Components Division	Plainfield, NJ	07061
0551H	Augat, Inc.	Attleboro, MA	
0552D	Dale Electronics, Inc.	Columbus, NE	
91833	Keystone Electronics Corp.	New York, NY	10012
95146	Alco Electronic Products, Inc.	Lawrence, MA	01843
95238	Continental Connector Corp.	Woodside, NY	11377
97564	Clare-Pendar, Inc.	Post Falls, ID	83854
97913	Industrial Electronic Hardware Corp.	New York, NY	10012
0587I	Amphenol Sales, Division of Bunker-Ramo	Broadview, IL	60153
1603G	No M/F description for this Mfg. Number		

SECTION VII

OPTIONS

7-1. INTRODUCTION

7-2. The basic 5526A Laser Measurement System consists of the 5500C Laser Head and 5505A Display Unit. At least one of the interferometer options must be included to make measurements. Other options allow flexibility of operation. The available options are described in this section and listed in Tables 7-1 and 7-2. Options available for the 5526A at the time of printing are listed in the following pages. This list is subject to changes and additions as new products develop. Contact your nearest HP Office (listed at back of this manual) for the latest information on options for the 5526A Laser Measurement Systems.

Table 7-1. Options for 5505A Display Unit

Option No.	Name
001	Line Voltage 230V ac at 50 Hz and Metric Readout (DISCONTINUED)
002	Pulse/Quadrature Outputs (DISCONTINUED)
004	Error Plotting Output (DISCONTINUED)

Table 7-2. Options for 5526A Laser Measurement System

Option No.	Name
002	Pulse/Quadrature Outputs
003	X10 Resolution Extension
004	Error Plotting Output
005	Error Plotting Board and X-Y Recorder (English)
006	Error Plotting Board and X-Y Recorder (Metric)
007	Digital Recorder
010	Linear Interferometer
011	Second Axis Add-On
012	Plain Mirror Measurement Add-On
013	Second Axis Plain Mirror Add-On
020	Linear Displacement and Flatness/Angle Interferometer
021	Flatness/Angle Add-On
030	Straightness Interferometer (Short-Range)
031	Straightness Interferometer (Long-Range)
032	Straightness Interferometer (Full-Range)
040	Single Beam Interferometer K03-10565A
041	Second Axis Add-On Single Beam (DISCONTINUED)
908	Rack Mount Kit
200 Series	Calculator/Plotter Systems

7-3. OPTION 01 LINE VOLTAGE — 230V AC AT 50 Hz (DISCONTINUED)

7-4. The 5505A Option 01 has been converted to 230V ac, 50 Hz operation at the factory. The LINE SELECTOR rear panel switch is set to 230 and a 1.5A, 250V fuse is installed in the fuse receptacle. In accordance with European conventions, display tubes with commas are inserted to provide proper decimal and comma placement for metric readout as shown in Table 7-3. Conversion for a metric readout can be accomplished by changing the display tubes and adding the parts identified in Figure 8-25.

Table 7-3. Display Tube HP Part Numbers

Display Tube	English System (Standard)	Metric System (Special)
DS0	1970-0035	1970-0046
DS1	1970-0035	1970-0035
DS2	1970-0035	1970-0035
DS3	1970-0035	1970-0035
DS4	1970-0035	1970-0046
DS5	1970-0035	1970-0046
DS6	1970-0035	1970-0046
DS7	1970-0035	1970-0046
DS8	1970-0035	1970-0035
DS9	1970-0047	1970-0047

7-5. OPTION 002 — PULSE/QUADRATURE OUTPUTS

7-6. The 5505A Option 002 is modified to supply quadrature outputs similar to that of a dc single-frequency system. An A-Quad-B Board (HP Part No. 05505-60042) is installed in XA14 of the 5505A. Either pulse or quadrature outputs may be selected by board straps. Discontinued as Option 02 for 5505A but is available as accessory 10569A (Option 002) for 5526A Laser Measurement System.

7-7. OPTION 003 — X10 RESOLUTION EXTENSION

7-8. The 5526A Option 003 includes a K02-5525A Resolution Extender which is connected between the 5500C and the 5505A. By multiplying the frequencies of the Doppler and Reference signals by factors of six or ten (selected by circuit board jumpers) the resolution of the reading on the 5505A display is extended by the same factor with no loss of accuracy. The K02-5525A Resolution Extender formerly used for 5526A Option 003 is replaced by the K04-59995A Resolution Extender.

7-9. OPTION 004 — ERROR PLOTTING OUTPUT

7-10. The 5505A Option 004 is modified to supply error plotting information to an X-Y Recorder (HP 7035B). An Error Plotting Board (HP Part No. 05505-60040) is installed in XA14 of the 5505A. Two BNC to dual banana plug cables (HP 11001A) are provided to interconnect the 5505A and the X-Y Recorder. Discontinued as Option 04 for 5505A but is available as accessory 10555A (Option 004) for the 5526A Laser Measurement System.

7-11. OPTION 005 — ERROR PLOTTING SYSTEM (ENGLISH UNITS)

7-12. The 5526A Option 005 consists of the 5526A Option 004 (see paragraph 7-9) and an HP 7035B X-Y Recorder. English unit (inch) calibration is provided.

7-13. OPTION 006 — ERROR PLOTTING SYSTEM (METRIC UNITS)

7-14. The 5526A Option 006 consists of the 5526A Option 004 (see paragraph 7-9) and an HP 7035B Option 001 Recorder. Metric unit (cm) calibration is provided.

7-15. OPTION 007 — DIGITAL RECORDER

7-16. The 5526A Option 007 consists of a C07-5055A Digital Recorder and a 5055A Option 002 cable. This option provides a printout of the displayed value at up to ten lines per second.

7-17. OPTION 010 — LINEAR DISPLACEMENT INTERFEROMETER

7-18. The 5526A Option 010 allows single-channel linear displacement to be measured. The option includes the 10565A Remote Interferometer and 10550B Reflector/Mount. A storage case (HP 10634A) is provided for the 10565A and 10550B.

7-19. OPTION 011 — SECOND AXIS AD-DD ON

7-20. This 5526A option consists of a 5505A Laser Display, 10567A Beam Splitter, 10565A Remote Interferometer, and 10556A Reflector. Option 011 is used with either option 010 or option 020 to extend the existing single-channel capability to dual-channel capability. The dual-channel 5526A can be used for two-axis interferometry.

7-21. OPTION 012 — PLANE MIRROR MEASUREMENT ADD-ON

7-22. The 5526A Option 12 is an Add-On Kit which converts an HP Linear Interferometer to a Plane Mirror Interferometer. The kit includes a 10581A Plane Mirro Converter and a K05-5505A Modified Resolution Board. Requires 5526A Option 010 or 020.

7-23. OPTION 013 — SECOND AXIS PLANE MIRROR ADD-ON

7-24. The 5526A Option 013 includes a second 5505A Laser Display with a 10556A Laser Reflector, 10565B Remote Interferometer, 10581A Plane Mirror Converter, K05-5505A Modified Resolution Board, and a 10567A Beam Splitter. Requires Option 010 or Option 020 with Option 012.

7-25. OPTION 020 — LINEAR DISPLACEMENT AND FLATNESS/ANGLE INTERFEROMETER

7-26. The 5526A Option 020 allows single-channel linear displacement, flatness, and angular measurements to be made. The option includes the 10565A Remote Interferometer, 10550B Reflector/Mount, 10558A Beam Bender, 10559A Reflector Mount, and two 10557A Turning Mirrors. Storage cases (HP 10634A and HP 10635A) are provided for the optical components.

7-27. OPTION 021 — FLATNESS/ANGLE ADD-ON

7-28. This 5526A option consists of a 10558A Beam Bender, 10559A Reflector Mount, two 10557A Turning Mirrors, and a 10635A Storage Case. When used with the 5526A Option 010, the existing linear displacement capability is extended to include flatness and angle measurements.

7-29. OPTION 030 — STRAIGHTNESS INTERFEROMETER (SHORT-RANGE)

7-30. The 5526A Option 030 allows straightness measurements to be made with resolution of a microinch (0.01 μm) up to 10 feet (3 m). The option consists of a 10579A Straightness Adaptor and 10690A Short-Range Straightness Interferometer.

7-31. OPTION 031 — STRAIGHTNESS INTERFEROMETER (LONG-RANGE)

7-32. The 5526A Option 031 allows straightness measurements to be made with a resolution of 10 microinches (0.1 μm) from 3 feet out to 100 feet (1 to 30 m).

7-33. OPTION 032 — STRAIGHTNESS INTERFEROMETER (FULL-RANGE)

7-34. The 5526A Option 032 combines Options 030 and 031. The 10579A Straightness Adapter is shared between both versions. The difference between long and short-range versions is in the Interferometer and Reflector which are matched pairs.

7-35. OPTION 040 — SINGLE-BEAM INTERFEROMETER

7-36. The 5526A Option 040 consists of a K03-10565A Single-Beam Interferometer. This option allows single-channel linear displacement to be measured. A plane reflecting surface is required, e.g., 10551A, when making measurements.

7-37. OPTION 041 — SECOND AXIS ADD-ON SINGLE BEAM (DISCONTINUED)

7-38. This 5526A option consisted of a 5505A Laser Display, 10567A Beam Splitter, and 10577A Single-Beam Interferometer. When used with the 5526A Option 040, the existing single-axis linear displacement capability is extended to dual-channel capability. The dual-channel 5526A can be used for two-axis interferometry.

7-39. OPTION 200 SERIES — CALCULATOR/PLOTTER SYSTEMS

7-40. Ask your local Hewlett-Packard representative for information on the latest of these systems and their associated programs. These systems are suitable for such applications such as surface plate calibration, positioning error plotting, machine tool repeatability analysis, large angle corrections for use with HP Angular Interferometer, and wavelength compensation factor determination.

SECTION VIII

DIAGRAMS

8-1. INTRODUCTION

8-2. This section contains:

a. Schematic diagrams
b. Notes for schematic diagrams
c. Component locators
d. Unit photos

Figure 8-1. Schematic Diagram Notes

SYMBOLS

FRONT PANEL

REAR PANEL

INTERIOR AND PC BOARDS

WIPER MOVES TOWARD "CW" WHEN CONTROL IS ROTATED CLOCKWISE

POWER LINE GROUND

CIRCUIT COMMON GROUND

FLOATING GROUND

CHASSIS GROUND

KNOB CONTROL

SCREWDRIVER ADJUST

MAIN SIGNAL PATH

FEEDBACK PATH

TEST POINT

"AND" GATE

"OR" GATE

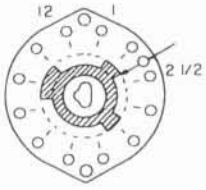
INVERTER

NAND GATE

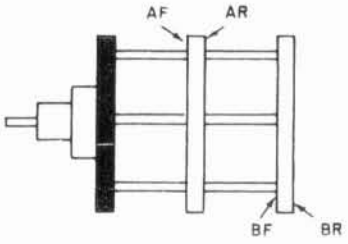
NOR GATE

EXCLUSIVE NOR

SWITCH DESIGNATIONS



A3S1		SWITCH S1 WITHIN ASSEMBLY A3
B		2ND WAFER FROM FRONT (A=1ST, ETC)
R		REAR OF WAFER (F=FRONT)
A3S1BR(2-1/2)	(2-1/2)	TERMINAL LOCATION (2 1/2) (VIEWED FROM FRONT)



REFERENCE DESIGNATIONS

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

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

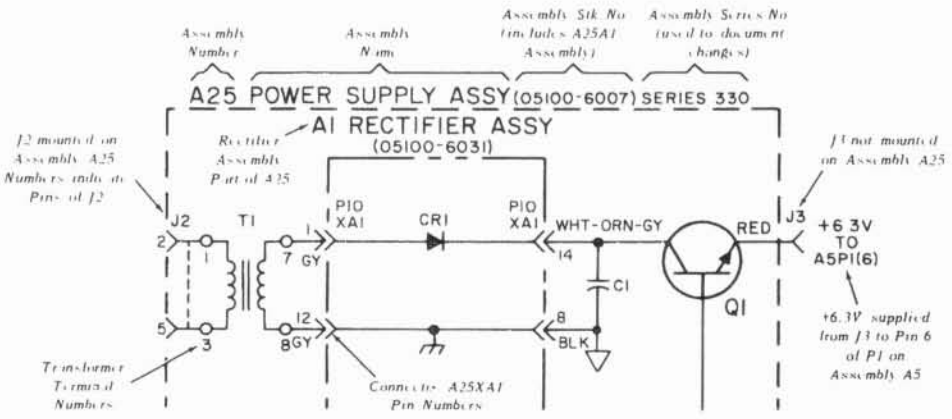
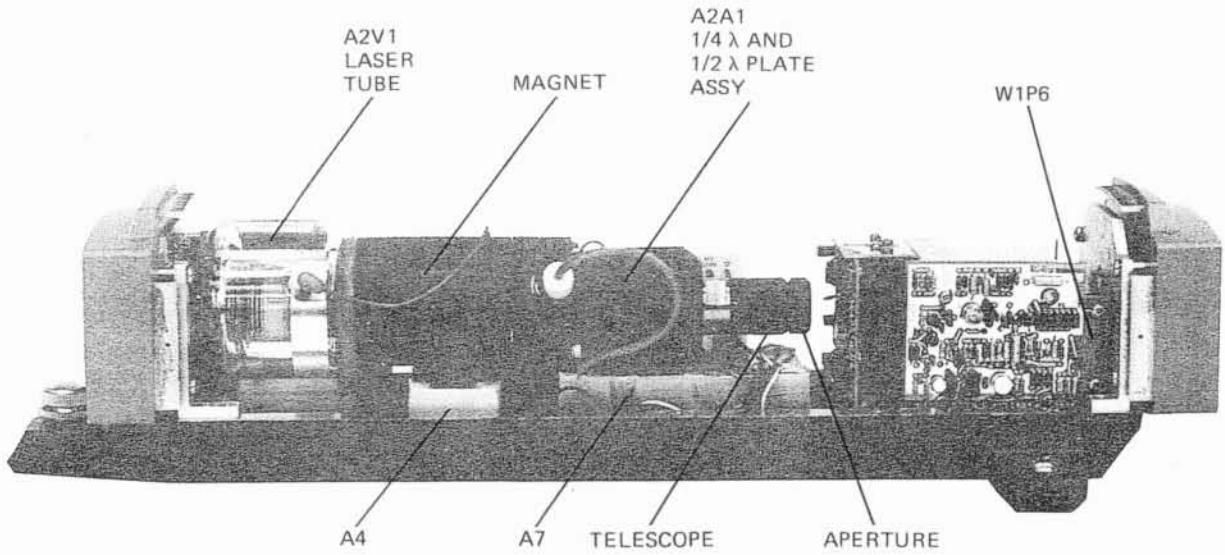
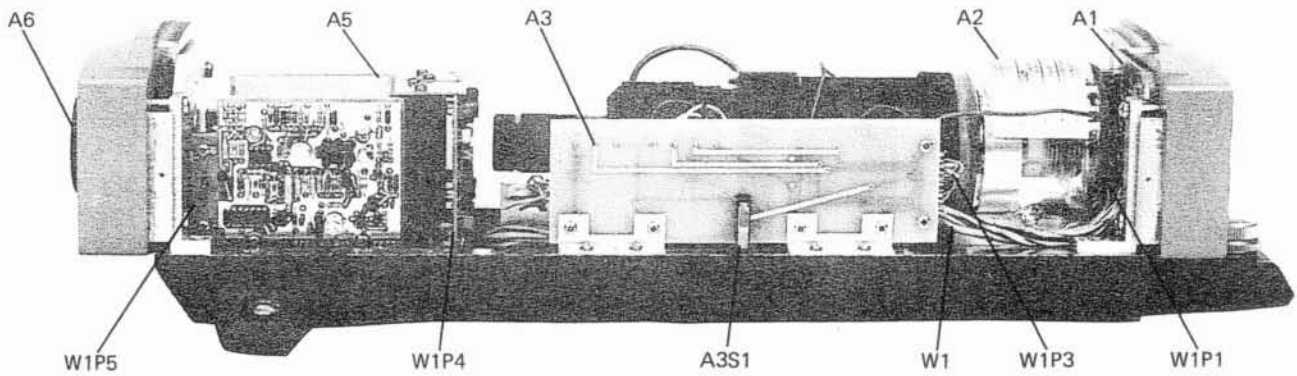


Figure 8-2. Laser Head, Right and Left Sides



LEFT



RIGHT

Figure 8-3. Laser Head, Top View

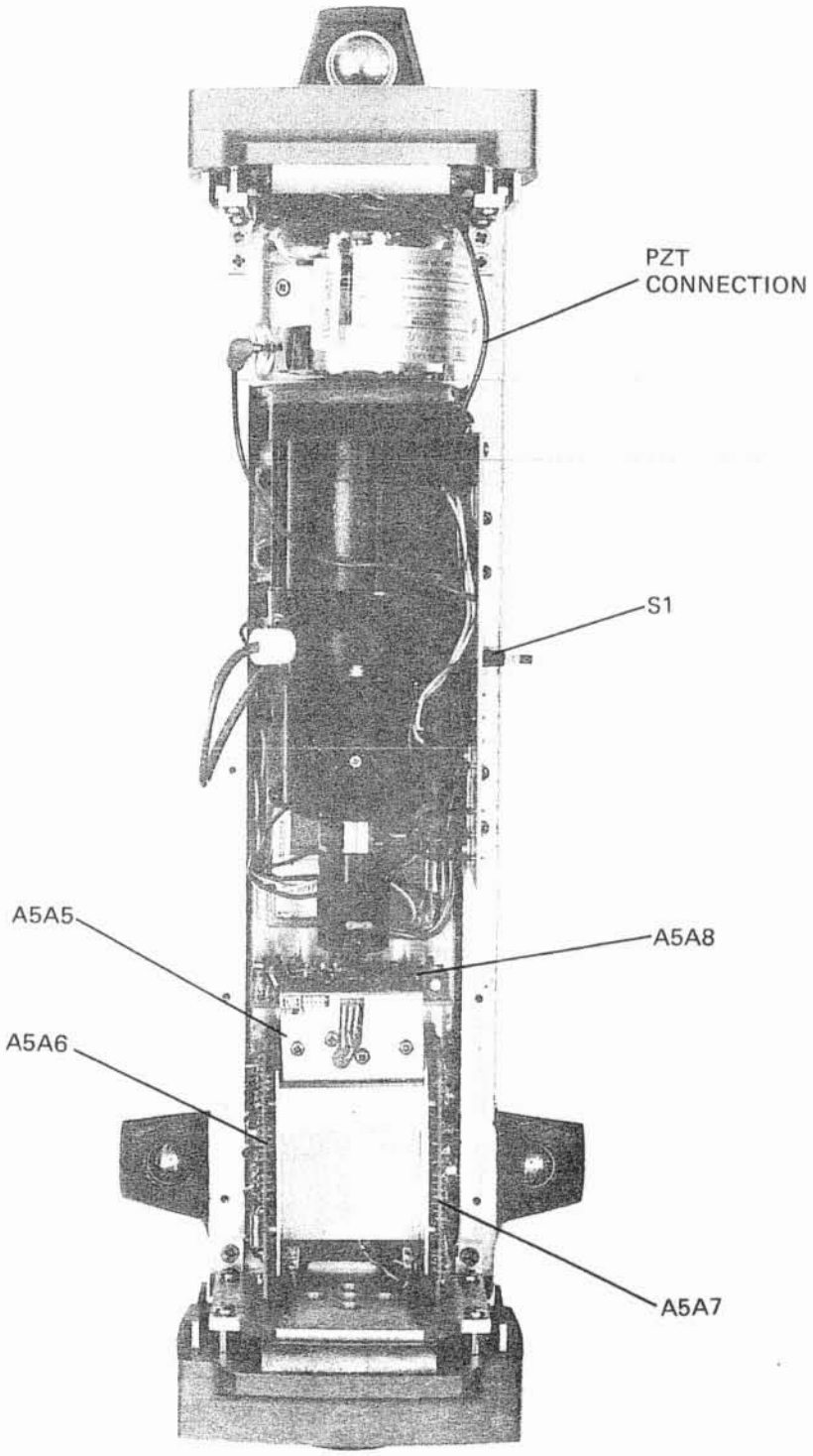


Figure 8-4. Laser Head, Rear View, Front View

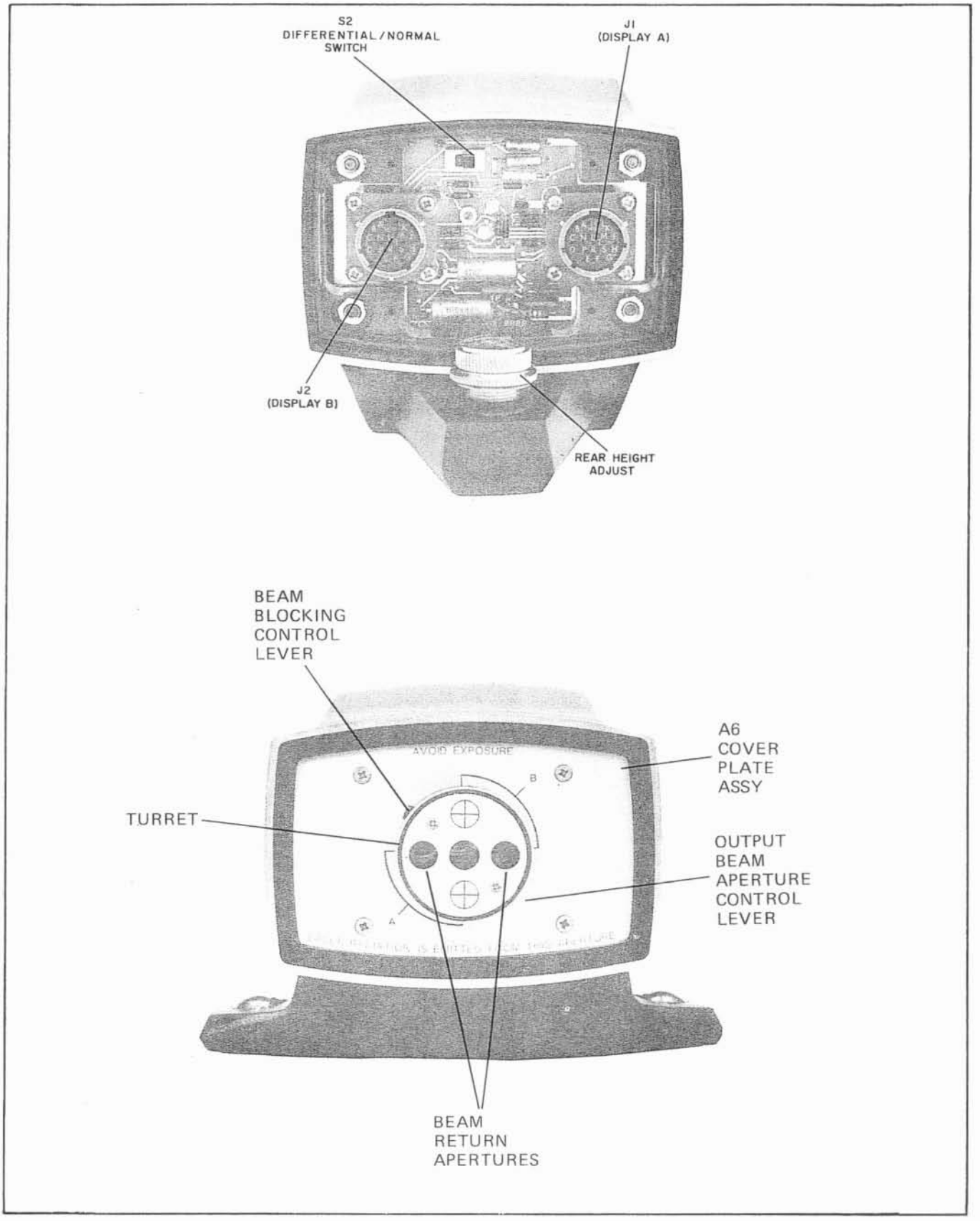


Figure 8-5. Display Unit, Front View

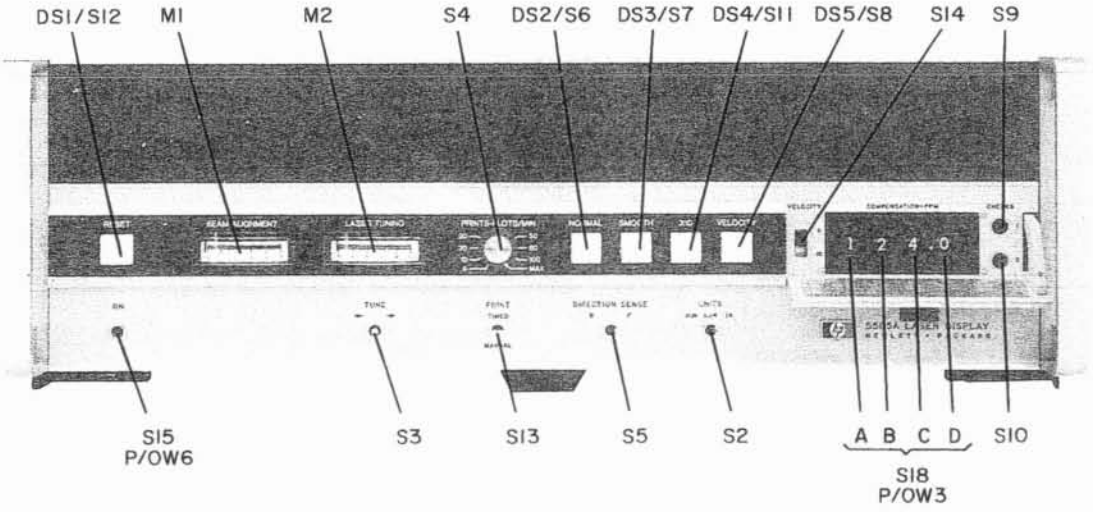


Figure 8-6. Display Unit, Top View

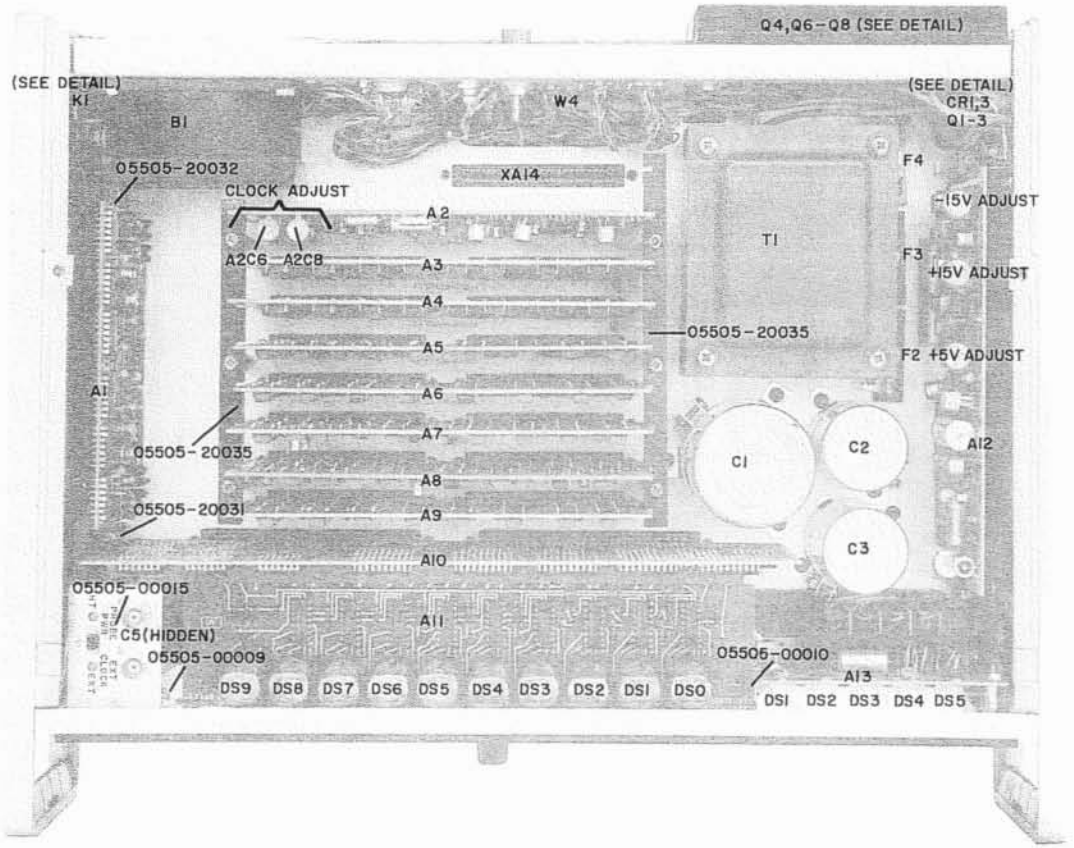


Figure 8-7. Display Unit, Bottom View

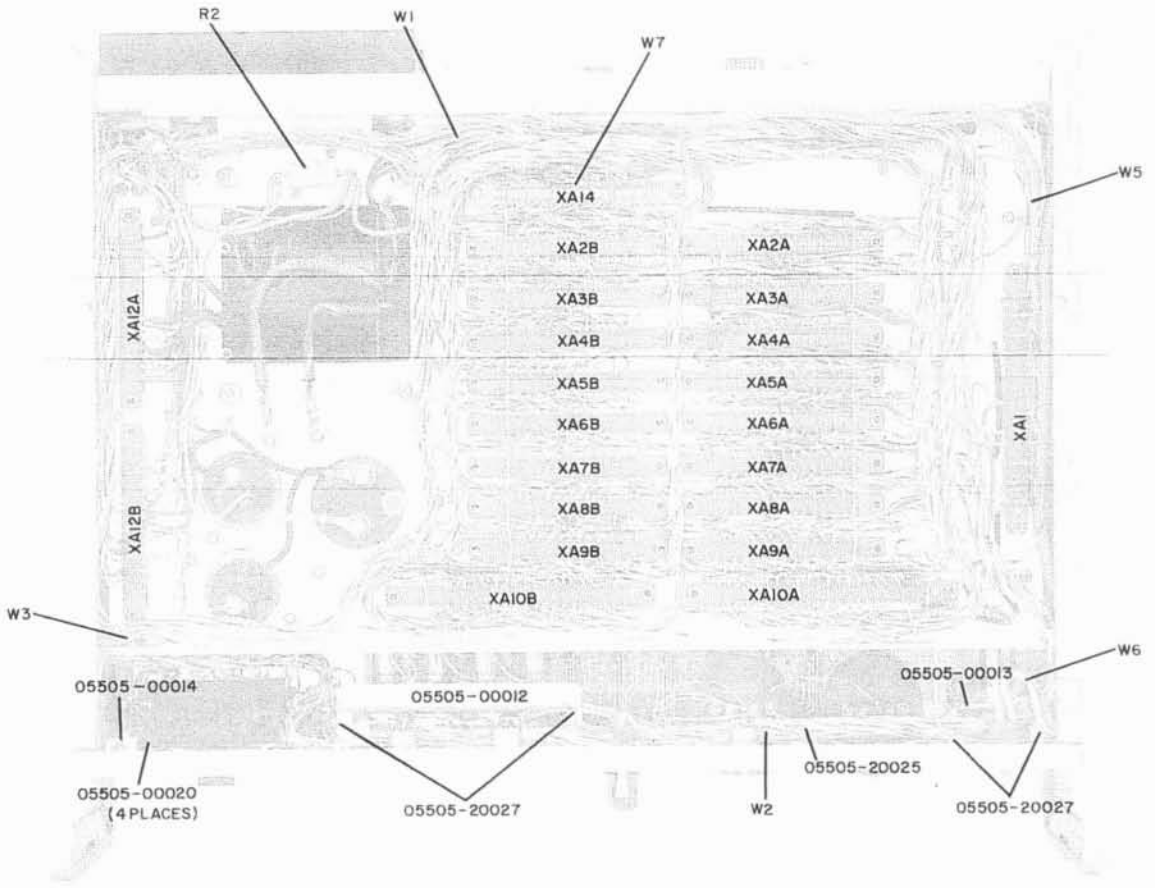
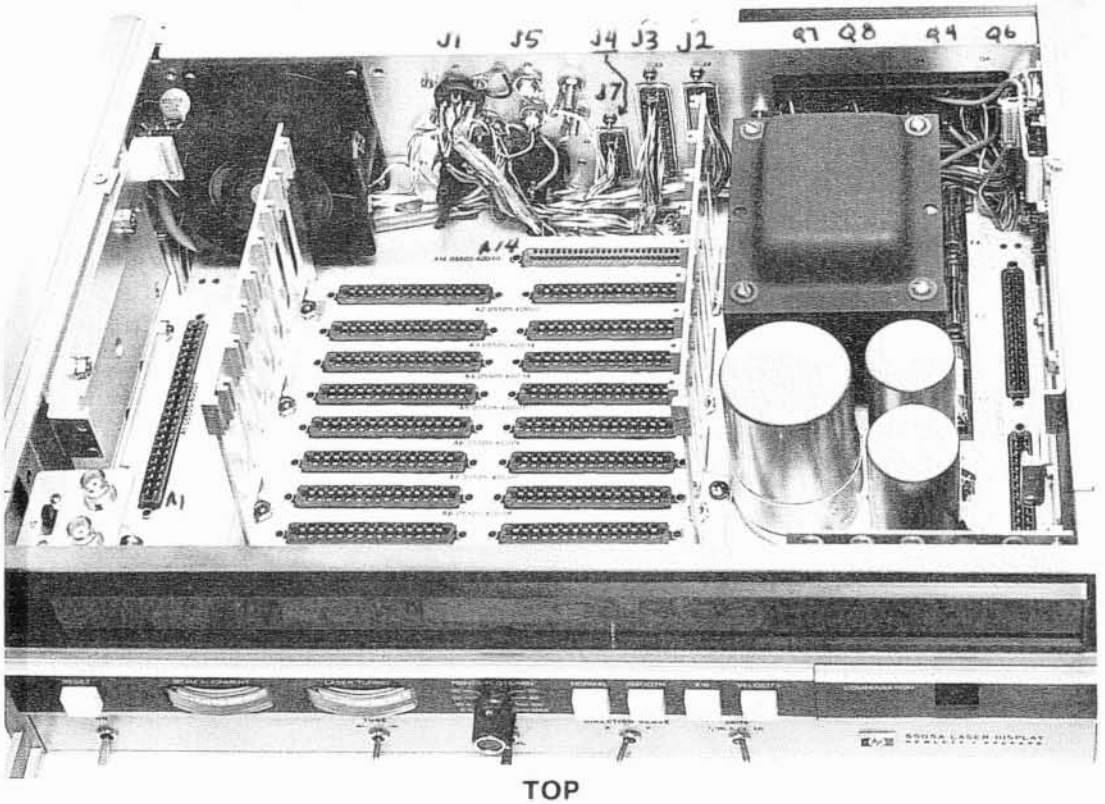
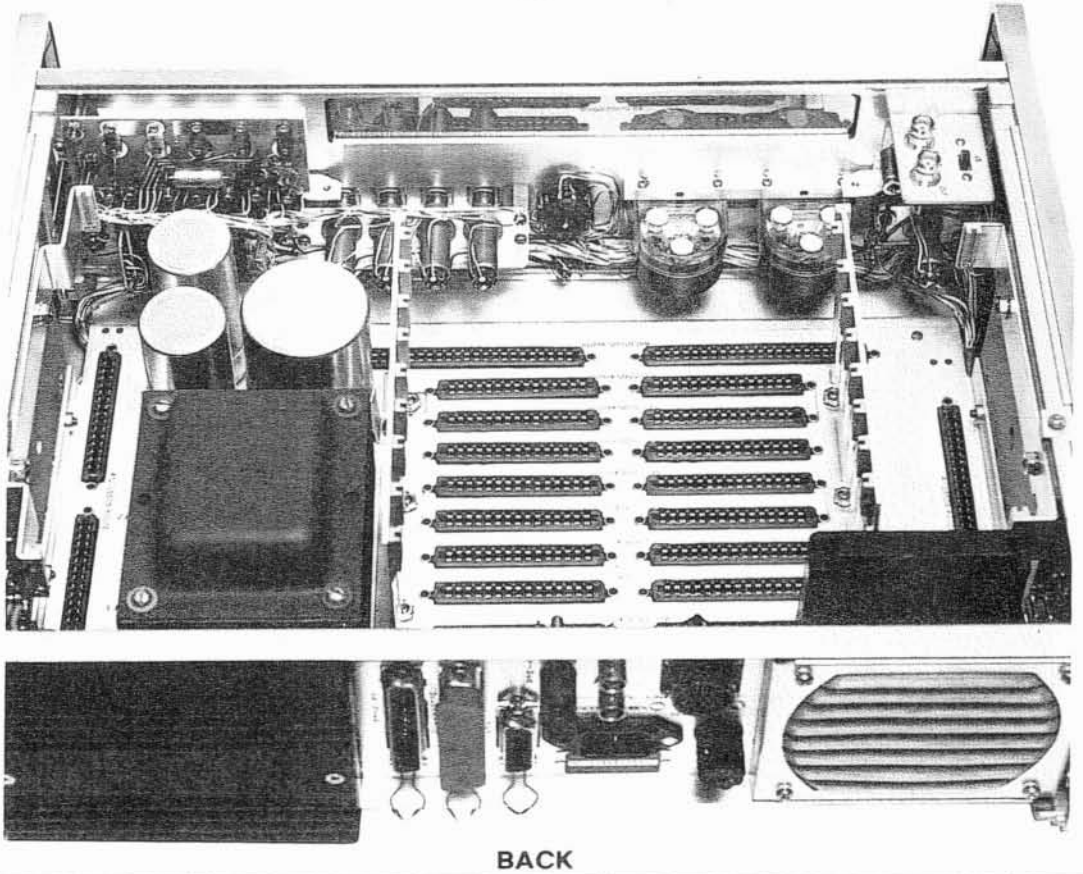


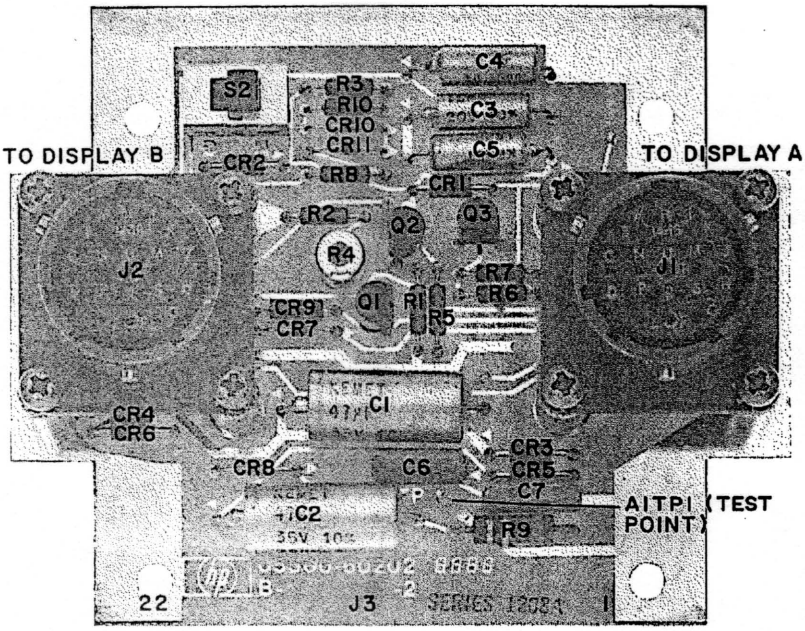
Figure 8-8. Display Unit, Interior Views



TOP



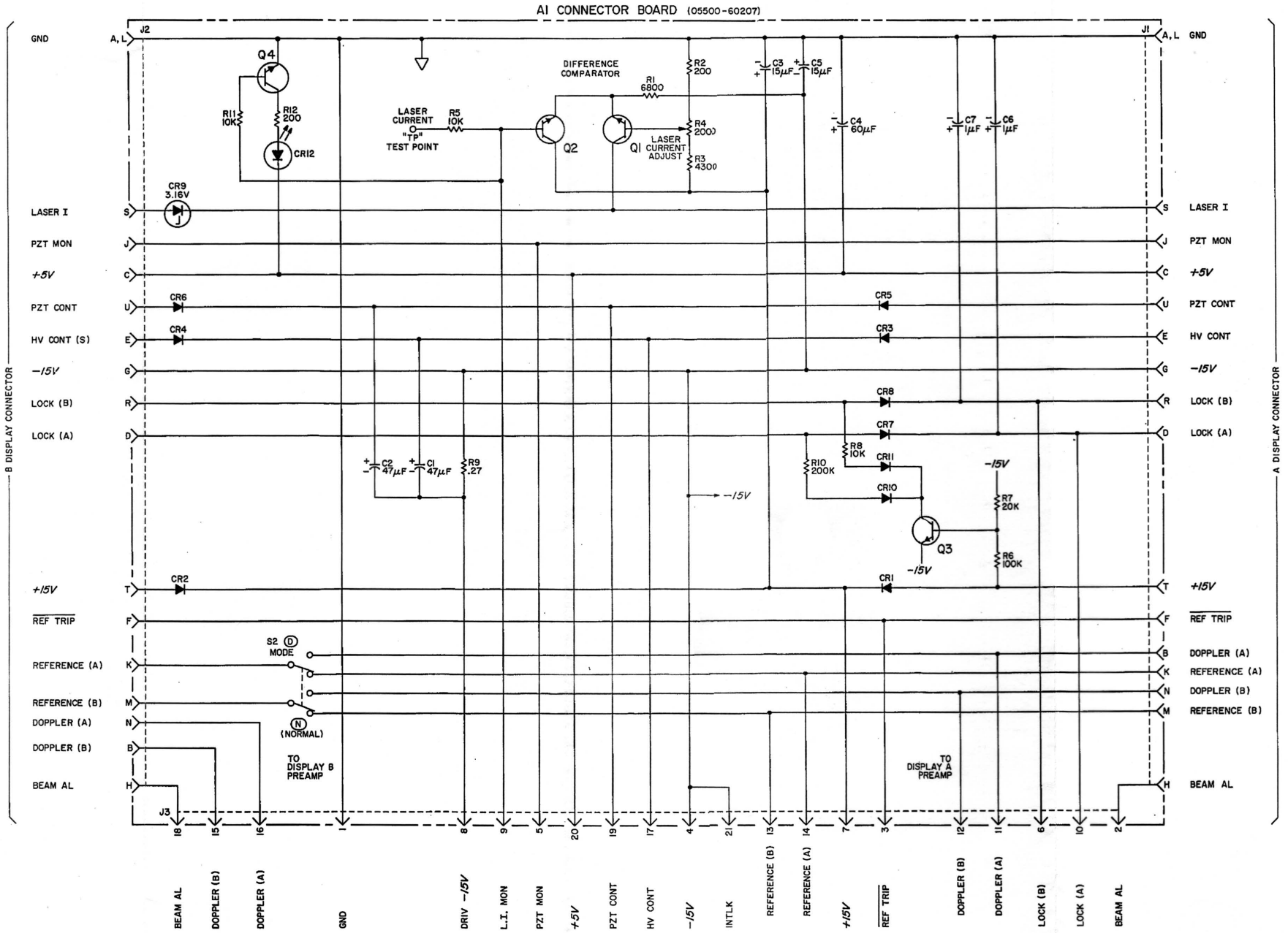
BACK



A1

NOTE

Photograph of board does not show R11, R12, Q4 and CR12.



NOTES

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

REFERENCE DESIGNATIONS

A1
C1-7
CR1-9
J1-3
Q1-3
R1-10
S2

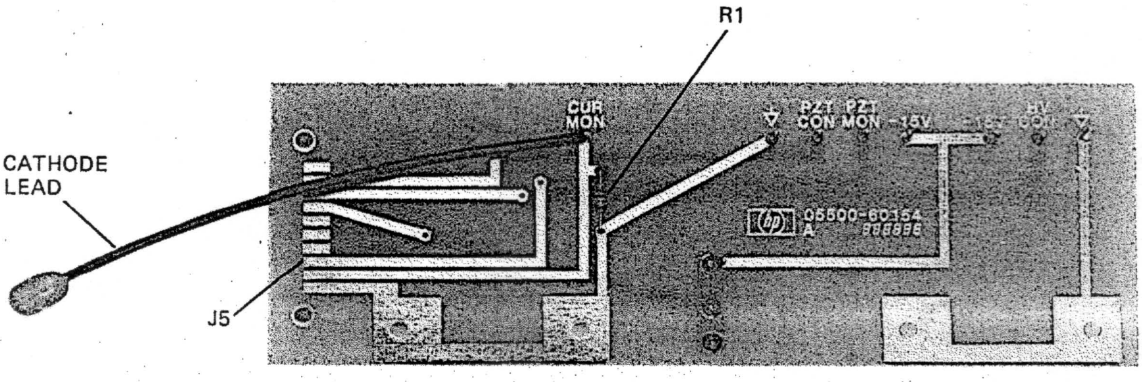
NOT ASSIGNED: S1

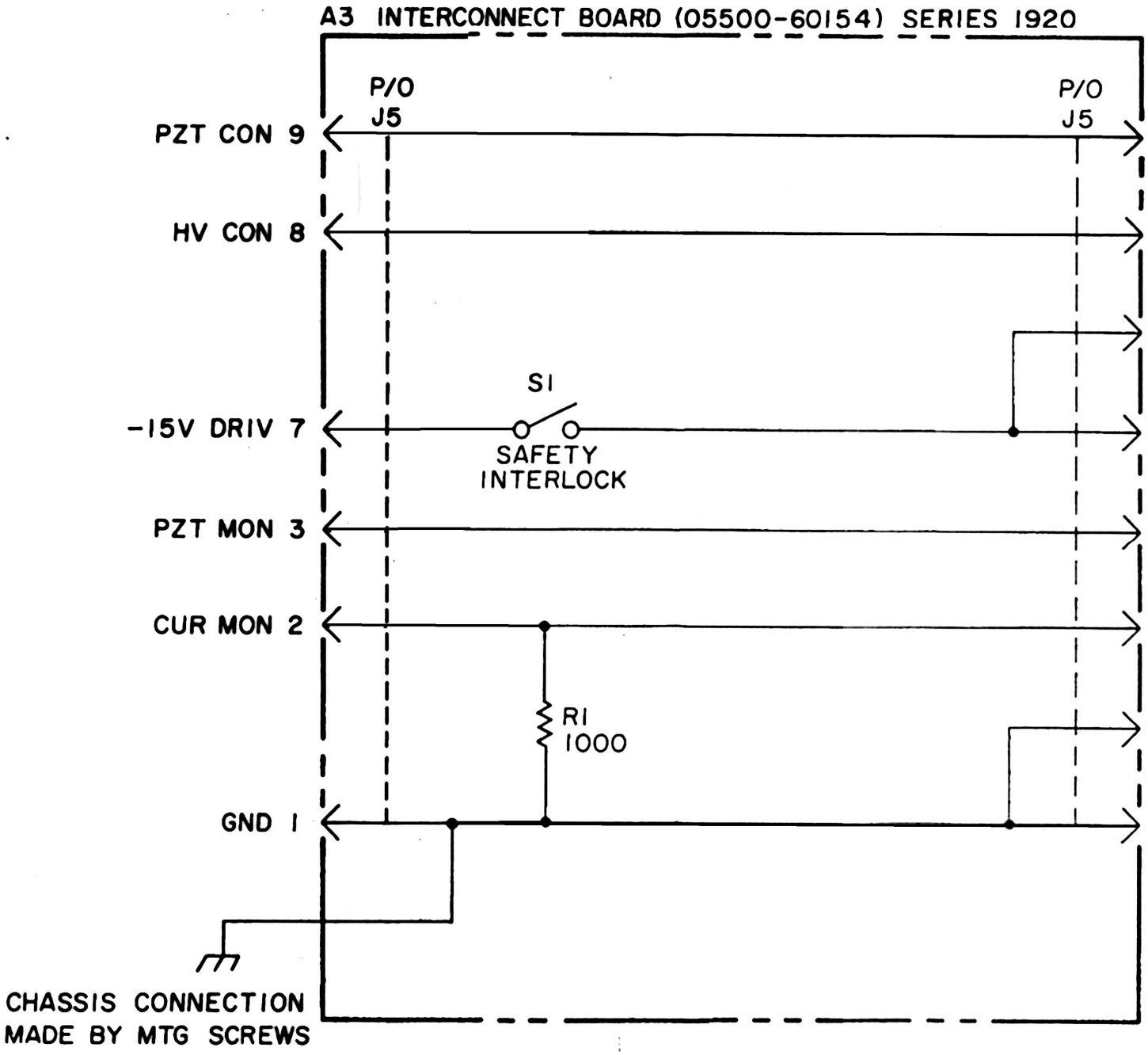
TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-6	1901-0028
CR7,8	1901-0040
CR9	1902-3036
Q1-3	1854-0071

5500-0-4

Figure 8-9
5500C LASER HEAD
A1 CONNECTOR BOARD


R1
CATHODE
LEAD
J5
CUR
MON
PZT
CON
PZT
MON
-15V
05500-60154
A


A3 INTERCONNECT BOARD (05500-60154) SERIES 1920
P/O J5
P/O J5
PZT CON 9
HV CON 8
S1
-15V DRIV 7
SAFETY INTERLOCK
PZT MON 3
CUR MON 2
R1 1000
GND 1
CHASSIS CONNECTION MADE BY MTG SCREWS

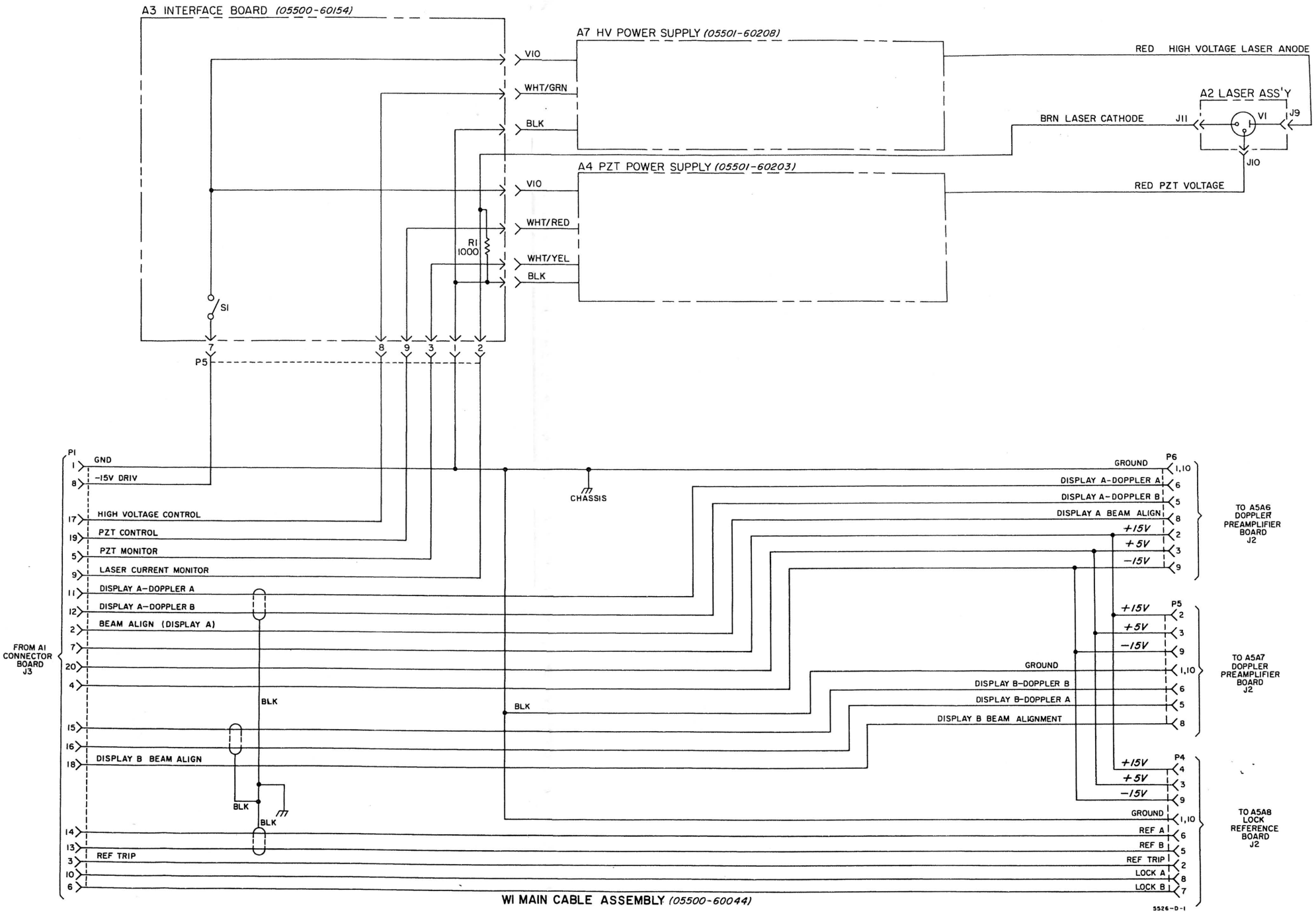
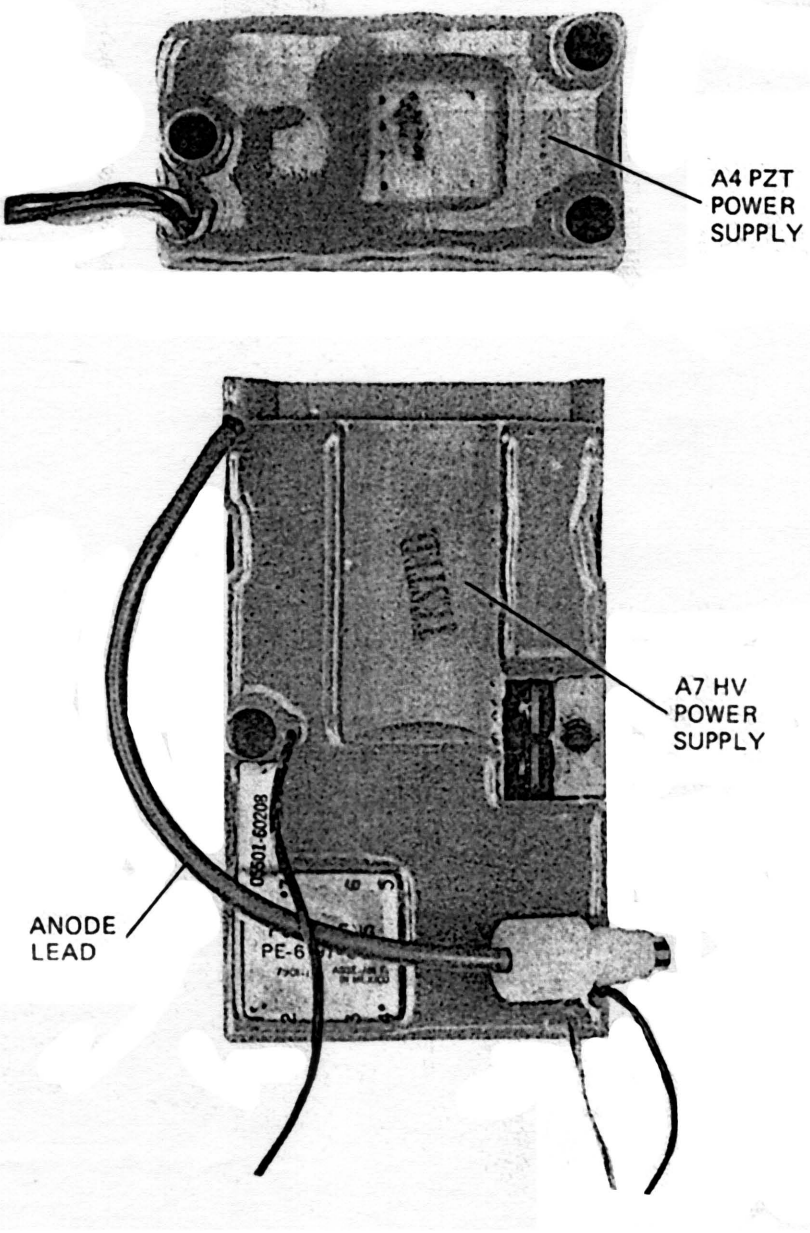
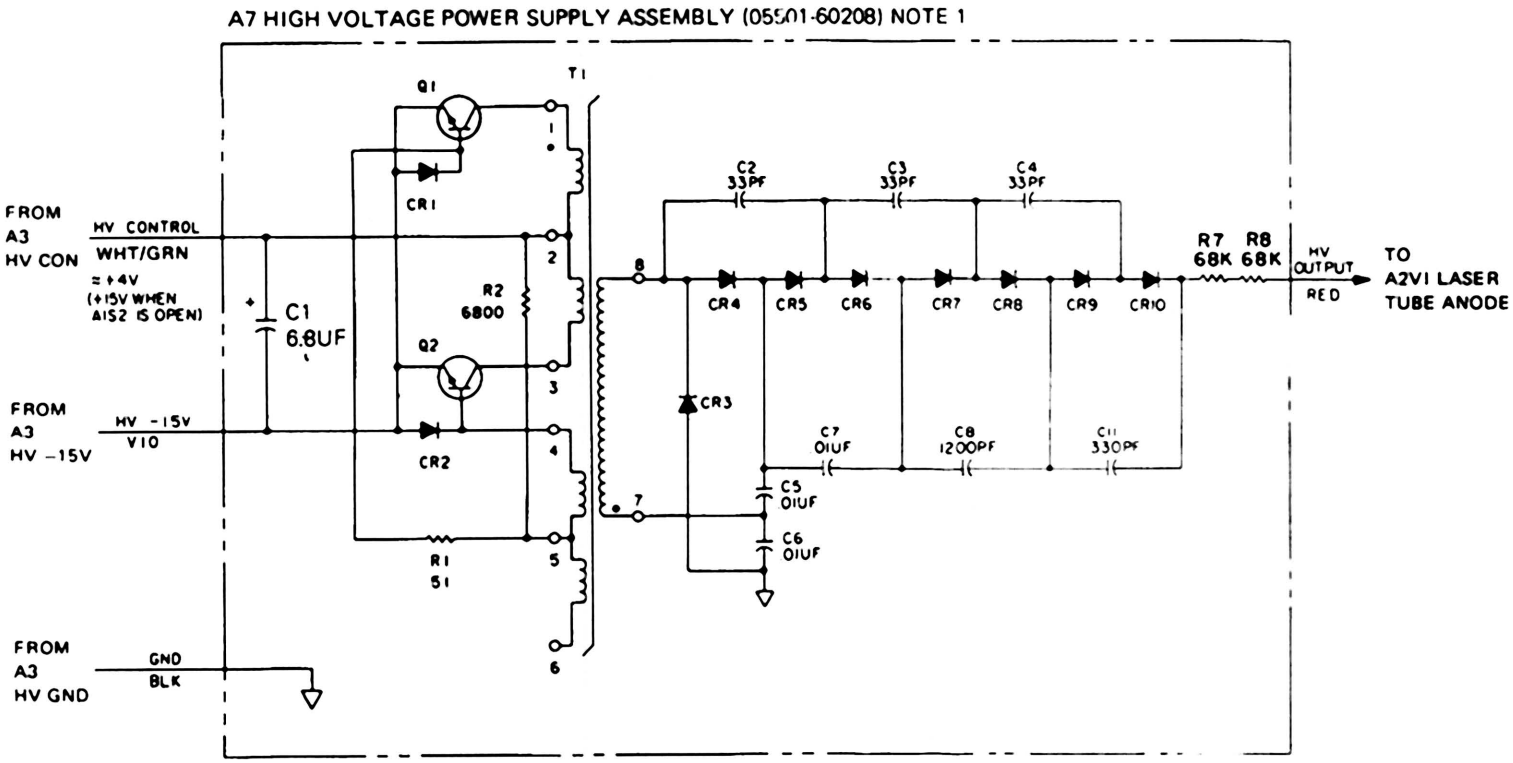


Figure 8-11
LASER WIRING DIAGRAM


A4 PZT
POWER
SUPPLY
A7 HV
POWER
SUPPLY
ANODE
LEAD



NOTE:
THIS ASSEMBLY IS NOT REPAIRABLE; SCHEMATIC FOR REFERENCE USE ONLY.

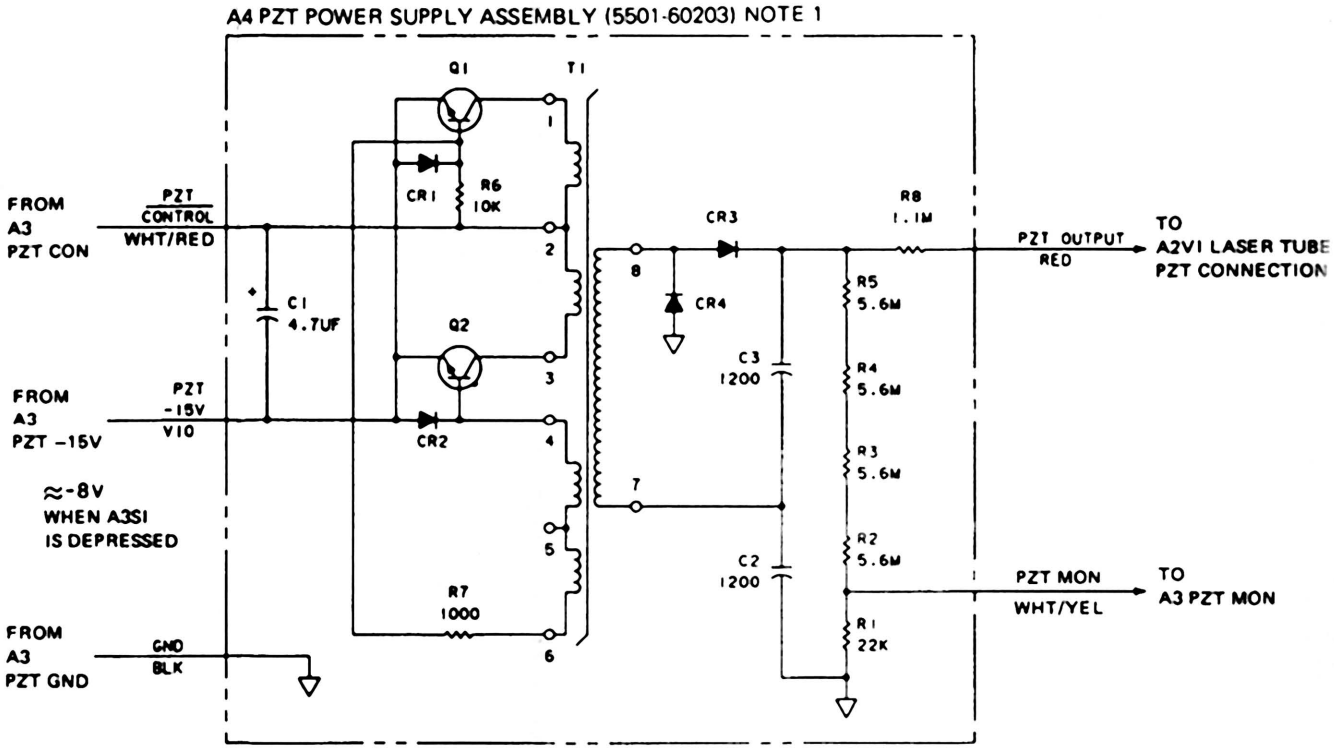
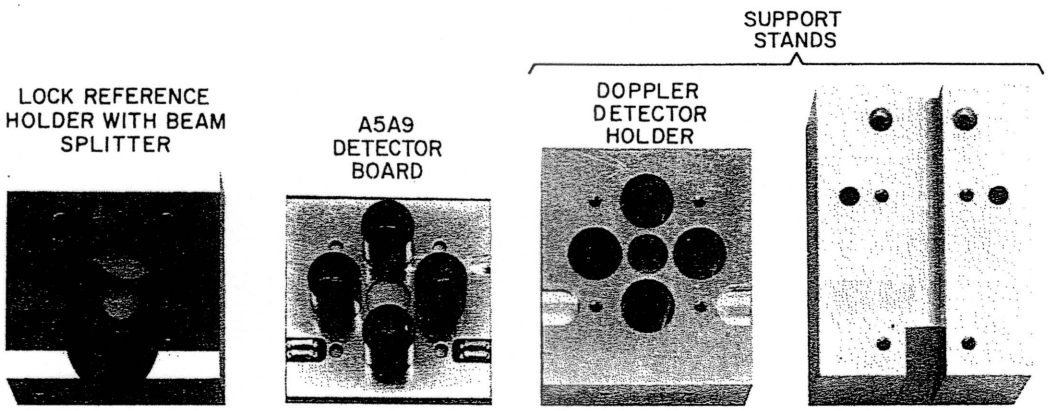
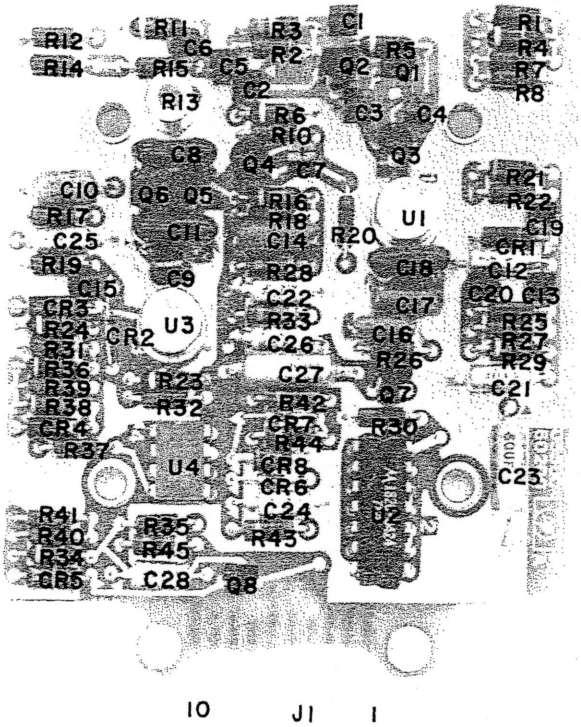


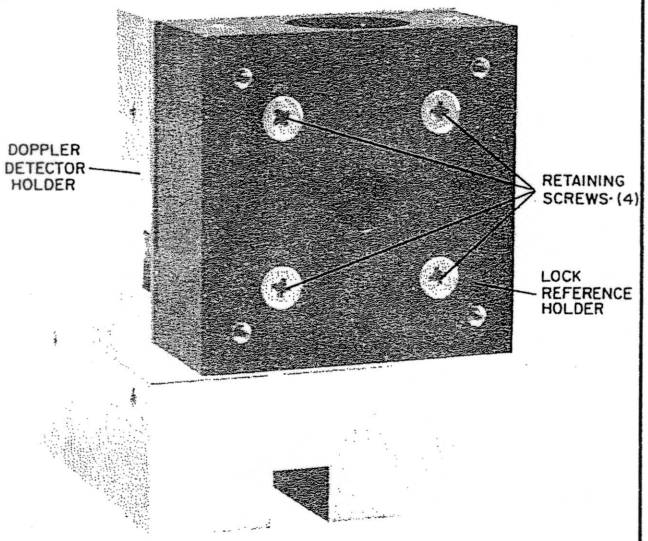
Figure 8-12
A4 PZT POWER SUPPLY AND A7 HIGH VOLTAGE POWER SUPPLY

P/O Figure 8-13

A5A6, A5A7







NOTES

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

REFERENCE DESIGNATIONS

A5A6, A5A7
C1-28
CR1-8
Q1-8
R1-45
U1-4

NOT ASSIGNED: R9

A5A6, A5A7 TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1, 3	1902-3182
CR2, 6, 7	1901-0040
CR4	1902-0025
CR5	1902-0041
CR8	1902-0579
Q1, 3-6	1854-0092 (2N3563)
Q2	1855-0081 (2N5245)
Q7, 8	1853-0036 (2N3906)
U1	1820-0474 (CA3012)
U2	1820-0424 (SN74H04N)
U3	1820-0475 (LM306H)
U4	1820-0493 (LM307N)

5500-D-9A

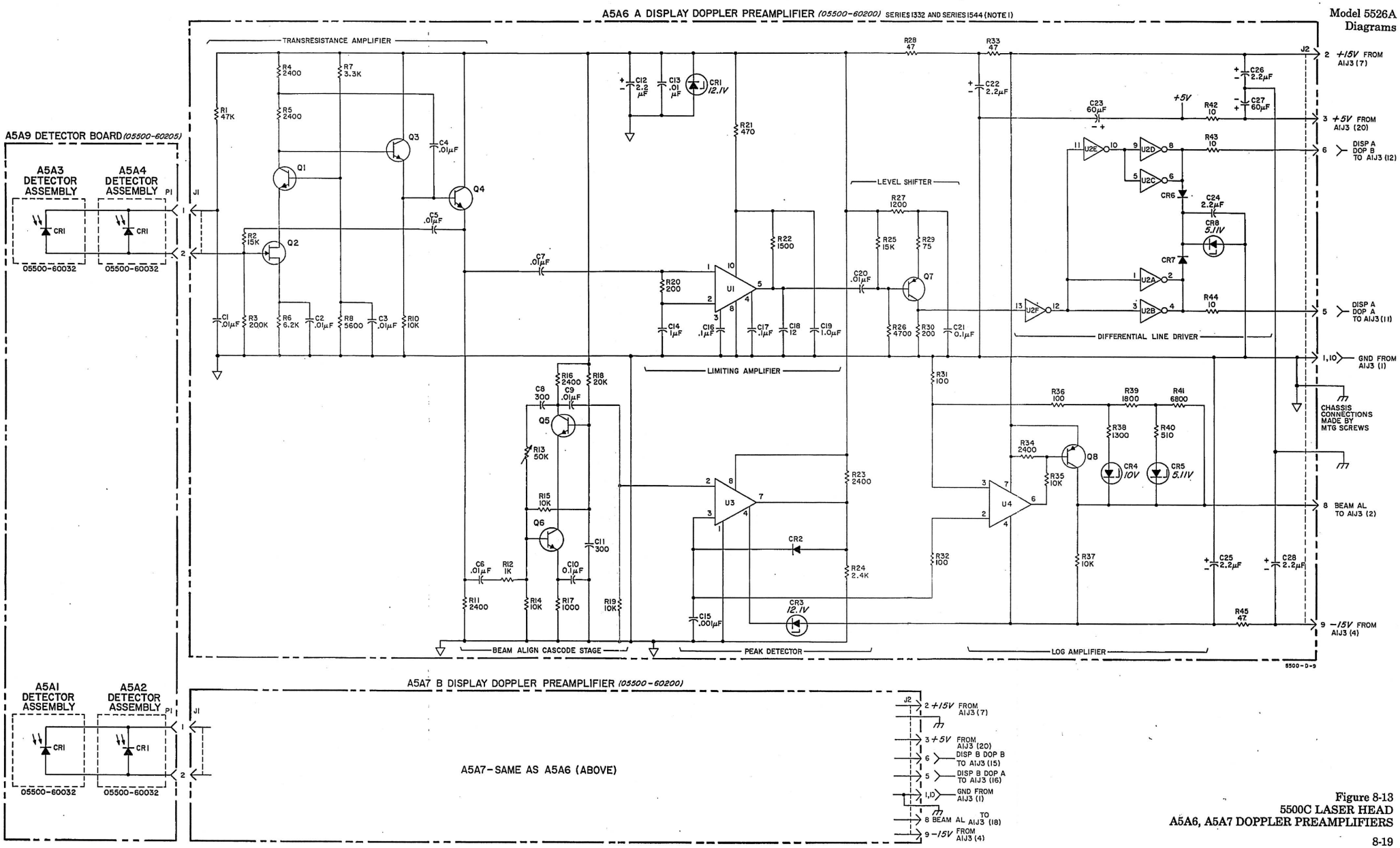
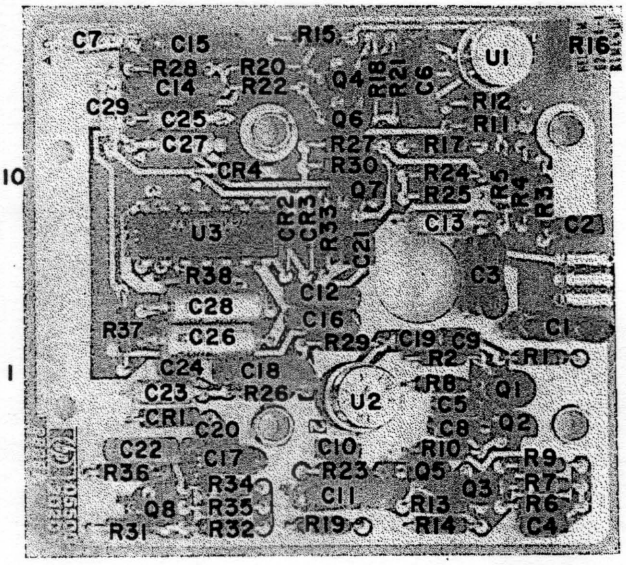
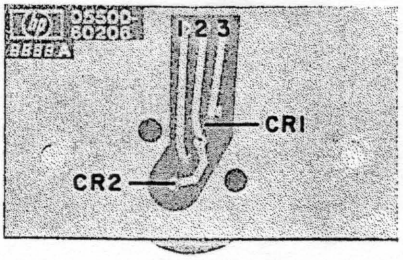
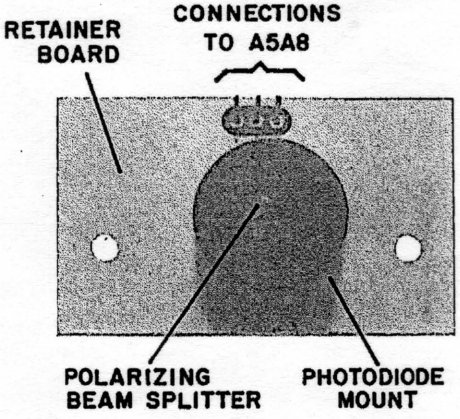


Figure 8-13
5500C LASER HEAD
A5A6, A5A7 DOPPLER PREAMPLIFIERS



A5A8





A5A5 Reference Detector Assembly

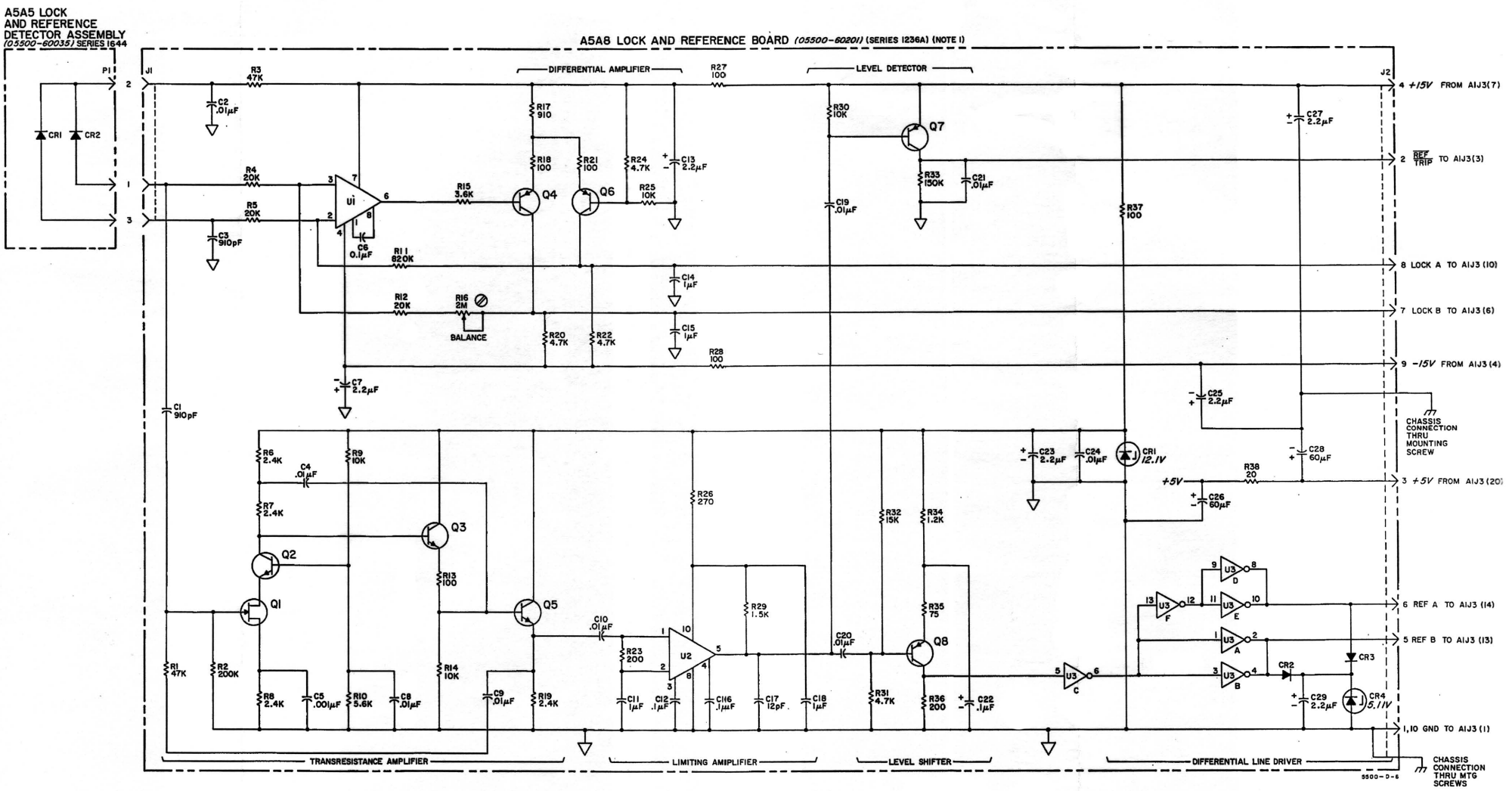


Figure 8-14
5500C LASER HEAD
A5A8 LOCK REFERENCE BOARD

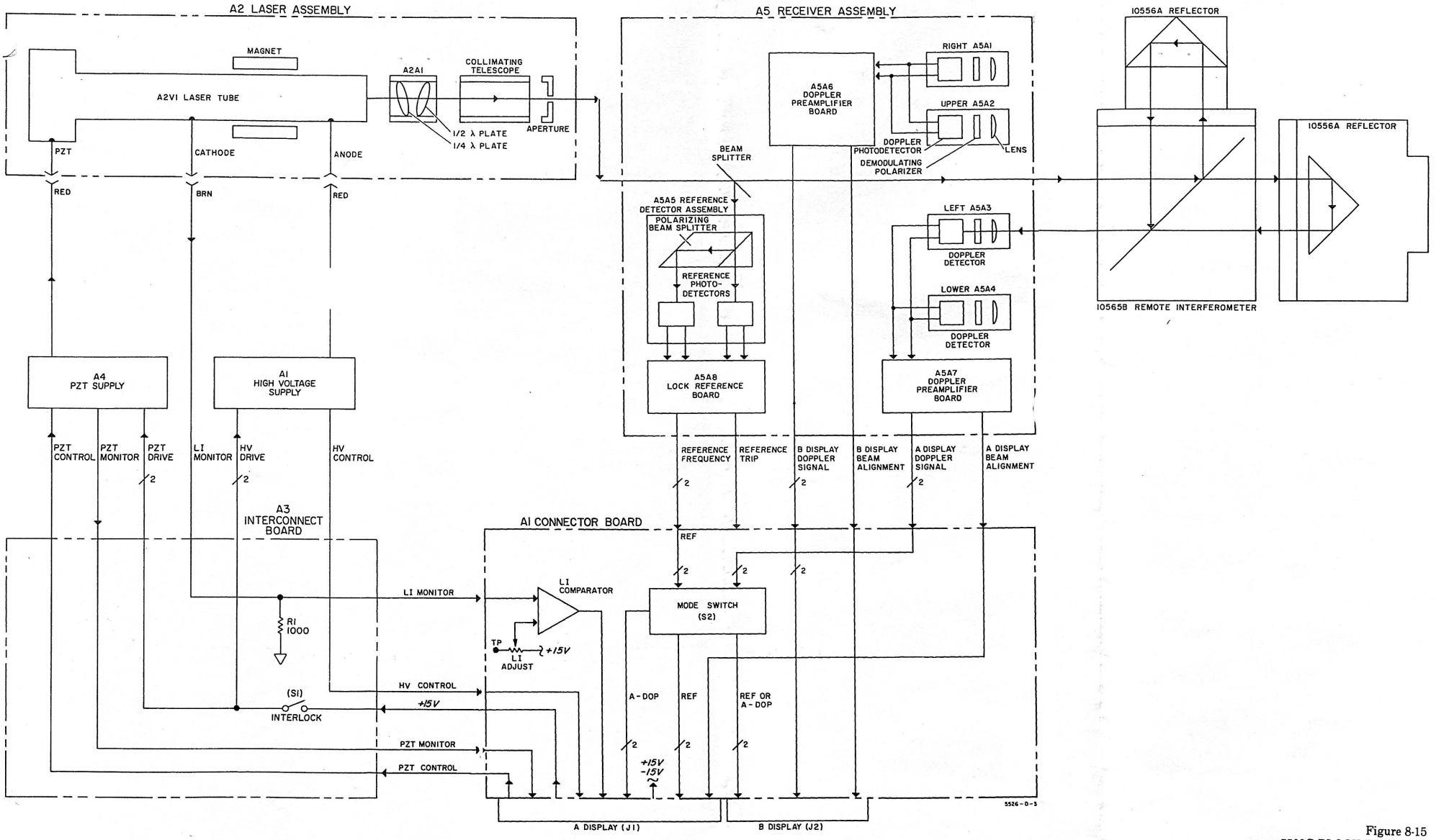
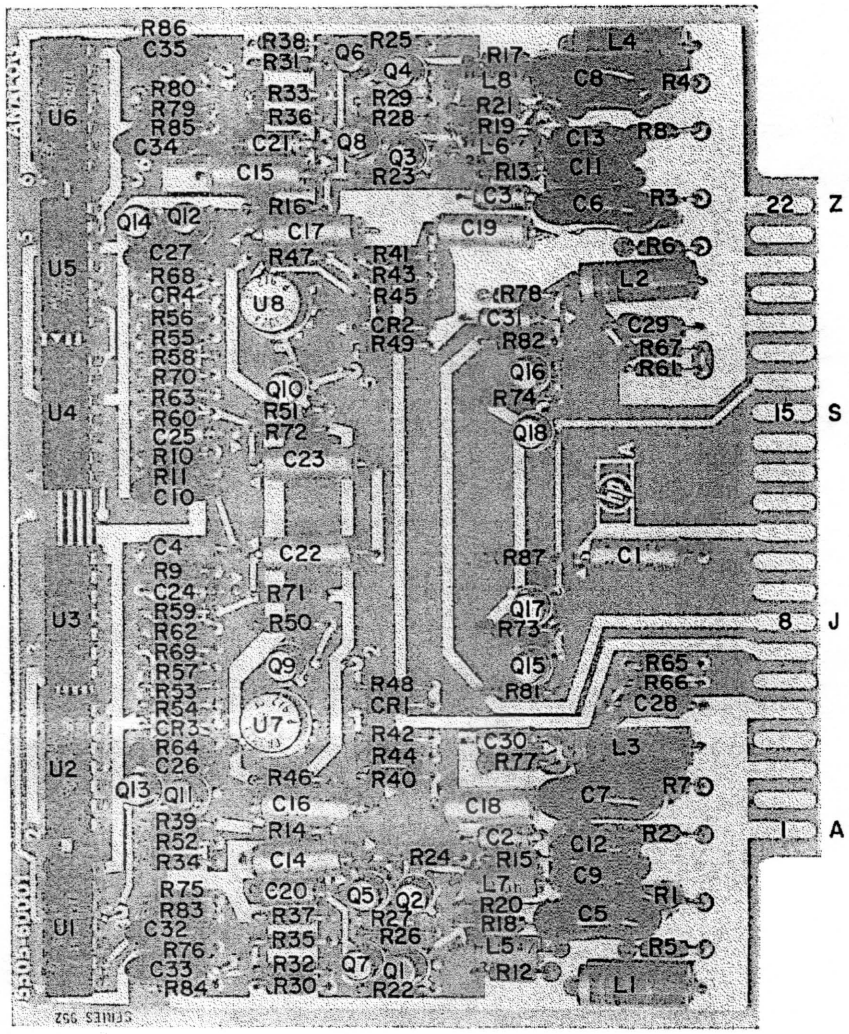
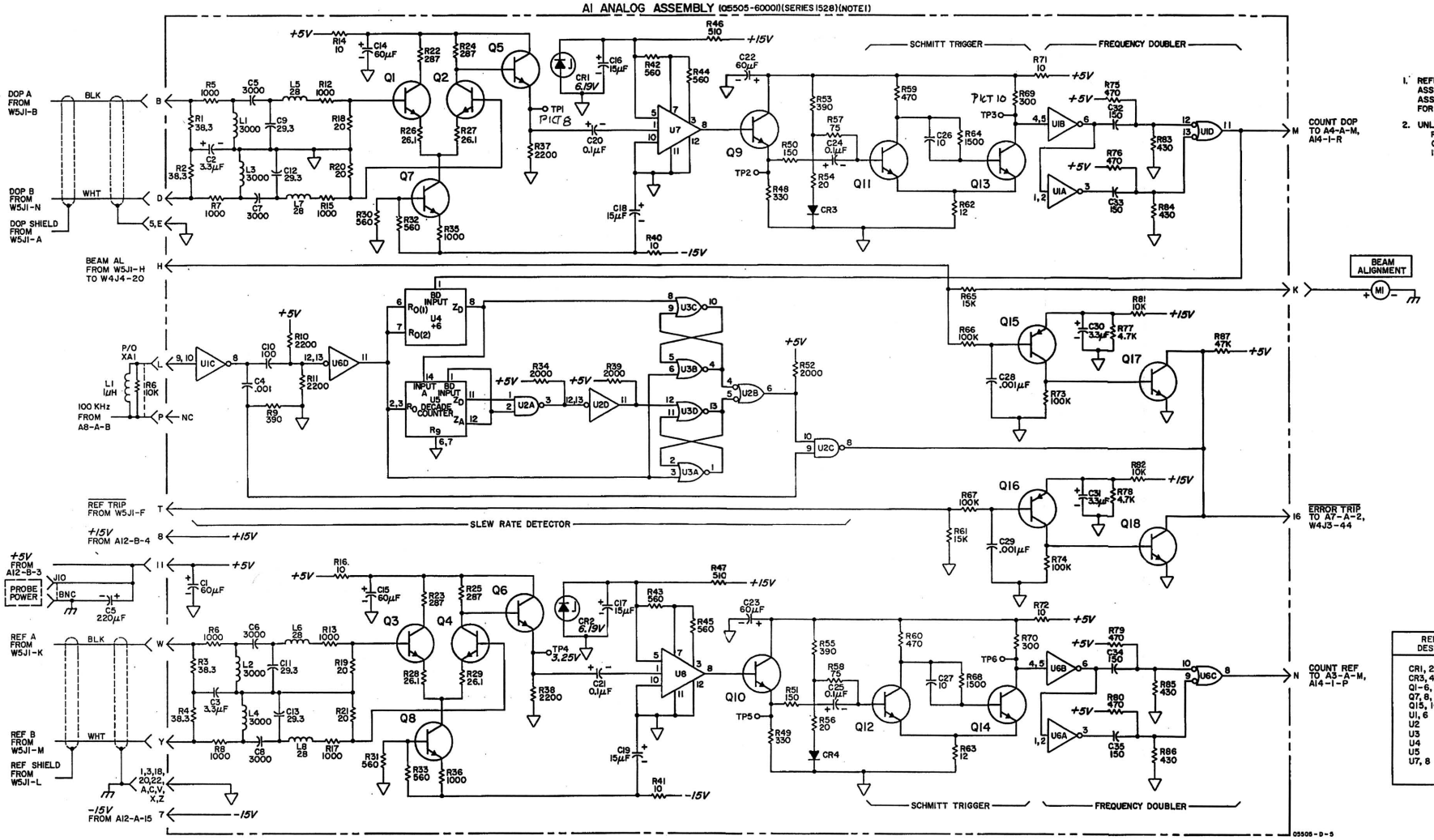


Figure 8-15
5500C BLOCK DIAGRAM


R86
C35
R38
R31
Q6
R25
Q4
R17
L4
L8
C8
R4
R80
R79
R85
C34
R33
R36
C21
R29
R28
Q8
Q3
R21
R19
L6
C13
R8
U6
C15
R23
R13
C11
C3
C6
R3
22
Z
Q14
Q12
R16
C17
C19
R6
C27
R68
CR4
R56
R55
R58
R70
R63
R60
C25
R10
R11
C10
U5
U4
R47
R41
R43
R45
U8
R78
C31
CR2
R49
L2
C29
R82
R67
R61
Q16
R74
Q18
Q10
R51
R72
C23
15
S
C4
R9
C24
R59
R62
R69
R57
R53
R54
CR3
R64
C26
U3
U2
C22
R71
R50
Q9
U7
R48
CR1
R87
C1
Q17
R73
Q15
R81
R65
R66
C28
8
J
R42
R44
R40
C30
R77
L3
C7
R7
Q13
Q11
R46
C16
C18
R39
R52
R34
R14
C14
R24
C2
R15
C12
C9
R2
1
A
R75
R83
C32
R76
C33
R84
U1
C20
R37
R35
R32
R30
Q5
Q2
Q7
Q1
R27
R26
R22
L7
R20
R18
L5
R12
C5
R1
R5
L1

A1



NOTES

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

REFERENCE DESIGNATIONS

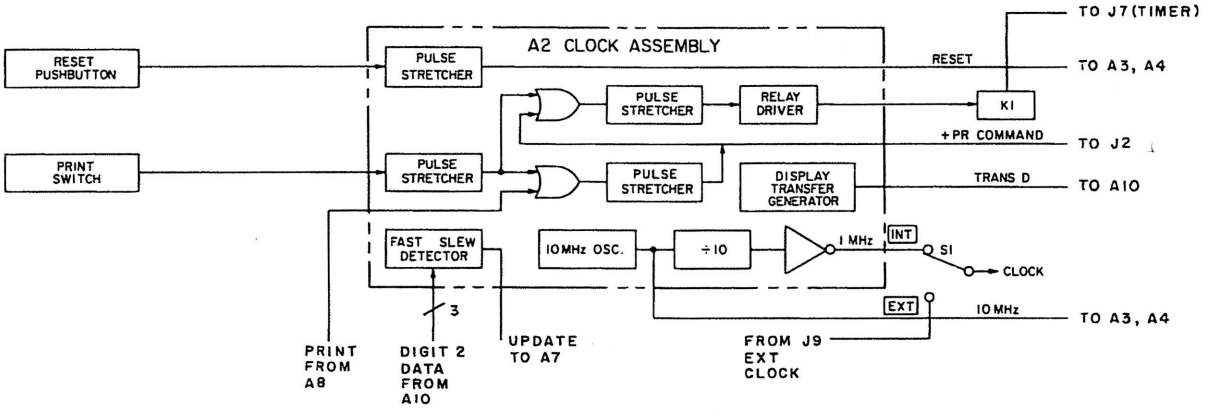
A1	NO PREFIX
C1-35	C4
CR1-4	
L1-8	J10
Q1-18	
R1-87	M1
U1-8	

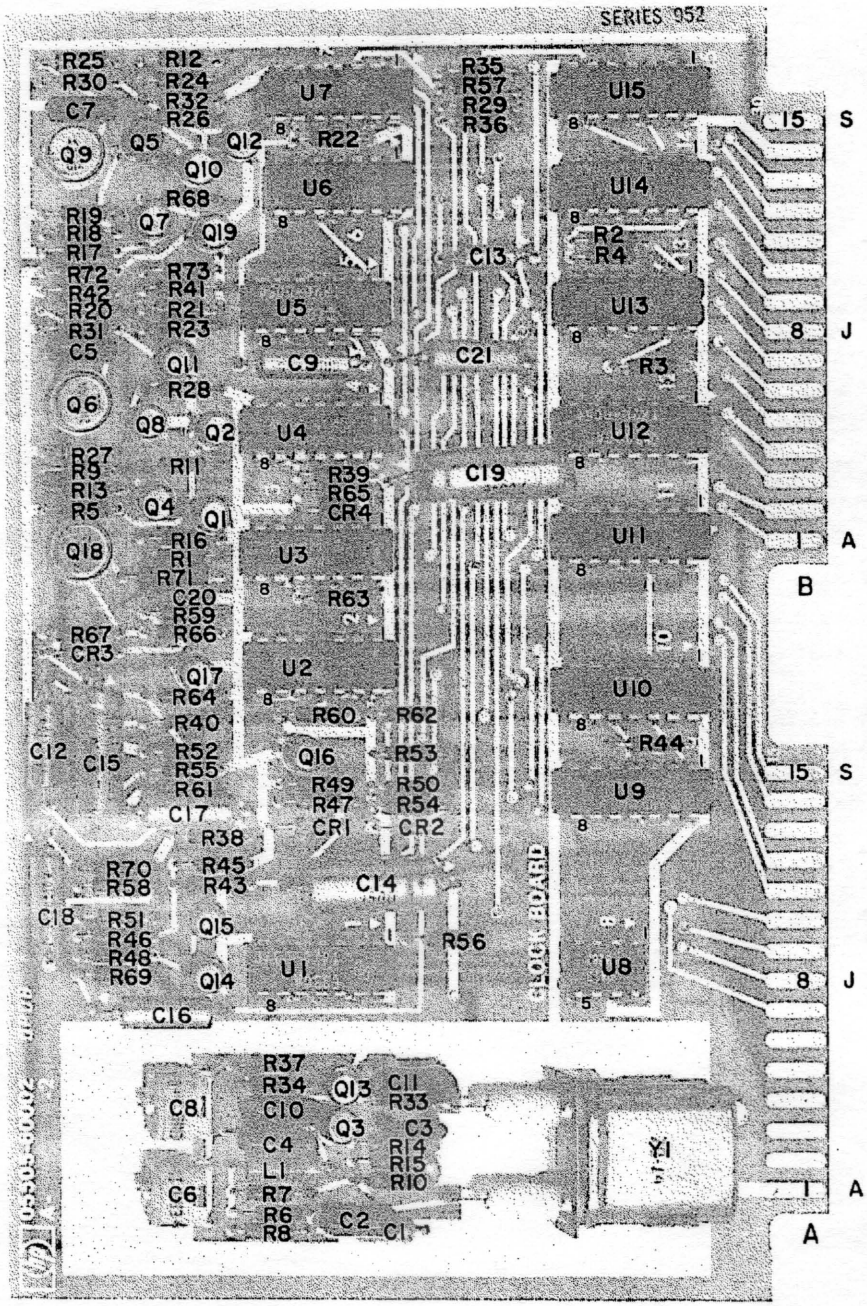
TABLE

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1, 2	1902-0049
CR3, 4	1901-0040
Q1-6, 9-14	1854-0019
Q7, 8, 17, 18	1854-0210
Q15, 16	1853-0010
U1, 6	1820-0370
U2	1820-0269
U3	1820-0328
U4	1820-0056
U5	1820-0055
U7, 8	1820-0433

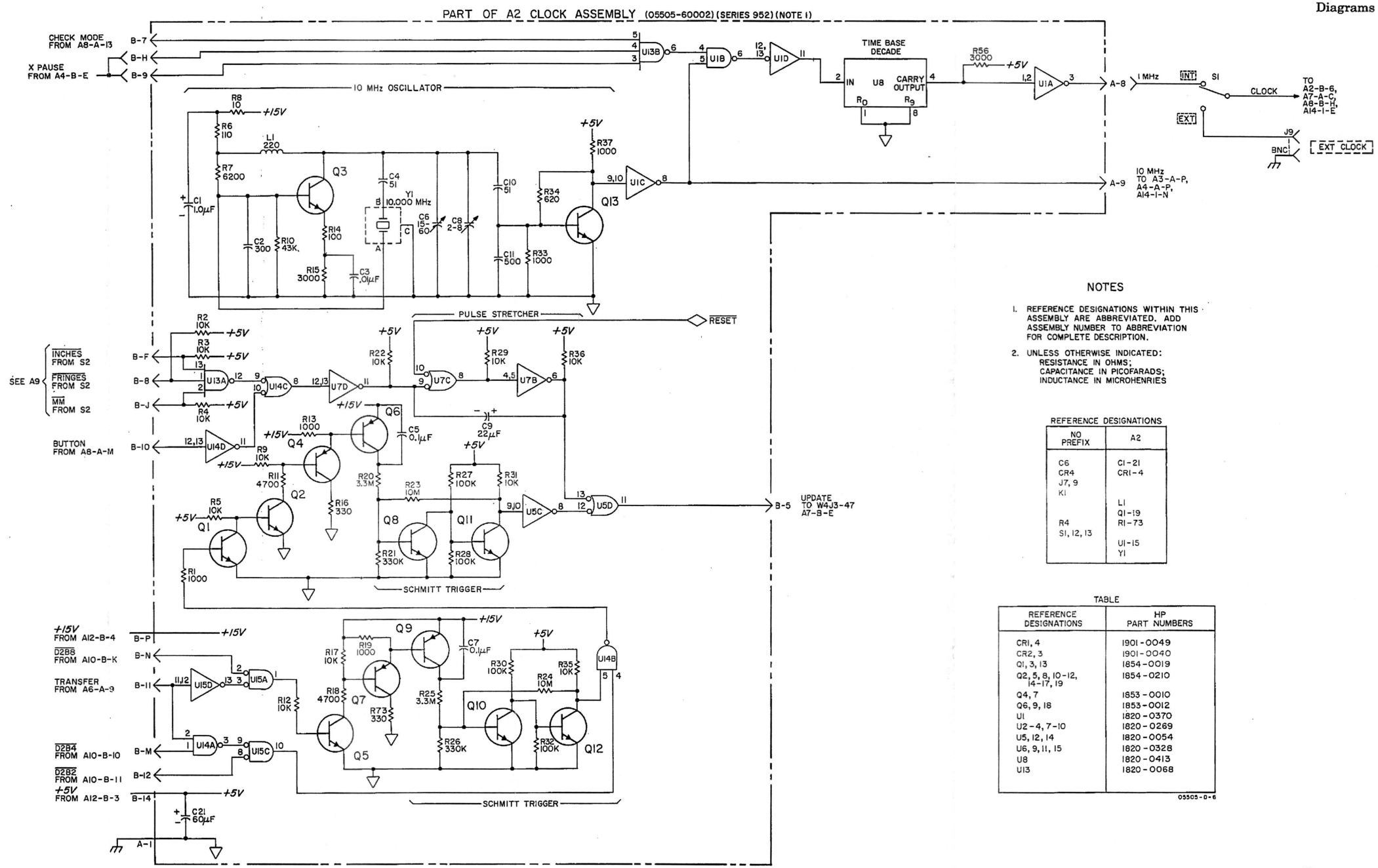
Figure 8-16
5505A LASER DISPLAY UNIT
A1 ANALOG BOARD

P/O Figure 8-17 (Sht 1)




SERIES 952
R25
R30
C7
Q9
Q5
R12
R24
R32
R26
Q12
U7
R22
Q10
R68
U6
R19
R18
R17
Q7
Q19
R72
R42
R20
R31
C5
R73
R41
R21
R23
U5
C9
Q11
R28
Q6
Q8
Q2
U4
R27
R9
R13
R5
Q4
R11
Q1
R39
R65
CR4
C19
Q18
R16
R1
R71
U3
C20
R59
R67
CR3
R66
R63
Q17
R64
R40
U2
R60
R62
C12
C15
R52
R55
R61
Q16
R53
R49
R47
C17
R50
R54
CR1
CR2
R38
R70
R58
R45
R43
C14
C18
R51
R46
R48
R69
Q15
Q14
U1
R56
C16
R37
R34
C10
C8
C4
L1
C6
R7
R6
R8
Q13
Q3
C2
C1
C11
R33
C3
R14
R15
R10
Y1
R35
R57
R29
R36
U15
R22
U14
R2
R4
C13
U13
R3
C21
U12
C19
U11
B
U10
R44
U9
U8
U15
U14
U13
U12
U11
U10
U9
U8
15
S
8
J
A
15
S
8
J
A
A

A2



NOTES

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

REFERENCE DESIGNATIONS

NO PREFIX	A2
C6	C1-21
CR4	CR1-4
J7, 9	
K1	
	L1
	Q1-19
R4	R1-73
S1, 12, 13	
	U1-15
	Y1

TABLE

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1, 4	1901-0049
CR2, 3	1901-0040
Q1, 3, 13	1854-0019
Q2, 5, 8, 10-12, 14-17, 19	1854-0210
Q4, 7	1853-0010
Q6, 9, 18	1853-0012
U1	1820-0370
U2-4, 7-10	1820-0269
U5, 12, 14	1820-0054
U6, 9, 11, 15	1820-0328
U8	1820-0413
U13	1820-0068

05505-D-6

Figure 8-17
5505A LASER DISPLAY UNIT
A2 CLOCK BOARD
(Sheet 1 of 2)

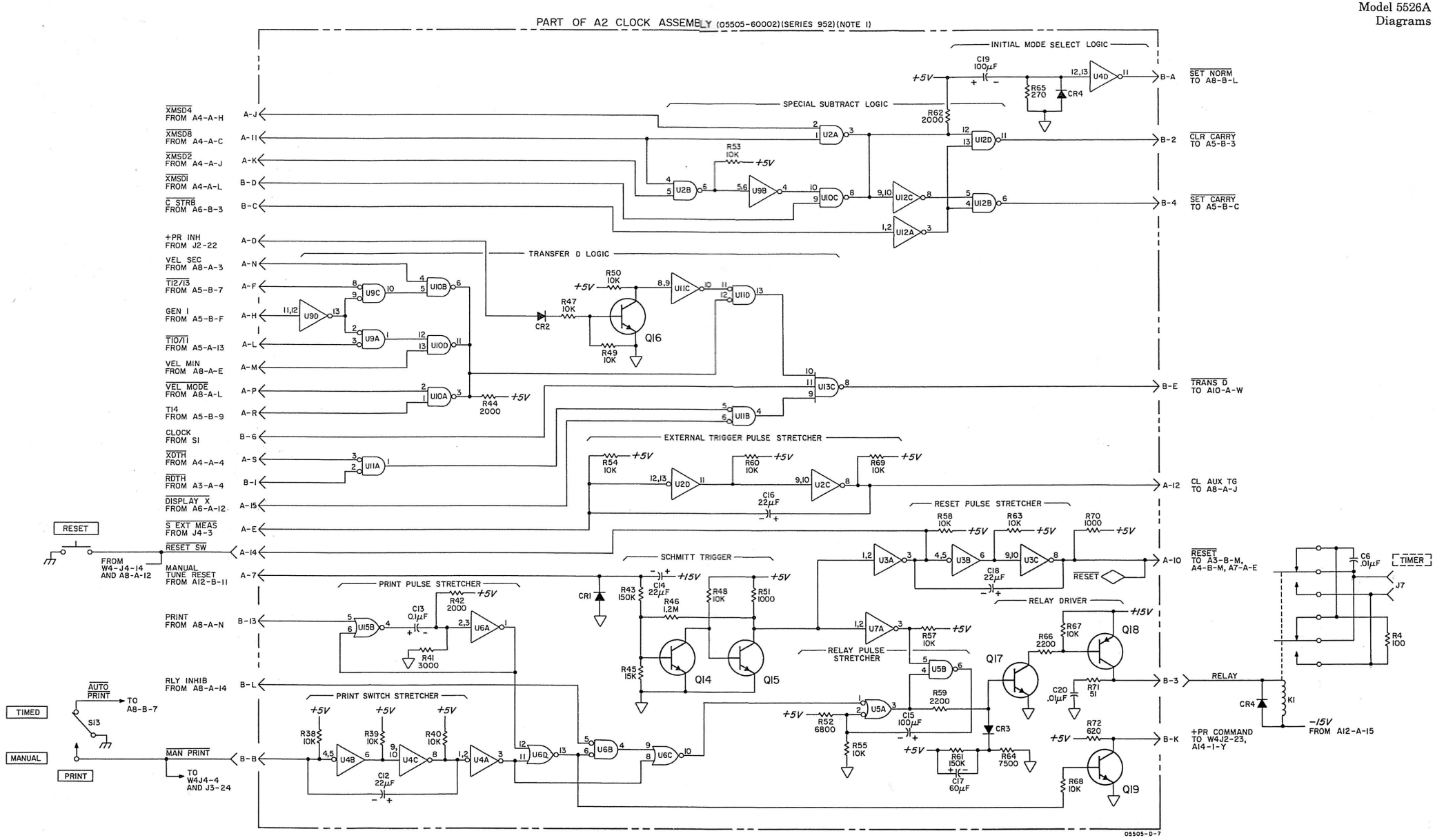
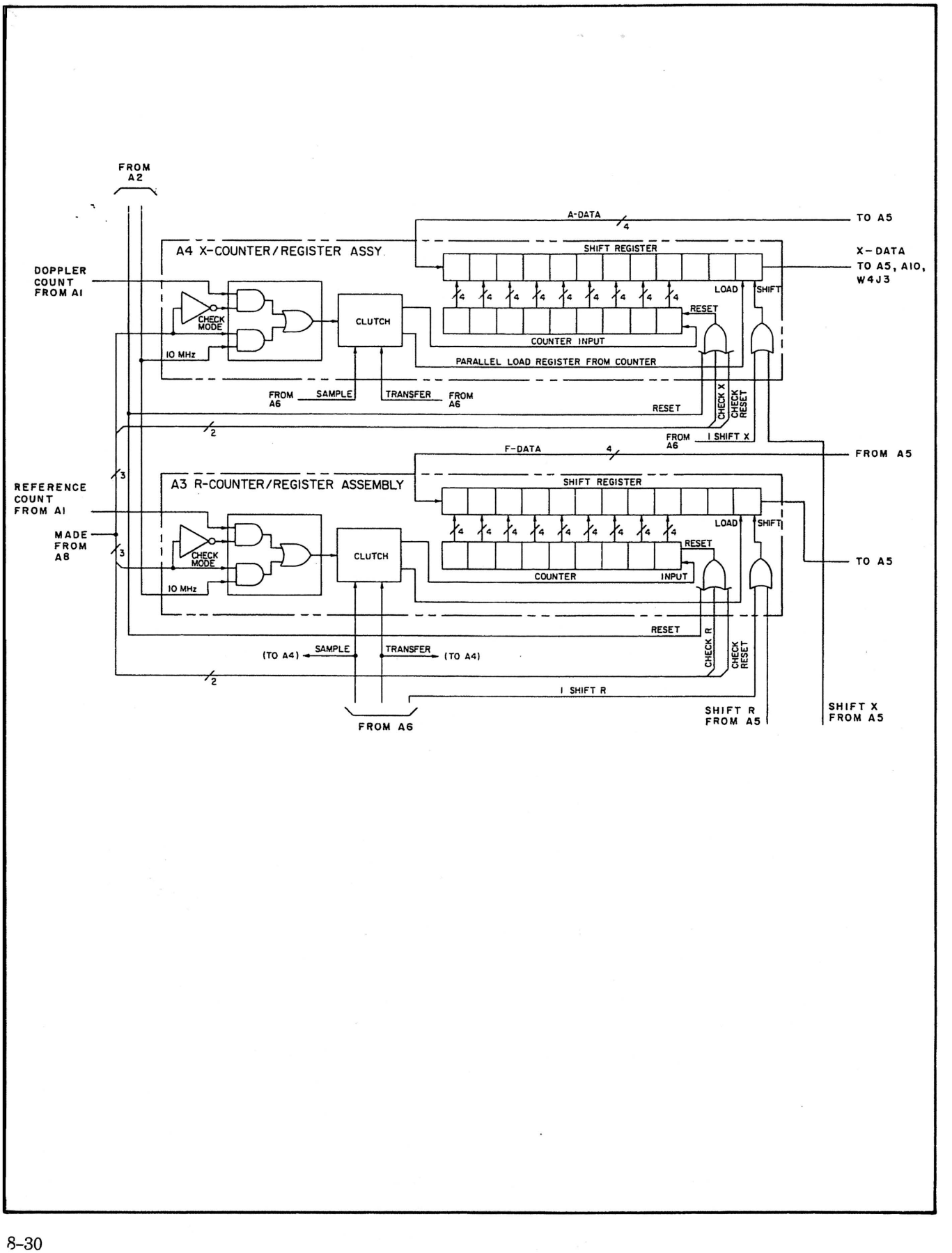
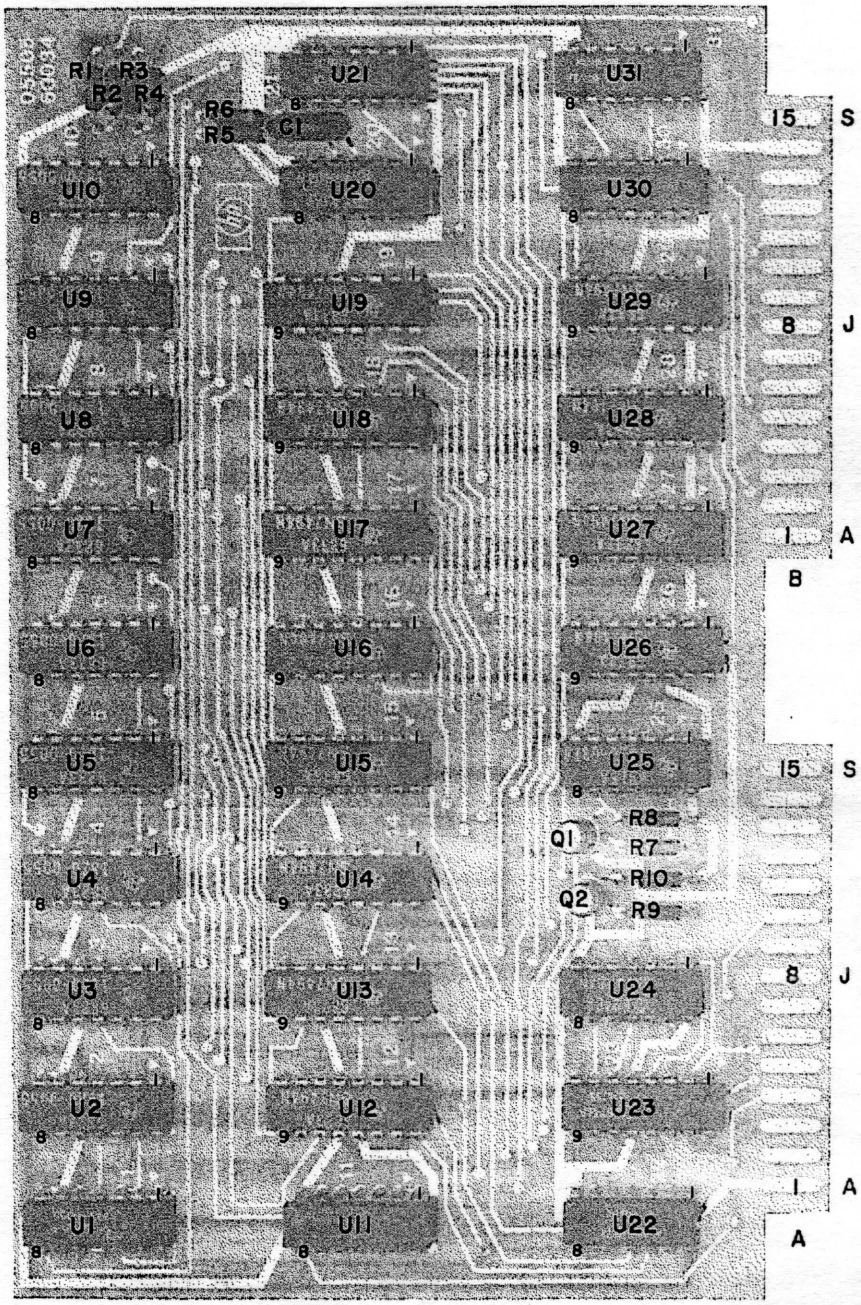


Figure 8-17
5505A LASER DISPLAY UNIT
A2 CLOCK BOARD
(Sheet 2 of 2)

P/O Figure 8-18




R1
R3
R2
R4
R6
R5
C1
U21
U31
U10
U20
U30
U9
U19
U29
U8
U18
U28
U7
U17
U27
U6
U16
U26
U5
U15
U25
U4
U14
U3
U13
U24
U2
U12
U23
U1
U11
U22
Q1
R8
R7
Q2
R10
R9
15
S
8
J
1
A
B
15
S
8
J
1
A
A

A3 A4

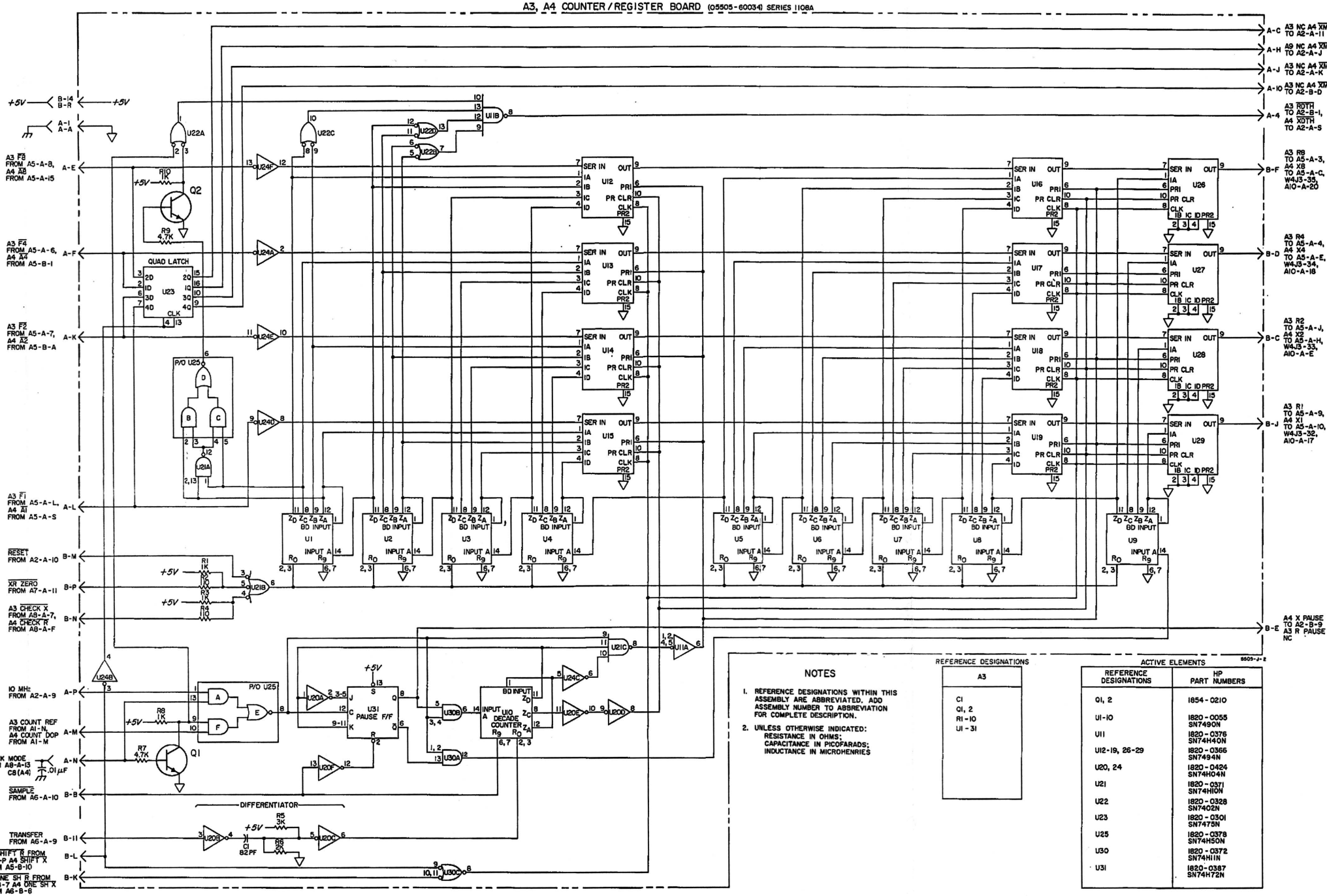
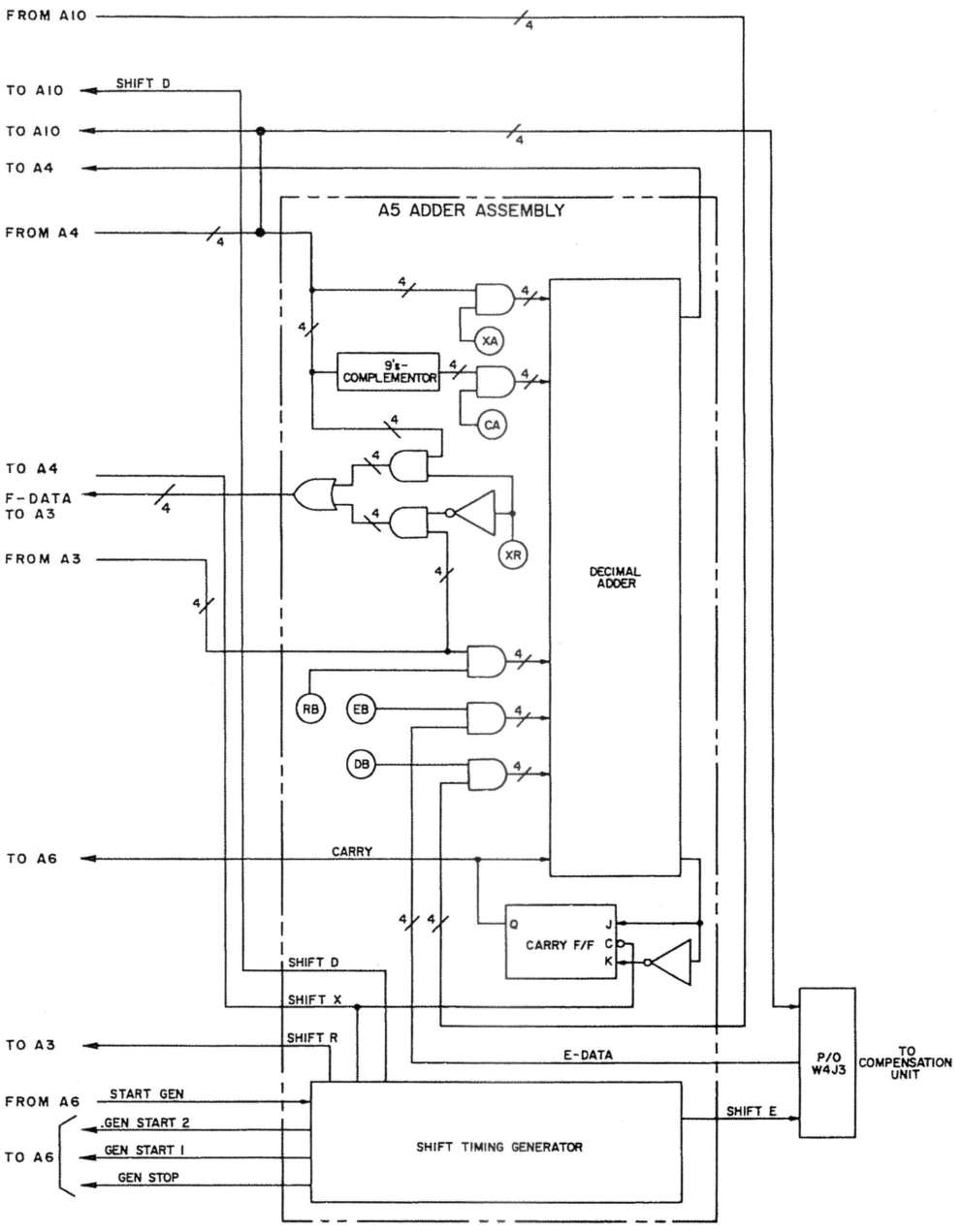
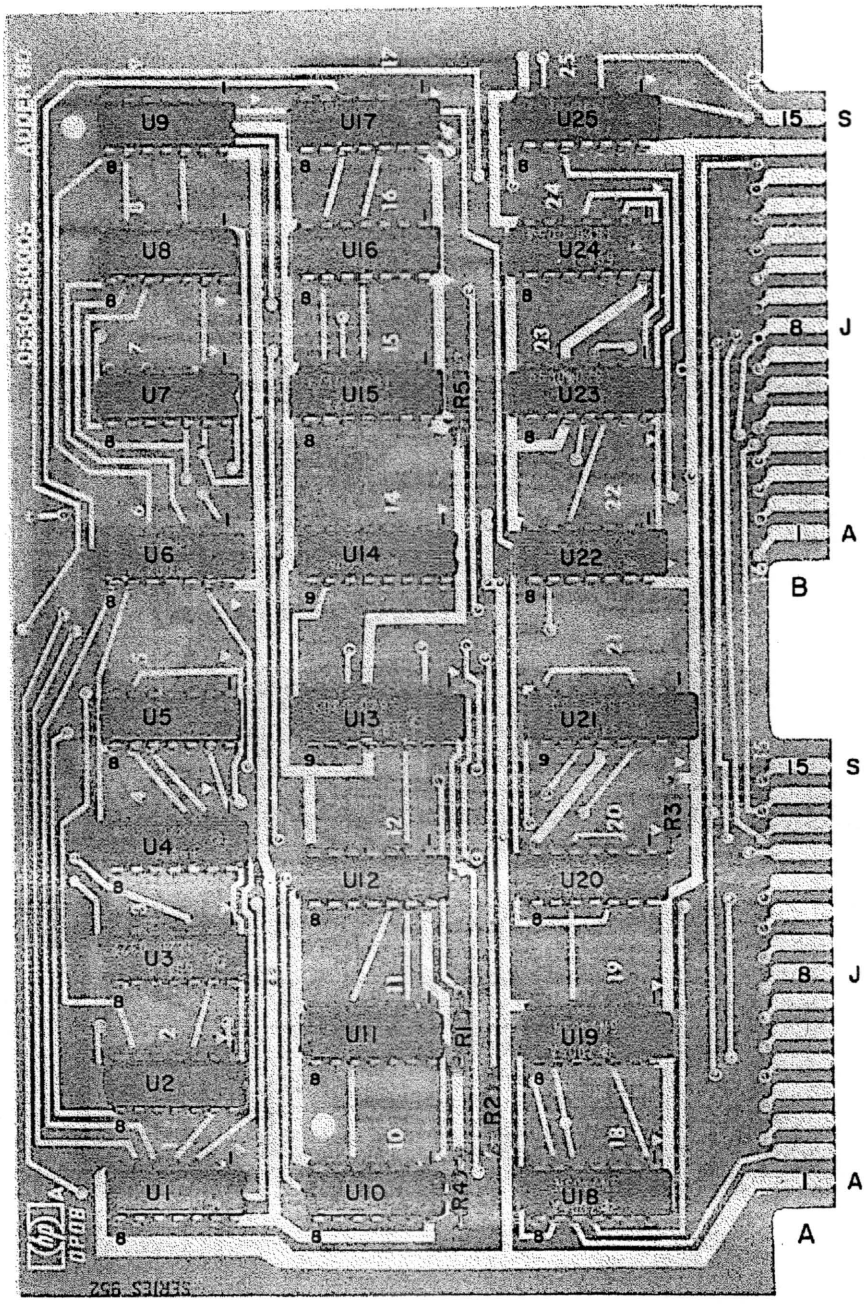


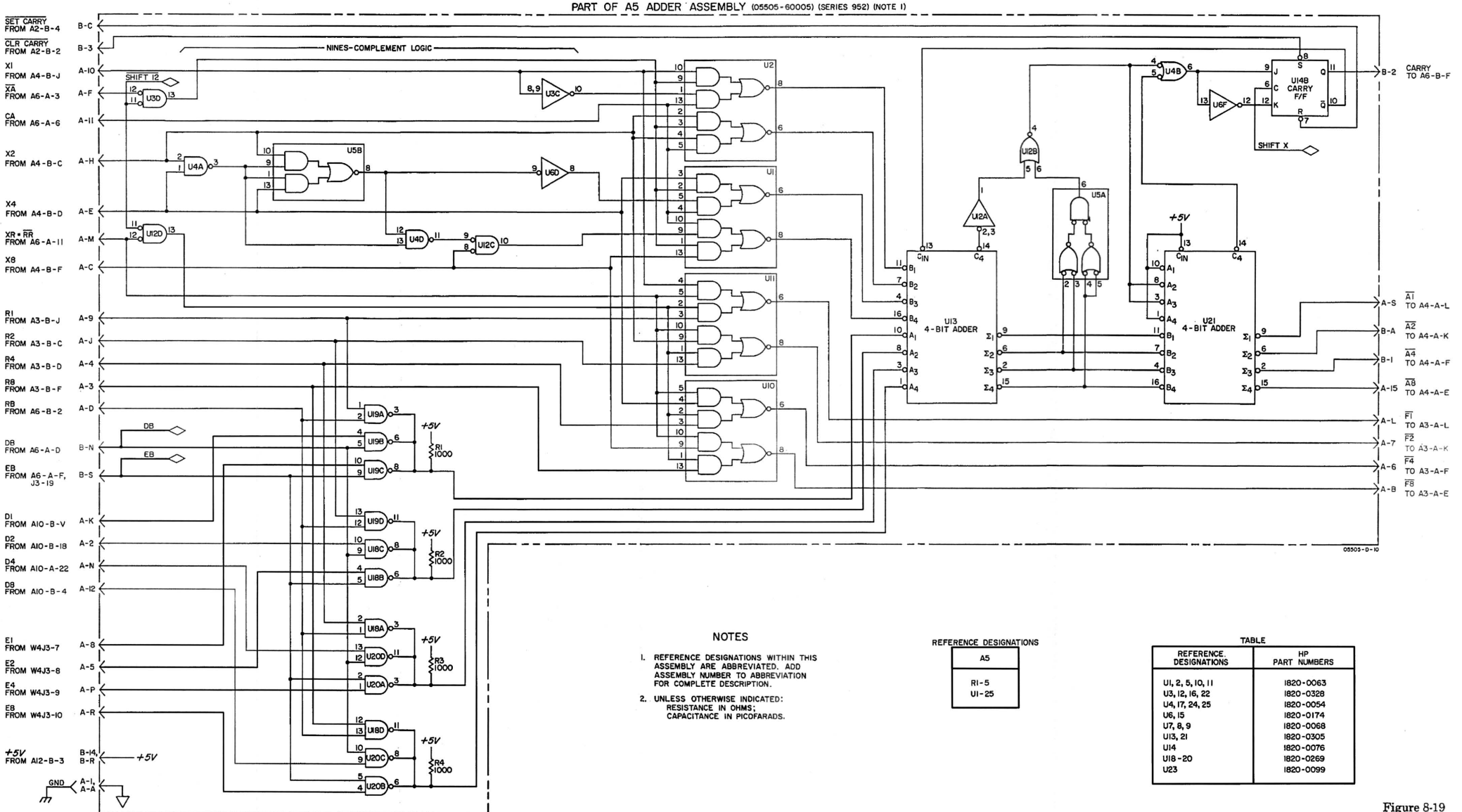
Figure 8-18
5505A LASER DISPLAY UNIT
A3 R-REGISTER, A4 X-REGISTER

P/O Figure 8-19 (Sht 1)




ADDER
U9
U17
U25
U8
U16
U24
U7
U15
U23
U6
U14
U22
U5
U13
U21
U4
U12
U20
U3
U11
U19
U2
U10
U18
U1
R1
R2
R3
R4
R5
15
S
8
J
A
B
15
S
8
J
A
A
SERIES 932

A5



NOTES

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

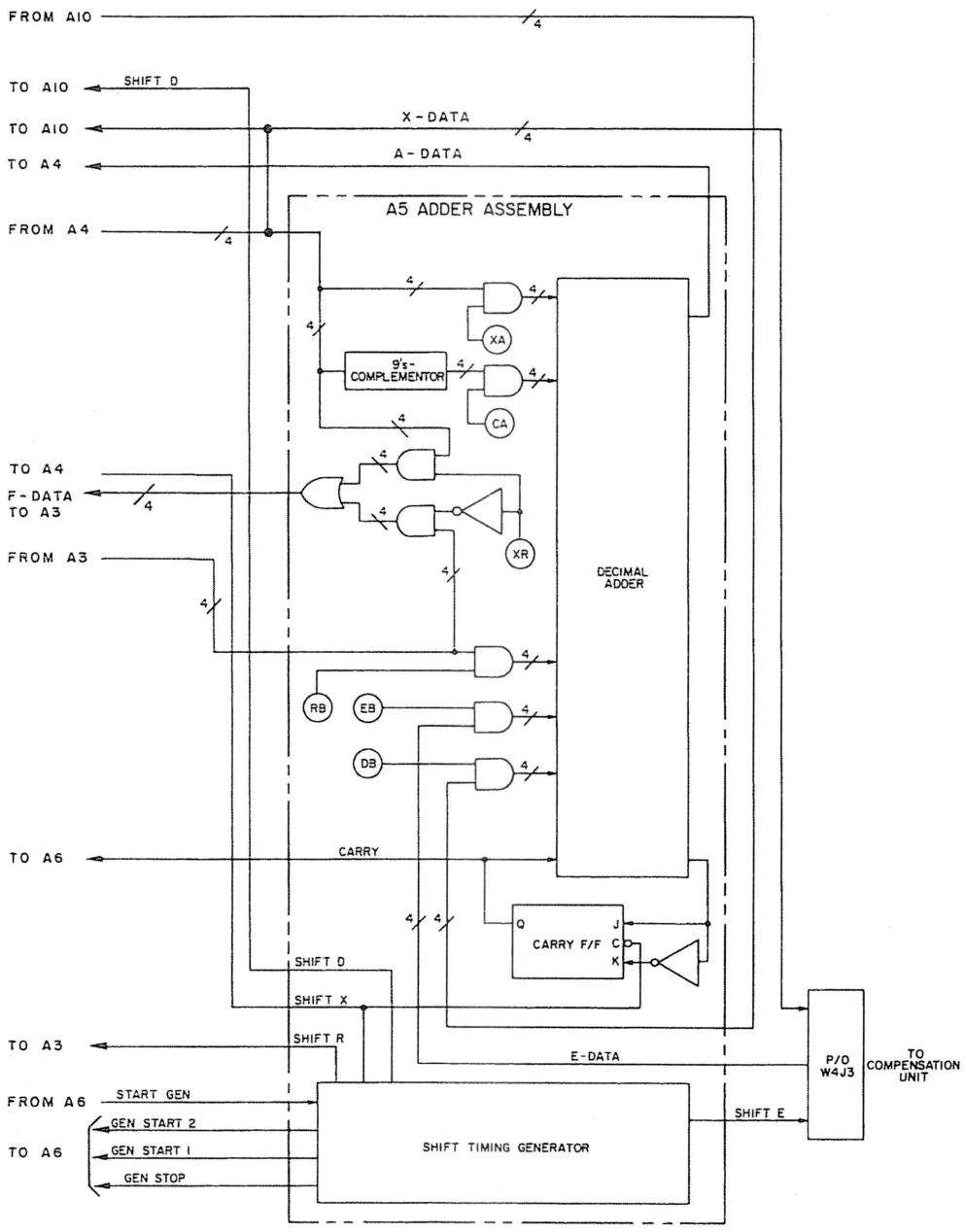
REFERENCE DESIGNATIONS

A5
RI-5 UI-25

TABLE

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1, 2, 5, 10, 11	1820-0063
U3, 12, 16, 22	1820-0328
U4, 17, 24, 25	1820-0054
U6, 15	1820-0174
U7, 8, 9	1820-0068
U13, 21	1820-0305
U14	1820-0076
U18-20	1820-0269
U23	1820-0099

Figure 8-19
5505A LASER DISPLAY UNIT
A5 ADDER
(Sheet 1 of 2)


FROM A10
TO A10
SHIFT D
TO A10
X-DATA
TO A4
A-DATA
A5 ADDER ASSEMBLY
FROM A4
XA
9's-
COMPLEMENTOR
CA
TO A4
F-DATA
TO A3
XR
DECIMAL
ADDER
FROM A3
RB
EB
DB
TO A6
CARRY
Q
J
C
K
CARRY F/F
SHIFT D
SHIFT X
TO A3
SHIFT R
E-DATA
P/O
W4J3
TO
COMPENSATION
UNIT
FROM A6
START GEN
GEN START 2
TO A6
GEN START 1
GEN STOP
SHIFT TIMING GENERATOR
SHIFT E

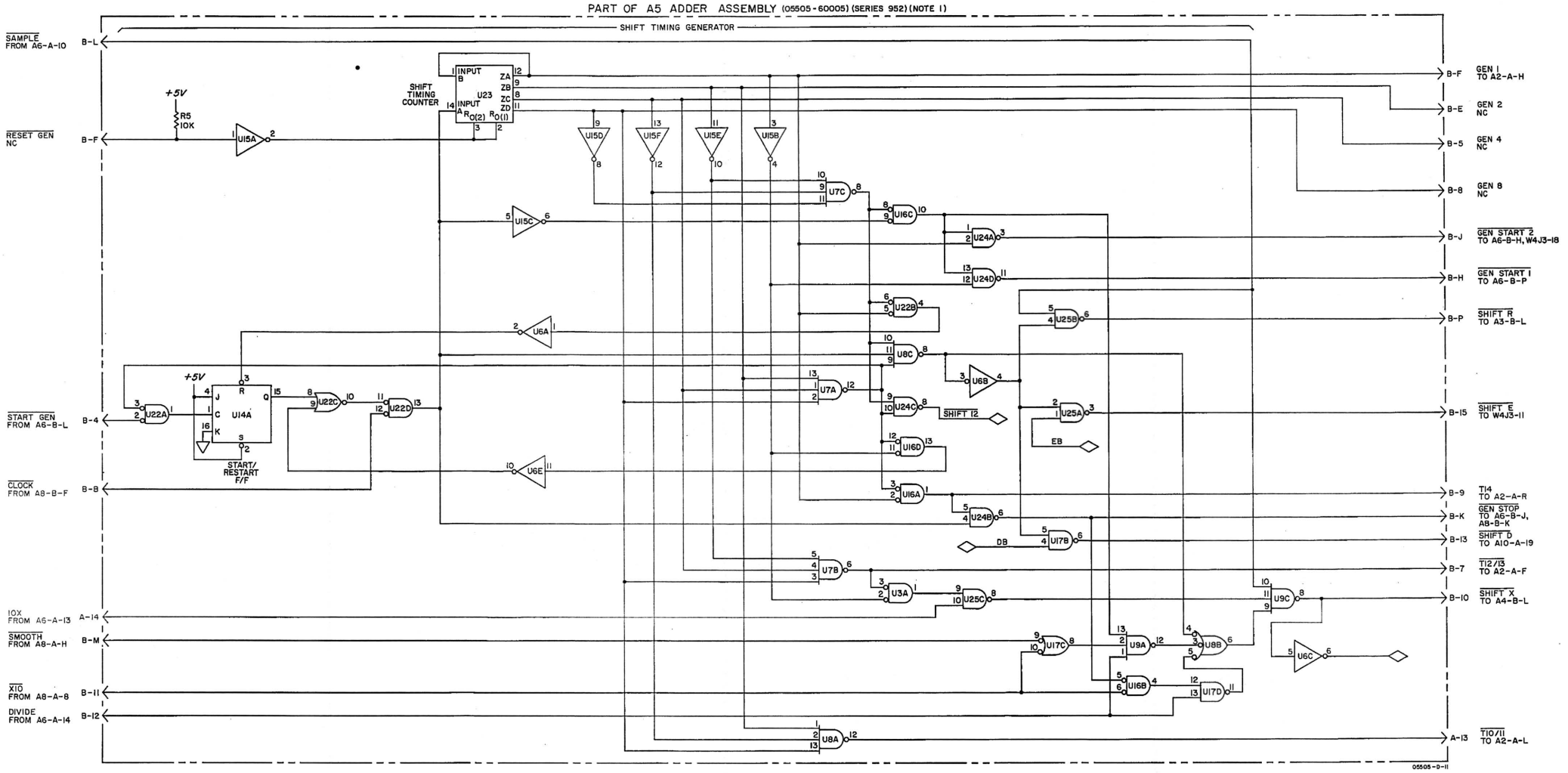
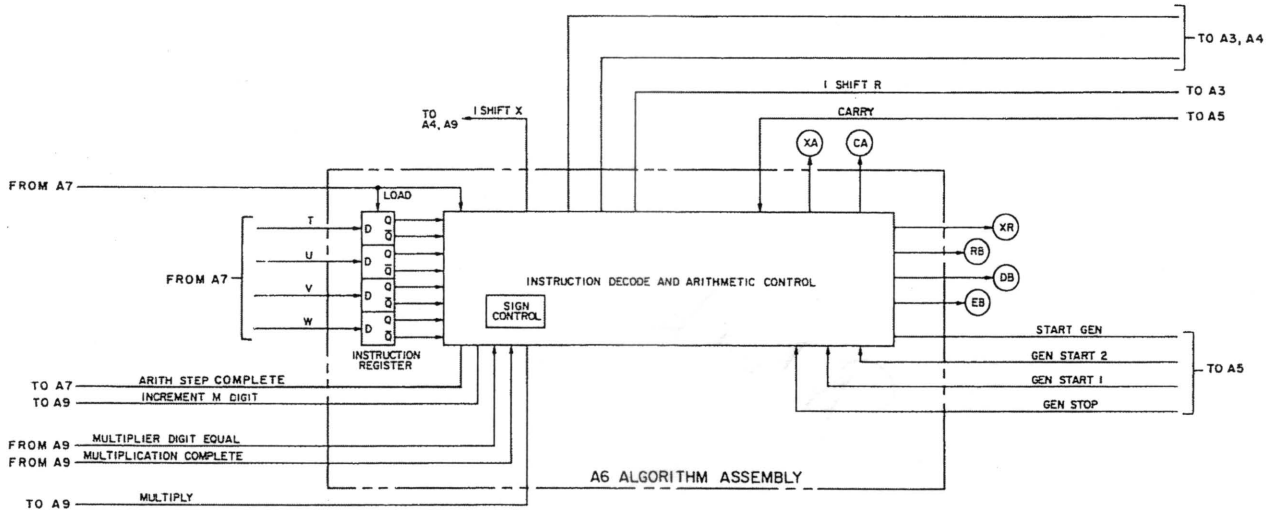
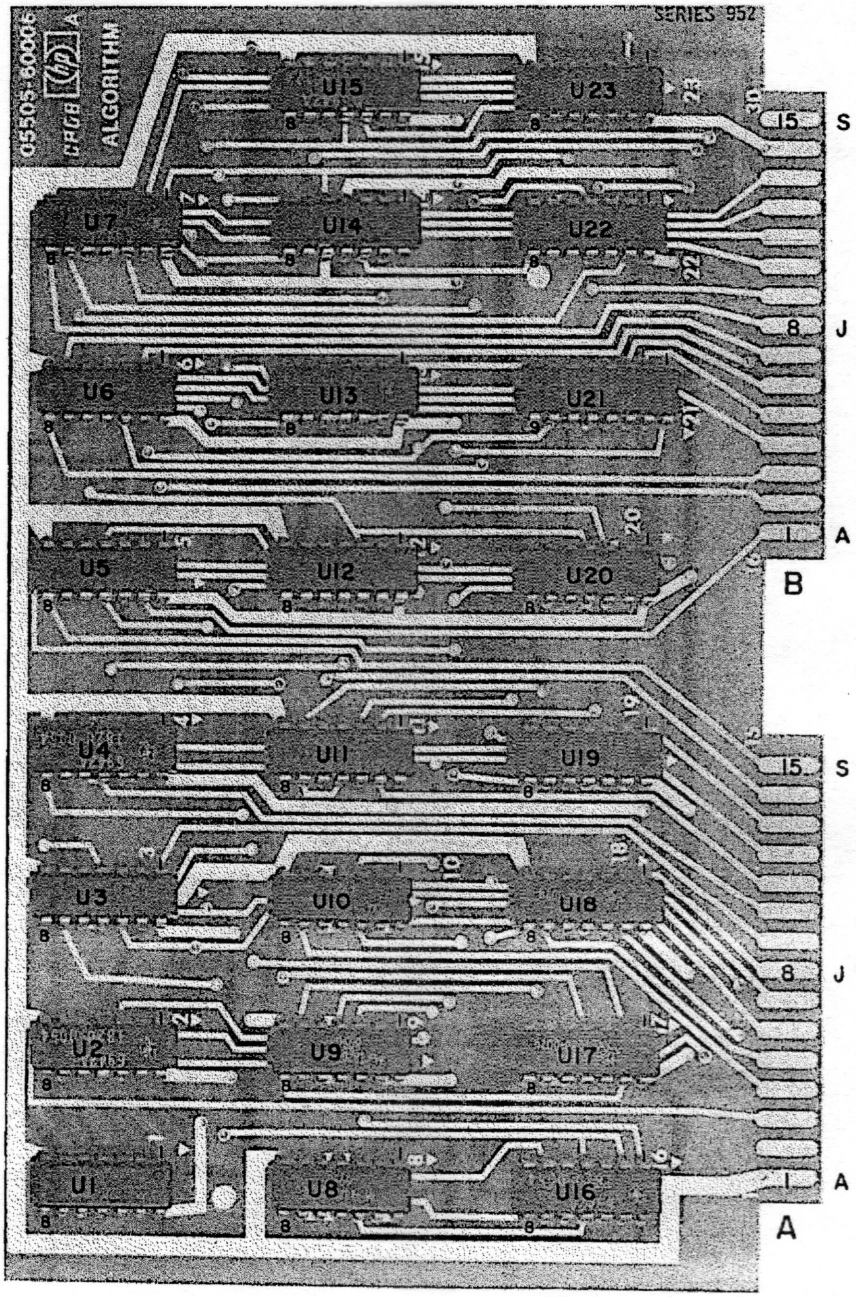


Figure 8-19
5505A LASER DISPLAY UNIT
A5 ADDER
(Sheet 2 of 2)

P/O Figure 8-20





A6

NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.

REFERENCE DESIGNATIONS

NO PREFIX	A6
S5	U1-23

TABLE

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1, 23	1820-0063
U2, 4, 7, 13, 16	1820-0054
U3, 5, 11, 12, 19, 22	1820-0328
U6, 20	1820-0068
U8-10	1820-0304
U14	1820-0075
U15	1820-0174
U17, 18	1820-0074
U21	1820-0301

05505-D-12

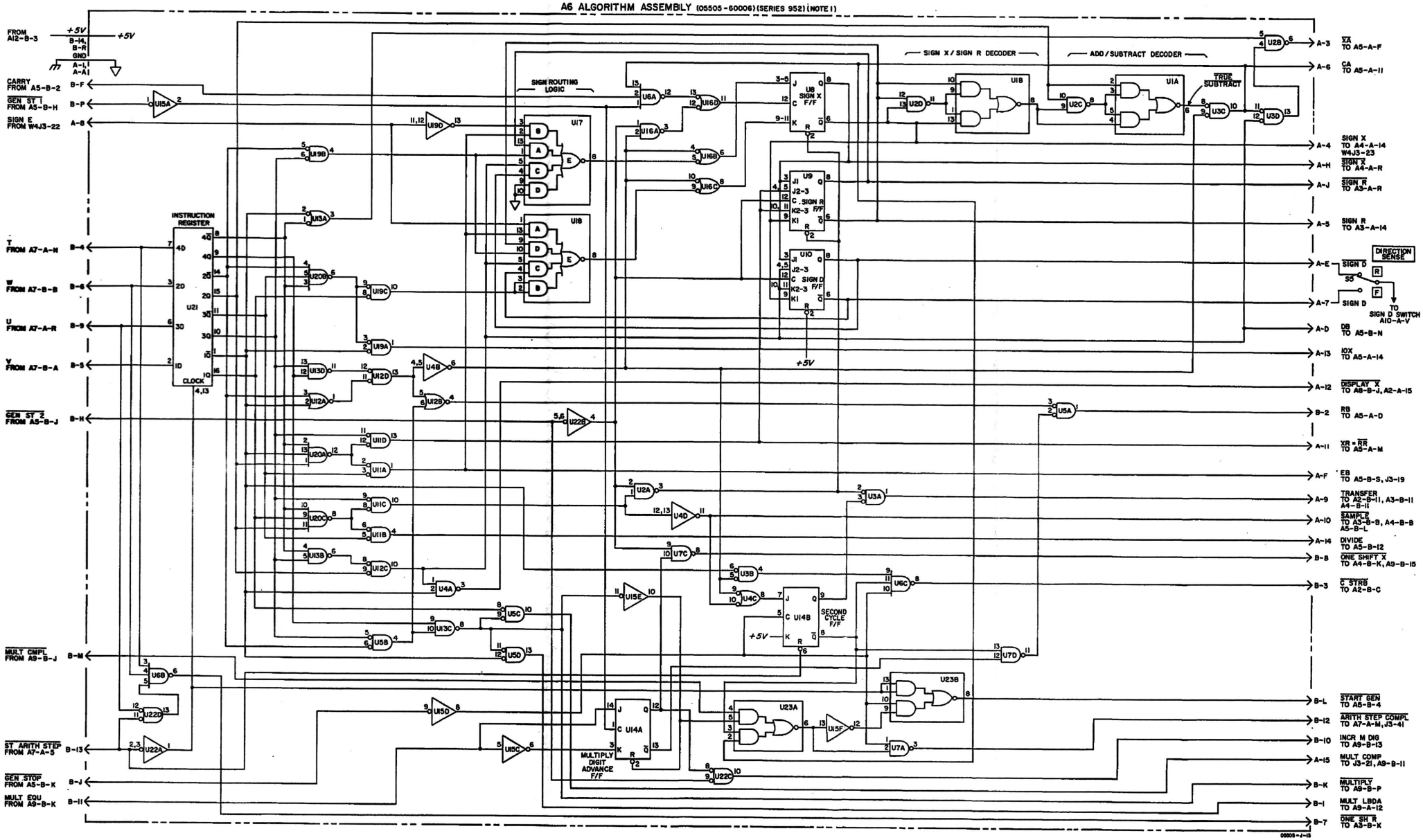
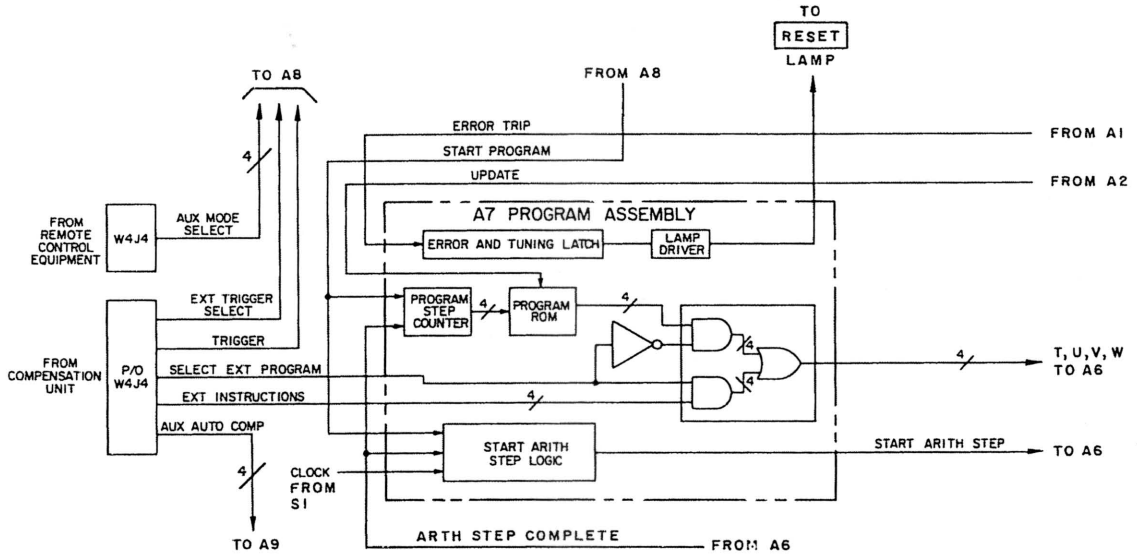
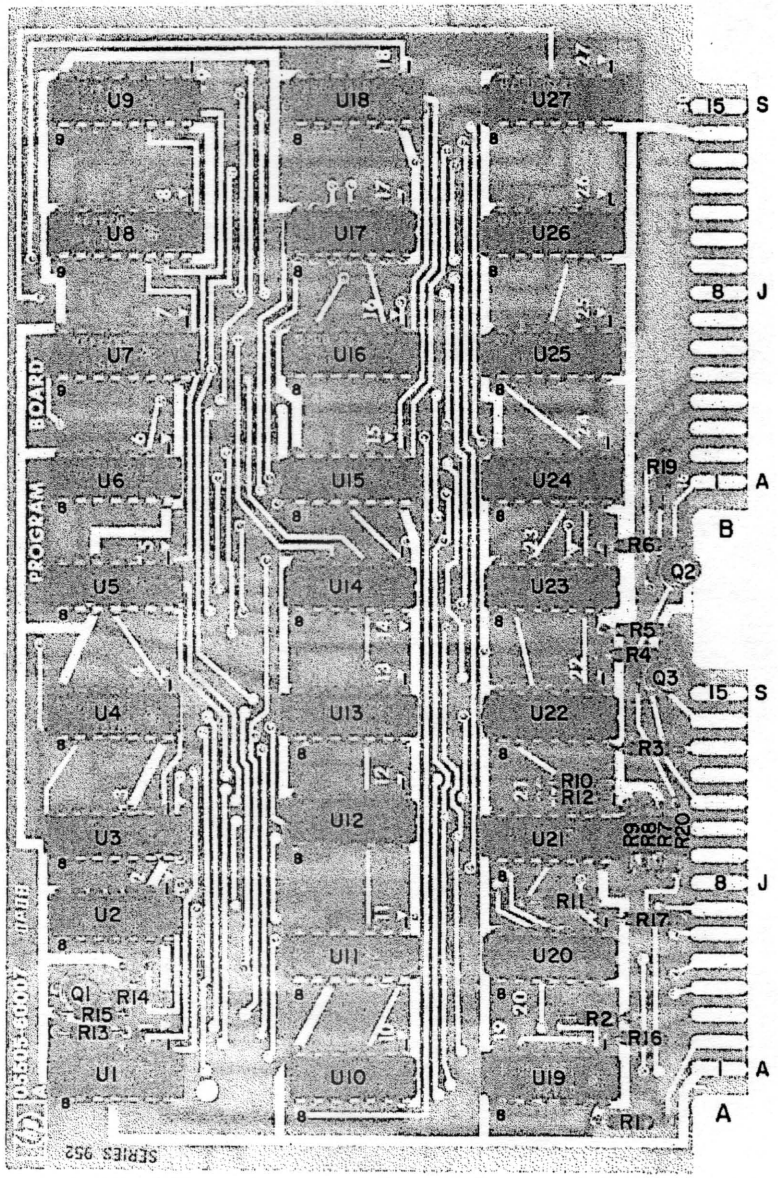


Figure 8-20
5505A LASER DISPLAY UNIT
A6 ALGORITHM BOARD

P/O Figure 8-21





A7

NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS.

REFERENCE DESIGNATIONS

A7
C10 Q1-3 R1-20 U1-27

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
C10	0160-0161
Q1-3	1854-0210
U1, 3	1820-0075
U2	1820-0304
U4, 18, 19	1820-0054
U5, 11	1820-0099
U6, 15, 21	1820-0269
U7-9	1820-0214
U10, 22, 23	1820-0063
U12, 14	1820-0174
U13, 24	1820-0328
U16, 25-27	1820-0070
U17	1820-0069
U20	1820-0068

05505-D-14

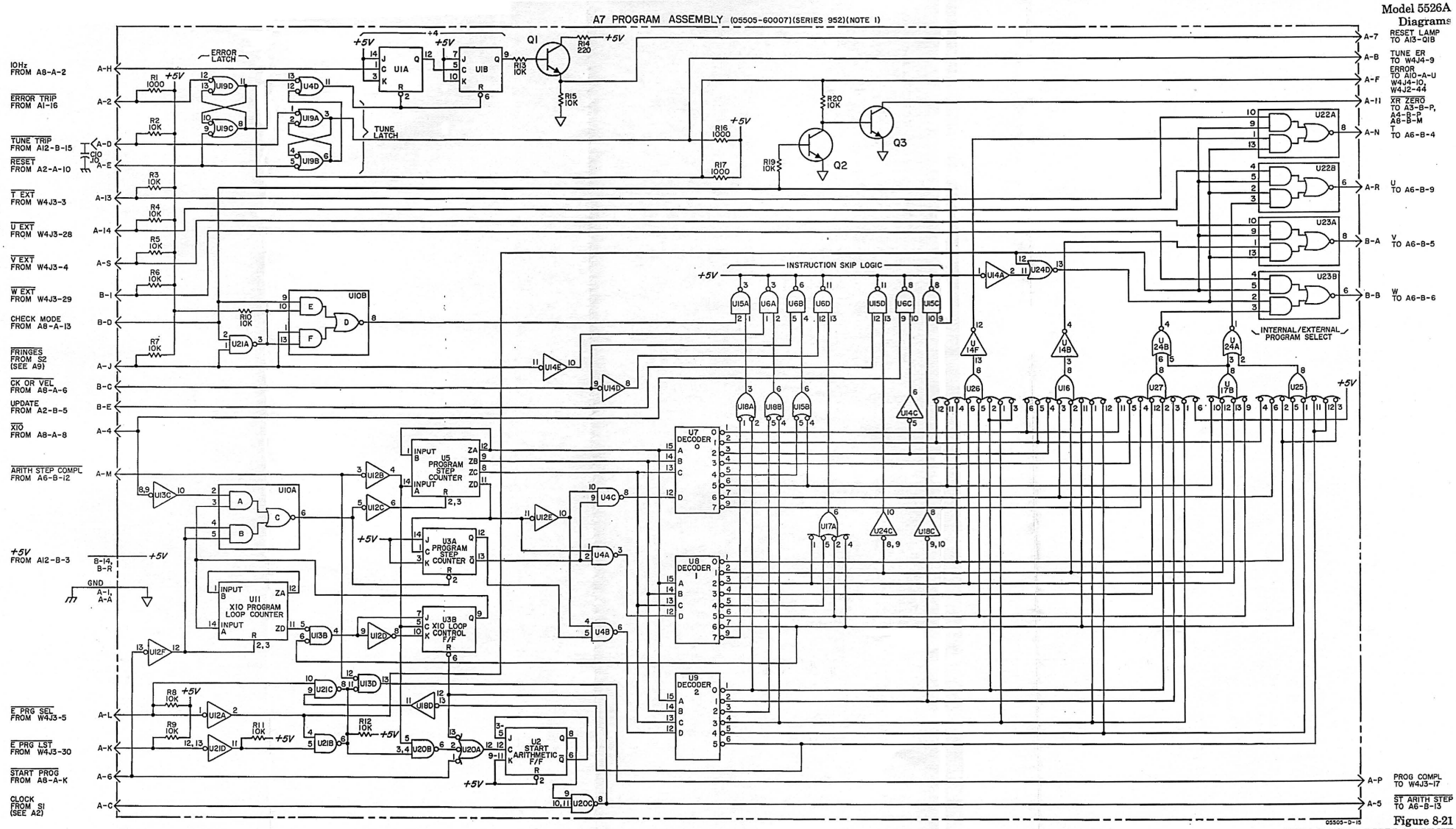
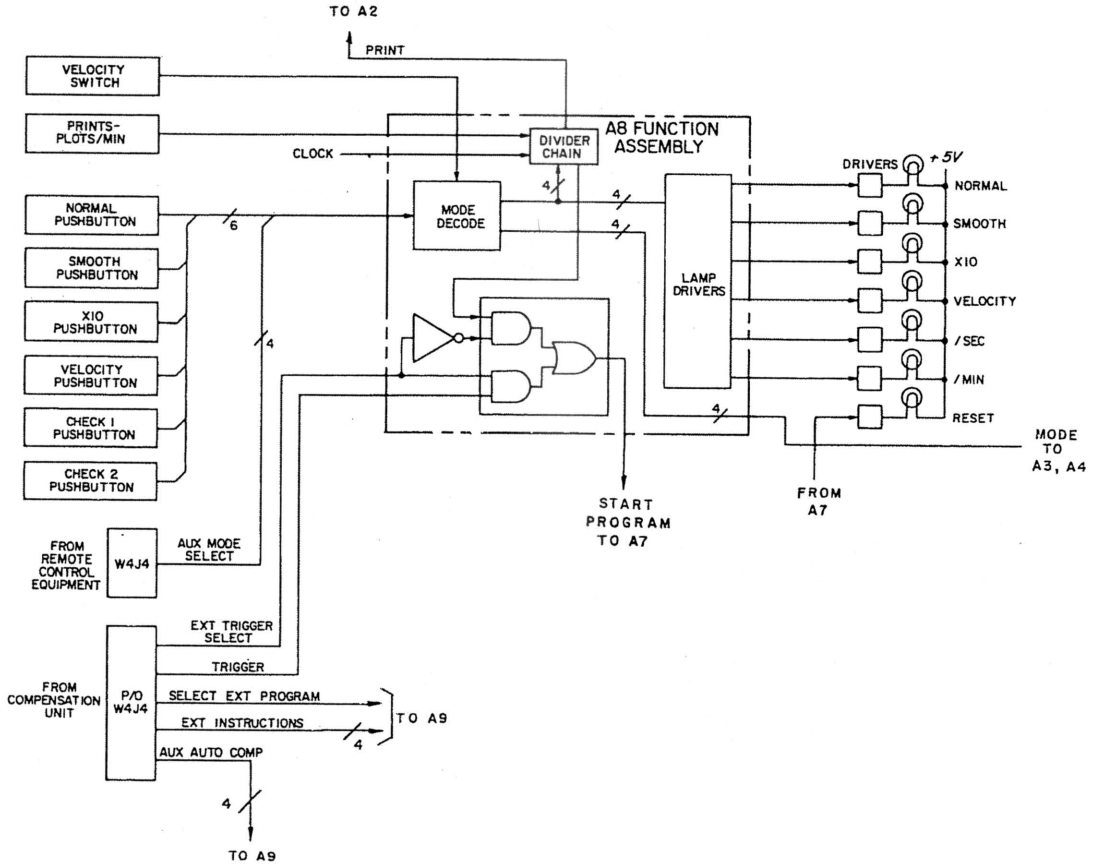
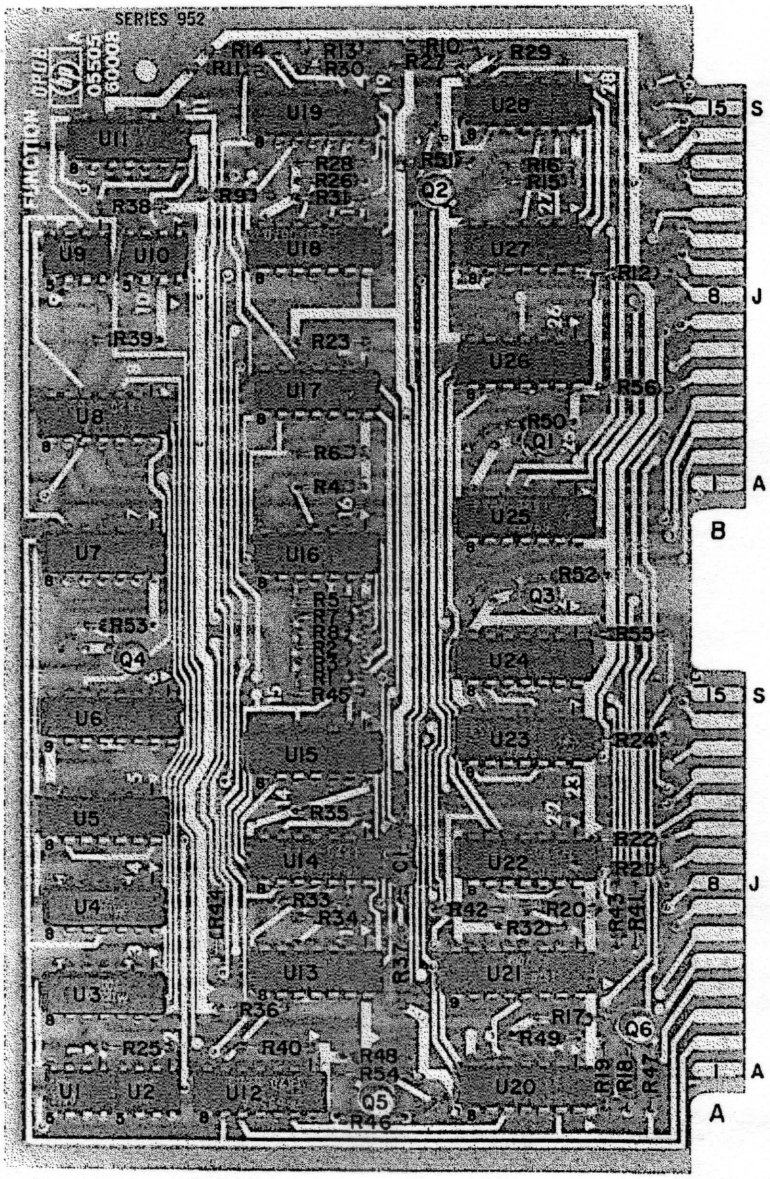


Figure 8-21
5505A LASER DISPLAY UNIT
A7 PROGRAM BOARD

P/O Figure 8-22





A8

NOTES

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

REFERENCE DESIGNATIONS

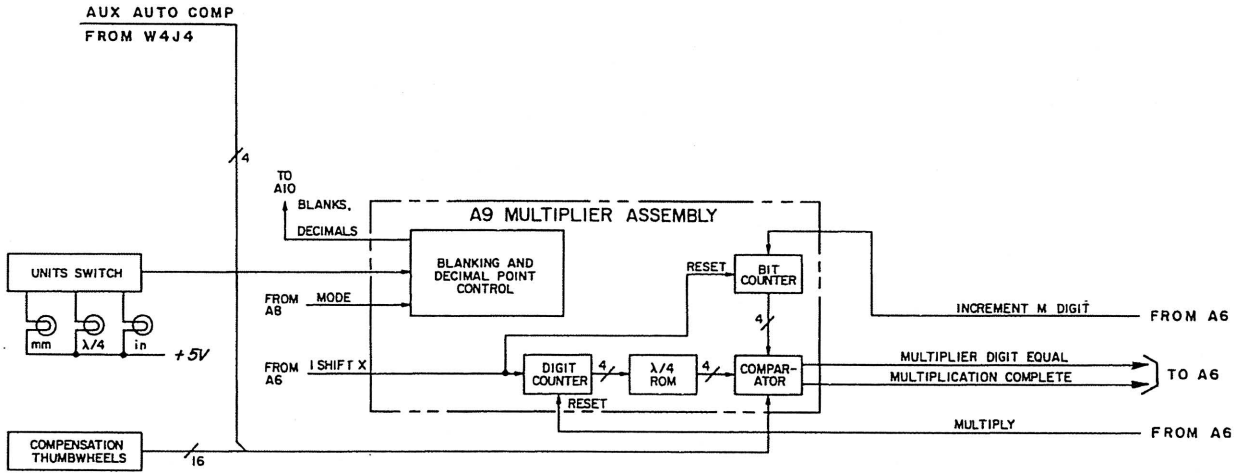
NO PREFIX	A8
S4, 6-11, 14	Q1-6 R1-36, 38-56 U1-28

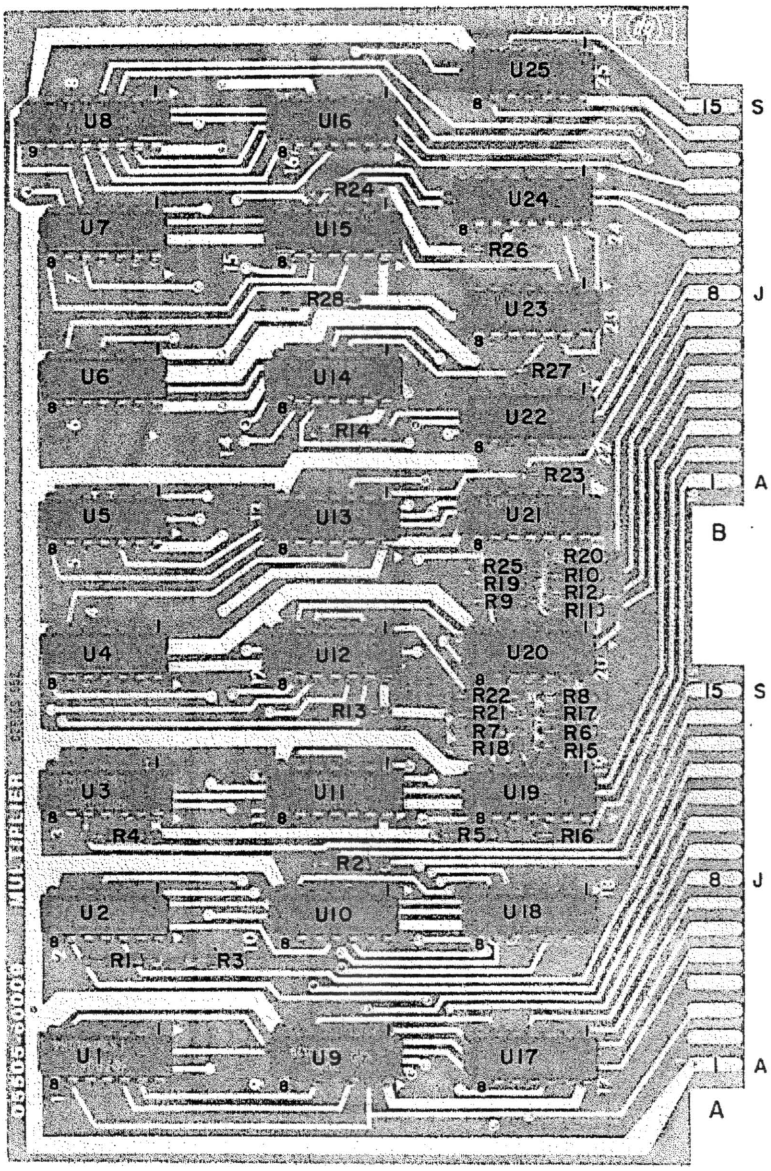
TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
Q1-6	1854-0210
U1, 2	1820-0412
U9, 10	1820-0413
U3, 4, 11	1820-0055
U5, 15	1820-0075
U6	1820-0076
U7	1820-0063
U8, 12, 14	1820-0269
U13, 20, 22, 24, 26	1820-0328
U16, 19, 27, 28	1820-0069
U17	1820-0174
U18	1820-0070
U21	1820-0214
U23, 25	1820-0054

05505-D-16

P/O Figure 8-23





A9

NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.

REFERENCE DESIGNATIONS

NO PREFIX	A9
S2	R1-28 U1-25

TABLE

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1, 3, 21, 23	1820-0054
U2, 10, 17, 18, 25	1820-0328
U4, 6, 7, 19, 20	1820-0069
U5	1820-0070
U8	1820-0214
U9	1820-0174
U11-15	1820-0269
U16	1820-0055
U22	1820-0074
U24	1820-0209

05505-D-18

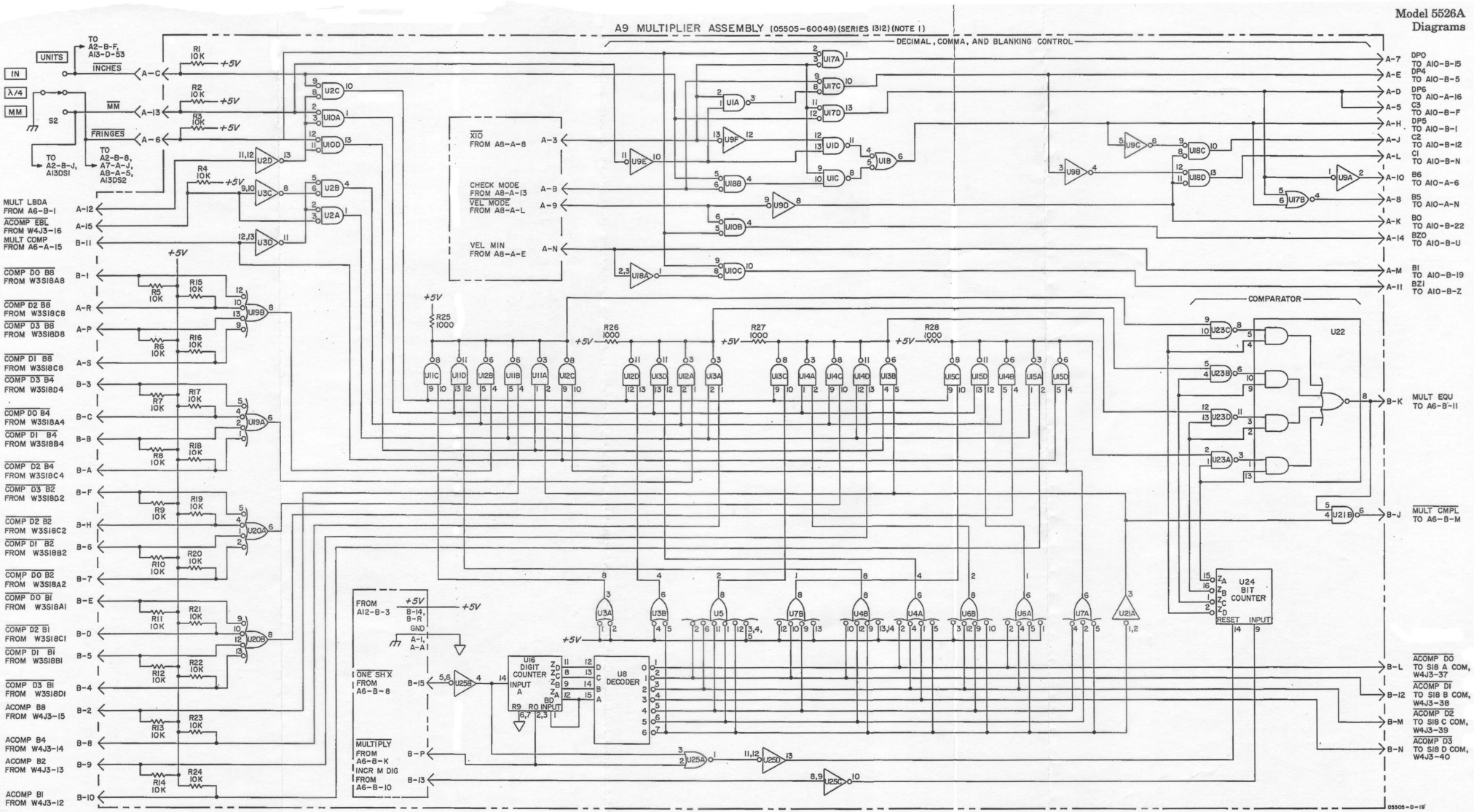
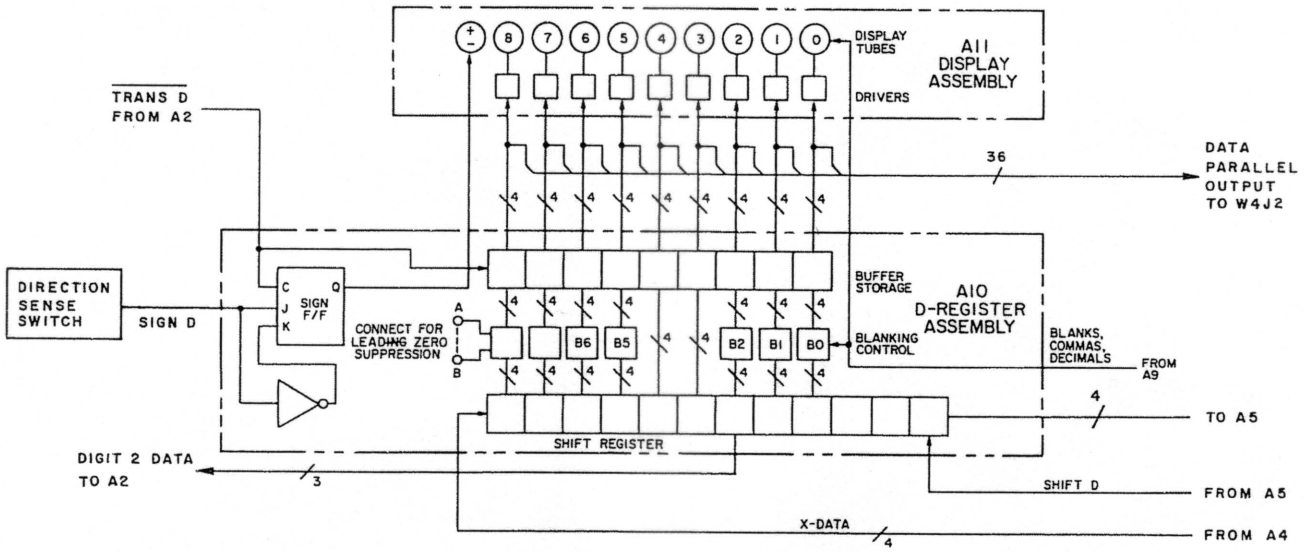
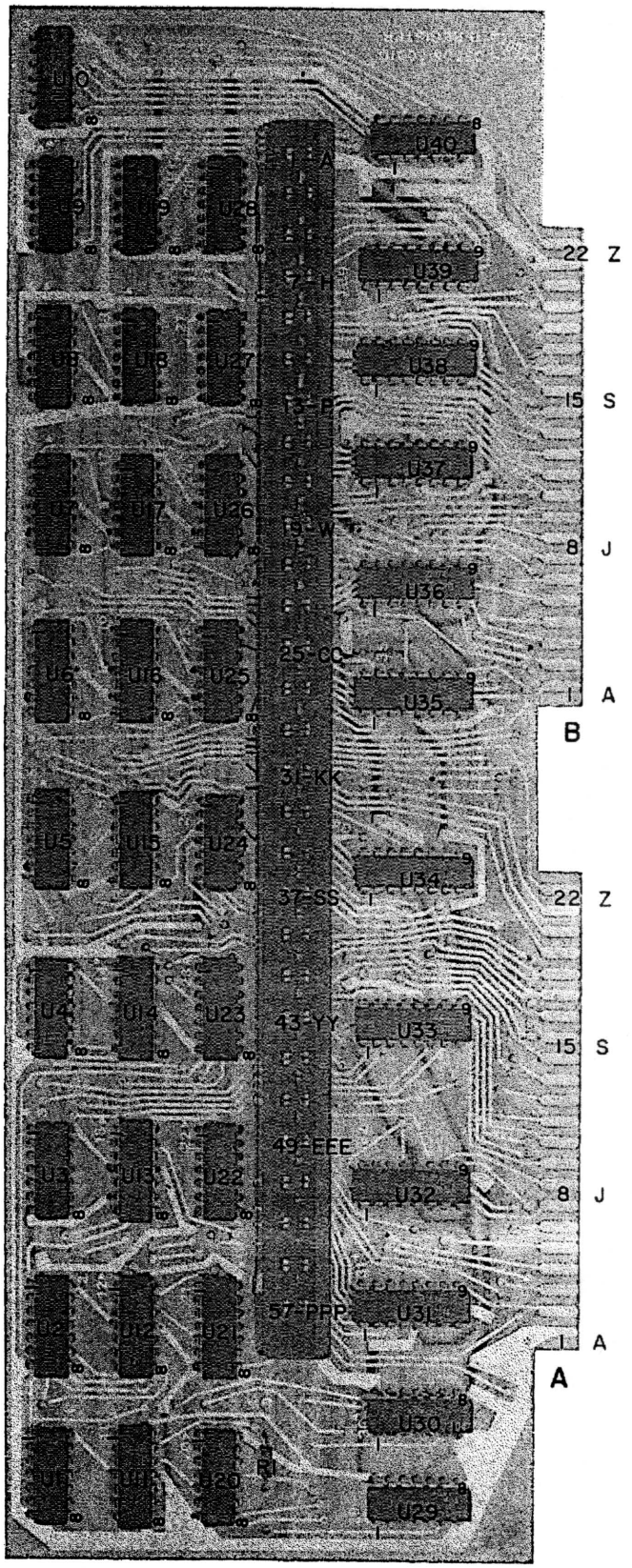


Figure 8-23
5505A LASER DISPLAY UNIT
A9 MULTIPLIER BOARD

P/O Figure 8-24





A10

NOTES

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

REFERENCE DESIGNATIONS

A10
J1 R1 Q1-40

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1, 3, 9, 10, 18-20, 22, 24, 27, 28	1820-0054 SN7400N
U2, 21	1820-0069 SN7420N
U4	1820-0539 SN7437N
U5-8, 11-14, 16, 17, 25, 26	1820-0599 SN74L95N
U15, 29, 40	1820-0174 SN7404N
U23	1820-0328 SN7402N
U30	1880-0304 SN7472N
U31-39	1820-0301 SN7475N

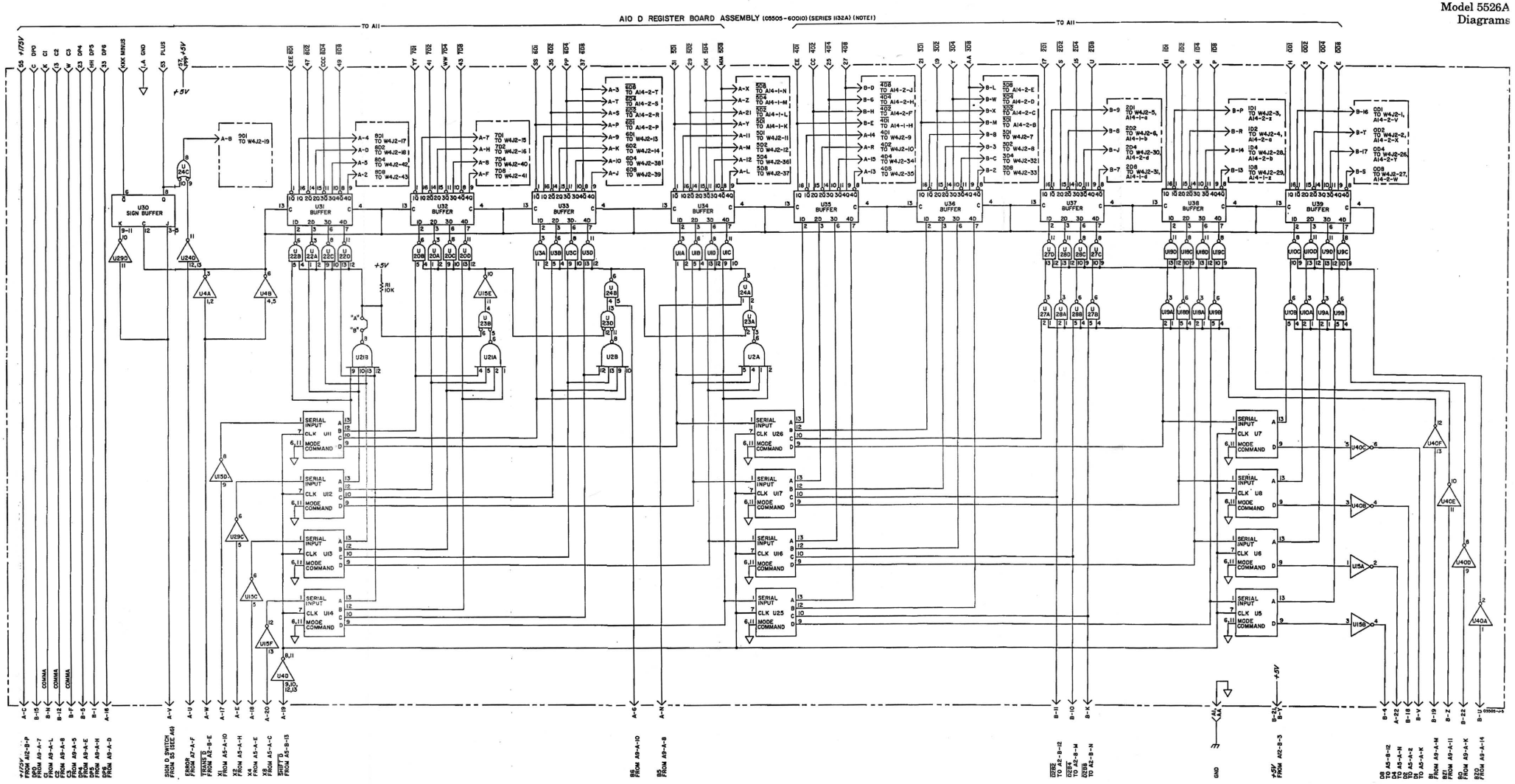
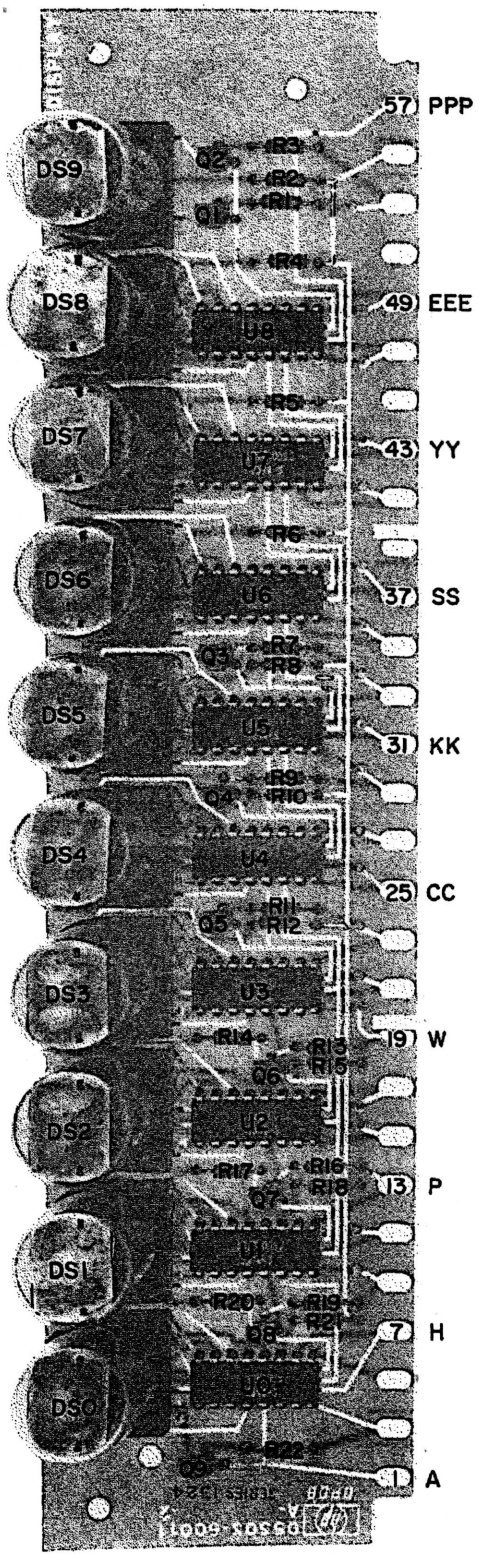


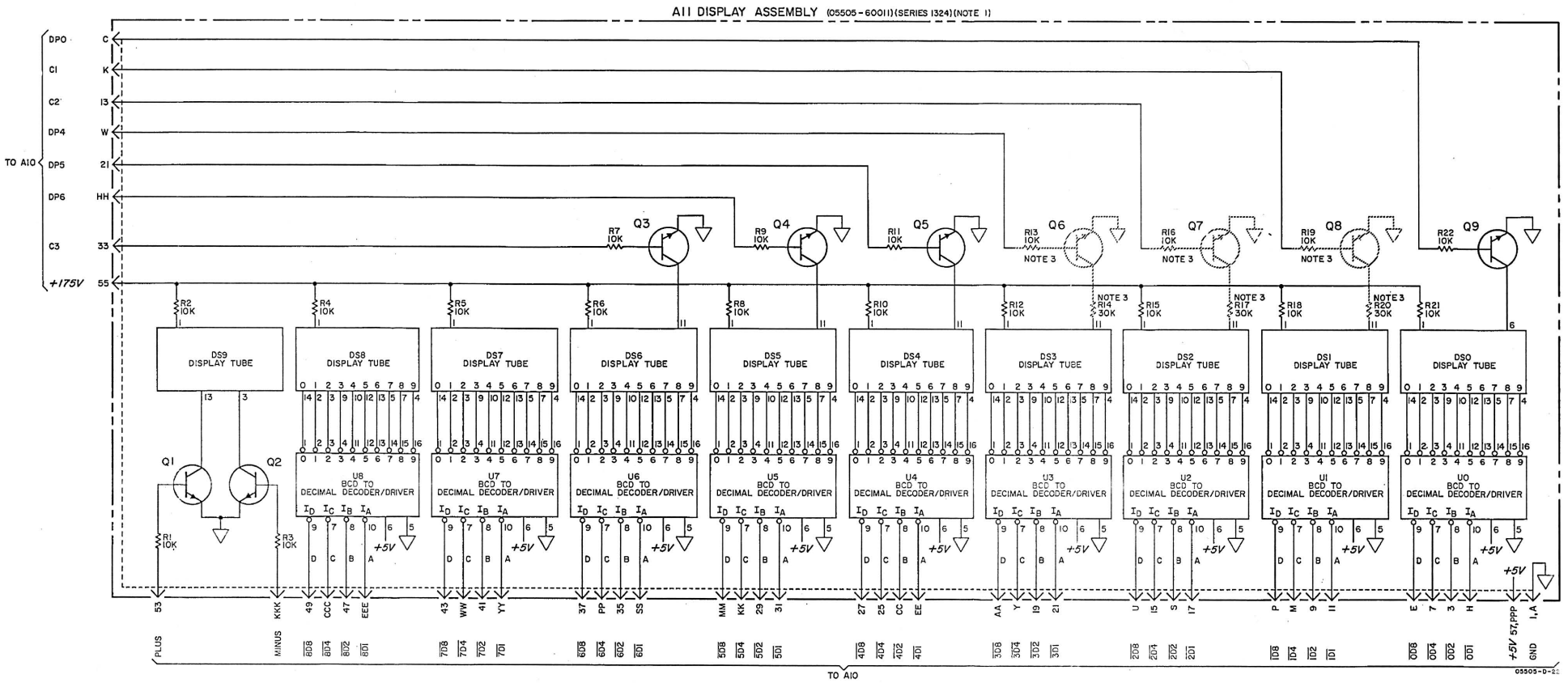
Figure 8-24
5505A LASER DISPLAY UNIT
A10 D-REGISTER BOARD



A11

Series 1324 and above circuit board for A11 is supplied less Q6-8, R13, 14, 16, 17, 19, 20 and has 1970-0035 display tubes (with decimal points) for DS1, 2, 3, and 8.

Old style boards with all components added and 1970-0046 display tubes (with commas) are available on special order.



NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS.
3. REMOVED IN SERIES 1324 AND ABOVE CIRCUIT BOARDS.

REFERENCE DESIGNATIONS

A11
DS0-9
Q1-9
R1-22
U0-8
XDS0-8

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
* DS1, 2, 3, 8	1970-0035
DS4-7	1970-0035
DS9	1970-0047
Q1-9	1854-0365
U0-8	1820-0092

* SERIES PRIOR TO 1324 USE 1970-0046 FOR DS1, 2, 3, 8

Figure 8-25
5505A LASER DISPLAY UNIT
A11 DISPLAY BOARD

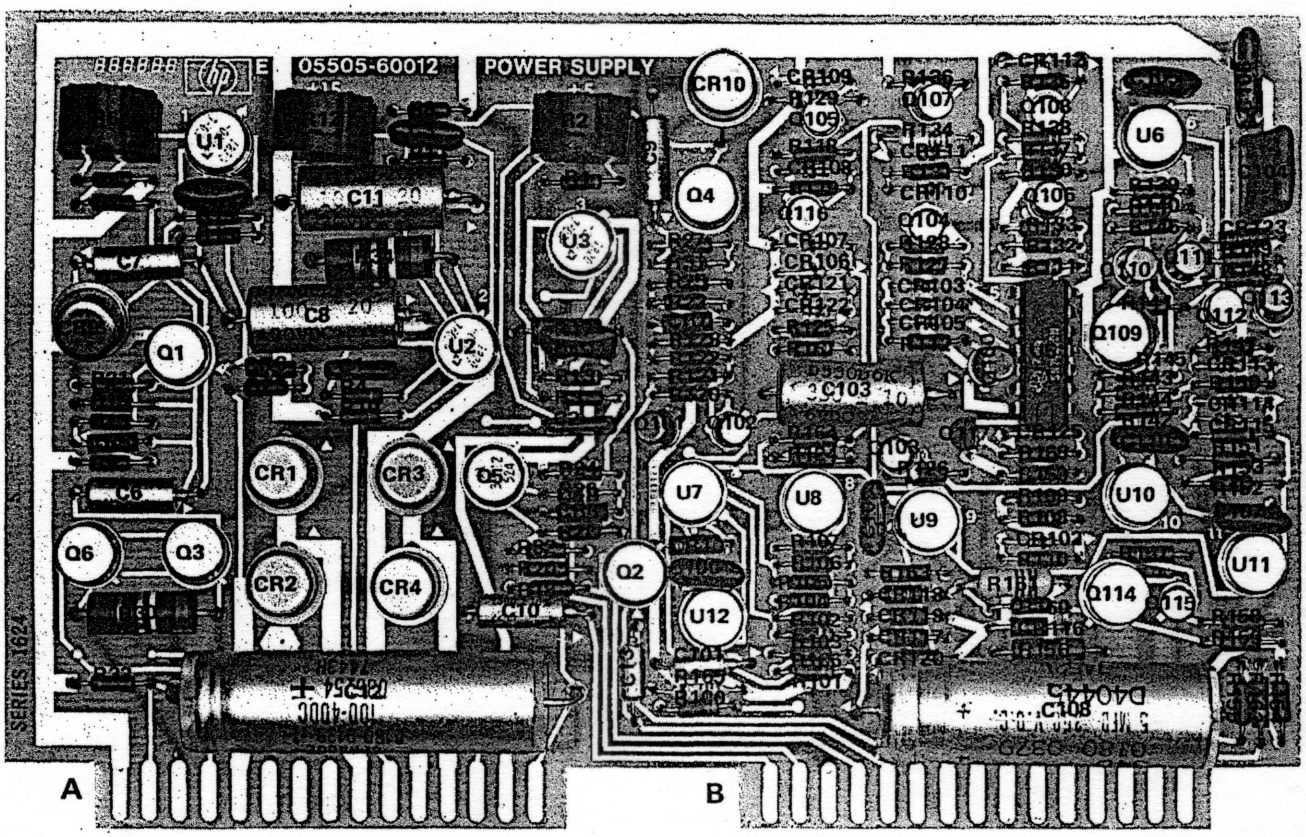


TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-4	1901-0418
CR5, 7	1902-3214
CR6	1902-0049
CR8	1902-0032
CR9, 10	1884-0018
CR101	1902-3070
CR102-115, 121, 122	1901-0040
C116	1902-0175
CR117-120	1901-0036
CR123	1902-0067
CR125	1902-3182
CR26	1902-3193
CR28	1902-3059
Q1-6,	1853-0012 (2N2904A)
Q100, 110, 111, 115	1854-0210 (2N2222)
Q101-104, 106, 108, 113	1853-0010
Q105, 107, 112, 116	1855-0020
Q114	1854-0232
Q117	1854-0071
U1-3	1820-0196
U4	NOT ASSIGNED
U5	1820-0587 (DM74L10N)
U6	1820-0478 (LM308H)
U7-12	1820-0223 (LM301AH)

NOTES

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

REFERENCE DESIGNATIONS

A12
C1-13, 100-110 CR1-10, 101-125 Q1-6, 100-117 R1-34, 1-34, 100-112, 118-169 U1-3, 5-12
DELETED CR124, C102

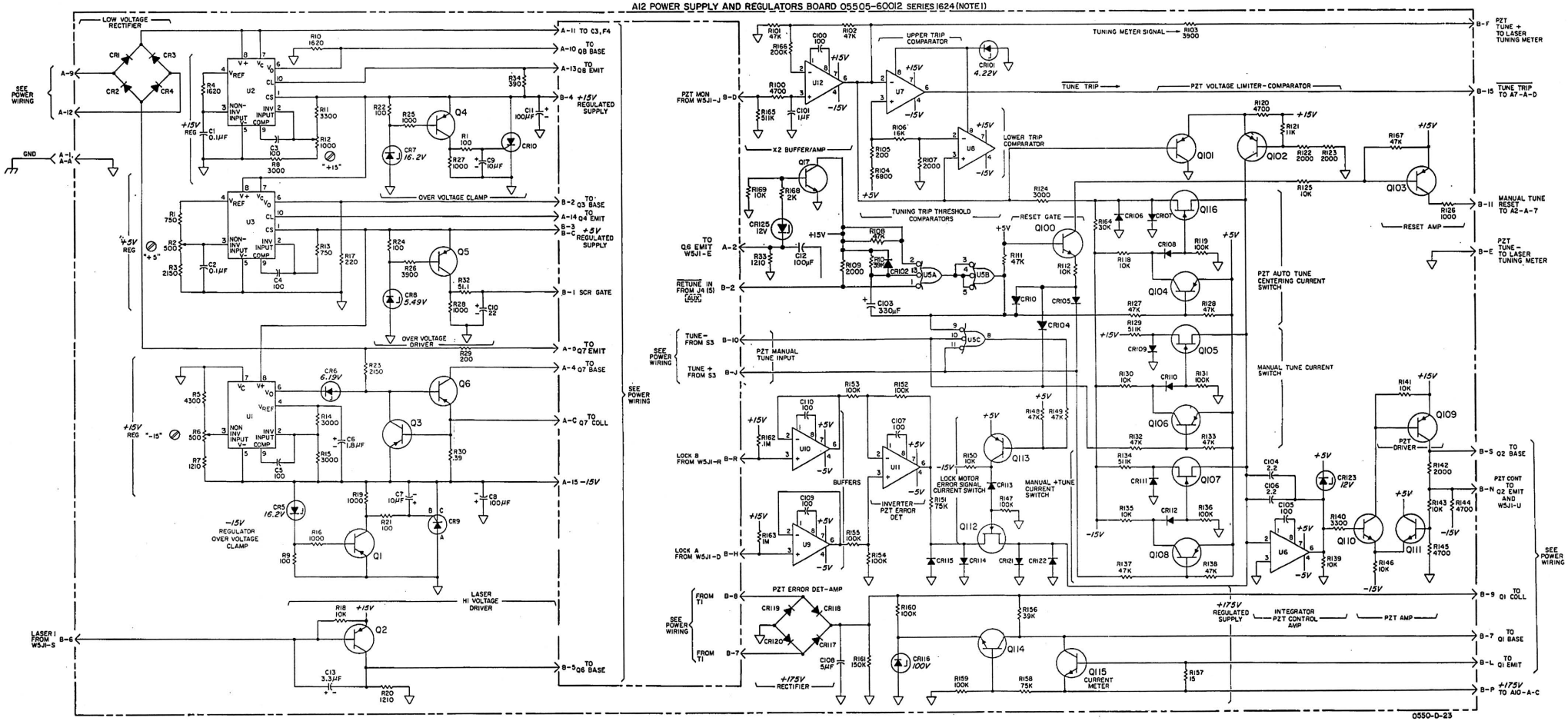
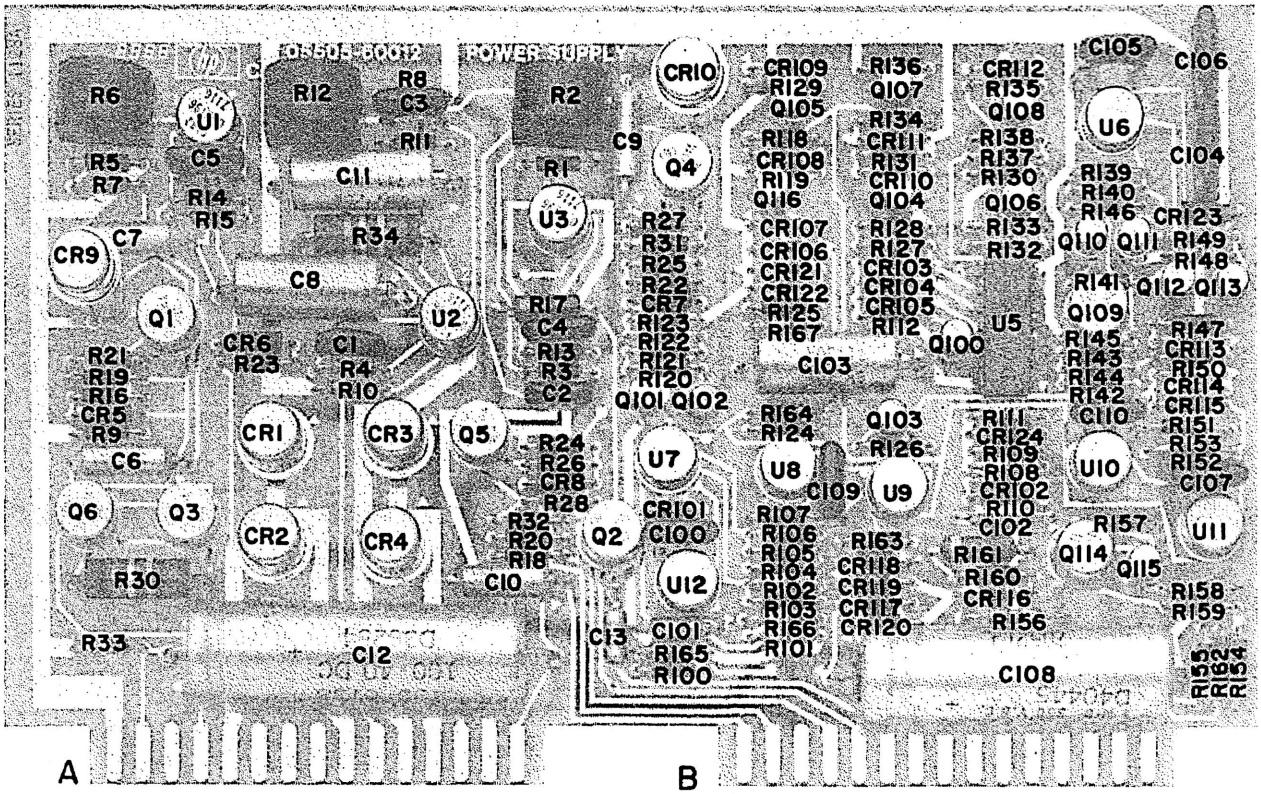


Figure 8-26
5505A LASER DISPLAY UNIT
A12 REGULATOR BOARD



A12

TABLE OF ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-4	1901-0418
CR5,7	1902-3214
CR6	1902-0049
CR8	1902-0032
CR9,10	1884-0018
CR101	1902-3070
CR102-115,121,122	1901-0040
CR116	1902-0175
CR117-120	1901-0036
CR123	1902-0067
CR124	1901-0028
CR26	1902-3193
CR28	1902-3059
Q1-6	1853-0012 (2N2904A)
Q100,110,111,115	1854-0210 (2N2222)
Q101-104,106,108,113	1853-0010
Q105,107,112,116	1855-0020
Q114	1854-0232
U1-3	1820-0196
U4	NOT ASSIGNED
U5	1820-0587 (DM74LION)
U6	1820-0478 (LM308H)
U7-12	1820-0223 (LM301AH)

NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS;

REFERENCE DESIGNATIONS

A12
C1-13,100-110 CR1-10,101-124 Q1-6,100-116 R1-34,100-112,118-167 U1-3,5-12
DELETE CR124, C102

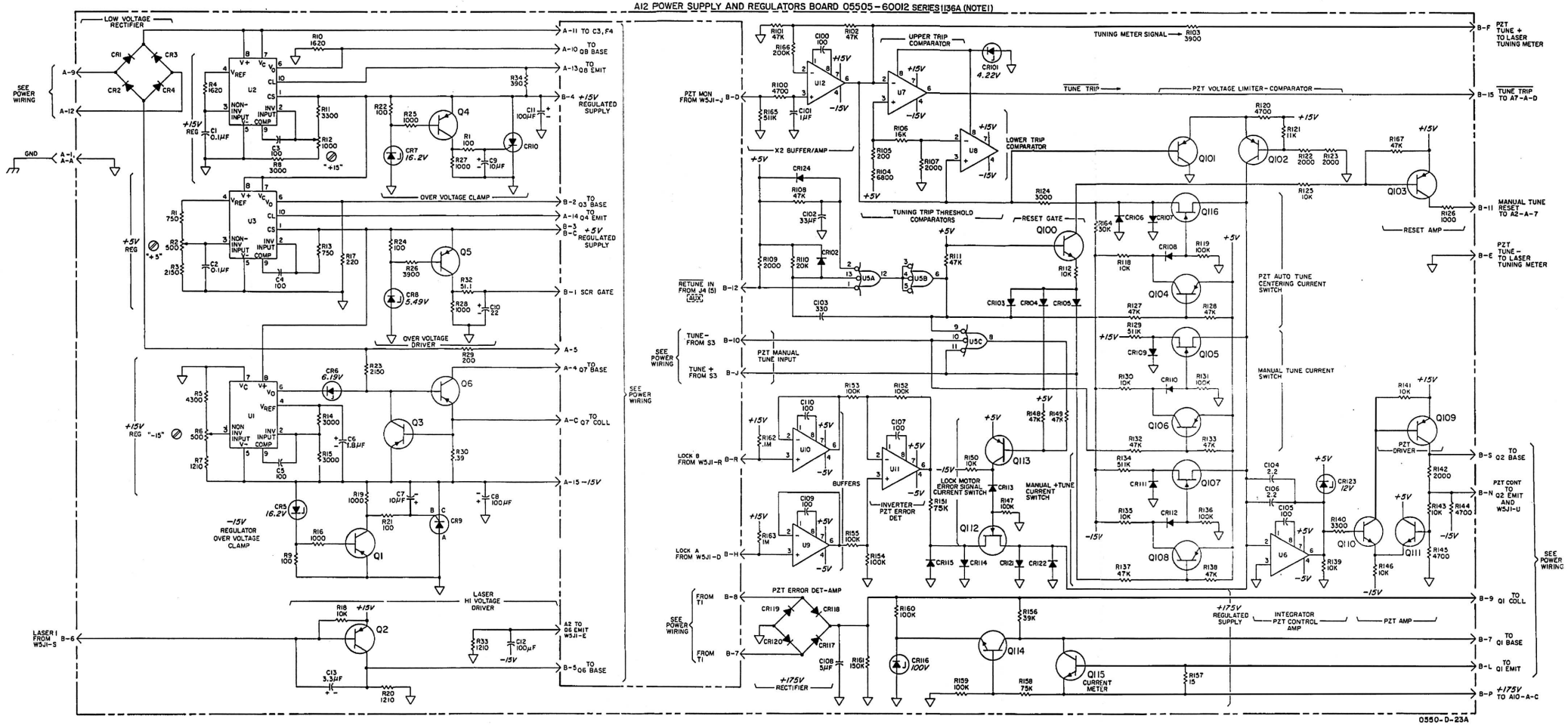
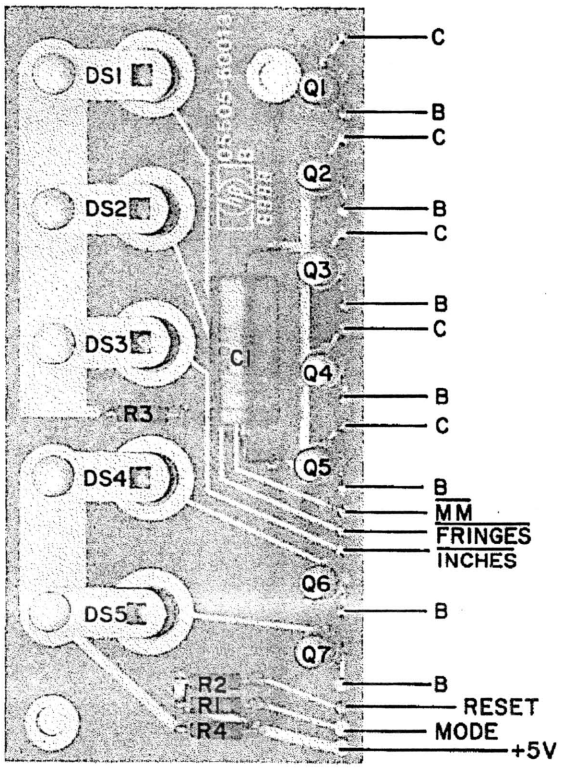


Figure 8-26a
5505A LASER DISPLAY UNIT
A12 REGULATOR BOARD


DS1
DS2
DS3
DS4
DS5
R3
C1
R2
R1
R4
Q1
Q2
Q3
Q4
Q5
Q6
Q7
C
B
C
B
C
B
C
B
C
B
B
MM
FRINGES
INCHES
B
B
RESET
MODE
+5V

A13

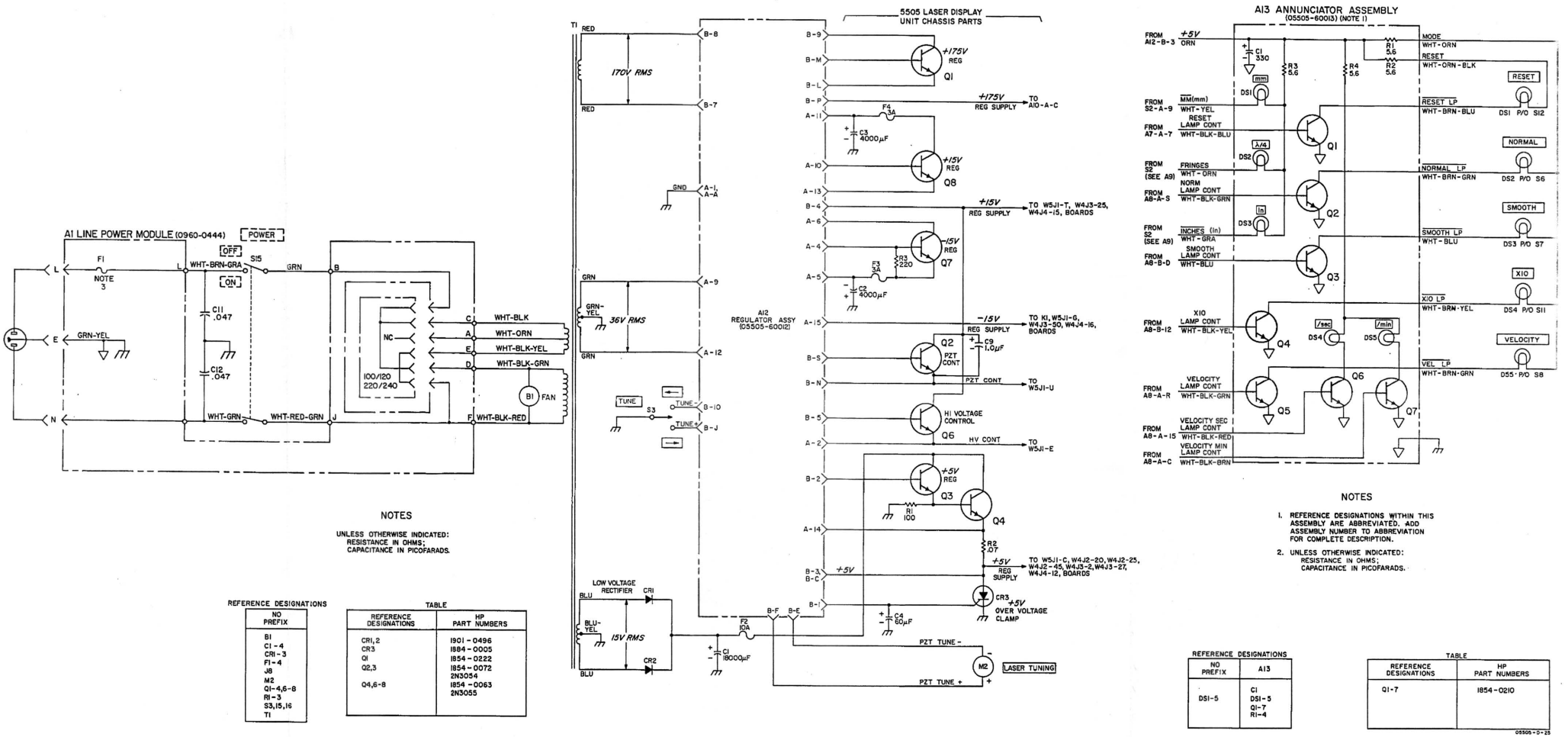
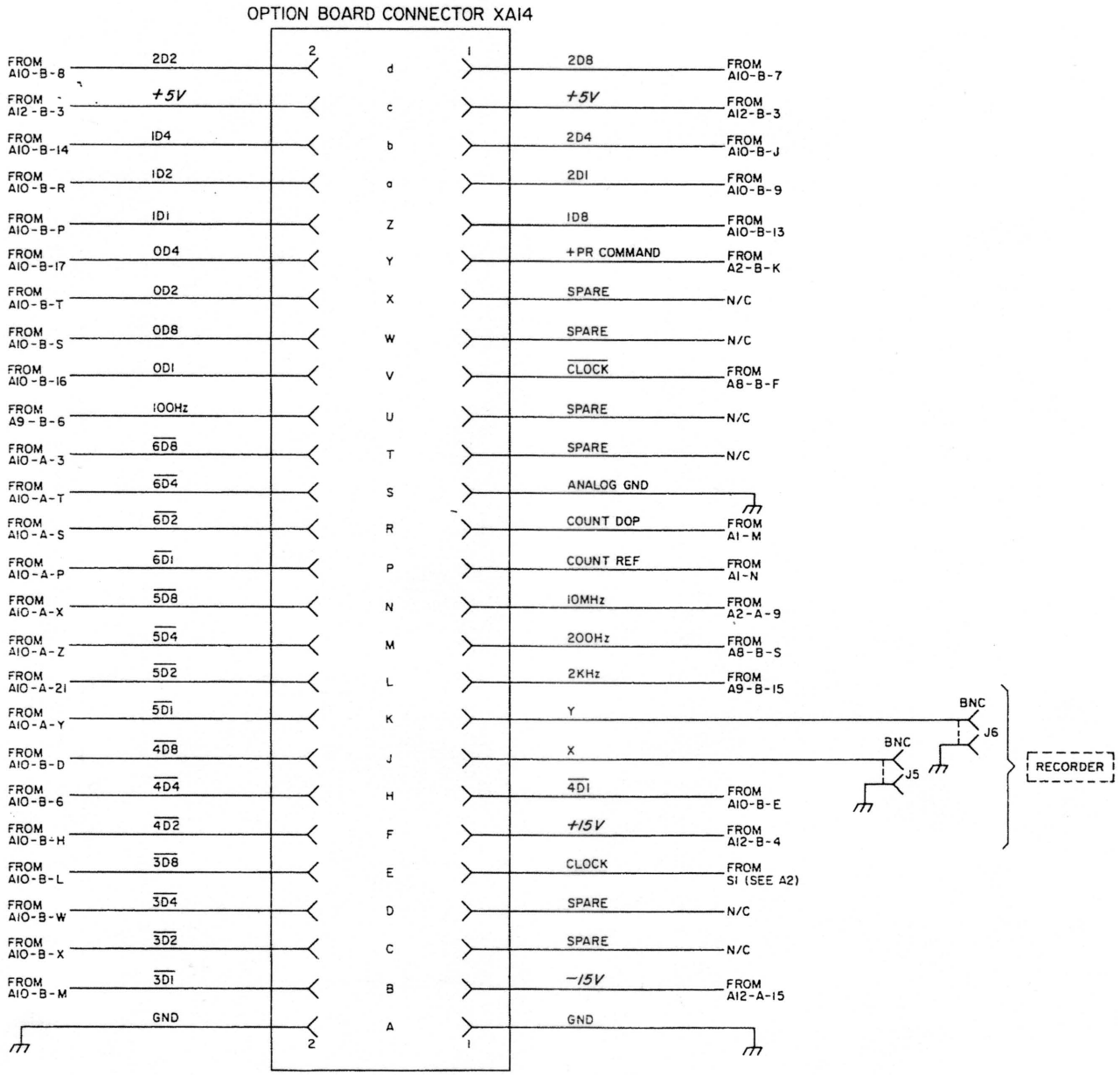


Figure 8-27
5505A LASER DISPLAY UNIT
POWER WIRING AND A13 ANNUNCIATOR

Figure 8-28. XA14 Option Board Connector



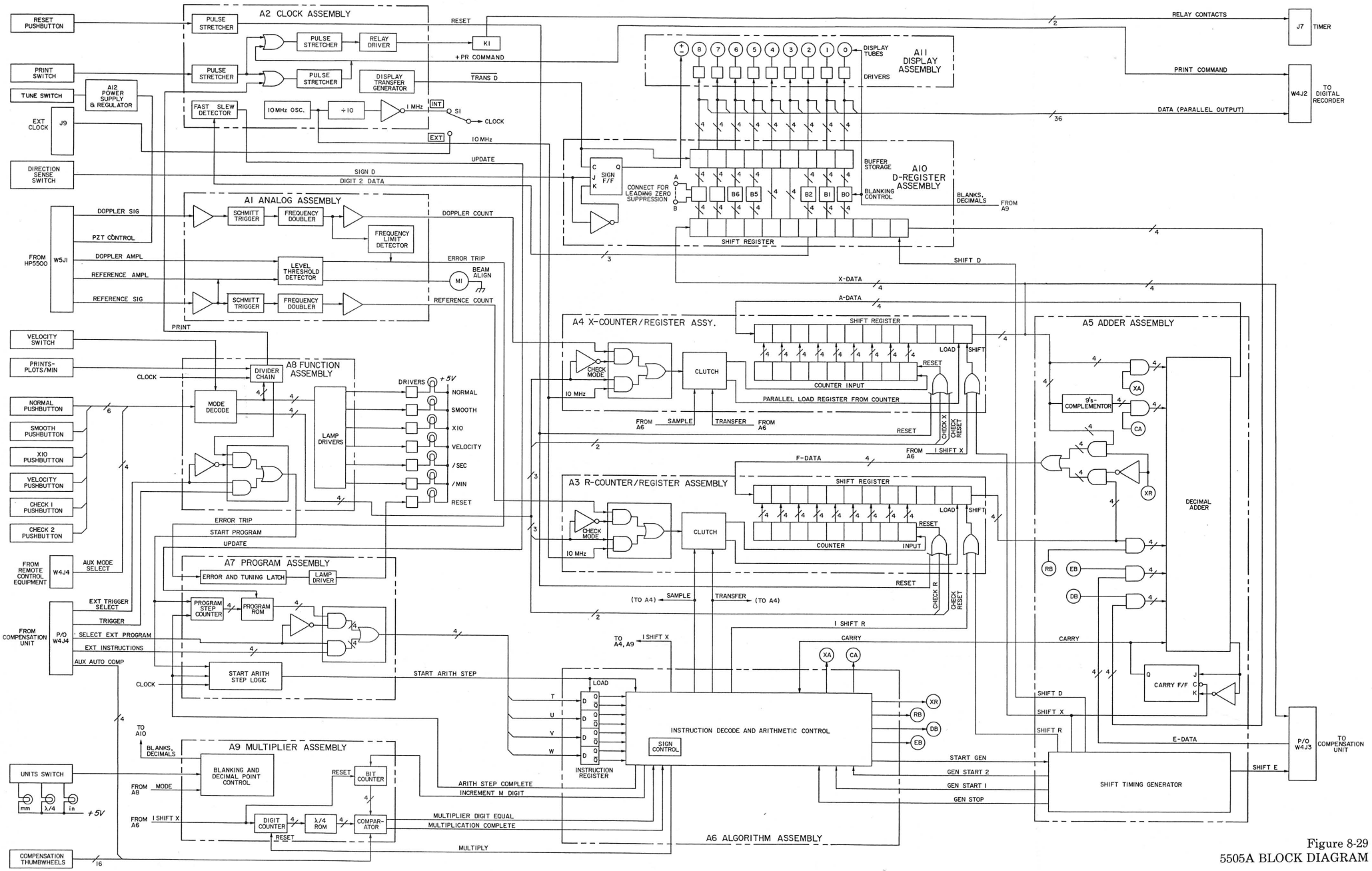


Figure 8-29
5505A BLOCK DIAGRAM

SECTION IX

MANUAL CHANGES

9-1. INTRODUCTION

9-2. This section contains information to adapt this manual to older instruments supplied for the 5500C Laser Head or 5505A Laser Display Unit in a 5526A Laser Measurement System.

9-3. MANUAL CHANGES

9-4. This manual applies directly to Model 5500C Laser heads with serial prefix 1644A and 5505A Laser Display Units with serial prefix 1640A. See paragraph 1-5 for instrument serial number identification.

9-5. NEWER INSTRUMENTS

9-6. Newer instruments may have changes and serial prefixes not listed in this manual. The manual for any such instrument is supplied with a "MANUAL CHANGES" insert which contains the information for manual updating. If this insert is missing, contact your nearest Hewlett-Packard Sales and Service Office listed at the back of this manual.

9-7. OLDER INSTRUMENTS

9-8. To adapt this manual to 5500C Laser Heads with serial prefixes below 1644A, refer to Table 9-1 and the changes following this table for manual backdating.

9-9. To adapt this manual to 5505A Laser Display Units with serial prefixes below 1640A, refer to Table 9-2 and the changes following this table for manual backdating.

9-10. The 5505A backdating information is limited to those instruments which were supplied as a 5526A Laser Measurement System. The Service Manual for the 5525B Laser Interferometer will have backdating information for 5505A Laser Display Units with serial prefixes below 1132A.

Table 9-1. 5500C Manual Backdating

5505A with Serial Prefix or Serial Prefix	Make 5505A Change
1820A, all serial numbers	Change 1
1648A, all serial numbers	Change 1 and 2
1644A, all serial numbers	Change 1, 2, and 3
1604A, all serial numbers	Change 4
1544A, all serial numbers	Change 4 and 5
1436A, all serial numbers	Change 4, 5, and 6
1332A, all serial numbers	Change 4, 5, 6, and 7
1236A, all serial numbers	Change 4, 5, 6, 7, and 8
1236A00175 or below	Change 4, 5, 6, 7, 8, and 9
1224A, all serial numbers	Change 4, 5, 6, 7, 8, 9, and 10

Change 1:

Page 6-8, Table 6-2, 5500C Laser Parts:
Under miscellaneous Parts, change QTY for 1520-0006 from 4 to 8. Delete 0380-0008 and listing.

Change 2:

Page 8-13, Figure 8-10, A3 Driver Assembly Schematic:
Change C1 value from 4.7UF to 3.3UF.
Delete C5 2700PF.
Add C3 .01μfd in series with R11. Change R11 to 20 ohms.
Add C4 .01μfd in series with R12. Change R12 to 20 ohms.

Page 6-5, Table 6-2, 5500C Laser Head Parts:
Change A3C1 to 0180-0210 CAPACITOR-FXD 3.3UF +20% 15VDC TA 0420J 150D335X0015AZ.
Delete A3C5 and listing.
Add A3C3 and A3C4 0160-2055 2 CAPACITOR-FXD .01UF +80-20% 100VDC CER 28480 0160-2055.

Change 3:

Page 6-8, Table 6-2, A6 Subassembly:
Delete A6MP12 05500-00053 1 APERTURE, CLOSED 28480 05500-00053.

Change 4:

Page 6-5, Table 6-2:
Change A5A5CR1 and A5A5CR2 each to read 1990-0338, 1, Photo-Diode: Silicon, 28480, 1990-0338.

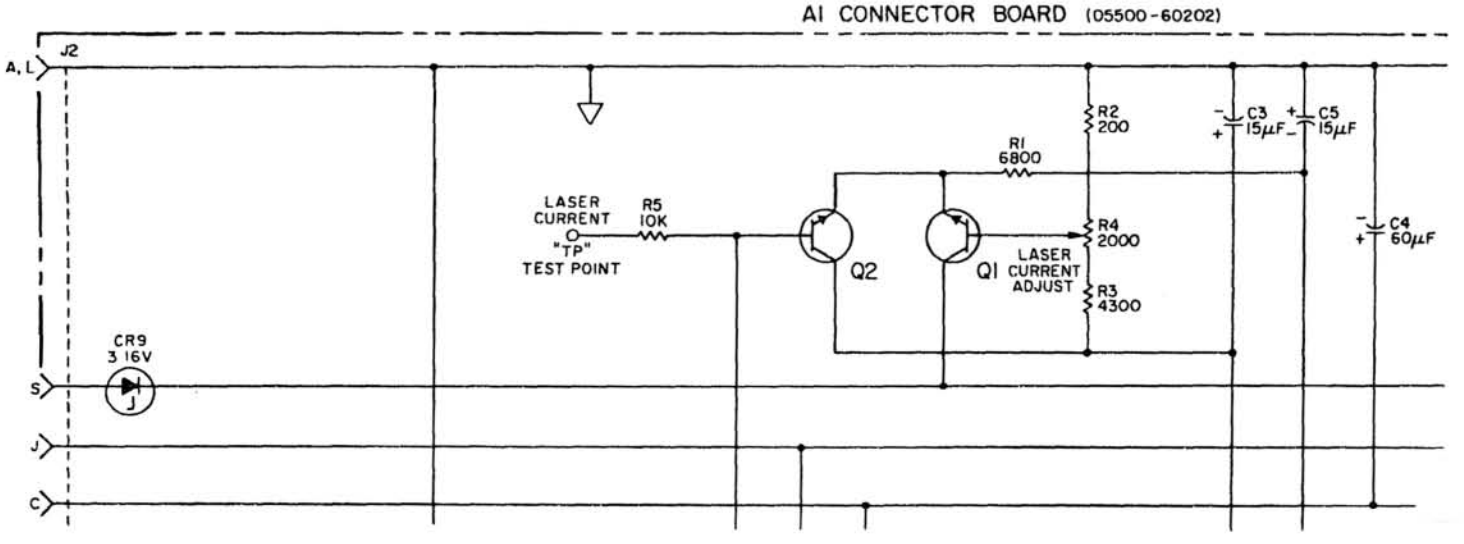
Page 8-21, Figure 8-14:
On A5A5 Board drawing, cross out "Series 1644"
Cross out "Series 1644" next to HP Part Number for Reference Designator A5A5.

Change 5:

Page 4-18, Paragraph 4-64:
Delete last sentence which states "Light-emitting diode A1CR12 will be lighted when the laser beam is on."

Page 5-1, Table 5-1:
Change A1 part number to 05500-60202.

Page 5-5, Table 5-4:
Delete under NORMAL INDICATION step 43:
d. LED on back of Laser Head is lighted when laser beam is on. (This is an indication only, and is not a functional necessity.)



Page 6-4, Table 6-2:
Change A1 part number to 05500-60202.
Delete the following items from Table 6-4:
A1CR12, 1990-0485, 1, Diode Lite Emit, 28480, 1990-0485
A1R11, 0698-5426, 1, R:FXD 10K ohms .125W, 01121, 888221
A1R12, 0698-5174, 1, R:FXD 200 ohms .125W, 01121, 882015
A1Q4, 1854-0071, 1, Transistor NPN SI, 28480, 1854-0071
——, 05000-20017, 1, Spacer LED, 28480, 05000-20017

Page 6-8, Table 6-2:
Change A6MP6 from 05500-00051 to 05500-00035 in both part number columns.
Change, under MISCELLANEOUS PARTS, in both part number columns, from 05500-00052 to 05500-00036.
Delete, under MISCELLANEOUS PARTS, the following items:
05500-80002, 1, Label: HP, Date
7120-5810, 1, Label: Caution

Page 8-11, Figure 8-9:
Change schematic with the following partial of Figure 8-9.
Delete note under A1 board photograph.

Change 6:

Page 6-5, Table 6-2:
Change A5A6C10 from 0160-3060 to the following:
0150-0121, 2, C:FXD CER 0.1 UF +80 -20% 50VDCW, 56289, 5c50b1-CML

Page 8-19, Figure 8-13:
At top of page, delete AND SERIES 1544.

Change 7:

Page 6-7, Table 6-2:
Change A5A8R11 from 0683-8245 (820K) to 0683-3055 (3 MEGOHM).
Change A5A8R12 from 0683-2035 (20K) to 0683-2055 (2.0 MEGOHM).

Page 8-12, Figure 8-14:
Change A5A8 schematic Ref. R11 from 820K to 3M; and Ref. R12 from 20K to 2M.

Change 8:

Page 6-7, Table 6-2:
Change A5A6R2 from 15K ohms to 47K ohms; "HP Part Number" and "Mfr. Part Number" change from 0757-0952 to 0757-0964.
Change A5A6R38 from 1300 ohms to 270 ohms; "HP Part Number" and Mfr. Part Number" change from 0757-0927 to 0757-0910.
Change A5A6R40 from 510 ohms to 270 ohms; "HP Part Number" and "Mfr. Part Number" change from 0757-0917 to 0757-0910.

Page 8-19, A5A6 and A5A7 Schematic Diagram:
Change A5A6R2 from 15K to 47K ohms.
Change A5A6R38 from 1300 to 270 ohms.
Change A5A6R40 from 510 to 270 ohms.
Change "SERIES" number at top of A5A6 schematic diagram from "1332" to "1236".

Change 9:

Page 6-8, Table 6-2:
Change A5A8R12 from 2.0 megohm (0683-2055) to 1.6 megohm, "HP Part Number" to 0683-1655, and "Mfr. Part Number" to CB-1655.

Page 8-12, A5A8 Schematic Diagram:
Change A5A8R12 from 2.0 megohm to 1.6 megohm.
Change "SERIES" number at top of diagram from "1236" to "1208".

Change 10:

Page 5-1, Table 5-1:
Change HP Part No. for A6 from 05500-60041 to 05500-60030.

Page 6-8, Table 6-2:
Change A6 part number from 05500-60041 to 05500-60030 in "HP Part Number" and "Mfr. Part Number" columns.
Delete the following parts:
A6MP5 Part No. 3050-0319 Washer: spring
A6MP7 Part No. 05500-00049 Aperture: small
A6MP9 Part No. 05500-20137 Spacer: target
A6MP10 Part No. 05500-20138 Plate: target
Change A5A8R12 from 1.6 megohm to 2.4 megohm, "HP Part Number" to 0683-2455 and "Mfr. Part Number" to CB-2455.
Change A5A16 from 2 megohm to 1 megohm; "HP Part Number" and "Mfr. Part Number" change from 2100-3359 to 2100-2692.

Page 8-21, A5A8 Schematic Diagram:
Change A5A8R12 from 1.6 megohm to 2.4 megohm.
Change A5A8R16 from 2 megohm to 1 megohm.

Table 9-2. 5505A Manual Backdating

5500C with Serial Prefix or Serial Number	Make 5500C Change
1718A, all serial numbers	Change 1
1644A, all serial numbers	Change 1 and 2
1624A, all serial numbers	Change 1, 2, and 3
1528A, see Note 2	Change 1, 2, 3, 4, and 5*
1512A, see Note 1 and 2	Change 1, 2, 3, 4, 5**, 6, and 7*
1436A, all serial numbers	Change 1, 2, 3, 4, 5, 6, and 7
1324A, all serial numbers	Change 1, 2, 3, 4, 5, 6, 7, and 8
1312A, all serial numbers	Change 1, 2, 3, 4, 5, 6, 7, 8, and 9
1132A, all serial numbers	Change 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10

*Changes 5 and 7 are made according to the serial prefix and number of your instrument; see Note 1 and 2 under Changes 5 7 respectively.

**Only for serial prefix number 1512A00902.

Change 1:

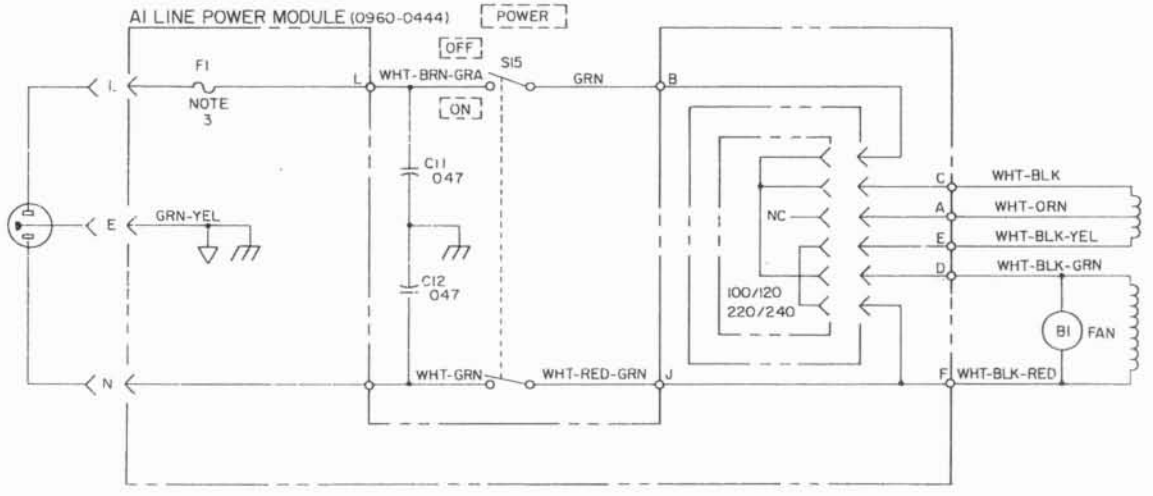
Page 6-22, Table 6-3, 5505A Chassis and Misc. Parts:
Change C11 to 0160-3043 CAPACITOR-FXD 500PF/500PF ±20%, 28480, 0160-3043.
Delete C12.
Change J8 to 1251-2357 CONNECTOR-AC PWR 05056 EAC-301.

Page 6-23, Table 6-3, 5505A Chassis and Misc. Parts:
Change S16 to 3101-1234, SWITCH DPDT 1.5A 250VAC, 0505G, 11A-1242A.
Add XF1 2110-0470 FUSEHOLDER-EXTR POST 20A 300V UL/IEC, 0470C, 345003-010; 2110-0465 FUSEHOLDER-EXTR POST, UL/IEC .25X1, 25 FUSE, 28480, 2110-0465.

Page 8-51, Figure 8-27, 5505A Laser Display Unit Power Wiring.
Change the primary power circuit as shown in the partial schematic diagram below.

Page 6-19, Table 6-3, 5505A Replaceable Parts:
Change A12CR8 from 1902-3082 to 1902-0032, DIODE-ZNR 5.49V 5% DO-7 PD=.4W TC=t.009%, 02036, SZ 10939-107.

Page 8-49, Figure 8-26, A12 Regulator Board Schematic Diagram:
Change CR8 voltage to 5.49V.



Change 2:

Page 6-24, Table 6-3, Miscellaneous Parts:
Delete 0460-0778 and listing.
Delete 05505-00034 and listing.

Change 3:

Page 6-22, Table 6-3:
Delete C11, 0160-3043.

Page 8-51, Figure 8-27, LASER DISPLAY UNIT POWER WIRING AND A13 ANNUNCIATOR:
Delete C11 Line Filter Capacitor, shown connected to J8 leads E, L, and N.

Change 4:

Page 6-19, Table 6-3:
Delete A12CR125, 1902-3182, 1, DIODE: BREAKDOWN 12.1V 5%, 04713, SZ 10939-206
Delete A12Q117, 1854-0071, 1, TSTR: SI NPN, 28480, 1854-0071
Add A12C102, 0180-0210, C:FXD ELECT 3.3 UF 20% 15VDCW, 56289, 150D335X0015A2-DYS
Add A12CR124, 1901-0028, 1 DIODE: SILICON 0.75A 400PIV, 04713, SR1358-9

Page 6-21, Table 6-3:
Delete A12R168, 0757-0931, 1, R:FXD FLM 2000 OHM 2% 1/8W, 28480, 0757-0931
Delete A12R169, 0757-0442, 1, R:FXD FLM 10K OHM 1% 1/8W, 28480, 0757-0442

Page 8-49, Figure 8-26:
Mark schematic diagram series 1624 "OBSOLETE", but do not throw it away.
Insert schematic diagram series 1136A, (Figure 8-26a). Figure 8-26a is on page 9-9 of this manual section.

Change 5

NOTE 2: Change 3 applies to Model 5505A serial number 1512A00902 and all serial prefixes 1528A EXCEPT the following:

1528A00905	1528A00910	1528A00913	1528A00916
1528A00907	1528A00911	1528A00914	1528A00917
1528A00909	1528A00912	1528A00915	1528A00918

Page 6-15, Table 6-3:
Change A8U1 and A8U2 from 1820-0412 to 1820-0413, Integrated Circuit, 28480, 1820-0413.

Page 6-22, Table 6-3:
Change L1 from 9140-0137 to 9140-0129, 1, COIL:FXD RF CHOKE MOLDED 220 UH 5%, 28480, 9140-0129.
Delete R6, 0683-1035, 1, R:FXD COMP 10K OHM, 01121, CB 1035

Page 8-25, Figure 8-16:
Change L1 value (on left side — pins "L" and "P") to 220 UH.
Delete R6 10K resistor.
Change the serial prefix number on diagram to read "952" instead of "1528".

Page 8-41, Figure 8-22:
In the table of active elements, change U1 and U2 to 1820-0413.

Change 6:

Page 5-1, Table 5-2:
Change A8 part number from 05505-60058 to 05505-60008.

Page 6-14, Table 6-3:
Change A8 part number from 05505-60058 to 05505-60008.

Page 8-41, Figure 8-22:
Change top of schematic to read:
"A8 FUNCTION ASSEMBLY (05505-60058) (SERIES 1512) (NOTE 1)"
Make circuit changes from Figure 9-1 below, and be sure to add R37 and C1 and delete the wire from pin B-1 (which is to be deleted as shown in Figure 9-1) to U21(12).

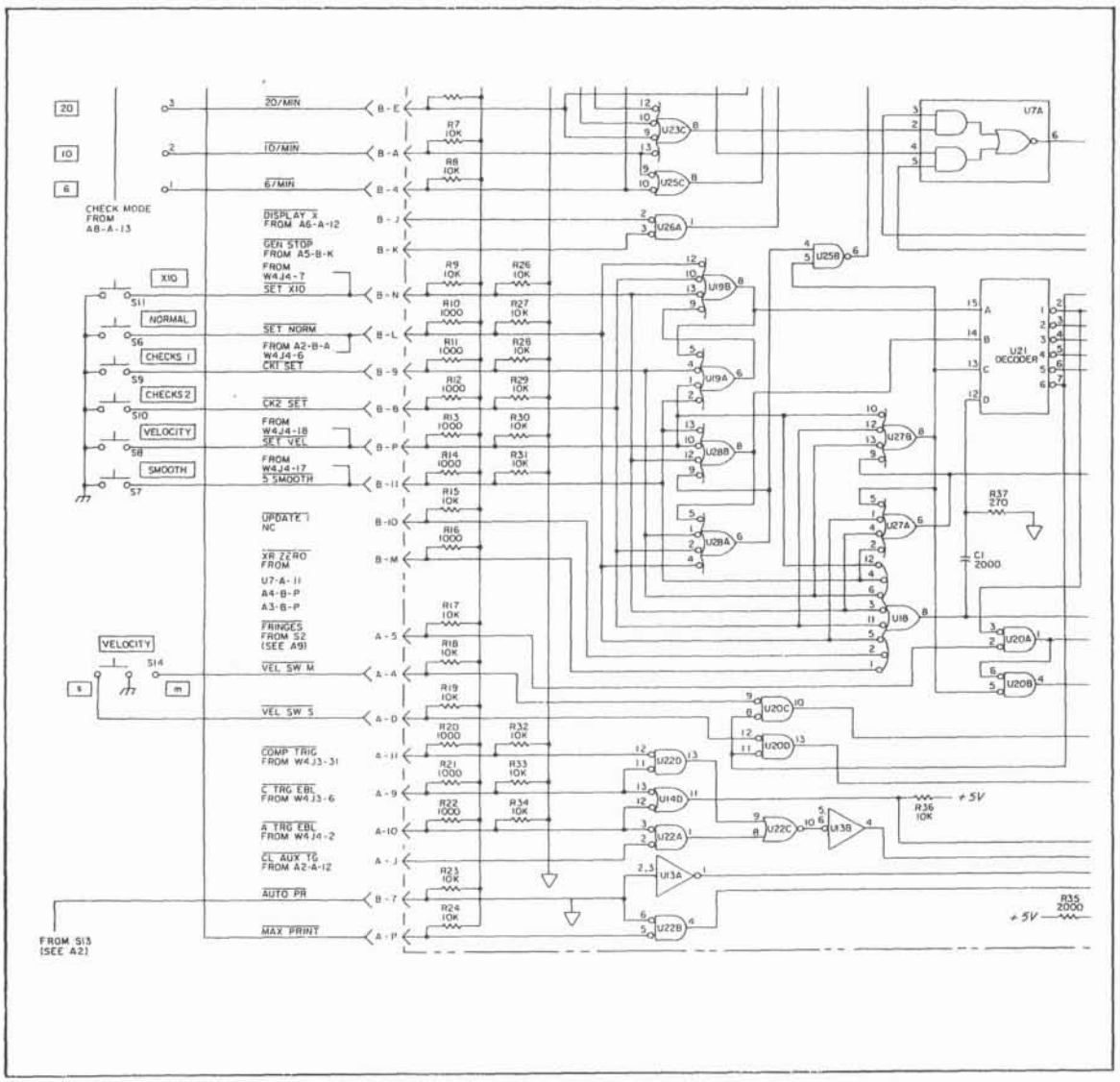


Figure 9-1

Change 7:

NOTE 1: Change 4 applies to Model 5505A with the following serial numbers:

1512A00846	1512A00853	1512A00857	1512A00863	1512A00871
1512A00850	1512A00854	1512A00860	1512A00864	Consecutively
1512A00851	1512A00856	1512A00861	1512A00868	thereafter

Page 5-1, Table 5-2:
Change A8 part number from 05505-60058 to 05505-60008.

Page 6-14, Table 6-3:
Add A3C1, 0160-0154, 1, C:FXD MICA MY 0.0022 UF 10% 200VDCW, 56289, 192P22292-PTS.
Change A8 part number from 05505-60058 to 05505-60008.

Page 6-15, Table 6-3:
Add A8R37, 0698-4241, 1, R:FXD FLM 270 OHM 5% 1/8W, 28480, 0698-4241.

Page 6-23, Table 6-3:
Delete R5, 0683-1025, R:FXD COMP 1000 OHM 5% 1/4W, 01121, CB 1015.

Page 8-41, Figure 8-22:
Change top of schematic title to read:
"A8 FUNCTION ASSEMBLY (05505-60008) (SERIES 952) (NOTE 1)"
Make circuit changes from Figure 9-1 below, and be sure to add R37 and C1 and delete the wire from pin B-1 (which is to be deleted as shown in Figure 9-1) to U21(12).

Change 8:

Page 6-21, Table 6-3:
Change A12R151 from 0757-0969 to 0757-0474, R:FXD FLM 75K OHM 2% 1/8W FACTORY SELECTED VALUE, 28480, 0757-0474

Page 6-22, Table 6-3:
Delete C9, 0180-0230, C:FXD 1.0 UF ±20% 50V, 56289, 150D105X0050A2DYS.

Page 8-49, Figure 8-26:
Change value A12R151 from 75K to 243K and place an asterisk beside this value.
At the bottom of the schematic place the following:
*FACTORY SELECTED VALUE AVERAGE SHOWN

Page 8-51, Figure 8-27, 5505 LASER DISPLAY UNIT CHASSIS PARTS:
Delete C9 and connection to Q2 collector and emitter.

Change 9:

Page 6-19, Table 6-3:
Change "HP Part Number" and "Mfr. Part Number" for A11DS1, A11DS2, A11DS3, and A11DS8 from 1970-0035 to 1970-0046.
Add for A11Q7 through A11Q9:
TSTR:SI NPN; HP Part Number 1854-0365; Mfr. 80131; and Mfr. Part Number 2N4410.
Add resistor A11R13, A11R16, and A11R19: 0698-4278, R:FXD FLM 10K OHM 5% 1/8W, 28480, 0698-4278.
Add resistors A11R14, A11R17, A11R20: 0698-4289, 3, R:FXD FLM 30K OHM 5% 1/8W, 28480, 0698-4289.

Page 6-23, Table 6-3:
Delete L1 fixed 220 UH choke.

Page 7-2, Table 7-3, "English System (Standard)" column:
Change part number for "Display Tube" DS1, DS2, DS3, and DS8 from 1970-0035 to 1970-0046.

Page 8-25, Figure 8-16 Schematic Diagram:
Delete 220 UH choke L1 between A1 terminals "L" and "P" and show terminal "L" as being connected to 100 kHz signal from A8-A-B.

Page 8-47, Figure 8-25 Schematic Diagram:
Change "SERIES" number at top of diagram from "1324" to "1132".
Change dotted lines for A11Q6-A11Q8, A11R13, A11R14, A11R16, A11R17, A11R19, and A11R20 to solid lines.

Change 10:

Page 5-1, Table 5-2:
Change HP Part Number for A9 from 05505-60049 to 05505-60009.

Page 6-17, Table 6-3:
Change A9 "HP Part Number" and "Mfr. Part Number" from 05505-60049 to 05505-60009.

Page 6-25, Table 6-3:
Change "HP Part Number" and "Mfr. Part Number" for "LABEL: FRONT PANEL DOOR (°F)" from 05505-00031 to 05505-00024.
Change "HP Part Number" and "Mfr. Part Number" for "LABEL: FRONT PANEL DOOR (°C)" from 05505-00032 to 05505-00028.

Page 8-43, Figure 8-23 Schematic Diagram:
Change HP Part Number at top of schematic from 05505-60049 to 05505-60009 and "SERIES" number from "1312" to "1132".
Change connections for A9U7B pin 12 and A9U6B pin 13 from +5 volt supply to pin 1 on A9U8 decoder. This change provides check numbers of 15,824,787 and 6,230,231 as explained in paragraph 4-51.

HEWLETT hp PACKARD

MANUAL CHANGES

MANUAL DESCRIPTION

INSTRUMENT:	LASER MEASUREMENT SYSTEM 5526A
SERIAL PREFIX:	1828A
DATE PRINTED:	NOVEMBER 1978
HP PART NO:	05526-90051
MICROFICHE NO:	05526-90052

CHANGE DATE May 18, 1979

(This change supersedes all earlier dated changes)

- Make all changes listed as ERRATA.
- Check the following table for your instrument's serial prefix or serial number and make listed change(s) to manual.

IF YOUR INSTRUMENT HAS SERIAL PREFIX OR SERIAL NUMBER	MAKE THE FOLLOWING CHANGES TO YOUR MANUAL	IF YOUR INSTRUMENT HAS SERIAL PREFIX OR SERIAL NUMBER	MAKE THE FOLLOWING CHANGES TO YOUR MANUAL
1852A	**1**		
1920A	**1, 2**		

► NEW OR REVISED ITEM

ERRATA

Page 3-3, replace original page 3-3 with attached page.

Page 6-14, reference designation A7R1:

Change Quantity to 4 of P/N 0698-4254 RF 1K 5% .125W.

Page 8-11, A1 Connector Board:

Change Schematic so that pin 21 (INTLK) is shorted to pin 20 (+5V).

Page 8-13, A3 Driver Board:

On left hand of schematic, delete +15V before INTLK and add +5V.

Page 8-17, Figure 8-12, A4A1 Voltage Multiplier Assembly Board:

In center of diagram, delete C8, C9 and C10. Also change C3, C4 and C5 from .01 μF to .022 μF.

Page 8-39, Figure 8-21, A7 Program Board Schematic Diagram in center:

Add 1K ohm pull up resistor (0698-4254) from +5V to junction of U6 pins 3, 6, 8, 11, and U14 pin 1, and U15 pins 3, 8, 11.

CHANGE 1

Page 4-36, Paragraph 4-141:

Line 7, insert "not" between words "normally installed"; end of line, insert "not" after "are" and before "automatically" on line 8.

Line 8, after blanked, insert two sentences:

"The unblanked display is necessary to use when Hewlett-Packard calculators are connected to the 5505A Laser Display Unit. If calculators are not used and blanking of leading zeros is desired, connect a jumper wire between A and B at U21B output.

CHANGE 2

This change replaces A3 with a new Interconnect board, replaces A4A1 with a new HV Power Supply Board A7 replaces A4A2 with a new PZT Power Supply A4.

Page 4-1, paragraph 4-2:

Change 5500C Laser Head Assemblies as follows:
A3 Interface Board
A4 PZT Power Supply
A7 HV Power Supply

Page 4-5:

Replace original page 4-5 with new attached page.

Page 4-18:

Replace original page 4-18 with new attached page.

Page 5-1, Table 5-1:

Change A3 to "Interconnect Board, 05500-60154"
Change A4 to "PZT Power Supply Assembly 05501-60203"
Add "A7 High Voltage Power Supply Assembly 05501-60208"

Page 5-10 through 5-13:

Replace original pages 5-10 through 5-13 with new attached pages.

Page 5-18, paragraph 5-57:

Change the paragraph to read as follows:
Power Supply A4 is a non-repairable item. The entire assembly must be replaced if defective.

Page 5-18:

Add paragraph 5-57a and 5-57b as follows:

5-57a. Power Supply Board (A7)

5-57b. The only repairable parts on A7 are the transistors external to the sealed portion of the unit. To replace these transistors, proceed as follows:

a. Remove the high voltage power supply from the 5501A Laser head according to the procedure given in 5-26a.

b. Remove the heat sink from the power supply by first removing the two nuts on the back of the sink which hold the transistors and then sliding the heat sink away from the transistors. The nuts can be loosened by using a very small flat head screwdriver. By wedging it between the nut and the side of the hole and rotating the nut counter-clockwise.

c. Unsolder and remove both transistors from the board.

d. Replace the transistors.

e. Replace the screws with nylon washers into the new transistors and insert the transistor leads into the board. Do NOT solder the transistors in at this point.

f. Reapply the silicon grease and microwashers to the heat sink if necessary and slide the heat sink back on the board, allowing the screws to slide through the holes.

g. Attach the nuts onto the screws to secure the transistors to the heat sink.

CAUTION

Do not apply too much force when tightening these nuts. Too much force may result in transistor breakage.

h. Solder in all transistor leads.

i. Replace power supply in the Laser Head and check for an output of 10kv.

NOTE

If replacement of the transistors does not solve the problem, please return the 05501-60208 power supply and the old transistors to the factory.

Page 5-23, Paragraphs 5-83 and 5-84:

Delete paragraphs 5-83 and 5-84. The new A3 is an interconnect board and requires no trouble-shooting information.

Page 5-25, Figure 5-16A. 5526A Typical Waveforms:

Delete Figures 1 through 3.

Page 5-26, Figure 5-16B. 5526A Typical Waveform:

Delete information for waveforms 1 through 3.

Pages 6-4 through 6-9, Table 6-2:

Replace with new attached pages.

Pages 8-3 through 8-5, Figures 8-2 through 8-4:

Replace with new attached pages.

Page 8-13, Figure 8-10, A3 Interconnect Board Schematic Diagram:

Replace with new attached schematic.

Page 8-15, Figure 8-11, Laser Wiring Diagram:

Replace with new attached schematic.

Page 8-17, Figure 8-12, Power Supply Schematics:

Replace with new attached schematic.

Page 8-23, Figure 8-15, 5500C Block Diagram:

Replace with new attached block diagram.