

HEWLETT

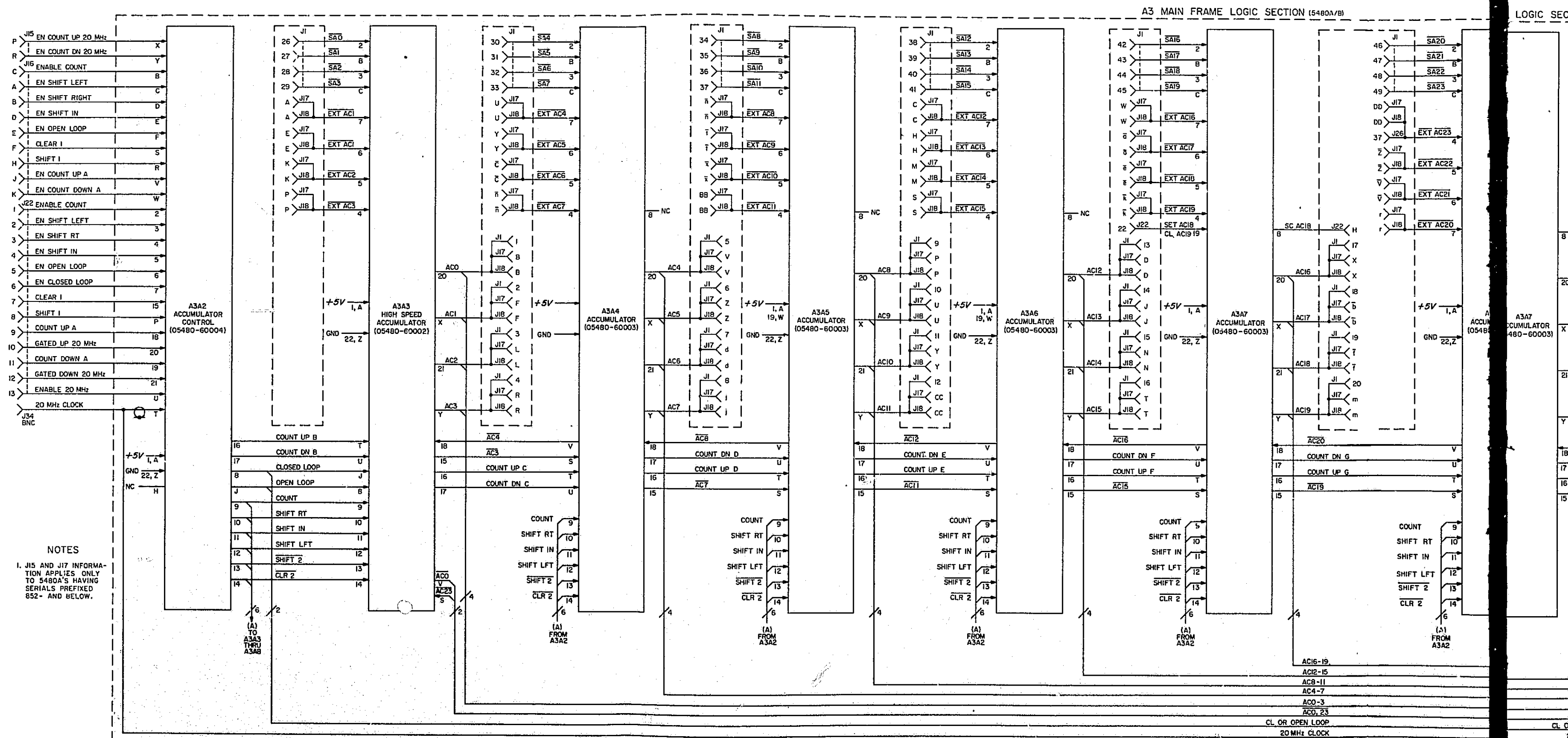


PACKARD

Signal Analyzer System
Operating and Service Manual
05480-90021 (Manual)
June 1975

Model 5480A/B
Serial Pfx — All
05480-90025 (Fiche)
5 of 5

**TROUBLE -
SHOOTING
CON'T**



LOGIC SECTION (5480A/B)

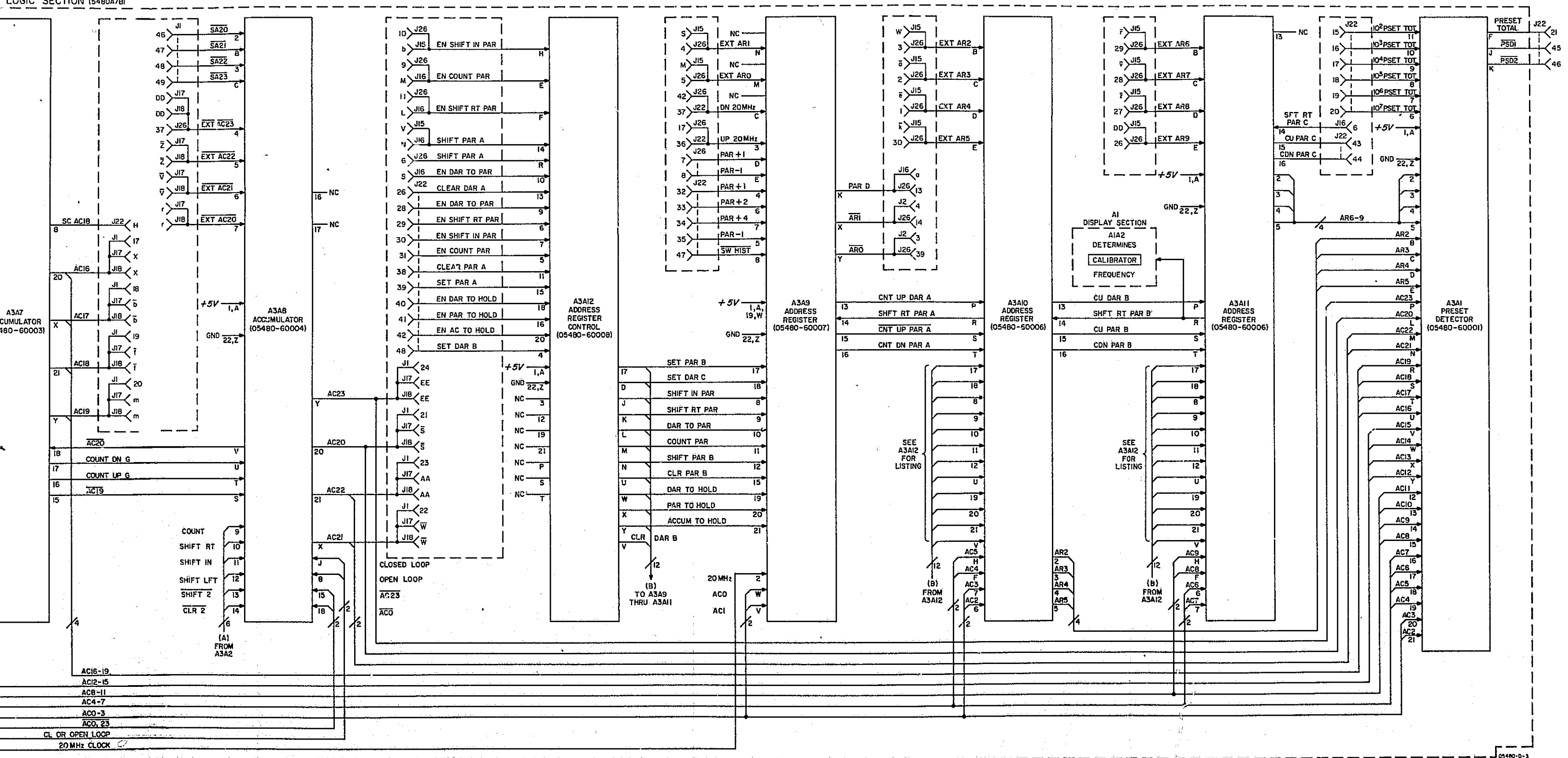
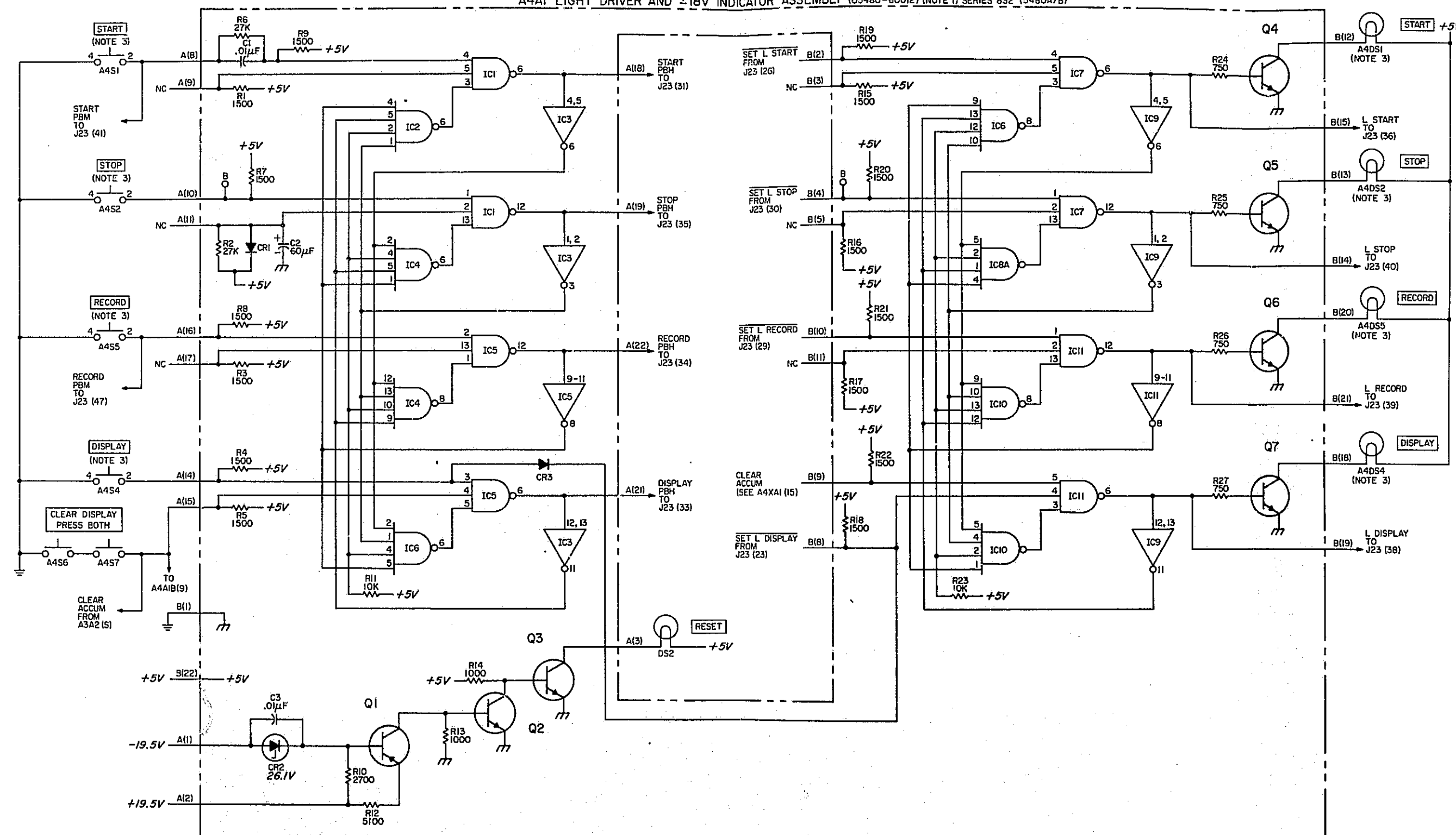


Figure 4-9
5480A/B (Main Frame Logic A3)
Wiring List: Table 4-2, Part D
4-153

Main Frame Logic Section (A3) is located at the lower left-hand rear corner of the 5480A/B. Board assemblies are numbered, in order, from the rear to the front of the instrument; there is a vacant (spare) board location between A1 and A3.

Figure 4-9
5480A/B (MAIN FRAME LOGIC A3)
Wiring List: Table 4-2, Part D

A4A1 LIGHT DRIVER AND $\pm 18V$ INDICATOR ASSEMBLY (05480-600(2) (NOTE 1) SERIES 832 (5480A/B)

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. **START** **STOP** **DISPLAY** **RECORD**
SWITCH CONNECTIONS
2,4: NORMALLY OPEN
1,3: NORMALLY CLOSED
CENTER CONNECTIONS: LAMP

REFERENCE DESIGNATIONS

NO PREFIX	A4	A4A1
DS2	DS1,2,4,5	CI-3 CRI-3 IC1-11 Q1-7 R1-27 SI,2,4-7

TABLE

REFERENCE DESIGNATIONS	HP PART NUMBER
CR 1, 2	1901 - 004C
3	1902 - 3268
IC 1,5,7,11	1820 - 0068
2,4,6,8,10	- 0069
3,9	- 0054
Q1	1853 - 0020
2-7	1854 - 0246
	2N3643

05480-9-4

NOTES

- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
- UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICOFARADS;
- START STOP DISPLAY RECORD
SWITCH CONNECTIONS
2,4: NORMALLY OPEN
1,3: NORMALLY CLOSED
CENTER CONNECTIONS: LAMP

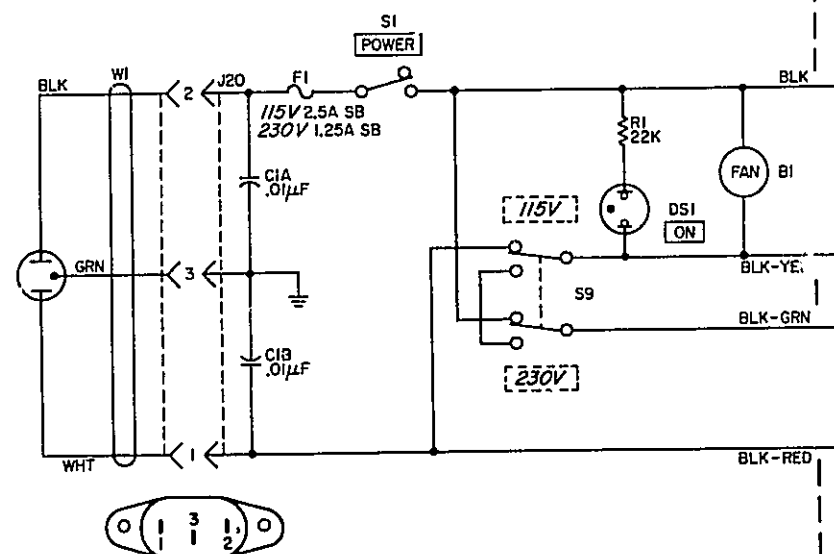
REFERENCE DESIGNATIONS

NO PREFIX	A4	A4A1
DS2	DS1,2,4,5	CI-3 CRI-3
	SI,2,4-7	IC1-11 OI-7 RI-27

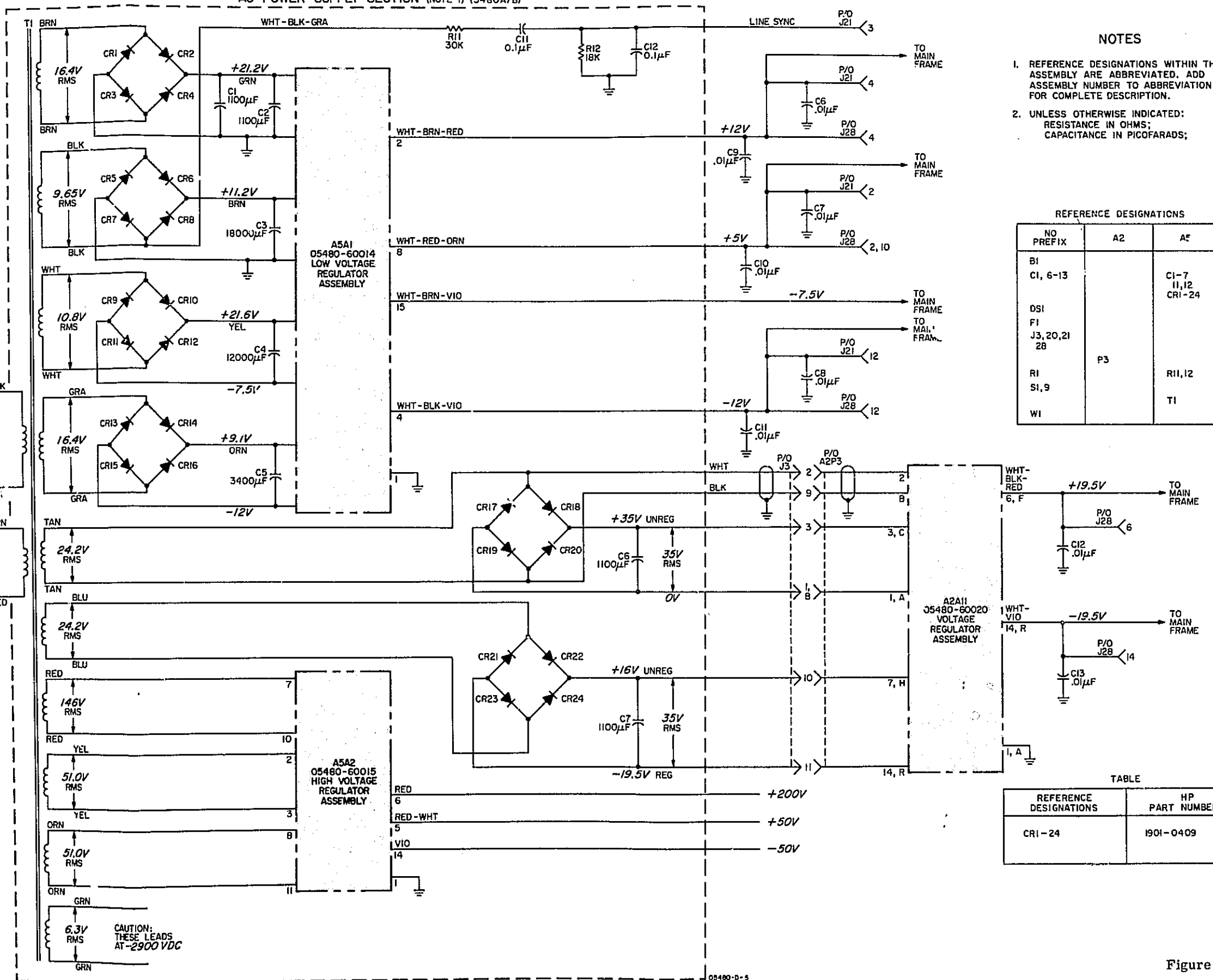
TABLE

REFERENCE DESIGNATIONS	HP PART NUMBER
CR 1,2	1901 - 0040
3	1902 - 3268
IC 1,5,7,11	1820 - 0068
2,4,6,8,10	- 0069
3,9	- 0054
OI	1853 - 0020
2-7	1854 - 0246
	2N5643

05480-D-4



A5 POWER SUPPLY SECTION (NOTE 1) (5480A/B)



NOTES

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

REFERENCE DESIGNATIONS

NO PREFIX	A2	A2
BI		CI-7 II,12 CRI-24
DS1		
F1		
J3,20,21		
28		
RI	P3	RI1,12
SI,9		TI
WI		

TABLE

REFERENCE DESIGNATIONS	HP PART NUMBERS
CRI-24	1901-0409

Figure 4-10
5480A/B (LD and FF A4, and Power Supply A5)
Wiring List: Table 4-2, Part E
4-155

NOTES:

1. A4 (A4A1) is located immediately behind the 5480A/B front-panel section on which the illuminated pushbuttons are mounted. For access to this section, remove top cover, and swing memory section deck out of the way.
2. A5 (Power Supply Section) is located at lower right-hand rear corner of 5480A/B unit. For access to boards in this section, remove top cover and swing memory section deck out of the way. For access to board sockets, remove bottom cover.

Figure 4-10

5480A/B (LD and FF A4, and POWER SUPPLY A5)

Wiring List: Table 4-2, Part E

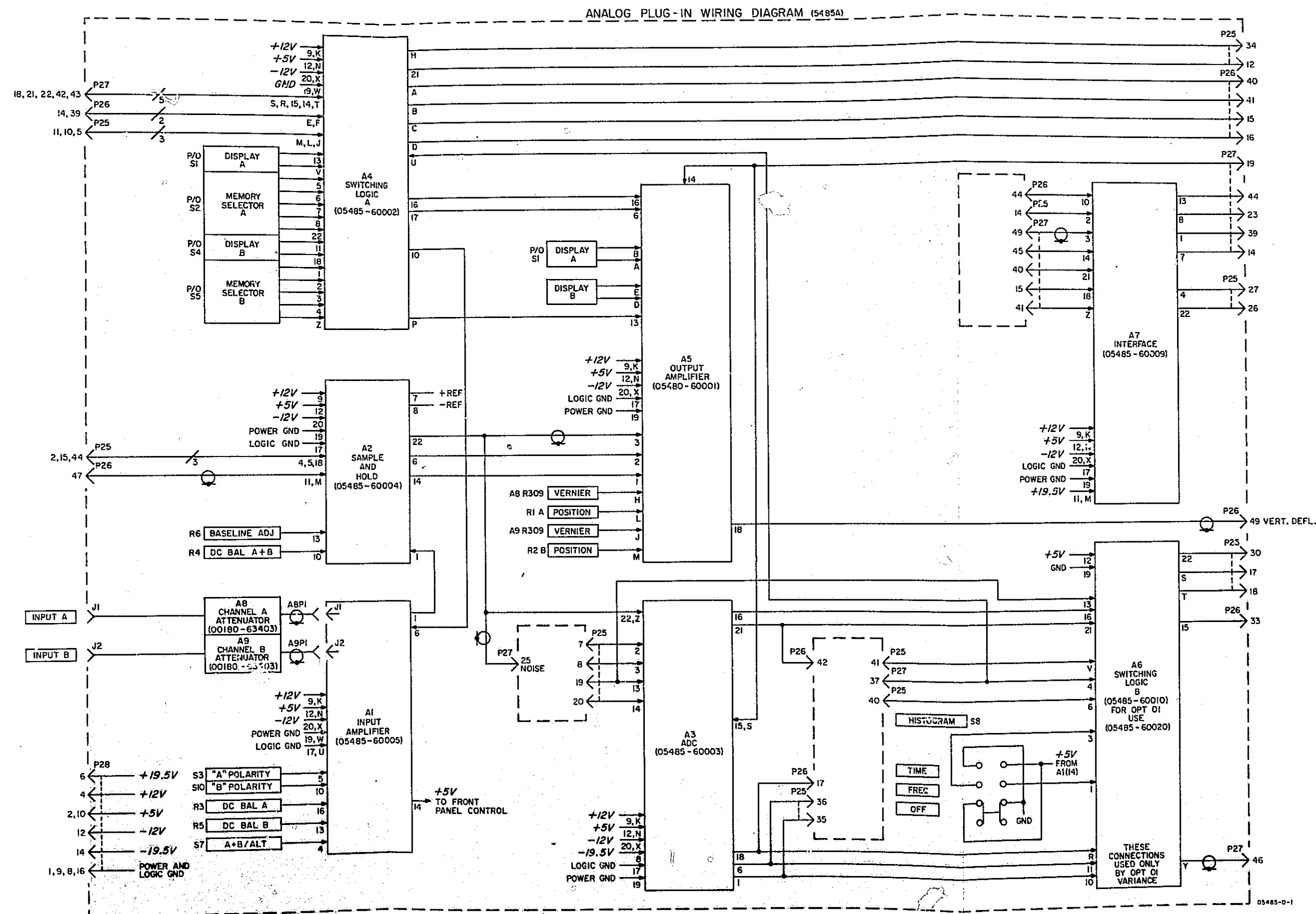
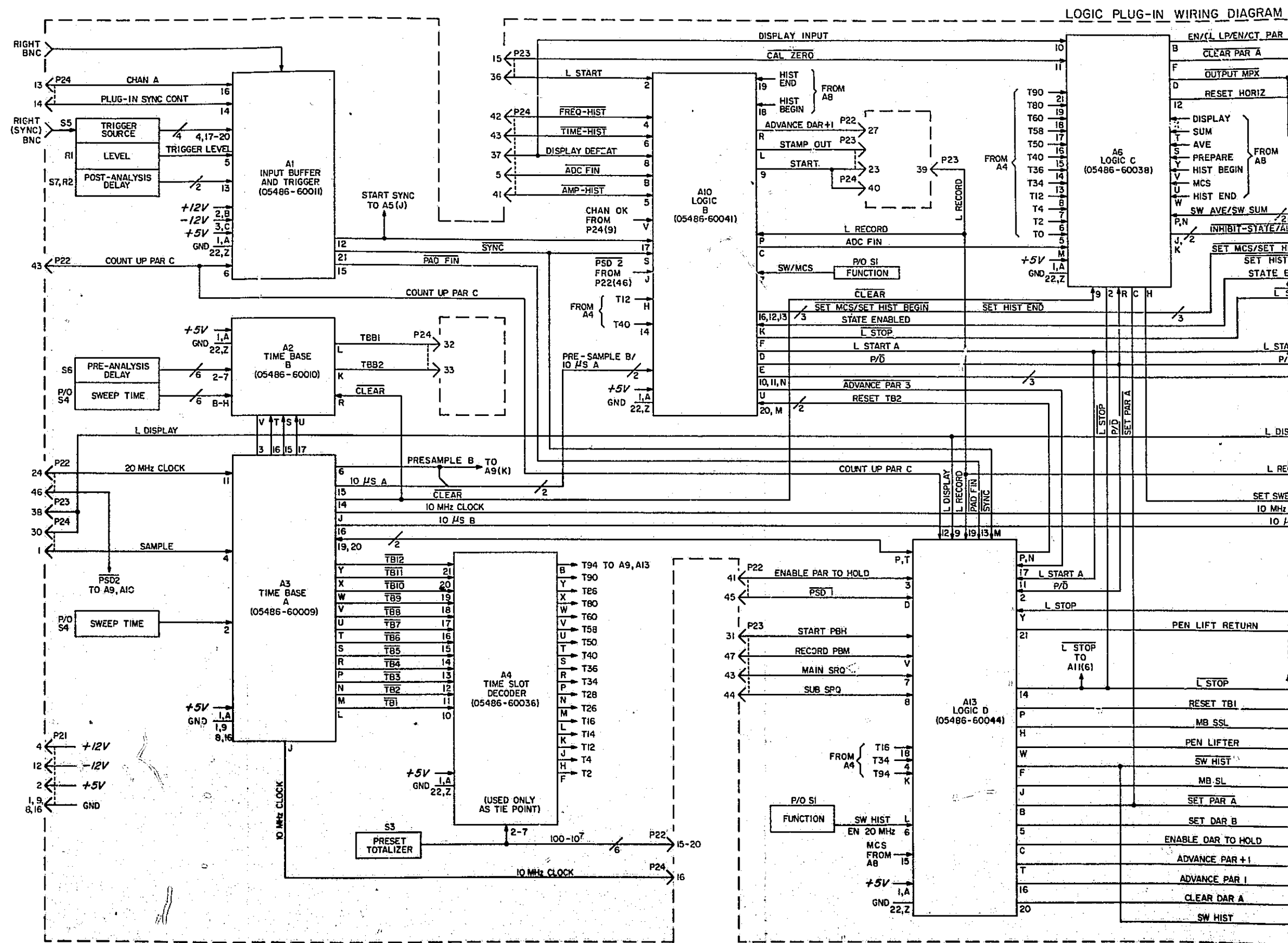


Figure 4-11
5485A
Wiring List: Table 4-2, Part G
4-157



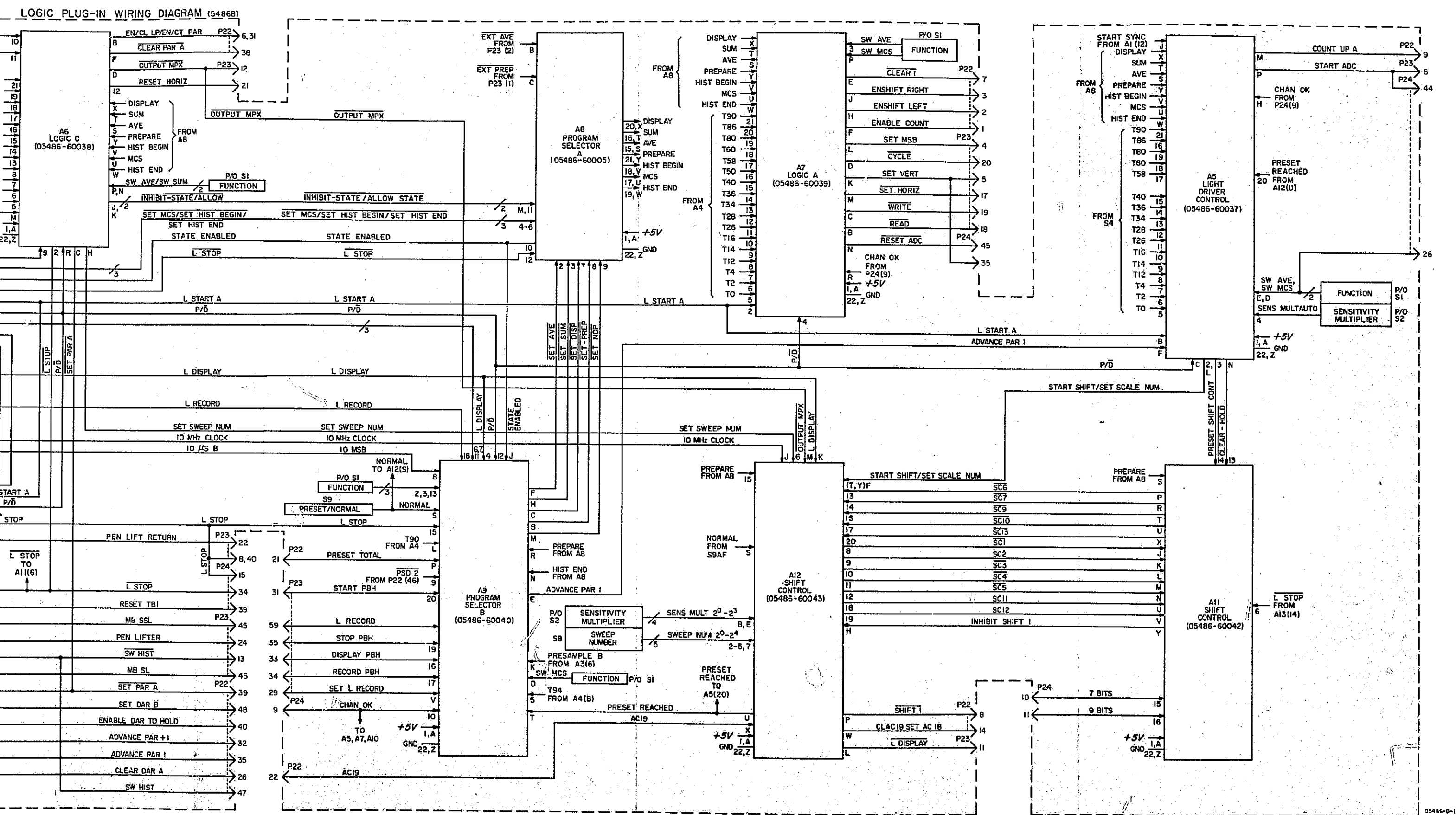


Figure 4-12
5486A/B (Sheet 1 of 2)
Wiring List: Table 4-2, Part H
4-159

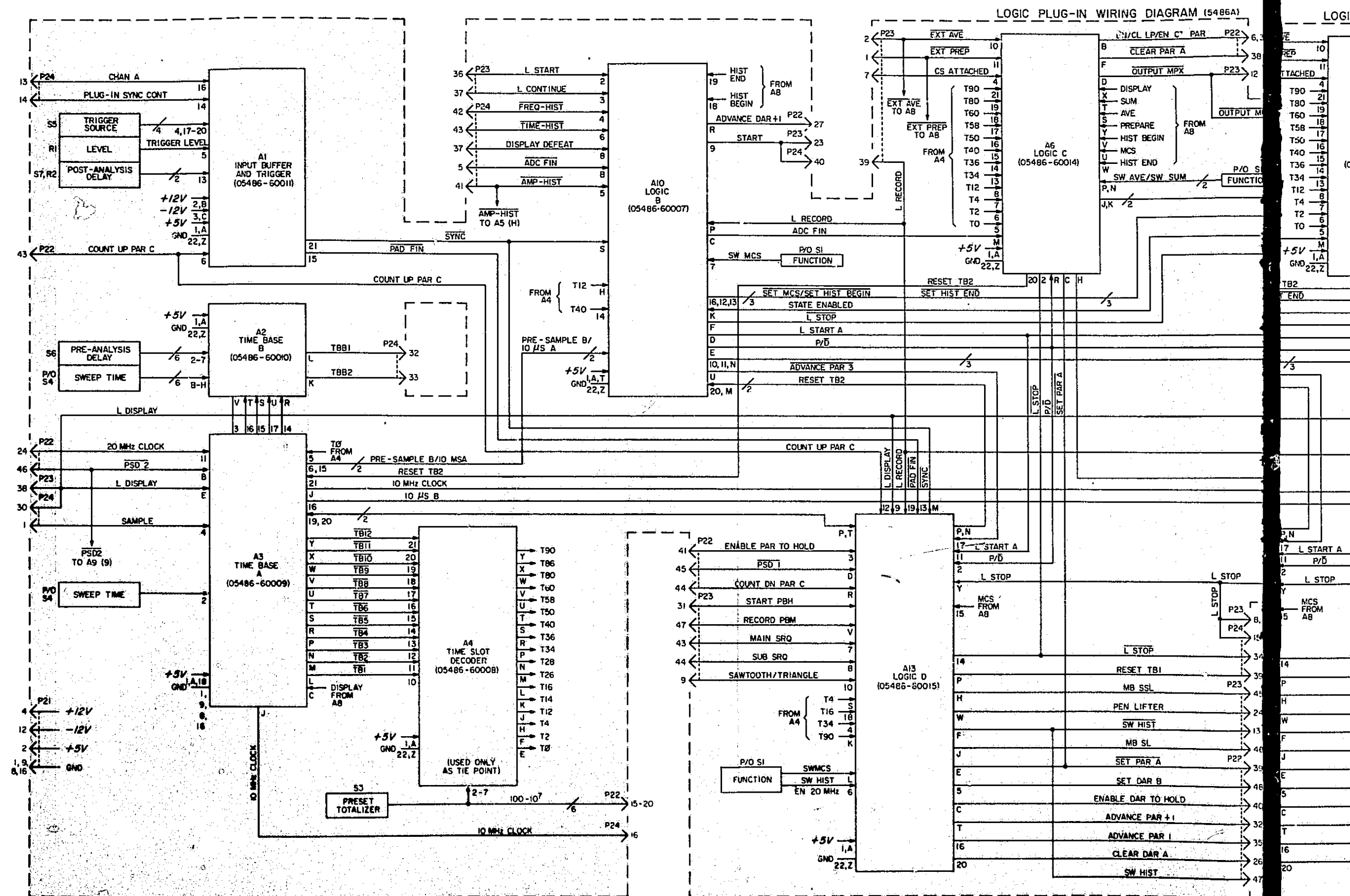




Figure 4-12
5486A/B (Sheet 2 of 2)
Wiring List: Table 4-2, Part H
4-161

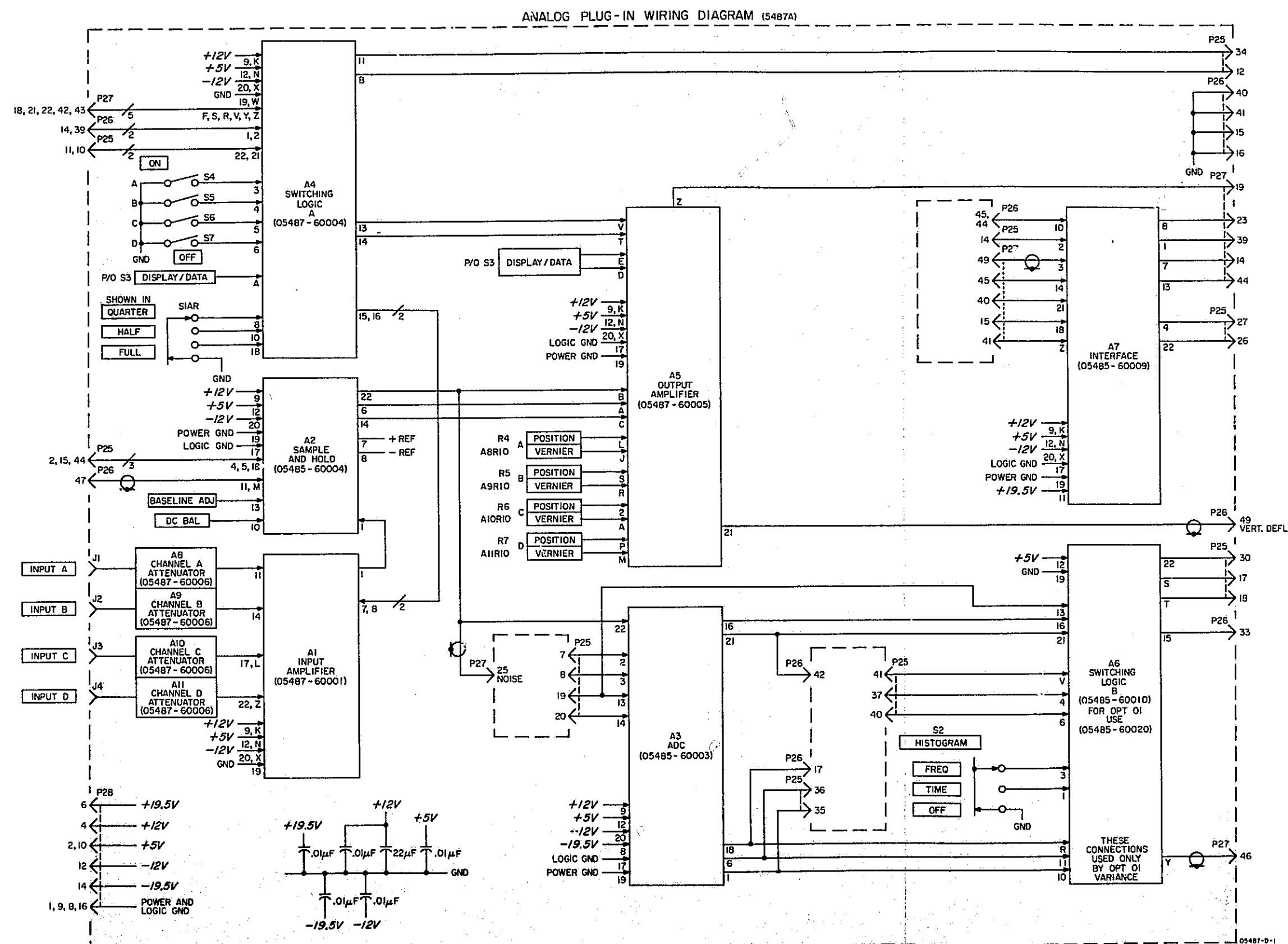


Figure 4-13

5487A

Wiring List: Table 4-2, Part I

4-163

ANALOG PLUG-IN WIRING DIAGRAM (5488A)

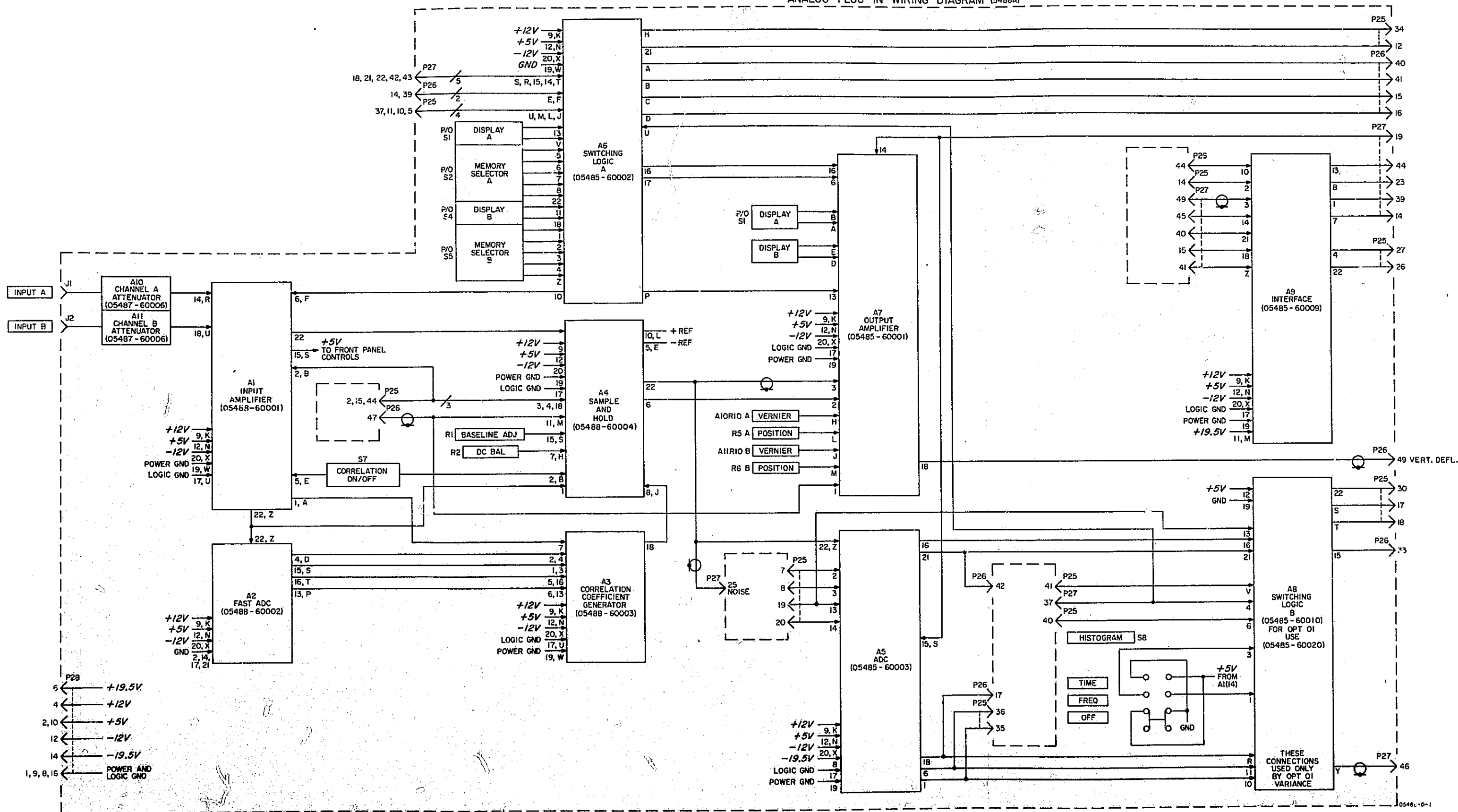


Figure 4-14

5488A

Wiring List: Table 4-2, Part J

4-165

Table 4-3. Replacing Pushbutton Indicator Lamps

DESCRIPTION

This table describes how to replace the lamps in the 5480 PROCESS START, PROCESS STOP, OUTPUT DISPLAY, or OUTPUT RECORD pushbuttons.

LAMP PART NUMBER

The pushbuttons named above use an incandescent 6.0 V, T 1-3/4 bulb (2140-0039)

REPLACEMENT PROCEDURE

Normally, the pushbutton may be removed from the front of the 5480 without removing the instrument top cover. Simply grasp two opposite sides of the button with your fingers, and pull the button out; the indicator lamp will come out with it. Remove lamp from button by holding button and pulling on lamp flange. Install new lamp in button, then replace button on switch; be sure to press button firmly onto switch.

If the pushbutton cannot be removed using the procedure described above, use the following procedure:

- a. Remove 5480 top cover.
- b. Open memory deck.
- c. Remove plug-in card A4A1, located immediately behind the pushbuttons.
- d. Using a phillips or pozi-drive screwdriver, remove the pushbutton switch mounting plate.
- e. Remove pushbutton from switch.
- f. Replace lamp as described above.
- g. Reverse procedure of steps a through d to re-assemble 5480.

Table 4-4. Replacement Parts

NOTE: For detailed listing, see Service Manual Volume for specific unit.

FUSE: LINE, 115V: 2.5A, SB, (2110-0015)
LINE, 230V: 1.25A, SB, (2110-0021)
+5V SUPPLY (only on 5480B and 5480A Serial Prefix 920- and higher): 10 Amp (2110-0051).

LAMP: For pushbuttons: Incandescent 6.0V, T1-3/4 bulb (2140-0039)

CRT: P31 Phosphor, Internal Graticule, (5083-1853)

CORD, LINE: (8120-0078)

KIT, RACK MOUNT: (5060-0779)

Boards 5480A/B

Reference Designation	HP Stock No.	Note	Description
A1A1	05480-60013	A, B	Deflection Amplifier
A1A2	05480-60025		Calibrator Assembly
A1A3	01200-66505		High Voltage Transformer & Rectifier
A1A4	01200-66515		High Voltage Oscillator & Regulator
A2A1	05421-6001	A, C	Sense Amplifier
A2A2	05421-6002		Inhibit Generator
A2A3	05421-6001		Sense Amplifier
A2A4	05421-6002		Inhibit Generator
A2A5	05421-6003		"X" Decoder Gate
A2A6	05421-6003		"Y" Decoder Gate
A2A7	05421-6004		"X" Read-Write Generator
A2A8	05421-6004		"Y" Read-Write Generator
A2A9	05480-60010		Horizontal DAC
A2A10	05480-60009		Vertical DAC
A2A11	05480-60020		±19V Regulator
A2A12	05480-60073		20 MHz Time Base
A2A13	05480-60011		Memory Time Decoder
A2A14	05480-60022		Memory Logic
A3A1	05480-60001	A, E	Preset Detector
A3A2	05480-60004		Accumulator Control
A3A3	05480-60002		Accumulator Bits 0-3
A3A4	05480-60003		Accumulator Bits 4-7
A3A5	05480-60003		Accumulator Bits 8-11
A3A6	05480-60003		Accumulator Bits 12-15
A3A7	05480-60003		Accumulator Bits 16-19
A3A8	05480-60005		Accumulator Bits 20-23
A3A9	05480-60077		Address Register Bits 0-1
A3A10	05480-60006		Address Register Bits 2-5
A3A11	05480-60006		Address Register Bits 6-9
A3A12	05480-60075		Address Control Board
A4A1	05480-60012	D	Light Driver Assembly
A5A1	05480-60014		Power Supply "A"
A5A2	05480-60015		Power Supply "B"

- A. Current Board is preferred replacement.
B. 01200-66506 in older instruments.
C. 05480-60021 in older instruments.
D. 05480-60008 in 5480A.
E. 05480-60007 in 5480A.

Table 4-4. Replacement Parts (Cont'd)

Boards 5485A

Reference Designation	HP Stock No.	Description
A1	05485-60005	Input Amplifier
A2	05485-60004	Sample & Hold
A3	05485-60003	Analog-to-Digital Converter
A4	05485-60002	Switching Logic
A5	05485-60001	Output Amplifier
*A6	05485-60010	Switching Logic B
*A6	05485-60020	Variance Option
A7	05485-60009	Interface

*NOTE: A6 assembly may be either 60010 or 60020 board, depending on customer order.

Boards 5486A/B

Reference Designation	HP Stock No.	Description
A1	05486-60011	Sync and Delay
A2	05486-60010	Time Base "B"
A3	05486-60009	Time Base "A"
A4	05486-60036	Time Slot Decoder
A5	05486-60037	Light Driver Control
A6	05486-60038	Logic Matrix "C"
A7	05486-60039	Logic Matrix "A"
A8	05486-60005	Program Selection "A"
A9	05486-60040	Program Selector "B"
A10	05486-60041	Logic Matrix "B"
A11	05486-60042	Shift Control "B"
A12	05486-60043	Shift Control "A"
A13	05486-60044	Logic Matrix "D"

The A4-7 and A9-13 assemblies are not interchangeable between 5486A and B models.

Boards 5487A

Reference Designation	HP Stock No.	Description
A1	05487-60001	Four Channel Input
A2	05485-60004	Sample and Hold
A3	05485-60003	Analog-to-Digital Converter
A4	05487-60004	Four-Channel Logic
A5	05487-60005	Four-Channel Output Amplifier
A6	05485-60010	Switching Logic B
	or 05485-60020	Variance Option (Option 01)
A7	05485-60009	Interface

Table 4-4. Replacement Parts (Cont'd)

Boards 5488A		
Reference Designation	HP Part No.	Description
A1	05488-60001	Input Amplifier
A2	05488-60002	Fast ADC
A3	05488-60003	Correlation Coefficient Generator
A4	05488-60004	Sample and Hold
A5	05485-60003	Analog-to-Digital Converter
A6	05485-60002	Switching Logic A
A7	05485-60001	Output Amplifier
A8	05485-60010	Switching Logic B
A9	or 05485-60020	Variance Option
	05485-60009	Interface

Table 4-5. Service Kit

GENERAL		
A comprehensive service kit for the 5480 system is available under HP Part Number 10646A. It contains one each of subordinate kits which may be ordered separately using the HP Part Number shown. Boards in the kit will be for Models 5480B, 5485A, and 5486B.* Other kits for extender cables and isolated spares are identical for both models.		
Plug-in Models 5487A and 5488A require a mixture of 5485A boards and boards unique to the particular model. The unique boards are available as separate kits.		
*Model 5480A and Model 5486A boards are compatible in most cases with the 5480B and 5486B boards, respectively. Substitution of non-compatible 5480A, 5486A boards will be made upon request. Refer to Table 4-6 for cross reference list of non-compatible boards.		
Description		HP Part Number
Comprehensive Kit containing: Replacement Board Kit Isolated Spares Kit Extender Cable Kit for Plug-ins		10646A
Replacement Board Contains one each boards for Models 5480B, 5485A, and 5486B.* These are listed separately below. Where both new and rebuilt boards are available, the kit may contain either board but not both.		10646-60001
Isolated Spares Kit: Includes replacement transistors, IC's, diodes and lamps for one year's isolated service of the 5480 system. These parts are listed below.		10646-60002
Extender Cable Kit: Includes 3 only 05480-60052 cables, and 1 only 05480-60051 cable. Allows operation of the 5485A or 5486A/B outside plug-in compartment.		10646-60003
REPLACEMENT BOARD KIT (10646-60001):		
Includes one each of the following boards		
5480B		
Reference Designator	Board Assembly Description	HP Part Number
A1A1	Deflection Amplifier	05480-60013 (new); 05480-60067 (rebuilt)
A1A2	Calibrator Assembly	05480-60025 (new)
A1A3	High Voltage Transformer and Rectifier	01200-66505 (new)
A1A4	High Voltage Oscillator and Regulator	01200-66515 (new)
A2A1, A2A3	Sense Amplifiers	05421-6001 (new); 05421-6039 (rebuilt)
A2A2, A2A4	Inhibit Generators	05421-6002 (new); 05421-6040 (rebuilt)
A2A5, A2A6	"X" and "Y" Decoder Gates	05421-6003 (new); 05421-6041 (rebuilt)
A2A7, A2A8	"X" and "Y" Read-Write Generators	05421-6004 (new); 05421-6042 (rebuilt)
A2A9	Horizontal DAC	05480-60010 (new); 05480-60064 (rebuilt)

Table 4-5. Service Kit (Cont'd)

5480B (Cont'd)		
Reference Designator	Board Assembly Description	HP Part Number
A2A10	Vertical DAC	05480-60009 (new); 05480-60063 (rebuilt)
A2A11	±19V Regulator	05480-60020 (new); 05480-60070 (rebuilt)
A2A12	20 MHz Time Base	05480-60073 (new);
A2A13	Memory Time Decoder	05480-60011 (new); 05480-60065 (rebuilt)
A2A14	Memory Logic	05480-60022 (new); 05480-60072 (rebuilt)
A3A1	Preset Detector	05480-60001 (new); 05480-60055 (rebuilt)
A3A2	Accumulator Control	05480-60004 (new); 05480-60058 (rebuilt)
A3A3	Accumulator Bits 0-3	05480-60002 (new); 05480-60056 (rebuilt)
A3A4, A3A5	Accumulator Bits 4-7, 8-11,	05480-60003 (new); 05480-60057 (rebuilt)
A3A6, A3A7	12-15, 16-19	
A3A8	Accumulator Bits 20-23	05480-60005 (new); 05480-60059 (rebuilt)
A3A9	Address Register Bits 0-1	05480-60077 (new); 05480-60061 (rebuilt)
A3A10, A3A11	Address Register Bits 2-5, 6-9	05480-60006 (new); 05480-60060 (rebuilt)
A3A12	Address Control Board	05480-60075 (new); 05480-60076 (rebuilt)
A4A1	Light Driver Assembly	05480-60012 (new); 05480-60066 (rebuilt)
A5A1	Power Supply "A"	05480-60014 (new); 05480-60068 (rebuilt)
A5A2	Power Supply "B"	05480-60015 (new); 05480-60069 (rebuilt)
5485A		
A1	Input Amplifier	05485-60005 (new); 05485-60025 (rebuilt)
A2	Sample and Hold	05485-60004 (new); 05485-60024 (rebuilt)
A3	A to D Converter	05485-60003 (new); 05485-60023 (rebuilt)
A4	Switching Logic A	05485-60002 (new); 05485-60022 (rebuilt)
A5	Output Amplifier	05435-60001 (new); 05485-60021 (rebuilt)
A6	Switching Logic B	05485-60010 (new); 05485-60027 (rebuilt)
A7	Interface	05485-60009 (new); 05485-60026 (rebuilt)
5486B		
A1	Sync and Delay	05486-60011 (new); 05486-60033 (rebuilt)
A2	Time Base "B"	05486-60010 (new); 05486-60032 (rebuilt)
A3	Time Base "A"	05486-00009 (new); 05486-60031 (rebuilt)
A4	Time Slot Decoder	05486-60036 (new); 05486-60045 (rebuilt)
A5	Light Driver Control	05486-60037 (new); 05486-60046 (rebuilt)
A6	Logic Matrix "C"	05486-60038 (new); 05486-60047 (rebuilt)
A7	Logic Matrix "A"	05486-60039 (new); 05486-60048 (rebuilt)
A8	Program Selector "A"	05486-60005 (new); 05486-60027 (rebuilt)
A9	Program Selector "B"	05486-60040 (new); 05486-60049 (rebuilt)
A10	Logic Matrix "B"	05486-60041 (new); 05486-60050 (rebuilt)
A11	Shift Control "B"	05486-60042 (new); 05486-60051 (rebuilt)
A12	Shift Control "A"	05486-60043 (new); 0546-60052 (rebuilt)
A13	Logic Matrix "D"	05486-60044 (new); 0546-60053 (rebuilt)
ISOLATED SPARES KIT (10646-60002):		
Includes replacement components as listed below.		
Resistors		
Part No.	Quantity	
0698-6224	2	
0698-6225	2	
0811-1397	2	
0811-1398	2	
0698-3146	2	
0698-5131	2	
0698-5132	2	

Table 4-5. Service Kit (Cont'd)

ISOLATED SPARES KIT
(10646-60002
(Cont'd)

Capacitors

Part No.	Quantity
0180-0042	1
0180-0268	1
0180-1809	1
0180-1871	1
0180-1968	1
0180-2130	1

Lamps

Part No.	Quantity
2140-0021	1
2140-0039	2

Fuses

Part No.	Quantity
2110-0015	1
2110-0021	1

Diodes

Part No.	Quantity	Part No.	Quantity
1901-0025	2	1902-0064	1
1901-0026	2	1902-0071	1
1901-0028	2	1902-0126	1
1901-0033	1	1902-0210	1
1901-0039	5	1902-0243	1
1901-0040	5	1902-3002	1
1901-0045	1	1902-3003	1
1901-0049	1	1902-3059	1
1901-0179	2	1902-3070	2
1901-0341	1	1902-3094	1
1901-0376	1	1902-3104	1
1901-0409	2	1902-3290	1
1902-0041	2	1902-3256	1
1902-0049	1	1902-3268	1
1902-0052	1	1902-3337	1
1902-0057	1	1910-0034	

Transistors

Part No.	Quantity	Part No.	Quantity
1853-0001	1	1854-0071	2
1853-0015	1	1854-0072	1
1853-0016	4	1854-0092	2
1853-0020	4	1854-0094	2
1853-0034	1	1854-0221	2
1853-0036	2	1854-0246	4
1853-0037	1	1854-0330	1
1854-0005	4	1855-0020	1
1854-0009	1	1855-0049	1
1854-0019	1	1855-0050	1
1854-0022	1	1855-0057	1
1854-0039	2	1884-0046	1
1854-0045	1	1884-0054	1
1854-0063	1		

Table 4-5. Service Kit (Cont'd)

(10646-60003)(Cont'd)			
Integrated Circuits			
Part No.	Quantity	Part No.	Quantity
1820-0054	2	1820-0085	2
1820-0055	2	1820-0304	1
1820-0063	1	1820-0370	2
1820-0068	2	1820-0371	2
1820-0069	2	1820-0373	1
1820-0070	2	1820-0375	1
1820-0071	2	1820-0376	1
1820-0072	2	1820-0378	1
1820-0074	2	1820-0380	1
1820-0075	1	1820-0381	1
1820-0077	2	1820-0383	1
1820-0084	2	1820-0387	2

REPLACEMENT BOARD KIT (10646-60004):

Includes one each of the following boards, unique to the 5487A.

Reference Designator	Board Assembly Description	HP Part Number
A1	Four Channel Input Amplifier	05487-60001 (new); 05487-60012 (rebuilt)
A4	Four Channel Logic	05487-60004 (new); 05487-60013 (rebuilt)
A5	Four Channel Output	05487-60005 (new); 05487-60014 (rebuilt)

REPLACEMENT BOARD KIT (10646-60005):

Includes one each of the following boards, unique to the 5488A.

Reference Designator	Board Assembly Description	HP Part Number
A1	Input Amplifier	05488-60001 (new); 05488-60012 (rebuilt)
A2	Fast ADC	05488-60002 (new); 05488-60013 (rebuilt)
A3	Correlation Coefficient Generator	05488-60003 (new); 05488-60014 (rebuilt)
A4	Sample and Hold	05488-60004 (new); 05488-60015 (rebuilt)

Table 4-6. Non-Compatible Board Number Cross Reference List*
(Models 5480A/5486A to 5480B/5486B)

5480 Main Frame		
Reference Designator	5480A Board Number	5480B Board Number
A2A12	05480-60021 (below Serial #928-0176)	05480-60073**
A3A12	05480-60008	05480-60075
5486 Logic Plug-in		
Reference Designator	5486A Board Number	5486B Board Number
A4	05486-60008	05486-60036
A5	05486-60003	05486-60037
A6	05486-60014	05486-60038
A7	05486-60006	05486-60039
A9	05486-60004	05486-60040
A10	05486-60007	05486-60041
A11	05486-60002	05486-60042
A12	05486-60001	05486-60043
A13	05486-60015	05486-60044

*These boards are not directly interchangeable
**Substitution requires the wiring of +5V to pin 15

Figure 4-15. 5480A/B Rear Panel Connections

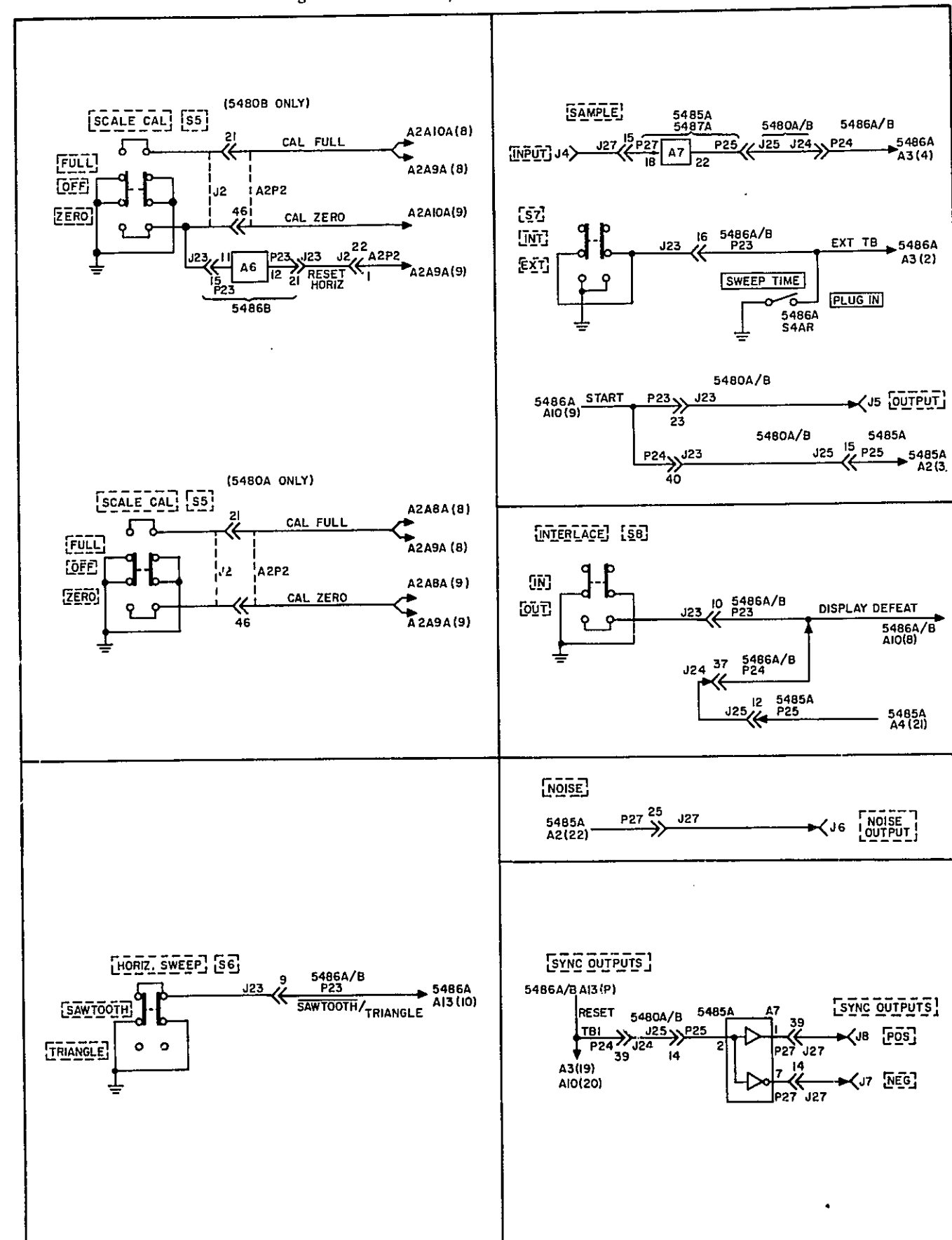


Figure 4-15. 5480A/B Rear Panel Connections (Cont'd)

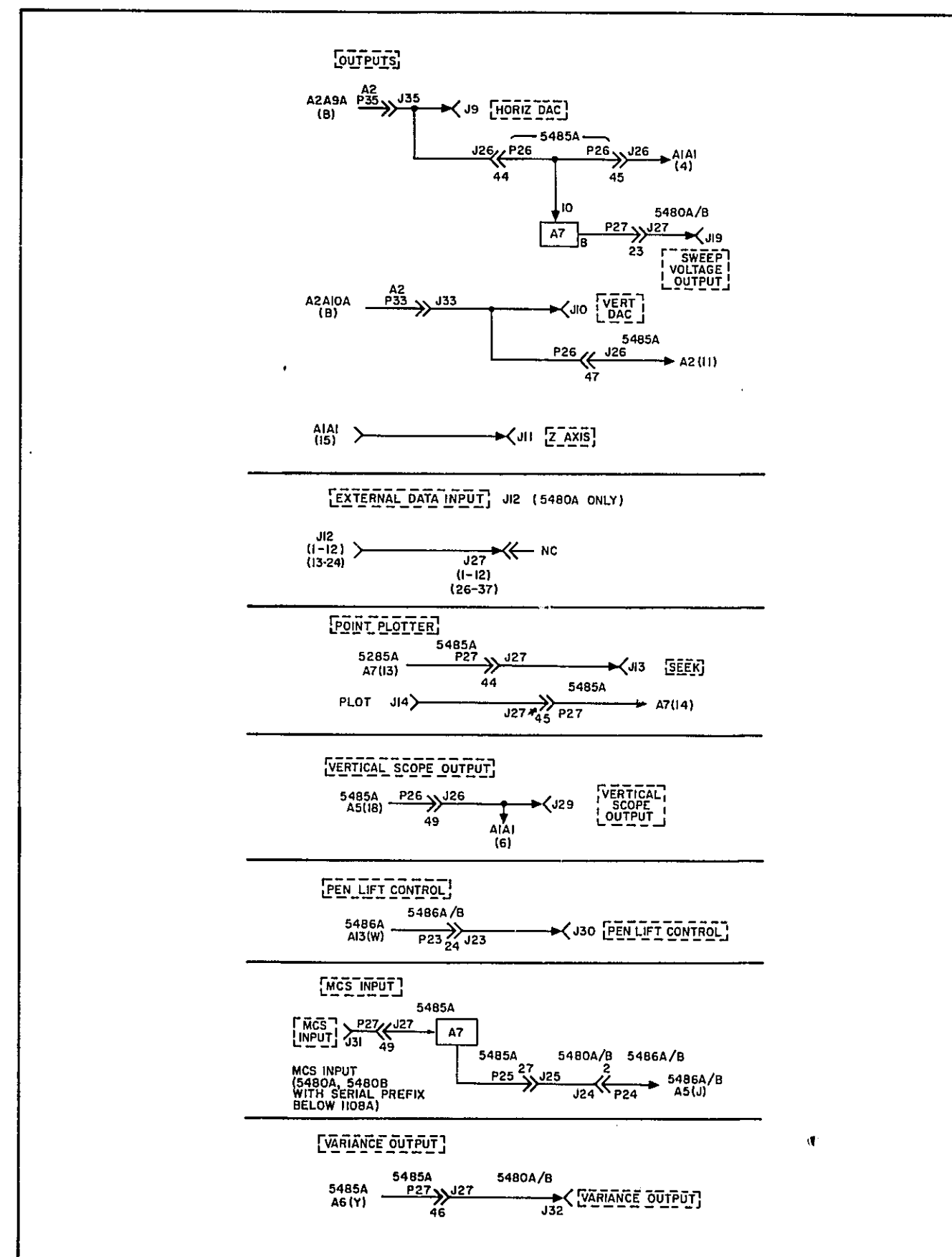
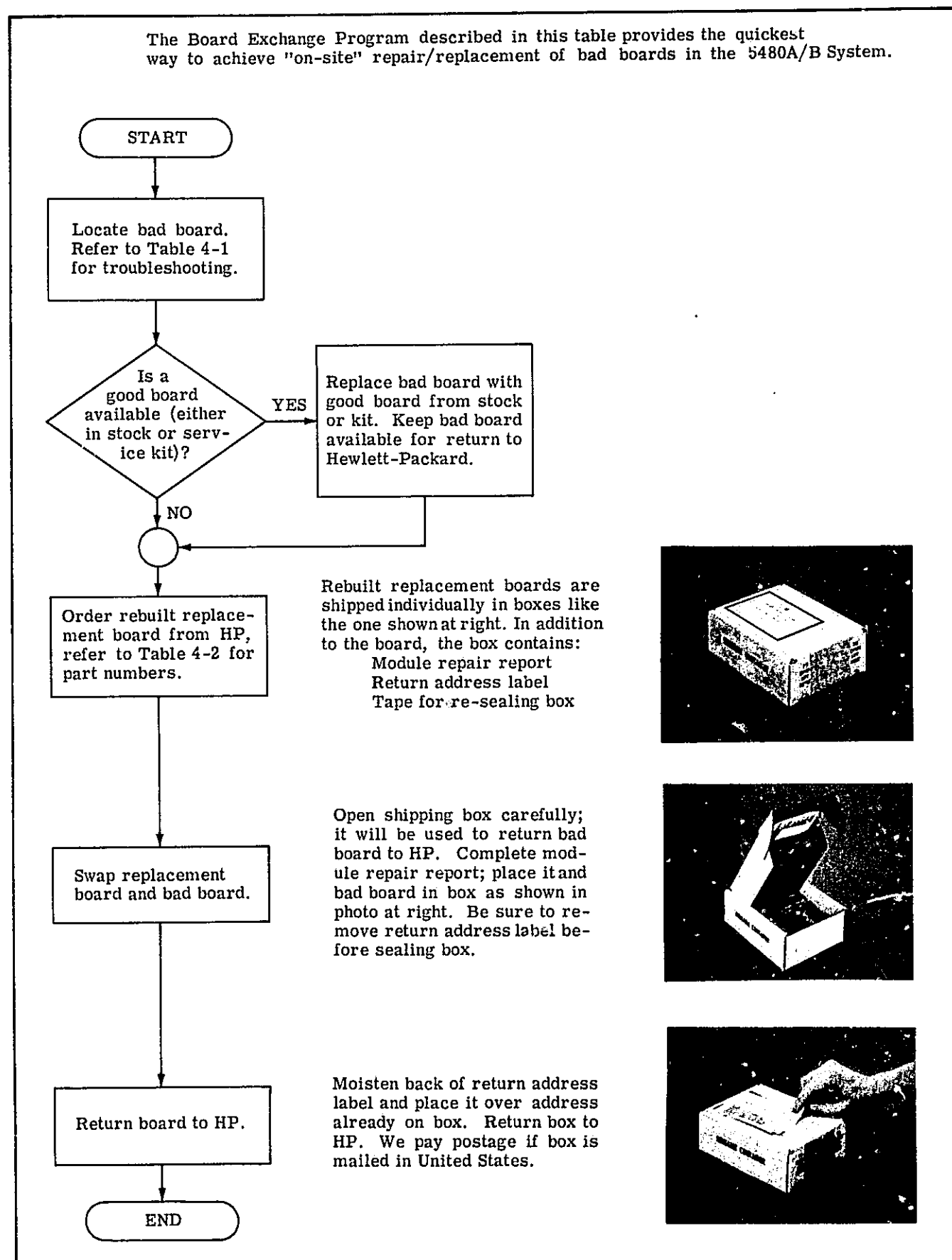


Table 4-16. Board Replacement Program



CATHODE RAY TUBE WARRANTY

The cathode ray tube (CRT) supplied in the Hewlett-Packard 5480A, and replacement CRTs purchased from HP, are guaranteed by the Hewlett-Packard Company against electrical failure for a period of one year from date of sale. Broken tubes or tubes with burned phosphor are not included under this guarantee. If the CRT is broken when received, a claim should be made with the responsible carrier.

Your nearest Hewlett-Packard Sales and Service office (listed at rear of instrument manual) maintains a stock of replacement tubes and will assist in processing the warranty claim.

In order to ensure credit for a CRT under the warranty period, the reverse side of this sheet should be filled out completely and returned with the defective tube to the nearest HP Sales and Service office. To avoid damage to the tube while in shipment, carefully follow the shipping instructions listed on the reverse side of this sheet; credit is not allowed on broken tubes.

CRT 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 _____

NAME _____

COMPANY _____

ADDRESS _____

For additional information, contact:

NAME _____

COMPANY _____

ADDRESS _____

1. HP INSTRUMENT a) MODEL _____
b) SERIAL NO. _____

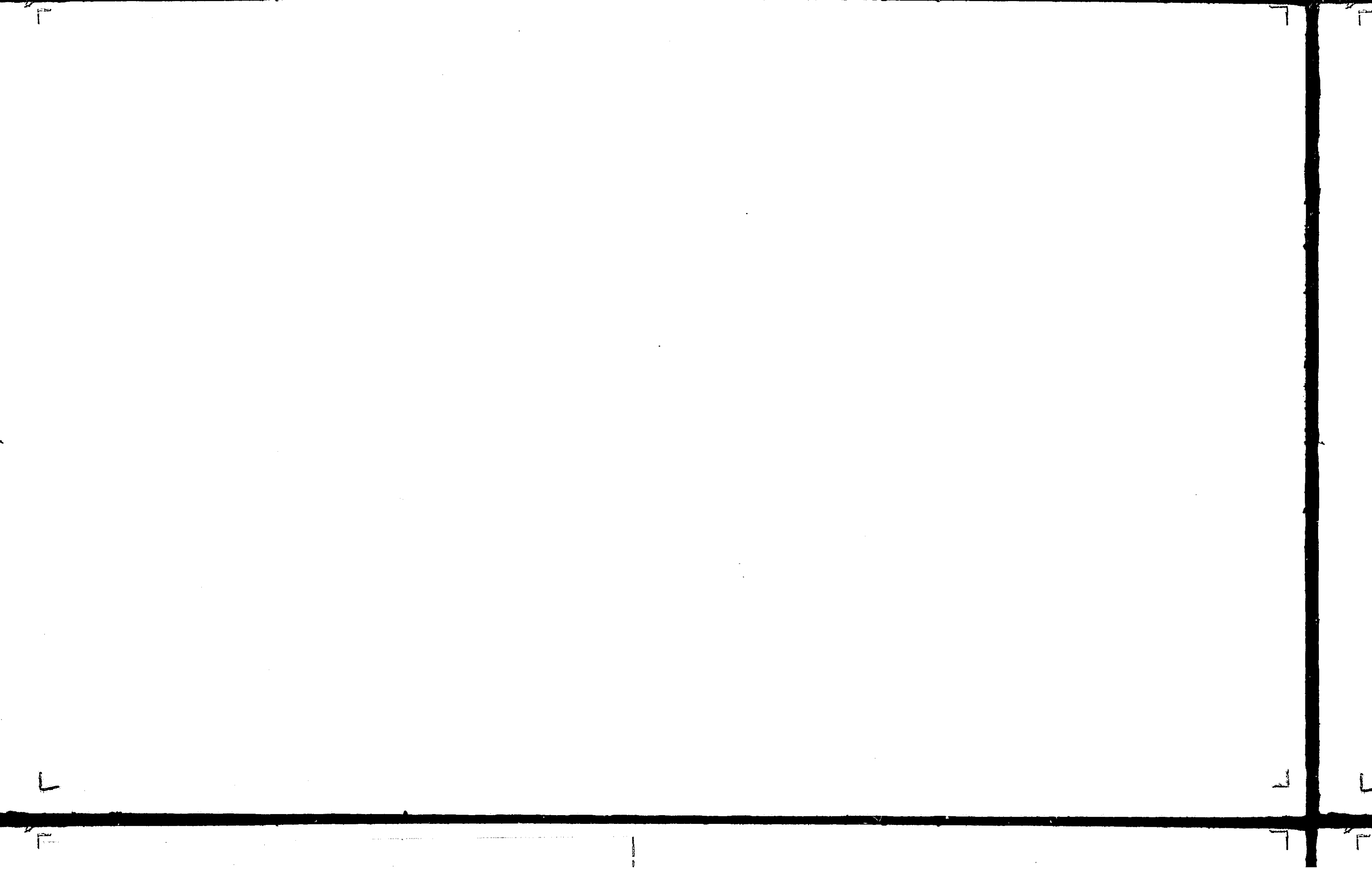
2. CRT a) TYPE (on bulb) _____
b) SERIAL NO. (on CRT base) _____

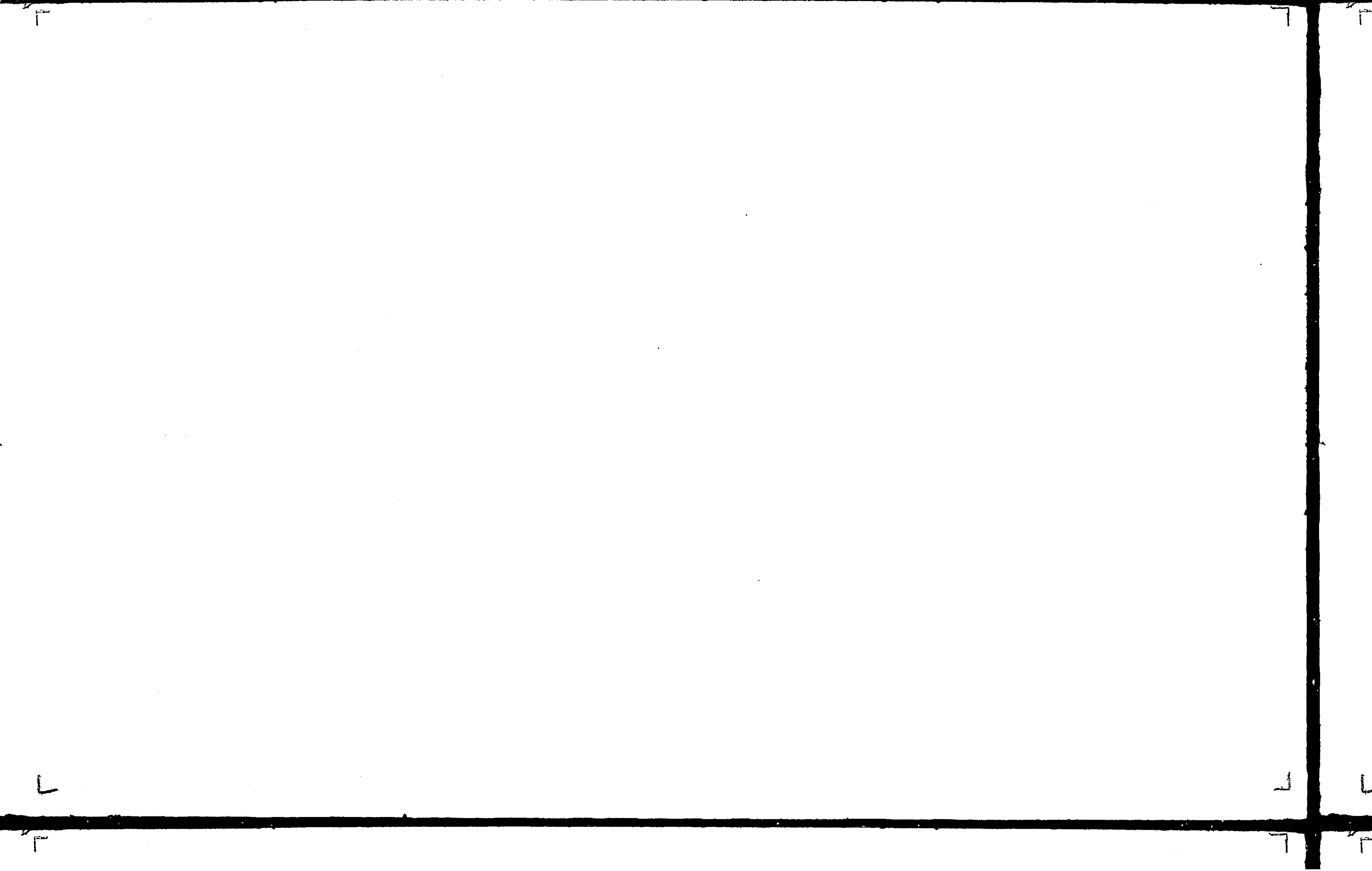
3. Is defective tube original? YES _____ NO _____

4. Date purchased (if available) _____

5. Describe nature and/or symptoms of trouble. _____

_____6. Describe operation conditions prior to and at time of failure. (Please estimate CRT "on-time" since purchase.) _____





SERVICE NOTES

5480A-1A SERVICE NOTE

SUPERSEDES:
5480A-1

HP MODEL 5480A SIGNAL ANALYZER

Serial Nos. below 928-00176

20 MHz TIME BASE REPLACEMENT

The Time Base Board (A2A12) has a new design for improved reliability and the elimination of two adjustments.

The installation of the new board requires the wiring of +5V to A2XA12 from the adjacent socket A2XA11. The old board should not be replaced unless it becomes defective.

PARTS AFFECTED BY CHANGE

Old No. : 05480-60021

New No. : 05480-60073

INSTALLATION PROCEDURE

1. Remove top cover of 5480A.
2. Using #18 buss, 11/16" (1.8 cm) long, wire between terminal 15 of A2XA11 and A2XA12.
3. Swing out A2 memory deck and replace 05480-60021 board with the 05480-60073 board. Replace deck to its normal position.
4. Turn on power and check for 20 MHz sine wave (3V amplitude at A2XA12 (2)).

WH/sg/WO

1/70-2

HEWLETT  PACKARD

For more information, call your local HP Sales Office or East (201) 265-5000 • Midwest (312) 677-0400 • South (404) 436-6181
West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, 1217 Meyrin-Geneva

Printed in U.S.A.

EUROPE

5480A-2 SERVICE NOTE

Supersedes:

None

HP MODEL 5480A SIGNAL ANALYZER

All Serial Nos.

IMPROVED A3A9 ADDRESS REGISTER

Operation of the 5480A with peripheral recording equipment can be improved by using a new A3A9 board, which was designed for the 5480B signal analyzer, or modifying the present board. Previously, holding the RECORD button (or applying a long external RECORD PBM signal) would cause fast recycling through channels 1 to 4 of the memory.

Releasing the button or completing the external control pulse would then start the record operation as it was designed to do. The recycling is not noticeable with all recording equipment but in some cases it may be annoying.

The problem can be completely cleared up with the new 5480B board or the old board may be easily modified. The new circuit requires an additional signal line which is very easy to install. It takes the "CLEAR DAR B" signal from A3A10 (V) and applies it to A3A9(S).

PARTS AFFECTED BY CHANGE

Old No: 05480-60007

New No: 05480-60077

Updated Rebuilt No: 05480-60061 (for board exchange program).

INSTALLATION PROCEDURE

1. Remove left side panel, bottom and top covers of the 5480A.
2. Locate the A3 Section at the left rear of the mainframe. Find A3XA9 which is the 9th socket from the rear, with the instrument right side up.
3. Using a 3/4" (2 cm) shielded hook-up wire, jumper between A3XA9(S) and A3XA10 (V).

WH/sg/WN

4. Turn 5480A upside down and find board A3A9. Pull out board 05480-60007 and replace with rebuilt board No. 05480-60061; or with new board No. 05480-60077; or modified present board as described below.
5. Turn instrument right side up. Turn on power and test

MODIFICATION OF 05480-60007

1. Drill holes with No. 64 drill bit as follows from foil side of board. (Refer to Parts Locator diagram, Figure 1.)
 - a. Hole(s) 1/8" above IC16 (12); hole(t) 3" to left of the IC16 (12) hole and 1/8" from top of board; hole(u) 3/16" up from board terminal "S" and just to right of foil.
 - b. Hole(v) 1/8" above IC16 (13); hole(w) 3/8" to right of IC16 (14); hole(x) 5/8" down from previous hole and through foil of lead going to terminal "18".
 - c. Hole(y) 3/16" above IC17 (13); and hole(z) 1/8" left of IC16 (8).
2. Cut foil with No. 60 drill bit at point 3/16" downward from IC17 (1) to break connection.
3. Cut lengths of No. 24 bare hook-up wire as specified and connect as follows (lengths are sufficient for small hook around IC terminal):
 - a. (8") Solder to IC16 (12), run through hole(s) to hole(t) run through this hole and straight down to hole(u) for board terminal "S". Push lead through hole(u), bend over on top for strength, and solder to foil. Use insulation, 3" on top of board, and 4" on bottom of board.

3/70-2

HEWLETT  PACKARD

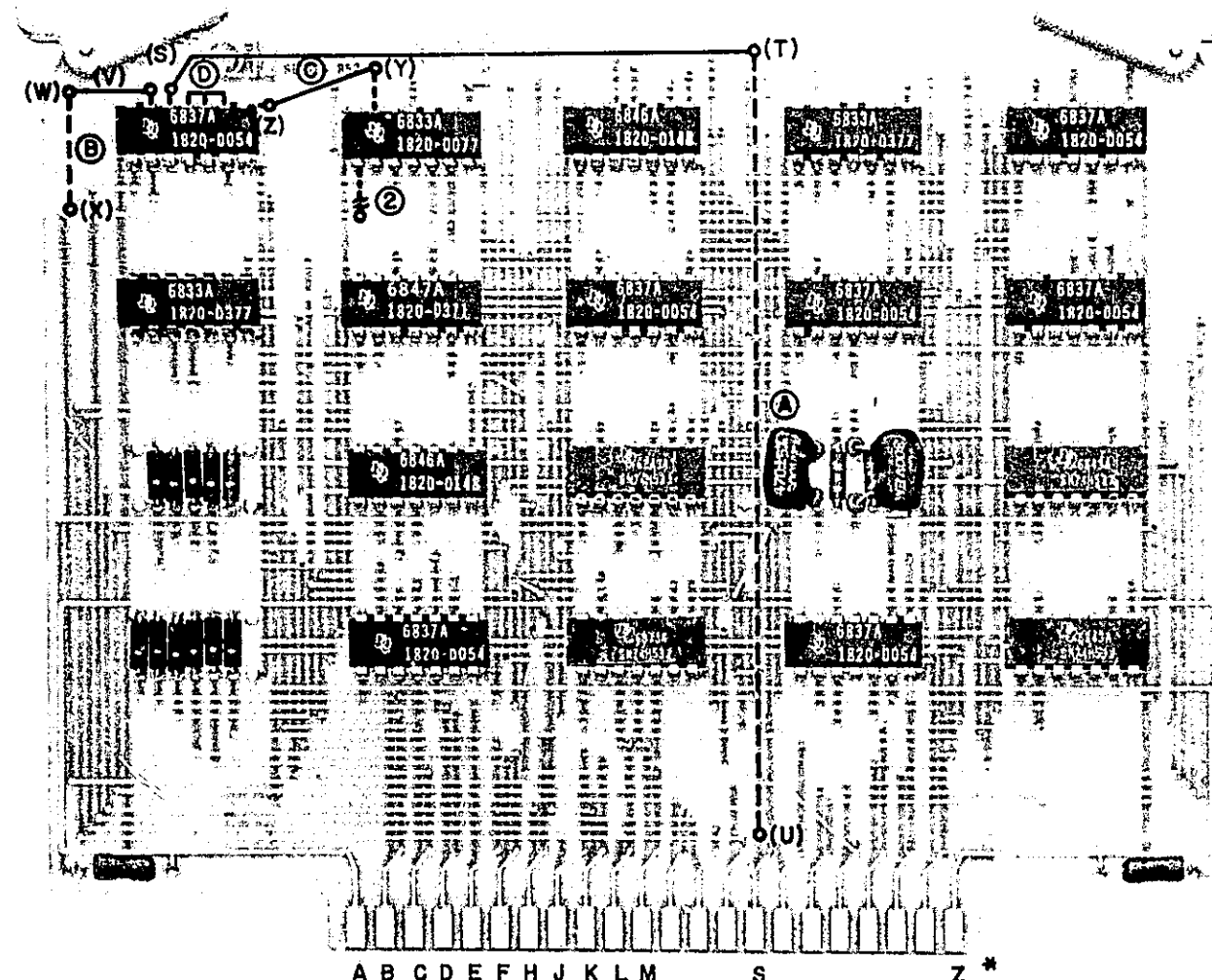
For more information, call your local HP Sales Office or East (201) 265-5000 • Midwest (312) 677-0400 • South (404) 436-6181 West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, 1217 Meyrin-Geneva

Printed in U.S.A.

- (1-5/8") Solder to IC 16 (13), run through hole(v) to hole(w) and through it, run wire down to hole(x) through it and the foil going to terminal 18, push end through hole, bend over for strength, solder to foil. Use 3/8" insulation on top of board.
 - (1-3/8") Solder to IC17 (13) and run through hole(y) to hole(z) and through to terminal IC16 (8). Solder both ends. Use 9/16" insulation on top of board.
 - (1/4") Solder across IC16 (9, 10, 11).
- Fasten down long leads with Duco Cement and clean board.
 - Set SWEEP TIME to 100 msec/cm.
 - Apply front panel CALIBRATOR signal to Analog Plug-in input.
 - Throw DC/GND/AC switch to AC.
 - Press CLEAR DISPLAY buttons.
 - Push START. Trace should deflect almost equally above and below center line.
 - Push DISPLAY. DISPLAY button should light and oscillogram should hold steady.
 - Depress RECORD button. While depressed, a single dot should appear on left of CRT screen.
 - Release RECORD button and trace moves across CRT once. STOP light comes on at end of sweep.

TEST PROCEDURE

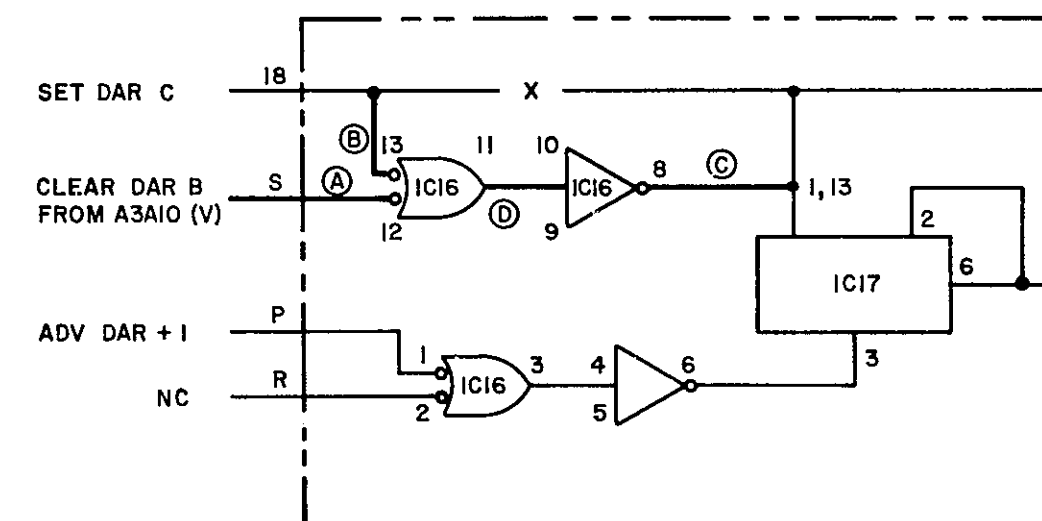
- Set up front panel controls as for Averaging operation. Use INTERNAL TRIGGER SOURCE.



NOTE: LETTER AND NUMBER CALLOUTS REFER TO TEXT. SOLID LINES FRONT, DASHED FOR BACK OF BOARD.
* TERMINALS LETTERED FOR BACK SIDE OF BOARD.

Figure 1.

A3A9 REGISTER ASSEMBLY (05840-60077)*



* PARTIAL SCHEMATIC: "X" SHOWS BREAK NECESSARY TO MODIFY 05840-60007 BOARD.
HEAVY LINES INDICATE ADDED JUMPERS TO MODIFY 05480-60007 BOARD.

Figure 2

5480A-3 SERVICE NOTE

SUPERSEDES:

None

5480A

PLOTTER INTERFACE PROBLEMS

Several problems have arisen when attempting to Interface a 5480A with any type of Plotter. A problem/cure synopsis is provided in this memo for your information.

Problem

Record Mode, with SWEPTIME set to EXT, does not begin when RECORD button pressed.

Remedy

Replace A7 INTERFACE ASSEMBLY (05485-60009) with current series 964.

Problem

5480A instruments with serial number prefix 928 and lower plot the first four memory channels repeatedly when the RECORD button is pressed, until it is released.

Remedy

Modify the A3A9 (05480-60007) board as per instructions in Service Note 5480A-2.

Problem

Non-compatibility of 5480A units, serial numbers 852-00175 and below and Interface cable 10640B. The older 5480A units have a 24 pin blue ribbon connector and two BNC connectors labeled SEEK and PLOT. The new 5480B and 5480A with serial numbers 928-00176 and above have a 14 pin Blue ribbon connector labeled PLOTTER and has eliminated the two BNC connectors. Obviously, a compatibility problem exists.

Remedy

Order Interface cable 10640B for 5480B for 5480A along with special Interface adapter box K07-5480A.

The K07-5480A Adapter Box connects to the rear panel of the 5480A and couples signals necessary to a 14 pin Blue ribbon connector for the 10640B cable.

Problem

Some plotters require different voltage levels for operating PEN LIFT. The 5480A provided only a TTL level to command this operation. With plotters having 35 volts on the PEN LIFT line the TTL gate was destroyed.

Remedy

Correction was made by adding a relay to the 5485A INTERFACE board. Replacing the old A13 board in the 5485A eliminates the PEN LIFT problem, but may add an additional problem as the circuitry for UP/DN sweep in MCS is eliminated. For customers not concerned with UP/DN sweep in the MCS mode, order board 05486-60044. For customers using UP/DN sweep mode, order special board 05486-60080. This board mounts to the side frame of the 5480A and is electrically connected between the old PEN LIFT signal from A13 and the BNC on the 5480A rear panel. Wiring procedures accompany the board assembly.

Problem

5480A will cause plotter to "Buzz" when servos are left on during an accumulation mode. Problem caused by not having signal L RECORD brought out to the rear panel.

Remedy

User must manually arm the recorder servo during OUTPUT RECORD and disarm at all other times.

HEWLETT  PACKARD

For more information, call your local HP Sales Office or East (201) 265-5000 • Midwest (312) 677-0400 • South (404) 436-6181 West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, 1217 Meyrin-Geneva

Printed in U.S.A.

5480A B-4 SERVICE NOTE

Supersedes:

None

HP MODEL 5480A/B SIGNAL ANALYZER

All serial numbers below 1248A00231 except 1132A00220/1132A00221

HIGH FREQUENCY OSCILLATIONS

High frequency oscillations (1 MHz) have caused the oscilloscope trace to be much thicker than desirable. This effect sometimes becomes intolerable with the use of the 5487A Four Channel Plug-in.

A 0.1 μ F capacitor (0160-3094) should be added to the A5A1 (05480-60014) low voltage power supply. The capacitor should be inserted from the base of Q1 to ground.

5480B's Serial Number 1132A00220/1132A00221 and all serial numbers 1248A00231 and above have this change.

RL/d1/WN

1/74-2

HEWLETT  PACKARD

For more information, call your local HP Sales Office or East (201) 265-5000 • Midwest (312) 677-0400 • South (404) 436-6181 West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, 1217 Meyrin-Geneva

PRINTED IN U.S.A.

5480A/B-5 SERVICE NOTE

Supersedes:

None

5480A/B SIGNAL ANALYZER

All Serial Numbers

REQUIREMENTS FOR AVERAGING

Several questions have arisen about interpreting the 5480A/B Operating and Service manuals, particularly concerning Averaging Modes; Summation and Average.

The manuals fail to emphasize the following three requirements necessary to utilize the 5480 Average Modes.

1. The waveform must be repetitive (not necessarily periodic).
2. A Sync" pulse must be available to signal the beginning of each repetition.
3. The highest frequency component of the input must be less than 50 KHz.

The second requirement causes the most concern because the 5480 Operating and Service manuals do not exclude the use of the "internal" or "line" trigger source. Please keep in mind that averaging can be done with the trigger source in either of the above positions, provided the following conditions are met:

- A. "Internal " - the input signal you wish to average is in "Sync" with the 5480 Internal Clock.
- B. "Line" - the input signal you wish to average is in "Sync" with the Line frequency.

Since these restrictions can be satisfied only in special cases, we recommend that "Internal" or "Line" trigger source not be used when using the 5480's Averaging or Summation Mode.

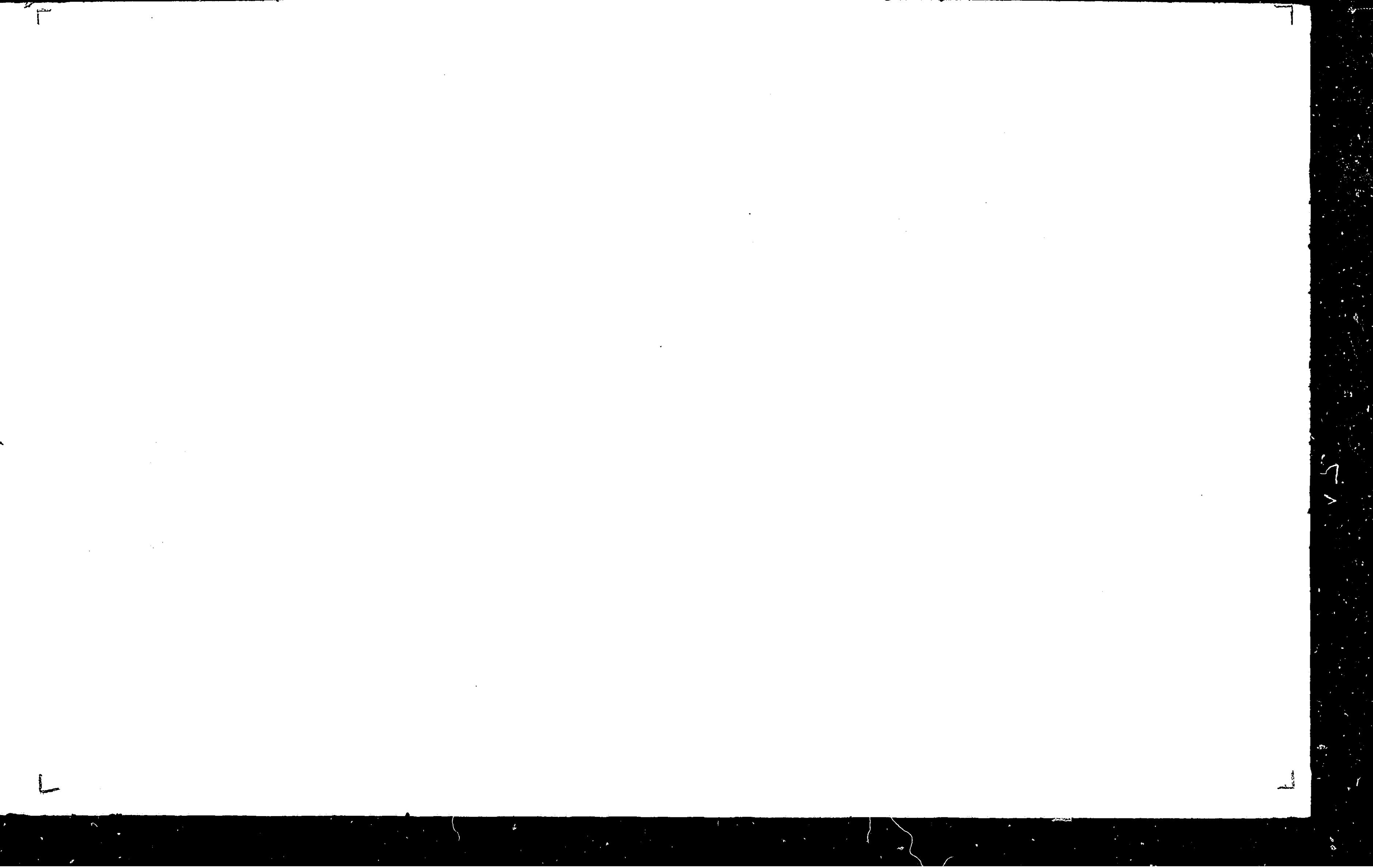
RL/d1/WN

10/72-2

HEWLETT  PACKARD

For more information, call your local HP Sales Office or East (201) 265-5000 • Midwest (312) 677-0400 • South (404) 436-6181
West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, 1217 Meyrin-Geneva

PRINTED IN U.S.A.





SALES & SERVICE OFFICES

UNITED STATES

ALABAMA
9290 Whitesburg Dr., S.E.
P.O. Box 4207
Huntsville 35892
Tel: (205) 881-4531
TWX: 810-726-2204

Medical Only
228 W. Valley Ave.,
Room 302
Birmingham 35209
Tel: (205) 879-20812

ARIZONA
2335 E. Magnolia St.
Phoenix 85034
Tel: (602) 244-1361
TWX: 910-951-1331
2424 East Aragon Rd.
Tucson 85706
Tel: (602) 889-4661

***ARKANSAS**
Medical Service Only
Little Rock 72205
Tel: (501) 664-8773

CALIFORNIA
1430 East Orangehorpe Ave.
Fullerton 92631
Tel: (714) 816-1009
TWX: 910-592-1288

3939 Lankershim Boulevard
North Hollywood 91604
Tel: (213) 877-1282
TWX: 910-499-2170

6305 Arizona Place
Los Angeles 90045
Tel: (213) 649-5211
TWX: 910-328-6147

***Los Angeles**
Tel: (213) 776-7500
3003 Scott Blvd.
Santa Clara 95050
Tel: (408) 249-7030
TWX: 910-335-0518

***Ridgcrest**
Tel: (714) 446-6165
2220 Watt Ave.
Sacramento 95825
Tel: (916) 492-1463
TWX: 910-367-2092

9608 Aero Drive
P.O. Box 23333
San Diego 92123
Tel: (714) 273-3200
TWX: 910-223-2000

Calculators Only
601 California St.
San Francisco 94108
Tel: (415) 389-8470

COLORADO
5600 South Ulster Parkway
Englewood 80110
Tel: (303) 771-3455
TWX: 910-935-0705

CONNECTICUT
12 Lunar Drive
New Haven 06525
Tel: (203) 389-6551
TWX: 910-465-2029

FLORIDA
P.O. Box 24210
2806 W. Oakland Park Blvd.
Ft. Lauderdale 33307
Tel: (305) 731-2029
TWX: 510-955-4099

***Jacksonville**
Medical Service Only
Tel: (904) 725-6333

P.O. Box 13910
6177 Lake Ellenor Jr.
Orlando 32809
Tel: (305) 859-2800
TWX: 810-450-0113

21 East Wright St.
Suite 1
Pensacola 32501
Tel: (904) 434-3081

GEORGIA
P.O. Box 23234
450 Intersouth North
Atlanta 30328
Tel: (404) 434-4000
TWX: 810-766-4850

HAWAII
2875 So. King Street
Honolulu 96814
Tel: (808) 955-4455

ILLINOIS
5500 Howard Street
Skokie 60076
Tel: (312) 677-0400
TWX: 910-223-3613

***St. Joseph**
Tel: (217) 469-2133

INDIANA
7301 North Shadeland Ave.
Indianapolis 46250
Tel: (317) 842-1009
TWX: 810-260-1796

IOWA
1902 Broadway
Iowa City 52240
Tel: (319) 338-9466
Night: (319) 338-9467

***KANSAS**
Derby
Tel: (316) 267-3655

LOUISIANA
P.O. Box 549
3239 Williams Boulevard
Kenner 70052
Tel: (504) 721-6201
TWX: 810-955-5524

KENTUCKY
Medical/Calculator Only
8003 Tourlouse Court
Louisville 40291
Tel: (502) 426-4341

MARYLAND
6707 Whitestone Road
Baltimore 21207
Tel: (301) 844-5400
TWX: 710-882-9157

4 Choke Cherry Road
Rockville 20850
Tel: (301) 948-6370
TWX: 710-828-9685

P.O. Box 1548
2 Choke Cherry Road
Rockville 20850
Tel: (301) 948-6370
TWX: 710-828-9684

MASSACHUSETTS
32 Hartwell Ave.
Lexington 02173
Tel: (617) 861-8950
TWX: 710-326-6904

MICHIGAN
23855 Research Drive
Farmington 48324
Tel: (313) 476-6400
TWX: 810-242-2900

MINNESOTA
2400 N. Prior Ave.
Roseville 55113
Tel: (612) 636-0700
TWX: 910-563-3734

MISSISSIPPI
*Jackson
Medical Service Only
Tel: (601) 892-9363

MISSOURI
11313 Colorado Ave.
Kansas City 64137
Tel: (816) 763-8000
TWX: 910-771-2087

148 Wilson Parkway
Maryland Heights 63043
Tel: (314) 567-1455
TWX: 910-764-0830

NEBRASKA
Medical Only
1992 Elm Street
Suite 4C
Omaha 68144
Tel: (402) 333-6017

NEW JERSEY
120 Century Rd
Paramus 07652
Tel: (201) 265-5000
TWX: 710-990-4951

NEW MEXICO
P.O. Box 11634
Station E
11300 Lomas Blvd., N.E.
Albuquerque 87123
Tel: (505) 292-1330
TWX: 910-983-1185

P.O. Box 1548
2 Choke Cherry Road
Rockville 20850
Tel: (301) 948-6370
TWX: 710-828-9684

OHIO
16500 Sprague Road
Cleveland 44130
Tel: (216) 243-7300
Night: 243-7305
TWX: 810-423-9431

330 Progress Rd.
Dayton 45449
Tel: (513) 859-8202
TWX: 810-459-1925

1041 Kingsmill Parkway
Columbus 43229
Tel: (614) 436-1041

NEW YORK
6 Automation Lane
Computer Park
Albany 12205
Tel: (516) 459-1550
TWX: 710-441-8270

1251 Avenue of the Americas
Floor 32 - Suite 3295
New York City 10020
Tel: (212) 265-5575

NEW YORK City
Manhattan, Bronx
Contact Paramus, NJ Office
Tel: (201) 265-5000
Brooklyn, Queens, Richmond
Contact Woodbury, NY Office
Tel: (516) 921-0300

201 South Avenue
Poughkeepsie 12601
Tel: (914) 454-7330
TWX: 510-248-0012

39 Saginaw Drive
Rochester 14623
Tel: (716) 473-3500
TWX: 510-253-5981

5858 East Molloy Road
Syracuse 13211
Tel: (315) 455-2486
TWX: 710-541-0482

SOUTH CAROLINA
6941-D N. Trenholm Road
Columbia 29250
Tel: (803) 782-6493

TENNESSEE
*Memphis
Medical Service Only
Tel: (901) 274-7472

*Nashville
Medical Service Only
Tel: (615) 244-5448

TEXAS
P.O. Box 1270
201 E. Arapaho Rd.
Richardson 75080
Tel: (214) 231-6101
TWX: 910-667-4721

156 Wyatt Drive
Las Cruces 88001
Tel: (505) 526-2485
TWX: 910-983-0550

UTAH
2850 South Main Street
Salt Lake City 84115
Tel: (801) 487-0715
TWX: 910-925-5681

VERMONT
P.O. Box 27409
400 Westpark Drive
Suite 100
Houseton 77027
Tel: (713) 781-6000
TWX: 910-881-2645

205 Billy Mitchell Road
San Antonio 78226
Tel: (512) 434-8241
TWX: 910-871-1170

OKLAHOMA
P.O. Box 32008
Oklahoma City 73132
Tel: (405) 721-0300
TWX: 910-630-6852

OREGON
17890 SW Boones Ferry Road
Tualatin 97062
Tel: (503) 620-3350
TWX: 910-467-8714

PENNSYLVANIA
111 Zeta Drive
Pittsburgh 15238
Tel: (412) 792-0400
Night: 782-0401

2914 Hunspring Springs Road
Richmond 23228
Tel: (804) 285-3431
TWX: 710-956-0157

WASHINGTON
Bellevue Office Pk.
1203-114th SE
Bellevue 98004
Tel: (206) 454-3971
TWX: 910-443-2446

***WEST VIRGINIA**
Medical/Analytical Only
Charleston
Tel: (804) 345-1640

WISCONSIN
9431 W. Beloit Road
Suite 117
Milwaukee 53227
Tel: (414) 541-5550

FOR U.S. AREAS NOT LISTED:
Contact the regional office
nearest you: Atlanta, Georgia...
North Hollywood, California...
Rockville, (4 Choke Cherry Rd.)
Maryland...Skokie, Illinois
Their complete addresses
are listed above

*Service Only

CANADA

ALBERTA
Hewlett-Packard (Canada) Ltd.
11748 Kingsway Ave.
Edmonton T5G 0X5
Tel: (403) 452-3670
TWX: 610-831-2431

Hewlett-Packard (Canada) Ltd.
915-42 Avenue S.E. Suite 102
Calgary T2G 1Z1
Tel: (403) 287-1672

BRITISH COLUMBIA
Hewlett-Packard (Canada) Ltd.
837 E. Cordova Street
Vancouver V6A 3R2
Tel: (604) 254-0531
TWX: 610-822-5059

MANITOBA
Hewlett-Packard (Canada) Ltd.
513 Century St.
St. James
Winnipeg R3J 0L8
Tel: (204) 786-7581
TWX: 610-671-3531

NOVA SCOTIA
Hewlett-Packard (Canada) Ltd.
800 Windmill Road
Dartmouth NS 1L1
Tel: (902) 469-7820

ONTARIO
Hewlett-Packard (Canada) Ltd.
1785 Woodward Dr.
Ottawa K2G 0P8
Tel: (613) 225-6530
TWX: 610-562-8968

Hewlett-Packard (Canada) Ltd.
6877 Goreway Drive
Mississauga L4V 1L9
Tel: (416) 678-9430
TWX: 610-492-4246

QUEBEC
Hewlett-Packard (Canada) Ltd.
275 Hymus Blvd.
St. Laurent J4M 4G4
Tel: (514) 697-4232
TWX: 610-422-3022
TLX: 05-821521 HPCL

Hewlett-Packard (Canada) Ltd.
2376 Gahway Road
St. Lawrence J4M 4G4
Tel: (416) 688-8710

FOR CANADIAN AREAS NOT LISTED:
Contact Hewlett-Packard (Canada)
Ltd. in Mississauga.

CENTRAL AND SOUTH AMERICA

ARGENTINA
Hewlett-Packard Argentina
S.A. C. del.
Lavalle 1171-3° Piso
Buenos Aires
Tel: 35-0436, 35-0627, 35-0341
Tel: 012-1009
Cable: HEWPAK ARG

BOLIVIA
Stambuk & Mark (Bolivia) Ltda.
Av. Mariscal, Santa Cruz 1342
La Paz
Tel: 40826, 53163, 52421
Tel: 3560014
Cable: BUKMAR

BRAZIL
Hewlett-Packard do Brasil
I.E.C. Ltda.
Rua Frei Caneca, 1.152-Reis Vista
01307-Sao Paulo-SP
Tel: 288-71-11, 287-81-25
Tel: 309151/22
Cable: HEWPAK Sao Paulo

Hewlett-Packard do Brasil
I.E.C. Ltda.
Praça Dom Feliciano, 78-8°
andar (Sala 806/8)
Avenida Azeiteiro 6287
Bogotá, D.E.
Cable: HEWPAK Porto Alegre

COLUMBIA
Instrumentación
Henrik A. Langebaek & Kier S.A.
Carrera 7 No. 48-59
Aparadó Aéreo 6287
Bogotá, D.E.
Tel: 45-78-05, 45-55-46
Cable: AARIS Bogotá
Tel: 44400INSTCO

COSTA RICA
Científica Costarricense S.A.
Aparadó 10159
Monterrey, N.
Tel: 257-60-94-0DD (021)
Tel: 2100 79 HEWPAK
Cable: BUKMAR

CHILE
Hewlett-Packard Ltda.
Calle Lira 81, Oficina 5
Casilla 2118
Santiago, 1
Tel: 395618
Cable: CALMET

MEXICO
Hewlett-Packard Mexicana,
S.A. de C.V.
Torres Adalid No. 21, 1° Piso
Col. del Valle
Mexico 12, D.F.
Tel: (905) 543-4232
Tel: 017-74-507
Hewlett-Packard Mexicana,
S.A. de C.V.
Ave. Constitución No. 2184
Monterrey, N.
Tel: 48-71-32, 48-71-84
Cable: ROTERAN Managua

PANAMA
Electrónica Balboa, S.A.
P.O. Box 4929
Calle Samuel Lewis
Ciudad de Panamá
Lima
Tel: 54-2700
Tel: 3431103 Curunda,
Canal Zone
Cable: ELECTRON Panama

PARAGUAY
Z.J. Melamed S.R.L.
División: Aparatos y Equipos
Division: Aparatos y Equipos
Scientificos y de
Investigación
P.O. Box 676
Cable: 482, Edificio Victoria
Asunción
Tel: 4-5069, 4-6272
Cable: RAMEL

PERU
Compañía Electro Máxima S.A.
Ave. Enrique Canaval 312
San Isidro
Casilla 1030
Lima
Tel: 22-3900
Cable: ELMED Lima

PUERTO RICO
San Juan Electronics, Inc.
P.O. Box 5167
Ponce de León 154
Pda. 3-PTA de Tierra
San Juan 00906
Tel: (809) 725-3342, 722-3342
Tel: 25-154
Cable: SATRONICS San Juan
Tel: SATRON 3450 332

URUGUAY
Pablo Ferrando S.A.
Comercial e Industrial
Avenida Italia 2877
Casilla de Correo 370
Montevideo
Tel: 40-3102
Cable: RADIUM Montevideo

VENEZUELA
Hewlett-Packard de Venezuela
C.A.
Apartado 50933
Caracas 107
Tel: 93859
Cable: HEWPAK Caracas

VENEZUELA
Hewlett-Packard de Venezuela
C.A.
Apartado 50933
Caracas 107
Tel: 93859
Cable: HEWPAK Caracas

FOR AREAS NOT LISTED, CONTACT:
Hewlett-Packard
Inter-Americas
3200 Hillview Ave.
P.O. Box 681
60, Park St.
Columbo 2
Tel: 26696
Cable: HUPPOINT Colombo

EUROPE

AUSTRIA
Hewlett-Packard Ges.m.b.H.
Handelskass 52/3
P.O. Box 7
A-1205 Vienna
Tel: (0222) 33 66 06 to 09
Cable: HEWPAK Vienna
Tel: 75923 hewpak a

BEELGIUM
Hewlett-Packard Benelux
S.A./N.V.
Avenue de Col-Vent, 1,
(Grootenkraaijan)
B-1170 Brussels
Tel: (02) 672 22 40
Cable: PALOEN Brussels
Tel: 23 494 paloben bru

DENMARK
Hewlett-Packard A/S
Dagbladet
DK-3450 Birkerød
Tel: (01) 81 66 40
Cable: HEWPAK AS
Tel: 166 40 to 45
Hewlett-Packard A/S
Navervej 1
DK-8600 Silkeborg
Tel: (089) 82 71 66
Tel: 166 40 to 45
Cable: HEWPAK AS

FINLAND
Hewlett-Packard Oy
Jahkahuomie 5
P.O. Box 6
SF-00211 Helsinki 21
Tel: 6822031
Cable: HEWPAK OY Helsinki
Tel: 12-45353

FRANCE
Hewlett-Packard France
Agence Régionale
Chemin des Mouilles
Boite Postale No. 6
F-91401 Orsay
Tel: (01) 907 78 25
Cable: HEWPAK Orsay
Tel: 60048

Hewlett-Packard France
Agence Régionale
Chemin des Mouilles
Boite Postale No. 12
F-91930 Evry
Tel: (01) 33 81 25
Cable: HEWPAK Evry
Tel: 31 617

Hewlett-Packard France
Agence Régionale
Zone Aéronautique
Avenue Clément Ader
F-31770 Colomiers
Tel: (61) 78 11 55
Tel: 51537

GERMANY
Hewlett-Packard GmbH
Vertriebszentrale Frankfurt
Bernersstrasse 117
F-6000 Frankfurt 56
Tel: (0511) 50 04-1
Cable: HEWPAKSA Frankfurt
Tel: 591254/5
Operations
35 Kolonnenstrasse
Platz Kettlinghaus
F-6000 Frankfurt 56
Tel: (0511) 56 72 87
Cable: HEWPAKSA Athens
Tel: (1) 907 78 25

Hewlett-Packard GmbH
Technisches Büro Düsseldorf
Vogelsanger Weg 38
D-4000 Düsseldorf
Tel: (0211) 63 60 71/5
Tel: 521 95
Cable: HEWPAKSA Hamburg
Tel: 21 63 032 hph d

IRELAND
Hewlett-Packard Ltd.
King Street Lane
Winnemah, Wokingham
GB-Berkshire RG11 5AR
Tel: (0201) 784 7874
Tel: 847178/846179
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

ITALY
Hewlett-Packard Italiana S.p.A.
Via Amerigo Vesputi 2
I-20124 Milan
Tel: (02) 6251 (10 lines)
Cable: HEWPAKIT Milan
Tel: 32046

Hewlett-Packard Italiana S.p.A.
Via Pietro Maroncelli 40
(ang. Via Visconti)
I-35100 Padova
Tel: (049) 62 62 63 31 88
Cable: HEWPAKIT Roma
Tel: (06) 531 21 31/7
Cable: INTERCAMBIO Lisbon
Tel: 12598

NETHERLANDS
Hewlett-Packard Benelux N.V.
Weerdestein 127
P.O. Box 7825
NL-Amsterdam, 1011
Tel: (020) 6111522
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

NORWAY
Hewlett-Packard Norge A/S
Nesveien 13
Box 149
N-1344 Haslum
Tel: (02) 53 53 60
Tel: 16621 hpnas n

POLAND
Analytical/Medical Only
Hewlett-Packard
Warsaw Technical Office
Spotkonia 1
00-120 Warszawa
Tel: 268031
Tel: 812453

PORTUGAL
Teletra-Empresa Técnica de
Equipamentos Eléctricos S. a. r. l.
Rua Rodrigo da Fonseca 103
P.O. Box 2531
P-Lisbon 1
Tel: (01) 68 60 72
Cable: HEWPAKIT Lisbon
Tel: 12598

SPAIN
Hewlett-Packard Española, S.A.
Jerre No. 3
E-Madrid 16
Tel: (01) 458 26 00 (10 lines)
Tel: 23515 hpe

Hewlett-Packard Española, S.A.
Manesado 21-23
E-Barcelona 17
Tel: (3) 203 6200 (5 lines)
Tel: 52603 hpe e

Hewlett-Packard Española, S.A.
Av. Ramón y Cajal, 1
Edificio Sevilla, P. 1ª planta 9°
E-Sevilla
Tel: 64 44 54/58

SWITZERLAND
Hilti-Packard (Schweiz) AG
Rue Rodolphe de Fosse 103
P.O. Box 2531
CH-8952 Schlieren Zurich
Tel: (01) 93 18 21
Cable: HPAE CH
Tel: 7825 hewpak SU

TURKEY
Telekom Engineering Bureau
Sapik Sok No. 15/1
Ayasova-Beyoglu
P.O. Box 437 Beyoglu
TR-Istanbul
Tel: 49 40 47
Cable: TELEKOM Istanbul
Tel: 12598

UNITED KINGDOM
Hewlett-Packard Ltd.
King Street Lane
Winnemah, Wokingham
GB-Berkshire RG11 5AR
Tel: 847178/846179
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

YUGOSLAVIA
Iskra-Standard-Hewlett-Packard
Topska 58/3
11000 Ljubljana
Tel: 315-979/321-674
Tel: 31300

AFRICA, ASIA, AUSTRALIA

ANGOLA
Teletra
Empresa Técnica de
Equipamentos
Eléctricos, S.A. R. L.
R. Barbosa Rodrigues, 42-1°DT.
Cable: PALOEN Angola
Tel: 355159
Cable: TELETRA Luanda

INDONESIA
Hewlett-Packard Indonesia P.T.
P.O. Box 495
1st Floor J.L. Chini Raya 6°
Jakarta
Tel: 50038, 40369, 49886
Tel: 2895 Jakarta

IRAN
Multi Corp International Ltd.
Dae Kyung Bldg., 8th Floor
107 Songdo-Ro.
Chongju-Ku, Seoul
Tel: (4 lines) 72-8924-7
Cable: AMTRACO Seoul

ISRAEL
Electronics & Engineering
Div. of Motorola Israel Ltd.
17 Aminadav Street
Tel-Aviv
Tel: 36941 (3 lines)
Cable: BASTEL Tel-Aviv
Tel: 33569

JAPAN
Yokogawa-Hewlett-Packard Ltd.
Onishi Building
1-5-1 Yoyoi
Shibuya-Ku, Tokyo
Tel: 03-370-2281/92
Tel: 232-2024/HP
Tel: 23-154
Yokogawa-Hewlett-Packard Ltd.
2-2-8 Kasuga
Ibaragi-Shi
Tel: (0726) 23-1641
Tel: 5332-385 YHP OSAKA
Yokogawa-Hewlett-Packard Ltd.
Nakano Building
No. 24 Kamatsazima-cho
Nakamura-Ku, Nagoya City
Tel: (052) 571-5171

KOREA
American Trading Company
Korea
1 P.O. Box 1103
Dae Kyung Bldg., 8th Floor
107 Songdo-Ro.
Chongju-Ku, Seoul
Tel: (4 lines) 72-8924-7
Cable: AMTRACO Seoul

KUWAIT
Al-Khaldiya Trading &
Contracting Co.
Al-Sour Street
Mushayyir Bldg., No. 4
Kuwait
Tel: 42 99 10
Cable: VESQUENT

LEBANON
Constantin E. Macridis
Osmann Chambers
Abdullah Haroon Road
Karachi 3
Tel: 511022, 512927
Cable: COOPERATOR Karachi

MALAYSIA
MEGOM Malaysia Ltd.
2 Lorong 23/6A
Section 13
Petaling Jaya, Selangor
Cable: MEGOM Kuala Lumpur

MOZAMBIQUE
A.N. Gonçalves, Lda
182, 1° Apt. 14, Av. D. Luis
C.C.P.O. Box 1028
Makalu, Ruzi
Tel: 85-16-87, 87-76-77,
Cable: ELEMEX Mania

NETHERLANDS
Hewlett-Packard Benelux N.V.
Weerdestein 127
P.O. Box 7825
NL-Amsterdam, 1011
Tel: (020) 6111522
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

NORWAY
Hewlett-Packard Norge A/S
Nesveien 13
Box 149
N-1344 Haslum
Tel: (02) 53 53 60
Tel: 16621 hpnas n

POLAND
Analytical/Medical Only
Hewlett-Packard
Warsaw Technical Office
Spotkonia 1
00-120 Warszawa
Tel: 268031
Tel: 812453

PORTUGAL
Teletra-Empresa Técnica de
Equipamentos Eléctricos S. a. r. l.
Rua Rodrigo da Fonseca 103
P.O. Box 2531
P-Lisbon 1
Tel: (01) 68 60 72
Cable: HEWPAKIT Lisbon
Tel: 12598

SPAIN
Hewlett-Packard Española, S.A.
Jerre No. 3
E-Madrid 16
Tel: (01) 458 26 00 (10 lines)
Tel: 23515 hpe

Hewlett-Packard Española, S.A.
Manesado 21-23
E-Barcelona 17
Tel: (3) 203 6200 (5 lines)
Tel: 52603 hpe e

Hewlett-Packard Española, S.A.
Av. Ramón y Cajal, 1
Edificio Sevilla, P. 1ª planta 9°
E-Sevilla
Tel: 64 44 54/58

SWITZERLAND
Hilti-Packard (Schweiz) AG
Rue Rodolphe de Fosse 103
P.O. Box 2531
CH-8952 Schlieren Zurich
Tel: (01) 93 18 21
Cable: HPAE CH
Tel: 7825 hewpak SU

TURKEY
Telekom Engineering Bureau
Sapik Sok No. 15/1
Ayasova-Beyoglu
P.O. Box 437 Beyoglu
TR-Istanbul
Tel: 49 40 47
Cable: TELEKOM Istanbul
Tel: 12598

UNITED KINGDOM
Hewlett-Packard Ltd.
King Street Lane
Winnemah, Wokingham
GB-Berkshire RG11 5AR
Tel: 847178/846179
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

YUGOSLAVIA
Iskra-Standard-Hewlett-Packard
Topska 58/3
11000 Ljubljana
Tel: 315-979/321-674
Tel: 31300

AFRICA, ASIA, AUSTRALIA
Hewlett-Packard Ltd.
c/o Makro
South Service Wholesale Centre
Amber Way
Halesowen Industrial Estate
GB-Halesowen, Worcs
Hewlett-Packard Ltd.
Edificio Luz
E - Valencia - 10
Tel: 60 42 00

SWEDEN
Hewlett-Packard Sverige AB
Enghjemsgränd 1-3
Fack
S-161 20 Bromma 20
Tel: (08) 730 05 54
Cable: MEASUREMENTS
Stockholm
Tel: 10721

Hewlett-Packard Sverige AB
Hagastaden 90
S-431 41 Molndal
Tel: (031) 27 68 00/01
Tel: 31300

NETHERLANDS
Hewlett-Packard Benelux N.V.
Weerdestein 127
P.O. Box 7825
NL-Amsterdam, 1011
Tel: (020) 6111522
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

NORWAY
Hewlett-Packard Norge A/S
Nesveien 13
Box 149
N-1344 Haslum
Tel: (02) 53 53 60
Tel: 16621 hpnas n

POLAND
Analytical/Medical Only
Hewlett-Packard
Warsaw Technical Office
Spotkonia 1
00-120 Warszawa
Tel: 268031
Tel: 812453

PORTUGAL
Teletra-Empresa Técnica de
Equipamentos Eléctricos S. a. r. l.
Rua Rodrigo da Fonseca 103
P.O. Box 2531
P-Lisbon 1
Tel: (01) 68 60 72
Cable: HEWPAKIT Lisbon
Tel: 12598

SPAIN
Hewlett-Packard Española, S.A.
Jerre No. 3
E-Madrid 16
Tel: (01) 458 26 00 (10 lines)
Tel: 23515 hpe

Hewlett-Packard Española, S.A.
Manesado 21-23
E-Barcelona 17
Tel: (3) 203 6200 (5 lines)
Tel: 52603 hpe e

Hewlett-Packard Española, S.A.
Av. Ramón y Cajal, 1
Edificio Sevilla, P. 1ª planta 9°
E-Sevilla
Tel: 64 44 54/58

SWITZERLAND
Hilti-Packard (Schweiz) AG
Rue Rodolphe de Fosse 103
P.O. Box 2531
CH-8952 Schlieren Zurich
Tel: (01) 93 18 21
Cable: HPAE CH
Tel: 7825 hewpak SU

TURKEY
Telekom Engineering Bureau
Sapik Sok No. 15/1
Ayasova-Beyoglu
P.O. Box 437 Beyoglu
TR-Istanbul
Tel: 49 40 47
Cable: TELEKOM Istanbul
Tel: 12598

UNITED KINGDOM
Hewlett-Packard Ltd.
King Street Lane
Winnemah, Wokingham
GB-Berkshire RG11 5AR
Tel: 847178/846179
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

YUGOSLAVIA
Iskra-Standard-Hewlett-Packard
Topska 58/3
11000 Ljubljana
Tel: 315-979/321-674
Tel: 31300

AFRICA, ASIA, AUSTRALIA
Hewlett-Packard Ltd.
c/o Makro
South Service Wholesale Centre
Amber Way
Halesowen Industrial Estate
GB-Halesowen, Worcs
Hewlett-Packard Ltd.
Edificio Luz
E - Valencia - 10
Tel: 60 42 00

SWEDEN
Hewlett-Packard Sverige AB
Enghjemsgränd 1-3
Fack
S-161 20 Bromma 20
Tel: (08) 730 05 54
Cable: MEASUREMENTS
Stockholm
Tel: 10721

Hewlett-Packard Sverige AB
Hagastaden 90
S-431 41 Molndal
Tel: (031) 27 68 00/01
Tel: 31300

NETHERLANDS
Hewlett-Packard Benelux N.V.
Weerdestein 127
P.O. Box 7825
NL-Amsterdam, 1011
Tel: (020) 6111522
Cable: PALOEN Amsterdam
Tel: 13 216 hpa ni

NORWAY
Hewlett-Packard Norge A/S
Nesveien 13
Box 149
N-1344 Haslum
Tel: (02)

END