



This package contains a section of the

# CE SERVICE HANDBOOK FOR 79XX SERIES DISC DRIVES

and consists of the following document:

**7920 A/B/D  
7925 A/B/D  
DISC DRIVE**

**Part no. 07925-90905**

(Refer to Appendix A for "H" Model Disc Drives)

Insert this section into the handbook binder P/N 9282-0683 along with cover and tabset P/N 5957-4228

#### NOTE

The tabset consists of model numbers for all DMD disc drives to be documented in the CE Service Handbook. Not all of these sections are available at this printing—refer to periodic announcements in the CSD service publication *Support Update* for part numbers and availability.

This handbook is intended as a reference of most-frequently-used material for the trained HP Customer Engineer. The information is condensed from other manuals related to the product and is not intended as a substitute for these manuals (see Related Manuals, page v).

## PRINTING HISTORY

New editions incorporate all update material since the previous edition. Updating Supplements, which are issued between editions, contain additional and revised information to be incorporated into the manual by the user. The date on the title page changes only when a new edition is published.

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### NOTICE

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## SAFETY CONSIDERATIONS

**GENERAL** - This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

### SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal.

### WARNING

The **WARNING** sign denotes a hazard. It calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

### CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure or practice which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

**SAFETY EARTH GROUND** - This is a safety class I product and is provided with a protective earthing terminal. An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and be secured against any unintended operation.

**BEFORE APPLYING POWER** - Verify that the product is configured to match the available main power source according to the input power configuration instructions provided in this manual.

If this product is to be operated with an autotransformer make sure that the common terminal is connected to the earth terminal of the main power source.

### SERVICING

#### WARNING

Any servicing, adjustment, maintenance, or repair of this product must be performed only by service-trained personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged after the product has been disconnected from the main power source.

To avoid a fire hazard, fuses with the proper current rating and of the specified type (normal blow, time delay, etc.) must be used for replacement.

To install or remove a fuse, first disconnect the power cord from the device. Then, using a small flat-bladed screw driver, turn the fuseholder cap counterclockwise until the cap releases. Install either end of a properly rated fuse into the cap. Next, insert the fuse and fuseholder cap into the fuseholder by pressing the cap inward and then turning it clockwise until it locks in place.

# MAINTENANCE PRECAUTIONS

To avoid injury to personnel and to prevent damage to equipment, observe the following safety precautions:

## **WARNING**

Observe all warnings and cautions provided in this manual and that are placed on the equipment.

Use extreme caution when working on the disc drive with shroud removed or doors opened. Hazardous voltages are present inside the mainframe when the power distribution assembly is connected to an active ac power source.

Do not attempt to remove or change printed-circuit assemblies, interconnecting cables, or extender cards while power is applied.

## **CAUTION**

Do not run the disc drive without an absolute filter. Severe contamination in the head/disc area will result which could damage the head and/or disc surface.

Use only the brands of cleaning material specified in table 2-10. Some other brands contain contaminating oils and/or lint which may leave a harmful residue.

Use only the type of alcohol specified in table 2-10. Some other brands contain impurities that could cause damage.

Avoid applying excessive pressure to the gimbal area of the head while cleaning. Excessive pressure may alter or damage the head characteristics which are precision set at the factory.

Never place an inspection mirror between the heads or allow it to touch the heads. The flying characteristics of the heads may be altered or damaged.

Do not use oil or other similar lubricants anywhere in the disc drive.

Do not attempt to manually extend the carriage assembly, unless the head loading tool (part no. 13354-60023) is clamped to the carriage assembly and there is no disc pack in the disc drive, otherwise head damage will result.

## RELATED MANUALS

07920-90001	7920A Operating and Service Manual
07920-90030	7920 A/B Operator's Manual
07920-90901	7920 A/B Installation Manual
07920-90902	7920B Service Manual
07920-90911	7920D User's Manual
07920-90912	7920D Installation Manual
07920-90913	7920D Service Manual
07925-90901	7925 A/B User's Manual
07925-90902	7925 A/B Installation Manual
07925-90903	7925 A/B Service Manual
07925-90911	7925D User's Manual
07925-90912	7925D Installation Manual
07925-90913	7925D Service Manual
12745-90901	12745A Disc Controller to HP-IB Adapter Kit Installation and Service Manual
12745-90911	12745D Disc Controller to HP-IB Adapter Kit Installation and Service Manual
13037-90006	13037 A/B/C Installation and Service Manual
13037-90015	13175A/B/13178B/C Interface Kit Installation and Service Manual
13037-90905	13037 A/B/C/D CE Handbook Section
13037-90911	13037D Installation and Service Manual
13037-90921	13175D/13178D Interface Kits Installation and Service Manual
13365-90901	13365A Programming Manual

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## **1-1. PRODUCT DESCRIPTION**

The HP 7920 Disc Drive is a 50-megabyte, random-access, mass storage device with an HP 13394A Removable Disc Pack. The HP 7925 Disc Drive is a 120-megabyte, random-access, mass storage device with an HP 13356A Removable Disc Pack. See figures 1-1 and 1-2.

This handbook sections covers the "A", "B", and "D" HP 7920 and HP 7925 Disc Drives. Unless otherwise indicated all information applies to both disc drives. Appendix A (light blue pages) describes the "H" models for both disc drives.

Tables 1-1 and 1-2 explains the various disc drives and their differences. Table 1-3 lists all options and accessories.

Both disc drives contain a fault detection system which senses abnormal conditions and indicates the fault through a group of eight light emitting diodes on the front panel. Refer to table 4-1.

Figure 1-1. HP 7920 Disc Drive Block Diagram

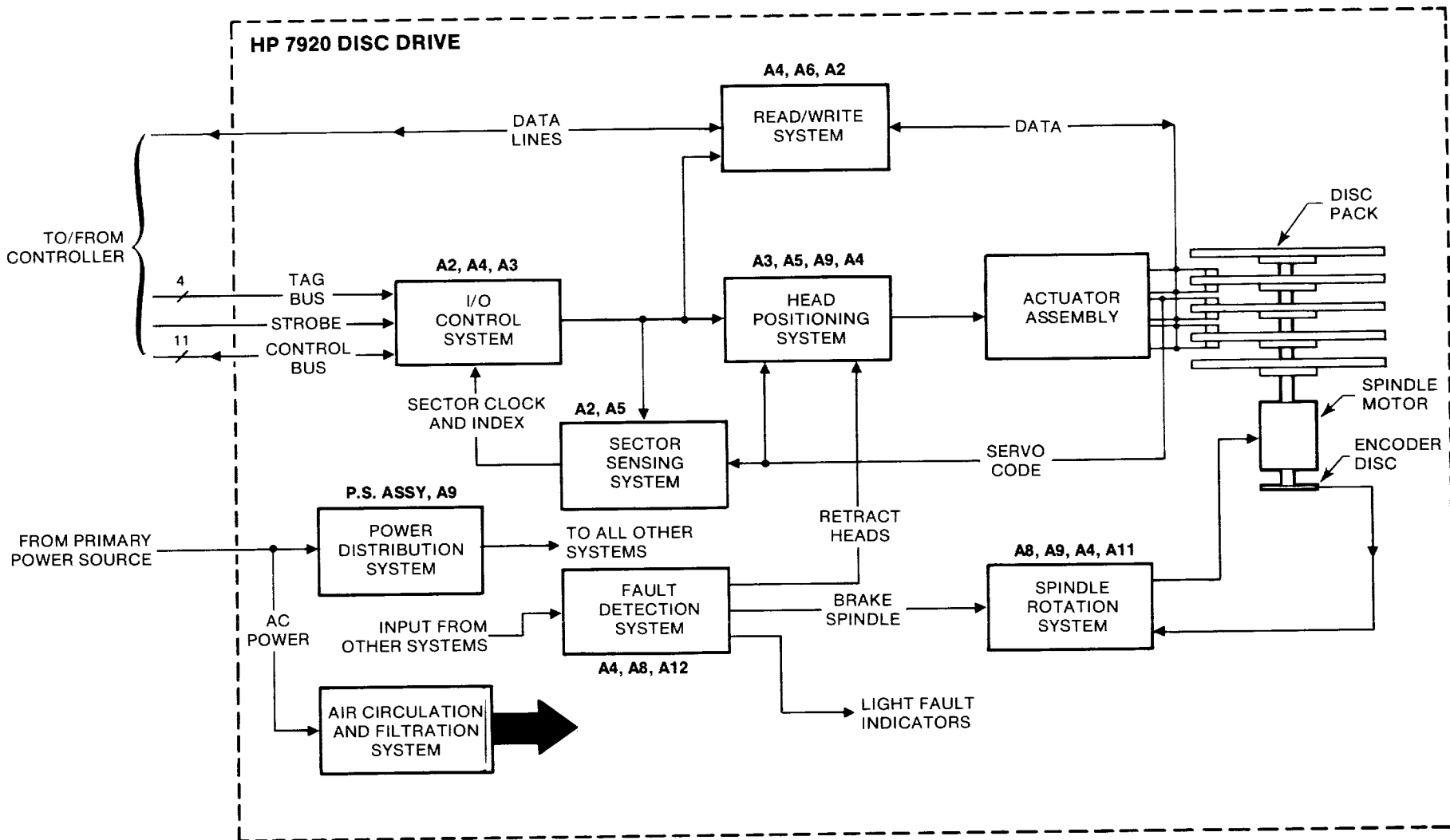


Figure 1-2. HP 7925 Disc Drive Block Diagram

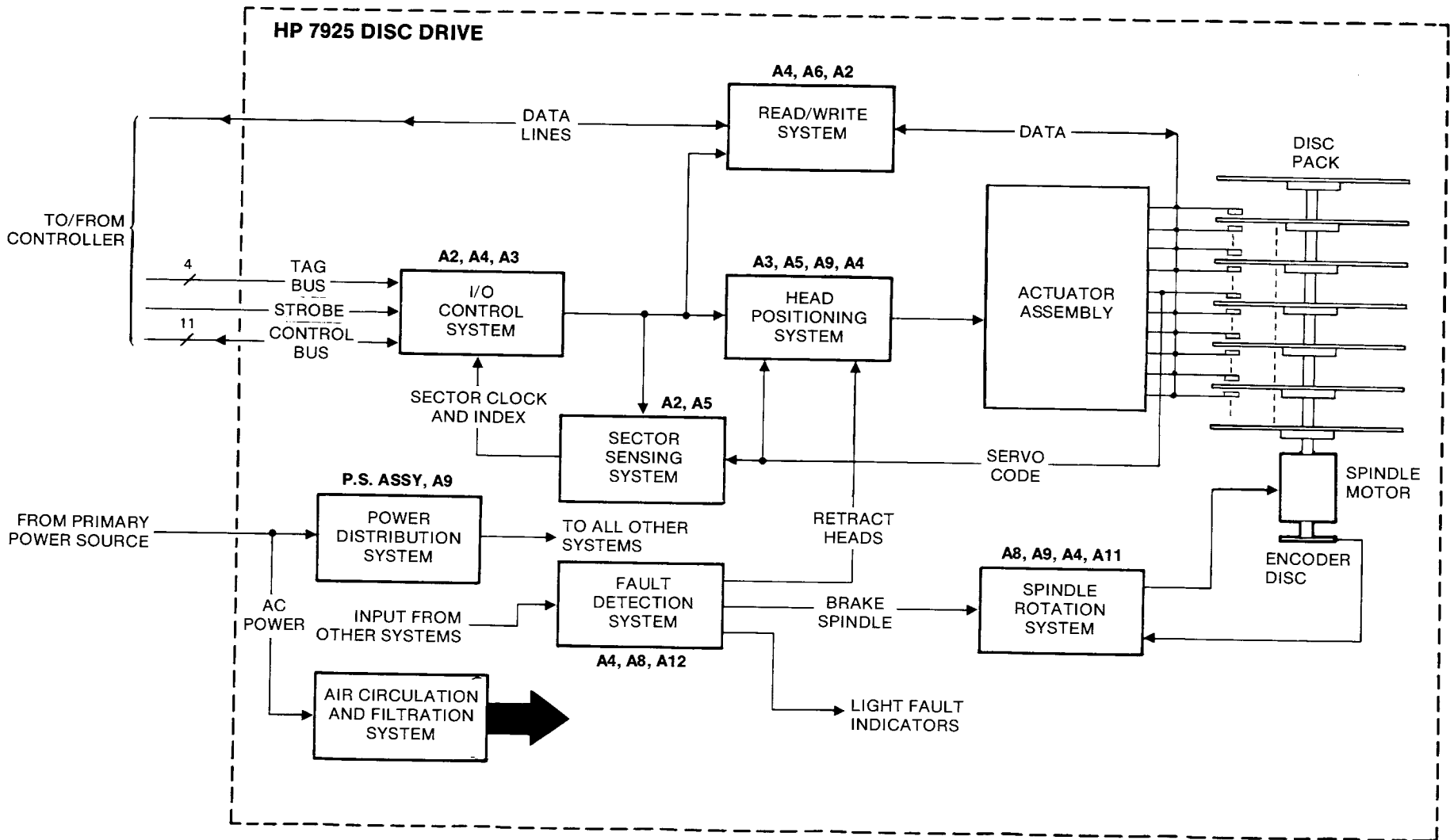


Table 1-1. HP 7920 Product Description

MODEL	OPT	DESCRIPTION
7920A		Original drive shipped 1976.
7920B		Redesigned power supply and cabling to meet European regulations 1979. Includes 7920M, 7920S and 7920H versions.
7920D		Added shielding for U.S.A. RFI requirements 1983. Includes 7920M, 7920S and 7920H versions.
7920M		Master disc drive (includes Model 13037 Disc Controller).
	015	Specifies 240 V/50 Hz operation.
	102	Adds Model 12745 HP-IB Adapter Kit (2m HP-IB cable included).
7920S		Add-on Disc Drive (excludes Model 13037 Disc Controller).
	001	Substitutes 5.5m (18 ft) multi-unit and 7.6m (25 ft) data cable for standard length.
	015	Specifies 240 V/50 Hz operation.
	250	Controller upgrade (adds Disc Controller PCA).
7920H		Current model (i.e., "D") with integrated controller.
	015	Specifies 240 V/50 Hz operation.



Table 1-2. HP 7925 Product Description

MODEL	OPT	DESCRIPTION
7925A		Original drive shipped 1978.
7925B		Redesigned power supply and cabling to meet European regulations 1979. Includes 7925M, 7925S and 7925H versions.
7925D		Added shielding for U.S.A. RFI requirements 1983. Includes 7925M, 7925S and 7925H versions.
7925M		Master disc drive (includes Model 13037 Disc Controller).
	015	Specifies 240 V/50 Hz operation.
	102	Adds Model 12745 HP-IB Adapter Kit (2m HP-IB cable included).
7925S		Add-on Disc Drive (excludes Model 13037 Disc Controller).
	001	Substitutes 5.5m (18 ft) multi-unit and 7.6m (25 ft) data cable for standard length.
	015	Specifies 240 V/50 Hz operation.
	250	Controller upgrade (adds Disc Controller PCA).
7925H		Current model (i.e., "D") with integrated controller.
	015	Specifies 240 V/50 Hz operation.

Table 1-3. Options and Accessories

MODEL	OPT	DESCRIPTION
13357A		CE Disc Pack (HP 7925 only)
13398A		CE Disc Pack (HP 7920 only)
13356A		Formatted Disc Pack (HP 7925 only)
13394A		Formatted Disc Pack (HP 7920 only)
07905-60039		Terminator PCA
07905-80010		Cable-to-Cable Adapter
13013D		Multi-unit Cable (Refer to table 2-6)
13213D		Data Cable (Refer to table 2-6)
13175D		Single Computer Interface Kit (Refer to table 2-6 for cables)
13178D		Multiple Computer Interface Kit (Refer to table 2-6 for cables)
13037U		Disc Controller for "M" Model Disc Drive
	015	230V/50 Hz Operation
	025	Substitutes rack slides kit to enable mounting in HP 29431F cabinet.
	102	Adds HP 12745 HP-IB Adapter Kit (Includes 2m, 6.5 ft HP-IB cable)
	050	HP-IB Extender. Supplies separate chassis to accommodate up to three HP 12745 HP-IB Adapter Kits.
Manual		Reference Related Manual (page v) for a complete listing of related manuals.
Service Kit		Reference Service Kits (para 1-2) for a complete description of related service kits.

## 1-2. SERVICE KITS

There are two customer service kits available.

HP 19905A - Customer Service Spare Parts Kit to support HP 7920 M/S and HP 7925 M/S.

Option 020 - Delete items to support HP 7925 M/S

Option 025 - Delete items to support HP 7920 M/S

Option 035 - Adds items to support HP 7920H and HP 7925H

Option 036 - Contains only items necessary to support HP 7920H and HP 7925H

HP 19906A - Customer Service Tools Kit to Support HP 7920 M/S and HP 7925 M/S

Option 020 - Delete items to support HP 7925 M/S

Option 025 - Delete items to support HP 7920 M/S

Option 035 - Contains only items to support HP 7920H and HP 7925H

The following CE Service Kits are available:

### HP 7920

07920-67801 Spares - empty case with foam for  
(3 cases) Alignment/Adjustment Tools (HP 7920 only) - service  
Data Disc Pack - white plastic case  
07920-67802 Pack Lock Kit  
07920-67806 Data Disc Pack - white plastic case  
07920-67898 Alignment Pack

### HP 7925

07925-67801 Spares - empty case with foam for  
(3 cases) Alignment/Adjustment Tools (HP 7925 only) - service  
Data Disc Pack - white plastic case  
07925-67802 Alignment Pack  
07925-67803 Spares - empty case with foam  
07925-67804 Alignment/Adjustment Tools (HP 7920+ HP 7925)  
installation, service  
07925-67806 Data Disc Pack - white plastic case

## 1-3. OPERATING SPECIFICATIONS

Operating specifications and characteristics are given in the appropriate User's Manuals and Technical Data Sheets.

Refer to Section II for a list of environmental and physical specifications.

**2-1. ENVIRONMENTAL REQUIREMENTS**

The following environmental requirements are considered the minimum for all disc drives. When connected to a host system the most stringent environmental requirement of the individual products within the system apply for the entire system. Refer to tables 2-1 and 2-2. Table 2-3 contains information on the disc drive's physical characteristics.

Table 2-1. Disc Drive Environmental Requirements

<b>AMBIENT TEMPERATURE</b> Operating: . . . . . 10°C to 40°C (50°F to 104°F) rate of temperature change not to exceed 20°C (36°F)/hour. Reliable data transfer requires that the disc drive be operated within +/-10°C (+/-18°F) of the temperature at which the heads were aligned. Above an altitude of 3 048 m (10,000 ft) the maximum operating temperature is 30°C (86°F).  Nonoperating (Storage and Transit): . . . . . -40°C to 75°C (-40°F to 167°F) rate of temperature change not to exceed 20°C (36°F)/hour.
<b>RELATIVE HUMIDITY</b> Operating: . . . . . 8% to 80% noncondensing with wet bulb temperature not to exceed 29.4°C (85°F)/hour.  Nonoperating (Storage and Transit, Disc Pack not installed): . . 5% to 95%
Note: The disc drive must not be turned on if there are signs of moisture condensation in or on the disc drive.
<b>ALTITUDE</b> Operating: . . . . . 0 m to 4 572 m (0 ft to 15,000 ft)  Nonoperating (Storage and Transit): . . . . . 0 m to 15 240 m (0 ft to 50,000 ft)
<b>POWER REQUIREMENTS</b> . . . . . 100/120/220/240, +5% -10%, 47.5 to 66 Hz, single phase.

Table 2-2. Disc Pack Environmental Requirements

<b>AMBIENT TEMPERATURE</b>	
Operating: . . . . .	10°C to 40°C (50°F to 104°F) rate of temperature change not to exceed 20°C (36°F)/hour.
Nonoperating (Storage and Transit): . . . . .	-40°C to 75°C (-40°F to 167°F) rate of temperature change not to exceed 20°C (36°F)/hour.
<b>RELATIVE HUMIDITY</b>	
Operating: . . . . .	8% to 80% noncondensing with wet bulb temperature not to exceed 29.4°C (85°F).
Nonoperating (Storage and Transit, in Shipping Carton): . . . . .	8% to 80%
Note: The disc pack must not be installed if there are signs of moisture condensation in or on the disc pack.	
<b>ALTITUDE</b>	
Operating: . . . . .	0 m to 4 572 m (0 ft to 15,000 ft)
Nonoperating (Storage and Transit): . . . . .	0 m to 15 240 m (0 ft to 50,000 ft)

## 2-2. ELECTROMAGNETIC EMISSIONS/SAFETY

The disc drives (D Models only) are designed to meet FCC Docket 20780 for Class A computing devices. For Europe, it is designed to meet VDE 0871 for level A computing devices and is FTZ licensed on some HP systems.

Table 2-3. Disc Drive Physical Characteristics

Tilt: . . . . .		Continues to operate up to 10 degrees about either horizontal axis.	
HP 7925 Dimensions:	Height:	82.6 cm	(32.5 in.)
	Width:	55.3 cm	(21.78 in.)
	Depth:	81.3 cm	(32 in.)
HP 7920 Dimensions:	Height:	82.6 cm	(32.5 in.)
	Width:	55.3 cm	(21.78 in.)
	Depth:	81.3 cm	(32 in.)
HP 7925 Net Weight (approximate):	"M"	155 kg	(341 lb)
	"S"	138 kg	(304 lb)
	"H"	145 kg	(320 lb)
HP 7920 Net Weight (approximate):	"M"	152.5 kg	(336 lb)
	"S"	135.7 kg	(299 lb)
	"H"	143 kg	(315 lb)

## 2-3. INSTALLATION

For installation details refer to the following manuals:

### Model "A", "B", and "H" Drives

- *HP 7920A Disc Drive Operating and Service Manual*  
P/N 07920-90001
- *HP 7920B Disc Drive Installation Manual*  
P/N 07920-90902
- *HP 7925B Disc Drive Installation Manual*  
P/N 07925-90902
- *HP 12745A Disc Controller to HP-IB Adapter Kit Installation and Service Manual* P/N 12745-90901
- *HP 13037A/B/C Disc Controller Installation and Service Manual*  
P/N 13037-90006
- *HP 13175 A/B/13178 B/C Interface Kit Installation and Service Manual* P/N 13037-90015

### Model "D" and "H" Drives

- *HP 7920D Disc Drive Installation Manual*  
P/N 07920-90912
- *HP 7925D Disc Drive Installation Manual*  
P/N 07925-90912
- *HP 12745D Disc Controller to HP-IB Adapter Kit Installation and Service Manual* P/N 12745-90911
- *HP 13037D Disc Controller Installation and Service Manual*  
P/N 13037-90911
- *HP 13175D/13178D Disc Controller Interface Kit Installation and Service Manual* P/N 13037-90921

## INSTALLATION SUMMARY

- A. AC Power Source Check - Verify incoming power. (Refer to tables 2-4 and 2-5 for disc drive electrical characteristics.)
- B. Voltage Strapping - Check input power strapping. (See figures 9-1 through 9-4.)
- C. Fuse Rating Check - Verify appropriate primary fuses. (Refer to table 2-8.)
- D. Power Cord Installation - Verify and connect appropriate power cord. (See figure 9-5.)
- E. Interconnections - Verify cables are routed and anchored properly. (Refer to table 2-6 for cable options.) (See figures 9-6 and 9-7.)
- F. Visual Inspection - Check drive termination, logical address and for signs of condensation in or on the disc drive.
- G. Set unit SELECT Switch to desired position.

- H. Inspect Heads - Clean if necessary.
- I. Head Cam Alignment - Perform at all installations. Refer to paragraph 6-7.
- J. Measure Air Pressure - Refer to paragraph 3-2 for air pressure specifications.
- K. Velocity Command Gain Adjustment - Refer to section VI or Service Manual, section 3.
- L. Data Head Alignment Check - Refer to section VI or Service Manual, section 3.
- M. Run Circumferential Alignment Check (HP 7925 only) - Refer to section VI or Service Manual, section 3.
- N. Diagnostic Check - Run appropriate system diagnostic check.
- O. Self-Test Procedure "H" Model Only - Run self test. (Refer to table A-4.)
- P. "H" Disc Drives Only - Turn Power off. If spindown time of card cage fan is less than 12 seconds, replace fan.

**Table 2-4. HP 7920 Electrical Characteristics**

VOLTAGE AC VOLTS, RMS	7920S				7920M			
	TYPICAL OPERATING <sup>1</sup>		TYPICAL MAXIMUM <sup>2</sup>		TYPICAL OPERATING <sup>1</sup>		TYPICAL MAXIMUM <sup>2</sup>	
	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)
100	6.0	460	6.6	535	8.4	710	9.6	800
120	5.2	475	5.6	535	7.1	710	8.2	810
220	2.9	460	3.3	540	4.1	740	4.8	820
240	2.8	470	3.1	560	3.8	745	4.5	840

Notes: 1. The operating readings were measured under the following operating conditions:  
a. Line frequency: 60 Hz for 100 Vac and 120 Vac, 50 Hz for 220 Vac and 240 Vac.  
b. Disc Drive operation — alternate seeks between widely separated tracks with 25 ms delay between seeks.

2. The maximum readings were measured under the following operating conditions:  
a. Line frequency: 60 Hz for 100 Vac and 120 Vac, 50 Hz for 220 Vac and 240 Vac.  
b. Disc Drive operation — spindle startup, excluding 60A, 5 ms inrush transient turn-on current.

**Table 2-5. HP 7925 Electrical Characteristics**

VOLTAGE AC VOLTS, RMS	7925S				7925M			
	TYPICAL OPERATING <sup>1</sup>		TYPICAL MAXIMUM <sup>2</sup>		TYPICAL OPERATING <sup>1</sup>		TYPICAL MAXIMUM <sup>2</sup>	
	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)
100	4.6	325	6.7	535	7.8	655	9.7	800
120	4.0	340	5.7	525	6.6	665	8.3	800
220	2.2	340	3.2	545	3.8	670	4.7	820
240	2.1	345	3.0	540	3.5	675	4.4	820

Notes: 1. The operating readings were measured under the following operating conditions:  
a. Line frequency: 60 Hz for 100 Vac and 120 Vac, 50 Hz for 220 Vac and 240 Vac.  
b. Disc Drive operation — alternate seeks between widely separated tracks with 25 ms delay between seeks.

2. The maximum readings were measured under the following operating conditions:  
a. Line frequency: 60 Hz for 100 Vac and 120 Vac, 50 Hz for 220 Vac and 240 Vac.  
b. Disc Drive operation — spindle startup, excluding 60A, 5 ms inrush transient turn-on current.

## 2-4. CABLE CONNECTIONS

For cable hookup, see interconnection Figures 9-6 and 9-7.

For cable options, refer to table 2-6. ("D" disc drives must have cables selected from the right column only.)



Table 2-6. Cable Options

MULTI UNIT CABLES - 13013B/D

<u>LENGTH*</u>	<u>13013B</u>	<u>OPTION</u>	<u>13013D</u>
6	13013-60011	001	13013-60024
8	13013-60012	003	13013-60025
12	13013-60013	STD	13013-60027
18	13013-60014	002	13013-60028
40**	13013-60017	H01	13013-60031
50**	13013-60018	H02	13013-60032
25**	13013-60019	H03	13013-60029
30**	13013-60020	H04	13013-60030
9**	13013-60021	H05	13013-60026
60**	13013-60022	H09	13013-60033
70**	13013-60023	H10	13013-60034

MULTI CPU CABLE - 13178C/D

<u>LENGTH*</u>	<u>13178C</u>	<u>OPTION</u>	<u>13178D</u>
8	13178-60003	STD	13178-60007
16	13178-60004	001	13178-60008
50**	13178-60005	H04	13178-60010
25**	13178-60006	H05	13178-60009

INTERFACE CABLE - 13175B/D

<u>LENGTH*</u>	<u>13175B</u>	<u>OPTION</u>	<u>13175D</u>
18	13037-60030	STD	13037-60043
30**	13037-60037	H02	13037-60044
50**	13037-60036	H05	13037-60045
65**	13037-60039	H08	13037-60046
6	13037-60029	025	13037-60047

DATA CABLES - 13213B/D

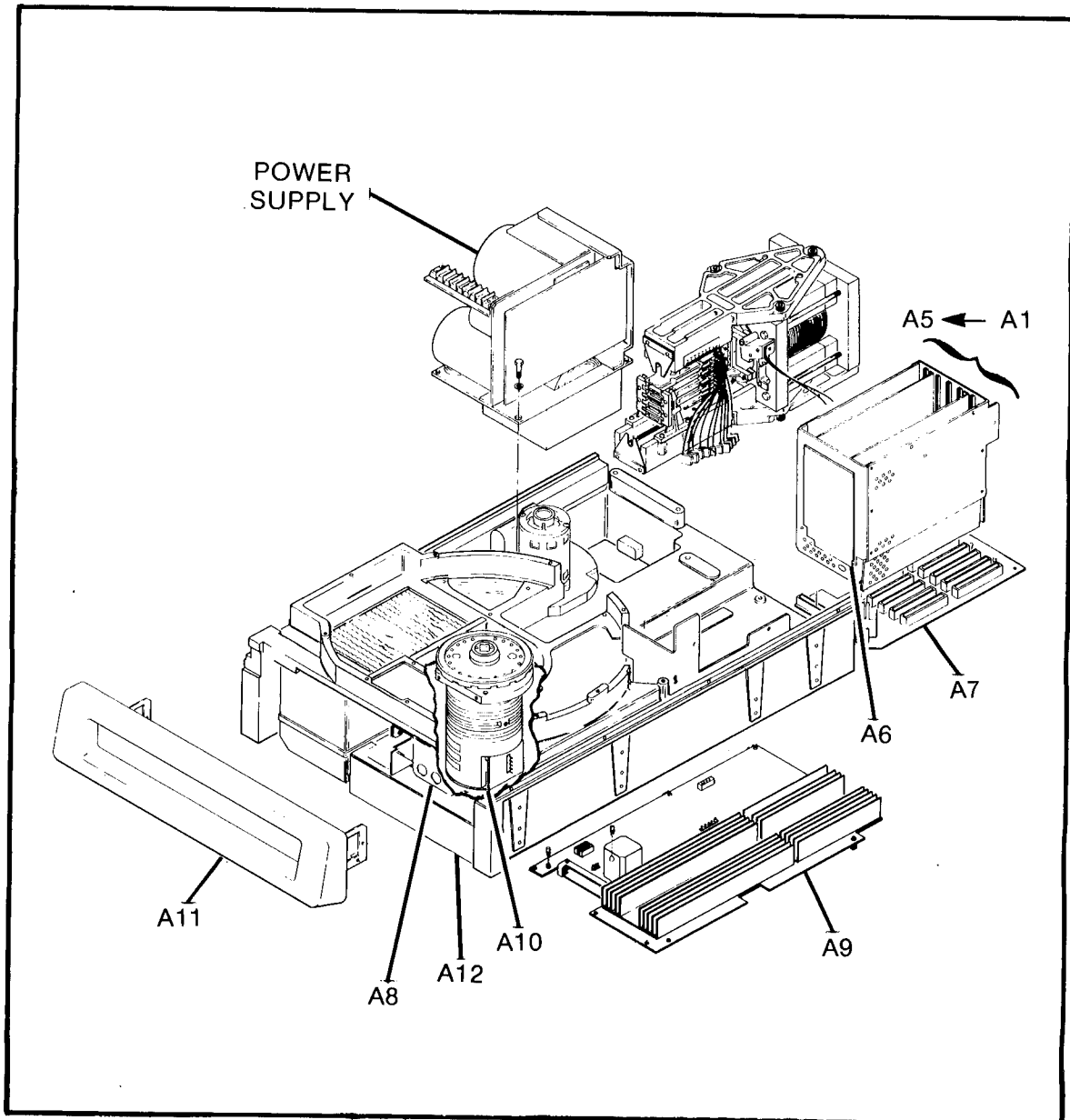
<u>LENGTH*</u>	<u>13213B</u>	<u>OPTION</u>	<u>13213D</u>
6	13213-60006	004	13213-60011
10	13213-60007	STD	13213-60012
25	13213-60008	001	13213-60013
50	13213-60009	002	13213-60014
75	13213-60010	003	13213-60015

\*In feet

\*\*All D model cables can be ordered from CPC. Replace all older model cables with D model cables

## 2-5. PCA LOCATIONS/CONFIGURATION

Figure 2-1 indicates PCA locations. Table 2-7 lists the PCA part numbers. Note "H" Model distinctions. Refer to table 3-1 and paragraph 3-4 for PCA compatibilities.



REF 07925-201A

Figure 2-1. PCA Locations

Table 2-7. PCA Part Numbers

PCA	DESCRIPTION	HP 7920 M/S	HP 7925 M/S	"H" MODEL
A1	Data	N/A	N/A	13365-6X201
A1	Head Alignment PCA*	13354-6X010	13354-6X110	
A2	I/O Sector	07925-6X001	Same	
A2	Microprocessor	N/A	N/A	13365-6X202
A3	Servo	07920-6X183	Same	Same
A4	Drive Control	07925-6X002	Same	Same
A5	Track Follower	07920-6X004	07925-6X105	Same
A6	R/W Preamplifier	07920-6X106	Same	Same
A7	Motherboard	07925-6X008	Same	Same
A8	Spindle Logic	07920-6X031	07925-6X031	Same
A9	Power Motor Regulator (PMR)	07920-6X010	Same	Same
A10	Encoder	07920-6X009	Same	Same
A11	Indicator PCA (lamps)	07920-6X011	Same	Same
A11	Indicator PCA (LED'S)	07926-6X211	Same	Same
A12	Fault Indicator	07920-6X030	Same	Same
A13	Self Test	N/A	N/A	13365-6X003

\* Used during head alignment only.

**Note:** For a complete PCA compatibility matrix refer to table 3-1.

## OPERATOR PANEL

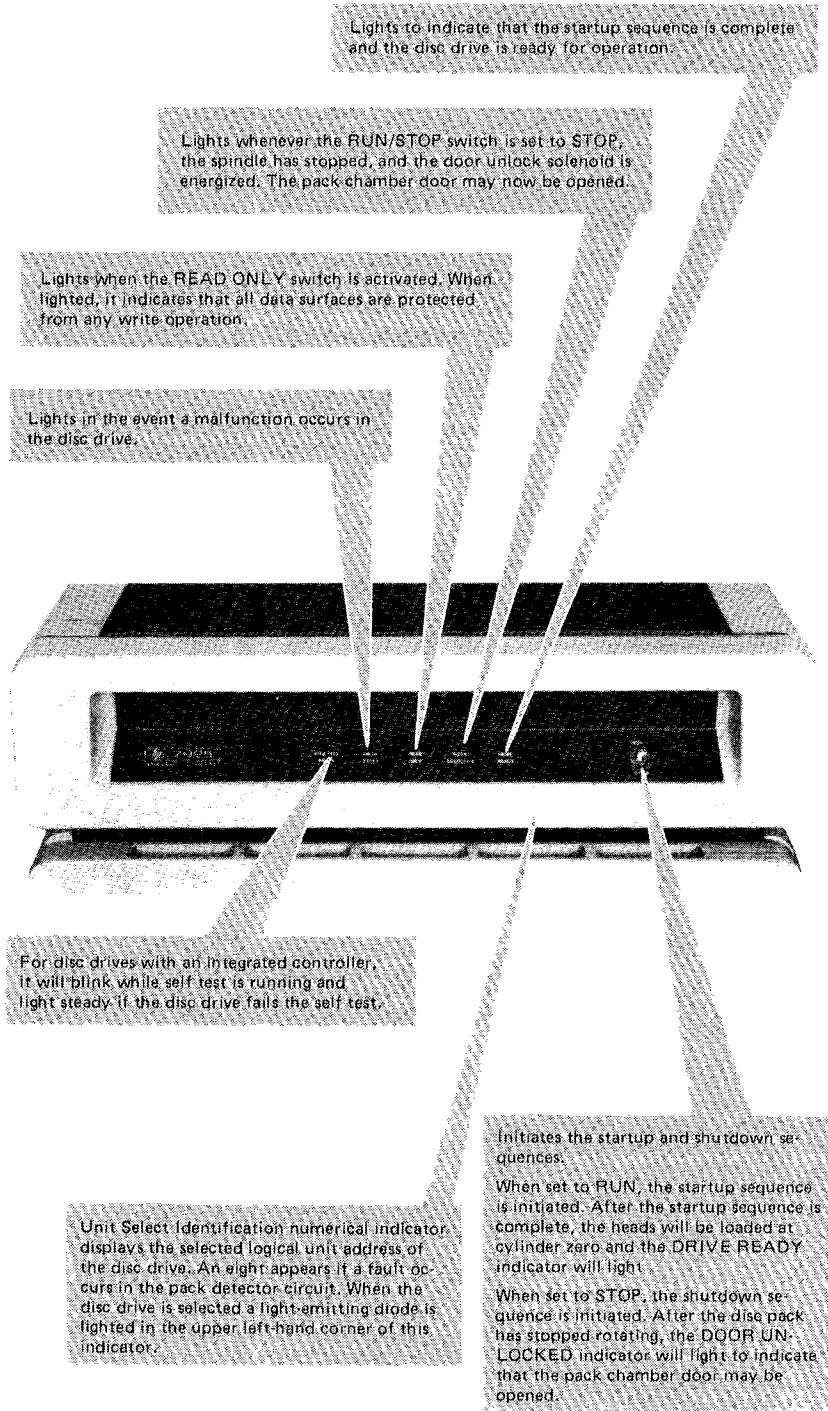


Figure 2-2. Operator Panel

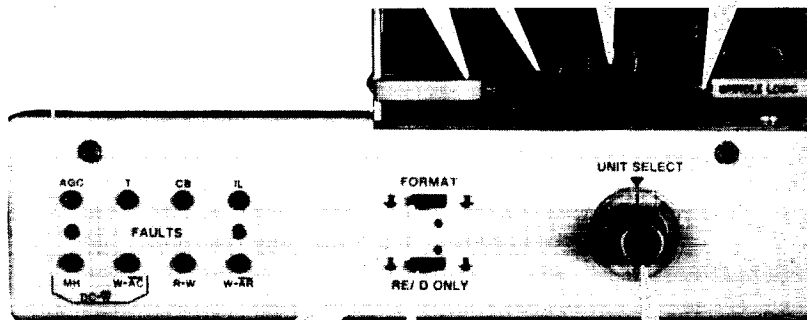
## CONTROL PANEL

A group of eight light-emitting diode indicators that light when the internal fault detection circuitry of the disc drive detects a fault. These indicators are designed to aid service-trained personnel. If any of these indicators light, notify the nearest Hewlett-Packard Sales and Support Office and specify which ones are lit.

These two light-emitting diode indicators indicate the disc drive spindle status and may be lit at any time. These indicators are designed to aid service-trained personnel.

This light-emitting diode indicator lights when the internal fault detection circuitry of the disc drive detects a fault. This indicator is designed to aid service-trained personnel. If this indicator lights, notify the nearest Hewlett-Packard Sales and Support Office and specify that this indicator is lit.

Spindle Logic PCA



When set to the alter position (\*), the contents of the sector address field may be altered. This position is used to initialize an unrecorded disc or to selectively set protected track or defective track status bits in the sector address field.

When set to the protected position, the contents of the sector address field may not be altered.

Selects the logical unit address of the disc drive. The Unit Select Identification Indicator will correspond to the switch position. (For disc drives with an integrated controller, the switch is labeled HP-IB DEVICE ADDRESS and selects the Hewlett-Packard Interface Bus device address of the disc drive.)

Inhibits write operations and lights the READ ONLY indicator.

When set to the protected position (\*), the data recorded on the data surfaces is protected from any write operations. The READ ONLY indicator will light to indicate that the data protection feature is activated.

When set to the unprotected position, the data recorded on any data surface is not protected from write operations and is therefore subject to change.

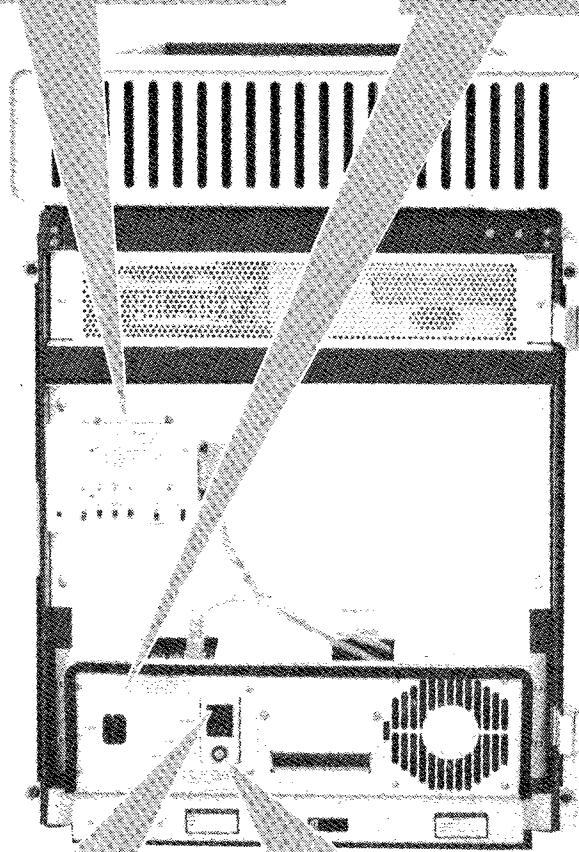
Figure 2-3. Control Panel

## POWER PANEL

### SELF-TEST PANEL

Only on disc drives with an integrated controller. A servicing aid for troubleshooting the integrated controller and disc drive. Automatically performs a self-test routine whenever power is turned on, whenever the RUN/STOP switch is set to RUN, by system command, or by activating the self-test panel START switch.

This three-terminal power line connector provides the means to connect an ac power source to the disc drive.



### POWER\*

Controls the application of ac power to the disc drive power supplies and blower motor. Power "on" condition is with the switch in the 1 position. The 1 and 0 indications correspond to international symbology currently in use.

### F1\*

Provides protection from an ac power overload. The current and voltage ratings and the HP part numbers of the required fuse are listed below.

### WARNING

To install or remove a fuse, first disconnect the power cord from the device. Then, using a small screwdriver, turn the fuseholder cap counterclockwise until the cap releases. Install the proper fuse in the cap — either end of the fuse can be installed in the cap. Next, install the fuse and fuseholder cap in the fuseholder by pressing the fuse inward and then turning it clockwise until it locks in place.

SOURCE VOLTAGE	REQUIRED RATING	HP PART NUMBER
100 Vac	8A SB*, 250V	2110-0383
120 Vac	8A SB*, 250V	2110-0383
220 Vac	4A SB*, 250V	2110-0365
240 Vac	4A SB*, 250V	2110-0365

\*The SB indicates that a slo-blo fuse must be used.

Figure 2-4. Power Panel

## 2-6. AC POWER CORDS/FUSES/STRAPPING

### 2-7. POWER CORD OPTIONS

See figure 9-5 for available power cords.

### 2-8. RESTRAPPING AC

See figures 9-1 through 9-4 for restrapping of input power.

### 2-9. FUSES

See figure 2-4 for primary fuse location. Secondary fuses F2 through F9 are located on the Power Supply Assembly. Refer to tables 2-8 and 2-9 for fuse part numbers.

Table 2-8. Primary Power Fuse Ratings

SOURCE VOLTAGE	REQUIRED RATING	HP PART NO.
100 Vac	8A, 250V, SB*	2110-0383
120 Vac	8A, 250V, SB*	2110-0383
220 Vac	4A, 250V, SB*	2110-0365
240 Vac	4A, 250V, SB*	2110-0365

\*The SB indicates that a slo-blo fuse must be used.

Table 2-9. Secondary Power Fuse Ratings

FUSE	REQUIRED RATING	HP PART NO.	SUPPLY VOLTAGE
F2	8A, 250V, SB*	2110-0383	-36 VDC
F3	8A, 250V, SB*	2110-0383	+36 VDC
F4	8A, 250V, SB*	2110-0383	+10 VDC
F5	1.5A, 250V, FB*	2110-0043	+20 VDC
F6	1.5A, 250V, FB*	2110-0043	-20 VDC
F7	20A, 125V, MB*	2110-0098	26 VAC
F8	20A, 125V, MB*	2110-0098	9 VAC
F9	20A, 125V, MB*	2110-0098	17 VAC
A9F1	1A, 125V, FB*	2110-0516	+10 VDC
A9F2	0.125A, 125V, FB*	2110-0513	-36 VDC

\*SB, MB and FB indicate slow-blo, medium-blo and fast-blo, respectively. The correct fuses must be used as specified.

## 2-10. PREVENTIVE MAINTENANCE

PM of the disc drive is scheduled every 6 months in a clean environment, more often if the operating environment is considered severe. Perform the following PM steps. Refer to Section II in the appropriate service manual for details.

- A. **Cleaning Heads** - Inspect heads, clean if necessary using ONLY 91% isopropyl alcohol and head cleaning sleeves followed by a clean dry sleeve. Inspect for damage or particulate when completed.
- B. **Inspecting Head Cables and Connectors** - Use a flashlight and magnifying glass (if available) to inspect for looseness or damage, particularly cracks in the clear plastic jacket and the insulation of the wires. Replace as necessary.
- C. **Cleaning Rails** - Clean rails and bearings using ONLY 91% isopropyl alcohol and Q-tips followed by a clean dry Q-tip.
- D. **Cleaning Spindle Hub and Pack Chamber** - Remove magnetic particles from hub using masking tape. Clean hub and pack chamber using ONLY 91% isopropyl alcohol and a cleaning wipe followed by a clean dry wipe.
- E. **Spindle Ground Contact** - Inspect spindle ground contact and spring for looseness and/or wear. Replace as necessary.
- F. **Spindle Motor Encoder PCA** - Remove the PCA from spindle and brush all particulate off component side.
- G. **Pre-filter and Impeller** - Remove duct and pre-filter. Clean inside of duct with Texwipe or vacuum cleaner. Remove compacted dirt from impeller vanes. Replace pre-filter if necessary.
- H. **Pack Lock Lubrication**

### **WARNING**

**The lubricant (p/n 6040-0084) used in this procedure can cause painful eye irritation upon contact and for some people skin inflammation (dermatitis). When using this lubricant, hand protection (latex gloves) should be worn and care should be taken to keep the lubricant away from eye tissue.**

**Note: If the lubricant (p/n 6040-0084) gets on the skin, a waterless hand cleaner is recommended to remove the lubricant.**

Lubricate the pack lock using ONLY lubricant part number 6040-0084.

- I. **Power Supplies Check** - Apply AC power to the drive and monitor the power supplies up (PSU) LED or the A4 PCA. If lit, the +5 and  $\pm 12$  volt supplies are within tolerance. Check the -24V supply,  $\pm 1.2$  Vdc, at A5J1-14.



- J. Mainframe Switches and Solenoids – Inspect for damage or loose wires: door unlock solenoid, door closed and door locked switches, carriage latch, carriage back detector.
- K. Absolute Filter Air Pressure – Must be greater than 0.30 inches of water for HP 7925. Refer to paragraph 3-2 for HP 7920 limits.
- L. Indicators – Inspect for proper operation: DOOR UNLOCKED, READ ONLY, DRIVE READY, unit select display. Replace as necessary.
- M. Alignments and Adjustments – Refer to Section VI in this handbook.

## 2-11. SERVICE TOOLS AND SUPPLIES

Table 2-10. Standard Tools

**WARNING**

**Isopropyl alcohol is a restricted article (flammable liquid). Transport in accordance with Department of Transportation Regulations, Title 49, parts 171 - 177 (Hazardous Materials).**

Lubricant*	6040-0084
Pozidriv Bit	8710-0915
Alcohol, isopropyl (filtered)*	8500-0559
Bit, 1/4-inch drive, hex key	8710-0664
Bit, 1/4-inch drive, Pozidriv #2	8710-0903
Bit, 1/4-inch drive, slotted	8710-0669
Bit, 1/4-inch drive (used with part no. 1535-2653)	1535-2652
Extension Bar (used with part no. 8710-1007)	8710-1132
Gauge set, 0.0015 - 0.025 inch	8750-0053
Hex head drive (used with part no. 8710-1007)	8710-1145
Inspection mirror	8830-0005
Kimwipe tissues*	9300-0001
Pin extractor	8710-0688
Pliers, diagonal cutting	8710-0006
Pliers, long nose	8710-0016
Q-tips	8520-0023
Screwdriver, 4 x 1/4-inch	8730-0001
Screwdriver, 3 x 3/16-inch	8730-0019
Screwdriver, Pozidriv	8710-0900
Screwdriver, Pozidriv	8710-0899
Screwdriver, Pozidriv, stubby	
Screwdriver, offset	
Socket set, 1/4-inch drive	
Soldering iron	8690-0011
Soldering iron tip	8690-0021
Steel rule, 6-inch	8750-0001
Tape, masking	0460-0030
Wire strippers	8170-0058
Wrench, 7/16-inch box	8720-0017
Wrench, torque, 0 - 12 inch-pounds	1535-2653
Wrench, torque, 30 - 200 inch-pounds	8710-1007
Cleaning sleeves (w/handle)	9310-5074
Head Cleaning Tool	07900-00091
Cleaning Wipes	9310-4865

\*Do not substitute

## 2-12. SPECIAL TOOLS AND EQUIPMENT

Table 2-11. Special Tools and Equipment

NAME	HP PART NO. OR HP PRODUCT NO.
Air Pressure Measuring Gauge	0101-0374
Cam Alignment Assembly	13354-60001
CE Pack Assembly	13357A (HP 7925)
CE Pack Assembly	13398A (HP 7920)
Extender Board	13354-60003
Head Alignment Tool	13354-20007
Head Installation Tool	13354-20009
Head Initial Position Tool	13354-20008
Spindle Logic Extender	13354-60002
Head Extender Cable	13354-60025
Head Loading Tool	13354-60023
Fault Indicator Assembly	13354-60014
Pack Lock Lubrication Tool	07920-20086
Socket	8710-1239
Torque Wrench	8710-1240
Standoff	2510-0115
Wrench-Retainer	07920-20090
Hub Locking Bushing	07920-60091
Thermometer	07925-60009
DSU Test Module	13354-60005*
Head Alignment PCA	13354-60110 (HP 7925)
Head Alignment PCA	13354-60010 (HP 7920)
20-Pin Jumper Cable	13354-60013
50-Pin Jumper Cable	13354-60012
Formatted Disc Pack	13356A (HP 7925)
Formatted Disc Pack	13394A (HP 7920)

\* The DSU must have a date code of 1845 or greater in order to do the HP 7925 Circumferential Alignment Check.

# CONFIGURATION

SECTION

III

This section contains some information pertaining to all "MAC family" drives.

## 3-1. SYSTEM CONFIGURATION

For information on how MAC family drives are configured in various systems, refer to the Peripheral Configuration Guide, P/N 5953-9450, available from Corporate Literature Distribution Center, COMSYS 0070.

For PCA compatibilities within the HP 7920 and HP 7925 refer to table 3-1.

For configuration of single drives, see interconnect diagrams in section IX.

## 3-2. ABSOLUTE FILTER REQUIREMENTS - MAC FAMILY

Note the different filter part numbers and pressure specifications for absolute filters on MAC family drives:

<u>MODEL</u>	<u>FILTER P/N</u>	<u>MINIMUM AIR PRESSURE</u> (inches of water)
All 7905's	3150-0276	0.35
All 7906's	3150-0276	0.35
7920's with contam. shield	3150-0340	0.45
7920's w/o contam. shield	3150-0276	0.60
All 7925's	3150-0340	0.30

The two filter types are mechanically interchangeable but functionally different. The filtration ability is the same but the air volume and venturi point is different. These differences are necessary due to variations in the design of the disc chamber, the contamination shield, or lack of one, and the air pump action created by the varying number of spinning discs.

## 3-3. FIRST SERIAL NUMBERS

The first serial number prefix for each model is listed below.

<u>DRIVE</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
7905	1429A	none	none	none
7906	1808A	1915A	none	2332A
7920	1652A	1916A	none	2332A
7925	1820A	1916A	none	2332A
13037	1509A	1630A	1915A	2332A

Table 3-1. PCA Comptability

PART NUMBER	7920A	7920B/D	7925A	7925B/D	CURRENT
07920-6X001	EXCH	TEMP	NO	NO	
07925-6X001	NEW	YES	YES	YES	*
07920-6X002	1840 YES	NO	NO	NO	*
07925-6X002	NO	43 YES	1843 YES	1843 YES	*
07920-6X003	W/-6X010 PMR	NO	NO	NO	
07920-6X083	W/-6X080 PMR	YES	YES	YES	
07920-6X183	W/-6X080 PMR	YES	YES	YES	*
07920-6X004	YES	YES	NO	NO	*
07925-6X004	NO	NO	YES	YES	
07925-6X005	NO	NO	YES	YES	
07925-6X105	NO	NO	YES	YES	*
07920-6X006	YES	NO	NO	NO	*
07920-6X106	NO	YES	YES	YES	*
07925-6X006	NO	NO	YES	YES	
07925-6X106	NO	NO	YES	YES	*
07920-60008	NEW	NO	NO	NO	*
07925-60008	NO	NEW	NEW	NEW	*
07920-60011(LAMP)	NEW-REV B	NEW	NEW	NEW	*
07920-60211(LED)	NEW	NEW	NEW	NEW	*
07920-6X012	CPL	CPL	NO	NO	
07925-6X012	NO	NO	CPL	CPL	
07920-6X112	YES	YES	NO	NO	*
07925-6X112	NO	NO	YES	YES	*
07920-6X031	YES	YES	NO	NO	*
07925-6X031	NO	NO	YES	YES	*
07920-6X097	YES	YES	YES	YES	*

CPL=CHANGE PACK LK      EXCH=EXCHANGE ONLY      NEW=NEW ONLY  
 \*-Indicates current PCA

### **3-4. PCA COMPATIBILITY**

The following is a cross reference for 792X PCA s. Included are the minimum acceptable date codes and service note/IOSM references.

#### **I/O Sector PCA 07920-6X001-used in the 7920A only**

This PCA has been replaced by the 07925-60001 for all new assemblies. CSD has elected to maintain a dual pipeline in the exchange program so the 7920A uses 07920-69001. All date codes are acceptable.

#### **I/O Sector PCA 07925-6X001-used in the 7920B/D and 7925A/B/D.**

All date codes are acceptable. Date code 1804 must have two capacitors removed. Refer to service note 7925M-02. Must place jumper in 20 or 25 position.

#### **Drive Control PCA 07920-6X002-used in the 7920A only**

This PCA must have a date code of 1840 or above. Refer to service note 7920M-01A. The two reasons that is PCA is not forward compatible are:  
1) brownout detect uses 25Vac  
2) ac write detect uses a 1.2 usec one shot circuit.

#### **Drive Control PCA 07925-6X002-used in the 7920B/D and 7925A/B/D.**

This PCA must have a date code of 1843 or above. Refer to service note 7925M-01A. The two reasons this board is not backward compatible are:  
1) brownout detect uses +10vdc  
2) ac write detect uses a 300 nsec one shot circuit.

#### **Servo PCA 07920-60003-used in 7920A only with PMR PCA 07920-6X010**

Refer to IOSM 7920-0178-01.

#### **Servo PCA 07920-60083-used in 7920B and 7925A/B to be used in 7920A only with PMR PCA 07920-6X080.**

Although this board is not the current PCA, all date codes are acceptable. Refer to service note 7920M-11 and 7925M-12.

#### **Servo PCA 07920-60183-used in 7920B/D and 7925B/D.**

Current exchange assembly Refer to service note 7920M-11 and 7925M-12. All date codes are acceptable.

#### **Track Follower PCA 07920-6X004-used in 7920A/B/D.**

All date codes are acceptable.

#### **Track Follower PCA 07925-60004-used in 7925A.**

Although this is not the current PCA, all date codes are acceptable except use in a 7925H. Refer to service note 7925M-05 and 7925H-13. Head alignment and circumferential timing must be verified after replacing the track follower PCA.

#### **Track Follower PCA 07925-60005-used in 7925A/B.**

Although this is not the current PCA, all date codes are acceptable except for use in a 7925H. Refer to service note 7925M-05 and 7925H-13. Head alignment and circumferential timing must be verified after replacing the track follower PCA.

**Track Follower PCA 07925-6X105-used in 7925B/D.**

Current exchange assembly. All date codes are acceptable. Refer to service note 7925H-13. Head alignment and circumferential timing must be verified after replacing the track follower PCA.

**Preamp PCA 07920-6X006-used in 7920A.**

All date codes are acceptable. Used in 7920A only because of ac write detect characteristics.

**Preamp PCA 07920-6X106-used in 7920B/D.**

All date codes are acceptable. Used in 7920B/D only because of ac write detect characteristics.

**Preamp PCA 07925-60006-used in 7925A.**

All date codes acceptable. To improve performance on systems which use large buffer transfers, use latest revision.

**Preamp PCA 07925-6X106-used on 7925B/D.**

Current exchange assembly. All date codes are acceptable.

**Power-Motor-Regulator PCA 07920-60010-used in 7920A with Servo PCA 07920-6X003.**

All date codes are acceptable. Not forward compatible because brownout detect voltage is 25Vac.

**Power-Motor-Regulator PCA 07920-6X080-used in 7920A with Servo PCA 07920-6X083.**

All date codes are acceptable. Not forward compatible because brownout detect voltage is 25Vac.

**Power-Motor-Regulator PCA 07925-60010-used in 7920B/D and 7925A/B/D.**

All date codes are acceptable. Not backwards compatible because brownout voltage is +10Vdc. Must place Jumper in 20 or 25 position.

**Spindle Motor 07920-6X012-used in 7920A/B.**

Acceptable if new pack lock is installed. Refer to service note 7920M-02A. Cannot be used in 7925 for two reasons.

- 1) pack lock is different
- 2) stator windings are different

**Spindle Motor 07920-6X112-used in 7920B/D.**

All date codes are acceptable. Cannot be used in 7925 for two reasons:

- 1) pack lock is different
- 2) stator windings are different.

**Spindle Motor 07925-6X012-used in 7925A/B.**

Acceptable if new pack lock is installed. Refer to service note 7920M-02A  
Cannot be used in 7920 for two reasons:

- 1) pack lock is different
- 2) stator windings are different

**Spindle Motor 07925-6X112-used in 7925B/D.**

All date codes are acceptable. Cannot be used in 7920 for two reasons.

- 1) pack lock is different
- 2) stator windings are different

**Spindle Logic PCA 07920-6X031 used in 7920A/B/D.**

All date codes are acceptable. Cannot be used in 7925 even if crystal is exchanged because this board is missing the circuitry that ensures the crystal oscillates at 2.4 Mhz.

**Spindle Logic PCA 07925-6X031 used in 7925A/B/D.**

All date codes are acceptable. The 07925-6X031 will work in a 7920A/B/D with a 3-Mhz crystal installed.

**Actuator Assembly 07920-6X097-used in 7920A/B/D and 7925A/B/D.**

Universal actuator assembly.

**Absolute Filter 3140-0340-used in 7920A/B/D date code 1843A and above and 7925A/B/D.**

This filter is to be used on any 7920 that has the contamination shield on the actuator assembly and on all 7925 drives. It is recommended that this filter be used after an actuator replacement has occurred on pre 1843A drives. Be sure to install the contamination shield p/n 07925-00084.

**Absolute Filter 3140-0276-used in pre 1843A date code 7920A.**

If an actuator change has occurred, update the unit with a contamination shield p/n 07925-00084 and use absolute filter p/n 3140-0340.

**Servo Heads 07920-60034/07920-60107/07920-60114.**

Replaced by 07920-60255. Used in 7920A/B/D and 7925A/B/D

**Data Head up 07920-60032-used in 7920A/B/D.**

No longer available. Current part number is 07920-60253. Cannot be used in 7925 drives because the r/w gap and flying height are different. Refer to TSO twx #341A.

**Data Head down 07920-60033-used in 7920A/B/D.**

No longer available. Current part number is 07920-60254. Cannot be used in 7925 drives because the r/w gap and flying height are different. Refer to TSO twx #341A.



**Data Head up 07925-60032-used in 7925A/B/D.**

No longer available. Current part number is 07925-60253. Cannot be used in 7920 drives because the r/w gap and flying height are different. Refer to TSO twx #341A.

**Data Head down 07925-60033-used in 7925A/B/D.**

No longer available. Current part number is 07925-60254. Cannot be used in 7920 drives because the r/w gap and flying height are different. Refer to TSO twx #341A.

## **4-1. DISC DRIVE STATUS VISUAL INDICATOR**

Verify disc drive status using the information provided in table 4-1.

## **4-2. POWER SUPPLY VOLTAGES**

Verify Power Supply Voltages at the following points:

- +5.0  $\pm$ 0.1 Vdc at A5J1-5, E\*
- +12.0  $\pm$ 0.6 Vdc at A5J1-3, C\*
- 12.0  $\pm$ 0.6 Vdc at A5J1-2, B\*
- 24.0  $\pm$ 1.2 Vdc at A5J1-14

\*These voltages are within tolerance if the PSU LED on drive control PCA-A4 is lit.

## **4-3. DSU FUNCTIONS**

See figure 4-1 and refer to table 4-2.

## **4-4. DISC DRIVE TROUBLESHOOTING FLOWCHARTS**

See figures 4-2 through 4-21.

**Note:** All figure references in figures 4-1 through 4-21 refer to those figures in the appropriate service manual.

Table 4 - 1. Visual Indication of Drive Status

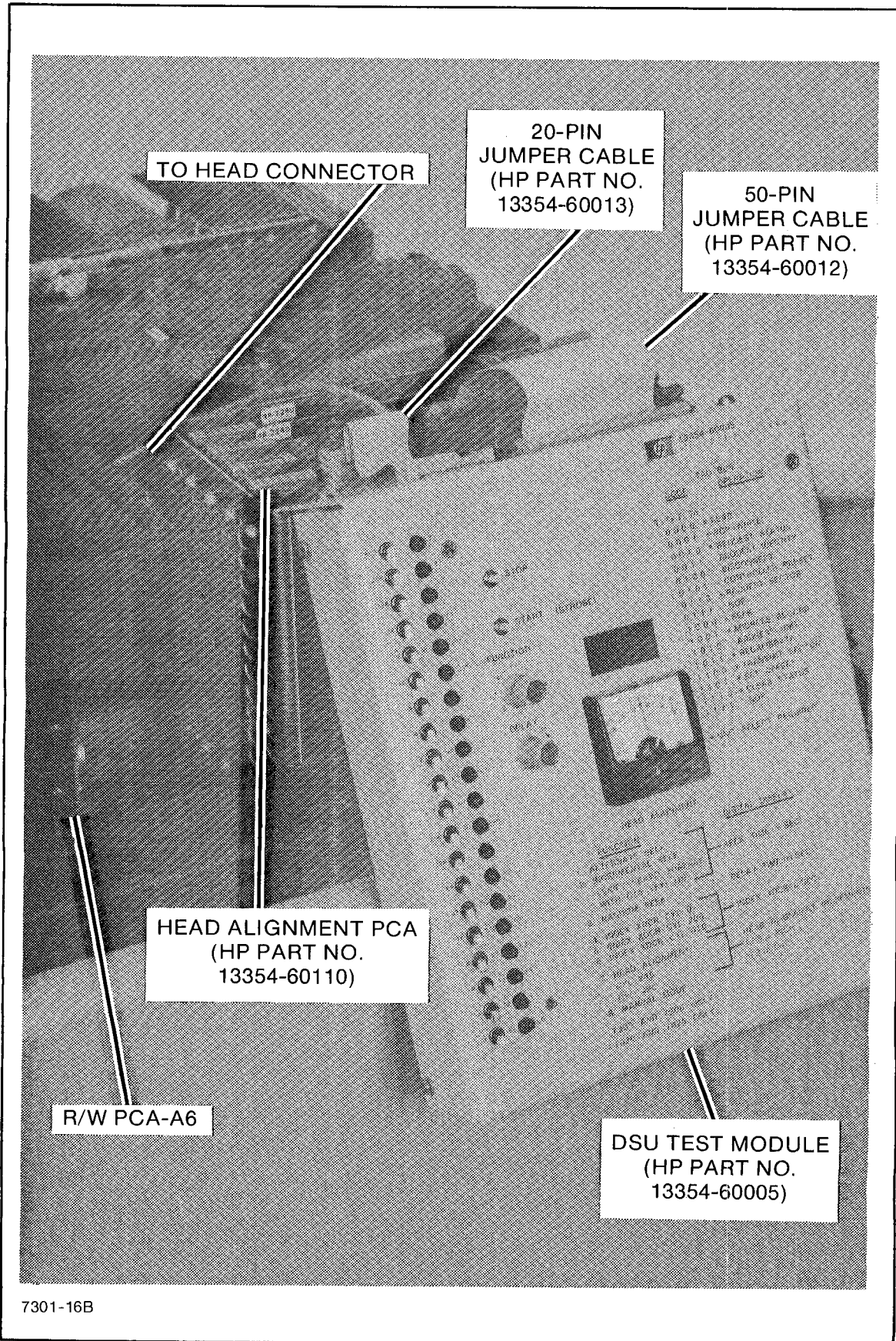
INDICATOR/ INDICATION	ACTIVE STATE		FUNCTIONAL DIAGRAM
	LOGIC EQUATION	CIRCUIT DESCRIPTION	
Unit Select Identification Indicator	SEL	Indicator is lit when both of the following conditions are met: a. Control bus bits D0 thru D2 match signals US0 thru US2 from UNIT SELECT switch S3. b. Select flip-flop is set. [ADU (Address Unit) signal selected on tag bus while STROBE signal is active sets flip-flop.]	I/O Control System, figure 4-24.
READ ONLY Indicator	$\overline{R01}$	Indicator is lit when READ ONLY switch S5 is set to READ ONLY.	Read/Write System, figure 4-24.
DOOR UNLOCKED Indicator	$\overline{PSF} \bullet (\text{STOP} \bullet \text{CRB} \bullet \text{SPD})$	Indicator is lit when all of the following conditions are met (door unlock solenoid energized): a. RUN/STOP switch S2 set to STOP. b. Carriage fully retracted. c. Spindle stopped. d. All power supplies are on.	Spindle Rotation System, figure 4-25.
DRIVE READY Indicator	Set = $\text{AGC} \bullet \text{CB}$ Reset = $\text{FLT} + \overline{\text{DL}} \bullet \text{PIP} + \text{SPU} + \text{STOP}$	Indicator is lit when both of the following conditions are met: a. AGC (Automatic Gain Control) signal active. b. SB (Servo Balanced) signal active.	Head Positioning System, figure 4-26.
DRIVE FAULT Indicator	$\text{FTL} = \text{AGC} + \text{CBF} + \text{TO} + \text{ILF} + \text{W} \bullet \overline{\text{AC}} + \text{W} \bullet \overline{\text{AR}} + \text{R} \bullet \text{W} + \text{MH} + \text{DCW}$	Indicator is lit when any one of the following conditions is met: a. AGC (Automatic Gain Control) signal active, caused by loss of servo information any time after drive becomes active. b. CB (Carriage Back) signal active, caused by defective carriage back detector (phototransistor). This occurs when drive is ready but the phototransistor or CB signals say that heads are retracted. c. TO (Time Out) caused by any one of the following: 1. Any head loading sequence or recalibration taking more than 1.25 seconds. 2. Track-to-track seek taking more than 120 milliseconds. d. ILF (Interlock) signal active, due to one of the following: 1. Out of tolerance or missing power supply voltage. 2. Excessive temperature condition, as sensed by switch A9A1. 3. PCA improperly seated or missing. 4. Line voltage 15 percent below nominal value. 5. Current limit in spindle power amplifier. e. Destructive write fault, caused by any one of the following: 1. Drive in write mode with no data signal applied ( $\text{W} \bullet \overline{\text{AC}}$ LED indicator is lit.) 2. More than one head selected for reading or writing. (MH LED indicator is lit.) 3. DC write current is supplied to the head driver while drive is not in write mode. (Both MH and $\text{W} \bullet \overline{\text{AC}}$ LED's are lit.)	Head Positioning System, figure 4-26.

Table 4 - 1. Visual Indication of Drive Status (cont)

INDICATOR/ INDICATION	ACTIVE STATE		FUNCTIONAL DIAGRAM
	LOGIC EQUATION	CIRCUIT DESCRIPTION	
DRIVE FAULT Indicator (Continued)		<p>f. Non-destructive write fault, caused by one of the following:</p> <ol style="list-style-type: none"> <li>1. Heads not settled on a cylinder [ACRY (Access Ready) signal inactive] while in write mode. (W • AR LED indicator is lit.)</li> <li>2. Drive in both read and write mode at the same time. (R • W LED indicator is lit.)</li> </ol>	
IL LED Indicator	---	<p>Indicator is lit when one of the following conditions is met:</p> <ol style="list-style-type: none"> <li>a. Any PCA (with the exception of PCA-A11 and PCA-A12) not firmly seated or correctly positioned in the drive.</li> <li>b. Pack loading assembly disconnected.</li> <li>c. +36 Vdc, +12 Vdc, +5 Vdc, -12 Vdc, -24 Vdc, or -36 Vdc power source out of tolerance or missing.</li> <li>d. Temperature of heat sink on PCA-A9 rises above a specified limit.</li> <li>e. A spindle fault is detected.</li> </ol>	Fault Detection System, figure 4-29.
AGC LED Indicator	$\overline{AGC} \bullet \overline{DRDY} = \overline{AGC} \bullet \overline{SKH} \bullet \overline{DRDY}$	<p>Indicator is lit when the following conditions are met:</p> <ol style="list-style-type: none"> <li>a. Heads are out of cylinder area between inner and outer guard bands. [DRDY (Drive Ready) signal active.]</li> <li>b. AGC (Automatic Gain Control) and DRDY (Drive Ready) signals active.</li> </ol>	Fault Detection System, figure 4-29.
CB LED Indicator	$CRB \bullet \overline{DRDY}$	<p>Indicator is lit when the following conditions are met:</p> <ol style="list-style-type: none"> <li>a. CRB (Carriage Back) signal active.</li> <li>b. DRDY (Drive Ready) signal active.</li> </ol>	Fault Detection System, figure 4-29.
MH LED Indicator	$MHS + \overline{WRITE} \bullet \overline{DCW}$	<p>Indicator is lit when more than one head is selected for reading or writing.</p>	Fault Detection System, figure 4-29.
W • $\overline{AC}$ and MH LED Indicators	$\overline{WRITE} \bullet \overline{DCW}$	<p>Both indicators are lit when the following conditions are met:</p> <ol style="list-style-type: none"> <li>a. DC current supplied to head drivers.</li> <li>b. Drive not in write mode.</li> </ol>	Fault Detection System, figure 4-29.
T LED Indicator	TOFL	<p>Indicator is lit when one of the following conditions is met:</p> <ol style="list-style-type: none"> <li>a. Heads not settled on specified cylinder within 120 milliseconds after SK (Seek) signal is activated.</li> <li>b. Heads not settled on cylinder 0 within 1667 milliseconds after SKH (Seek Home) signal becomes active.</li> <li>c. Heads do not reach fully retracted position within 1667 milliseconds after RET (Retrack) signal becomes active.</li> <li>d. Heads not settled on cylinder 0 within 1667 milliseconds after RH (Restore Home) signal becomes active.</li> </ol>	Fault Detection System, figure 4-29.

Table 4-1. Visual Indication of Drive Status (cont)

INDICATOR/ INDICATION	ACTIVE STATE		FUNCTIONAL DIAGRAM
	LOGIC EQUATION	CIRCUIT DESCRIPTION	
W • $\overline{AR}$ LED Indicator	WRITE • ACRY	Indicator is lit when the following conditions are met: a. Drive in write mode. b. ACRY (Access Ready) signal inactive.	Fault Detection System, figure 4-29.
R • W LED Indicator	URG • WRITE	Indicator is lit when the following conditions are met: a. URG (Unselected Read Gate) signal active. b. WRITE (Write) signal active.	Fault Detection System, figure 4-29.
W • $\overline{AC}$ LED Indicator	WRITE • $\overline{ACW}$	Indicator is lit when the following conditions are met: a. Drive in write mode. b. No data signal present.	Fault Detection System, figure 4-29.
SPU LED Indicator	---	Indicator is lit when spindle motor is operating at correct speed.	Spindle Rotation System, figure 4-25.
OFF LED Indicator	---	Indicator is lit when power is removed from spindle motor.	Spindle Rotation System, figure 4-25.
SPFLT LED Indicator	---	Indicator is lit when an overcurrent condition is sensed in spindle rotation system.	Spindle Rotation System, figure 4-25.
Spindle starts to rotate from a stationary state.	PIP • DL • $\overline{ILF}$ • RUN • CRB • $\overline{TOF}$	Spindle rotation occurs when the following conditions are met: a. Disc pack in place. b. Disc pack access door locked. c. No IL drive fault. d. RUN/STOP switch set to RUN. e. Carriage fully retracted. f. No time-out fault.	Spindle Rotation System, figure 4-25.
Spindle continues to rotate.	$\overline{CRB}$ • $\overline{ILF}$	Once started, the spindle motor continues to rotate as long as the following conditions are met: a. Carriage not fully retracted. [CRB (Carriage Back) signal inactive.] b. $\overline{ILF}$ (Interlock Fault) signal inactive.	Spindle Rotation System, figure 4-25.
Heads seek to cylinder 0 (home) from the retracted position.	$\overline{RET}$ • SPU	During a power-up operation, the heads seek home when the RET (Retract) signal becomes inactive. This occurs when the spindle reaches operational speed (SPU signal active).	Head Positioning System, figure 4-26.
Heads seek from one cylinder to another.	ACRY • SK • $\overline{ICA}$	The heads seek from one cylinder to another provided the following conditions are met: a. Heads settled on any legal cylinder. [ACRY (Access Ready) signal active.] b. The SK (Seek) signal from controller is present. c. The address to which the heads are to seek is not an illegal one (> 823).	Head Positioning System, figure 4-26.



7301-16B

Figure 4-1. DSU Installed

Table 4-2. Disc Service Unit (DSU) Functions

CONTROL/ INDICATOR	FUNCTION
<p>FUNCTION switch</p> <p>START (STROBE) pushbutton</p> <p>STOP pushbutton</p> <p>Upper bank of 10 toggle switches (1 through 512)</p> <p>Lower bank of 10 toggle switches (1 through 512)</p> <p>DELAY control</p> <p>3-digit display</p>	<p style="text-align: center;"><b>Function No. 1 — Alternate Seek</b></p> <p>Selects automatic Alternate Seek function (position 1).</p> <p>Starts operation of Alternate Seek function. Heads first seek to cylinder 0, then to the cylinder address selected on the upper bank of ten toggle switches, and then alternately between this address and the cylinder address selected on the lower bank of ten toggle switches. If either selected address is an illegal one (greater than 822), the heads seek to the legal address and remain there. If both addresses are illegal, only the seek to 0 (zero) is performed.</p> <p>Stops operation of Alternate Seek function.</p> <p>Selects cylinder address to which heads seek after leaving cylinder 0.</p> <p>Selects cylinder address to which heads seek after leaving cylinder address selected by upper bank of 10 toggle switches.</p> <p>Selects time interval between seeks.</p> <p>Indicates time interval for seek. Readout is in milliseconds.</p>
<p>FUNCTION switch</p> <p>START (STROBE) pushbutton</p> <p>STOP pushbutton</p> <p>Lower bank of 9 toggle switches (1 through 256)</p> <p>DELAY control</p> <p>3-digit display</p>	<p style="text-align: center;"><b>Function No. 2 — Incremental Seek</b></p> <p>Selects automatic Incremental Seek function (position 2).</p> <p>Starts operation of Incremental Seek function. Heads first seek to cylinder 0 and then to next address. Next address is determined by adding the numbers selected by the lowest ten (1 through 512) switches on the lower bank of toggle switches. Incremental seeking of the heads to the next address continues until a next address greater than 822 is reached. When this occurs, the programmed next address number is subtracted from the preceding valid next address (822 or less), causing decremental seeking to the next address until cylinder 0 is reached. The heads continue this incremental and decremental seek action until the STOP pushbutton is pressed.</p> <p>Stops operation of Incremental Seek function.</p> <p>Selects amount by which current cylinder address is incremented (or decremented) for next seek.</p> <p>Selects time interval between seeks.</p> <p>Indicates time for seek. Readout is in milliseconds.</p>
<p>FUNCTION switch</p> <p>START (STROBE) pushbutton</p>	<p style="text-align: center;"><b>Function No. 3 — Random Seek</b></p> <p>Selects automatic Random Seek function (position 3).</p> <p>Starts operation of Random Seek function. Heads first seek to cylinder 0 and then to cylinder addresses generated by the DSU in a pseudo-random sequence.</p>
<p>Note: On functions 1 through 3, head 0 and sector 0 are selected before the initial seek to 0 (zero).</p>	

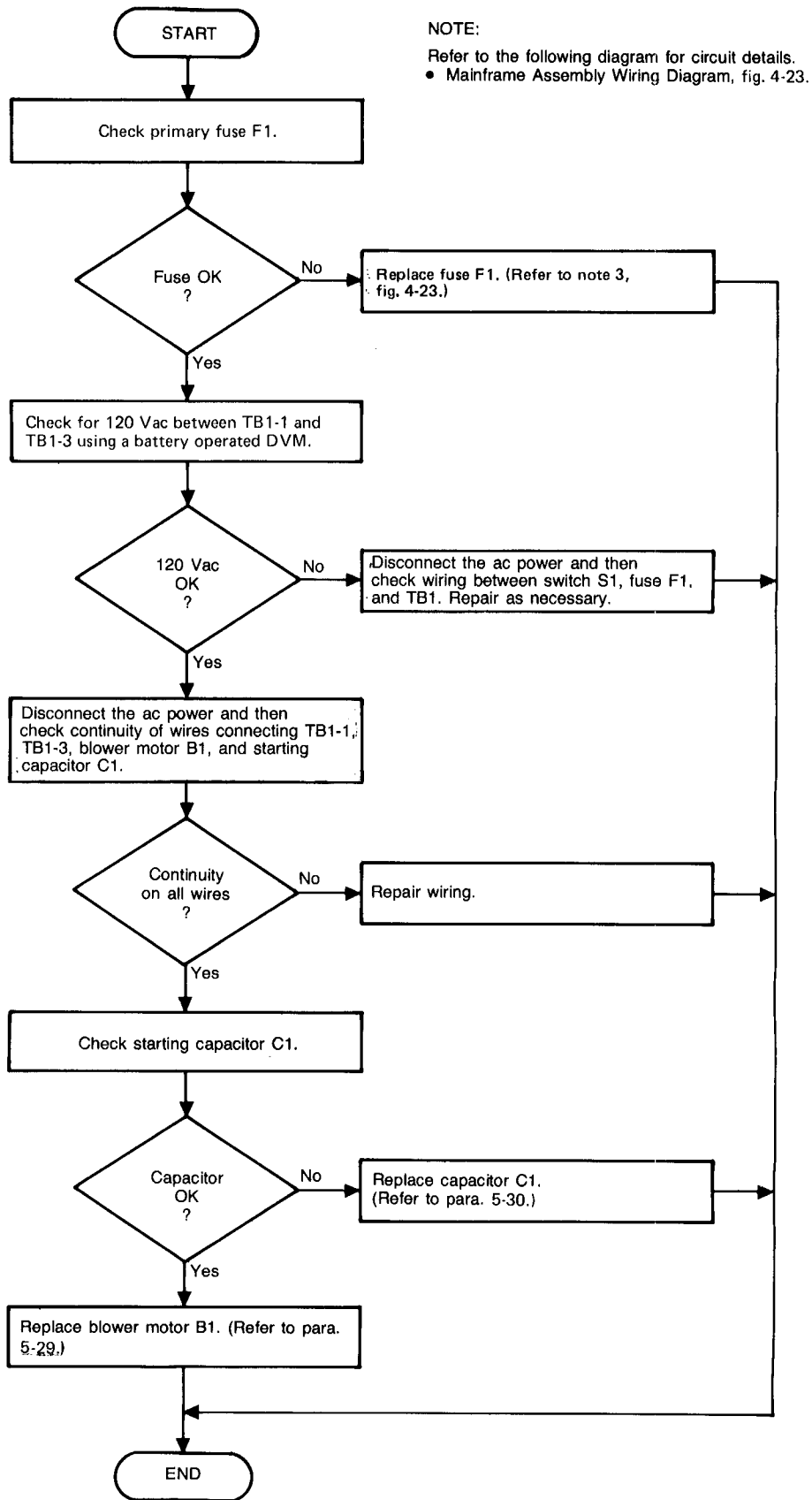
**Table 4 - 2. Disc Service Unit (DSU) Functions (cont)**

<b>CONTROL/ INDICATOR</b>	<b>FUNCTION</b>									
<p>STOP pushbutton</p> <p>DELAY control</p> <p>3-digit display</p>	<p style="text-align: center;"><b>Function No. 3 — Random Seek (Continued)</b></p> <p>Stops operation of Random Seek function.</p> <p>Selects time interval between seeks.</p> <p>Indicates time interval between seeks. Readout is in milliseconds.</p>									
<p>FUNCTION switch</p> <p>START (STROBE) pushbutton</p> <p>STOP pushbutton</p> <p>3-digit display</p>	<p style="text-align: center;"><b>Function No. 4, 5, or 6 — Circumferential Alignment</b></p> <p>Selects automatic setting to prescribed cylinder depending on the position.</p> <p style="margin-left: 40px;">Position 4 — cylinder 0 Position 5 — cylinder 410 Position 6 — cylinder 820</p> <p>Starts operation. Heads go to the cylinder listed above.</p> <p>Stops operation.</p> <p>Indicates time interval to seek to the cylinder. Readout is in milliseconds.</p>									
<p>FUNCTION switch</p> <p>START (STROBE) pushbutton</p> <p>Upper 4 toggle switches (T0 through T3)</p> <p>T0 thru T3 LED indicators</p> <p>Lower bank of 16 toggle switches (1 through 512 and 1 through 32)</p>	<p style="text-align: center;"><b>Function No. 8 — Manual Mode</b></p> <p>Selects Manual mode of operation (position 8).</p> <p>When pressed, activates STROBE signal applied to the tag bus decoder in I/O Sector PCA-A2. This executes the command selected by tag bus switches 64 through 512 on the upper bank of 10 toggle switches. The STROBE signal is active as long as the START (STROBE) pushbutton is held down.</p> <p>Selects input command to be supplied on tag bus to drive. The toggle switch settings and the associated input commands are listed on the upper right-hand corner of the DSU front panel. The DSU does not issue a Write command.</p> <p>Indicates the state of the tag bus bits (input command) selected by the upper 4 toggle switches (64 through 512).</p> <p>Selects state of control bus bits C0 through C15 for the following tag bus commands. Bits are strobed into the drive when the START (STROBE) pushbutton is pressed.</p> <table border="0" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="text-align: left; width: 30%;"><b>Command</b></th> <th style="text-align: left; width: 30%;"><b>Control Bits</b></th> <th style="text-align: left; width: 40%;"></th> </tr> </thead> <tbody> <tr> <td>Address Record (ADR) — 1001</td> <td>C0 thru C5</td> <td>Selects sector address to be stored in drive Sector Address register.</td> </tr> <tr> <td></td> <td>C8, C9, C10, and C11</td> <td>Selects head identity to be stored in drive Head register.</td> </tr> </tbody> </table>	<b>Command</b>	<b>Control Bits</b>		Address Record (ADR) — 1001	C0 thru C5	Selects sector address to be stored in drive Sector Address register.		C8, C9, C10, and C11	Selects head identity to be stored in drive Head register.
<b>Command</b>	<b>Control Bits</b>									
Address Record (ADR) — 1001	C0 thru C5	Selects sector address to be stored in drive Sector Address register.								
	C8, C9, C10, and C11	Selects head identity to be stored in drive Head register.								
<p>Note: On functions 1 through 3, head 0 and sector 0 are selected before the initial seek to 0 (zero).</p>										



Table 4-2. Disc Service Unit (DSU) Functions (cont)

CONTROL/ INDICATOR	FUNCTION		
C0 thru C15 LED indicators	<b>Function No. 8 — Manual Mode (Continued)</b>		
	<b>Command</b>	<b>Control Bits</b>	
	Address Unit (ADU) — 1010	C0 thru C2	Selects identity of drive to be enabled for communication with DSU. (The identity of the drive is the number selected on the UNIT SELECT switch on the drive operator panel.)
	Clear Status (CLS) — 1110	C0	Clears three Attention flip-flops in drive. This deactivates First Status signal. Note: If C0 and C1 are both selected, the Attention flip-flops and the First Status flip-flop are cleared.
	Seek (SK) — 1000	C0 thru C9	Selects cylinder address to which heads are to seek.
	Set Offset (SOF) — 1101	C0 thru C5	Selects offset magnitude in 63 increments of 12.5 microinches each.
		C7	Selects direction (+ or -) of offset.
	Transmit Sector (XMS) — 1100	C0 thru C5	Selects sector address to be stored in drive Sector Address register.
		a. Indicates the state of the control bus bits selected by the lower band of 16 toggle switches when any one of the preceding six commands is selected.	
		b. Indicates the status of the drive when any one of the following commands is selected:	
	Read (READ) — 0000		
	Write (WRITE) — 0001		
	Request Status (RQS) — 0010		
	Coding for the LED's is as follows. With the exception of C0 (ACRY), a lighted LED indicates that the corresponding signal is active. C0, when lighted, indicates that signal ACRY is inactive.		
	C0 — ACRY (Access Ready)		
	C1 — DRDY (Drive Ready)		
	C2 — Illegal head selected, illegal sector selected, or seek check		
	C3 — First Status		
	C4 — FLT (Fault)		
	C5 — Format		
	C6 — READ Only		
	C7 — ATT (Attention)		
	C8 — SC (Sector Compare)		
	C9 — High		
	C10 — Drive Type } C9 on and C10 on, drive = 7925		
	C11 through C15 — Not used		



7311-4C

Figure 4-2. Blower Troubleshooting Flowchart

7311-5

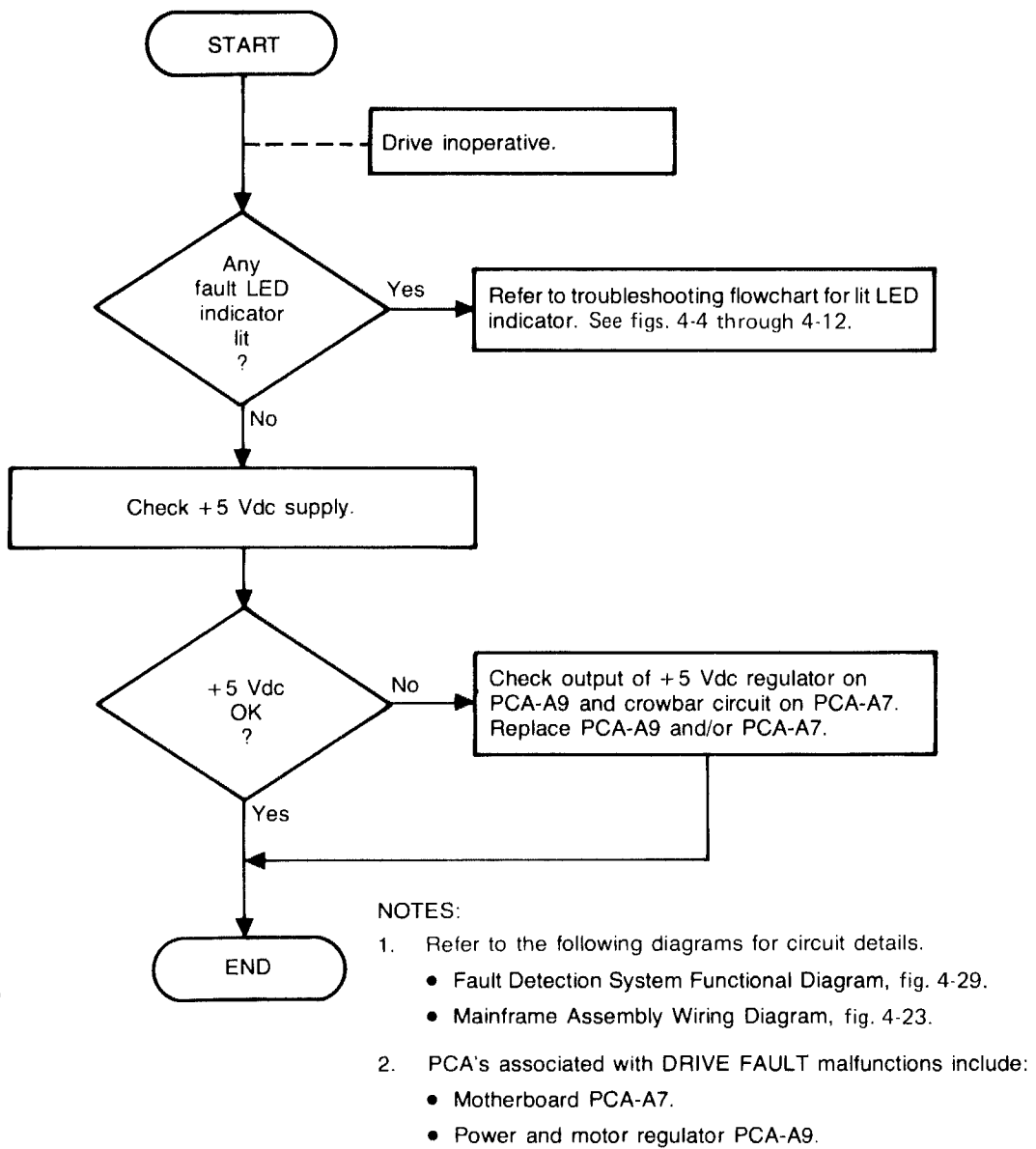
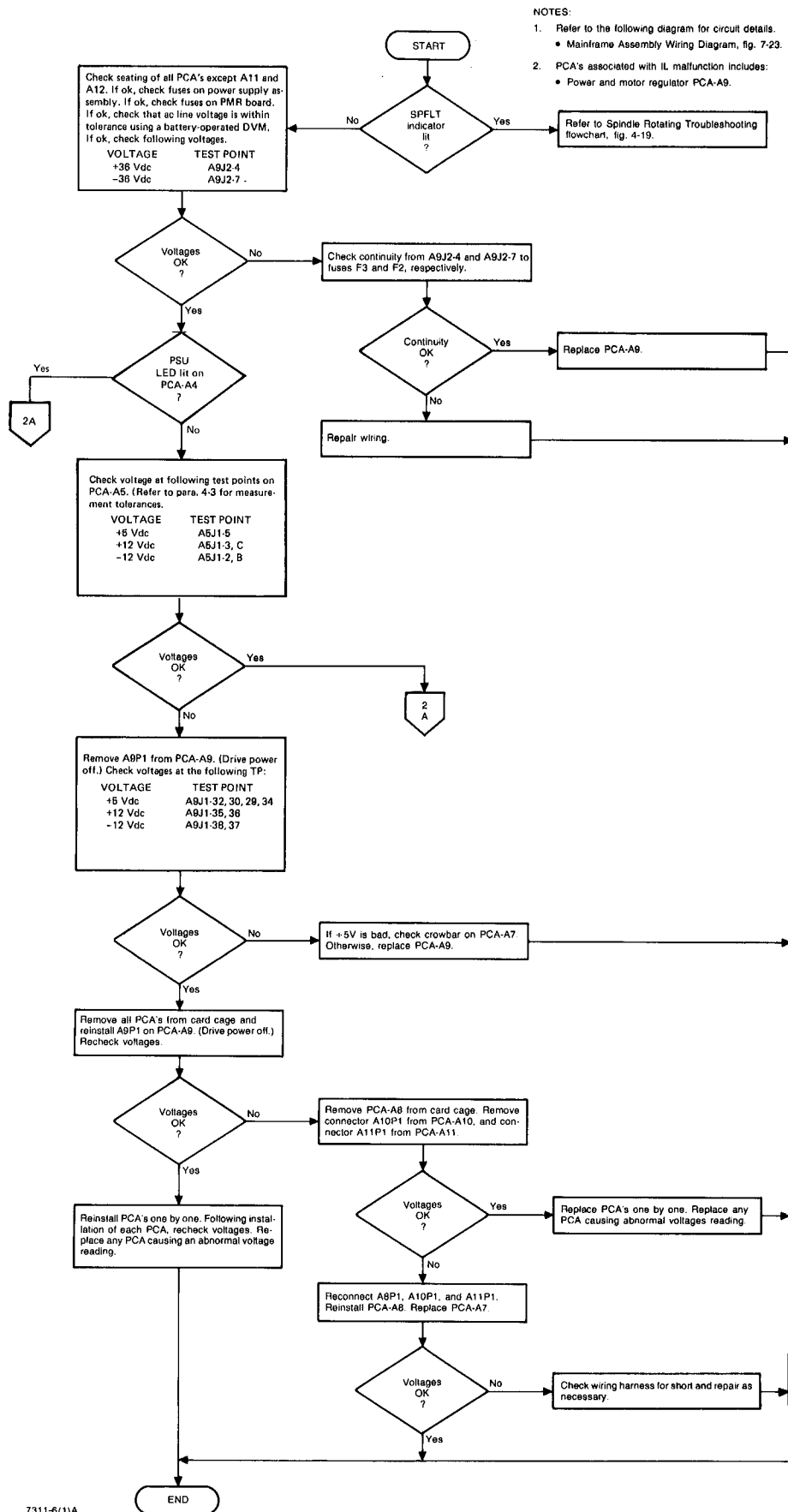


Figure 4 - 3. DRIVE FAULT Indicator Troubleshooting Flowchart



7311-6(1)A

Figure 4-4. IL LED Indicator Troubleshooting Flowchart (sheet 1 of 2)

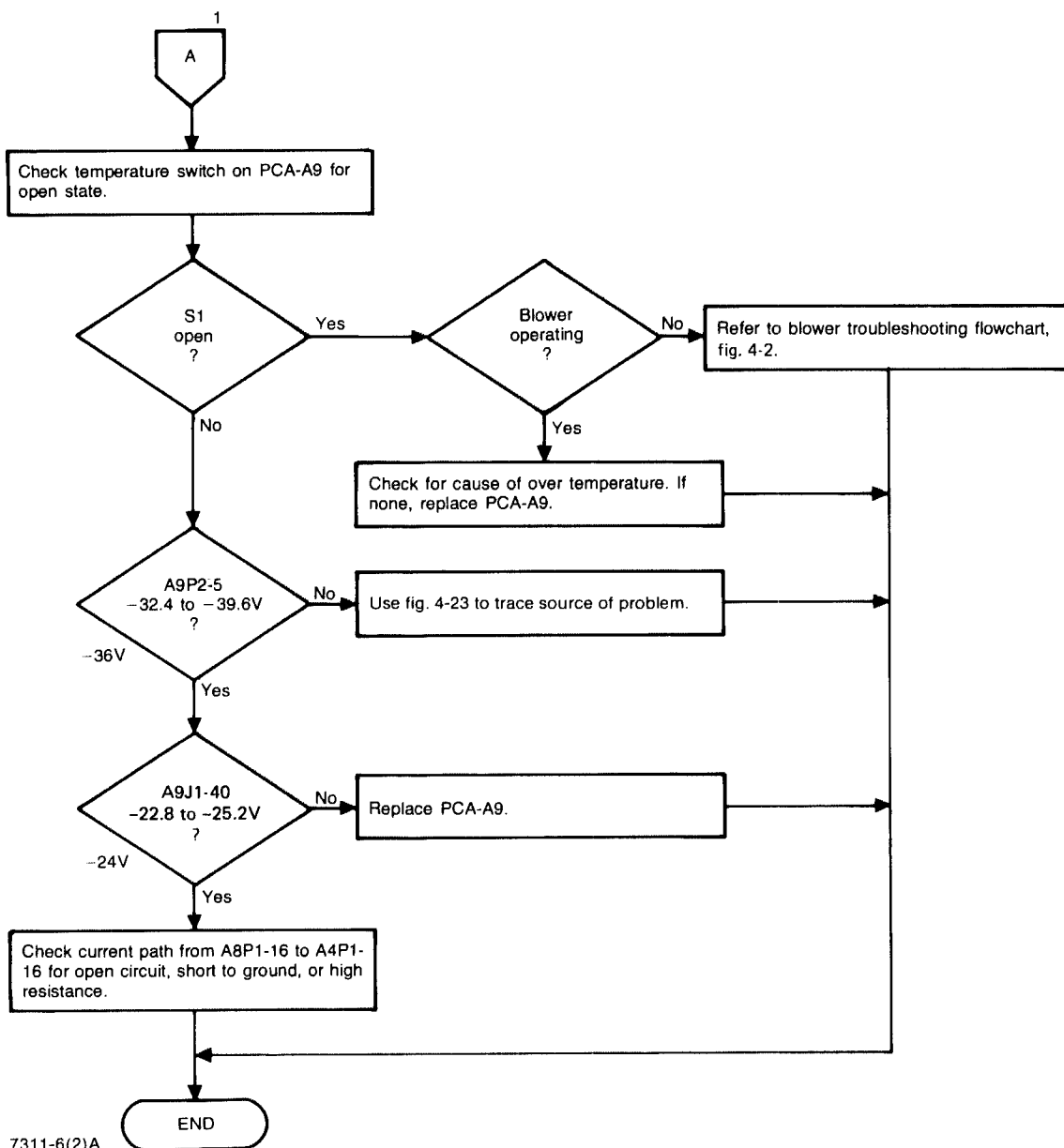


Figure 4-4. IL LED Indicator Troubleshooting Flowchart (sheet 2 of 2)

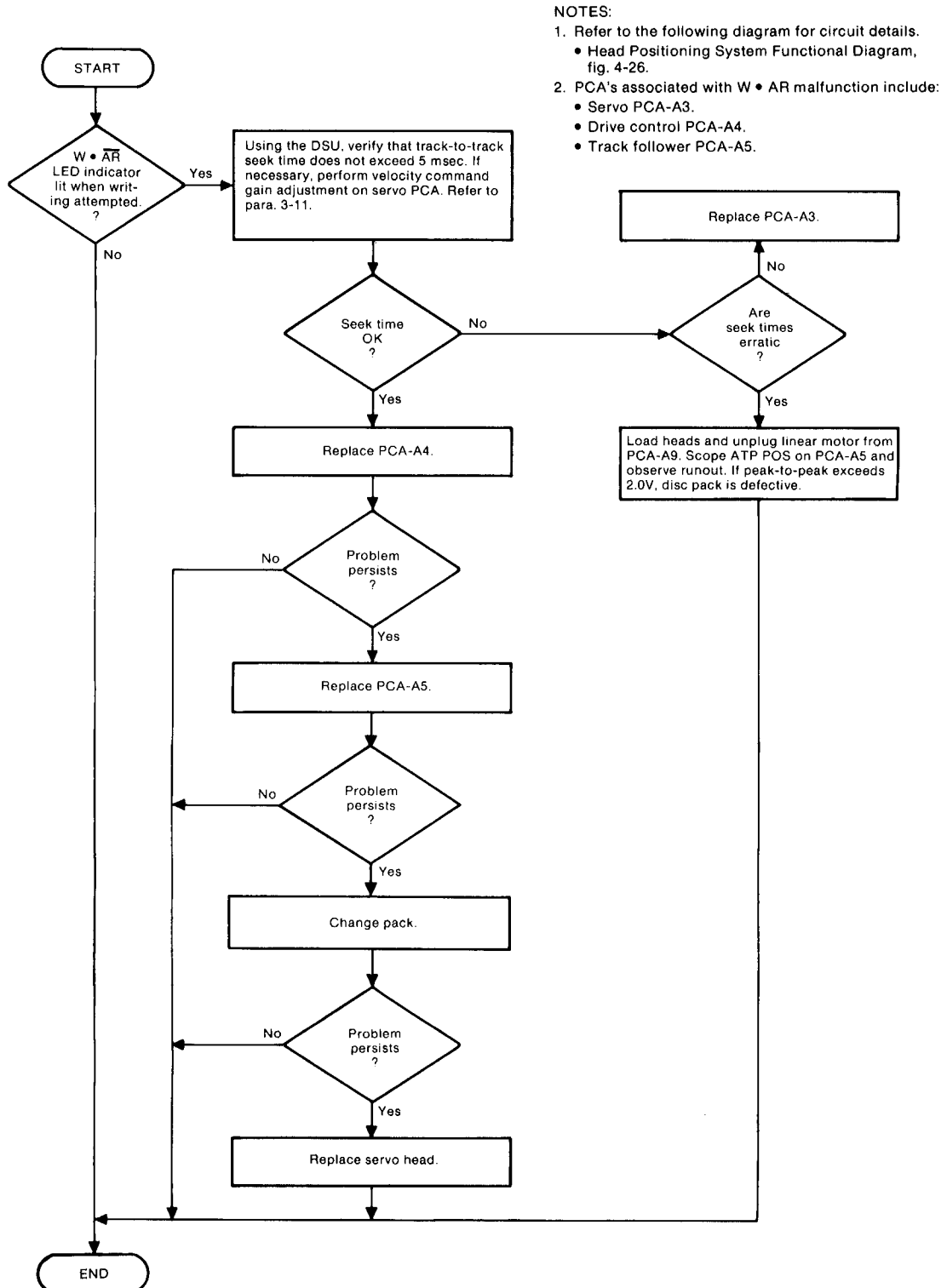
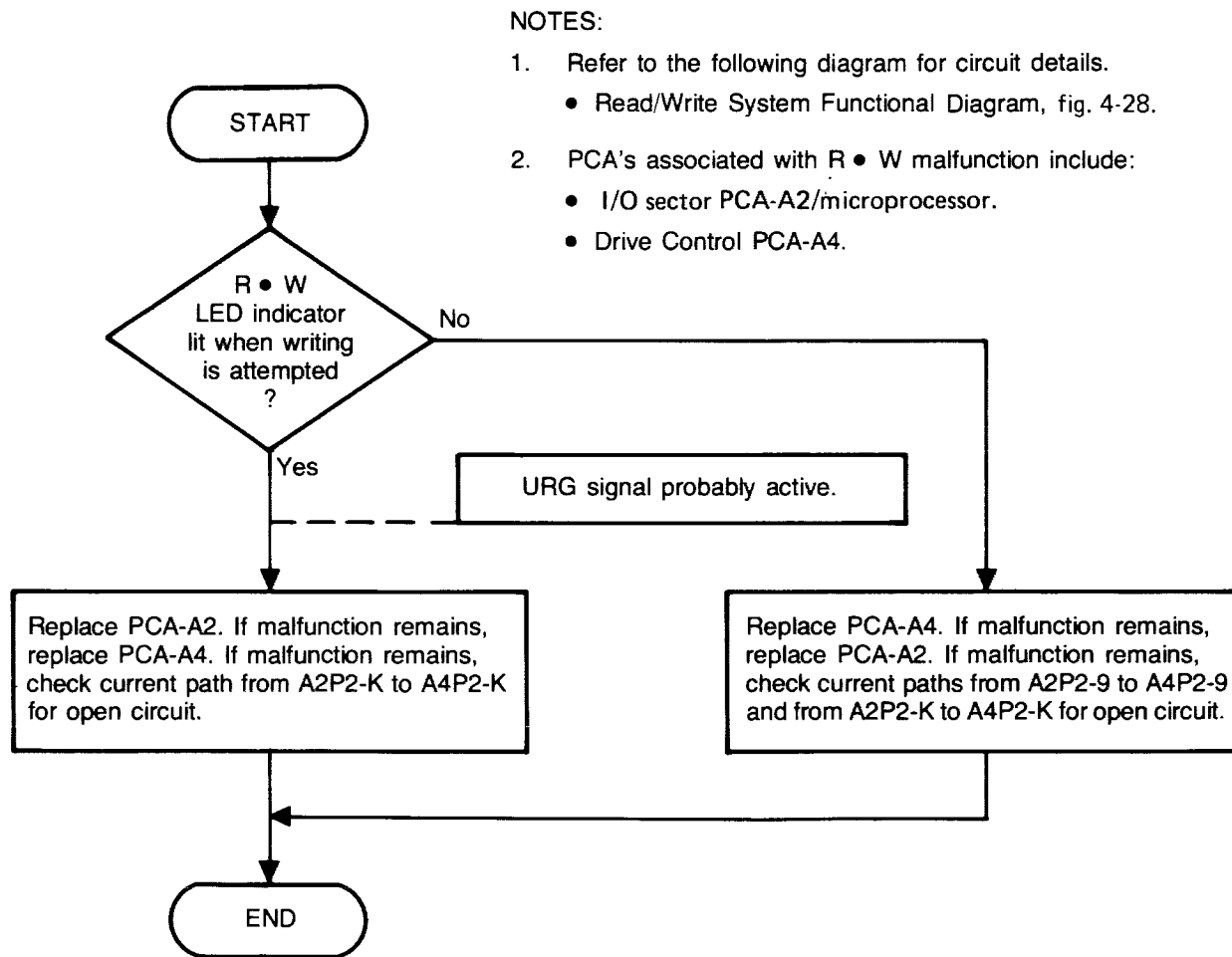


Figure 4-5. W • AR LED Indicator Troubleshooting Flowchart

Figure 4-6. R • W LED Indicator Troubleshooting Flowchart



7311-8A

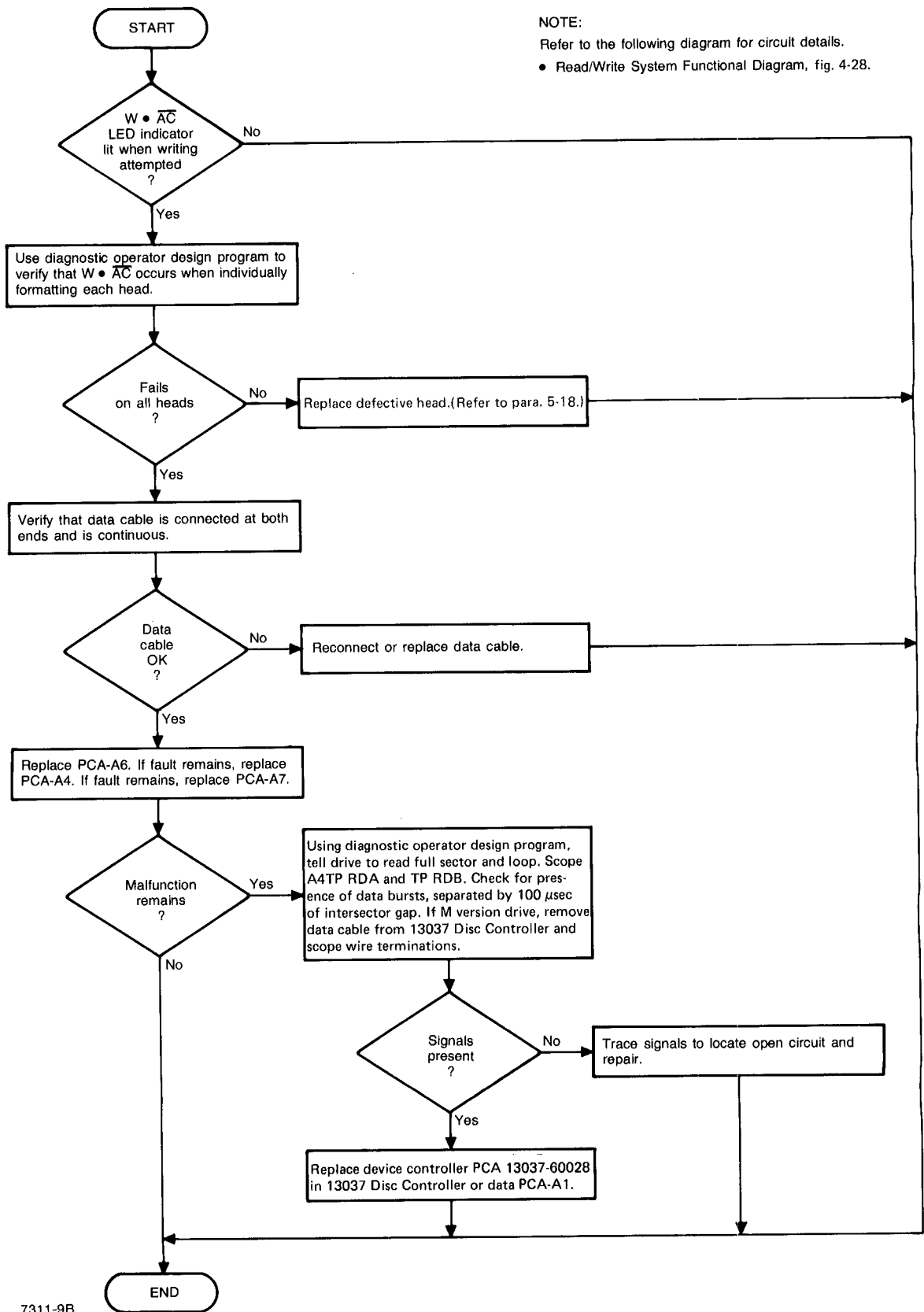
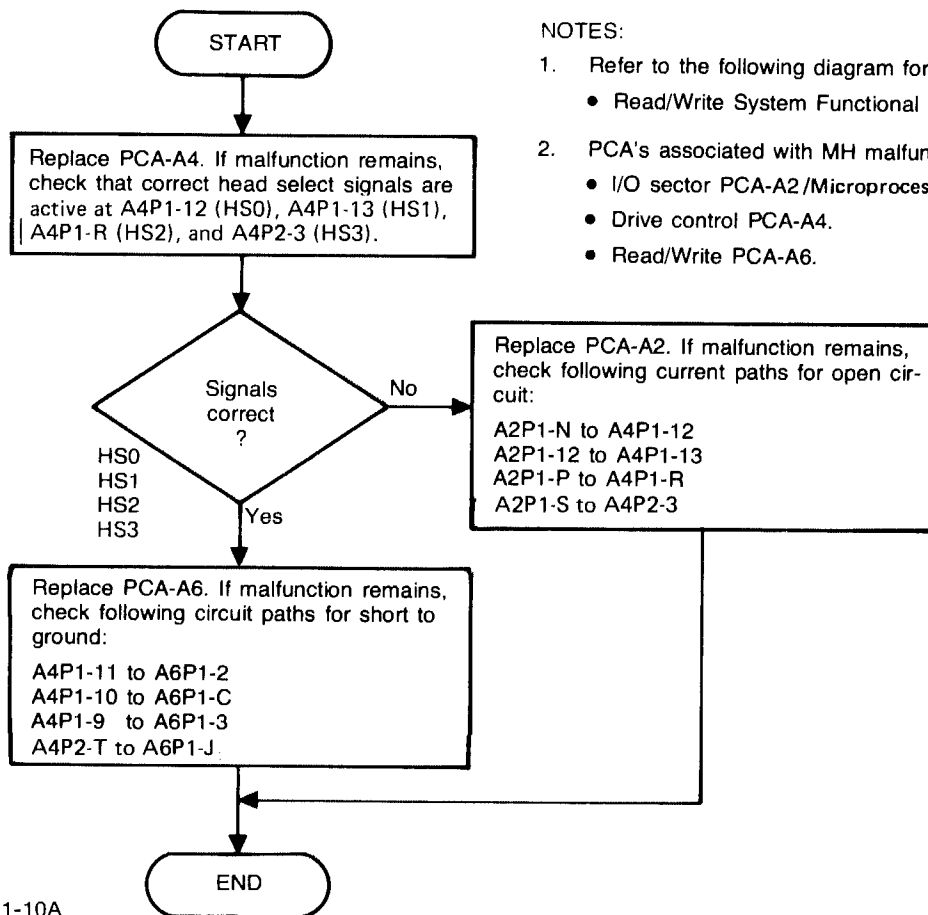


Figure 4-7. W • AC LED Indicator Troubleshooting Flowchart



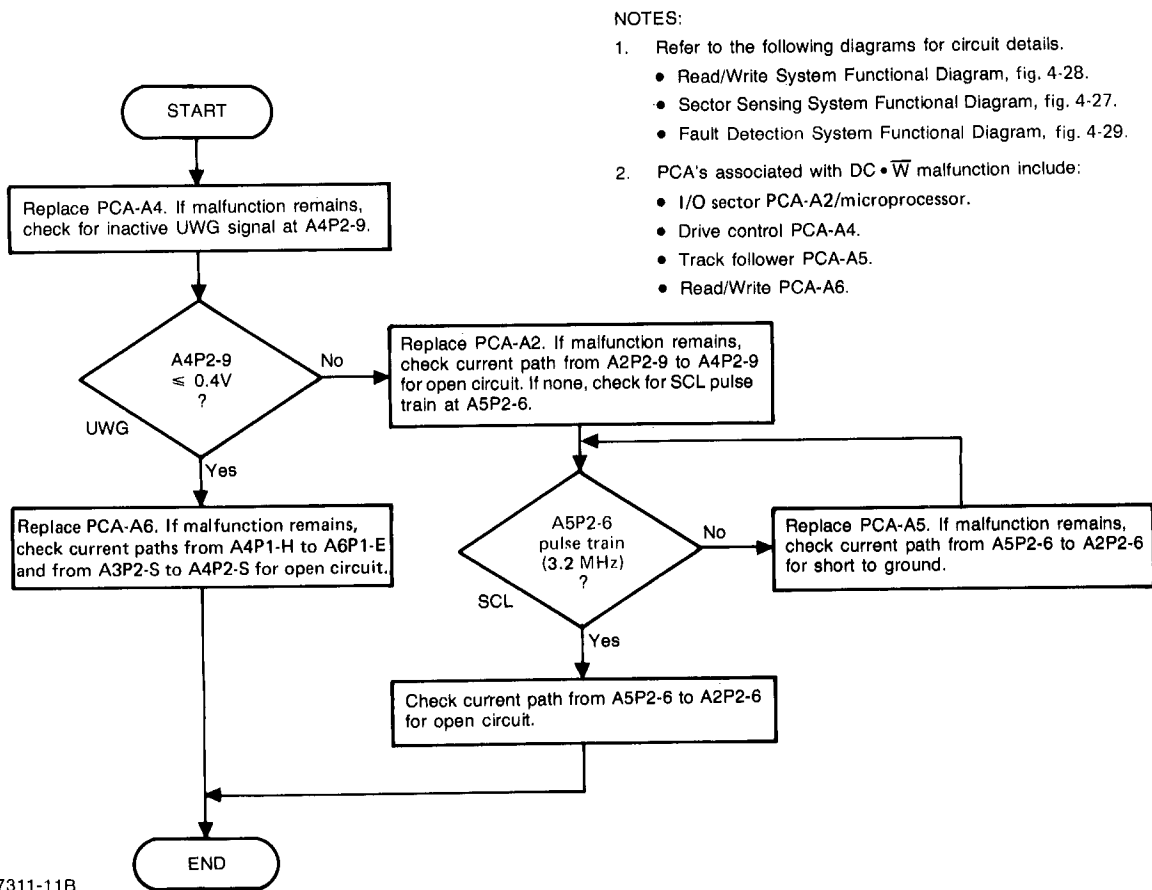


NOTES:

1. Refer to the following diagram for circuit details.
  - Read/Write System Functional Diagram, fig. 4-28.
2. PCA's associated with MH malfunction include:
  - I/O sector PCA-A2/Microprocessor.
  - Drive control PCA-A4.
  - Read/Write PCA-A6.

7311-10A

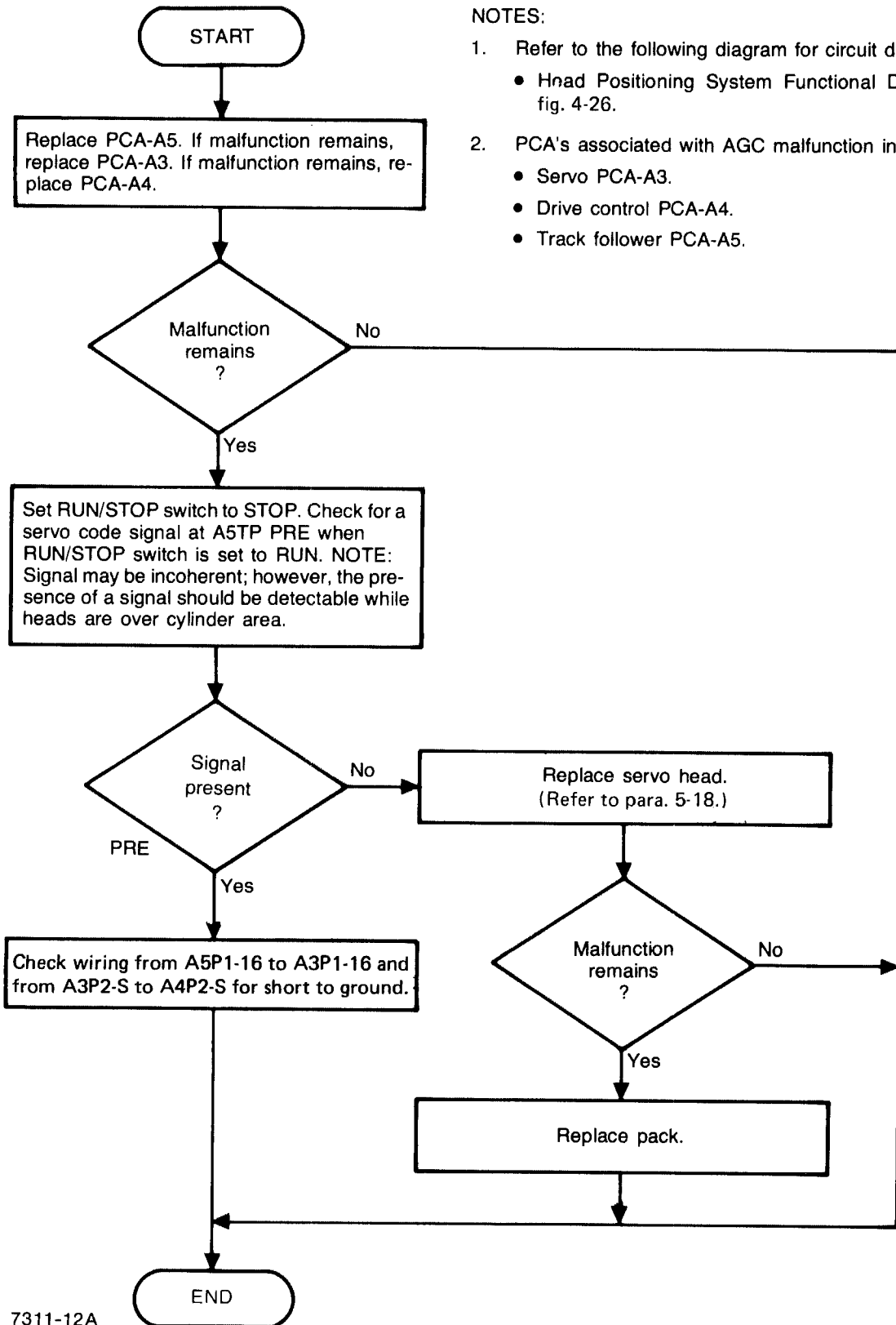
Figure 4-8. MH LED Indicator Troubleshooting Flowchart



NOTES:

1. Refer to the following diagrams for circuit details.
  - Read/Write System Functional Diagram, fig. 4-28.
  - Sector Sensing System Functional Diagram, fig. 4-27.
  - Fault Detection System Functional Diagram, fig. 4-29.
2. PCA's associated with DC •  $\overline{W}$  malfunction include:
  - I/O sector PCA-A2/microprocessor.
  - Drive control PCA-A4.
  - Track follower PCA-A5.
  - Read/Write PCA-A6.

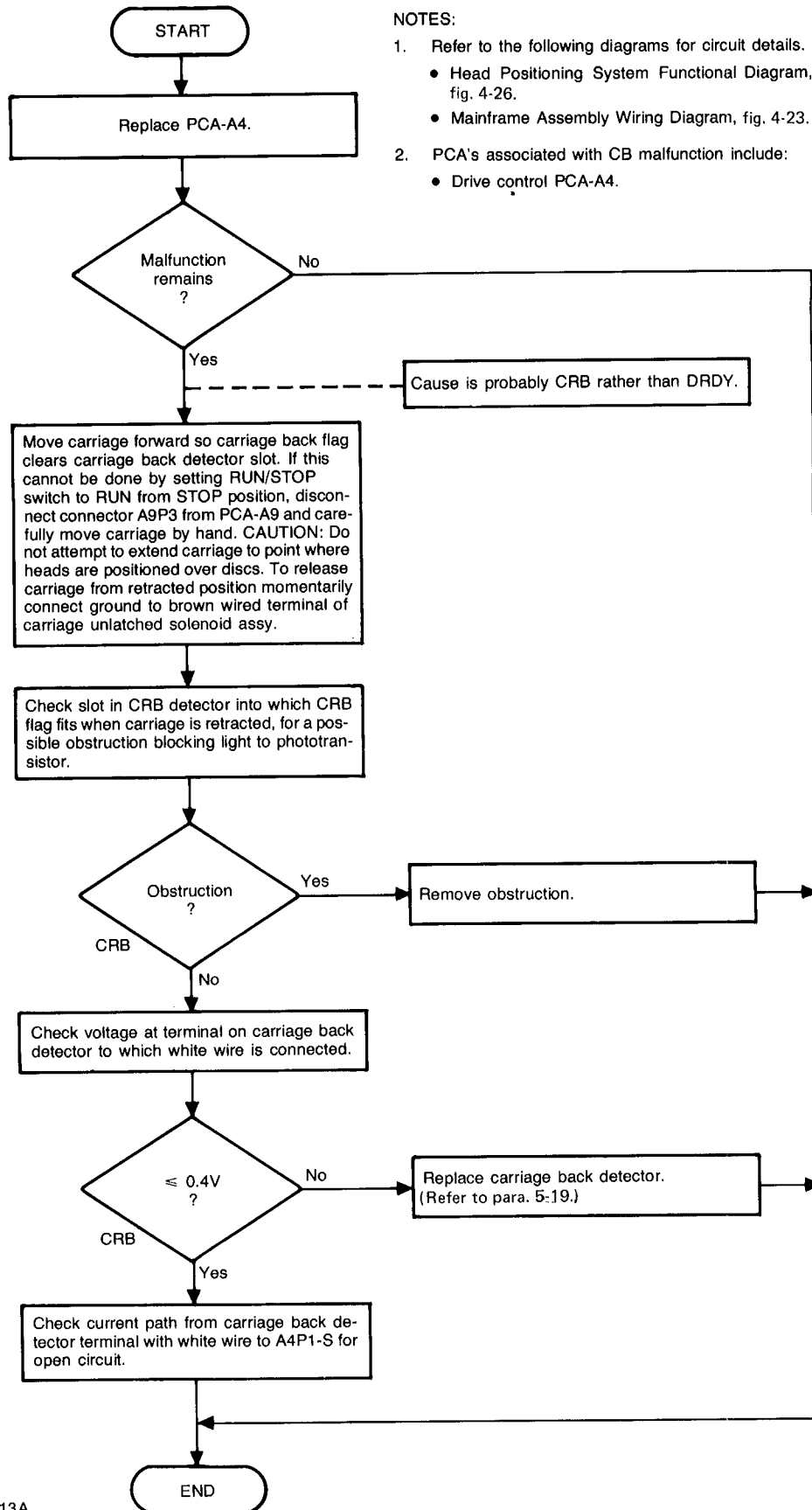
Figure 4-9. DC •  $\overline{W}$  LED Indicator Troubleshooting Flowchart



NOTES:

1. Refer to the following diagram for circuit details.
  - Head Positioning System Functional Diagram, fig. 4-26.
2. PCA's associated with AGC malfunction include:
  - Servo PCA-A3.
  - Drive control PCA-A4.
  - Track follower PCA-A5.

Figure 4-10. AGC LED Indicator Troubleshooting Flowchart



NOTES:

1. Refer to the following diagrams for circuit details.
  - Head Positioning System Functional Diagram, fig. 4-26.
  - Mainframe Assembly Wiring Diagram, fig. 4-23.
2. PCA's associated with CB malfunction include:
  - Drive control PCA-A4.

7311-13A

Figure 4 - 11. CB LED Indicator Troubleshooting Flowchart

NOTES:

1. Refer to the following diagrams for circuit details.
  - Head Positioning System Functional Diagram, fig. 4-26.
  - Mainframe Assembly Wiring Diagram, fig. 4-23.
2. PCA's associated with T malfunction include:
  - Servo PCA-A3.
  - Drive control PCA-A4.

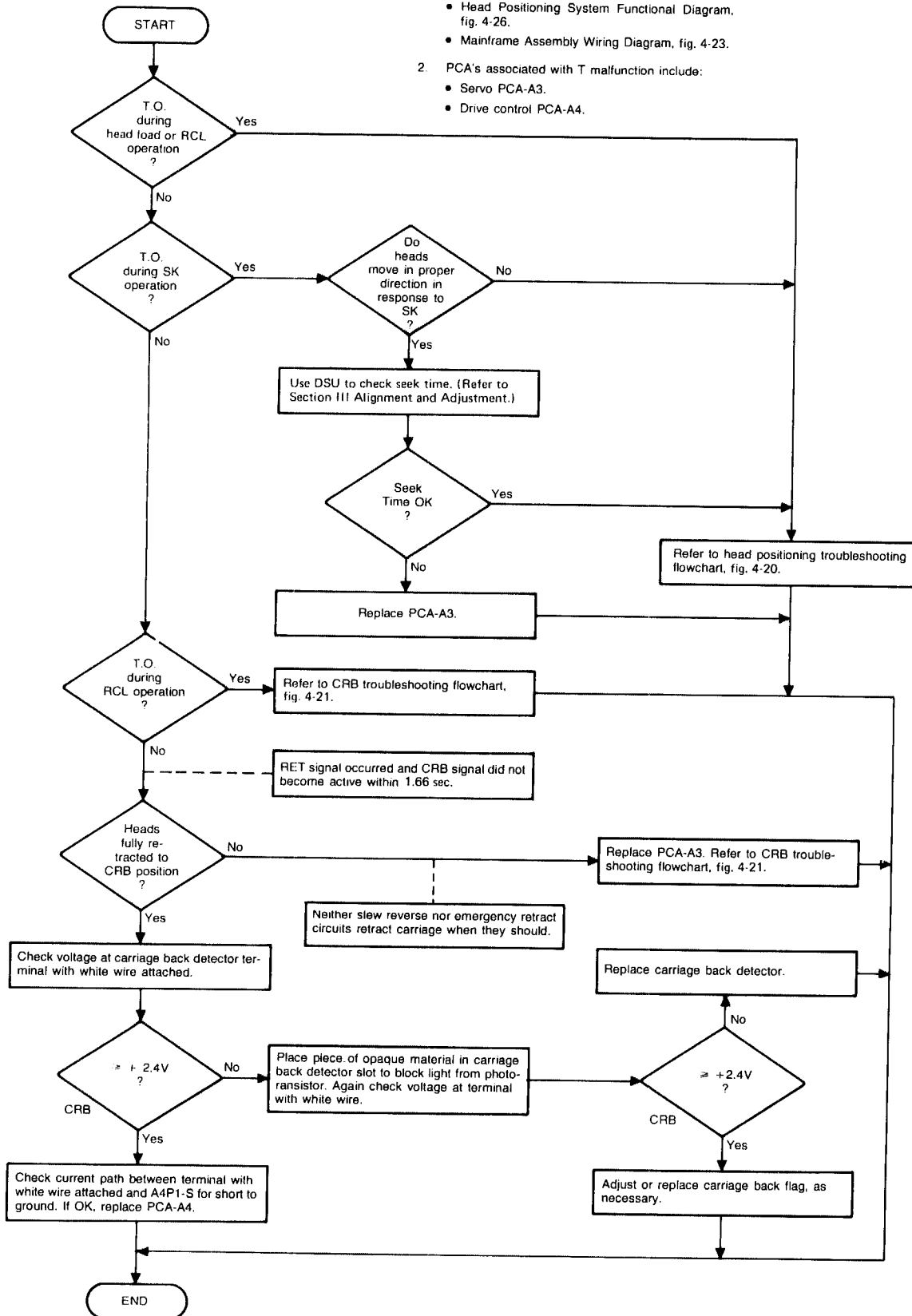
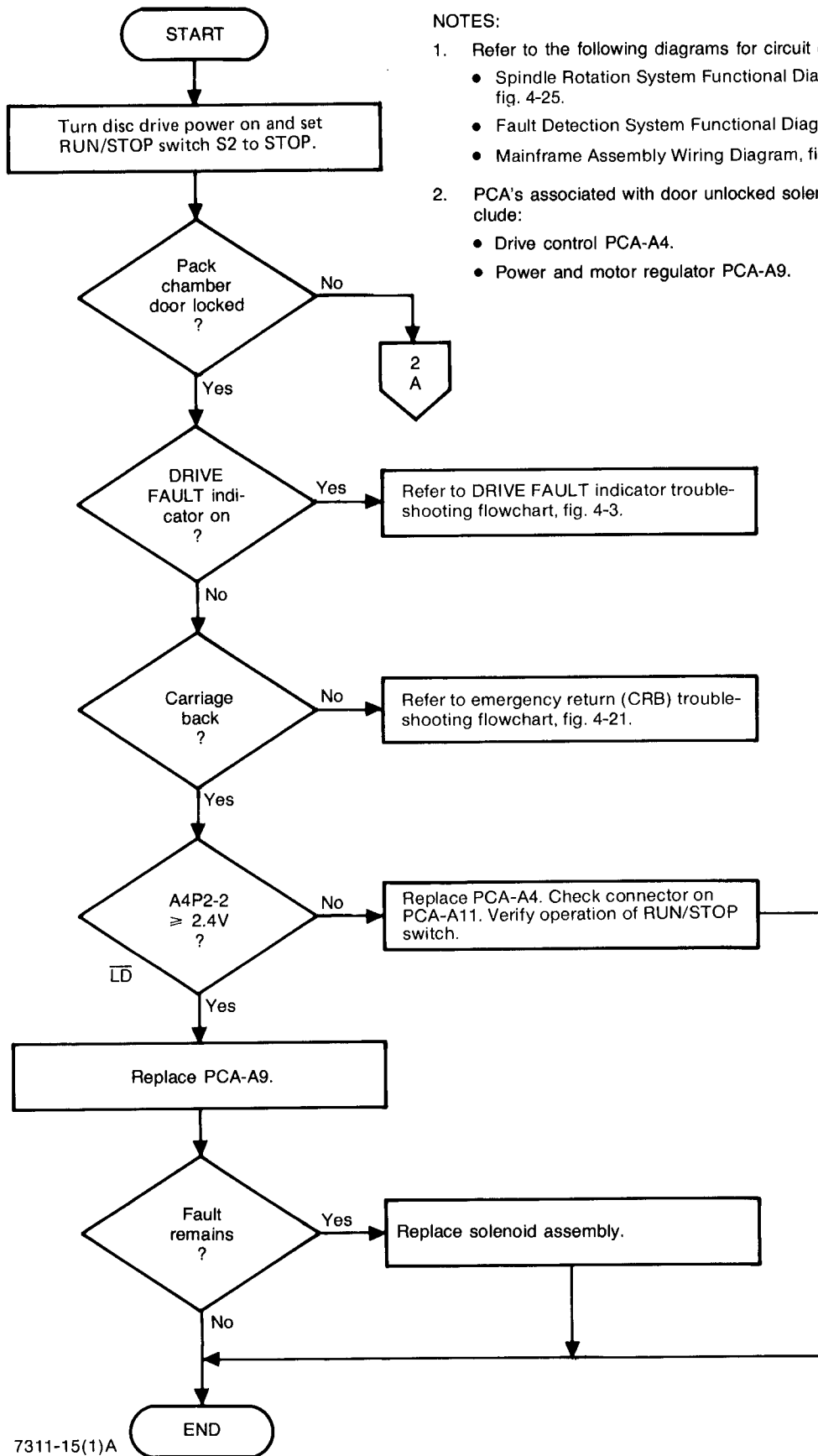


Figure 4-12. T LED Indicator Troubleshooting Flowchart

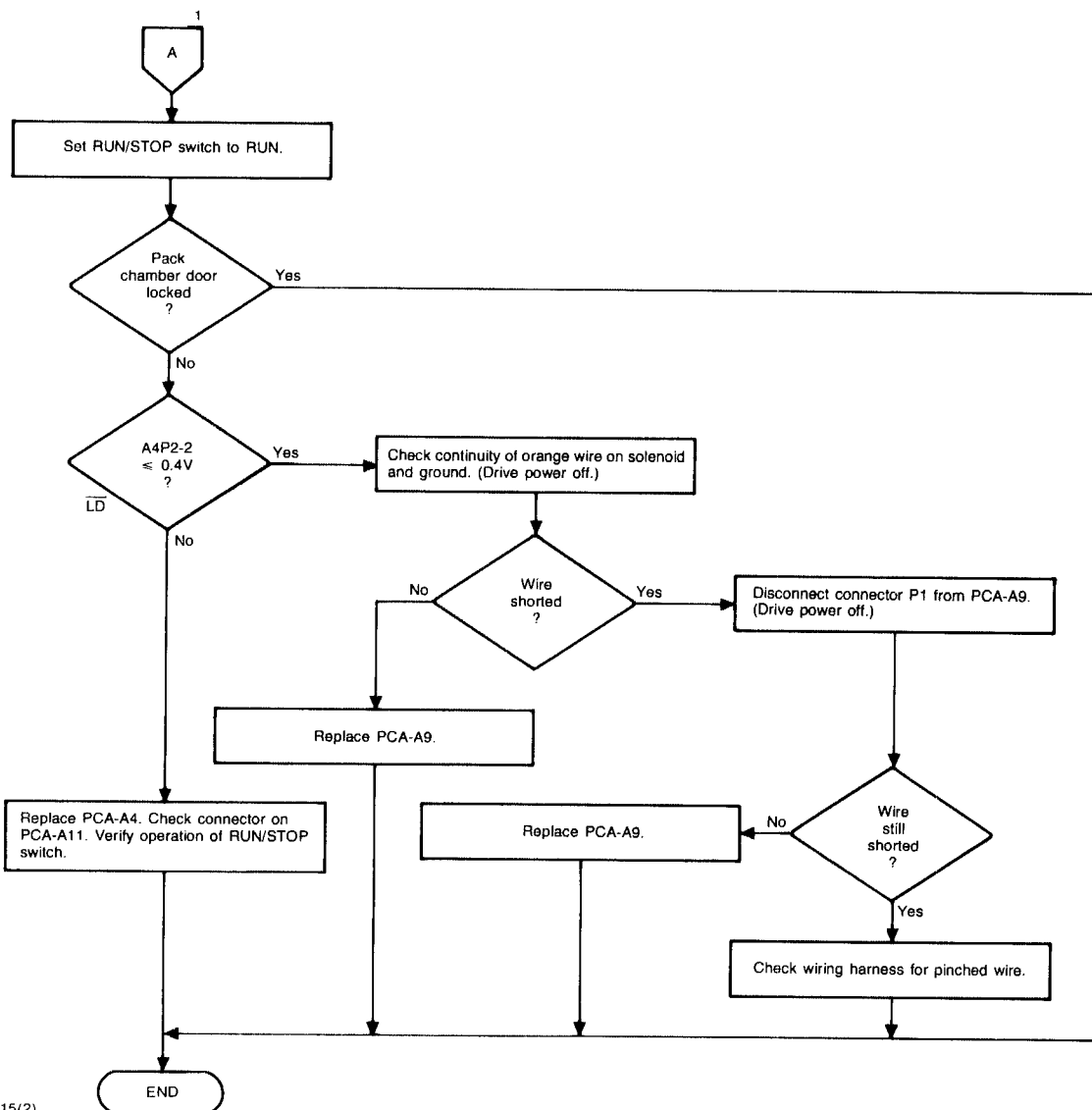


NOTES:

1. Refer to the following diagrams for circuit details.
  - Spindle Rotation System Functional Diagram, fig. 4-25.
  - Fault Detection System Functional Diagram, fig. 4-29.
  - Mainframe Assembly Wiring Diagram, fig. 4-23.
2. PCA's associated with door unlocked solenoid malfunction include:
  - Drive control PCA-A4.
  - Power and motor regulator PCA-A9.

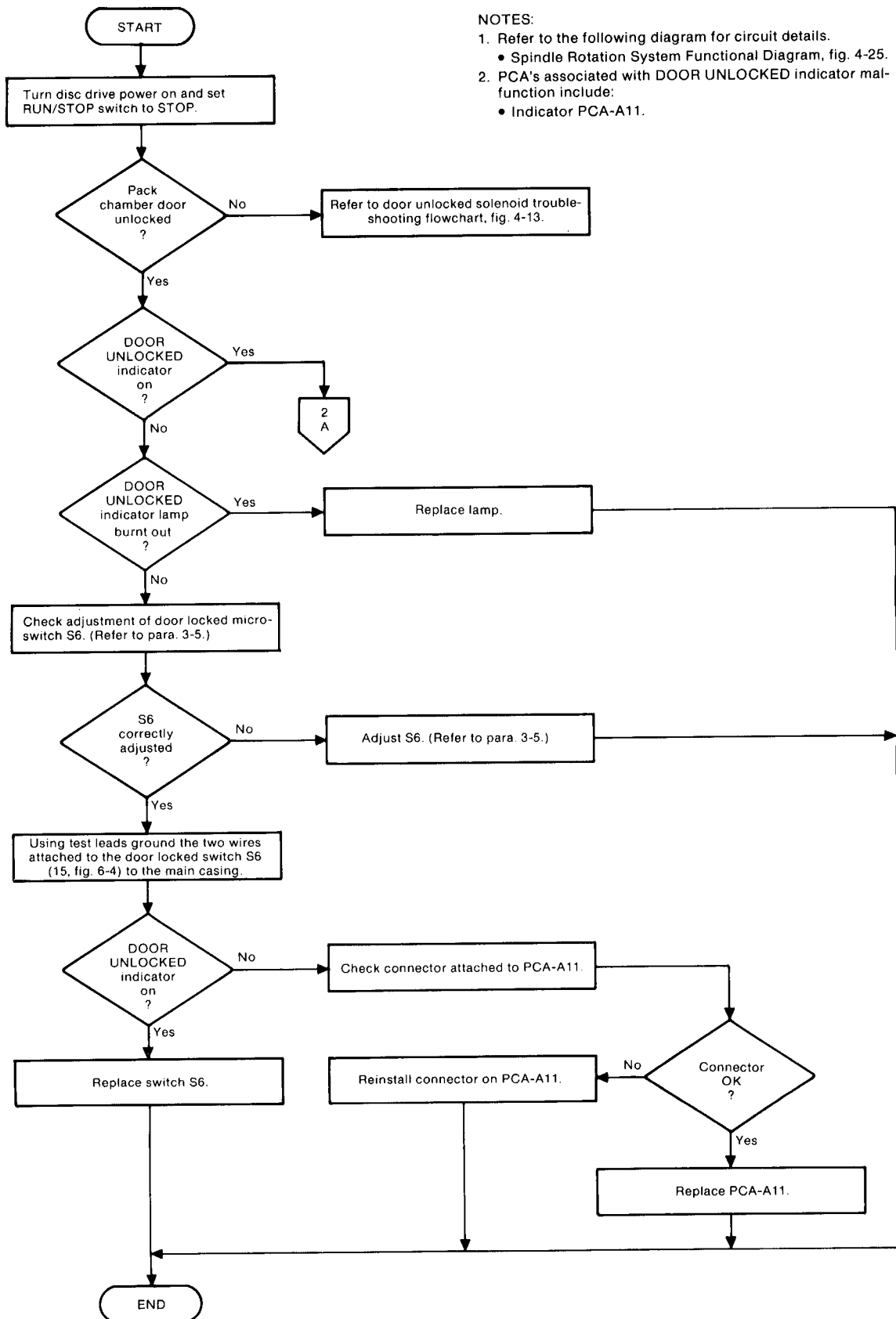
7311-15(1)A

Figure 4-13. Door Unlock Solenoid Troubleshooting Flowchart (sheet 1 of 2)



7311-15(2)

Figure 4-13. Door Unlock Solenoid Troubleshooting Flowchart (sheet 2 of 2)

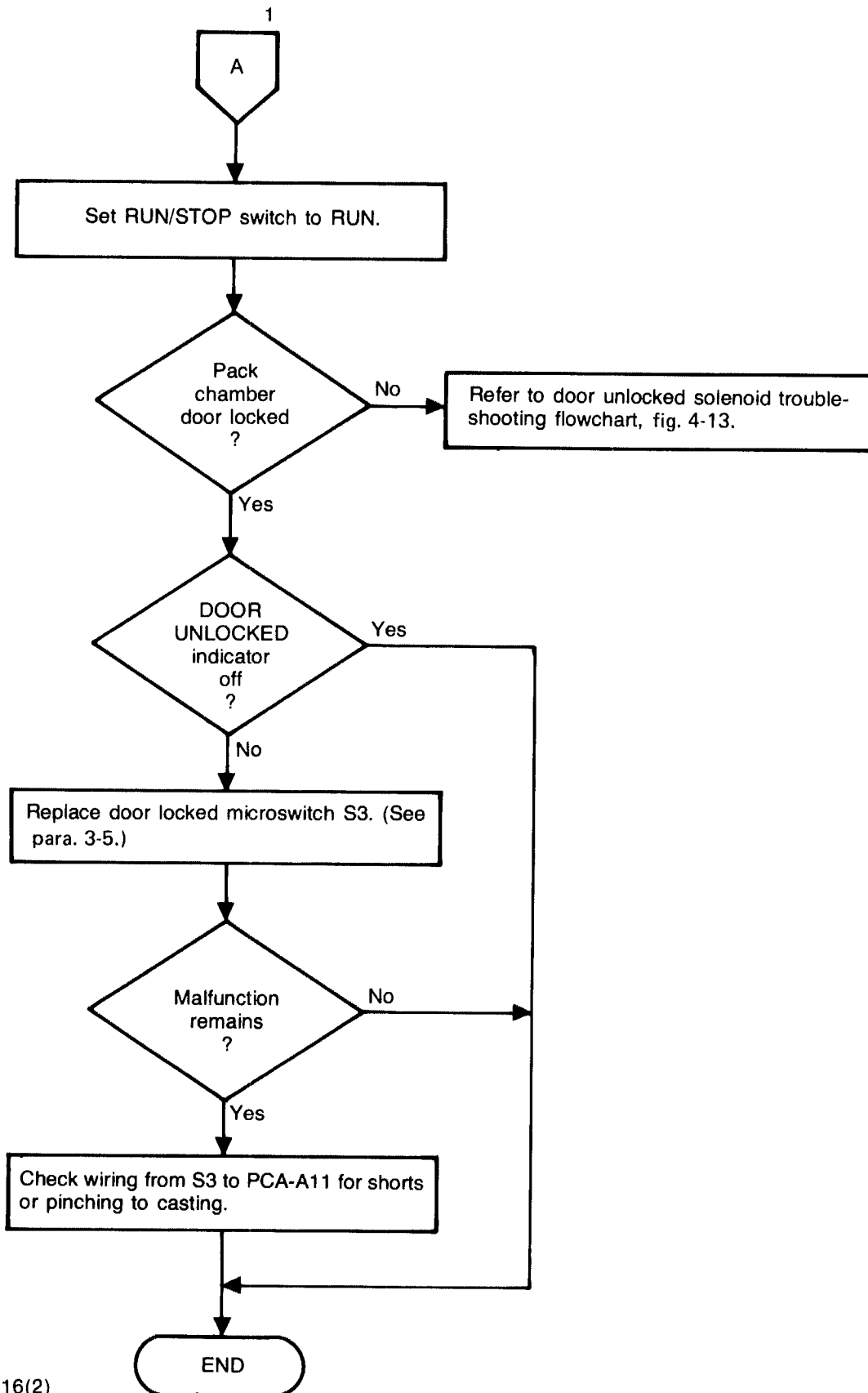


NOTES:

1. Refer to the following diagram for circuit details.
  - Spindle Rotation System Functional Diagram, fig. 4-25.
2. PCA's associated with DOOR UNLOCKED indicator malfunction include:
  - Indicator PCA-A11.

Figure 4-14. DOOR UNLOCKED Indicator Troubleshooting Flowchart (sheet 1 of 2)

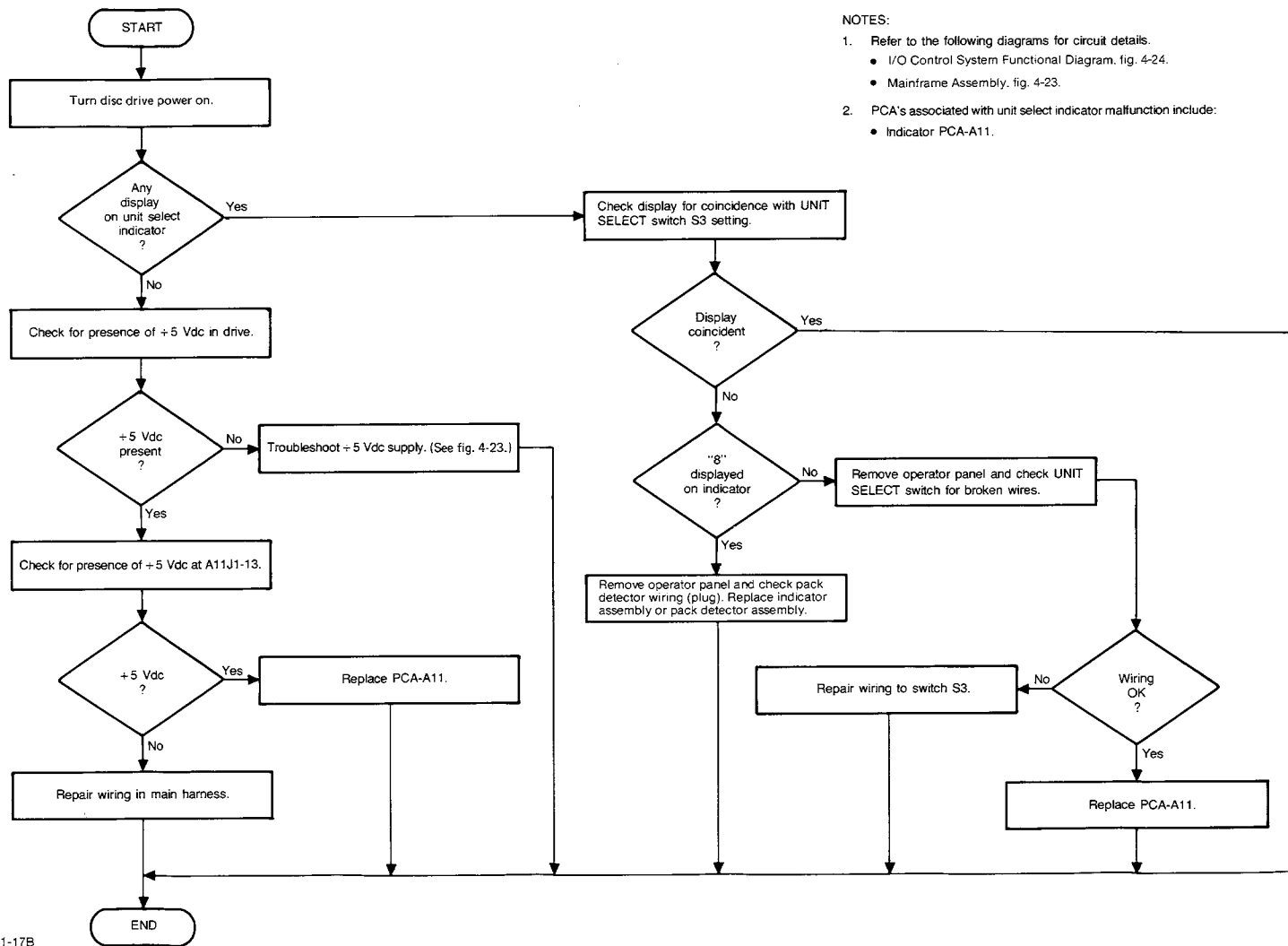




7311-16(2)

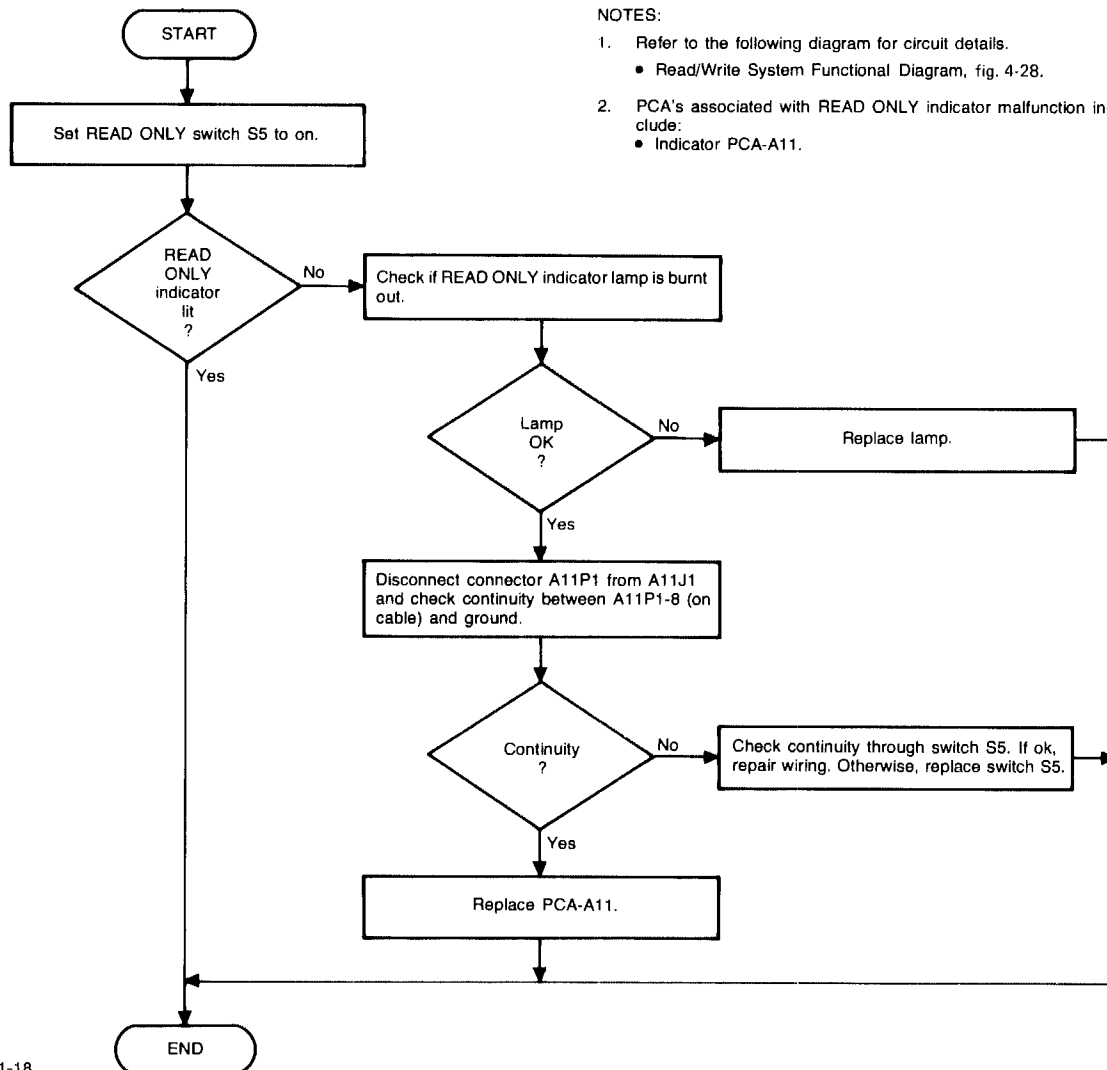
Figure 4-14. DOOR UNLOCKED Indicator Troubleshooting Flowchart (sheet 2 of 2)

Figure 4-15. Unit Select Indicator Troubleshooting Flowchart



NOTES:

1. Refer to the following diagrams for circuit details.
  - I/O Control System Functional Diagram, fig. 4-24.
  - Mainframe Assembly, fig. 4-23.
2. PCA's associated with unit select indicator malfunction include:
  - Indicator PCA-A11.

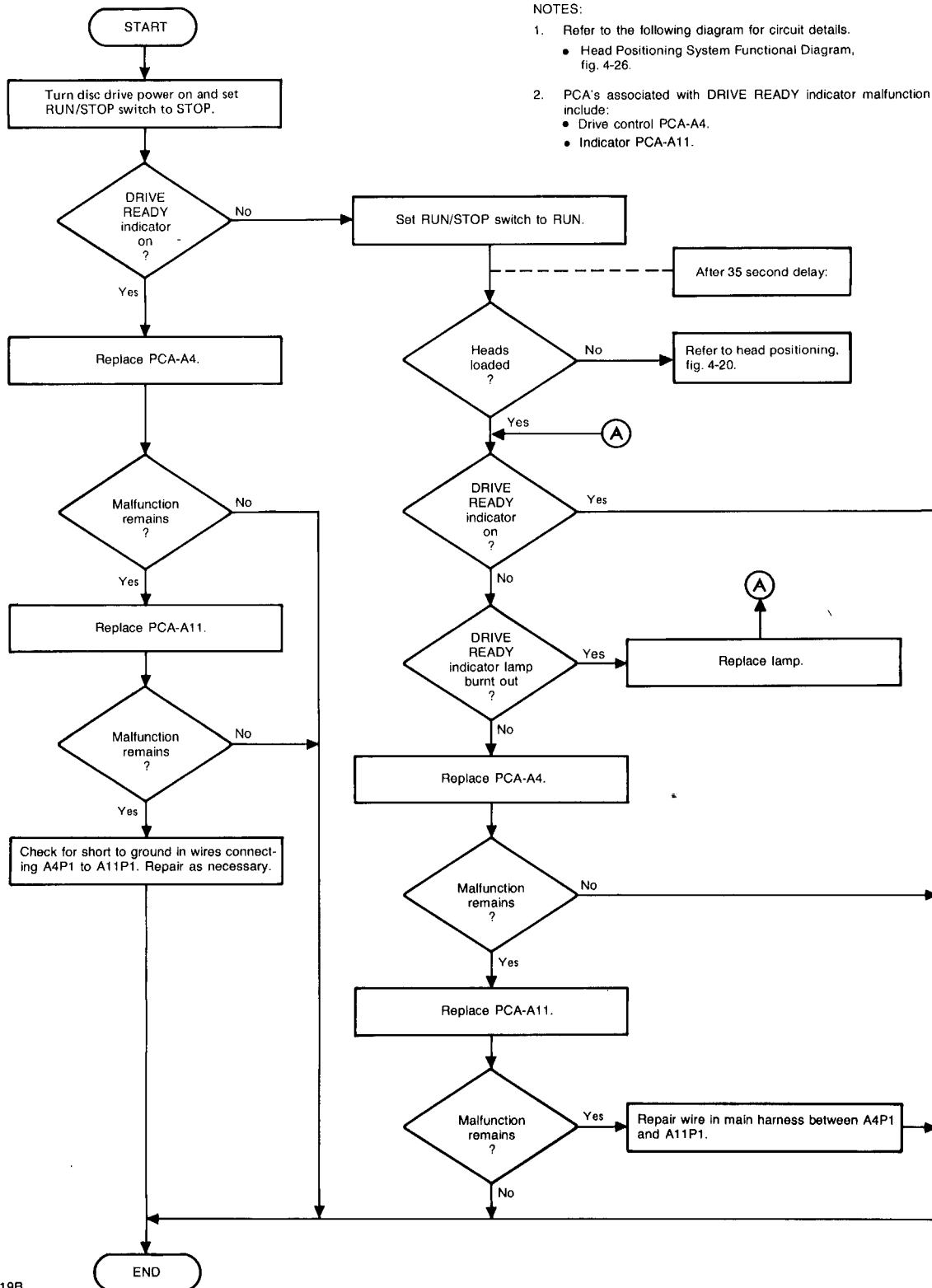


NOTES:

1. Refer to the following diagram for circuit details.
  - Read/Write System Functional Diagram, fig. 4-28.
2. PCA's associated with READ ONLY indicator malfunction include:
  - Indicator PCA-A11.

7311-18

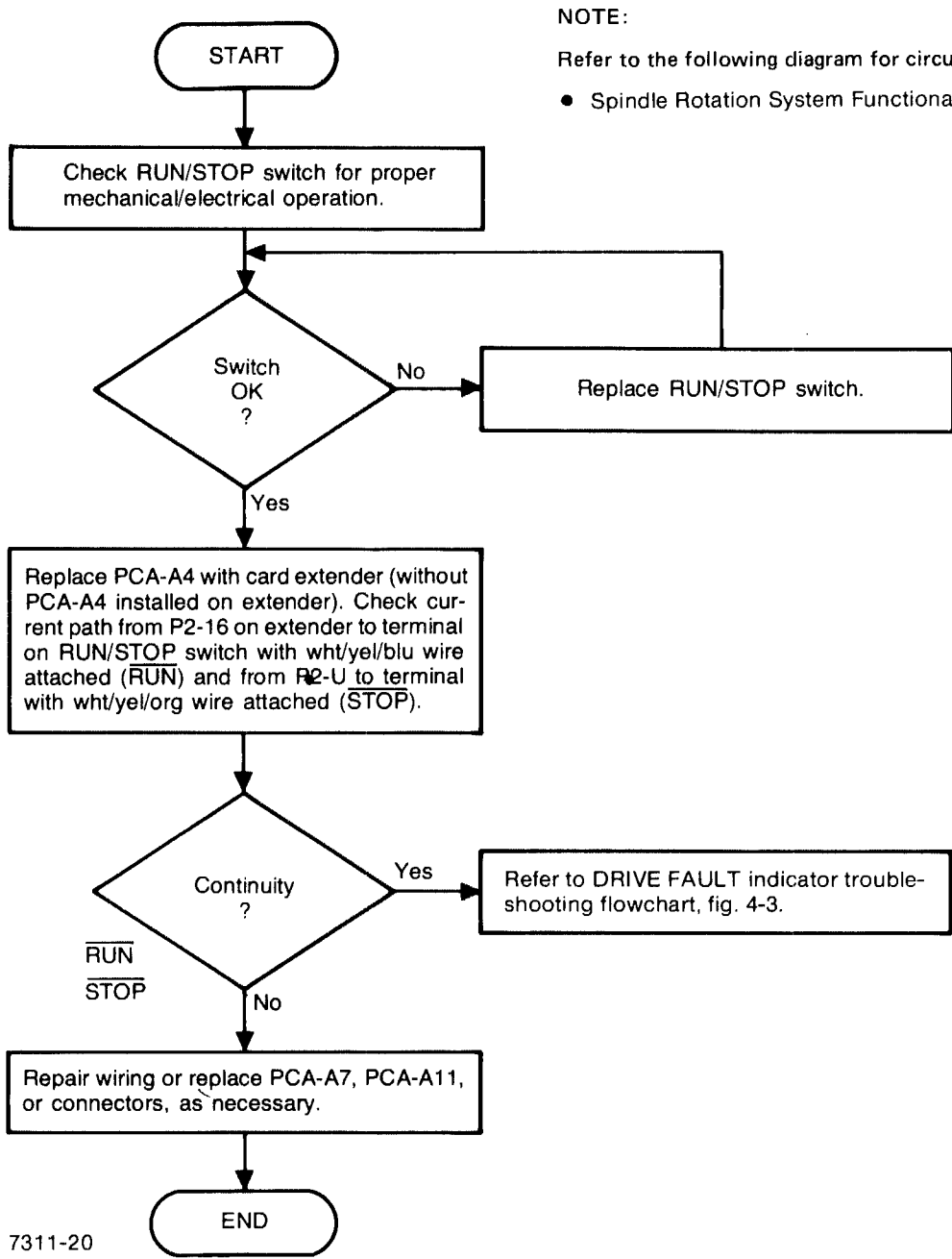
Figure 4-16. READ ONLY Indicator Troubleshooting Flowchart



- NOTES:
1. Refer to the following diagram for circuit details.
    - Head Positioning System Functional Diagram, fig. 4-26.
  2. PCA's associated with DRIVE READY indicator malfunction include:
    - Drive control PCA-A4.
    - Indicator PCA-A11.

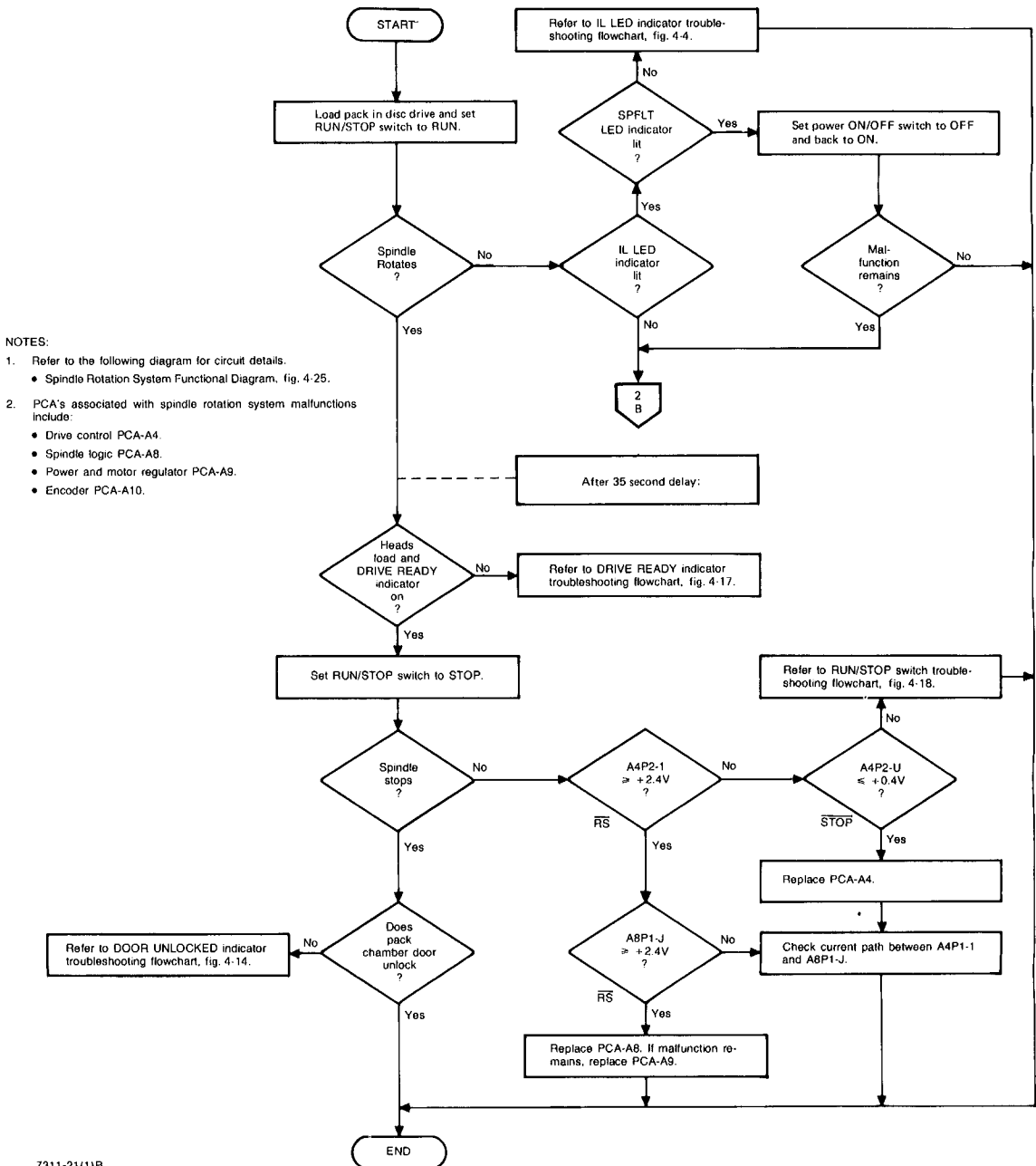
7311-19B

Figure 4 - 17. DRIVE READY Indicator Troubleshooting Flowchart



7311-20

Figure 4 - 18. RUN/STOP Switch Troubleshooting Flowchart

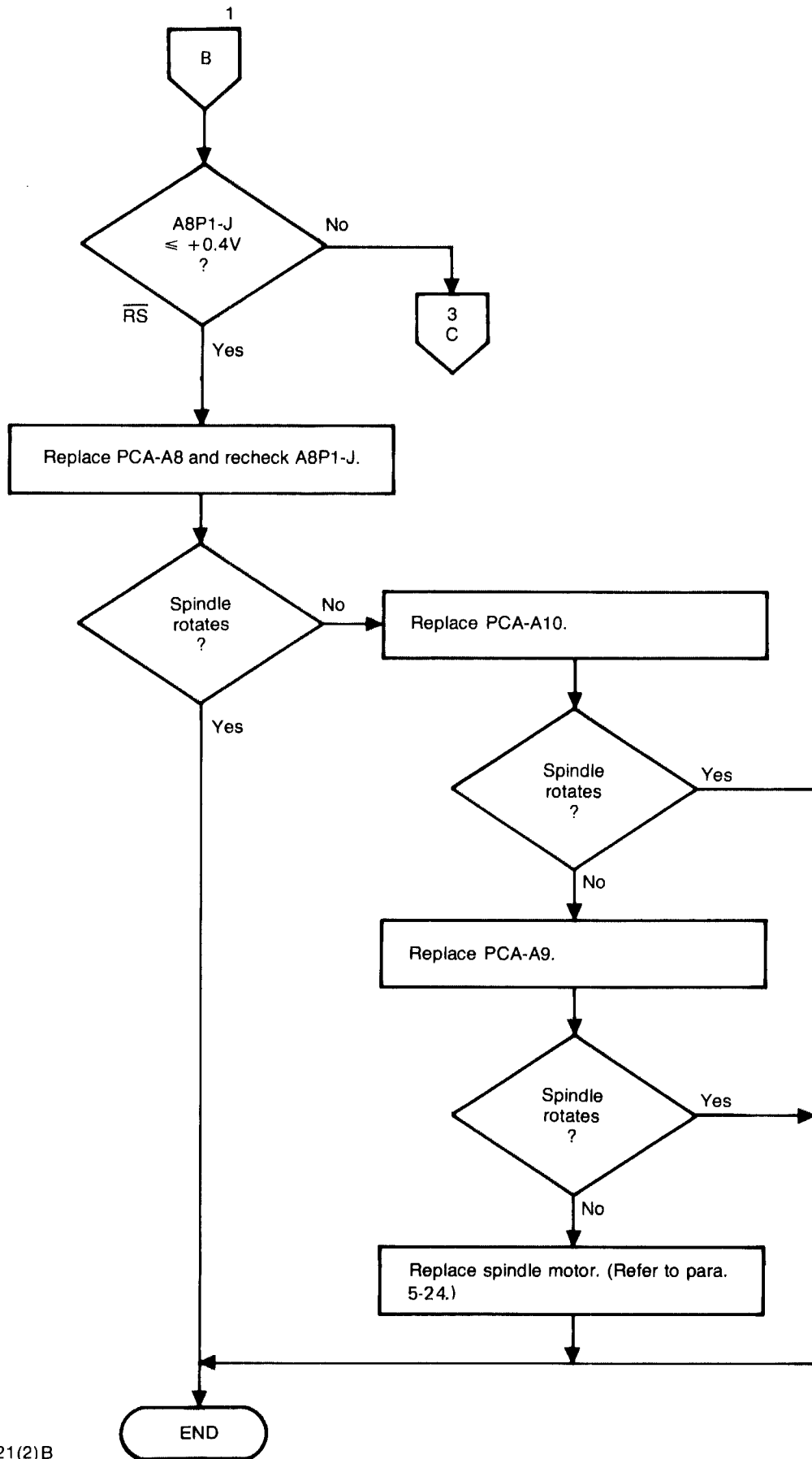


NOTES:

1. Refer to the following diagram for circuit details.
  - Spindle Rotation System Functional Diagram, fig. 4-25.
2. PCA's associated with spindle rotation system malfunctions include:
  - Drive control PCA-A4.
  - Spindle logic PCA-A8.
  - Power and motor regulator PCA-A9.
  - Encoder PCA-A10.

7311-21(1)B

Figure 4-19. Spindle Rotation Troubleshooting Flowchart (sheet 1 of 3)



7311-21(2)B

Figure 4 - 19. Spindle Rotation Troubleshooting Flowchart (sheet 2 of 3)

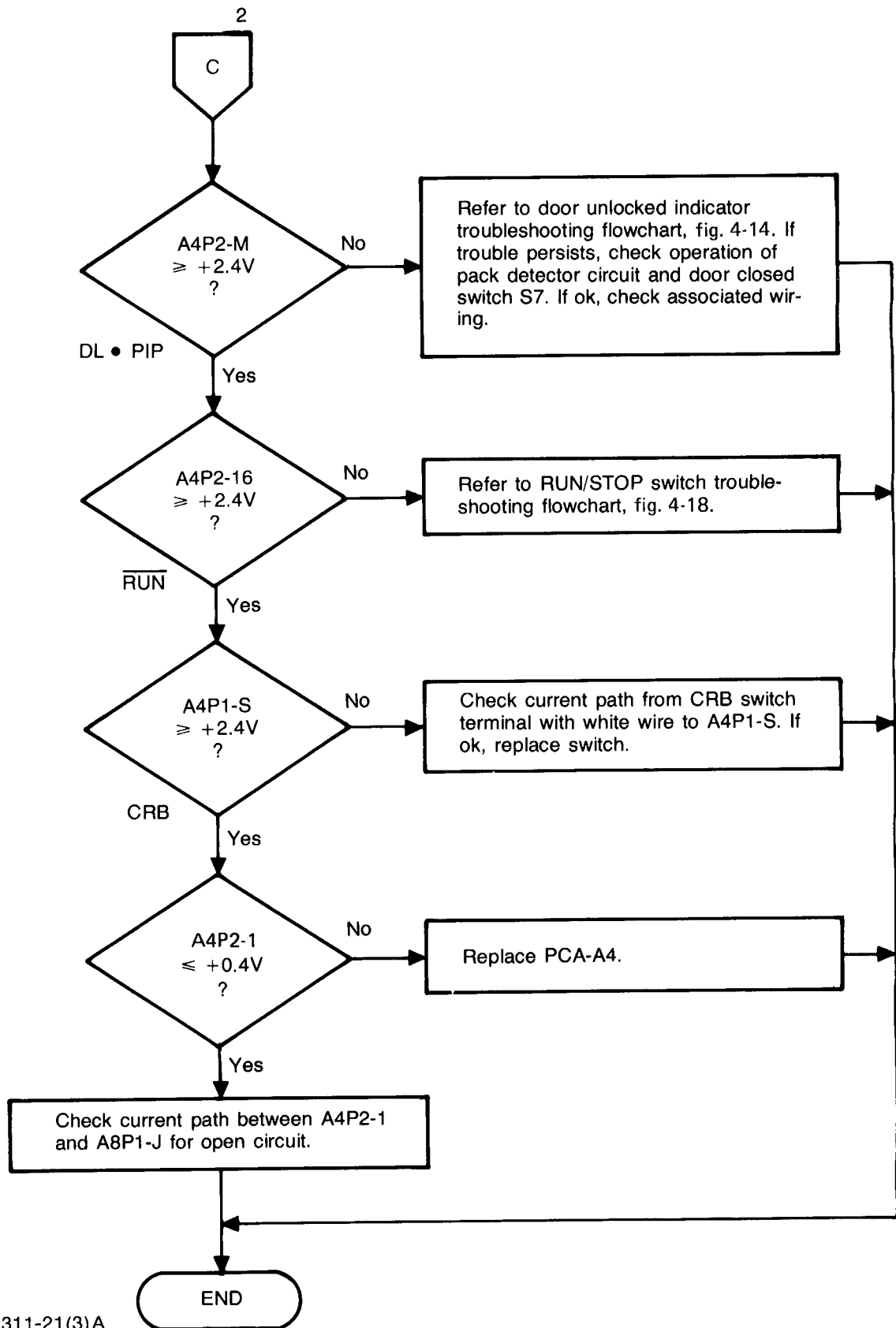
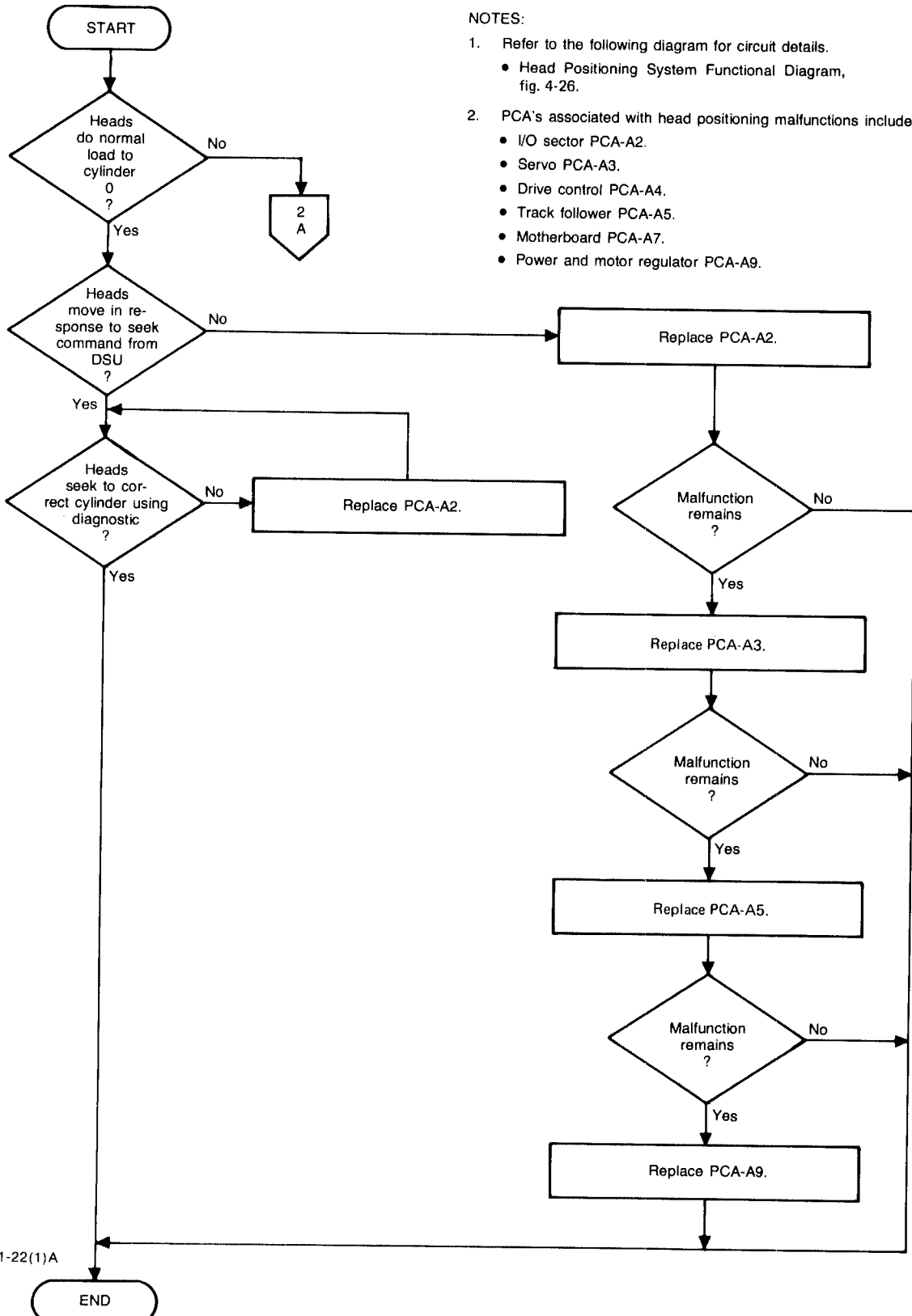


Figure 4 - 19. Spindle Rotation Troubleshooting Flowchart (sheet 3 of 3)



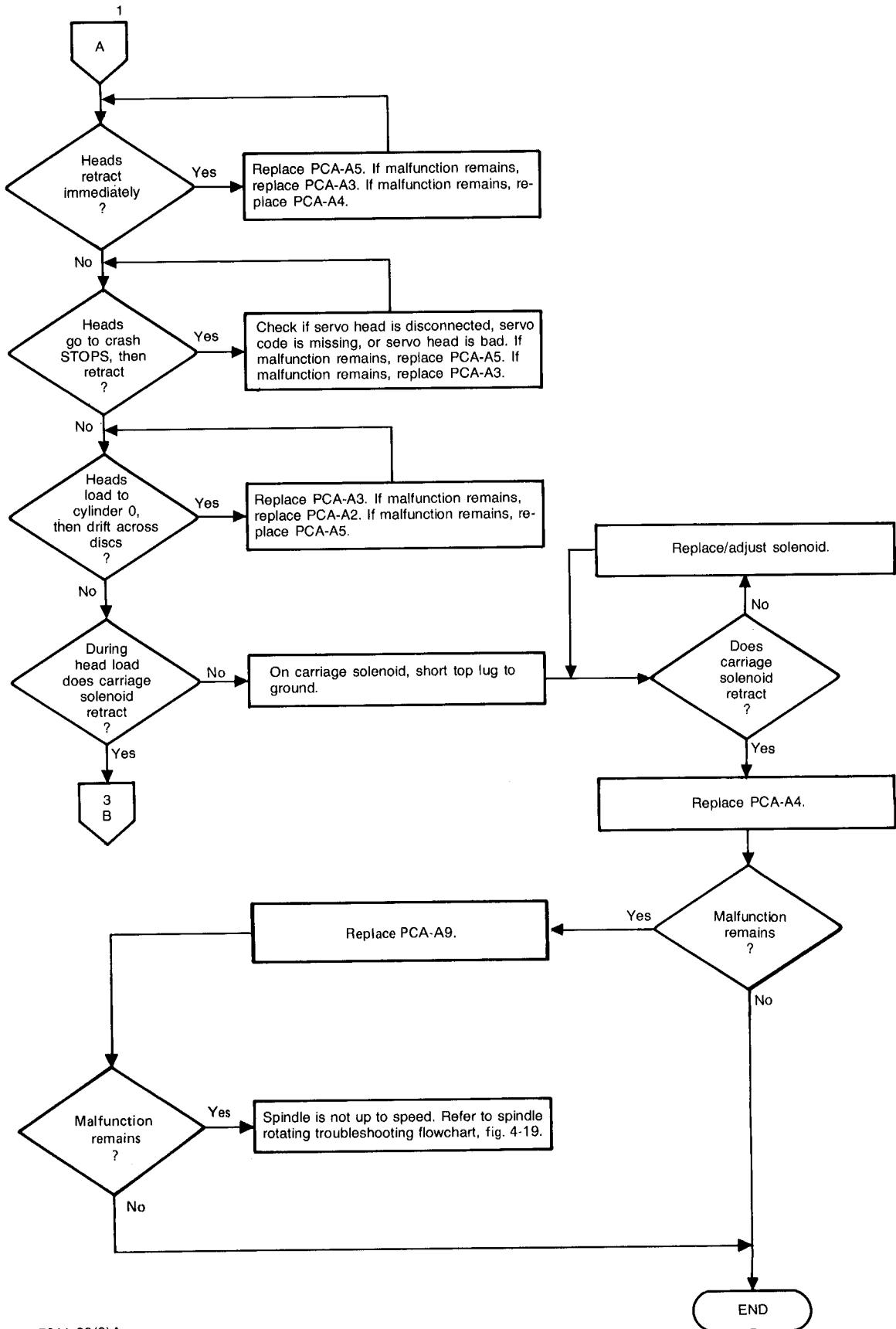


NOTES:

1. Refer to the following diagram for circuit details.
  - Head Positioning System Functional Diagram, fig. 4-26.
2. PCA's associated with head positioning malfunctions include:
  - I/O sector PCA-A2.
  - Servo PCA-A3.
  - Drive control PCA-A4.
  - Track follower PCA-A5.
  - Motherboard PCA-A7.
  - Power and motor regulator PCA-A9.

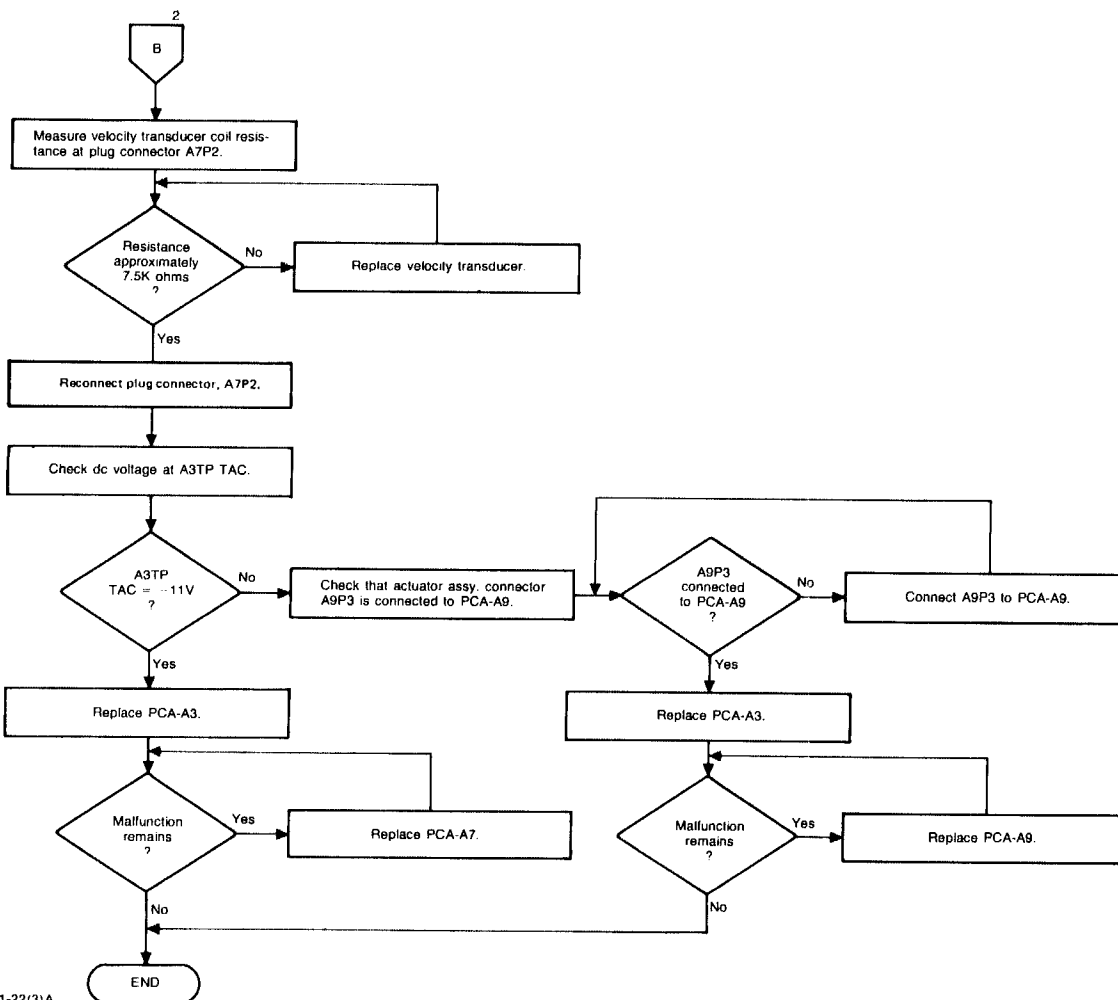
7311-22(1)A

Figure 4-20. Head Positioning Troubleshooting Flowchart (sheet 1 of 3)



7311-22(2)A

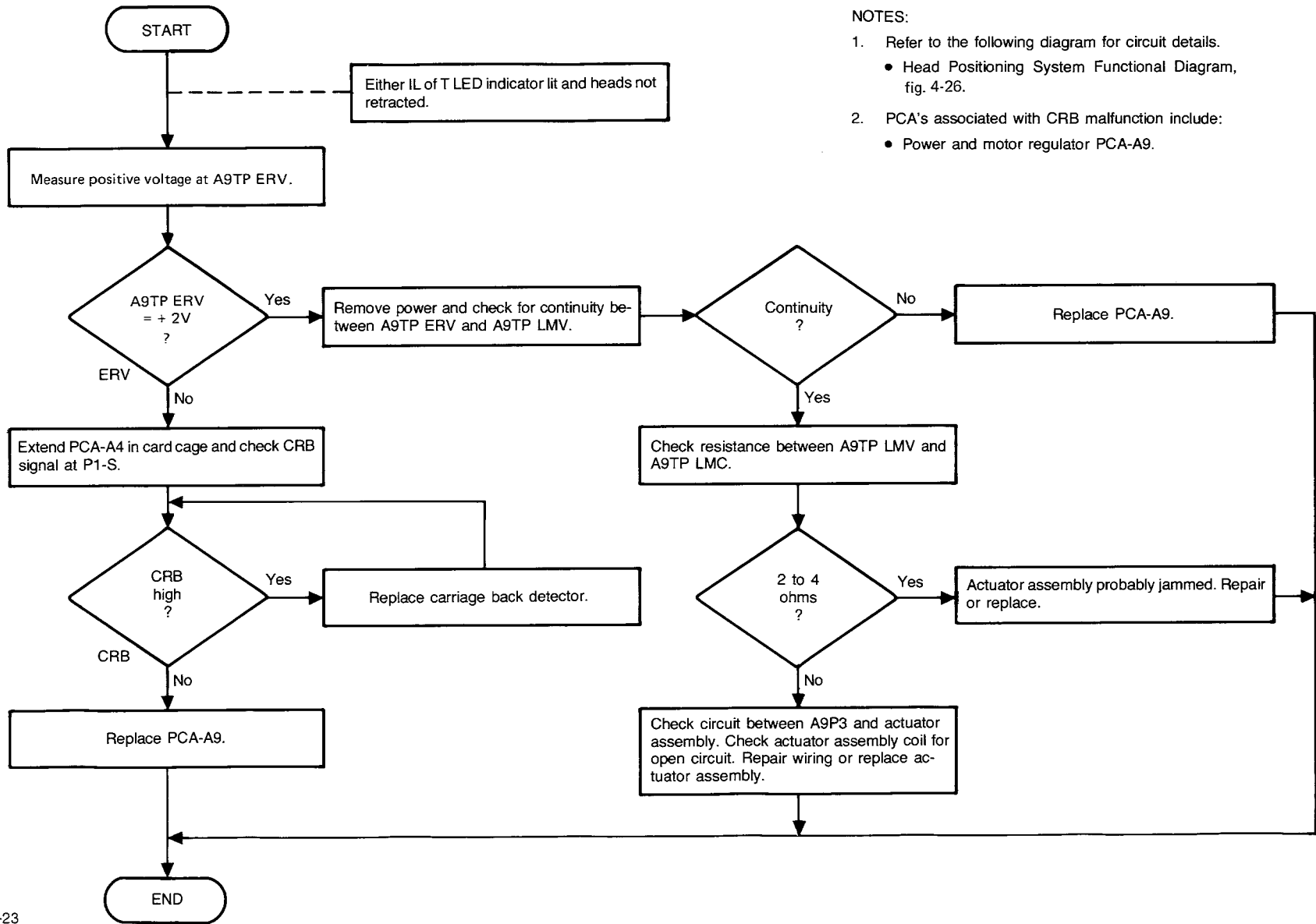
Figure 4-20. Head Positioning Troubleshooting Flowchart (sheet 2 of 3)



7311-22(3)A

Figure 4-20. Head Positioning Troubleshooting Flowchart (sheet 3 of 3)

Figure 4 - 21. Emergency Return (CRB) Troubleshooting Flowchart



NOTES:

1. Refer to the following diagram for circuit details.
  - Head Positioning System Functional Diagram, fig. 4-26.
2. PCA's associated with CRB malfunction include:
  - Power and motor regulator PCA-A9.

## 5-1. INTRODUCTION

Refer to table 5-1 and 5-2 for host run diagnostics information. Refer to Appendix A for "H" model self test information.

Refer to table 5-3 for an explanation of the Request Status Fields.

Table 5-1. System Diagnostics

### HP 1000 M, E, F SERIES

TITLE: HP79XX/13037 Disc Memory Diagnostic

MANUAL P/N: 12962-90001

DIAGNOSTIC MEDIA: 2645 Cartridges (24396-13306)  
7900 Disc (24396-13001)  
7905 Disc (24396-13101)  
7970 B Mag Tape (24396-13501)  
7970 E Mag Tape (24396-13601)

### HP 1000 L SERIES

TITLE: HP 1000 ICD/MAC Disc Diagnostic

MANUAL P/N: 5955-4355

DIAGNOSTIC MEDIA: 2645 Cartridge (24398B #20)  
CS/80 Tape-Linus (24398B #22)  
8 in. Floppy (24398B #41)  
5.25 in. Floppy (24398B #42)  
3.5 in. Floppy (24398B #44)  
7970E Mag Tape (24398B #51)

### HP 9835/9845 DESKTOP

TITLE: DISCO, DISKEY

MANUAL P/N: (Integrated with diagnostic - HELP)

DIAGNOSTIC MEDIA: 9845 Tape Cartridge (98041-90010)

### HP 3000 SERIES III

TITLE: Disc Verifier (SLEUTH, SLEUTH-07)

MANUAL P/N: (Integrated with diagnostic)

DIAGNOSTIC MEDIA: 7970E Mag Tape (32230-90002)

TITLE: WORKOUT2

MANUAL P/N: 30000-90172 (HP 3000 III CE Handbook)

DIAGNOSTIC MEDIA: (On-line, integrated with op system)

TITLE: Colossus

MANUAL P/N: (Integrated with diagnostic - HELP)

DIAGNOSTIC MEDIA: 7970E Mag Tape (35074A)

### HP 250 SERIES

TITLE: Hard Disc Diagnostic

MANUAL P/N: 45000-94000 (CE Handbook)

DIAGNOSTIC MEDIA: CS/80 Tape-Linus (45260-19001)  
8-in. Floppy (45260-18001)

Table 5-2. Status Words for MAC Disc Drives

**Status Word 1**

15	0	Track flagged spare
14	1	Track flagged protect
13	2	Track flagged defective
12	3	Encoded status - - - - -
11	4	Encoded status   Refer to
10	5	Encoded status   table
9	6	Encoded status   5-3
8	7	Encoded status - - - - -
7	8	reserved
6	9	reserved
5	10	reserved
4	11	reserved
3	12	Unit number
2	13	Unit number
1	14	Unit number
0	15	Unit number

**Status Word 2**

15	0	Status word 2 error
14	1	Drive type 000000 = 7906
13	2	Drive type 000001 = 7920
12	3	Drive type 000010 = 7905
		000011 = 7925
11	4	Drive type
10	5	Drive type
9	6	Drive type
8	7	reserved
7	8	Attention required
6	9	Write protected
5	10	Format switch on
4	11	Drive fault
3	12	First status (Heads just loaded over media)
2	13	Seek check Caused by invalid cylinder, head or sector address, or multiple seeks requested
1	14	Drive not ready
0	15	Drive busy

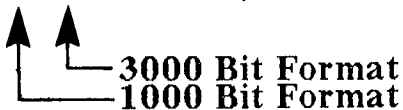


Table 5-3. Request Status Fields

**STATUS 1: CONTROLLER STATUS LAST OPERATION**

- 00 NORMAL COMPLETION. Transmitted in one of two situations:
- When command has been fully executed without error.
  - At completion of a REQUEST STATUS command when it is the first command issued after interface is connected to controller during a polling sequence. In this case, the U field is zero.
- 01 ILLEGAL OPCODE. A command word has been received by the controller of which bits 12-8 contain a command code which is not one of controller's command set.
- 02 UNIT AVAILABLE. Controller transmits this status after interface has put out a WAKEUP command for a specific drive and that drive has become available.
- 07 CYLINDER COMPARE ERROR. During verification of address of sector preceding the address of first sector to be read from or written to, the contents of cylinder address field of that sector do not match contents of controller's cylinder address register. When this status is received, the system should issue a RECALIBRATE command and then retry data transfer sequence. This status is transmitted only after the sequence of events listed below.
- Addresses do not compare as described above.
  - Controller generates a seek-to-address from its cylinder address register and head-sector address register.
  - Controller again attempts to verify a sector.
  - Addresses still do not compare.
  - The S bit is not set at new track address.
- 10 UNCORRECTABLE DATA ERROR. This status is generated by the error correction circuits and is transmitted in one of three cases:
- Immediately following a data transfer (or VERIFY) command if error is uncorrectable.
  - In response to a REQUEST SYNDROME command whenever a Possibly Correctable Data Error has proved uncorrectable.
  - During sector address verification preceding the address of first sector to be read from or written on, the controller cannot read (verify) and of 16 consecutive sectors without error.
- 11 HEAD-SECTOR COMPARE ERROR. Similar to Cylinder Compare Error, including controller's recovery attempt sequence described for that status, except that in this case the head and/or sector address fields of the disc sector do not compare with corresponding fields in the controller's head-sector address register. The system need not issue a RECALIBRATE command when this status is received.
- 12 I/O PROGRAM ERROR. The interface of systems containing a programmable data channel separate from the CPU may detect abnormal channel operations and notify the controller. At that time, controller will interrupt the CPU with this status. An example of such an error might be an inconsistent direction of data transfer (a READ command has been transmitted to controller, but channel has been programmed to write).
- 14 END OF CYLINDER. A multiple-sector data transfer must continue beyond end-of-logical-cylinder, but file mask will not allow controller to automatically seek to next logical cylinder and continue.
- 16 OVERRUN. Detected by interface (read) or controller (write) whenever the instantaneous data rate of controller exceeds that of the CPU-interface combination. The overrun is reported at end-of-sector in which it occurred. The contents of that sector, either on disc (write) or in I/O buffer (read), should be considered invalid.

Note: The controller always transfers complete sectors. If CPU or data channel wishes to transfer less than a complete sector, it must notify interface (or controller) when transfer is complete so that subsequent controller requests for data transfer do not cause an overrun error.



**Table 5 - 3. Request Status Fields (cont)**

- 17 POSSIBLY CORRECTABLE DATA ERROR. This status is generated by the error correction circuits and is transmitted in one of two cases as follows:
- Immediately following a data transfer (or VERIFY) command if error is possibly correctable.
  - In response to a REQUEST SYNDROME command if error is in fact correctable. In this case, proceed as described in REQUEST SYNDROME command.
- 20 ILLEGAL ACCESS TO SPARE TRACK. The same conditions and sequence of events described for a Cylinder Compare error or Head-Sector Compare Error have occurred, except that S bit is set at a new track address. This error usually results from trying to directly access (via a SEEK command) a spare track in active use. The addresses will not compare because of the way in which spare tracks are set up and this status merely differentiates between this situation and other address errors.
- 21 DEFECTIVE TRACK. Detected during verification of track status of the sector preceding the address of the first sector to be read from or written on. Defective track status is issued when the D bit is found to be set but File Mask will not allow automatic seeking to a spare track. This status is also issued if the D bit is set but the spare track address is the same as the defective track address.
- 22 ACCESS NOT READY DURING DATA OPERATION. While in the process of transferring data to or from the disc, the track center detector in the drive detected head motion. The transfer should be retried.
- 23 STATUS 2 ERROR. The controller is unable to complete a command due to some condition in the disc drive. The Status 2 word may be examined for reason. Examples of Status 2 Errors are:
- An Initialize command, but FORMAT switch is off or PROTECT (READ ONLY) switch is on.
  - A SEEK command is issued to a drive which is Not Ready (heads unloaded).
- 26 ATTEMPT TO WRITE ON PROTECTED TRACK. Status detected during verification of track status of the sector preceding the first sector to be written on using a Write command. This status information is issued when the P bit is found to be set and the FORMAT switch is off.
- 27 UNIT UNAVAILABLE. This status is returned whenever the U field of the command word is greater than 7 (octal).
- Note: The interface busy bit is false whenever this status is returned.
- 37 DRIVE ATTENTION. Controller generates an interrupt (issues STINT) to the interface which last accessed the drive which is requesting attention (or to interface 0 if this is the first attention after power-on or hard clear) whenever all of the following occur:
- Drive is requesting attention.
  - Interface does not have a subsequent command pending in its command buffer excepting WAKEUP, which is ignored here.
  - Interface flag INTOK (Interrupt O.K.) is set, thereby allowing attention interrupts.
- Briefly, conditions causing a drive to request attention are the following:
- Seek completion.
  - Drive becomes ready (heads load).
  - Drive becomes not ready (heads unload).
  - Seek check, illegal cylinder address.
  - Drive Fault.
- Refer to the appropriate Disc Drive User's Manual for a more complete description of these conditions.

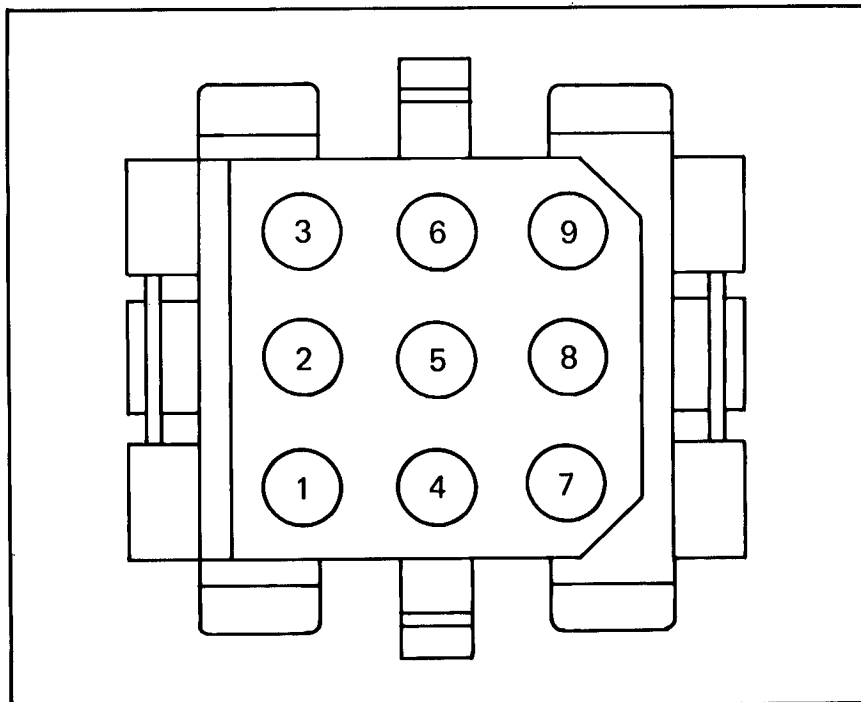
Table 5-3. Request Status Fields (cont)

<b>STATUS 2: STATUS OF DISC DRIVE ADDRESSED BY STATUS COMMAND</b>	
S2	Unit status
	<b>Bit</b>
0*	Drive busy (BS)
1*	Drive not ready (heads not loaded) (NR)
2*	Seek check (SC)
3	First status (FS)
4*	Fault (FLT)
5	Format (FRM)
6	Upper/Lower Protect or Read Only (RO)
7	Attention (ATN)
8	(Reserved)
9-12	Encoded drive type (used by controller to determine last available head and sector) (DRV TYP)
15	Status 2 error (true if any bit marked * is true) (ER)

## 6-1. INTRODUCTION

The adjustment sequence is given below.

<u>Description</u>	<u>Paragraph</u>
Door Unlock Solenoid . . . . .	6-3
Door Closed Switch . . . . .	6-4
Door Locked Switch . . . . .	6-5
Carriage Latch and Detector Assembly . . . . .	6-6
Head Cam Alignment . . . . .	6-7
Velocity Command Gain Adjustment . . . . .	6-8
Head Alignment Procedures	
Circumferential Alignment Check (HP 7925 only) . . . . .	6-9
Servo Head Alignment . . . . .	6-10
Data Head Alignment Check . . . . .	6-11
Data Head Alignment . . . . .	6-12



7311-2:

Figure 6-1. Connector Assembly

## 6-2. ADJUSTMENT

### 6-3. DOOR UNLOCK SOLENOID

- A. Loosen two screws - adjust until latch lever operates freely.

### 6-4. DOOR CLOSED SWITCH

- A. Measure resistance between pins 5 and 6 of connector assembly (see figure 6-1) - Resistance = infinite (switch open).
- B. Close latch lever - Resistance = 0 ohms (switch closed).
- C. Adjust by repositioning switch.

### 6-5. DOOR LOCKED SWITCH

- A. Measure resistance between pins 1 and 2 of connector assembly (see figure 6-1) - Resistance = infinite (switch open).
- B. Close Latch Lever - Resistance = 0 ohms (switch closed).
- C. Adjust by repositioning switch.

### 6-6. CARRIAGE LATCH AND DETECTOR ASSEMBLY

**CAUTION**

To avoid damage to the disc drive, do not move the carriage out more than 1.3 cm (0.5 in.).

- A. Position assembly so carriage-back flag travels through center of photoswitch light path.

### 6-7. HEAD CAM ALIGNMENT

- A. Mount tool on spindle hub, secure with knurled knobs.
- B. If cams do not align with tool pins, loosen four cam screws.
- C. Reposition cams until aligned with tool pins. Tighten four cam screws.

## 6-8. VELOCITY COMMAND GAIN ADJUSTMENT

- A. Measure voltage across terminals 1 and 4 of TB1 (incoming AC).
- B. Verify voltage strapping (refer to table 6-1).
- C. DSU function to 1. Alternate seek from cylinder 0 to 822.
- D. Rotate delay until seek between cylinder 0 and 282 can be differentiated.
- E. DSU digital display - seek time within range specified in table 6-1. Deviation between forward and reverse seek is equal to or less than 3.0 milliseconds.

Table 6-1. Seek Time Ranges

STRAPPING OF THE POWER SUPPLY (Vac)	LINE VOLTAGE (Vac, refer to step b)	HP 7925 SEEK TIME RANGE (milliseconds)	HP 7920 SEEK TIME RANGE (milliseconds)
100	90 to 95	46.0 to 49.0	44.0 to 47.0
	96 to 100	45.5 to 48.5	43.5 to 46.5
	101 to 105	45.0 to 48.0	43.0 to 46.0
120	108 to 110	46.0 to 49.0	44.0 to 47.0
	111 to 115	45.0 to 48.0	43.0 to 46.0
	116 to 120	44.5 to 47.5	42.5 to 45.5
	121 to 126	44.0 to 47.0	42.0 to 45.0
220	198 to 200	46.5 to 49.5	44.5 to 47.5
	201 to 210	45.5 to 48.5	43.5 to 46.5
	211 to 220	45.0 to 48.0	43.0 to 46.0
	221 to 230	44.5 to 47.5	42.2 to 45.5
240	216 to 220	46.0 to 49.0	44.0 to 47.0
	221 to 230	45.0 to 48.0	43.0 to 46.0
	231 to 240	44.5 to 47.5	42.5 to 45.5
	241 to 252	44.0 to 47.0	42.0 to 45.0

Note: The seek time adjustment is set for the best overall operation of the disc drive and this time setting will vary for each disc drive. The best operation of the disc drive does not necessarily mean the shortest seek time. If necessary, adjust VC GAIN potentiometer A3R33 on servo PCA-A3 until the values are within the specified range.

## 6-9. CIRCUMFERENTIAL ALIGNMENT CHECK (HP 7925 ONLY)

Note: DSU must have serial number prefix 1845 or later.

- A. Match disc drive track follower with CE pack label.
- B. For all eight heads, compare digital display from functions 4, 5, 6 to timing label data.
- C. Adjust index delay (IND DEL) potentiometer if any head is out of limits at any function.
- D. Replace head if step C fails.
- E. If head 0 or head 0 and 1 outside limit and head 8 or head 7 and 8 outside opposite limit replace actuator.

## 6-10. SERVO HEAD ALIGNMENT

### **WARNING**

**Do not use any tools on the carriage assembly while the heads are loaded unless the DSU has just performed a function 7 operation and the 5-second DSU head alignment cycle time is completed. This precaution is necessary to prevent the carriage from emergency retracting and damaging tools, or possibly causing injury to personnel.**

- A. Seek to cylinder 822.
- B. Crash stop clearance 0.051 cm (0.02 inches).
- C. If not, align servo head - DSU at function 7.

## 6-11. DATA HEAD ALIGNMENT CHECK

- A. Disc drive - 5 minutes random seek.
- B. FUNCTION 7 - 15 minutes at cylinder 490.
- C. Verify head alignment 0.0; +/- 5 on DSU meter.

## 6-12. DATA HEAD ALIGNMENT

### **CAUTION**

Do not insert the head alignment tool into the servo head adjustment hole, which is the fifth from the top otherwise all data heads will require realignment.

- A. Disc drive at 5 minutes random seek.
- B. Function 7 - 15 minutes at cylinder 490.
- C. Torque heads to 5 inch-pounds.
- D. Adjust head for  $0.0 \pm 1$  on meter.
- E. Torque head to 7.5 inch-pounds.

# PERIPHERALS

SECTION

VII

## 7-1. INTRODUCTION

This section will contain host (as opposed to peripheral) information as it becomes available. --Contributions Welcome--



# REPLACEABLE PARTS

SECTION

VIII

## 8-1. COMMON REPLACEABLE PARTS

### A. Filters

Prefilter	3150-0316
HP 7925 Filter	3150-0340
HP 7920 (with contamination shield)	3150-0340
HP 7920 (without shield)	3150-0276

### B. Switches

Switch (Run/Stop)	3101-1051
Switch (Door Locked, Door Closed)	3102-0009
Photo Switch (Carriage Back detector)	1990-0615

### C. Lamps

Front panel lamp	2140-0537
Front panel LED - red	1990-1030
Front panel LED - yellow	1990-1029

### D. Heads

	HP 7920	HP 7925
Up	07920-60253 (Qty 2)	07925-60253 (Qty 5)
Down	07920-60254 (Qty 3)	07925-60254 (Qty 4)
Servo	07920-60255	07920-60255

### E. Miscellaneous

Velocity Transducer	07905-60046
Carriage Latch Solenoid	07920-60017
Door Unlock Solenoid	0491-0079
Cables	Refer to table 2-6
Fuses	Refer to table 2-8, 2-9

## 8-2. RECOMMENDED SPARES AND TOOLS

Table 8-1 gives a list of recommended spare parts. Table 8-2 provides the recommended Tools/Kit Listing.

Table 8-1. Recommended Spare Parts

Item	Part Number	Qty
Solenoid	0491-0079	1
Solenoid	0491-0093	1
Jumper Plug	1258-0124	4
Door Latch	1390-0685	2
Rectifier 400 V	1901-0028	2
LED Interrupt Switch	1900-0615	1
Fuse 1.5A Normal Blow	2100-0043	5
Fuse 4A Normal Blow	2110-0055	5
Fuse 8A Normal Blow	2110-0342	5
Fuse 4A Slow Blow	2110-0365	5
Fuse 8A 250 V Slow Blow	2110-0383	10
Fuse 1A 125 V	2110-0516	5
Lamp 14 V	2140-0537	6
Switch Rotary	3100-1700	1
Switch SL DPDT	3101-0070	1
Switch TGL SPDT	3101-1051	1
Switch Sen SPDD	3102-0009	2
Terminator PCA	07905-60039	1
Velocity Transducer Assembly	07905-60046	1
Track Follower PCA(HP 7920 only)	07920-60004	1
Encoder PCA	07920-60009	1
Indicator PCA	07920-60011	1
Fault Indicator Assembly	07920-60030	1
Spindle Logic PCA(HP 7920 only)	07920-60031	1
Head Assembly-up(HP 7920 only)	07920-60032	1
Head Assembly-down(HP 7920 only)	07920-60033	1
Data Coupler Assembly	07920-60037	1
Fault Cable Assembly	07920-60048	1
Door Lock Assembly	07920-60054	1
Data Cable Assembly	07920-60096	1
Preamplifier PCA(HP 7920 only)	07920-60106	1
Servo Head	07920-60114	1
Servo PCA	07920-60183	1
I/O Sector	07925-60001	1
Control Assembly	07925-60002	1
Motherboard PCA	07925-60008	1
PMR PCA	07925-60010	1
Spindle Logic PCA(HP 7925 only)	07925-60031	1
Head Assembly-up(HP 7925 only)	07925-60032	2
Head Assembly-down(HP 7925 only)	07925-60033	2
Pack Detector Assembly	07925-60079	1
Track Follower PCA	07925-60105	1
Preamplifier PCA	07925-60106	1
Velocity Shaft Assembly	07930-60226	4
Data PCA ("H" models)	13365-60101	1
Microprocessor PCA("H" models)	13365-60202	1

Table 8-2. Tools Kit

Item	Part Number	Qty
Thermometer Assembly	07925-60009	1
Service Manual (HP 7925 A/B)	07925-90903	1
Service Manual (HP 7925 D)	07925-90913	1
Operating and Service Manual (HP 7920A)	07920-90001	1
Service Manual (HP 7920B)	07920-90902	1
Service Manual (HP 7920 D)	07920-90913	1
Head Adjustment Tool	13354-20007	1
Head Initial Position Tool	13354-20008	1
Head Installation Tool	13354-20009	1
Head Cam Alignment Tool	13354-60001	1
Spindle Logic Extender Board	13354-60002	1
Extender Board	13354-60003	1
DSU Test Module	13354-60005	1
Head Alignment PCA(HP 7920 only)	13354-60010	1
Fault Indicator Service Adaptor	13354-60014	1
Head Loading Tool	13354-60023	1
Cable Assembly	13354-60025	1
Head Alignment PCA(HP 7925 only)	13354-60110	1
Pressure Gauge	0101-0374	1
3/32" Bit	1535-2652	1
Torque Wrench	1535-2653	1
Posidrive Bit	8710-0915	1
Torque Wrench	8710-1007	1
Extension Bar	8710-1132	1
Hex Head Driver	8710-1145	1
Head Cleaning Tool	07900-00091	1
Lubrication Applicator	07920-20086	1
I/O Sector PCA	07925-60001	1

**9-1. INTRODUCTION**

Figures 9-1 through 9-11 are provided for reference.

**WARNING**

**TO AVOID PERSONAL INJURY, DISCONNECT THE POWER CORD FROM THE POWER SOURCE BEFORE CHANGING A STRAPPING CONFIGURATION.**

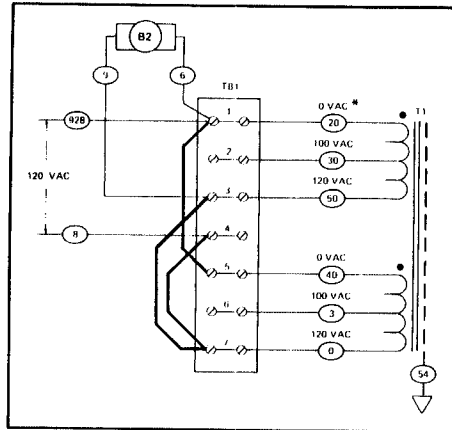
IF YOUR DISC DRIVE IS CONFIGURED FOR 120 VAC, THE REVERSIBLE WIRING CONFIGURATION LABEL WILL READ AS FOLLOWS, DEPENDING ON THE TYPE OF DISC DRIVE:

7920S ~ LINE  
120V +5 -10%  
475 WATTS TYP  
5.2A TYP  
47.5 - 66 Hz

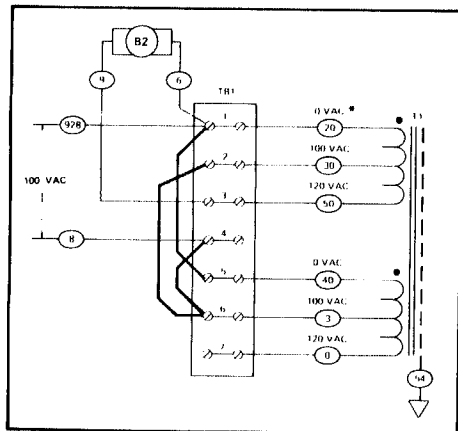
7920M ~ LINE  
120V +5 -10%  
700 WATTS TYP  
6.0A TYP  
47.5 - 66 Hz

(PART NO. 5090-0101) (PART NO. 5090-0561)

AND TERMINAL BOARD TB1 IS STRAPPED LIKE THIS.



TO CHANGE OPERATING VOLTAGES FROM 120 VAC TO 100 VAC, FIRST REMOVE THE WIRING CONFIGURATION LABEL. THEN STRAP TERMINAL BOARD TB1 AS SHOWN.



THEN

REVERSE AND REPLACE THE LABEL, ENSURING THAT IT READS LIKE ONE OF THESE, DEPENDING ON THE TYPE OF DISC DRIVE.

7920S ~ LINE  
100V +5 -10%  
460 WATTS TYP  
6.0A TYP  
47.5 - 66 Hz

7920M ~ LINE  
100V +5 -10%  
680 WATTS TYP  
7.2A TYP  
47.5 - 66 Hz

(PART NO. 5090-0101) (PART NO. 5090-0561)

NOTE: ENCIRCLED NUMBERS INDICATE WIRING COLOR CODE AS FOLLOWS



COLOR	1 <sup>ST</sup> DIGIT A	2 <sup>ND</sup> DIGIT B	3 <sup>RD</sup> DIGIT C
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GREY	8	8	8
WHITE	9	9	9

**IMPORTANT NOTICE**

IF THE DISC DRIVE IS CONVERTED FROM A 7920S TO A 7920M OR VICE VERSA, ORDER A NEW WIRING CONFIGURATION LABEL AND INSTALL IT ON THE ENCLOSURE AS SHOWN IN FIGURE 4.

\* THIS POINT IS NOT AT ZERO POTENTIAL WITH RESPECT TO THE CABINET. THIS POINT IS AT ZERO POTENTIAL WITH RESPECT TO WIRE 928.

Figure 9-1. HP 7920 Strapping Configurations for 120/100 Vac

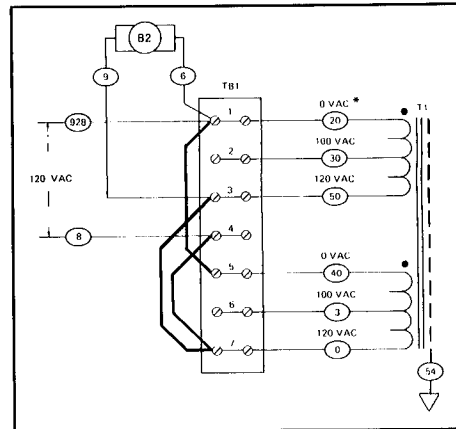
**WARNING**

**TO AVOID PERSONAL INJURY, DISCONNECT THE POWER CORD FROM THE POWER SOURCE BEFORE CHANGING A STRAPPING CONFIGURATION.**

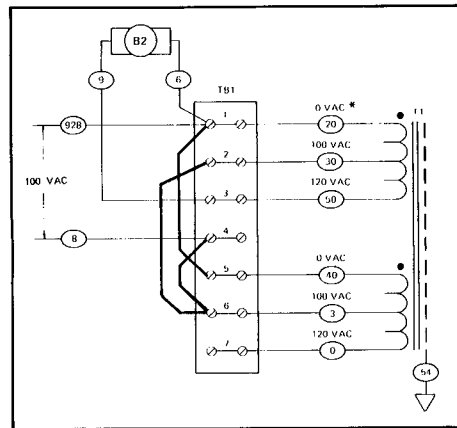
IF YOUR DISC DRIVE IS CONFIGURED FOR 120 VAC, THE REVERSIBLE WIRING CONFIGURATION LABEL WILL READ AS FOLLOWS, DEPENDING ON THE TYPE OF DISC DRIVE:

<p>7925S ~LINE 120V +5 -10% 340 WATTS TYP 4.0A TYP 47.5-66 Hz</p>	<p>7925M ~LINE 120V +5 -10% 665 WATTS TYP 6.6A TYP 47.5-66 Hz</p>
(PART NO. 07925-00007)	(PART NO. 07925-00009)

AND TERMINAL BOARD TB1 IS STRAPPED LIKE THIS.



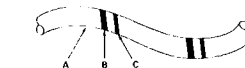
TO CHANGE OPERATING VOLTAGES FROM 120 VAC TO 100 VAC, FIRST REMOVE THE WIRING CONFIGURATION LABEL. THEN STRAP TERMINAL BOARD TB1 AS SHOWN.



THEN REVERSE AND REPLACE THE LABEL, ENSURING THAT IT READS LIKE ONE OF THESE, DEPENDING ON THE TYPE OF DISC DRIVE.

<p>7925S ~LINE 100V +5 -10% 325 WATTS TYP 4.6A TYP 47.5-66 Hz</p>	<p>7925M ~LINE 100V +5 -10% 655 WATTS TYP 7.8A TYP 47.5-66 Hz</p>
(PART NO. 07925-00007)	(PART NO. 07925-00009)

NOTE: ENCIRCLED NUMBERS INDICATE WIRING COLOR CODE AS FOLLOWS



COLOR	1ST DIGIT A	2ND DIGIT B	3RD DIGIT C
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GREY	8	8	8
WHITE	9	9	9

**IMPORTANT NOTICE**

IF THE DISC DRIVE IS CONVERTED FROM A 7925S TO A 7925M OR VICE VERSA, ORDER A NEW WIRING CONFIGURATION LABEL AND INSTALL IT ON THE ENCLOSURE AS SHOWN IN FIGURE 4.

\* THIS POINT IS NOT AT ZERO POTENTIAL WITH RESPECT TO THE CABINET. THIS POINT IS AT ZERO POTENTIAL WITH RESPECT TO WIRE 928.

Figure 9-2. HP 7925 Strapping Configurations for 120/100 Vac

**WARNING**

**TO AVOID PERSONAL INJURY, DISCONNECT THE POWER CORD FROM THE POWER SOURCE BEFORE CHANGING A STRAPPING CONFIGURATION.**

IF YOUR DISC DRIVE IS CONFIGURED FOR 240 VAC, THE REVERSIBLE WIRING CONFIGURATION LABEL WILL READ AS FOLLOWS, DEPENDING ON THE TYPE OF DISC DRIVE:

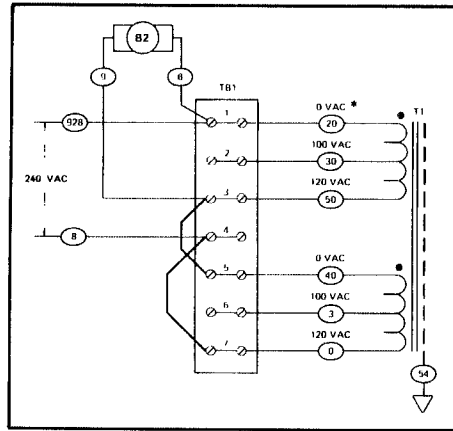
~ LINE  
7920S 240V~ 50 Hz  
470 WATTS TYP 2.8A TYP  
OPERATING RANGE  
216V~ -252V~ 47.5 - 66 Hz

(PART NO. 5090-0102)

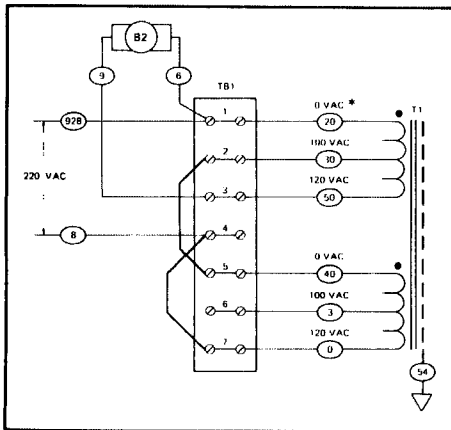
~ LINE  
7920M 240V~ 50 Hz  
710 WATTS TYP 3.9A TYP  
OPERATING RANGE  
216V~ -252V~ 47.5 - 66 Hz

(PART NO. 5090-0562)

AND TERMINAL BOARD TB1 IS STRAPPED LIKE THIS.



TO CHANGE OPERATING VOLTAGES FROM 240 VAC TO 220 VAC, FIRST REMOVE THE WIRING CONFIGURATION LABEL. THEN STRAP TERMINAL BOARD TB1 AS SHOWN.



THEN

REVERSE AND REPLACE THE LABEL, ENSURING THAT IT READS LIKE ONE OF THESE, DEPENDING ON THE TYPE OF DISC DRIVE.

~ LINE  
7920S 220V~ 50 Hz  
460 WATTS TYP 2.9A TYP  
OPERATING RANGE  
198V~ -231V 47.5 - 66 Hz

(PART NO. 5090-0102)

~ LINE  
7920M 220V~ 50 Hz  
700 WATTS TYP 4.3A TYP  
OPERATING RANGE  
198V~ -231V 47.5 - 66 Hz

(PART NO. 5090-0562)

NOTE ENCIRCLED NUMBERS INDICATE WIRING COLOR CODE AS FOLLOWS



COLOR	1ST DIGIT A	2ND DIGIT B	3RD DIGIT C
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GREY	8	8	8
WHITE	9	9	9

**IMPORTANT NOTICE**

IF THE DISC DRIVE IS CONVERTED FROM A 7920S TO A 7920M OR VICE VERSA, ORDER A NEW WIRING CONFIGURATION LABEL AND INSTALL IT ON THE ENCLOSURE AS SHOWN IN FIGURE 4.

\* THIS POINT IS NOT AT ZERO POTENTIAL WITH RESPECT TO THE CABINET. THIS POINT IS AT ZERO POTENTIAL WITH RESPECT TO WIRE 928.

Figure 9-3. HP 7920 Strapping Configurations for 240/220 Vac

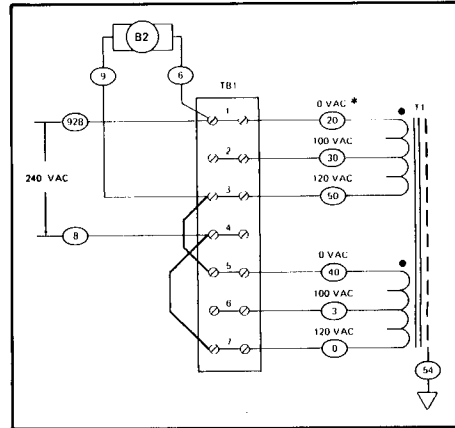
**WARNING**

**TO AVOID PERSONAL INJURY, DISCONNECT THE POWER CORD FROM THE POWER SOURCE BEFORE CHANGING A STRAPPING CONFIGURATION.**

IF YOUR DISC DRIVE IS CONFIGURED FOR 240 VAC, THE REVERSIBLE WIRING CONFIGURATION LABEL WILL READ AS FOLLOWS, DEPENDING ON THE TYPE OF DISC DRIVE:

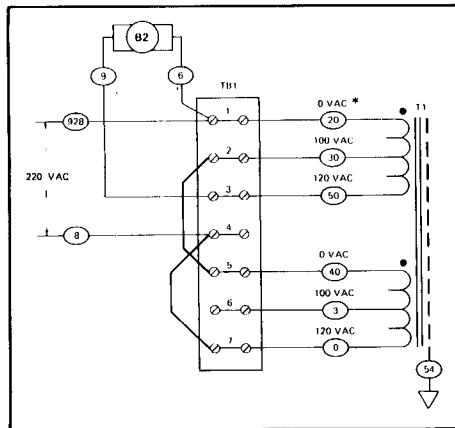
~LINE  
7925S 240V~ 50 Hz  
345 WATTS TYP 2.1A TYP  
OPERATING RANGE  
216V~ -252V~ 47.5 - 66 Hz  
(PART NO. 07925-00008)

~LINE  
7925M 240V~ 50 Hz  
675 WATTS TYP 3.5A TYP  
OPERATING RANGE  
216V~ -252V~ 47.5 - 66 Hz  
(PART NO. 07925-00010)



AND TERMINAL BOARD TB1 IS STRAPPED LIKE THIS.

TO CHANGE OPERATING VOLTAGES FROM 240 VAC TO 220 VAC, FIRST REMOVE THE WIRING CONFIGURATION LABEL. THEN STRAP TERMINAL BOARD TB1 AS SHOWN.



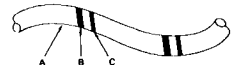
THEN

REVERSE AND REPLACE THE LABEL, ENSURING THAT IT READS LIKE ONE OF THESE, DEPENDING ON THE TYPE OF DISC DRIVE.

~LINE  
7925S 220V~ 50 Hz  
340 WATTS TYP 2.2A TYP  
OPERATING RANGE  
198V~ -231V~ 47.5 - 66 Hz  
(PART NO. 07925-00008)

~LINE  
7925M 220V~ 50 Hz  
670 WATTS TYP 3.8A TYP  
OPERATING RANGE  
198V~ -231V~ 47.5 - 66 Hz  
(PART NO. 07925-00010)

NOTE: ENCIRCLED NUMBERS INDICATE WIRING COLOR CODE AS FOLLOWS



COLOR	1ST DIGIT A	2ND DIGIT B	3RD DIGIT C
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GREY	8	8	8
WHITE	9	9	9

**IMPORTANT NOTICE**

IF THE DISC DRIVE IS CONVERTED FROM A 7925S TO A 7925M OR VICE VERSA, ORDER A NEW WIRING CONFIGURATION LABEL AND INSTALL IT ON THE ENCLOSURE AS SHOWN IN FIGURE 4.

\* THIS POINT IS NOT AT ZERO POTENTIAL WITH RESPECT TO THE CABINET. THIS POINT IS AT ZERO POTENTIAL WITH RESPECT TO WIRE 928.

Figure 9-4. HP 7925 Strapping Configurations for 240/220 Vac



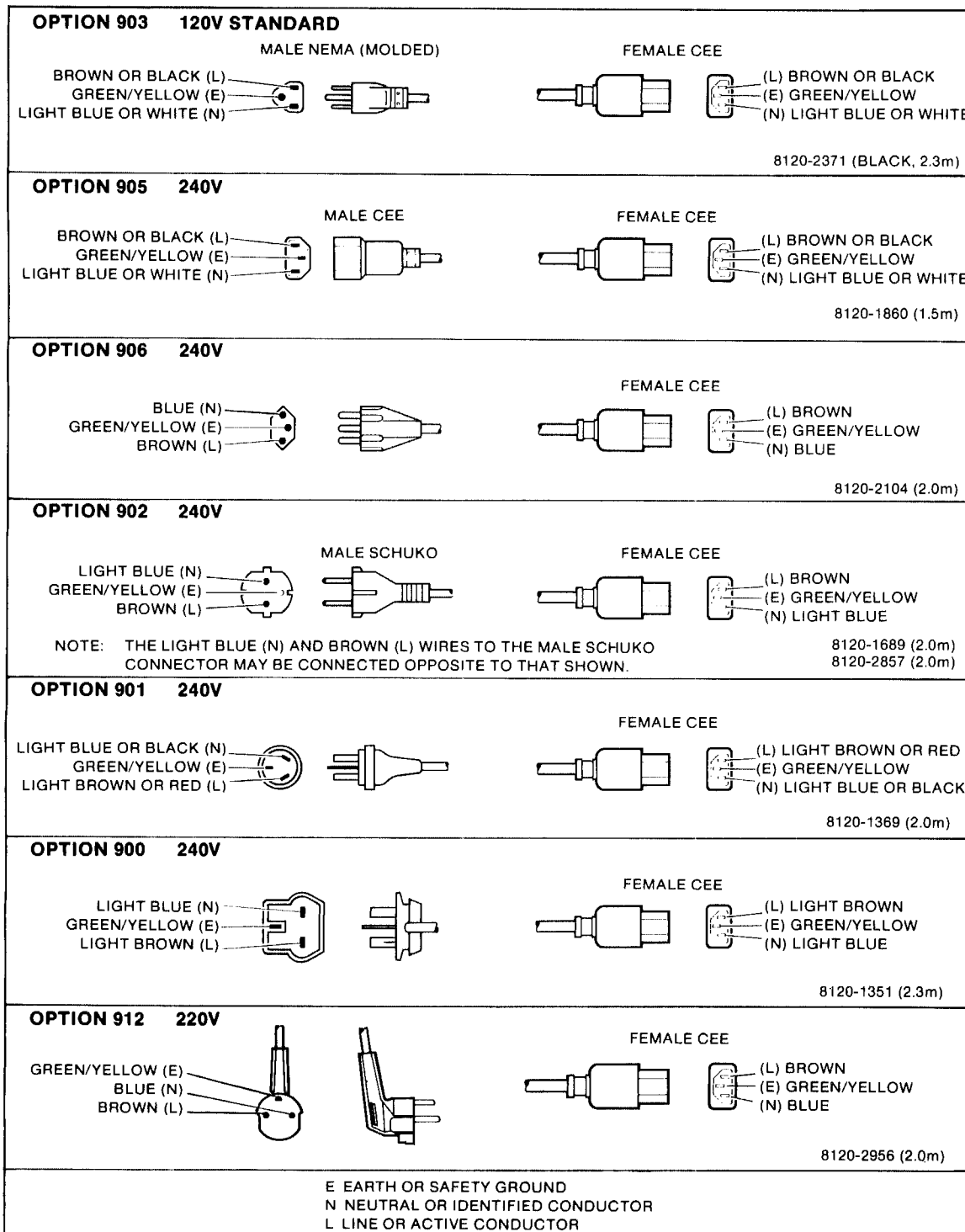


Figure 9-5. AC Power Cord Sets

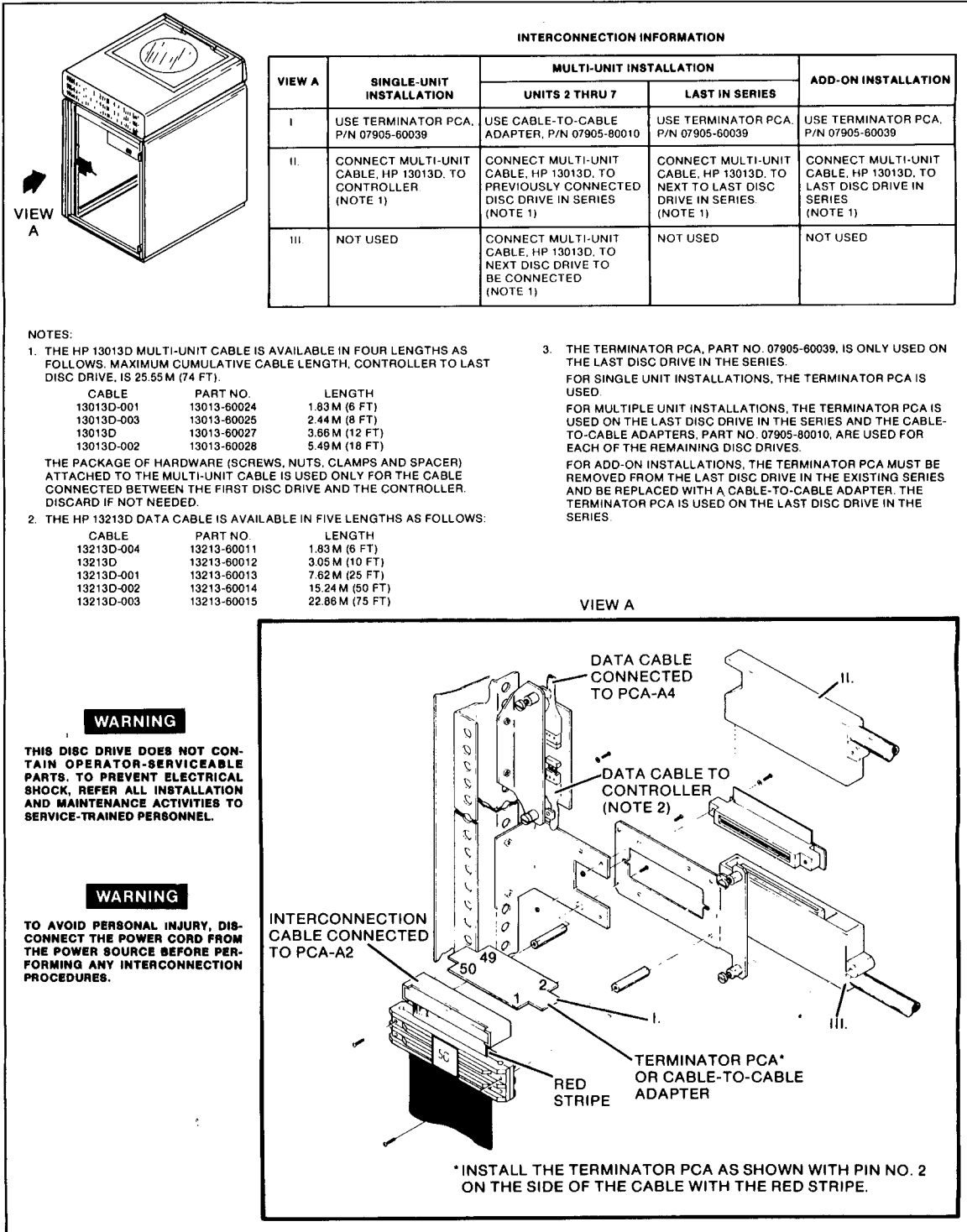


Figure 9-6. Disc Drive Interconnect Diagram

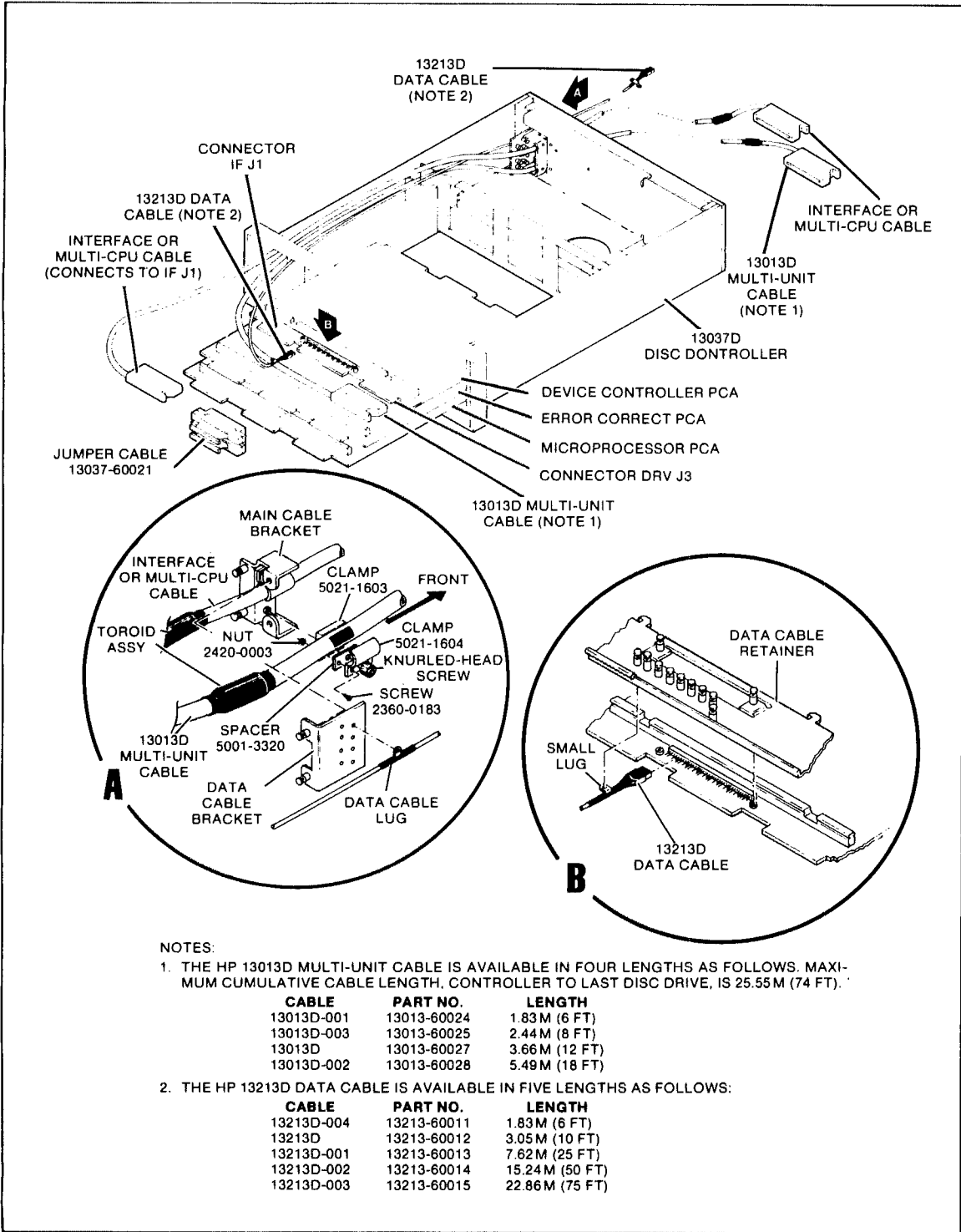


Figure 9-7. Disc Drive to Controller Interconnect Diagram

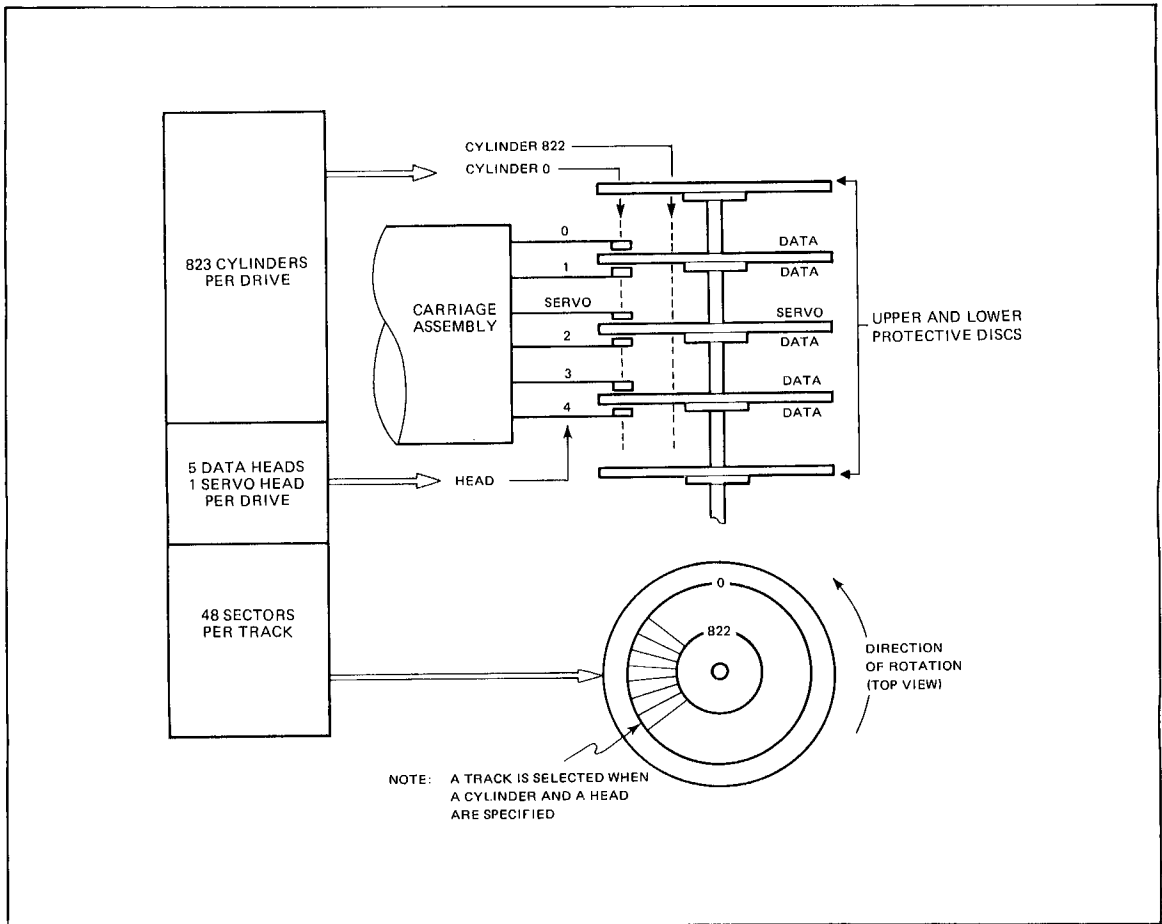


Figure 9-8. HP 7920 Addressing Structure

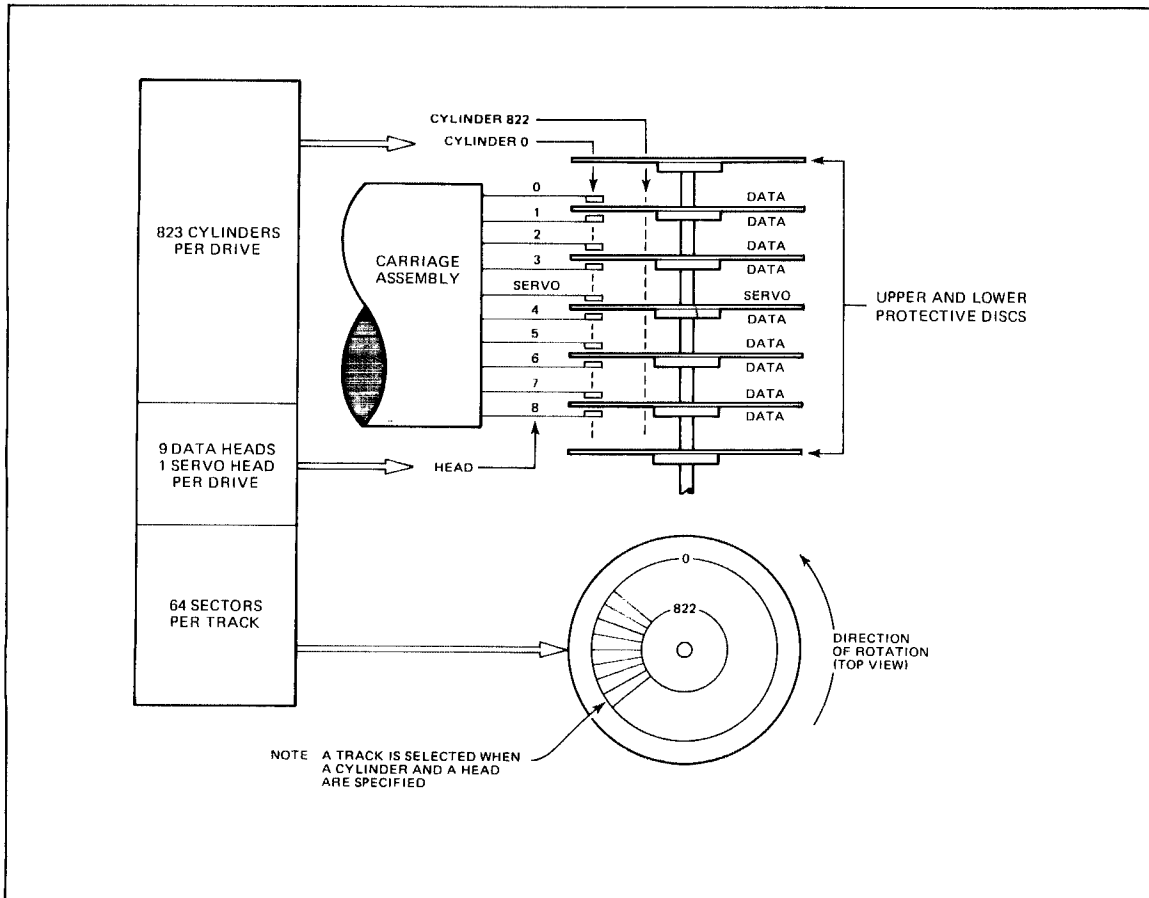


Figure 9-9. HP 7925 Addressing Structure

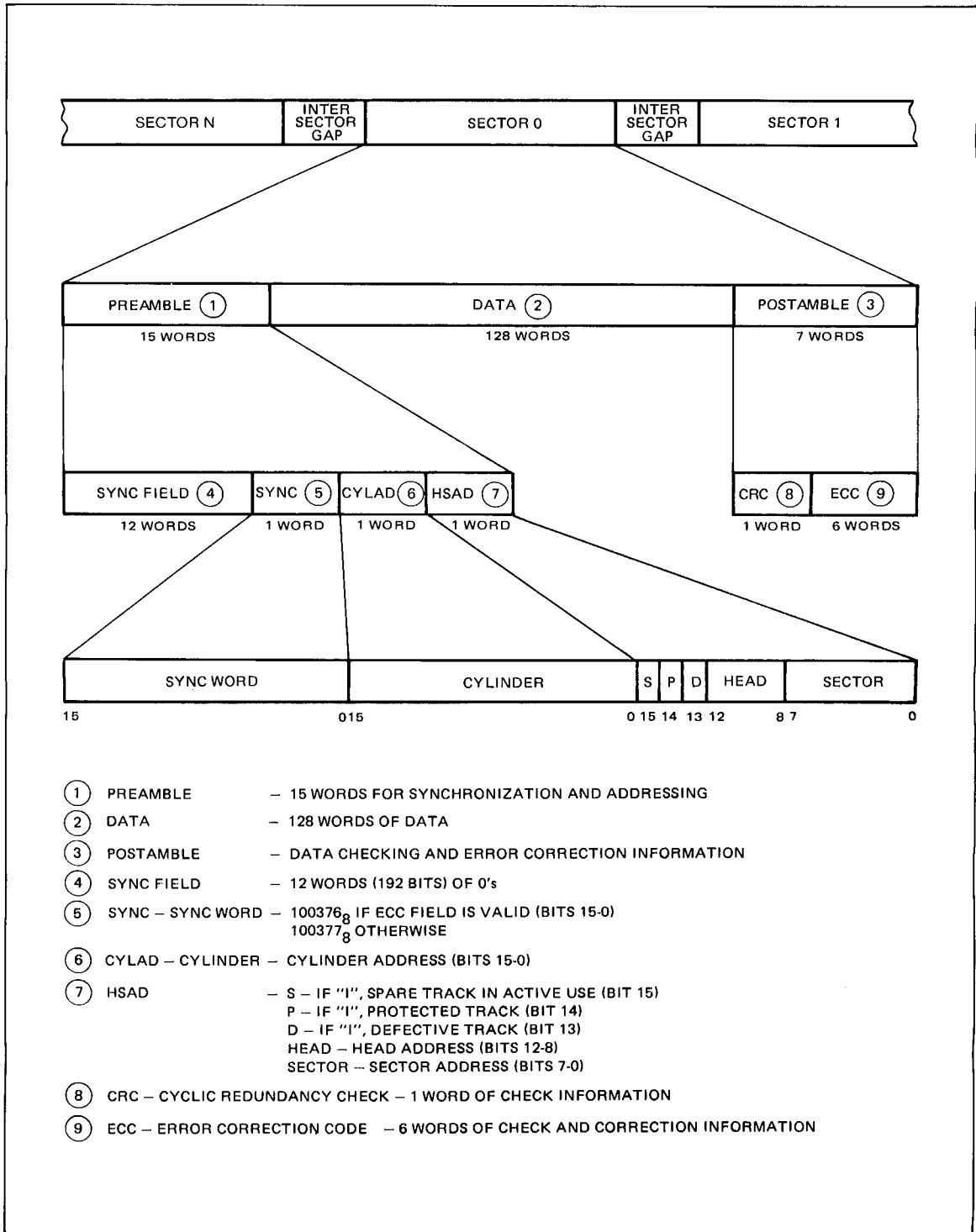


Figure 9-10. Sector Format

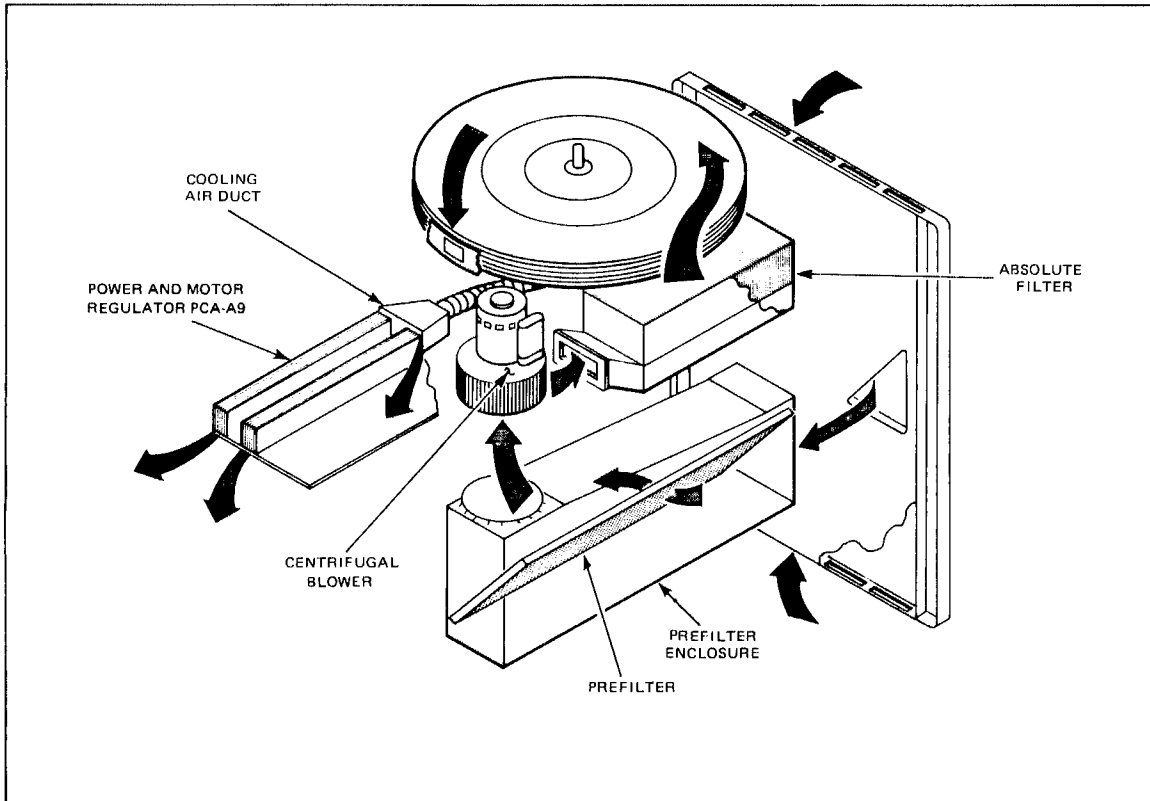


Figure 9-11. Air Circulation and Filtration System

# REFERENCE

SECTION

X

## 10-1. FUNCTIONAL DIAGRAMS

See figures 10-1 through 10-10 for the functional diagrams of the disc drives.

## 10-2. MNEMONICS AND ABBREVIATIONS

Note: Certain mnemonics require a "Not" function bar ( $\bar{\quad}$ ). This function is indicated by a "Not" in the name.

Mnemonic	Name	Mnemonic	Name
$\overline{\text{ACRY}}$	"Not" Access Ready	$\overline{\text{CBFL}}$	"Not" Carriage Back Fault LED
ACW	AC Write (Current Sense)	CBS	Carriage Back Supply
AGC	Automatic Gain Control	$\overline{\text{CBUS0}}$	"Not" Control Bus Bit 0
$\overline{\text{AGCF}}$	"Not" AGC Fault	$\overline{\text{CBUS1}}$	"Not" Control Bus Bit 1
$\overline{\text{AGFL}}$	"Not" AGC Fault LED	$\overline{\text{CBUS2}}$	"Not" Control Bus Bit 2
ATT	Attention	$\overline{\text{CBUS3}}$	"Not" Control Bus Bit 3
BHS0	Buffered Head Select Bit 0	$\overline{\text{CBUS4}}$	"Not" Control Bus Bit 4
BHS1	Buffered Head Select Bit 1	$\overline{\text{CBUS5}}$	"Not" Control Bus Bit 5
BHS2	Buffered Head Select Bit 2	$\overline{\text{CBUS6}}$	"Not" Control Bus Bit 6
BHS3	Buffered Head Select Bit 3		



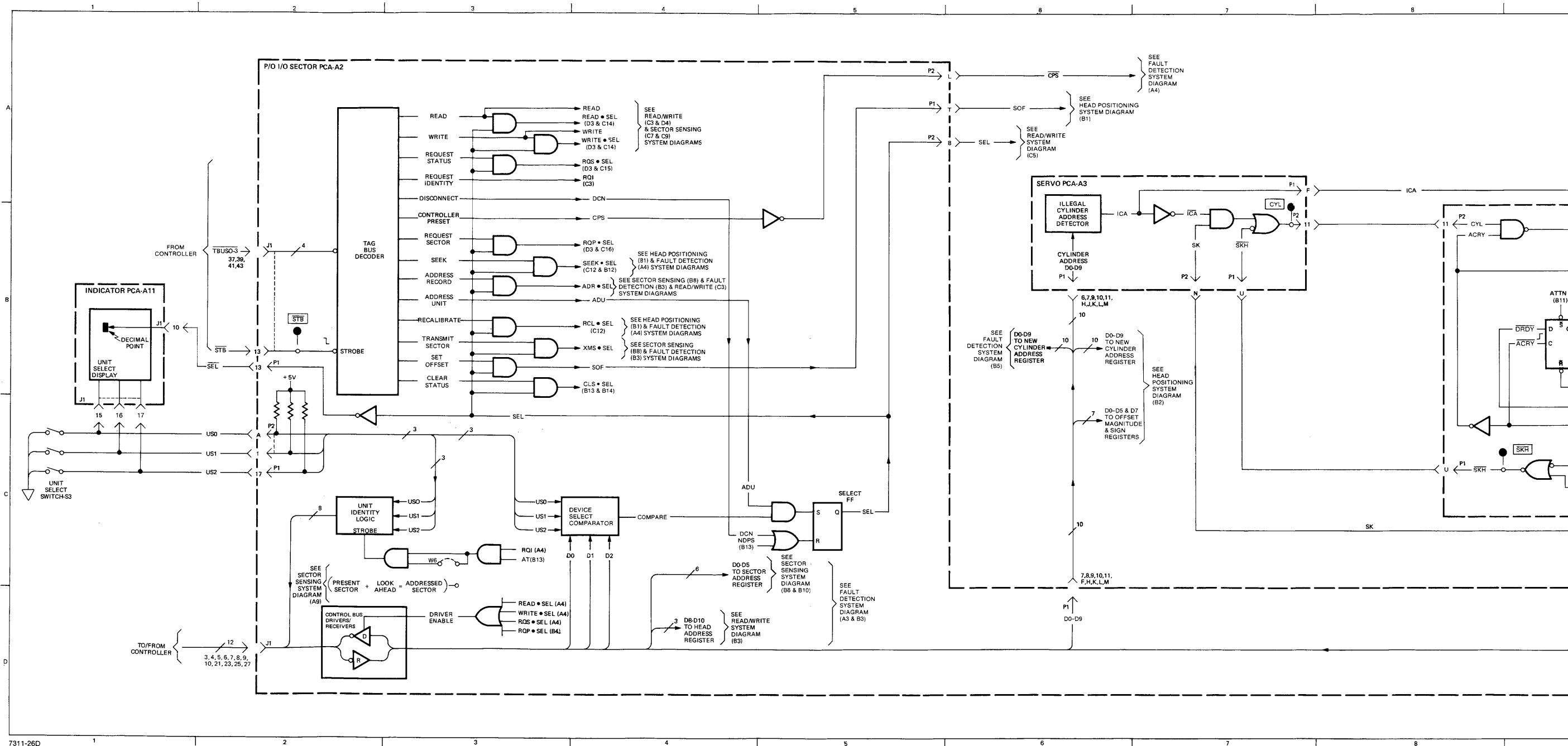
Mnemonic	Name	Mnemonic	Name
<u>CBUS7</u>	"Not" Control Bus Bit 7	D0	Internal Control Bus Bit 0
<u>CBUS8</u>	"Not" Control Bus Bit 8	D1	Internal Control Bus Bit 1
<u>CBUS9</u>	"Not" Control Bus Bit 9	D2	Internal Control Bus Bit 2
<u>CBUS10</u>	"Not" Control Bus Bit 10	D3	Internal Control Bus Bit 3
CC	Current Command	D4	Internal Control Bus Bit 4
<u>CEP</u>	"Not" CE Pack Installed	D5	Internal Control Bus Bit 5
<u>CLA</u>	"Not" Clear Attention	D6	Internal Control Bus Bit 6
CL1	Current Limit Phase 1	D7	Internal Control Bus Bit 7
CL2	Current Limit Phase 2	D8	Internal Control Bus Bit 8
<u>COF</u>	"Not" Clear Offset	D9	Internal Control Bus Bit 9
<u>CPS</u>	"Not" Controller Preset	D10	Internal Control Bus Bit 10
CRB	Carriage Back	DATA	Differential R/W Data
<u>CSOL</u>	"Not" Carriage Solenoid	<u>DATA</u>	"Not" Differential R/W Data
CYL	Set Cylinder		

Mnemonic	Name	Mnemonic	Name
DCW	DC Write (Current Sense)	ECS	Energize Carriage Solenoid
DDB	Differential Data Bus	$\overline{\text{ECSOL}}$	"Not" Energize Carriage Latch Solenoid
$\overline{\text{DDB}}$	"Not" Differential Data Bus	EIL 1	Encoder Interlock 1
DGC	Data AGC	EIL 2	Encoder Interlock 2
DL•PIP	Door Locked and Pack in Place	ENCA	Encoder Signal A
$\overline{\text{DPS}}$	"Not" Destructive Preset	ENCB	Encoder Signal B
DRDY	Drive Ready	FLT	Drive Fault
$\overline{\text{DRDYL}}$	"Not" Drive Ready Lamp	$\overline{\text{FLTL}}$	"Not" Drive Fault Lamp
DSOL	Door Lock Solenoid Lock	FMT	Format Pack
$\overline{\text{DU}}$	"Not" Door Unlocked	GDT	Ground Data
DWA	"Not" Decrease Write Current A (13 mA)	HS0	Head Select Bit 0
$\overline{\text{DWB}}$	"Not" Decrease Write Current B (6.5 mA)	HS 1	Head Select Bit 1
$\overline{\text{DWC}}$	"Not" Decrease Write Current C (3.25 mA)	HS 2	Head Select Bit 2
		HS 3	Head Select Bit 3
		ICA	Illegal Cylinder Address
		ICI 2	Interlock Chain In A 2

Mnemonic	Name	Mnemonic	Name
ICI5	Interlock Chain In A5	$\overline{\text{MHFL}}$	"Not" Multiple Head Fault LED
ICI7	Interlock Chain In Spindle Logic	$\overline{\text{MHS}}$	"Not" Multiple Head Sense
ICI8	Interlock Chain In Spindle Logic	$\overline{\text{NDPS}}$	"Not" Non-Destructive Preset
ICI9	Interlock Chain In A9	PH1+	Phase 1 Positive
IOC2/ CI3	Interlock Chain Out A2/In A3	PH1-	Phase 1 Negative
ICO3 / CI4	Interlock Chain Out A3/In A4	PH2+	Phase 2 Positive
ICO5/ CI6	Interlock Chain Out A5/In A6	PH2-	Phase 2 Negative
ICO6	Interlock Chain Out A6	POS	Position
$\overline{\text{ILFL}}$	"Not" Interlock Fault LED	$\overline{\text{PSF}}$	"Not" Power Supply Failed
$\overline{\text{IP}}$	"Not" Index Pulse	RDA	Read Data A
$\overline{\text{LD}}$	"Not" Lock Door (Pack Access)	RDB	Read Data B
LMV	Linear Motor Voltage	RET	Retract Heads
LSB	Least Significant Bit (of Cylinder Address)	$\overline{\text{RH}}$	"Not" Restore Home
		RO1	Read Only 1
		RO2	Read Only 2
		$\overline{\text{RS}}$	"Not" Run Spindle

Mnemonic	Name	Mnemonic	Name
$\overline{\text{RUN}}$	"Not" Run	$\overline{\text{SPU}}$	"Not" Speed Up
$\overline{\text{RWFL}}$	"Not" Read with Write Fault LED	$\overline{\text{STB}}$	"Not" Strobe
$\overline{\text{SB}}$	"Not" Servo Balanced	$\overline{\text{STF}}$	"Not" Self Test Failed
SCL	Sector Clock	$\overline{\text{STOP}}$	"Not" Stop
SCS+	Positive Spindle Current	TAC	Tachometer
SCS-	Negative Spindle Current Sense	$\overline{\text{TAC}}$	"Not" Tachometer
SEL	Drive Selected	$\overline{\text{TBUS0}}$	"Not" Tag Bus Bit 0
$\overline{\text{SELL}}$	"Not" Drive Selected LED	$\overline{\text{TBUS1}}$	"Not" Tag Bus Bit 1
$\overline{\text{SEN}}$	"Not" Servo Enable	$\overline{\text{TBUS2}}$	"Not" Tag Bus Bit 2
SK	Seek	$\overline{\text{TBUS3}}$	"Not" Tag Bus Bit 3
$\overline{\text{SKH}}$	"Not" Seek Home	TCC	Timeout Count Clock
$\overline{\text{SKI}}$	"Not" Seek Inhibit	$\overline{\text{TCC}}$	"Not" Timeout Count Clock
SOF	Set Offset	$\overline{\text{TOFL}}$	"Not" Timeout Fault LED
$\overline{\text{SPD}}$	"Not" Speed Down	URG	Unselected Read Gate
SPEN	Spindle Enable	US0	Unit Select Bit 0
$\overline{\text{SPS}}$	"Not" Spindle Preset	US1	Unit Select Bit 1
		US2	Unit Select Bit 2

Mnemonic	Name	Mnemonic	Name
UWG	Unselected Write Gate	WEN	Write Enable
VL+	Voltage Limit +	WENT	Write Enable Toggle
VL-	Voltage Limit -	$\overline{\text{WRFL}}$	"Not" Write with Access Not Ready Fault LED
$\overline{\text{WAFL}}$	"Not" Write with No AC Fault LED	5VRS	+5V Remote Sense
WDT	Write Data		



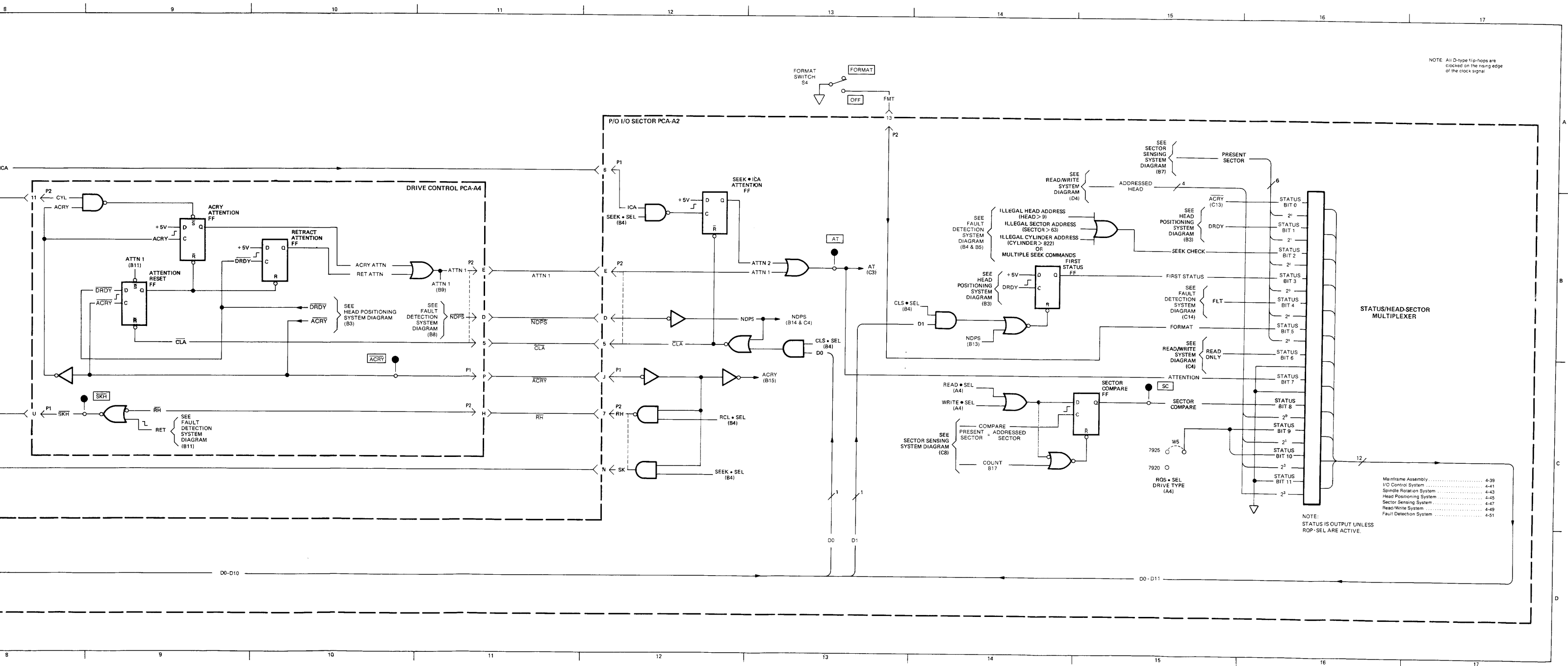


Figure 10-1. I/O Control System Functional Diagram





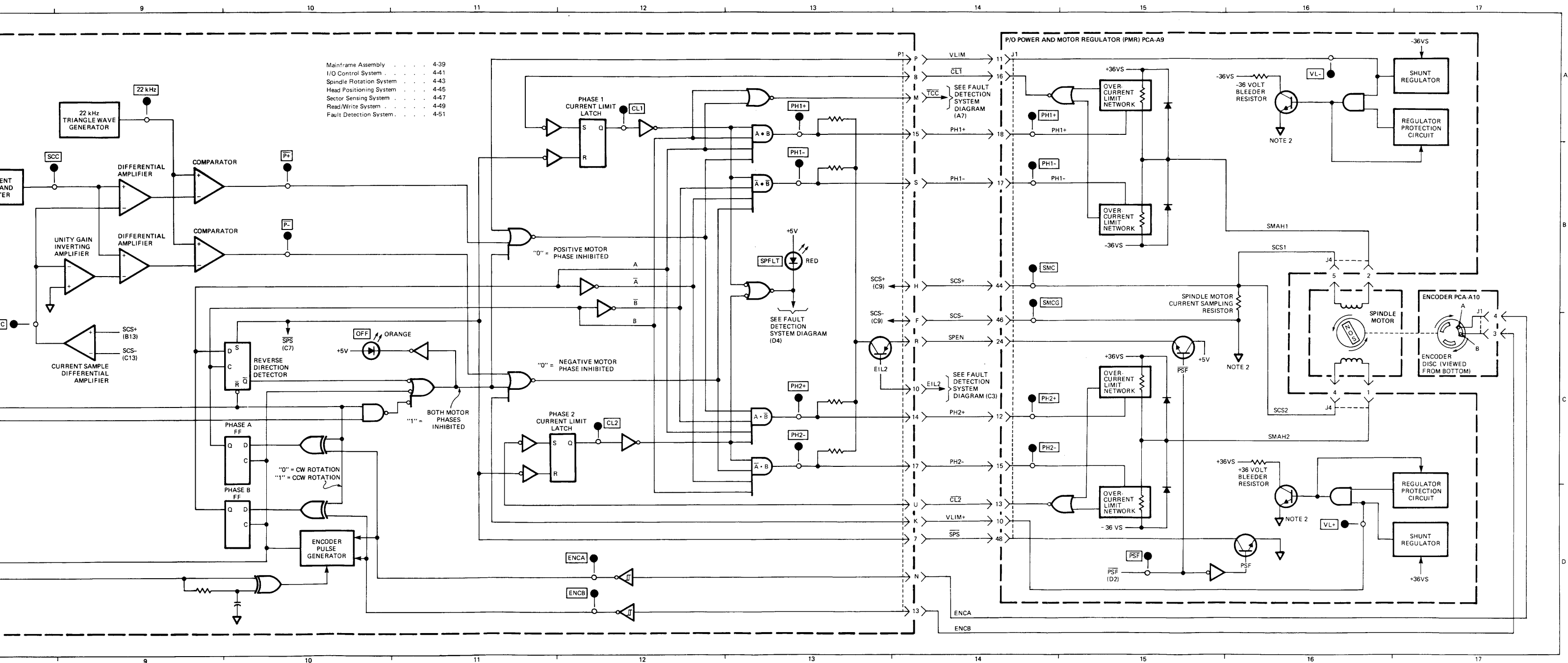
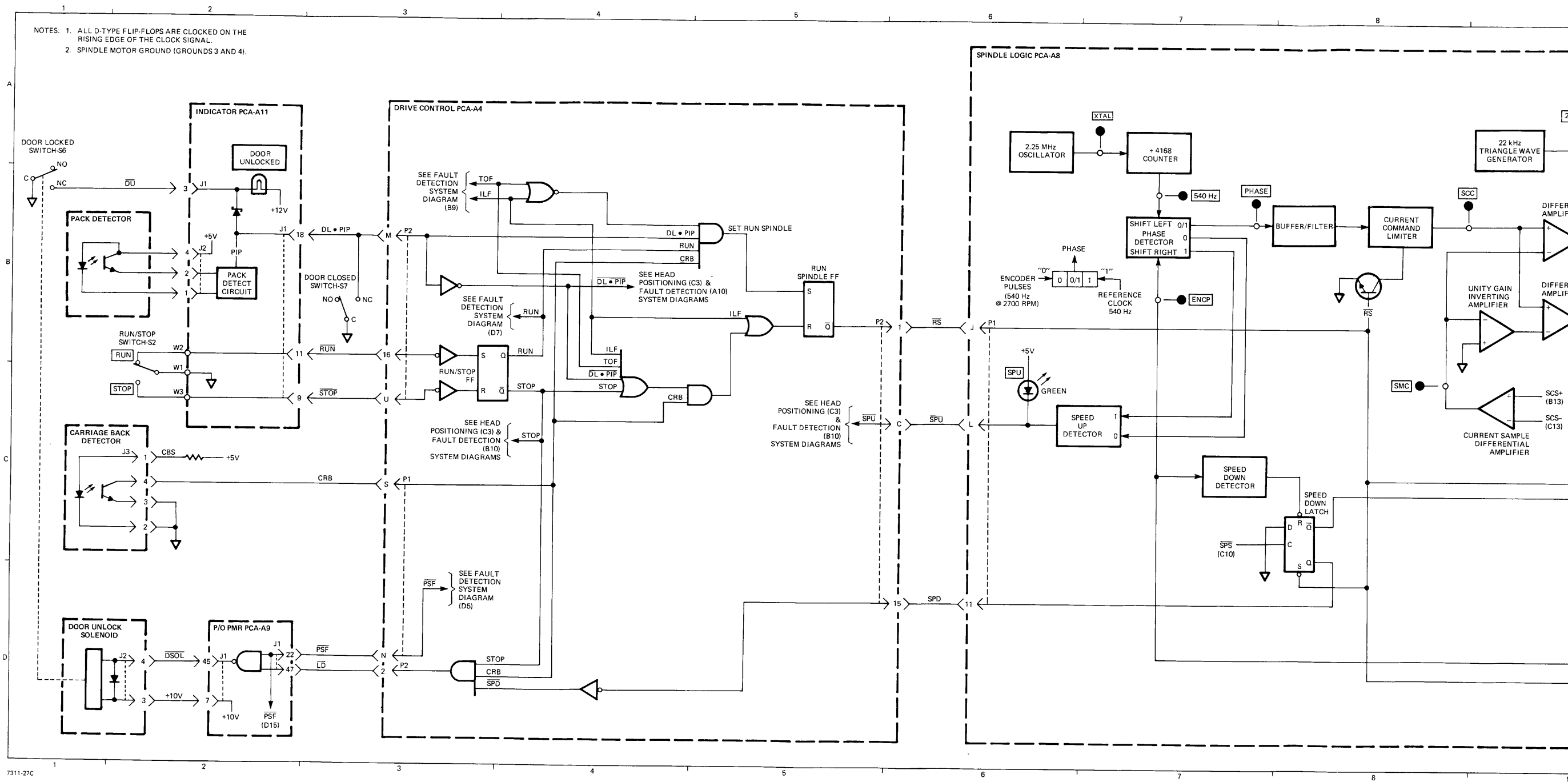


Figure 10-2. HP 7920 Spindle Rotation System, Functional Diagram



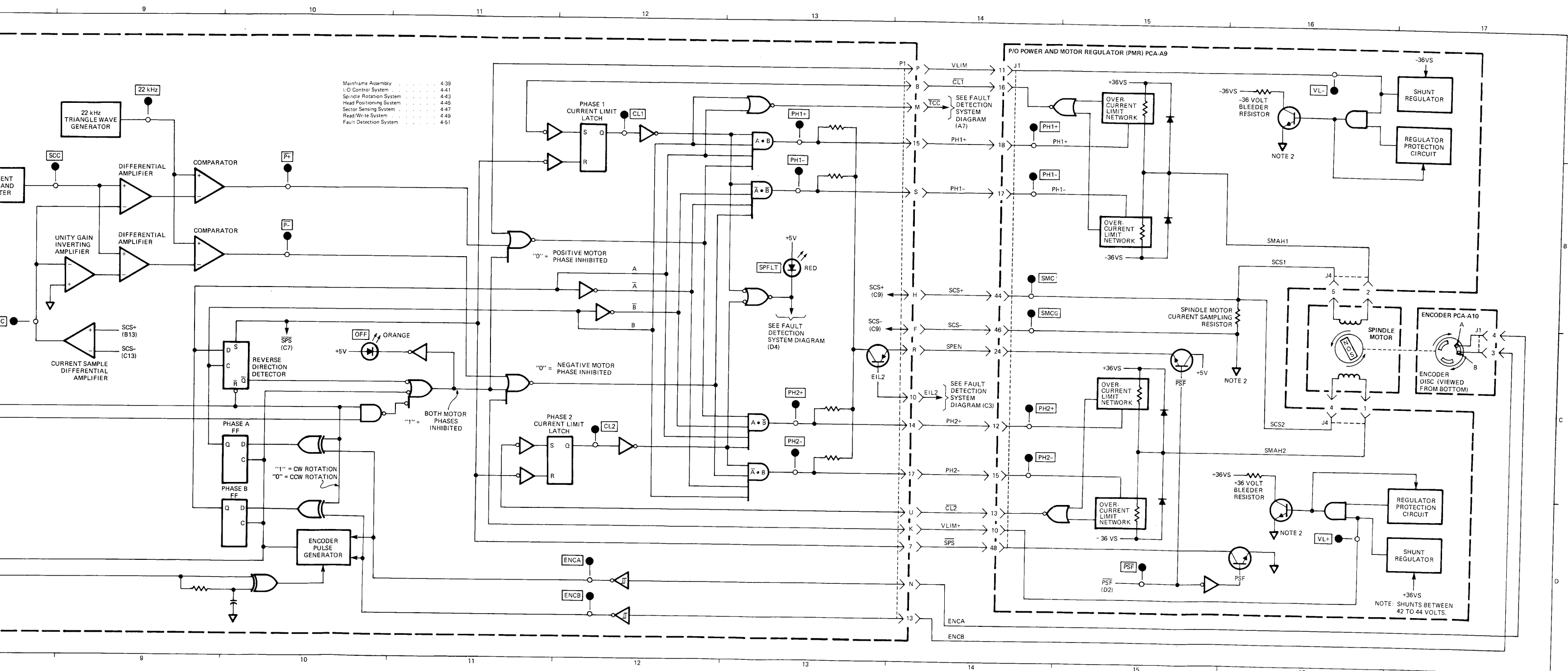
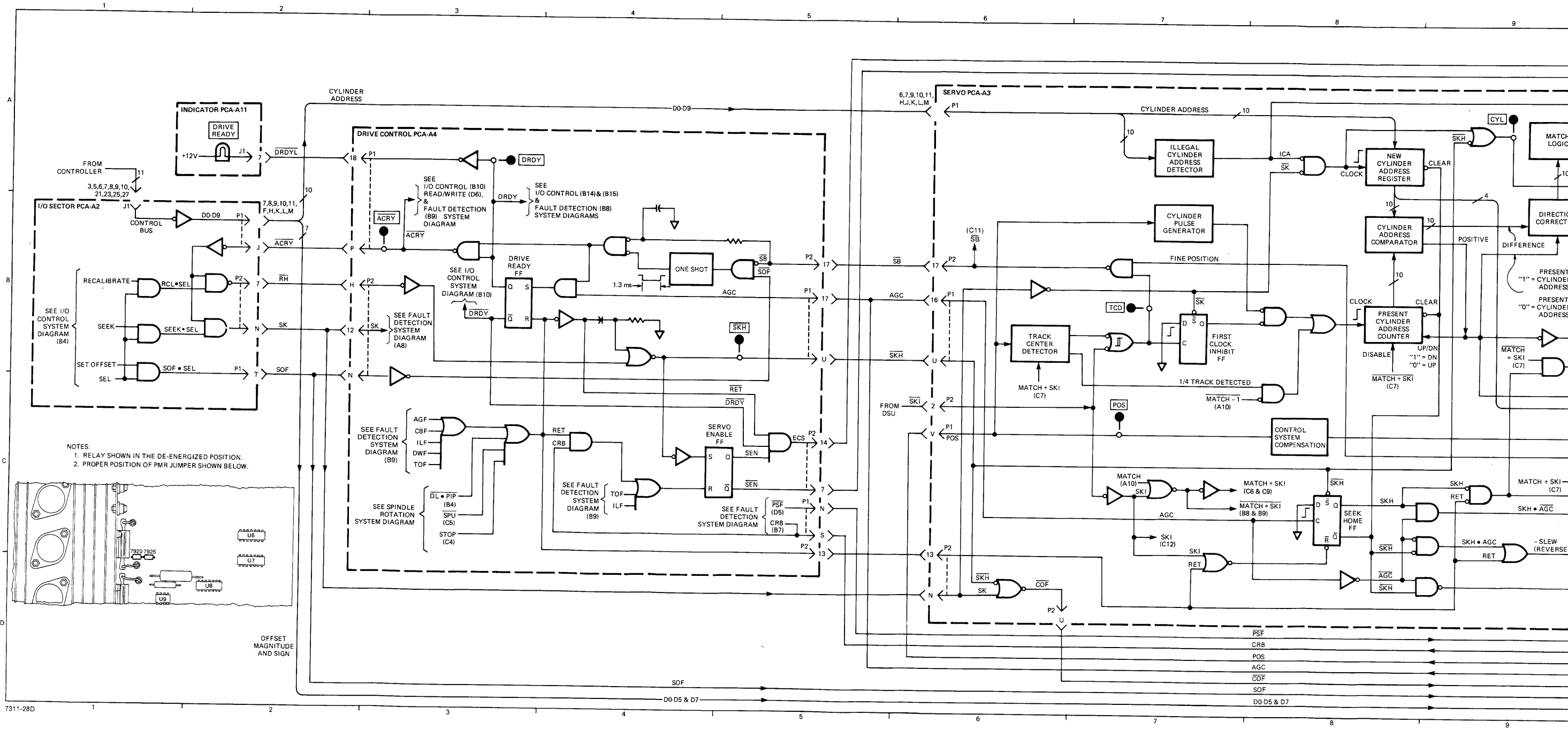


Figure 10-3. HP 7925 Spindle Rotation System, Functional Diagram



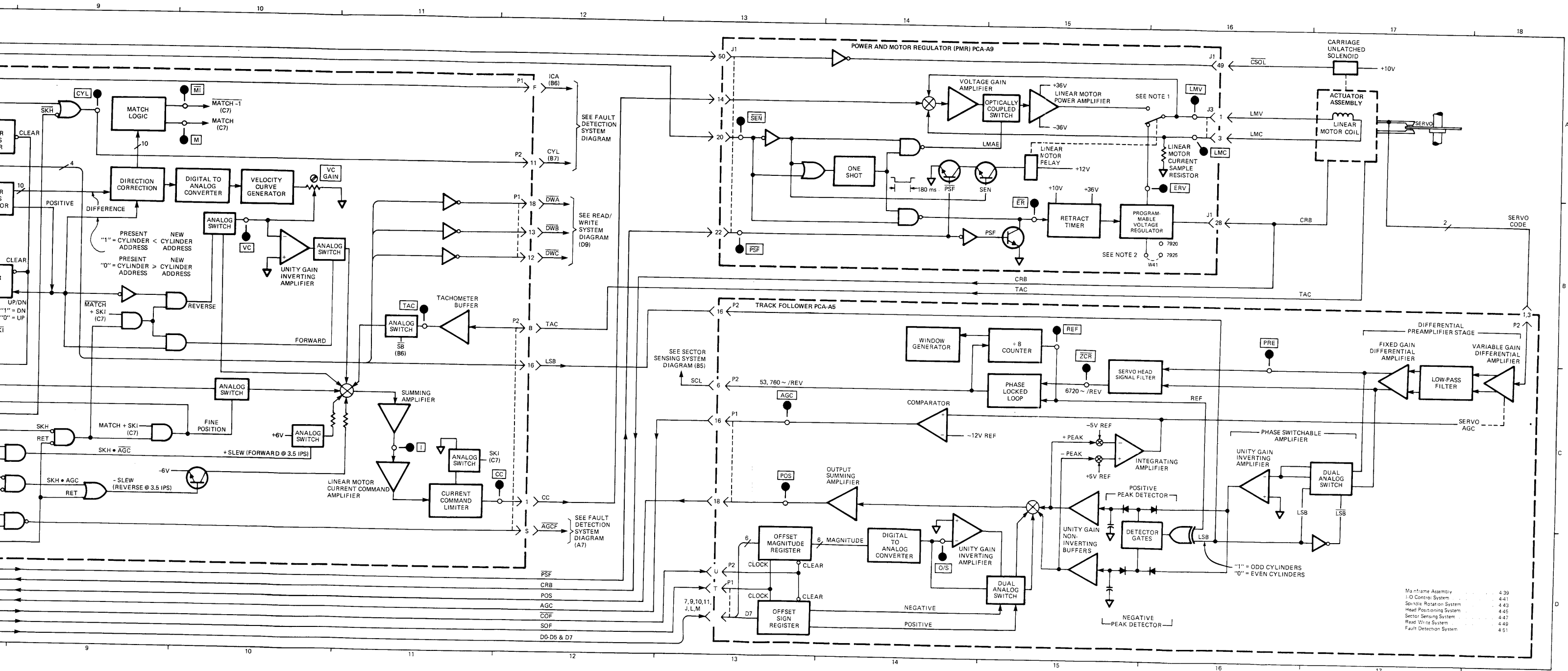
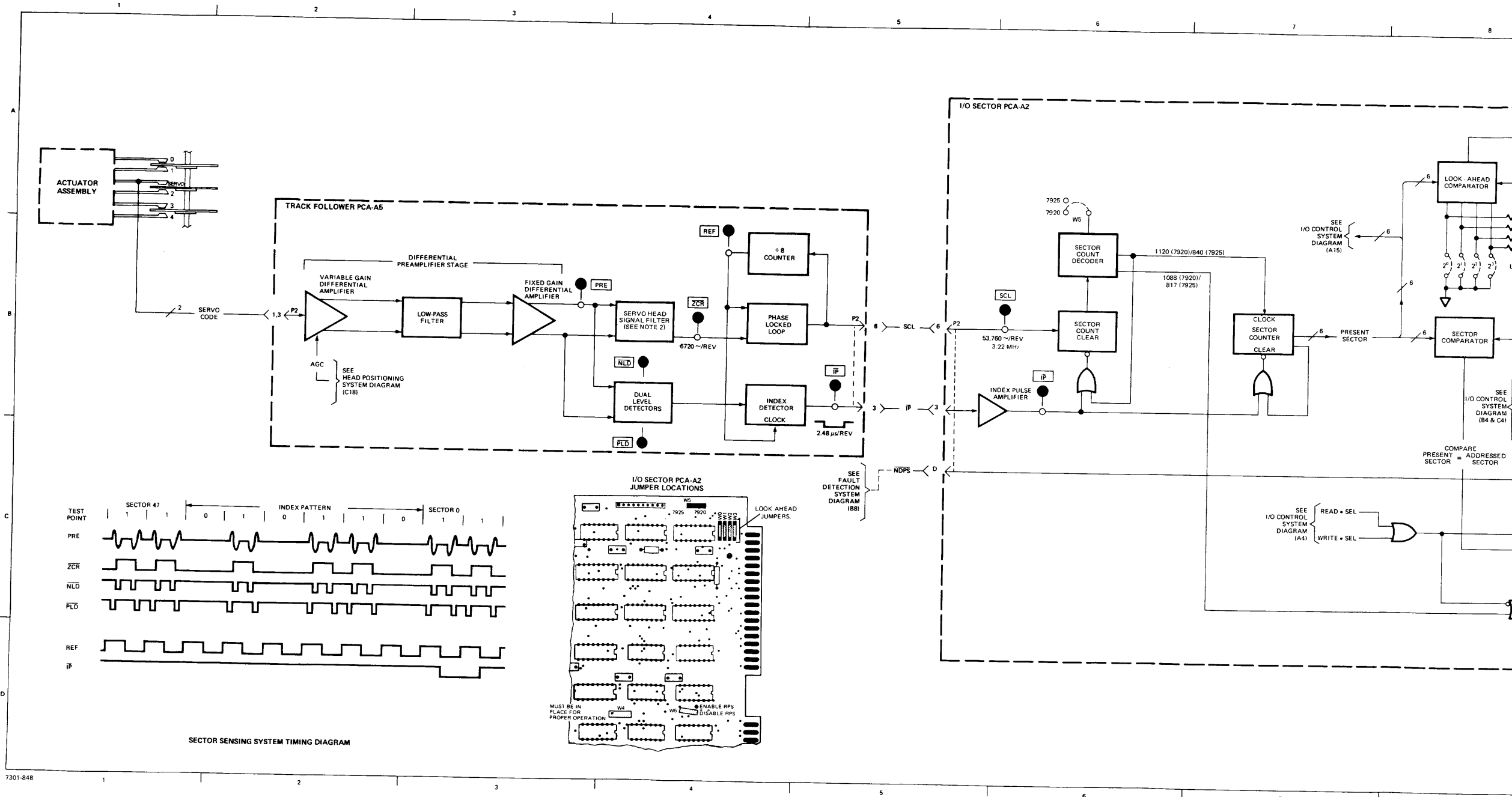


Figure 10-4. Head Positioning System, Functional Diagram



7301-84B

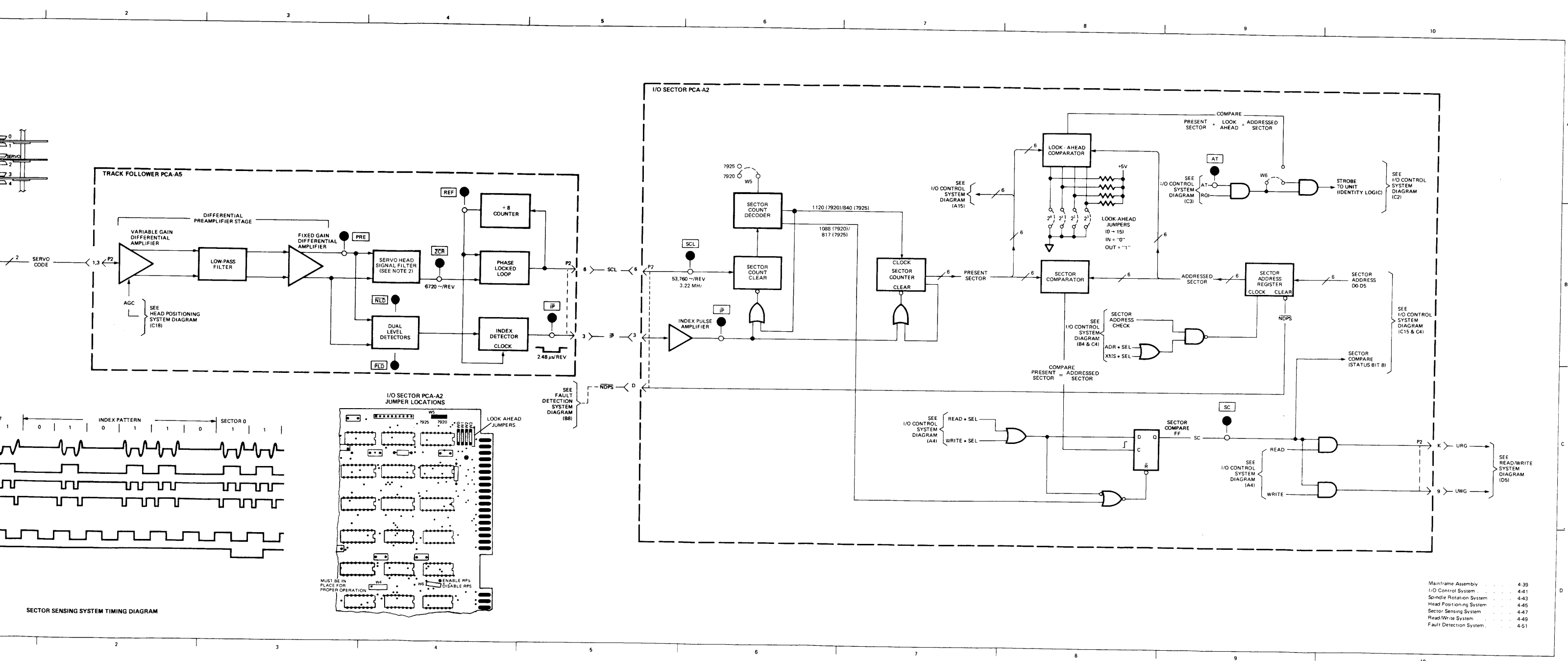
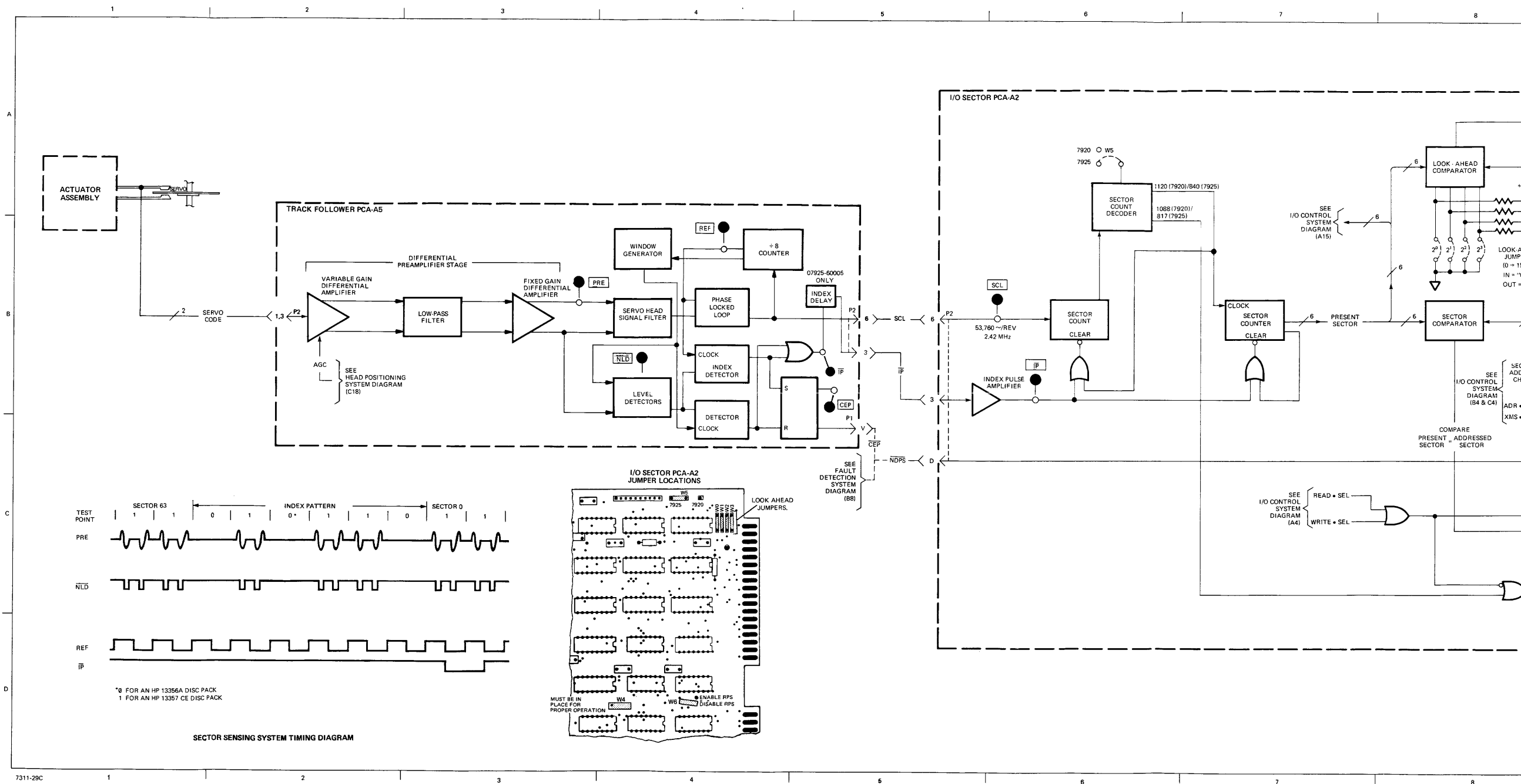


Figure 10-5. HP 7920 Sector Sensing System, Functional Diagram





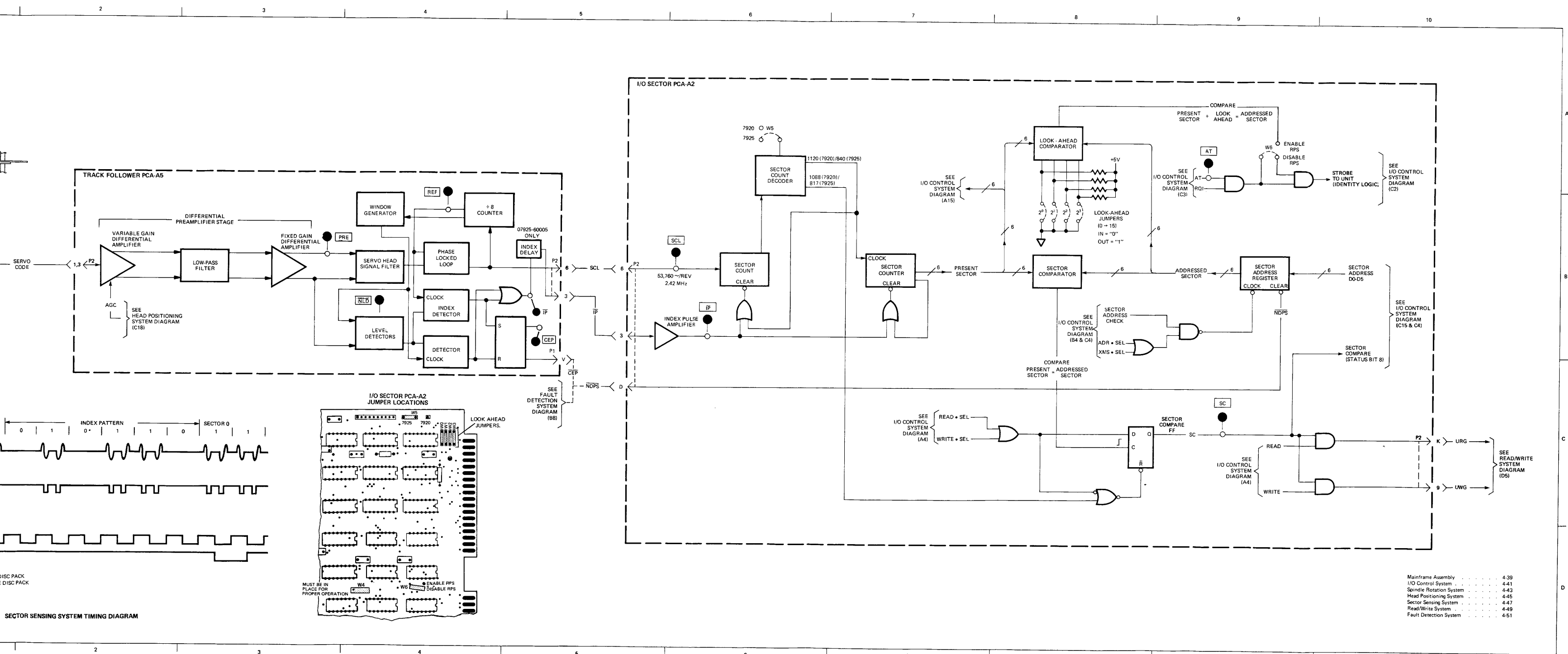
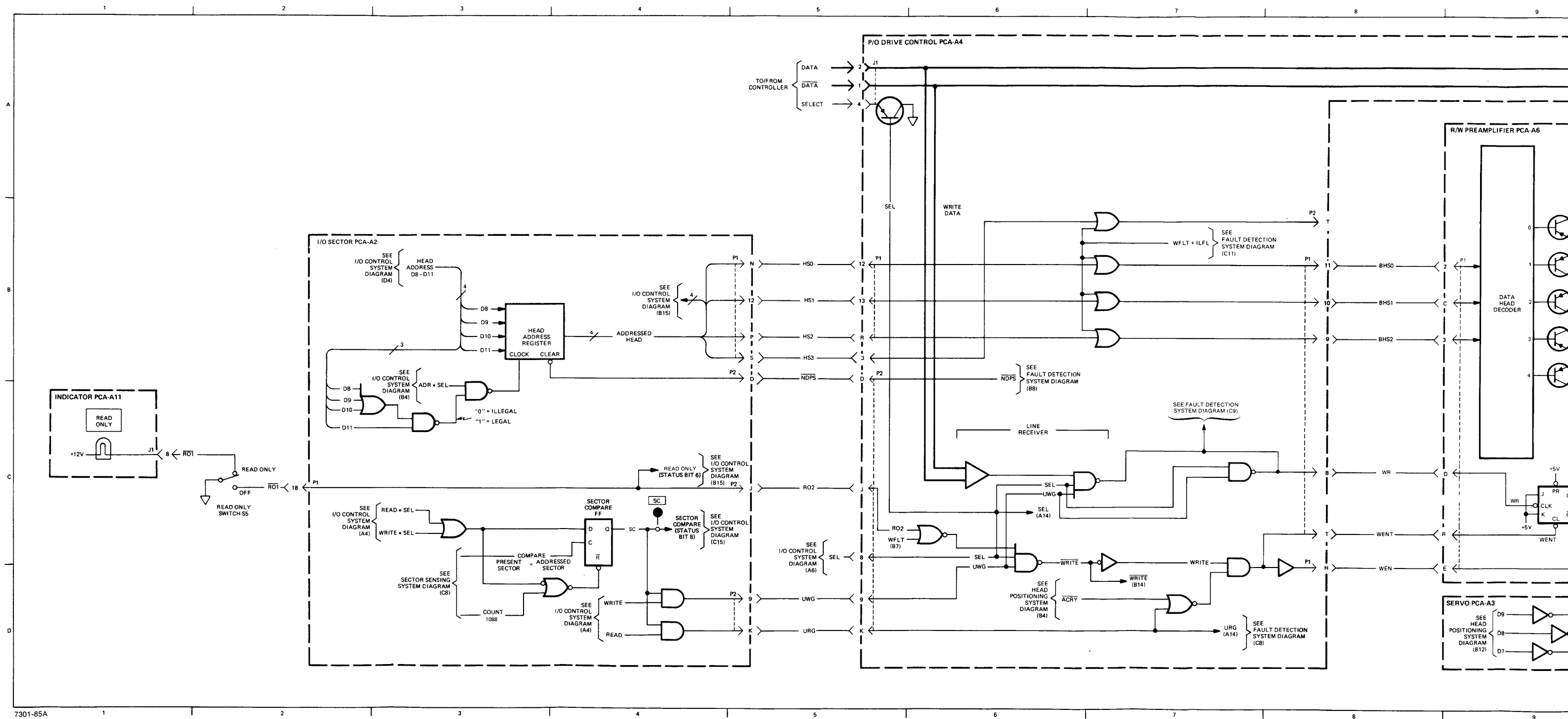


Figure 10-6. HP 7925 Sector Sensing System, Functional Diagram



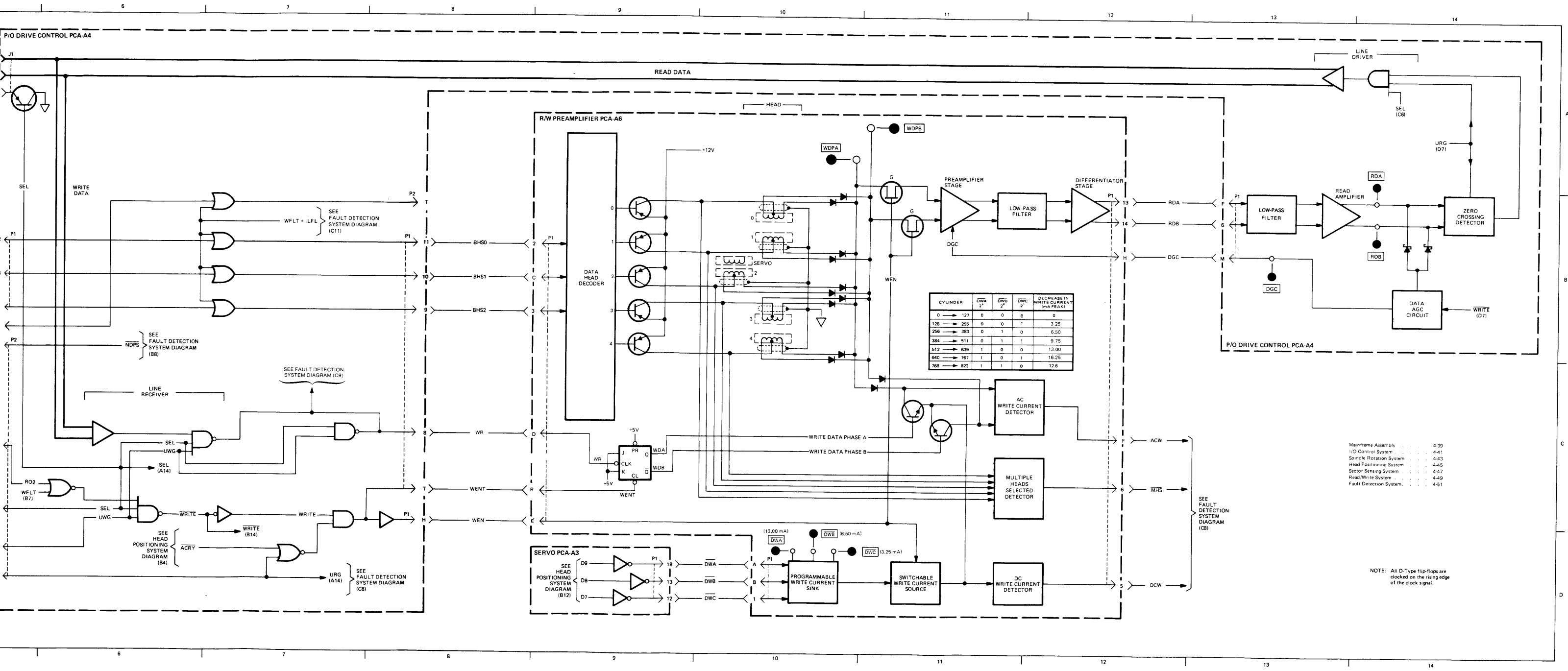
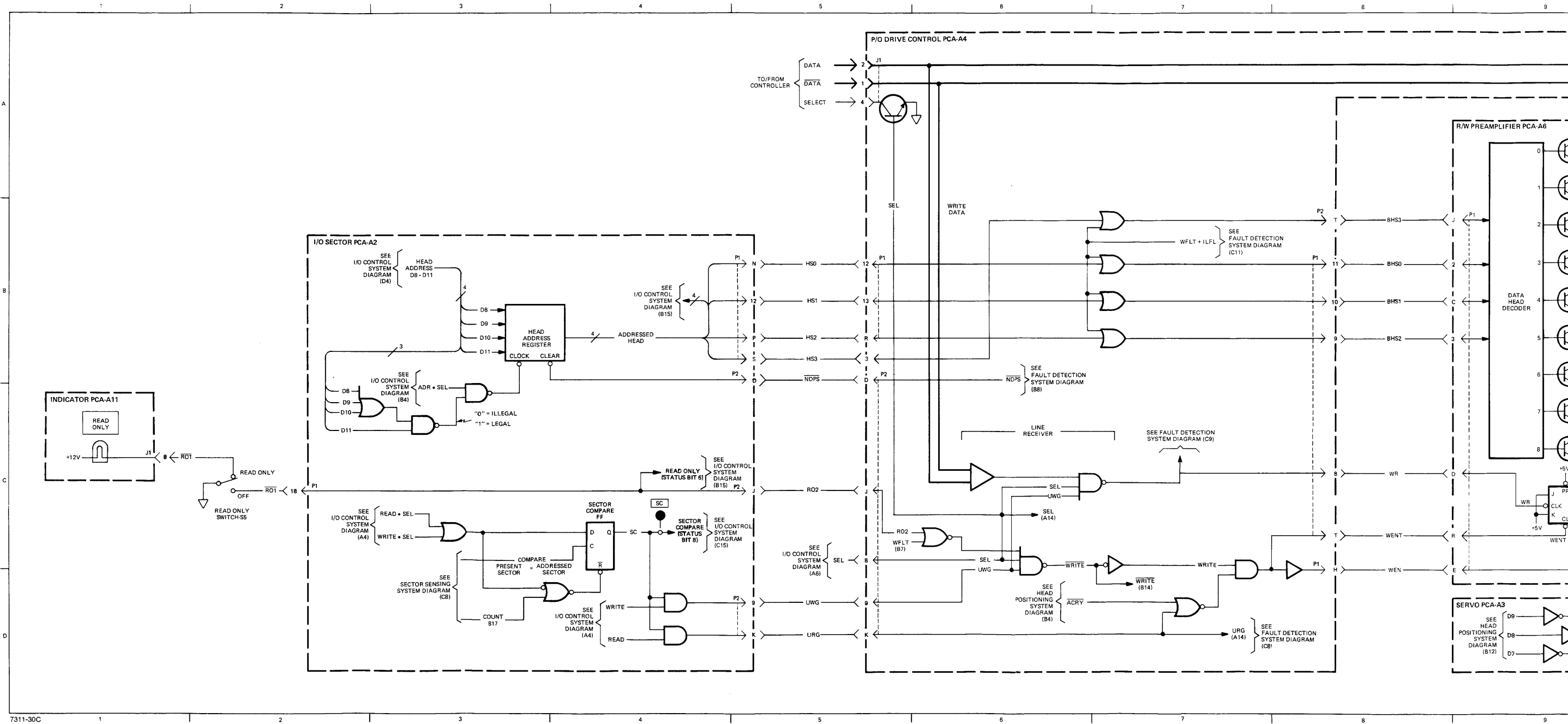


Figure 10-7. HP 7920 Read/Write System, Functional Diagram



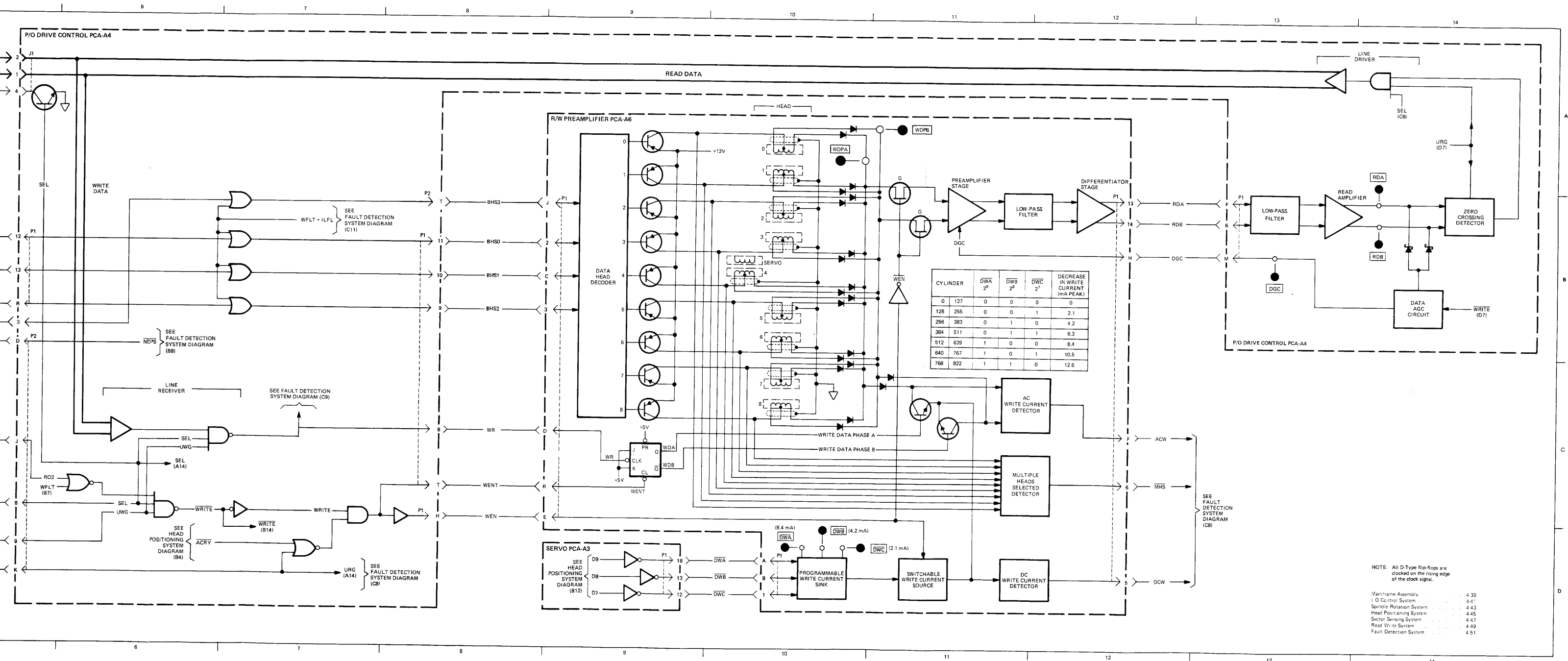
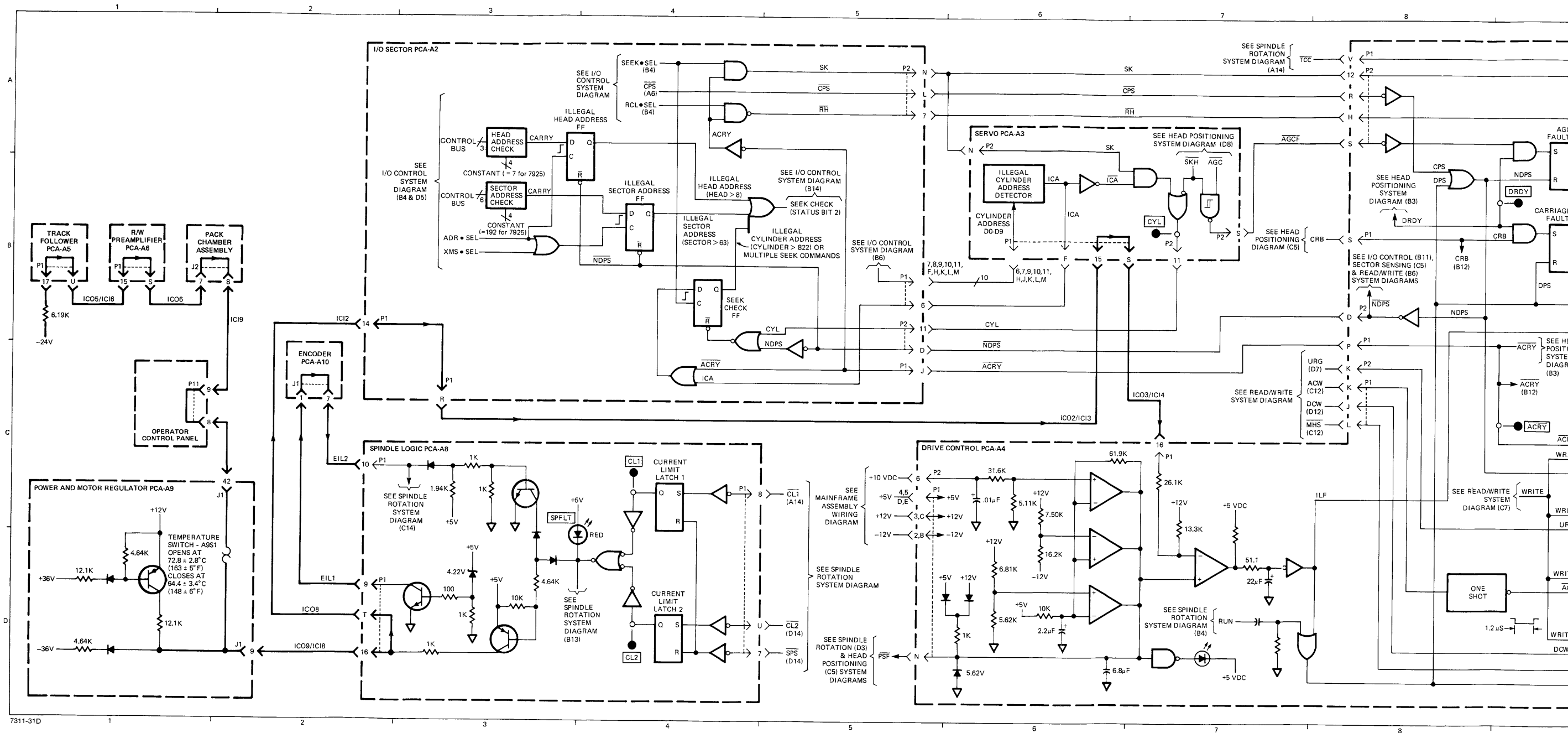


Figure 10-8. HP 7925 Read/Write System, Functional Diagram



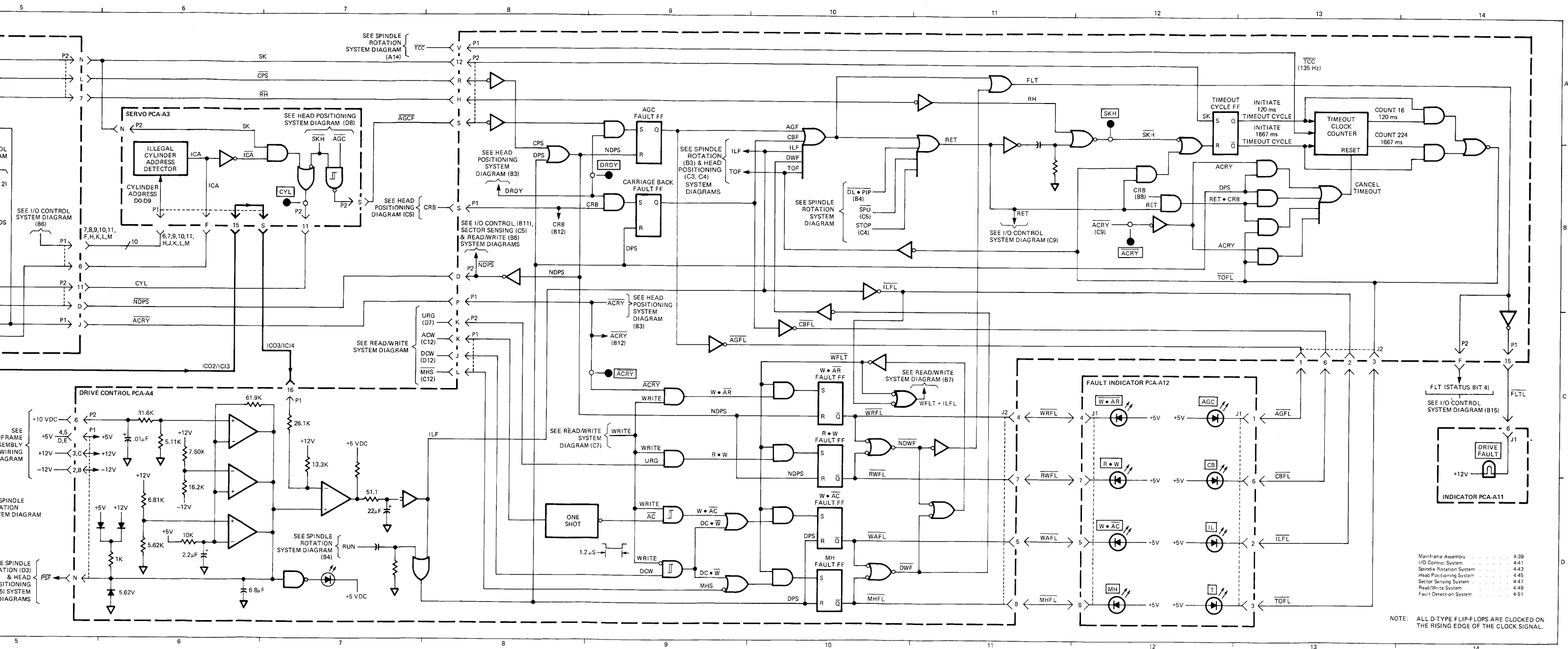
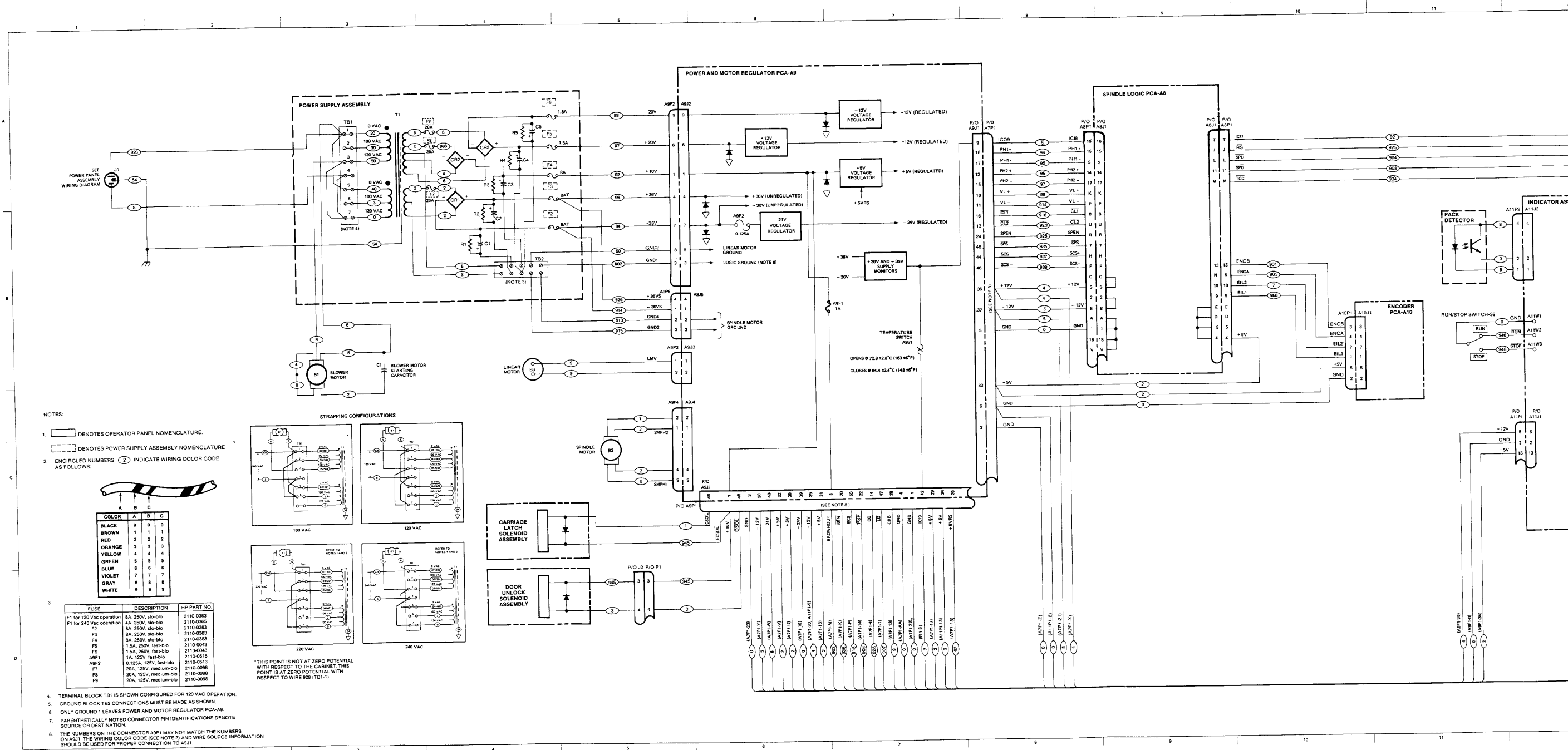


Figure 10-9. Fault Detection System, Functional Diagram



**NOTES**

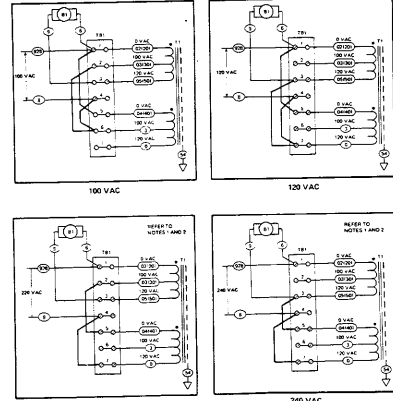
1. DENOTES OPERATOR PANEL NOMENCLATURE.
2. DENOTES POWER SUPPLY ASSEMBLY NOMENCLATURE AS FOLLOWS.



COLOR	A	B	C
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GRAY	8	8	8
WHITE	9	9	9

FUSE	DESCRIPTION	HP PART NO.
F1 for 120 vac operation	8A, 250V, slo-blo	2110-0383
F1 for 240 vac operation	4A, 250V, slo-blo	2110-0365
F2	8A, 250V, slo-blo	2110-0383
F3	8A, 250V, slo-blo	2110-0383
F4	8A, 250V, slo-blo	2110-0383
F5	1.5A, 250V, fast-blo	2110-0043
F6	1.5A, 250V, fast-blo	2110-0043
ASF1	1A, 125V, fast-blo	2110-0516
ASF2	0.125A, 125V, fast-blo	2110-0513
F7	20A, 125V, medium-blo	2110-0098
F8	20A, 125V, medium-blo	2110-0098
F9	20A, 125V, medium-blo	2110-0098

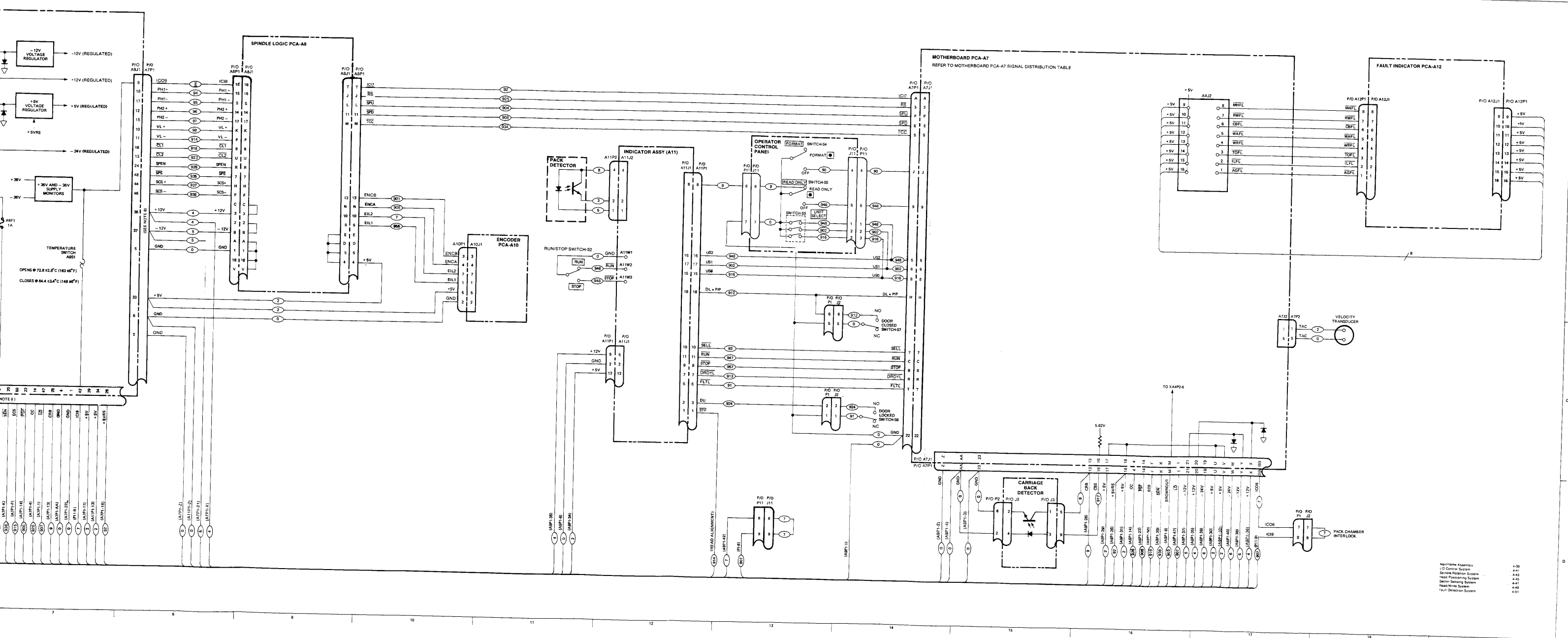
**STRAPPING CONFIGURATIONS**



\*THIS POINT IS NOT AT ZERO POTENTIAL WITH RESPECT TO THE CABINET. THIS POINT IS AT ZERO POTENTIAL WITH RESPECT TO WIRE 928 (TB1-1)

4. TERMINAL BLOCK TB1 IS SHOWN CONFIGURED FOR 120 VAC OPERATION.
5. GROUND BLOCK TB2 CONNECTIONS MUST BE MADE AS SHOWN.
6. ONLY GROUND 1 LEAVES POWER AND MOTOR REGULATOR PCA-A9.
7. PARENTHETICALLY NOTED CONNECTOR PIN IDENTIFICATIONS DENOTE SOURCE OR DESTINATION.
8. THE NUMBERS ON THE CONNECTOR ASB1 MAY NOT MATCH THE NUMBERS ON ASB1. THE WIRING COLOR CODE (SEE NOTE 2) AND WIRE SOURCE INFORMATION SHOULD BE USED FOR PROPER CONNECTION TO ASB1.





Motherboard Assembly: 4-39  
 I/O Control System: 4-41  
 Spindle Position System: 4-43  
 Head Positioning System: 4-45  
 Sensor Sensing System: 4-47  
 Reading System: 4-49  
 Fault Detection System: 4-51

Figure 10-10. Mainframe Assembly, Wiring Diagram

# **SERVICE NOTES**

**SECTION**

**XI**

## **11-1. INTRODUCTION**

Tables 11-1 and 11-2 provide a current listing of all Service Notes for the HP 7920 and HP 7925. Table 11-3 provides a listing of all current IOSM's.

Table 11-1. HP 7920 Service Note Summary

DATE	TITLE	SERVICE NOTE NUMBERS		
7'78	TIMEOUT FAULTS	M-01	S-01	
4'79	POWER SUPPLY FILTER	M-03	S-03	
7'79	3150-0340 ABSOLUTE FILTER	M-04	S-04	
7'79	RADIATED EMISSIONS	M-05		
8'79	DATA ERRORS ON HIGH PERFORMANCE	M-06	S-05	
10'79*	WIRING POLARITY REVERSALS	M-07	S-06	
11'79	PACK IN PLACE DETECTION	M-08	S-07	
4'80*	DEFECTIVE POWER SWITCHES	M-09	S-08	
7'80	POTENTIAL SAFETY HAZARD	M-10	S-09	
11'80	DATA ERRORS ON IDC'S	H-01		
11'80	DCW BAR FAULTS	H-02	M-11	S-10
5'81	MICROPROCESSOR BOARD CHNG.	H-03		
12'81*	IMPROPERLY GROUNDED FANS	H-04	M-12	S-11
1'82	PACK LOCK RETROFIT	H-05	M-02A	S-02A
1'82	DOOR LOCK ASSEMBLY	H-06	M-15	S-14
1'82	DATA BOARD FAILURES	H-07		
2'82	REPLACEMENT SERVO HEAD	H-08	M-16	S-15
2'82	MODIFIED PACK LOCK LUB. TOOL	H-12	M-21	S-19
3'82	SPINDLE MOTOR FAILURES	H-09	M-17	S-16
3'82	NEW BLOWER MOTOR	H-10	M-18	S-17
10'82	MISLOADED CAPACITOR (13037)	M-19		
12'82	POWER SUPPLY FUSES	H-11	M-20	S-18
8'83	NEW UNIT SELECT SWITCH	H-13	M-22	S-20
'83	H-DISC DATA BOARD FAILURES	H-15		
11'83	PDU FAN REVERSAL	M-23		
8'84	MAC SPNDL COVR/GND BUTTON	H-16	M-24	S-21
10'84	MAC SPNDL COVR/GND BUTTON	H-16A	M-24A	S-21A
10'84	DEFECTIVE HUB LOCKS	H-17	M-25	M-22

\*Denotes product safety service note

Table 11-2. HP 7925 Service Note Summary

DATE	TITLE	SERVICE NOTE NUMBERS	
8'78	WRITE OPERATIONS DURING EMERGENCY RETRACT	M-01	S-01
2'79	WRITE OPER./EMER.RETRACT AND TIME OUT	M-01A	S-01A
8'78	INTERLOCK DRIVE FAULTS	M-02	S-02
'79	PACK LOCK RETROFIT	M-04	S-04
3'79	CIRCUMFERENTIAL TIMING	M-05	S-05
7'79	RADIATED EMISSIONS	M-06	
8'79	DATA ERRORS ON HIGH PERFORMANCE	M-07	S-06
9'79	CONDUCTIVE FOAM	M-08	S-07
10'79*	WIRING POLARITY REVERS.	M-09	S-08
4'80	POWER SWITCH DEFECT	M-10	S-09
7'80	7925 M/S MODEL	M-11	S-10
11'80	DATA ERRORS ON IDC'S	H-01	
11'80	DWC BAR FAULTS	H-02	M-12 S-11
5'81	MICROPROCESSOR BOARD CHNG.	H-03	
12'81*	IMPROPERLY GROUNDED FANS	H-04	M-13 S-12
1'82	REPLACEMENT SERVO HEAD	H-06	M-15 S-14
1'82	PACK LOCK RETROFIT	H-07	M-04A S-04A
1'82	DOOR LOCK ASSEMBLY	H-08	M-17 S-16
1'82	H-DISC DATA FAILURES	H-09	
2'88	MODIFIED PACK LOCK LUB. TOOL	H-14	M-22 S-20
3'82	PREMATURE MOTOR FAILURE	H-10	M-18 S-17
3'82	NEW BLOWER MOTER	H-11	M-19 S-18
10'82	MISLOADED CAPACITOR (13037)		M-20
12'82	POWER SUPPLY FUSES	H-12	M-21 S-19
12'82	NEW TRACK FOLLOWER	H-13	
8'83	NEW UNIT SELECT SWITCH	H-15	M-23 S-21
11'83	PDU GROUND REVERSAL		M-24
8'84	MAC SPINDLE CVR/GND BUTTON	H-16	M-25 S-22
10'84	MAC SPINDLE CVR/GND BUTTON	H-16A	M-25A S-22A
10'84	DEFECTIVE HUB LOCK	H-17	M-26 S-23
*Denotes Product Safety Service Note			
Note 1: On the occasions when duplicate numbers were erroneously assigned, reference the date and title to differentiate the notes.			

Table 11-3. HP 7920/HP 7925 IOSM List

Number	Description
7920A-0877-01	7920 50 Mbyte Disc Drive Support Plan
7920A-0877-02	Pack Interchangeability
7920A-0977-03	Defective 7920 Head-Cam Alignment Tools
7920A-1077-04	Modification of 07920-67001 Product Support Package and 13394A Customer Service Kit
7920A-1077-05	Correcting Manufactured 13213A-1/Data Cables
7920A-0178-01	Changes affecting Power Motor Regulator and Servo PCA Parts Interchangeability
7920-0178-02	Removal of Ground Cables from 7920
7920-0280-01	7920 50 Mbyte Disc Drive Support Plan Addendum
7920-0580-01	Discontinue use of Kimwipes for cleaning
7925-0580-01	Heads
7920A/B-0281-01	New Type Spindle Motor Bearings
7920-0481-01	7906/7920/7925 Power Supplies
7925-0481-01	
7920-0981-01	7906/7920/7925 Power Supplies
7925-0878-01	7925 Product Support Plan

# APPENDIX

APPENDIX

A

## A-1. INTRODUCTION

The information in this section is provided for reference and should be used to supplement the information in the other sections.

Figure A-1. HP 7920H Disc Drive Block Diagram

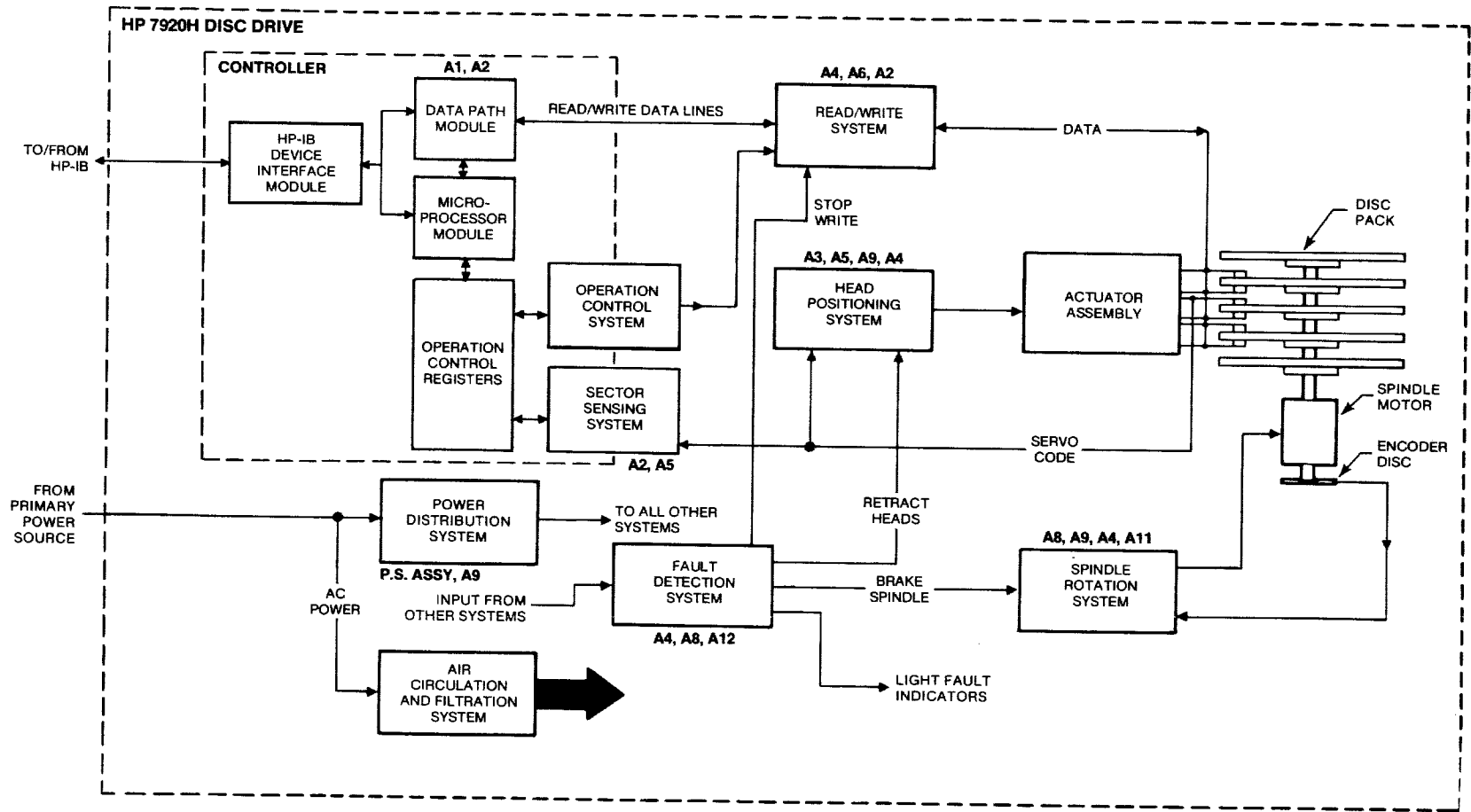
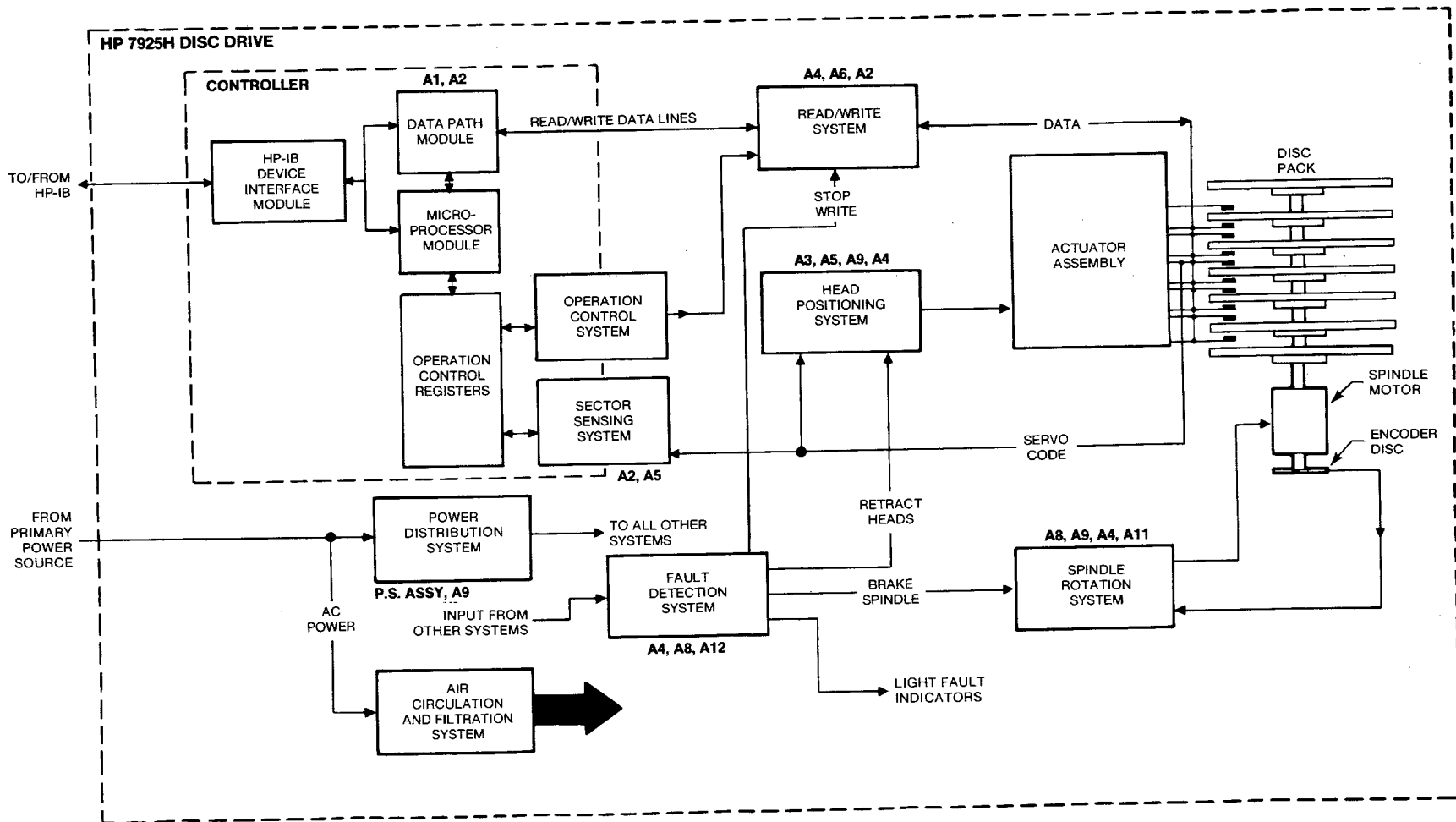
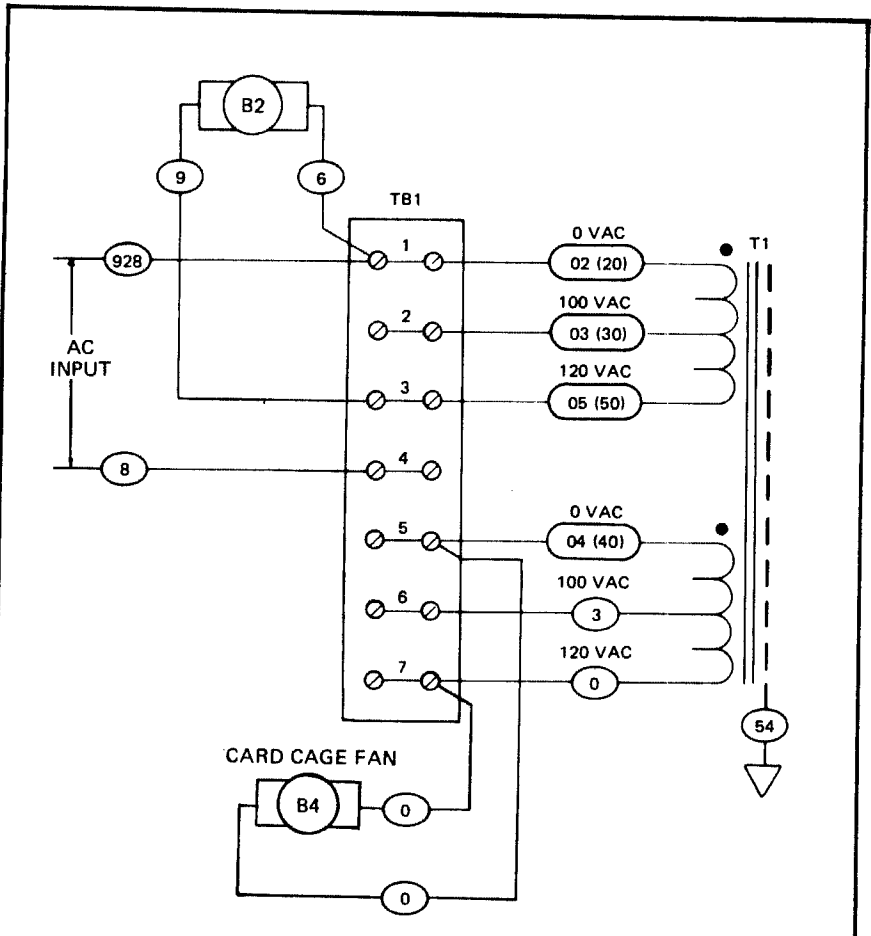


Figure A-2. HP 7925H Disc Drive Block Diagram







NOTE: CARD CAGE FAN CONNECTIONS ARE UNCHANGED FOR ALL VAC INPUT LEVELS.

7920H ~ LINE  
 120V +5 -10%  
 560 WATTS TYP  
 5.6A TYP  
 47.5 -66 Hz

~ LINE  
 7920H 240V~ 50 Hz  
 540 WATTS TYP 3.0A TYP  
 OPERATING RANGE  
 216V~ -252V~ 47.5 -66 Hz

7920H ~ LINE  
 100V +5 -10%  
 500 WATTS TYP  
 6.5A TYP  
 47.5 -66 Hz

~ LINE  
 7920H 220V~ 50 Hz  
 540 WATTS TYP 3.2A TYP  
 OPERATING RANGE  
 198V~ -231V~ 47.5 -66 Hz

(PART NO. 13365-00007)

(PART NO. 13365-00008)

Figure A - 3. HP 7920H Wiring Changes

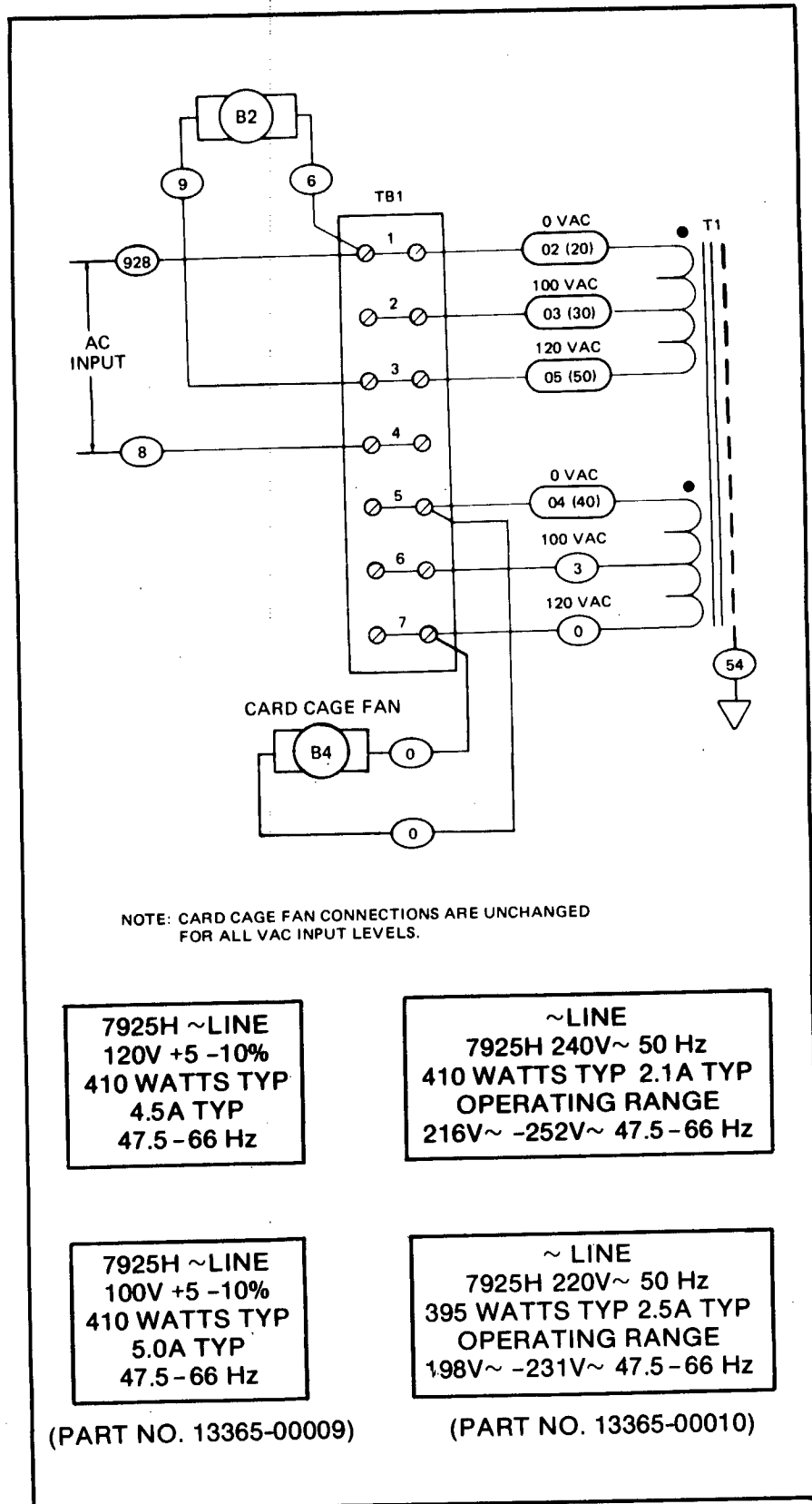


Figure A - 4. HP 7925H Wiring Changes

Table A-1. HP 7920H Electrical Characteristics

VOLTAGE AC VOLTS, RMS	TYPICAL OPERATING <sup>1</sup>		TYPICAL MAXIMUM <sup>2</sup>	
	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)
100	6.5	500	7.9	620
120	5.6	560	6.6	620
220	3.2	540	4.0	640
240	3.0	540	3.6	650

Notes:

1. Operating readings were measured under the following conditions:
  - a. Line frequency: 60 Hz for 100 Vac and 120 Vac, 50 Hz for 220 Vac and 240 Vac.
  - b. Disc Drive operation: Alternate seeks between widely separated addresses (tracks) using a delay time of 25 microseconds for standardization.
2. Maximum readings were measured under the following conditions:
  - a. Line frequency: Same as in note 1 above.
  - b. Disc Drive operation: Spindle startup, excluding 60 ampere, 5 millisecond inrush transient turn-on current.

Table A-2. HP 7925H Electrical Characteristics

VOLTAGE AC VOLTS, RMS	TYPICAL OPERATING <sup>1</sup>		TYPICAL MAXIMUM <sup>2</sup>	
	CURRENT AMPERES, RMS	POWER (WATTS)	CURRENT AMPERES, RMS	POWER (WATTS)
100	5.0	410	8.0	650
120	4.5	410	6.8	650
220	2.5	395	3.8	655
240	2.1	410	3.6	650

Notes:

1. Operating readings were measured under the following conditions:
  - a. Line frequency: 60 Hz for 100 Vac and 120 Vac, 50 Hz for 220 Vac and 240 Vac.
  - b. Disc Drive operation: Alternate seeks between widely separated addresses (tracks) using a delay time of 25 microseconds for standardization.
2. Maximum readings were measured under the following conditions:
  - a. Line frequency: Same as in note 1 above.
  - b. Disc Drive operation: Spindle startup, excluding 60 ampere, 5 millisecond inrush transient turn-on current.

**CAUTION**

The "H" model disc drive uses a short data settling time. To ensure that the disc drive(s) will operate at its specified transfer rate, check that the HP-IB cabling meets the length restrictions described on the "HP-IB Configuration Restriction" label attached to the rear of the disc drive. See figure A-5. The equivalent load of the HP-IB controller-in-charge (CIC) must also be considered when calculating the total cable length.

**HP-IB  
CONFIGURATION RESTRICTION**

THIS DEVICE USES A SHORT DATA  
SETTLING TIME. TO ASSURE DATA  
INTEGRITY, LIMIT TOTAL CABLE LENGTH  
OF ANY BUS INCLUDING THIS DEVICE  
TO ONE METRE PER EQUIVALENT LOAD  
CONNECTED (MAXIMUM 15 METRES).  
LENGTH (METRES) = SUM EQUIV LOADS  
THIS DEVICE = 2 EQUIV LOADS

Figure A-5. H Model HP-IB Configuration Restriction Label

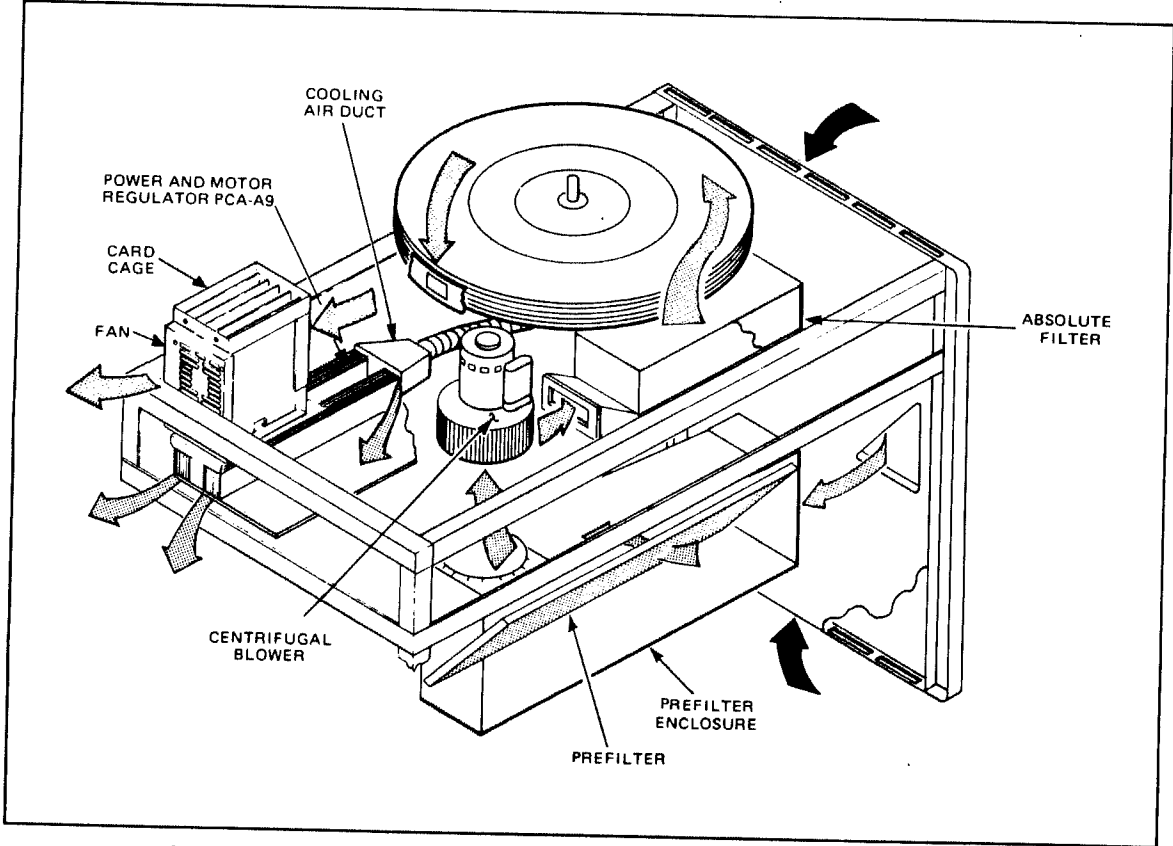


Figure A-6. H Model Air Circulation and Filtration System

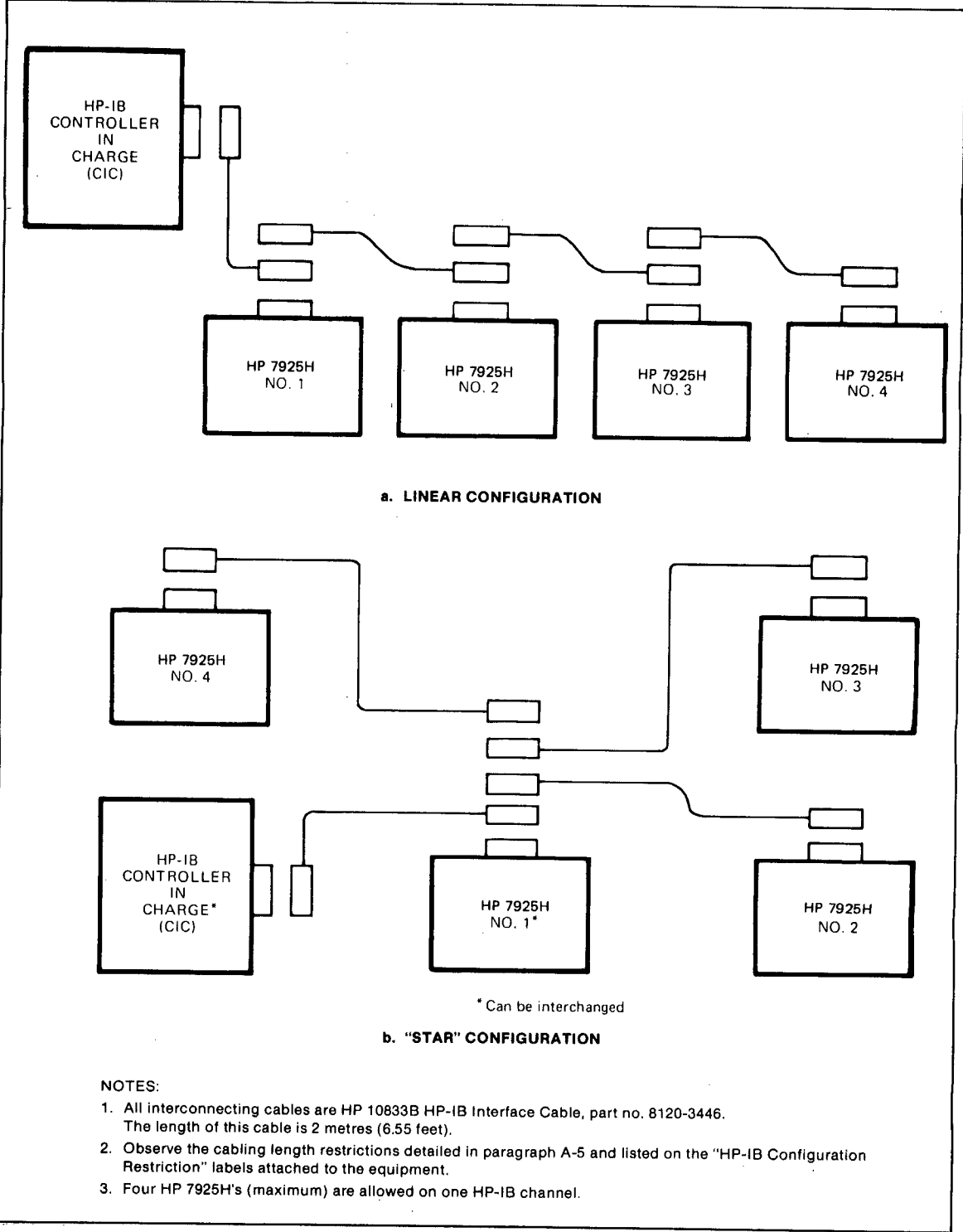
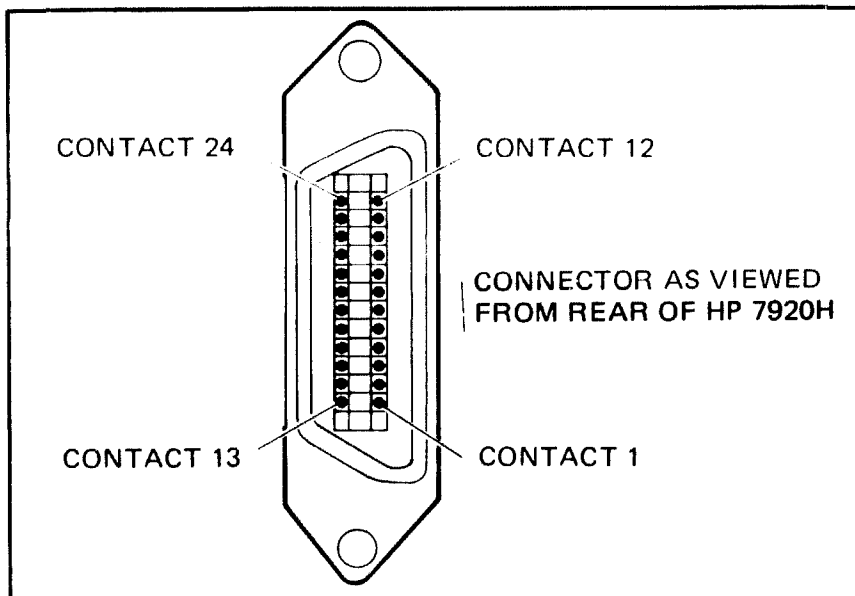


Figure A-7. H Model Interconnect Details

Table A-3. H Model HP-IB Pin Assignments



CONTACT	SIGNAL
1	DIO 1 — Data In/Out 1
2	DIO 2 — Data In/Out 2
3	DIO 3 — Data In/Out 3
4	DIO 4 — Data In/Out 4
5	EOI — End or Identify
6	DAV — Data Valid
7	NRFD — Not Ready for Data
8	NDAC — Not Data Accepted
9	IFC — Interface Clear
10	SRQ — Service Request
11	ATN — Attention
12	SHIELD — Shield
13	DIO 5 — Data In/Out 5
14	DIO 6 — Data In/Out 6
15	DIO 7 — Data In/Out 7
16	DIO 8 — Data In/Out 8
17	REN — Remote Enable
18	GND, (6)
19	GND, (7)
20	GND, (8)
21	GND, (9)
22	GND, (10)
23	GND, (11)
24	GND, LOGIC

NOTE: GND (n) refers to the signal ground return of the referenced contact.

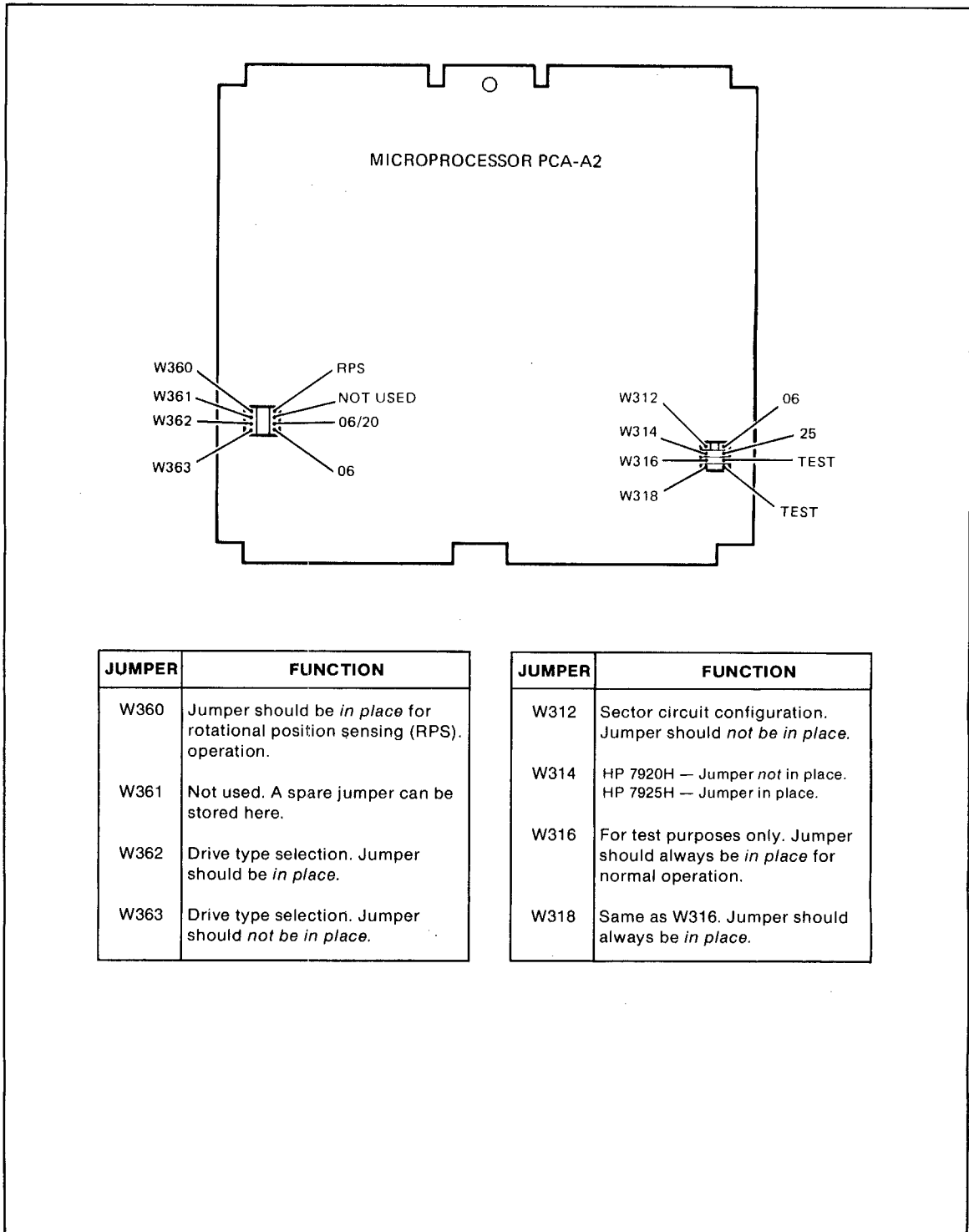


Figure A - 8. H Model Microprocessor PCA -A 2 Jumper Setting



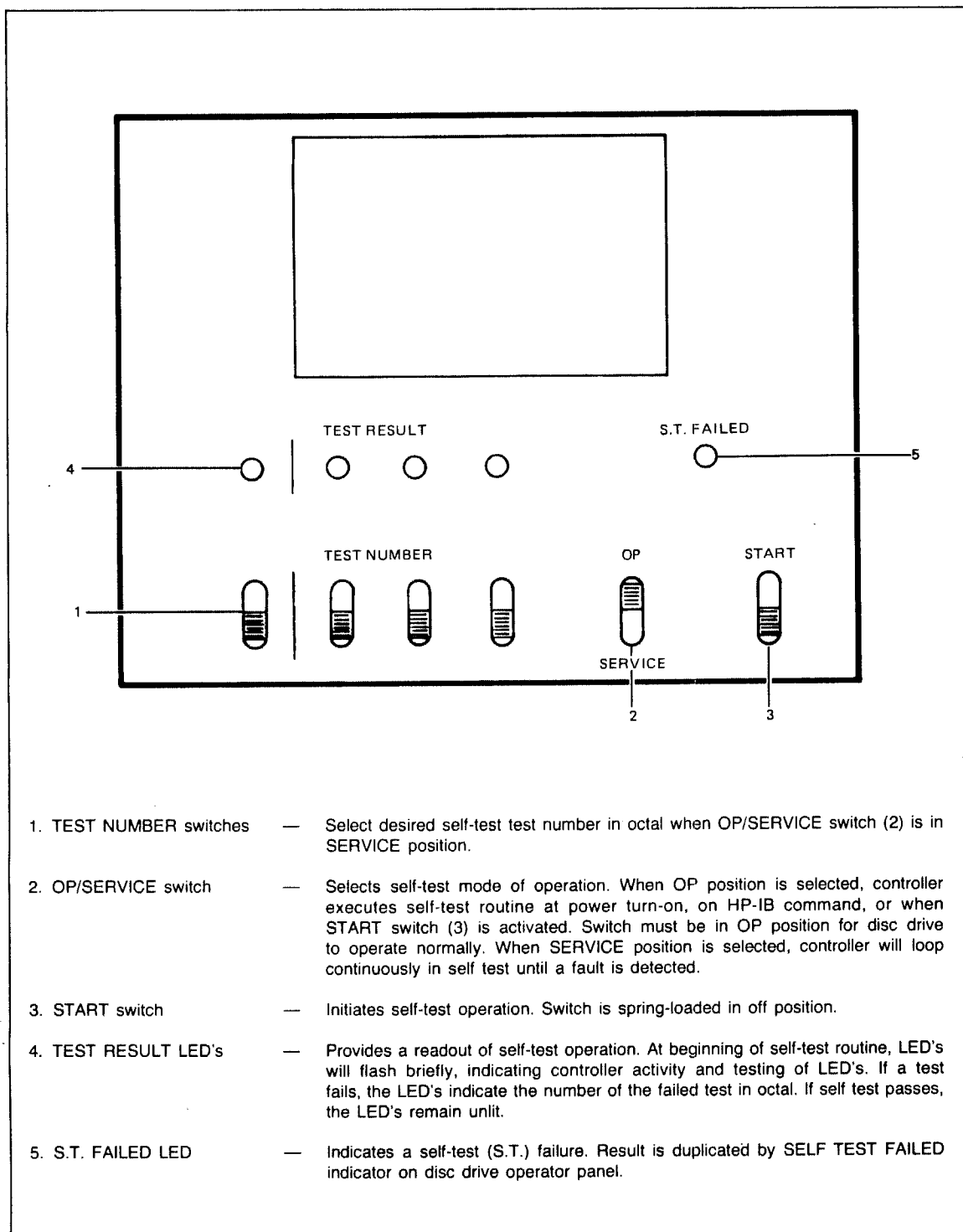


Figure A-9. H Model Self-Test Controls and Indicators

**Table A-4. H Model Self-Test Control Operation**

SWITCH SETTING	SELF-TEST ACTION	LED DISPLAY
OP/SERVICE switch: OP TEST NUMBER switches: Any setting START switch: Momentary operation	Tries to execute all tests once. If error in test 17, 16, or 15, controller hangs! If error in tests 14 through 1, exits immediately to controller firmware.	All LED's flash momentarily. If there is an error, TEST RESULT LED's display failed test number. S.T. FAILED LED is also lit. If there is no error, all LED's go off.
OP/SERVICE switch: OP TEST NUMBER switches: Any setting START switch: Held in on position <sup>2</sup>	Loops on entire self test until START switch is released. Exits test only when switch is released. Executes tests up to first error and then restarts self test.	All LED's flash momentarily each pass through self test. Error is not displayed until START switch is released.
OP/SERVICE switch: SERVICE <sup>3</sup> TEST NUMBER switches: n 2 START switch: Momentary operation	Loops on test n until first error is detected. Halts (JMP*) on error until START switch is set again (except for error in test 17, where controller hangs).	TEST RESULT LED's flash test n each time that test is completed. On error in test n, LED's continuously display section number of failure. S.T. FAILED LED is also lit.
OP/SERVICE switch: SERVICE <sup>3</sup> TEST NUMBER switches: 2 START switch: Momentary operation	Generates PHI tuning procedure.	Flashes 2 on TEST RESULT LED's.
OP/SERVICE switch: SERVICE <sup>3</sup> TEST NUMBER switches: 1 START switch: Momentary operation	Causes disc drive to do random seeks.	Flashes 1 on TEST RESULT LED's.
OP/SERVICE switch: SERVICE <sup>3</sup> TEST NUMBER switches: 0 START switch: Momentary operation	Loops on entire self test until error is detected. Halts on error until START switch is set again (except for errors in test 17, where controller hangs).	TEST RESULT LED's flash test number each time test is completed. On error in a test, LED's continuously display failed test number. S.T. FAILED LED is also lit.
<p>Notes:</p> <ol style="list-style-type: none"> <li>1. An error in test 17, 16, or 15 will cause the controller to hang (i.e., not respond to HP-IB commands). The only way to reset the controller after a test 17 failure is to reset the disc drive, either by cycling the disc drive power switch or the RUN/STOP switch. In tests 16 and 15, activating the START switch also restarts self test.</li> <li>2. In the service mode, with the START switch held in the on position, the controller will loop on the appropriate test (or entire self test) until the first error is detected, when it will start over again. The START switch inhibits error halts except in test 17.</li> <li>3. Always return the OP/SERVICE switch to the OP position to use the disc drive. Otherwise, the controller will not respond to HP-IB commands.</li> </ol>		

Table A - 5. H Model Self - Test Function Test Description

TEST NO.	TEST	DESCRIPTION
17	Microprocessor alive	This is the first test executed. It tests the heart of the microprocessor — the sequencers and the branching logic. Some ALU faults are also trapped by test 17. If a fault is detected in test 17, the controller hangs up in a JMP* loop. The only way to exit this loop is to either cycle the POWER switch or the disc drive RUN/STOP switch. This action resets the microprocessor and causes it to start self test over. There are no distinct sections within this test. On error, the TEST RESULT LED's display an octal 17 both in the OP (operating) and SERVICE positions of the OP/SERVICE switch.
16	RALU, Flags	This test checks the 2901 registers and arithmetic/logic units (RALU's), and the program status register flags. Like test 17, if a failure is detected in test 16, the controller hangs. Unlike test 17, the "hang" loop can be exited by activating the START switch. On error, the TEST RESULT LED's display an octal 16 continuously whether in the OP or SERVICE mode (unless the START switch is held in the on position).
15	PHI	<p>This test checks the PHI in its offline mode. The following items are tested:</p> <ul style="list-style-type: none"> <li>• PHI identity sequence</li> <li>• PHI interrupt flags</li> <li>• Inbound and outbound FIFO data test</li> <li>• Data tag bits (EOI and ATN)</li> </ul> <p>On error, test 15 outputs an octal 15 on the TEST RESULT LED's and hangs the controller, whether in the OP or SERVICE mode. The hang condition can be exited by activating the START switch.</p>
14	FIFO's	<p>This test checks the 9403 FIFO's in the controller. The following possible faults are tested:</p> <ul style="list-style-type: none"> <li>• NTORE stuck at 0 or 1 faults</li> <li>• Data errors within each FIFO</li> </ul> <p>At this point, the microprocessor and PHI are assumed good and errors can be reliably reported via the HP-IB. This is the first test that a) reports section numbers, and b) exits to the controller operating firmware after an error is detected. Even if test 14 fails, the controller attempts to execute commands and secondaries. Any operation involving data transfer through the FIFO's will probably fail.</p>
13	PHI/FIFO handshake	This test checks the PHI/FIFO handshake logic, sector word counters, read full/write full flip-flop, and EOT detector. The test transfers data from the FIFO, through the PHI, and back to the FIFO. The PHI is in its offline loopback mode.
12	Formatter/ Separator Loopback Test	<p>This test checks the formatter/separator, serial operation of the FIFO's (both in and out), the overrun detector, and the EOW/8th word counter. The test is divided into three subtests:</p> <ol style="list-style-type: none"> <li>a. The formatter/separator itself is first tested by passing a known data pattern from the FIFO through the formatter/separator in its loopback mode and back into the FIFO. The received data pattern is then compared with the original.</li> <li>b. The overrun detector is then checked by clearing the FIFO and enabling the formatter/separator. An overrun will result when the formatter/separator tries to pull data from an empty FIFO.</li> <li>c. Finally, the 8th word counter is tested by passing 16 bytes through the formatter/separator, counting EOW's, and seeing that the 8th word flag is set only after the 16th byte (8th word) is transferred.</li> </ol>

**Table A - 5. H Model Self - Test Function Test Description (cont)**

TEST NO.	TEST	DESCRIPTION
11	CRC/Data Path Switch	This test checks the CRC generator/checker (9401) and the data path switch (CRC multiplexer). It checks that the CRC chip generates the proper CRC pattern and properly detects CRC errors. A known pattern is loaded into the FIFO, sent through the CRC chip, and returned through the formatter/separator to the FIFO. The generated CRC pattern is then switched into the data path and loaded into the FIFO, where it is checked against the expected results. The ANYER (CRC error) flag is also checked as data is shifted through the CRC chip.
10	Drive Status	This test looks at the drive status register and reports an error if the disc drive is busy with drive ready set or if the drive is faulted. Self test will loop on Tests 17 through 10 until Drive Ready becomes active, flashing octal 10 every time test 10 is executed. If Drive Ready does not become true before 92 seconds have elapsed, the S.T. FAILED LED will light and the TEST RESULT LED's will display octal 10. Note: If the disc drive is powered on and the RUN/STOP switch is not in the RUN position or the disc pack is not in place, the resulting absence of Drive Ready will cause the S.T. FAILED indicator to come on approximately 92 seconds after power on is initiated. If this occurs, proper preparation of the disc drive for operation (disc pack installed and RUN/STOP switch set to RUN) will allow the self-test routine to start again.
7	Head/Sector Logic	This test checks much of the I/O sector logic of the controller. The head register is first tested for stuck-at faults. Disallowing drive types (set via the drive type jumpers) will also be reported as an error. The index counters, sector counters, sector comparators, sector registers, and sector compare flip-flop are also tested here. This section of the test is executed twice, once with head 1 addressed and once with head 2 addressed. This tests both sets of sector counters if the drive type is set to a 7906.
6	Recalibrate Test	This test issues a RECALIBRATE command to the drive, waits for drive attention (with a time limit of 1275 milliseconds), and checks the resulting drive status. If the recalibrate does not complete in time, a timeout error is reported. If an attention is received in time, the drive status is then checked; bad drive status is reported to the TEST RESULT LED's.
5	Seek Test	This test exercises the seek function of the disc drive by issuing a seek to the maximum cylinder address. If the seek completes within 100 milliseconds, the controller issues a seek to the maximum cylinder address + 1, forcing a seek check. If a seek check does in fact occur, the controller then issues a seek to cylinder 0, again with a 100 millisecond timeout. No address verification is done in this test, but if the drive does not end up on cylinder 0, the verify test which follows will fail.
4	Set Offset Test	The purpose of this test is to see if a set offset drive order to the disc drive will complete. The maximum positive offset (+63), maximum negative offset (-63), and zero offset are sent to the disc drive in that order. If attention is not received within 10 milliseconds, a timeout error is reported. This test does not verify that the heads are actually offset the proper direction and magnitude.
3	Verify Cylinder 0	This test attempts to verify cylinder 0 with no head offset. The purpose of this test is to check the read data path from the heads, through the preamp, and to the data separator. This test also verifies that the heads are on cylinder 0 by checking the address field in a sector. The entire cylinder is verified in cylinder mode with track sparing enabled. If a data error is found in any sector, one retry is attempted. If the retry also results in a data error, the test is aborted, and the failure is reported to the test panel LED's. No limit is placed on the number of retries allowed for the entire cylinder. Test 3 can fail due to several non-hardware related problems. Bad media, a track flagged defective but not properly spared, or a spare track in cylinder 0 will cause a test 3 failure. However, the drive can still be used after a test 3 failure.

Table A-5. H Model Self-Test Function Test Description (cont)

TEST NO.	TEST	DESCRIPTION
2	PHI Tuning Procedure	This test is not a legitimate part of the self-test routine. It is provided for diagnostic and service purposes. When selected, self test loops through the program steps described in the PHI data sheet. The HSE waveform can be measured and the delay stabilization trimmer adjusted.
1	Drive Random Seek Procedure	This test is not a legitimate part of the self-test routine. It is provided for diagnostic and service purposes. When selected, self test will generate seek commands using a pseudo-random number generator.

Table A -6. H Model Test Failure Summary

TEST NO.	SECTION NO.	TEST RESULT LED'S	TEST/SECTION FAILURE	PROBABLE SOURCE	
17	—	● ● ● ●	MICROPROCESSOR	PCA-A2*, disc drive	
16	—	● ● ● ○	RALU, FLAGS	PCA-A2	
15	—	● ● ○ ●	PHI	PCA-A1*, PCA-A2	
14	17	● ● ○ ○	FIFO's	PCA-A1*, PCA-A2	
	16	● ● ● ●	NTORE stuck-at-0.	PCA-A1*, PCA-A2	
	15	● ● ● ○	NTORE stuck-at-1.	PCA-A1*, PCA-A2	
	14	● ● ○ ●	Upper FIFO data error. Lower FIFO data error.	PCA-A1 PCA-A1	
13	17	● ○ ● ●	PHI/FIFO HANDSHAKE	PCA-A1	
	16	● ● ● ●	EOT flag stuck.	PCA-A1	
	15	● ● ● ○	Write-to-PHI not complete.	PCA-A1	
	14	15	● ● ○ ●	Sector word counter does not handshake.	PCA-A1
		14	● ● ○ ○	Read full/write full does not override EOS (read from PHI handshake does not complete).	PCA-A1
	13	● ○ ● ●	EOT not detected.	PCA-A1	
12	● ○ ● ○	Lower NYBBLE data bad.	PCA-A1		
11	● ○ ○ ●	Upper NYBBLE data bad.	PCA-A1		
12	17	● ○ ● ○	FORMATTER/SEPARATOR	Data PCA-A1*, PCA-A2	
	16	● ● ● ●	EOW stuck true.	PCA-A1	
	15	● ● ● ○	No EOW in data test.	PCA-A1	
	14	15	● ● ○ ●	Bad data from formatter/separator.	PCA-A1
		14	● ● ○ ○	Overrun stuck true.	PCA-A1*, PCA-A2
	13	● ○ ● ●	Undetected overrun.	PCA-A1*, PCA-A2	
	12	● ○ ● ○	No EOW in 8th word test.	PCA-A1	
	11	● ○ ○ ●	8th word flag stuck true.	PCA-A1*, PCA-A2	
10	● ○ ○ ○	8th word flag stuck false.	PCA-A1*, PCA-A2		
11	17	● ○ ○ ●	CRC/DATA PATH SWITCH	PCA-A1*, PCA-A2	
	16	● ● ● ●	No EOW in test.	PCA-A1	
	15	● ● ● ○	CRC error stuck false.	PCA-A1*, PCA-A2	
	14	● ● ○ ●	CRC error stuck true. Bad generated CRC pattern.	PCA-A1*, PCA-A2 PCA-A1	
10	17	● ○ ○ ○	DRIVE STATUS	Drive electronics*, PCA-A2	
	16	● ● ● ●	Drive fault.	Drive electronics	
	10	● ● ● ○	Drive busy while ready.	Drive electronics, PCA-A2	
		● ○ ○ ○▲	Drive not ready.	Drive electronics	

○ = LED "OFF"

● = LED "ON"

▲ Display flashing

\* Most probable source

Table A -6. H Model Test Failure Summary (cont)

TEST NO.	SECTION NO.	TEST RESULT LED'S	TEST/SECTION FAILURE	PROBABLE SOURCE
7	17	○ ● ● ●	HEAD/SECTOR LOGIC Illegal drive type.	PCA-A2*, drive electronics
	16	● ● ● ○	Bad head register.	PCA-A2
	15	● ● ○ ●	Sector count too large (head 1)	PCA-A2
	14	● ● ○ ○	Sector count not incrementing (head 1).	PCA-A2*, drive electronics
	13	● ○ ● ●	Sector count not properly cleared (head 1).	PCA-A2*, drive electronics
	12	● ○ ● ○	Sector compare stuck-at-1 (head 1).	PCA-A2
	11	● ○ ○ ●	Sector compare stuck-at-0 (head 1).	PCA-A2
	10	● ○ ○ ○	Sector compare set more than once per revolution (head 1).	PCA-A2
	7	○ ● ● ●	Sector count too large (head 2).	PCA-A2
	6	○ ● ● ○	Sector count not incrementing (head 2).	PCA-A2
	5	○ ● ○ ●	Sector count not properly cleared head 2).	PCA-A2*, drive electronics
	4	○ ● ○ ○	Sector compare stuck-at-1 (head 2).	PCA-A2
	3	○ ○ ● ●	Sector compare stuck-at-0 (head 2).	PCA-A2
2	○ ○ ● ○	Sector compare set more than once per revolution (head 2).	PCA-A2	
6	17	○ ● ● ○	RECALIBRATE Recalibrate timeout error.	Drive electronics*, PCA-A2
	16	● ● ● ●	Attention stuck-at-1.	Drive electronics*, PCA-A2
	4	○ ● ○ ○	Drive busy and attention set.	Drive electronics*, PCA-A2
	3	○ ○ ● ●	Drive not ready.	Drive electronics
	2	○ ○ ● ○	Seek check.	Drive electronics*, PCA-A2
	1	○ ○ ○ ●	Drive fault.	Drive electronics
5	17	○ ● ○ ●	SEEK Seek timeout error.	Drive electronics*, PCA-A2
	16	● ● ● ●	Attention stuck-at-1.	Disc drive*, PCA-A2
	15	● ● ○ ●	Undetected seek check.	Drive electronics
	4	○ ● ○ ○	Drive busy and attention set.	Drive Electronics
	3	○ ○ ● ●	Drive not ready.	Drive electronics
	2	○ ○ ● ○	Seek check.	Drive electronics*, PCA-A2
1	○ ○ ○ ●	Drive fault.	Drive electronics	
4	17	○ ● ○ ○	SET OFFSET Set offset timeout error.	Drive electronics*, PCA-A2
	16	● ● ● ●	Attention stuck-at-1.	Drive electronics*, PCA-A2
	4	○ ● ○ ○	Drive busy and attention set.	Drive electronics
	3	○ ○ ● ●	Drive not ready.	Drive electronics
	2	○ ○ ● ○	Seek check.	Drive electronics
	1	○ ○ ○ ●	Drive fault.	Drive electronics
		○ = LED "OFF"      ● = LED "ON"	* Most probable source	

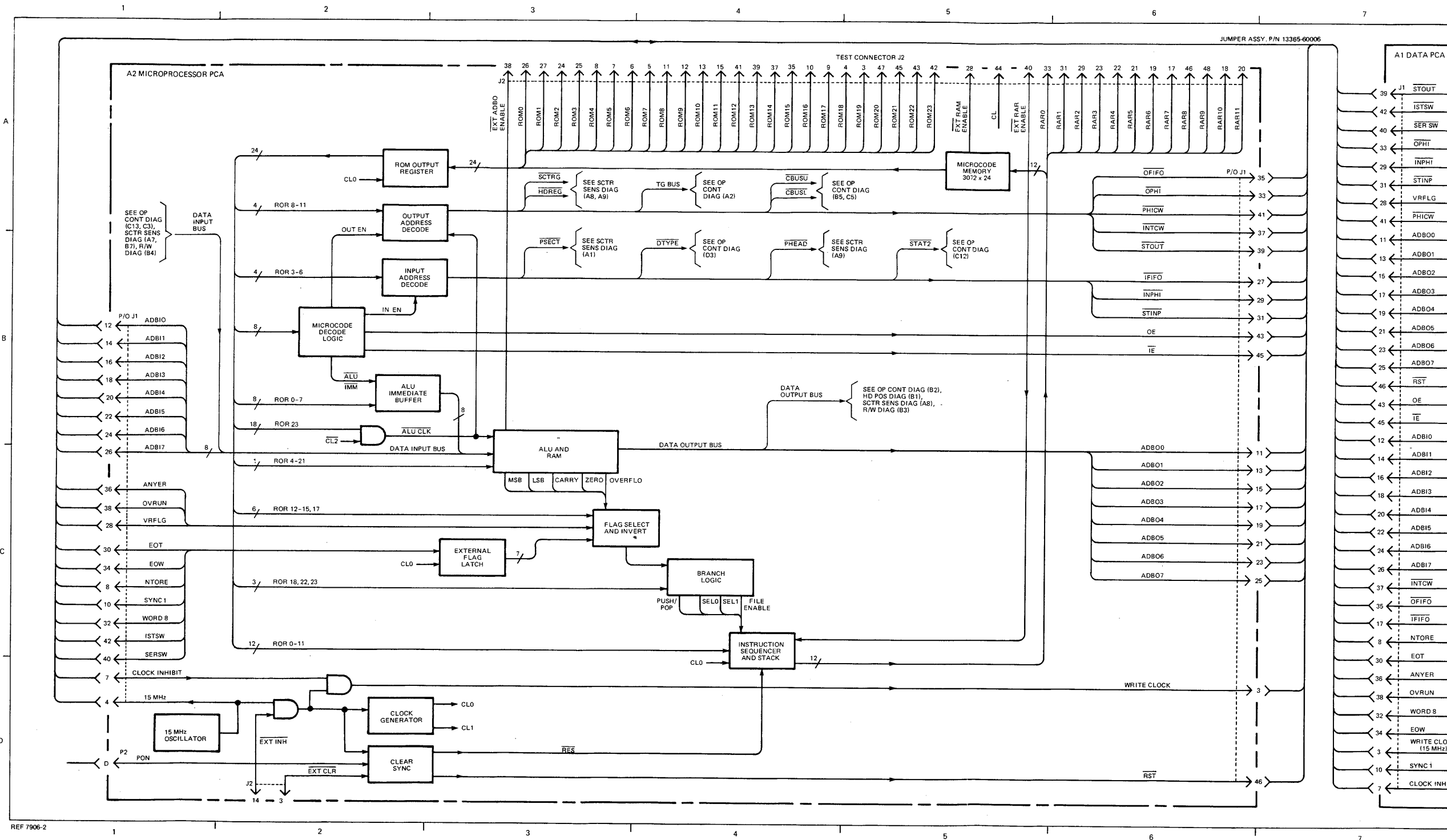
Table A-6. H Model Test Failure Summary (cont)

TEST NO.	SECTION NO.	TEST RESULT LED'S	TEST/SECTION FAILURE	PROBABLE SOURCE
3		○ ○ ● ●	VERIFY CYLINDER ZERO	Drive electronics* disc cartridge, PCA-A1
	17	● ● ● ●	Drive status error.	Drive electronics
	16	● ● ● ○	Address miscompare.	Drive electronics
	15	● ● ○ ●	Defective track error.	Disc cartridge
	14	● ● ○ ○	Direct access to spare track.	Disc cartridge
	13	● ○ ● ●	Head 10 data error.	Disc cartridge*, PCA-A6, PCA-A5
	12	● ○ ● ○	Head 9 data error.	Same as section 13
	11	● ○ ○ ●	Head 8 data error.	Same as section 13
	10	● ○ ○ ○	Head 7 data error.	Same as section 13
	7	○ ● ● ●	Head 6 data error.	Same as section 13
	6	○ ● ● ○	Head 5 data error.	Same as section 13
	5	○ ● ○ ●	Head 4 data error.	Same as section 13
	4	○ ● ○ ○	Head 3 data error.	Same as section 13
	3	○ ○ ● ●	Head 2 data error.	Same as section 13
	2	○ ○ ● ○	Head 1 data error.	Same as section 13
1	○ ○ ○ ●	Head 0 data error.	PCA-A1*, disc cartridge, PCA-A6, PCA-A5	
		○ = LED "OFF"      ● = LED "ON"	* Most probable source	

Table A-7. H Model Visual Indication of Drive Status

INDICATOR/ INDICATION	ACTIVE STATE		FUNCTIONAL DIAGRAM
	LOGIC EQUATION	CIRCUIT DESCRIPTION	
Unit Select Identification Indicator	SEL	Indicator is off when any one of the following conditions is met: a. Self test is running. b. Controller is in Idle State 2 or Idle State 3.	Operation Control System, figure A-16.





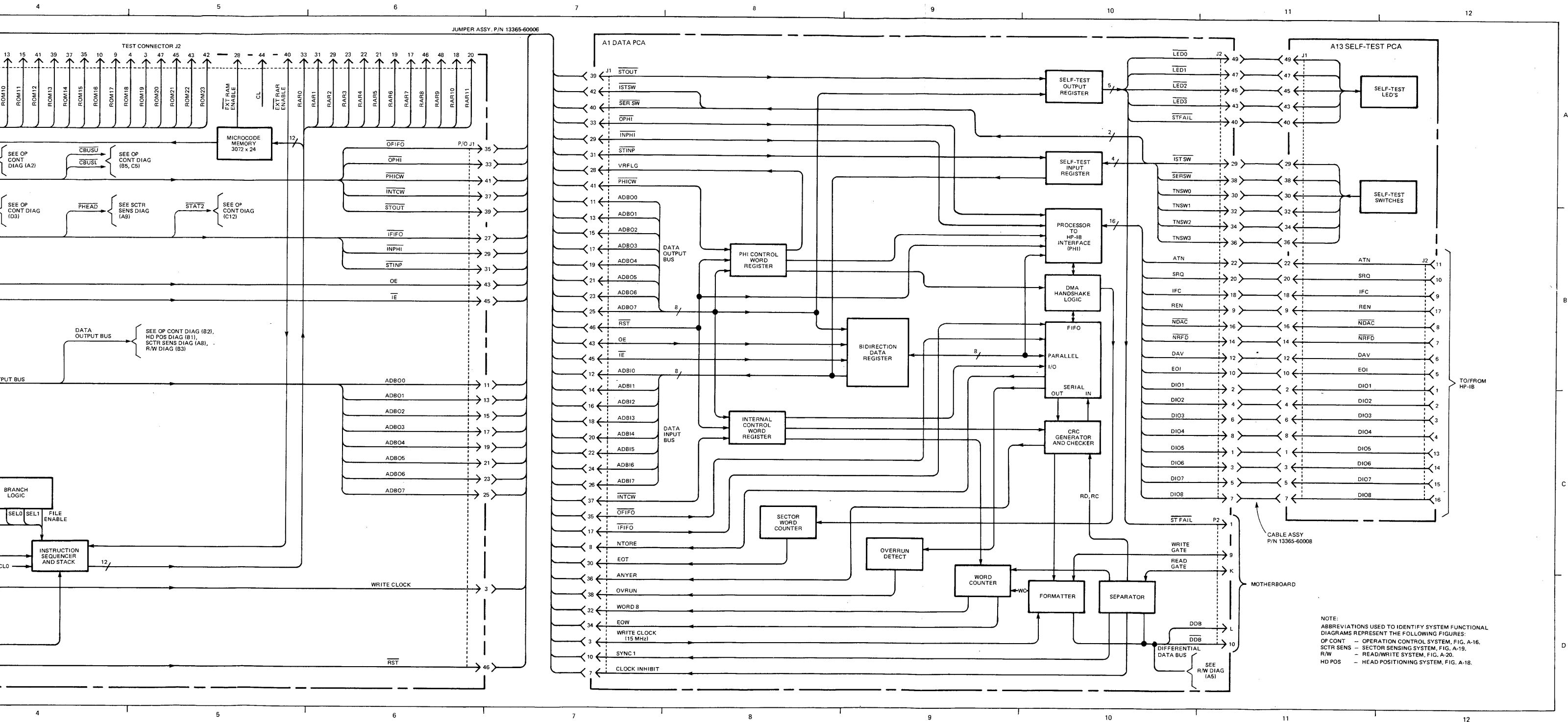
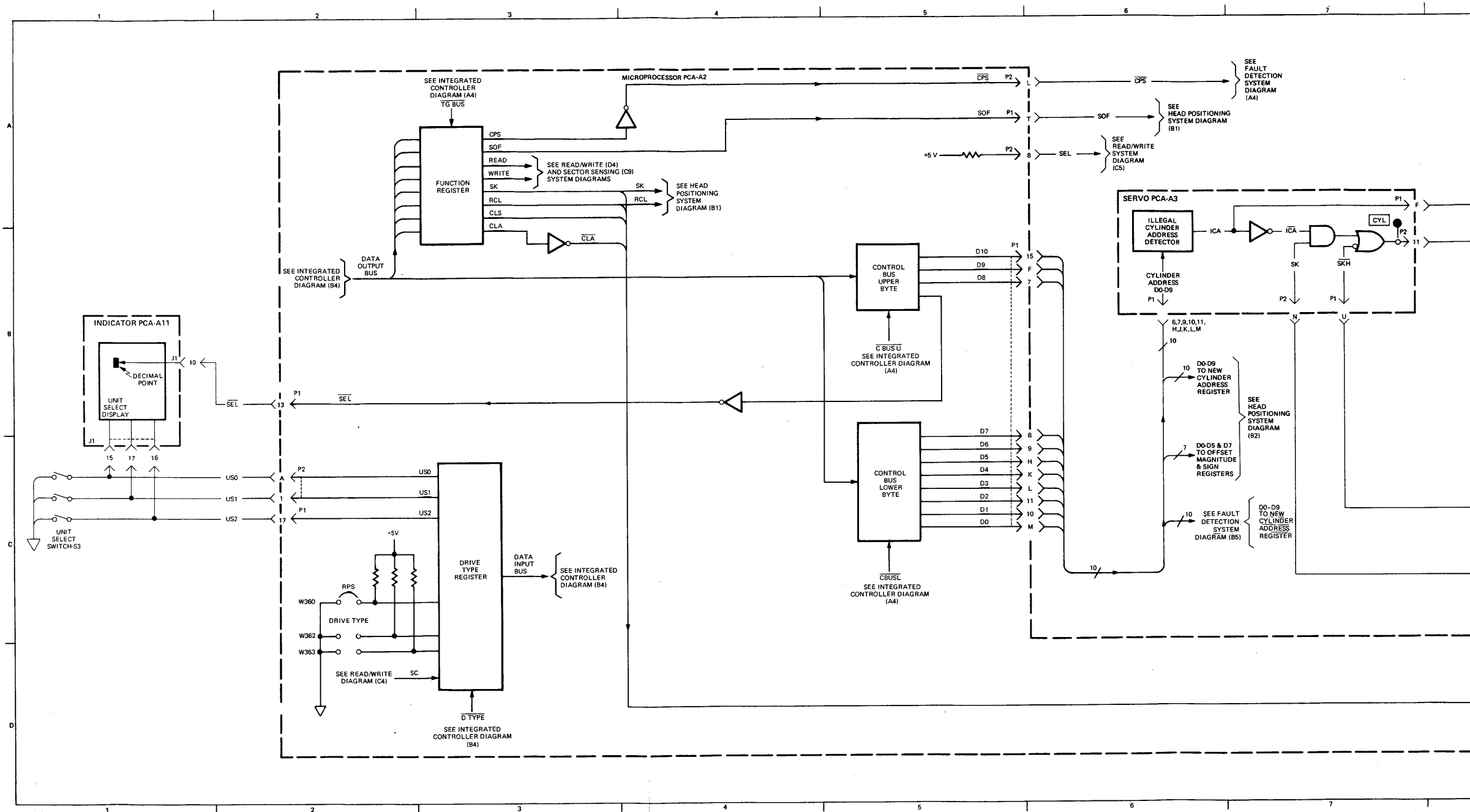


Figure A-10. H Model Integrated Controller, Functional Diagram



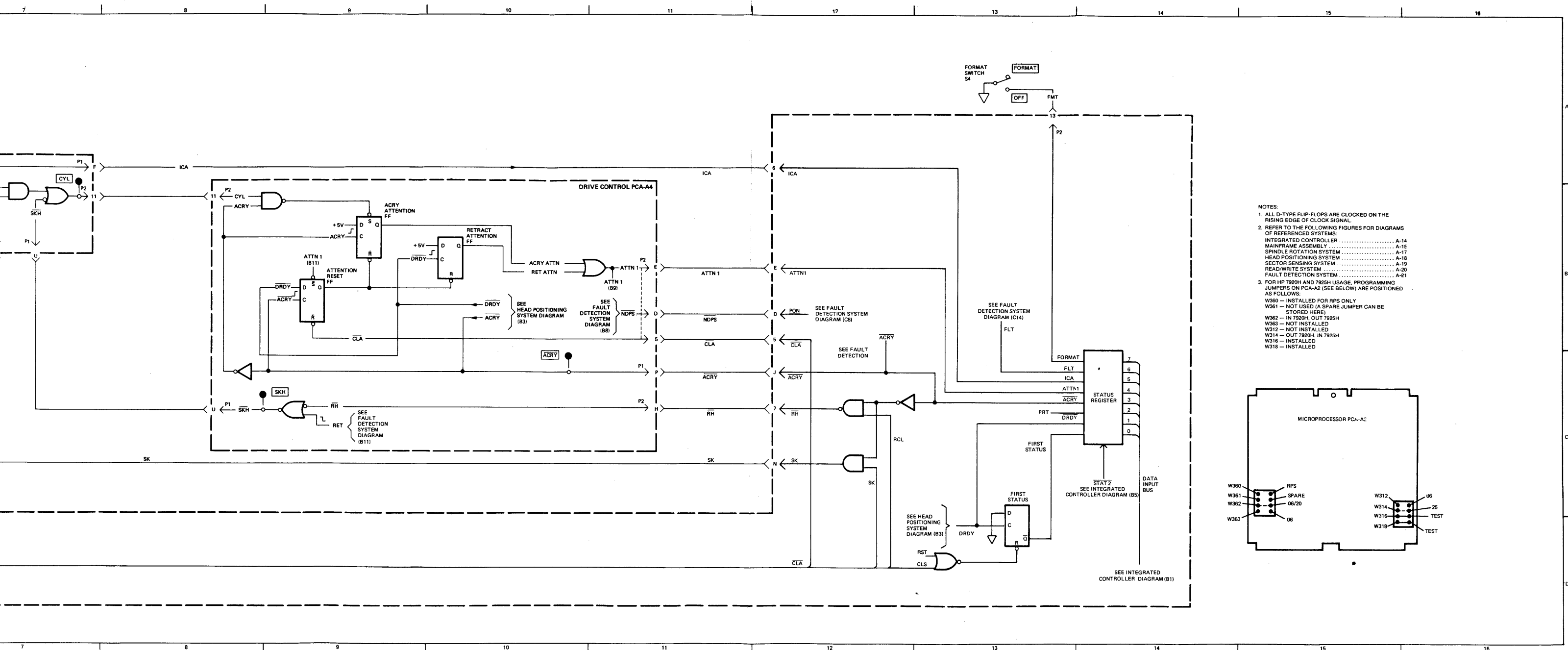
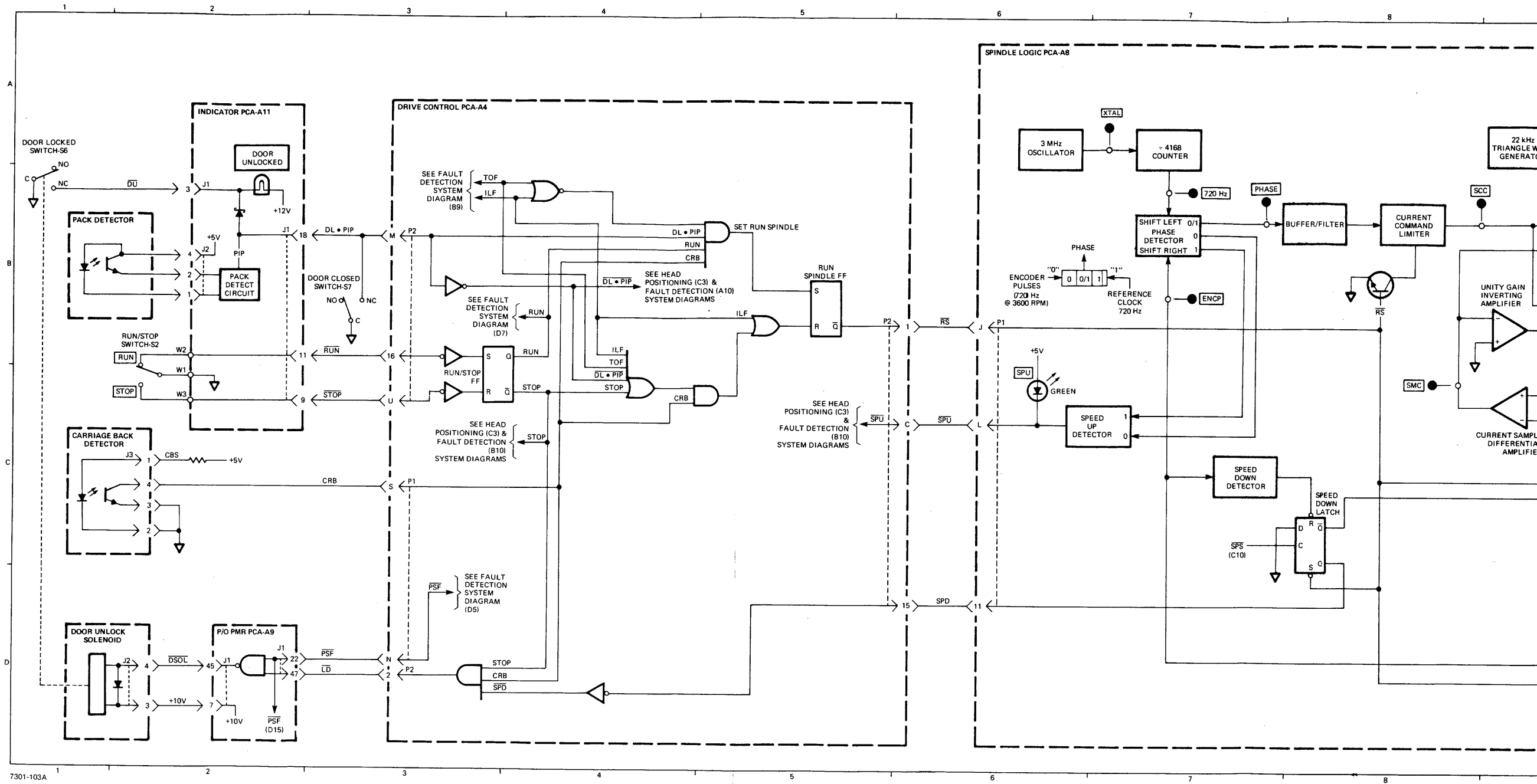


Figure A-11. H Model Operation Control System, Functional Diagram



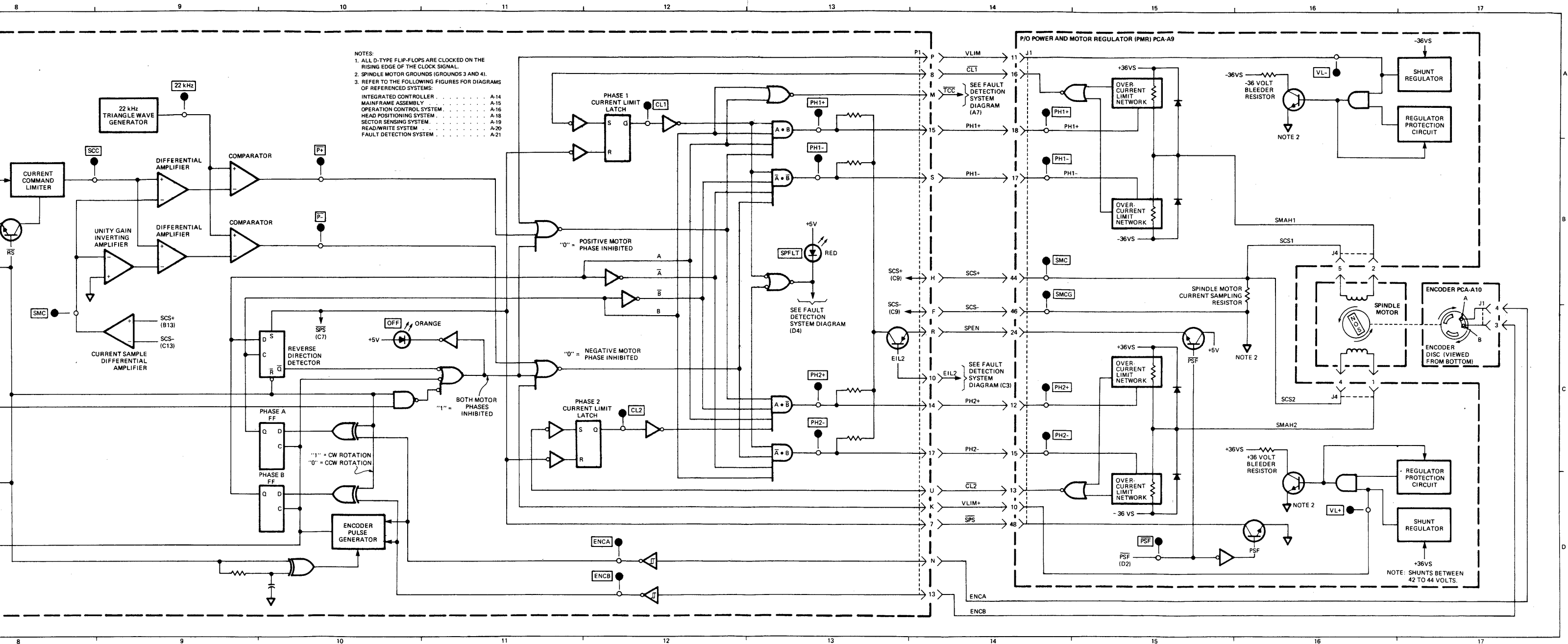
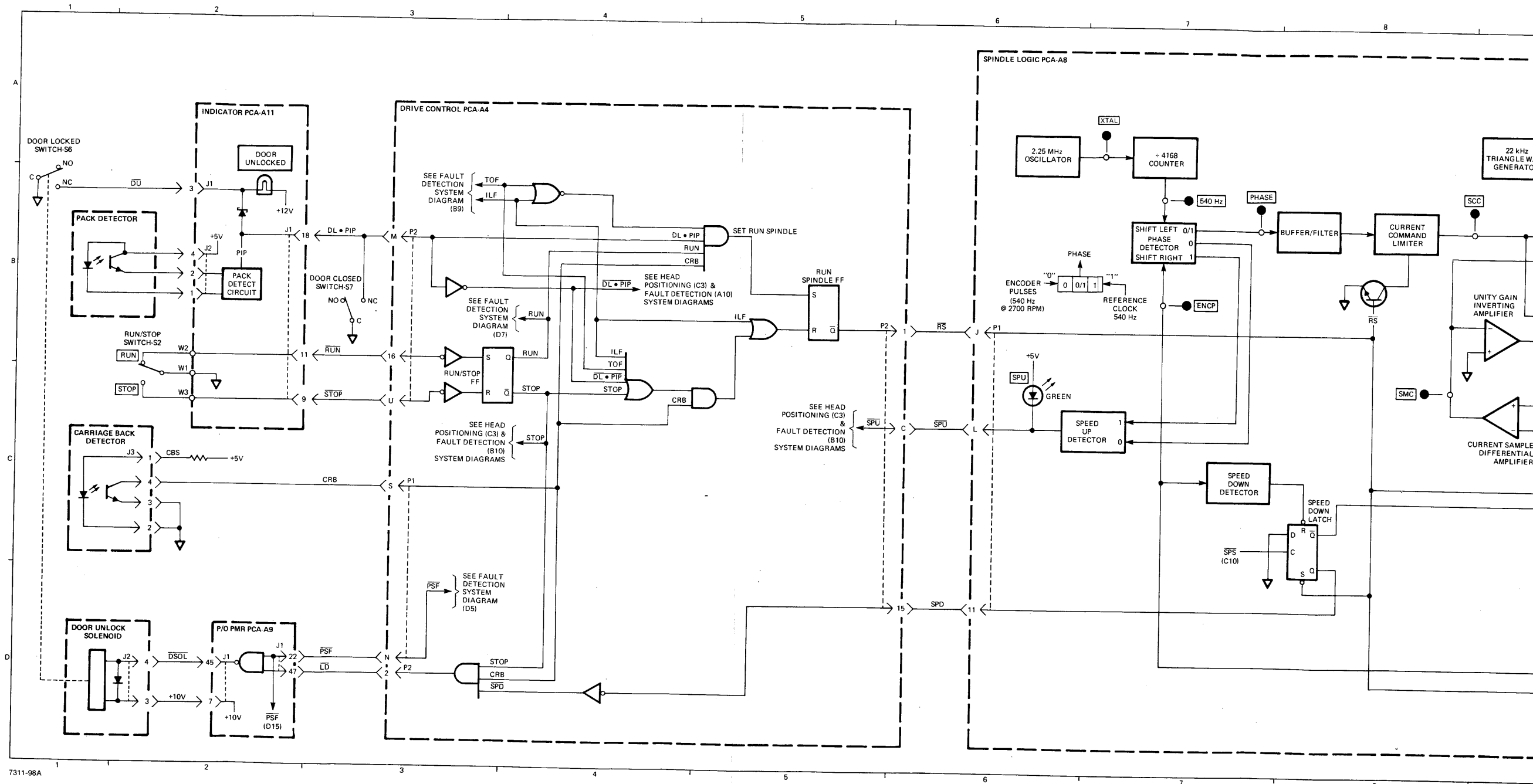


Figure A-12. HP 7920H Spindle Rotation System, Functional Diagram



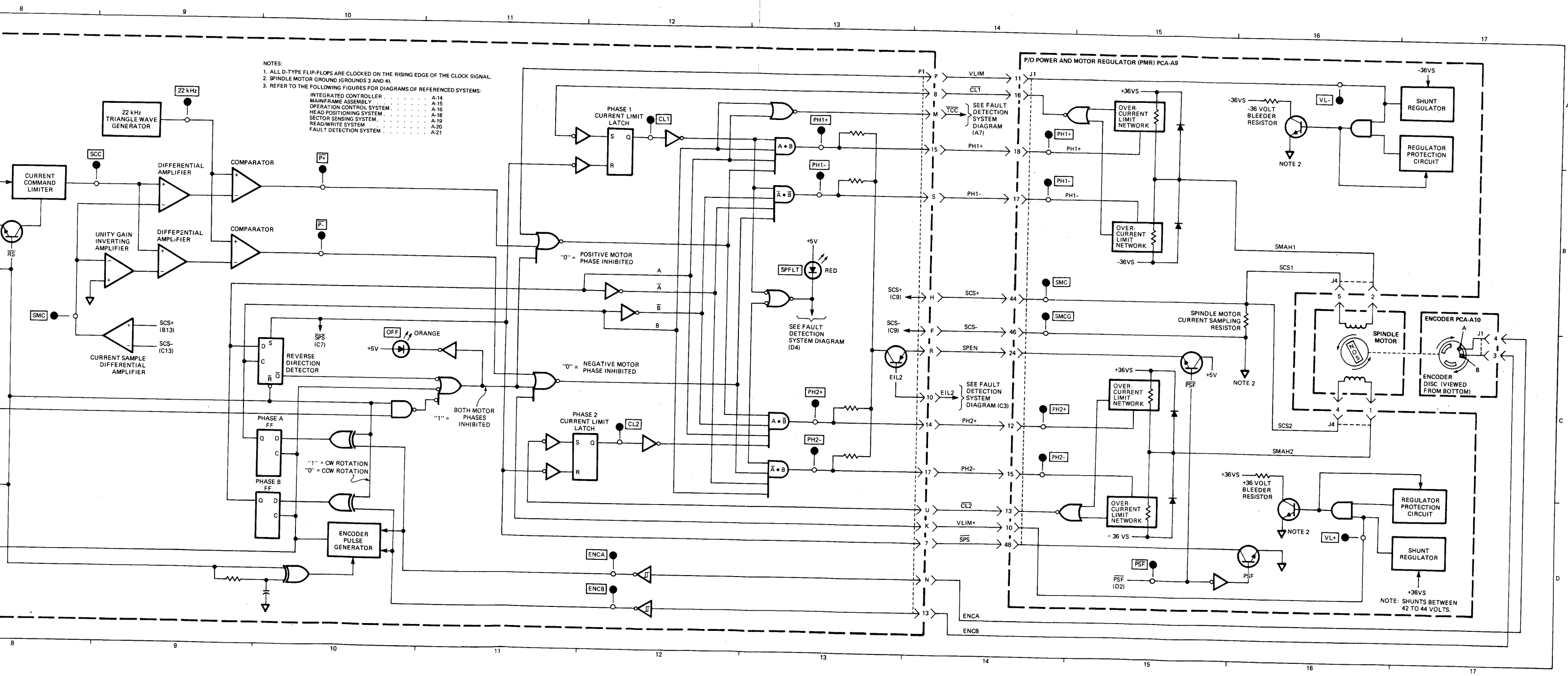
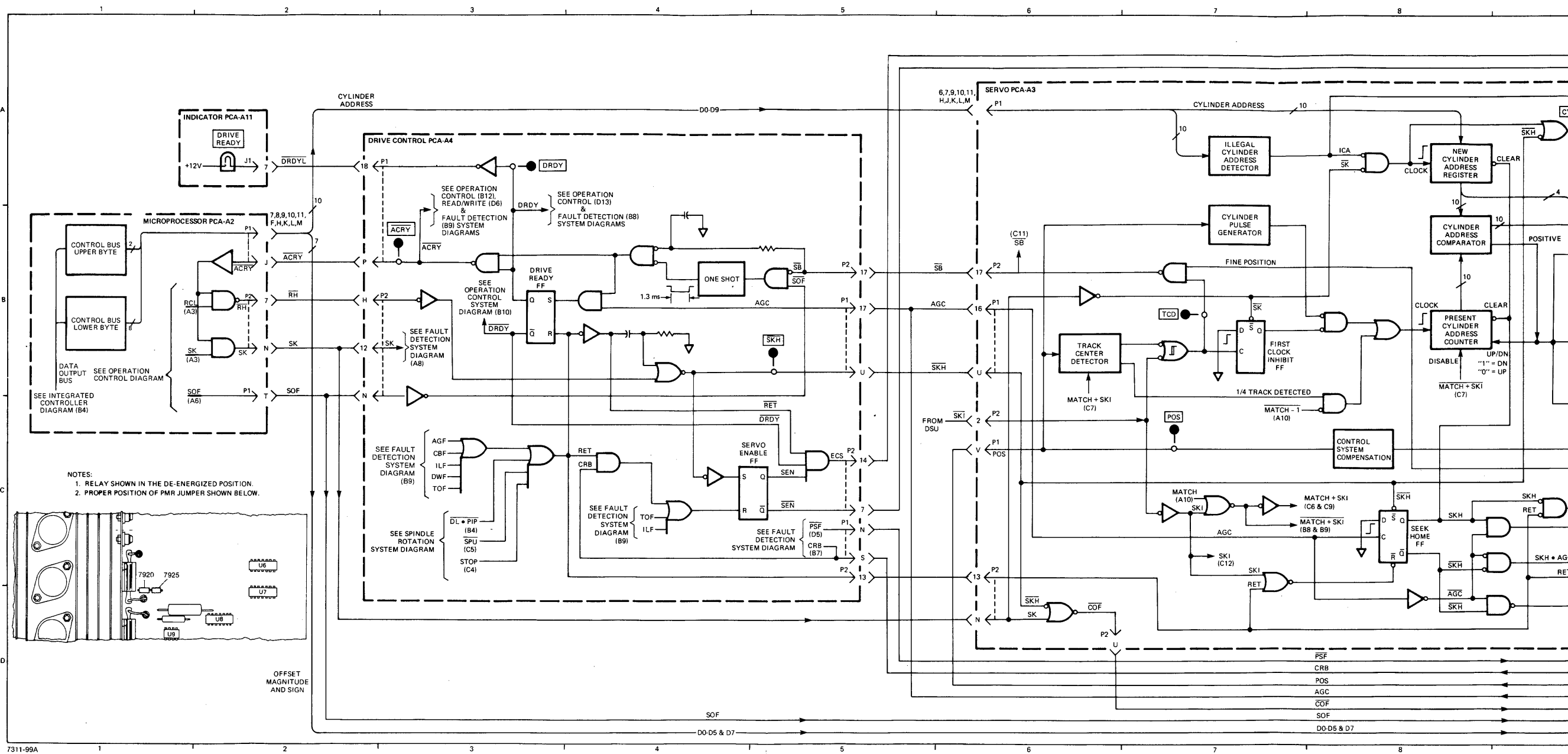
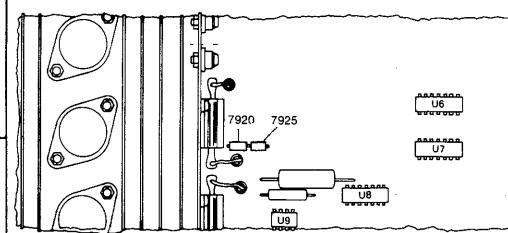


Figure A-13. HP 7925H Spindle Rotation System, Functional Diagram





NOTES:  
 1. RELAY SHOWN IN THE DE-ENERGIZED POSITION.  
 2. PROPER POSITION OF PMR JUMPER SHOWN BELOW.



OFFSET  
 MAGNITUDE  
 AND SIGN

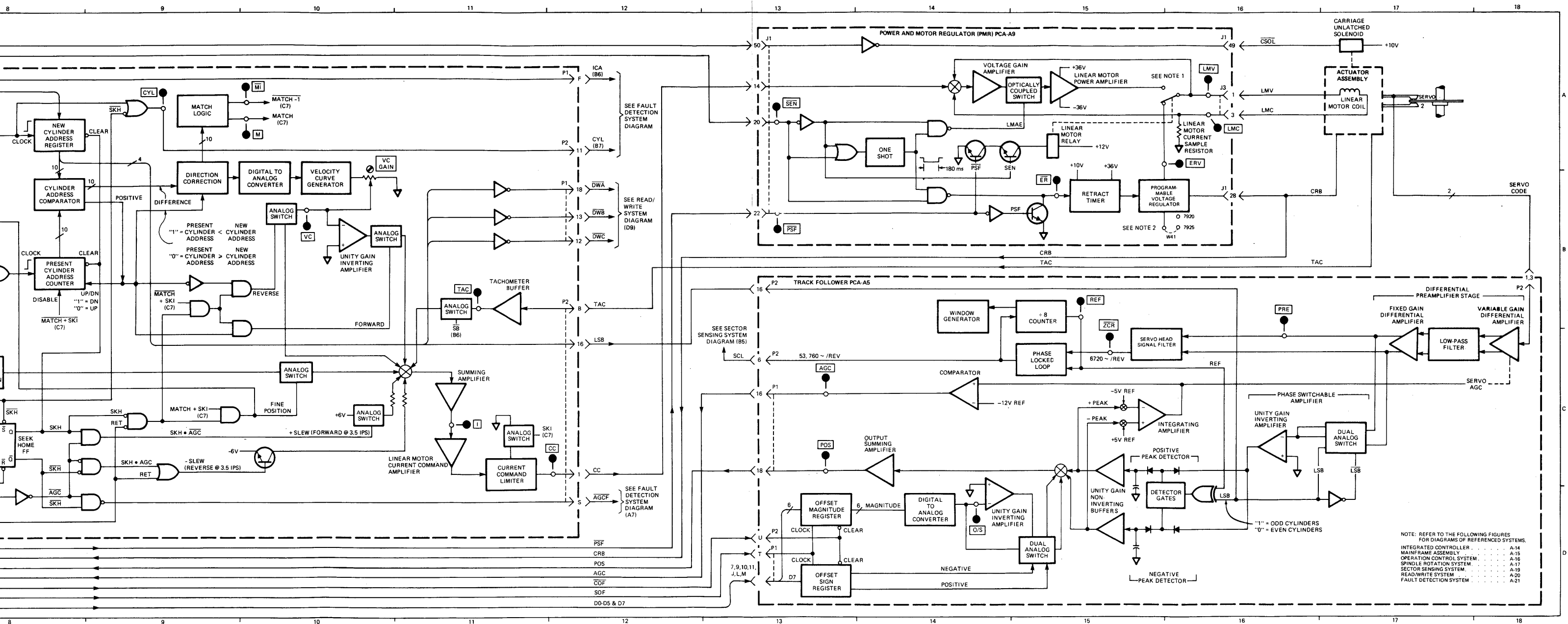
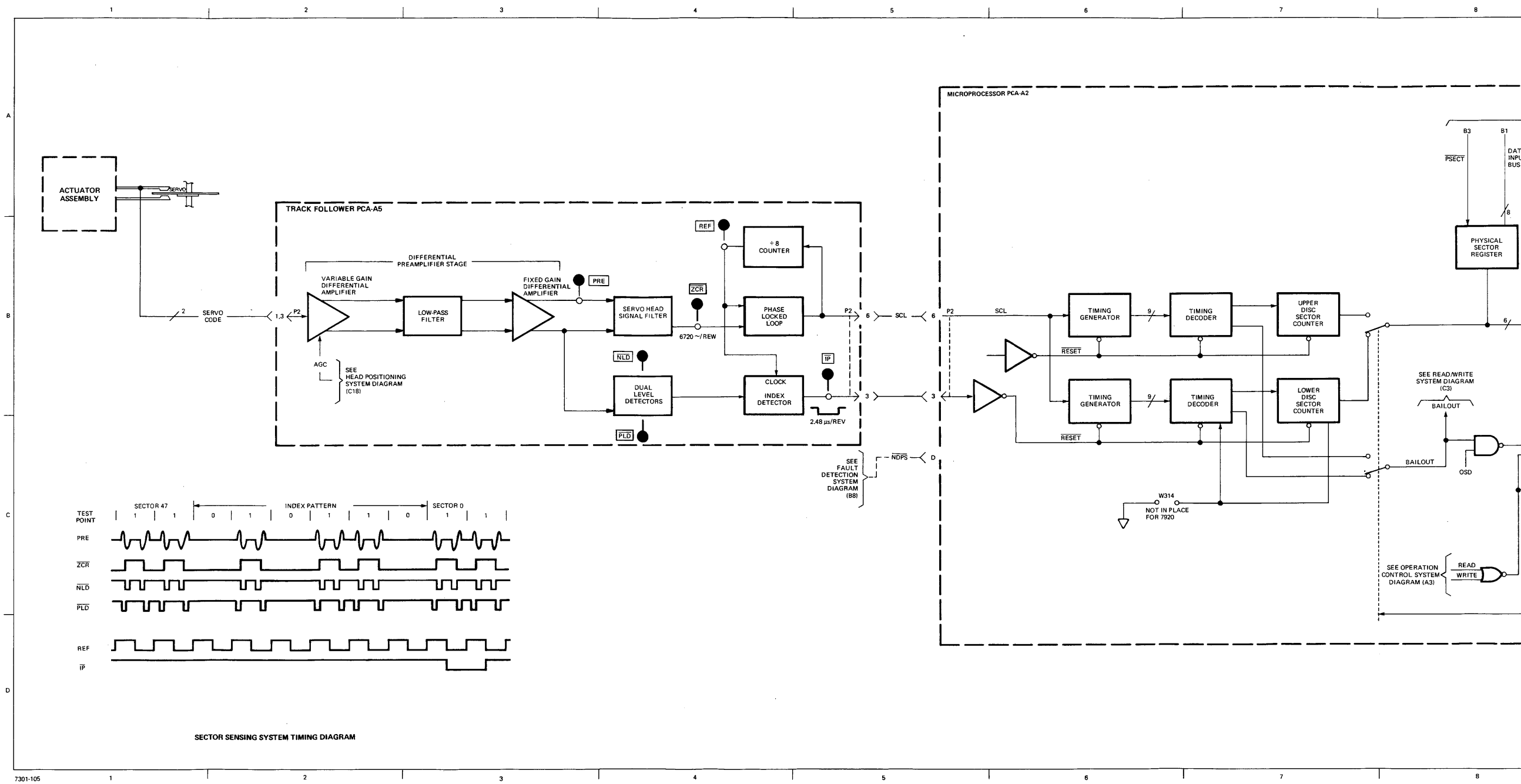


Figure A-14. H Model Head Positioning System, Functional Diagram



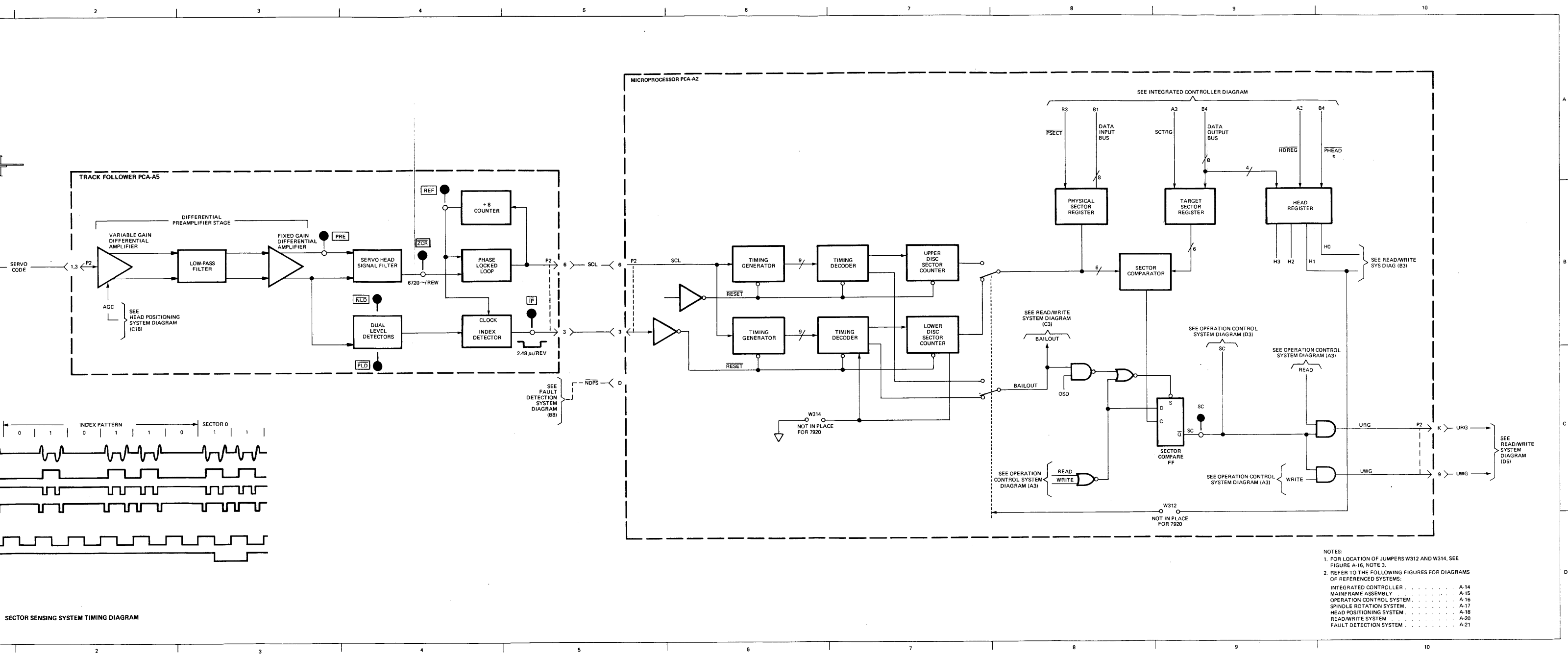
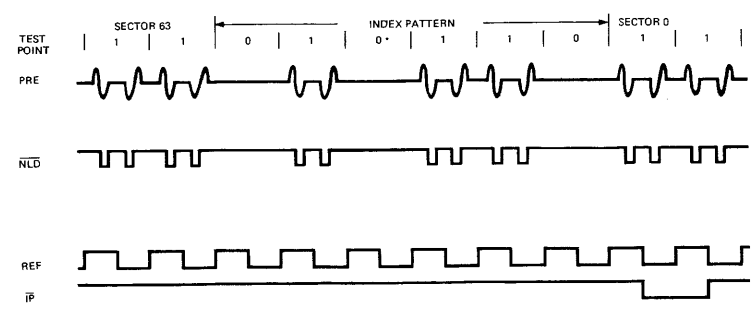
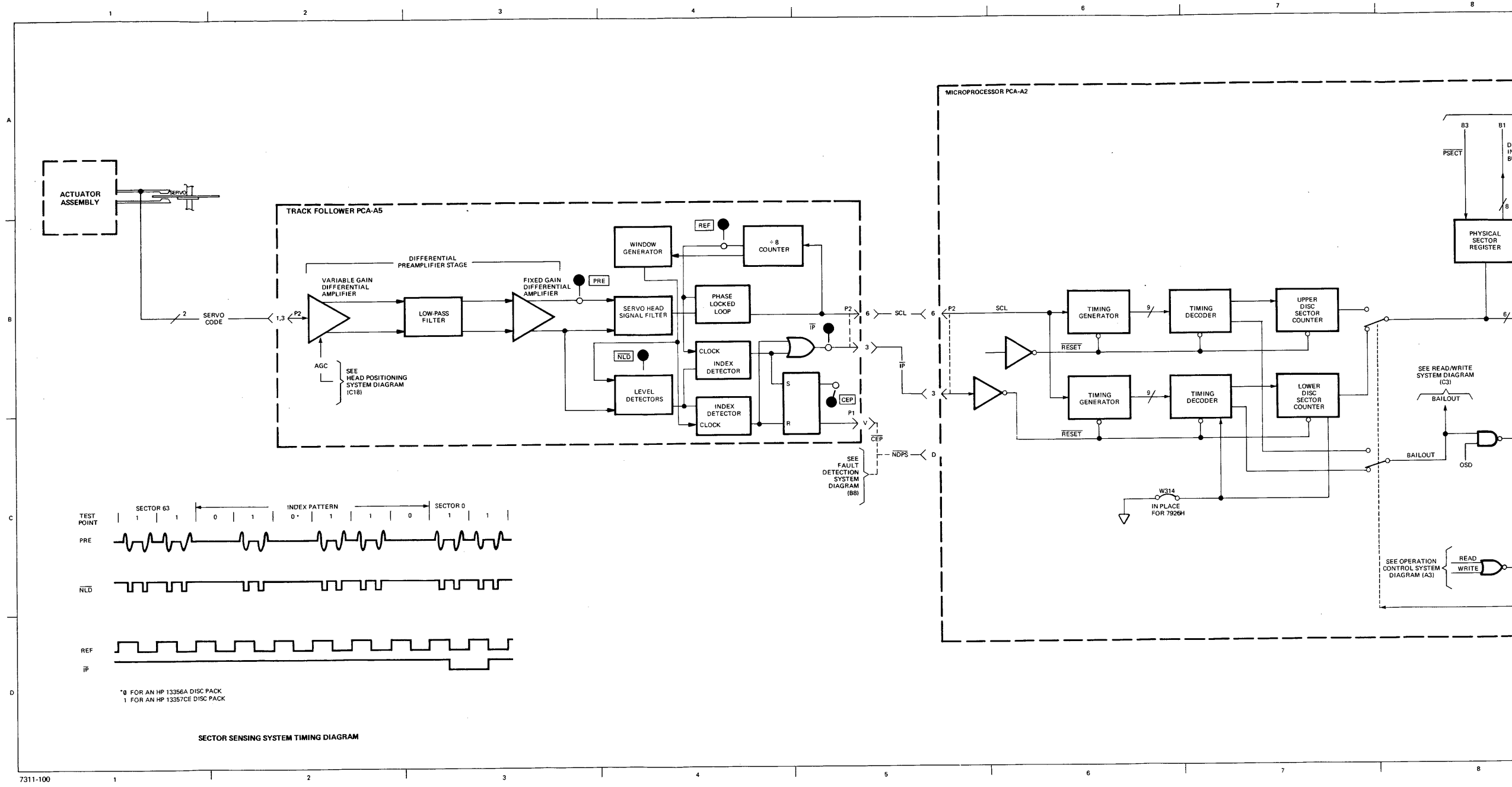


Figure A-15. HP 7920H Sector Sensing System, Functional Diagram



\*0 FOR AN HP 13356A DISC PACK  
 1 FOR AN HP 13357CE DISC PACK

SECTOR SENSING SYSTEM TIMING DIAGRAM

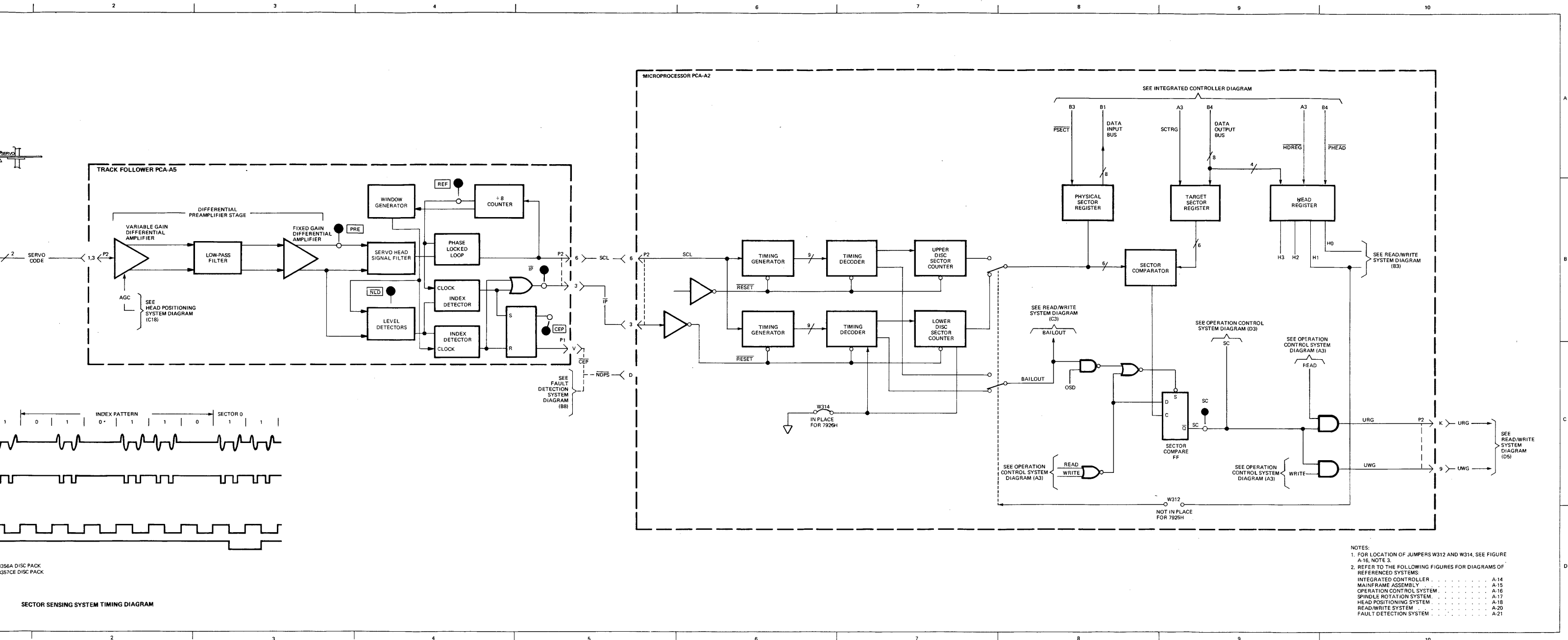
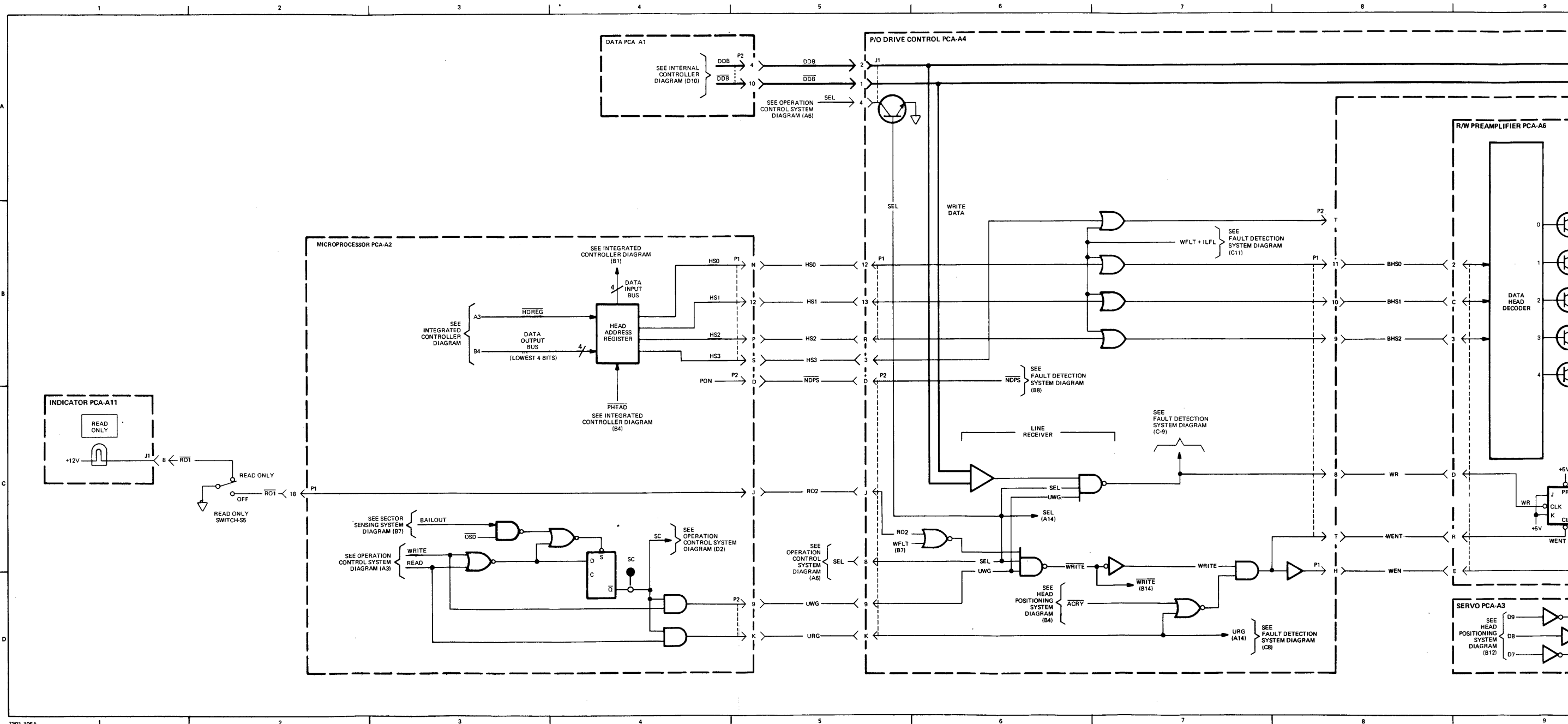


Figure A-16. HP 7925H Sector Sensing System, Functional Diagram



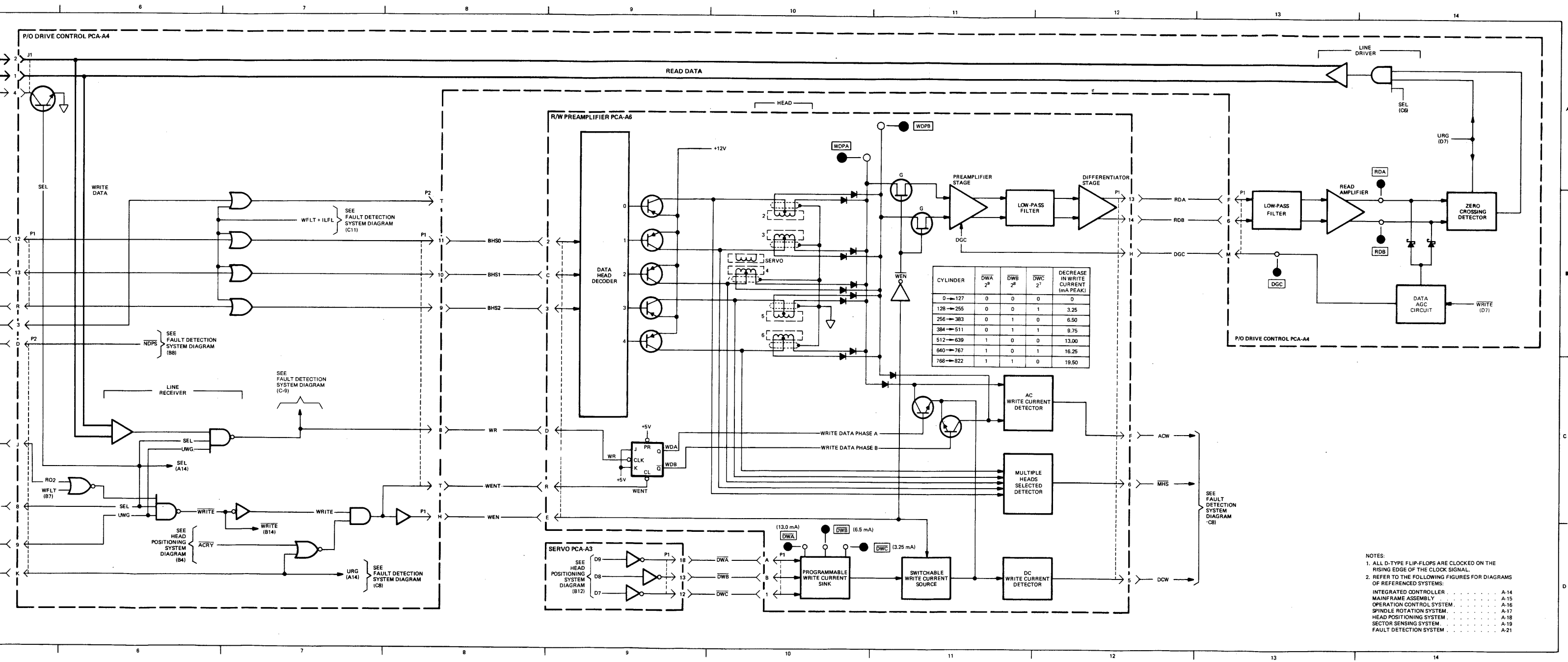
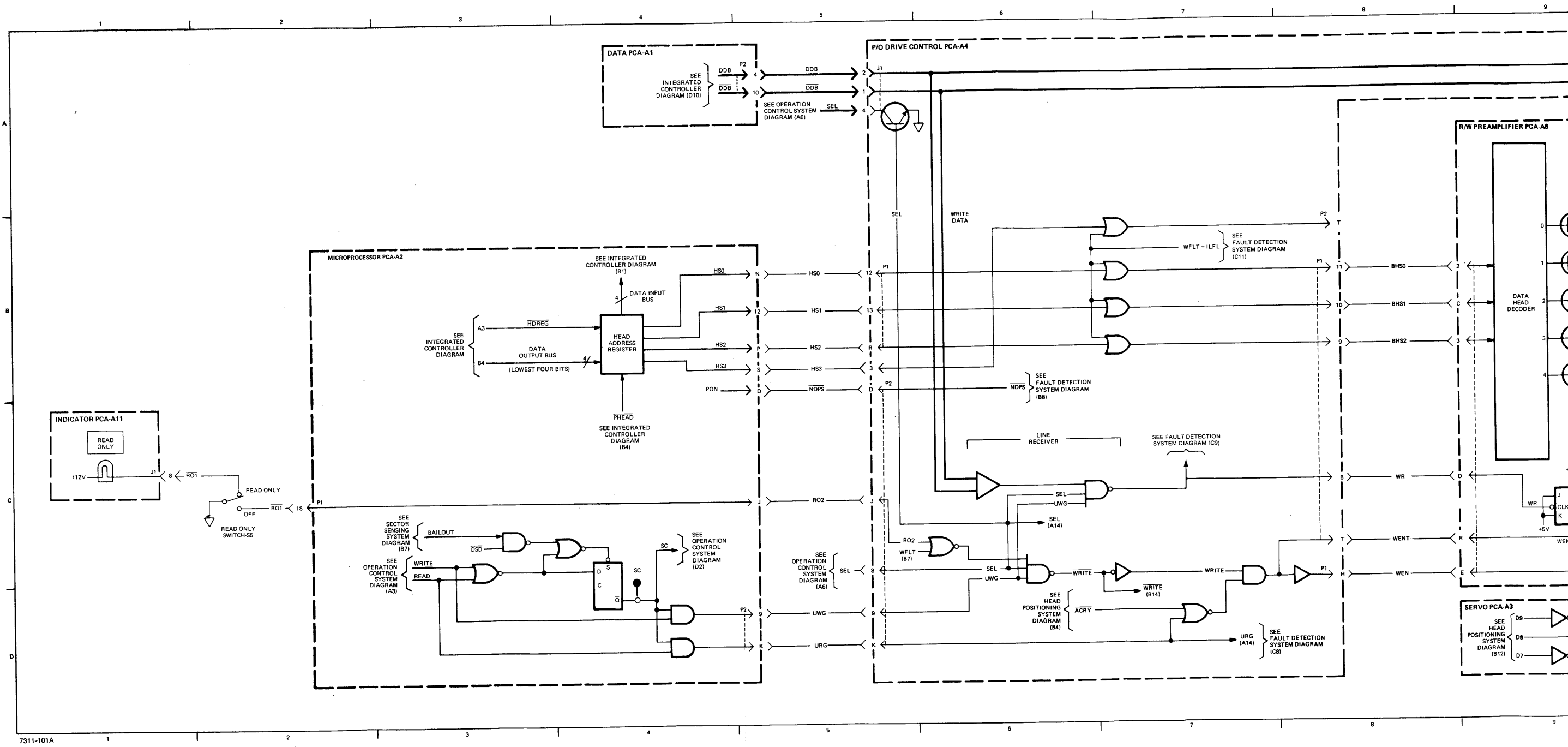


Figure A-17. HP 7920H Read/Write System, Functional Diagram





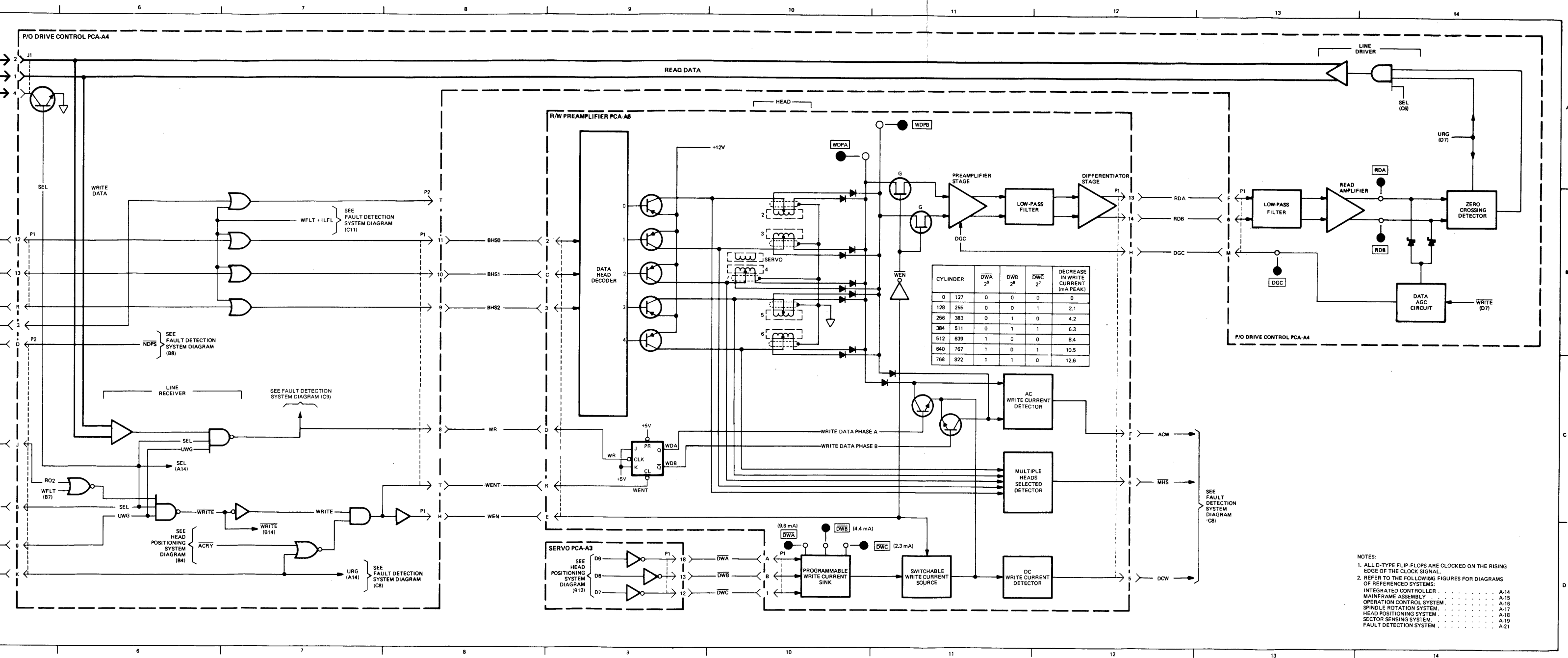
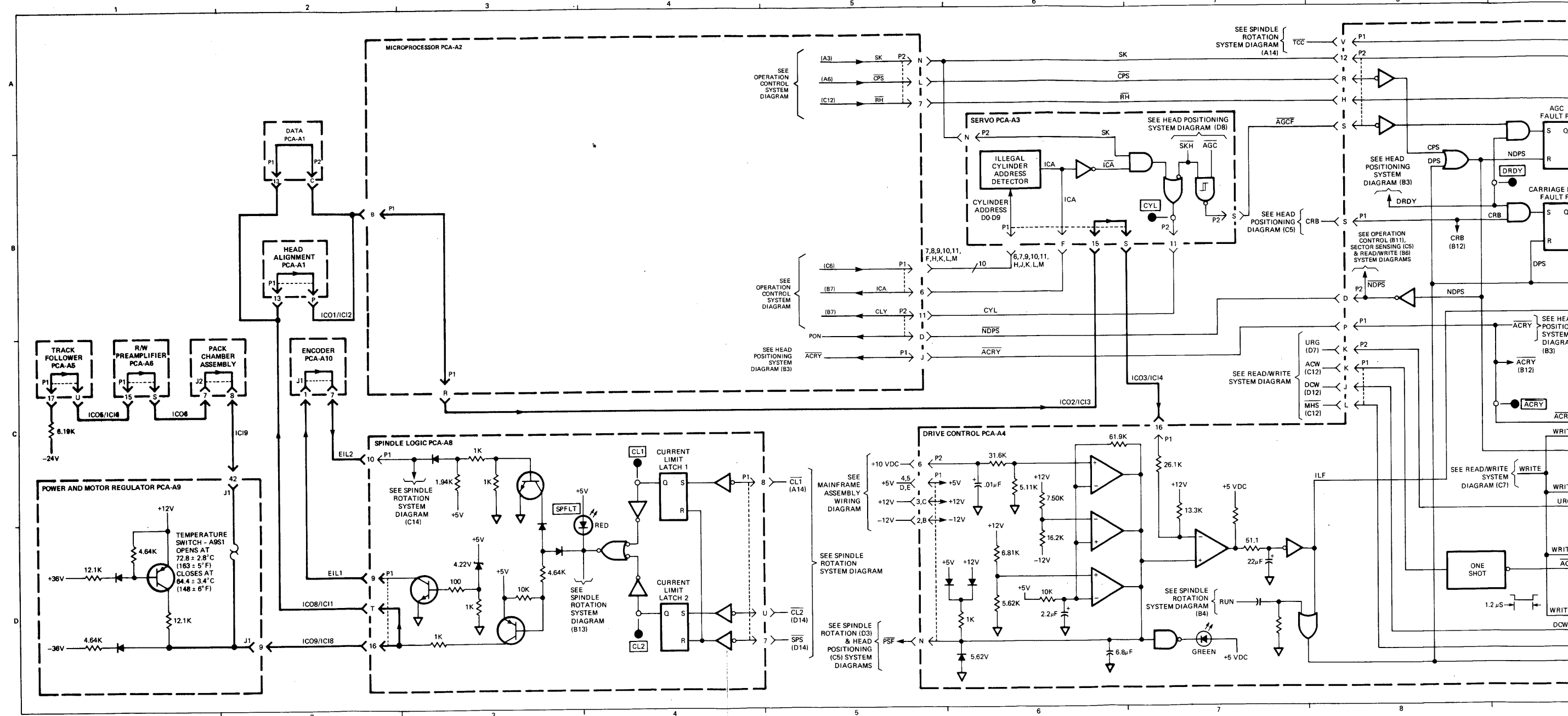
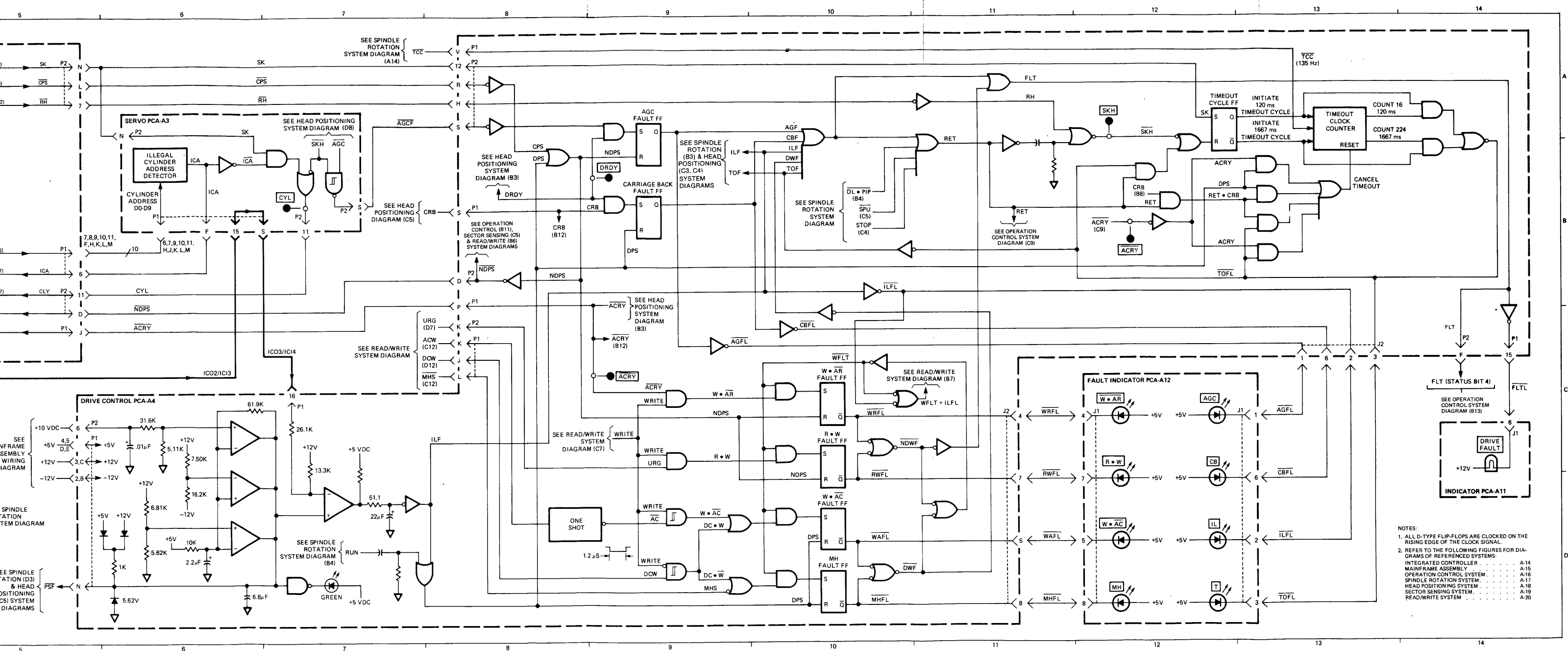


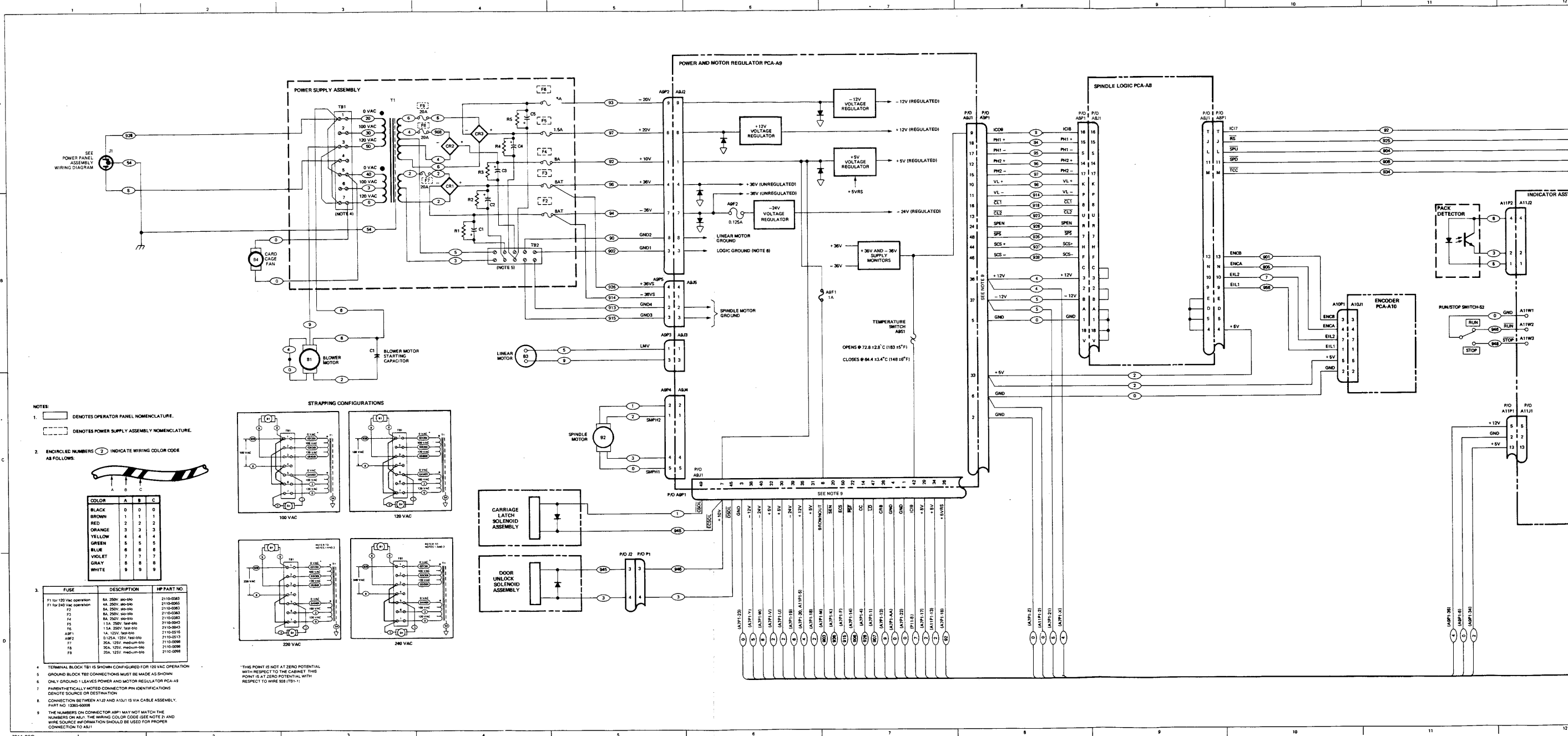
Figure A-18. HP 7925H Read/Write System, Functional Diagram





- NOTES:
1. ALL D-TYPE FLIP-FLOPS ARE CLOCKED ON THE RISING EDGE OF THE CLOCK SIGNAL.
  2. REFER TO THE FOLLOWING FIGURES FOR DIAGRAMS OF REFERENCED SYSTEMS:
    - INTEGRATED CONTROLLER . . . . . A-14
    - MAIN-FRAME ASSEMBLY . . . . . A-15
    - OPERATION CONTROL SYSTEM . . . . . A-16
    - SPINDLE ROTATION SYSTEM . . . . . A-17
    - HEAD POSITIONING SYSTEM . . . . . A-18
    - SECTOR SENSING SYSTEM . . . . . A-19
    - READ/WRITE SYSTEM . . . . . A-20

Figure A - 19. H Model Fault Detection System, Functional Diagram

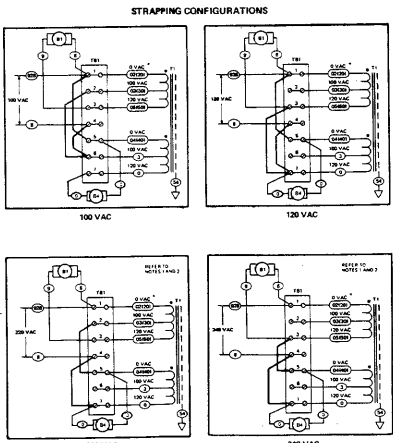


- NOTES:
- 1.   DENOTES OPERATOR PANEL NOMENCLATURE.
  - 2.   DENOTES POWER SUPPLY ASSEMBLY NOMENCLATURE.
  - 3. ENCIRCLED NUMBERS   INDICATE WIRING COLOR CODE AS FOLLOWS:

COLOR	A	B	C
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GRAY	8	8	8
WHITE	9	9	9

FUSE	DESCRIPTION	HP PART NO.
F1	150/120 VAC operation	2110-0083
F2	150/240 VAC operation	2110-0085
F3	BA, 250V, 100-040	2110-0083
F4	BA, 250V, 100-040	2110-0083
F5	BA, 250V, 100-040	2110-0083
F6	1.5A, 250V, 100-040	2110-0083
F7	1A, 250V, 100-040	2110-0083
F8	1.5A, 250V, 100-040	2110-0083
F9	1A, 250V, 100-040	2110-0083
F10	1.5A, 250V, 100-040	2110-0083
F11	1A, 250V, 100-040	2110-0083
F12	1.5A, 250V, 100-040	2110-0083
F13	1A, 250V, 100-040	2110-0083
F14	1.5A, 250V, 100-040	2110-0083
F15	1A, 250V, 100-040	2110-0083
F16	1.5A, 250V, 100-040	2110-0083
F17	1A, 250V, 100-040	2110-0083
F18	1.5A, 250V, 100-040	2110-0083
F19	1A, 250V, 100-040	2110-0083
F20	1.5A, 250V, 100-040	2110-0083

- 4. TERMINAL BLOCK T81 IS SHOWN CONFIGURED FOR 120 VAC OPERATION.
- 5. GROUND BLOCK T82 CONNECTIONS MUST BE MADE AS SHOWN.
- 6. ONLY GROUND 1 LEAVES POWER AND MOTOR REGULATOR PCA-AS.
- 7. PARENTHESE INDICATED CONNECTOR PIN IDENTIFICATIONS DENOTE SOURCE OR DESTINATION.
- 8. CONNECTION BE T81 AND A131 IS VIA CABLE ASSEMBLY, PART NO. 1285-0008.
- 9. THE NUMBERS ON CONNECTOR A8P1 MAY NOT MATCH THE NUMBERS ON A8U. THE WIRING COLOR CODE (SEE NOTE 3) AND WIRE SOURCE INFORMATION SHOULD BE USED FOR PROPER CONNECTION TO A8U.



\* THIS POINT IS NOT AT ZERO POTENTIAL WITH RESPECT TO THE CABINET. THIS POINT IS AT ZERO POTENTIAL WITH RESPECT TO WIRE 928 (T81-1).

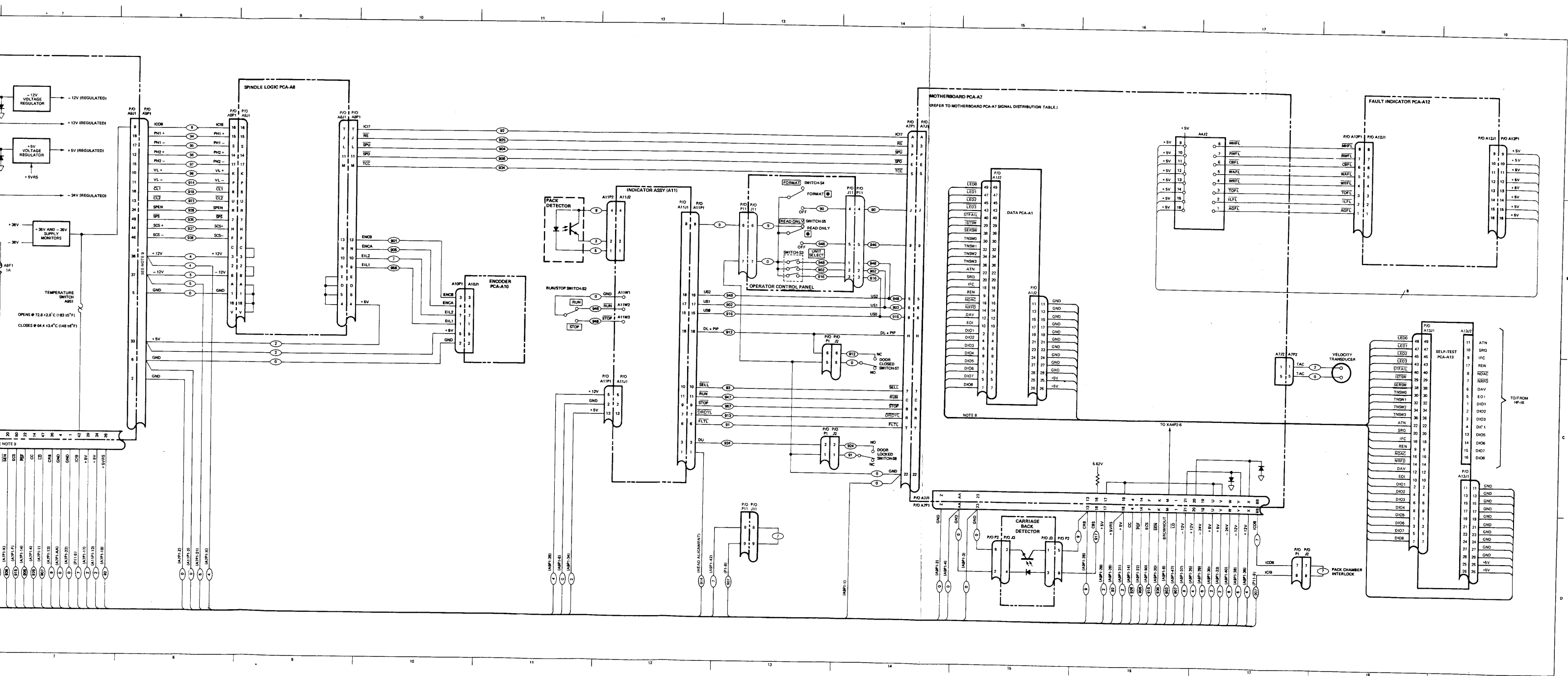


Figure A-20. H Model Mainframe Assembly, Wiring Diagram