MODEL D5000
DISK MEMORY
DRIVE

PERTEC

PERIPHERAL EQUIPMENT

MODEL NO. _____

SERIAL NO. _____

MODEL D5000
DISK MEMORY
DRIVE

PERTEC
PERIPHERAL EQUIPMENT

9600 IRONDALE AVE., CHATSWORTH, CALIF. 91311
PHONE (213) 882-0030 TWX (910) 494-2093

OPERATING AND SERVICE MANUAL NO. 102525

SERVICE AND WARRANTY

This PERTEC product has been rigorously checked out by capable quality control personnel. The design has been engineered with a precise simplicity which should assure a new level of reliability. Ease of maintenance has been taken into consideration during the design phase with the result that all components (other than mechanical components) have been selected wherever possible from manufacturer s "off the shelf" stock. Should a component fail, it may be readily replaced from PERTEC or your local supplier. The unit has been designed for "plug-in" replacement of circuit boards or major components which will ensure a minimum of equipment down time.

PERTEC warrants products of its manufacture to be free from defects in design, workmanship, and material under normal and proper use and service for a period of twelve (12) months after the date of shipment. PERTEC agrees to repair or replace at the place of manufacture, without charge, all parts of said products which are returned, for inspection, to its factory within the applicable warranty period, provided such inspection discloses that the defects are as above specified and provided also that the equipment has not been altered or repaired other than with authorization from PERTEC and by its approved procedures, subjected to misuse, improper maintenance, negligence, or accident, damaged by excessive current or otherwise, or had its serial number or any part thereof altered, defaced or re - moved. This warranty is in lieu of all other warranties, expressed or implied, including those of merchantability or fitness for purpose.

Please read the instruction manual thoroughly as to operation, maintenance, and component reference list. Should you require additional assistance in servicing this equipment, please contact the following regional service centers. A trained service representative will be pleased to assist you.

SALES AND SERVICE REPRESENTATIVES

*Los Angeles, Calif.	(213) 882-0030	Munich, Germany	18-48-53
*Chicago, Ill.	(312) 696-2460	Nieuwkoop, Holland	2614
*Waltham, Mass.	(617) 890-0720	India	50443
Sydney, Australia	69-0444	Haifa, Israel	(04) 68234
Brussels, Belgium	2-480586	Milano, Italy	5462641
Toronto, Canada	(613) 224-1221	Tokyo, Japan	210-4602
Vancouver, Canada	(604) 926-3411	Oslo, Norway	550750
Naerum, Denmark	(01) 804200	Johannesburg, So. Africa	42-1939
*London, England	Reading 582-115	Madrid, Spain	2560265
Helsinki, Finland	460844	Solna, Sweden	820410
Clamart, France	6445530		

*Indicates PERTEC-operated service center

PROPRIETARY NOTICE

TABLE OF CONTENTS

Section			Page
I	GENERAL DESCRIPTION		
	1.0	Functional Information	1-1
	1.1	Functional Description	1-2
	1.2	Physical Description	1-3
	1.3	Related Products Available	1-3
II	OPERATION		
	2.0	Operating Procedures	2-1
	2.1	Safety	2-1
	2.2	Power-Up Sequence	2-1
	2.3	Load Sequence, Normal	2-3
	2.4	Seek Sequence (Normal Address)	2-4
	2.5	Seek Sequence (Restore to Initial Cylinder)	2-5
	2.6	Unload Sequence, Normal	2-7
	2.7	Emergency Unload Sequence	2-8
	2.8	Media Handling	2-9
	2.9	Media Storage	2-11
III	SHIPPING AND INSTALLATION		
	3.0	Shipping and Installation	3-1
	3.1	Shipping Specification	3-1
	3.2	Unpacking	3-1
	3.3	Installation	3-2
	3.4	Preliminary Checks	3-3
IV	MAINTENANCE		
	4.0	Maintenance	4-1
	4.1	Safety	4-1
	4.2	Head Cleaning Agent	4-1
	4.3	Precautions	4-1
		4.3.1 Disk Cartridge Handling	4-2
		4.3.2 Inserting or Removing Disk Cartridge	4-2
		4.3.3 CE Restricted Tracks on Disk Cartridge	4-2
		4.3.4 Read/Write Heads	4-3
		4.3.5 DC Power	4-3
		4.3.6 Cable and PWB Removal	4-3

TABLE OF CONTENTS (continued)

Section			Page
IV (continued)			
4.4	Reference Data		4-4
	4.4.1	Disk Cartridge Description	4-4
	4.4.2	Heads, Types	4-4
	4.4.3	Recording Modes	4-5
	4.4.4	Track Access Time	4-5
	4.4.5	Spindle Rotation	4-6
	4.4.6	Data Transfer — Bit Rate	4-6
4.5	General Maintenance		4-6
	4.5.1	Visual Inspection	4-6
	4.5.2	Electronic Circuits	4-6
	4.5.3	Mechanical Maintenance	4-7
	4.5.4	Cleanliness	4-7
4.6	Preventive Maintenance		4-7
	4.6.1	Cleaning Procedures	4-8
		4.6.1.1 Cleaning Fixed Disk (Dual Disk Only)	4-8
		4.6.1.2 Cleaning Read/Write Heads (Disk Cartridge Removed)	4-9
		4.6.1.3 Cleaning Carriage Rail	4-10
		4.6.1.4 Cleaning Glass Slide	4-10
		4.6.1.5 Cleaning Spindle Assembly	4-11
		4.6.1.6 Cleaning Base Plate	4-11
4.7	Operation		4-11
	4.7.1	Circuit Descriptions	4-11
		4.7.1.1 Definitions	4-11
		4.7.1.2 File-User Interface	4-13
		4.7.1.3 Daisy-Chain Interface	4-14
4.8	Logic		4-14
	4.8.1	File Select	4-14
	4.8.2	Logic Load Sequence	4-16
	4.8.3	Logic Unload Sequence	4-18
		4.8.3.1 Normal Unload or Preventive Load Conditions	4-19
		4.8.3.2 Emergency Unload	4-19
	4.8.4	Positioner Operation	4-21
		4.8.4.1 Index Signal	4-22
		4.8.4.2 Servo Normal Seek Command	4-22
		4.8.4.3 Seek Complete	4-23
		4.8.4.4 Illegal Address	4-23

TABLE OF CONTENTS (continued)

Section			Page
IV (continued)			
		4.8.4.5 Restore Command	4-25
		4.8.4.6 Seek Complete on Restore Command	4-25
		4.8.4.7 Servo Logic Load Operation	4-26
		4.8.4.8 Servo Unload Operation	4-26
4.9	Sector, Index Circuitry		4-28
4.10	Read/Write Operations		4-31
	4.10.1 Double Frequency Recording		4-31
	4.10.2 Head Selection		4-35
4.11	Write Circuits		4-35
4.12	Read Circuits		4-37
4.13	Data Decode Circuits		4-38
4.14	Removal and Replacement Procedures		4-41
	4.14.1 Face Panel		4-41
	4.14.2 Cartridge Receiver		4-41
	4.14.3 Inlet Air Filter		4-41
	4.14.4 Absolute Filter		4-42
	4.14.5 Capacitor, Motor Start		4-42
	4.14.6 Positioner Drive Boards		4-42
	4.14.7 Emergency Retract Capacitor		4-43
	4.14.8 Handle Lock Solenoid		4-43
	4.14.9 Start-Stop Toggle Switch		4-44
	4.14.10 Electric Module PWB's		4-45
	4.14.11 Blower		4-45
	4.14.12 Positioner		4-46
	4.14.13 Drive Belt		4-47
	4.14.14 Drive Motor		4-47
	4.14.15 Cartridge Down Switch		4-48
	4.14.16 RA/WD/A Board		4-48
	4.14.17 Heads		4-49
	4.14.18 Spindle, Single Disk		4-50
	4.14.19 Spindle, Dual Disk		4-50
	4.14.20 Fixed Disk		4-51
	4.14.21 Sector Transducer, Removable Disk		4-52
	4.14.22 Sector Transducer, Fixed Disk (Dual Disk Only)		4-52
	4.14.23 Front Panel Lights		4-53
	4.14.24 Triac		4-53

TABLE OF CONTENTS (continued)

Section			Page
IV (continued)			
4.15	Adjustment and Alignment Procedures		4-53
	4.15.1	Photo Pickup Alignment, General	4-53
	4.15.2	Photo Pickup Function	4-53
	4.15.3	Track Control, Photocells	4-54
	4.15.4	Index, Photocell	4-56
	4.15.5	Photo Pickup Adjustment Procedure	4-56
		4.15.5.1 Gap Adjustment	4-56
		4.15.5.2 Graticule Adjustment, Course	4-56
		4.15.5.3 Lamp Adjustment	4-57
		4.15.5.4 X + 90 Adjustment	4-57
		4.15.5.5 X + 0 Adjustment	4-58
	4.15.6	Index Centering Adjustment	4-58
	4.15.7	Servo Alignment	4-59
	4.15.8	Servo Adjustment	4-60
		4.15.8.1 Servo Velocity Adjustment	4-60
		4.15.8.2 Servo Loop Gain Adjustment.	4-60
		4.15.8.3 Servo Current Feedback Adjustment	4-60
		4.15.8.4 Servo Check	4-61
	4.15.9	CE Alignment	4-61
		4.15.9.1 CE Track 100	4-62
		4.15.9.2 CE Track 95	4-65
	4.15.10	CE Alignment	4-67
		4.15.10.1 Head Alignment Procedure	4-67
		4.15.12.2 Index Alignment Procedure	4-71
4.16	D5000 CE Board Functions and Use		4-74
	4.16.1	Description	4-74
	4.16.2	Switch Functions	4-74
	4.16.3	Sequencing to Track 100	4-76
	4.16.4	Operation	4-77
	4.16.5	Interaction of Switches	4-77
	4.16.6	Summary of D5000 CE Board Operations	4-79
V	SCHEMATICS – PCBAs		
VI	PARTS EXPLOSIONS AND PARTS LIST (SINGLE DISK)		
VII	PARTS EXPLOSIONS AND PARTS LIST (DUAL DISK)		

TABLE OF CONTENTS (continued)

Section		Page
VIII	SPECIAL TOOLS AND SPARE PARTS LIST	
IX	POWER SUPPLY	
X	CONVERSION OF CMD TO PERTEC DRAWING NUMBERS	
	NOMENCLATURE LIST	4-80

LIST OF ILLUSTRATIONS

Figure		Page
2-1	D5000 Disk File, Basic Block Diagram	2-13
2-2	Power-Up Sequence	2-15
2-3	Load Sequence, Normal	2-17
2-4	Seek Sequence, Normal Address	2-19
2-5	Seek Sequence, Restore to Initial Cylinder	2-21
2-6	Unload Sequence, Normal	2-23
2-7	Emergency Unload Sequence	2-25
4-1	D5000 Disk File I/O Lines	4-12
4-2	Logic Flow Chart	4-17
4-3	Timing Diagram, Repetitive Single Track Move	4-24
4-4	Signals During Load Operation	4-27
4-5	Index Circuitry Block Diagram	4-29
4-6	Sector Timing	4-30
4-7	Double Frequency Recording Flux and Pulse Relationship	4-32
4-8	Read/Write Amplifier Circuit Block Diagram	4-34
4-9	Read Timing, Single Density	4-39
4-10	Photocell Alignment and Related Waveforms	4-55
4-11	Double Density Head to Track Relationship	4-63
4-12	Single Density Head to Track Relationship	4-66
4-13	Double Density CE Alignment	4-69
4-14	Single Density CE Alignment	4-70
4-15	Sector Transducer Timing	4-72
4-16	Sector Adjust	4-72

LIST OF TABLES

Table		
4-1	Preventive Maintenance Schedule	4-6A

SECTION I
GENERAL DESCRIPTION

1.0 FUNCTIONAL INFORMATION

The D5000 Series Disk Memory Devices are a family of disk drives configured as shown in the following table.

Device	Removable Disk Cartridge	Fixed Disk	Single Density 1100 BPI Recording	Double Density 2200 BPI Recording
D5101, D5101A	X		X	
D5201, D5201A	X			X
D5121, D5121A	X	X	X	
D5221, D5221A	X	X		X

The disk cartridge used with the 1100 BPI devices is equivalent to the IBM 2315 cartridge. The cartridge used with the 2200 BPI devices is physically identical with the IBM 2315 cartridge except that the disk is of the type used in the IBM 2316 Disk Pack. The control circuits have been designed to provide an interface which is non-systems oriented, providing maximum flexibility in adapting the D5000 Series to any system. Physically the D5000 Series is designed to fit within a standard 19-inch rack enclosure. A protective, non-decorative shroud, enclosing the entire mechanism and circuitry, minimizes contamination from an unclean environment.

A system of cooling and air filtration has been designed into the D5000 Series to provide maximum protection from its environment.

The operator controls are simple and straight-forward in their function. A significant feature in the design is the attention which has been paid to functional reliability. The D5000 Series has been developed to provide continuing reliable operation.

1.1 FUNCTIONAL DESCRIPTION

With the disk pack in place and the front door closed, the operator can turn the unit on by placing the toggle switch in the START position.

Following a delay of 45 seconds, the unit is ready for operation with the user's system. During the 45 seconds the disk is brought up to the speed of 1500 RPM, the disk cartridge is purged, the read/write heads are loaded to fly above the disk surface and also positioned at track 000 (home position). Access is gained to any of 203 available tracks with an average positioning time of 60 milliseconds.

The D5000 Series devices use double frequency recording as shown in the following table.

Device	Data Transmission
D5101, 5101A	720,000 DATA BITS/SEC
D5201, 5201A	1,562,500 DATA BITS/SEC
D5121, 5121A	720,000 DATA BITS/SEC
D5221, 5221A	1,562,500 DATA BITS/SEC

During operation, circuitry within the unit continuously monitors the disk speed. Should the disk speed fall, the unit will automatically cycle down and provide appropriate indication through the interface logic.

1.2 PHYSICAL DESCRIPTION

The D5000 Series is shown in Drawing No. 106018*. The basic unit is 19 inches wide, 17-1/2 inches high and 30 inches deep. An overall outline describing the mounting requirements, air flow passage and power input connectors is also shown.

The basic unit contains:

(1) The positioner mechanism with read and write magnetic head assemblies plug related control circuitry.

(2) Drive and spindle mechanism.

(3) Operator control panel with indicators and START/STOP switch.

(4) The basic logic and control circuitry required for operation.

(5) Air blower ducting and air filters.

(6) Shrouds and front decorative face panel.

1.3 RELATED PRODUCTS AVAILABLE

The following products are available for use with the MD 5000 Series Devices.

Model No.	Title	Description
PS 9004	Power Supply 60 Hz	Used with one or two 5000 Series devices.
PD 9004A	Power Supply 50 Hz	Used with one or two 5000A Series devices.
CB 9505	Cable IO	Used to connect lines between devices (3 feet long).

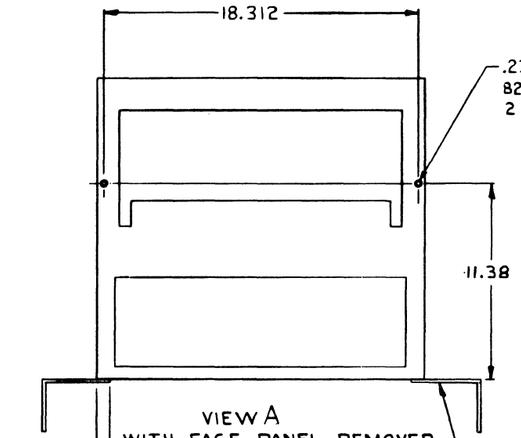
*Foldout drawing, see end of this section.

Model No.	Title	Description
CB 9506	Cable IO	Used to connect lines between devices (10 feet long).
CB 9507	Cable IO	Used to connect user IO to device (10 feet long).
CB 9508	Cable DC, AC	Used to convert a PS 9004A to supply two devices (10 feet long).
CB 9510	Cable DC, AC	Used to convert a PS 9004A to supply two devices (5 feet long).
CB 9901-8	Disk Pack (1100 BPI)	Used with a 5000 Series device that has an 8 sector timing disk.
CB 9901-12	Disk Pack (1100 BPI)	Used with a 5000 Series device that has a 12 sector timing disk.
CB 9901-16	Disk Pack (1100 BPI)	Used with a 5000 Series device that has a 16 sector timing disk.
CB 9901-24	Disk Pack (1100 BPI)	Used with a 5000 Series device that has a 24 sector timing disk.
CB 9902-8	Disk Pack (2200 BPI)	Used with a 5000 Series device that has a 8 sector timing disk.
CB 9902-12	Disk Pack (2200 BPI)	Used with a 5000 Series device that has a 12 sector timing disk.
CB 9902-16	Disk Pack (2200 BPI)	Used with a 5000 Series device that has a 16 sector timing disk.
CB 9902-24	Disk Pack (2200 BPI)	Used with a 5000 Series device that has a 24 sector timing disk.

DWG NO. 106018

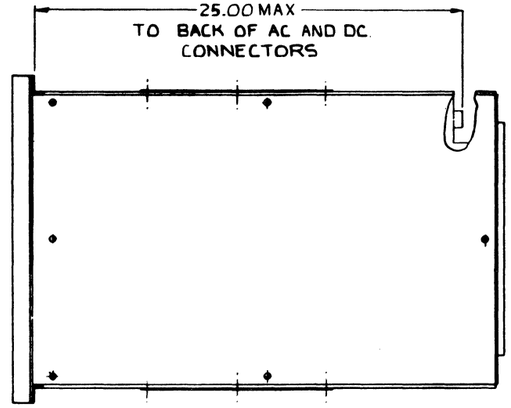
NOTES:
1. BY REMOVING THE 3 MOUNTING SCREWS ON EACH SIDE, A EMCOR SLIM SLIDE MODEL NO. SS-28-S-CS CAN BE MOUNTED USING NO. 10-32 UNF-2B SCREWS SUPPLIED WITH SLIM SLIDE.

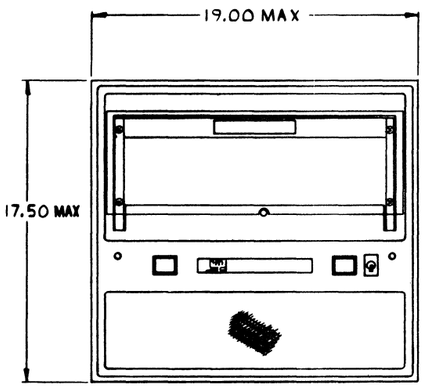
REVISIONS		
REV	C.O. NO	DATE
A	ISSUED	2-8-77
A	[illegible]	[illegible]

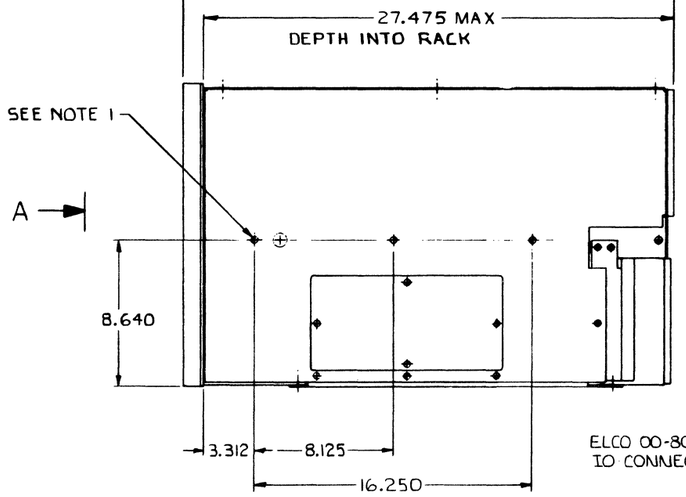


VIEW A
WITH FACE PANEL REMOVED

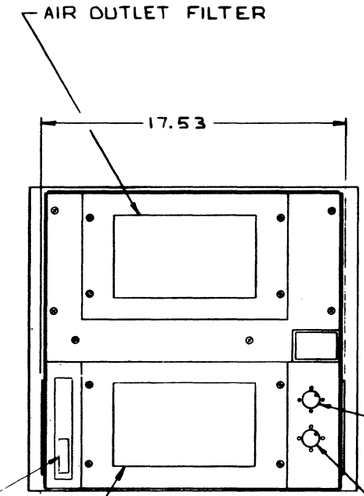
RACK SUPPORT RAILS ARE REQUIRED TO CARRY WEIGHT (100 LBS) OF THIS DEVICE.







1" MIN. CLEARANCE NEEDED FOR AIR CIRCULATION



ELCO 00-8016-056-000-702-
IO CONNECTOR

PERTEC PERIPHERAL EQUIPMENT

QTY REQ	ITEM NO	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE POLLIWINS SHOP PRACTICES:

SIGNATURES

DRAWN
CHECKED
ENG
APP'D

MATL:
FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: OUTLINE

SIZE D | DWG NO. 106018 | REV -

SCALE: 1/4 | SHEET 1 | DRAWING F

SECTION II
OPERATION

2.0 OPERATING PROCEDURES

This section defines the unit operating procedures for the D5000 Series Disk storage unit.

Figure 2-1* is a simplified block diagram of the D5000 Disk Drive.

2.1 SAFETY

AC power is still present on terminals inside the machine while the drive motor is de-energized. Be cautious when servicing the machine; objects can contact line voltage despite the safety shields and covers provided.

CAUTION

DO NOT WRITE ON THE CE DISK CARTRIDGE AT TRACKS 090 THROUGH 110. THIS BAND CONTAINS PRE-RECORDED TEST TRACKS 095, 100 AND 105 WHICH WILL BE DESTROYED. ANY OTHER TRACKS MAY BE USED FOR TEST PURPOSES.

2.2 POWER-UP SEQUENCE

Figure 2-2* and the following paragraphs describe the D5000 Power-up sequence.

AC line voltage applied to Power Supply generates +24v control voltage which illuminates the POWER OFF lamp. Contactor K1 is de-energized and Power Supply Reset (PPFR OSO) is low.

When the ON button is pressed, the POWER OFF lamp is extinguished, the POWER ON lamp is illuminated, contactor K1 is energized, and dc power is applied.

*Foldout drawing, see end of this section.

The Power Supply Reset is low at this time which resets Unload Latch (FUNL), Down To Speed Latch, Stop Load Sequence Latch (FSLC), Load Latch (FLDL), and Head Select Error latch (DHSE). The unload relay is held de-energized. At the end of the 1.5 second delay timer, Power Supply Reset goes high and the unload relay is energized. This connects the voice coil to the servo.

NOTE

The power supply will not cycle down as long as all voltages remain within tolerance.

After the Down To Speed Timer times out (30 seconds after the POWER ON lamp is illuminated and K1 is energized), the door is unlocked and SAFE lamp is illuminated.

The Disk unit is now ready to accept a cartridge. The cartridge receiver handle can now be pulled out and down (it rotates on the mounting pivot). This action results in the cartridge receiver being raised into position for cartridge withdrawal or insertion.

CAUTION

DO NOT FORCE CARTRIDGE INTO UNIT. SERIOUS DAMAGE TO HEADS CAN RESULT.

Note that cartridge being out has set Stop Load Sequence Latch which will be reset if START/STOP switch is placed to STOP. When the START/STOP switch is placed in the START position (or first to STOP and then to START depending on original switch position) a normal Load sequence is entered. Paragraph 2.3 describes this sequence.

2.3 LOAD SEQUENCE, NORMAL

It is assumed that all conditions inhibiting a Load sequence do not currently exist and that the Power-up sequence (Paragraph 2.2) has been completed. Figure 2-3* and the following paragraphs describe a normal Load sequence.

Setting the START/STOP switch to START will set Load Latch (FLDL). Load Latch energizes the drive motor. The brake is released and the door is locked. The Load Heads Timer is enabled. Reverse Slow (DRVS) causes servo to hold the heads retracted. When the Load Heads Timer times out for the first time, Load Heads F-F is one-set. This releases Position Transducer F-F and also causes Forward Slow (DFWD).

NOTE

Forward Slow F-F (FFWS) is already preset by Reverse Slow latch (FRVS) and Heads Up (DHSU).

The Seek Time Check Timer (TSTC) is triggered.

At track No. 125, Heads Up (DHSU), Position Transducer Index (DPTI) change state as the heads are advanced over the disk under control of Forward Slow. Reverse Slow latch (FRVS) is reset. Slightly before track No. 1-1/2, Position Transducer Index (DPTI) changes state, Position Transducer Error F-F is one-set.

As the positioner passes track No. 1-1/2, Up Count Pulse (DUCP) occurs and the Forward Slow (FFWS) is zero set on the trailing edge. Demand Address Register Reset (DDAR) which up to now had been holding the address register reset, releases it, as well as the up/down counter which it had previously loaded with all ones. The address difference is now = $[01_{16}]$ and the servo continues as Lock Servo Loop (DLSL) is not yet high and Forward Slow (DFWD) has changed as the result of FFWS.

*Foldout drawing, see end of this section.

The servo is now operating in the normal mode, and on the next count-up pulse, the up/down counter goes to zeros, the address difference goes to zero, and the servo locks at track 000.

When the Load Heads Timer (TLHD) times out for the second time the Down To Speed Latch is reset causing the ready condition and lighting READY lamp.

Illumination of the READY lamp indicates that the Disk unit has completed a normal Load sequence and, if selected, is ready for data (see Paragraph 2.4 for Seek Sequence).

2.4 SEEK SEQUENCE (NORMAL ADDRESS)

If the file is selected and ready then when an Address Strobe is received the following sequence will occur. Figure 2-4* should be used in conjunction with this description.

The Valid Address Enable one-shot (TVAE) is triggered. Triggering TVAE causes the Busy signal ($\overline{XBZY}$) to go into a low state and resets the Busy Latch (FBZY). This temporarily disables the Illegal Address line. These events occur as a result of the leading edge of strobe.

The address checking decoder will determine if the address is out of range (≥ 203) while the strobe is occurring (low time). The Illegal Address F-F (FILA) will be cleared if the Settle Time Busy one-shot (TBZY) is not occurring and the address is within range. (It may already be in the cleared state.)

When the trailing edge of strobe occurs, the Illegal Address F-F (FILA) is set if either the Settle Time Busy one-shot (TBZY) is causing busy (DBZE) or the address was found to be out of range. The Illegal Address

*Foldout drawing, see end of this section.

line is re-enabled. The Valid Address Clock (DVAQ) is generated and clocks the new address into the Demand Address Register (FDAO-7) provided that no illegal condition was occurring.

The contents of the New Demand Address Register (FDAO-7) cause the subtractor to produce a new difference (DDFO-7). In order for additional action to take place, the difference must be other than zero. This will be the case unless the new address is the same as the contents of the Current Address counter (FCAO-7). A non-zero difference will cause the servo to unlock and the Lock Servo Loop (DLSL) to go low. This causes the Busy Latch (FBZY) to set and the Seek Time Check (DSTC) to trigger the Seek Timing Check one-shot (TSTC).

The heads will then be moved, under servo control, towards the new track. When the heads are within 1/4 track, Lock Servo Loop (DLSL) goes high and triggers the Settle Time Busy one-shot (TBZY) resetting the Busy Latch (FBZY). The servo, acting as a position servo, causes the heads to be centered in the track during the Settle Time Busy time. When the Settle Time Busy one-shot (TBZY) times out, the busy signal to the interface ends, indicating seek complete.

2.5 SEEK SEQUENCE (RESTORE TO INITIAL CYLINDER)

If the file is selected and ready then when an Address Strobe is received, the following sequence will occur only if a Logic File Reset command is present at the time of a strobe. Figure 2-5* should be used in conjunctionwith the following description.

The Valid Address Enable one-shot (TVAE) is triggered. Triggering TVAE causes the Busy signal to go low, resets the Busy Latch (FBZY), and temporarily disables the Illegal Address line. These events occur as a result of the leading edge of strobe.

*Foldout drawing, see end of this section.

During the strobe, The Address Initialize Latch (FADI) will be set as a result of the restore command occurring during the time of Valid Address Enable (DVAE). DVAE is the result of the strobe and TVAE. The signal ($\overline{\text{DADI}}$) which sets FADI also sets Reverse slow latch and clears the Illegal Address F-F (FILA). Valid Address Clock (DVAQ) will be issued at the end of strobe.

As a result of Reverse Slow Latch (FRVS) being set, the servo starts moving the heads towards the retract position. Demand Address Register Reset (DDAR) clears the Demand Address Register (FDAO-7) and loads ones into the Current Address counter (FCAO-7). Movement of the heads continues. At track 1-1/2, the Position Transducer Index (DPTI) signal goes high resulting in the Forward Slow F-F (FFWS) being preset. This causes the Forward Slow (DFWD) which results in the servo moving the heads forward towards track 000.

As the positioner passes track No. 1-1/2, Up-Count Pulse (DUCP) occurs and the Forward Slow (FFWS) is zero set on the tracking edge. Demand Address Register Reset (DDAR) which up to now had been holding the address register reset, releases it, as well as the up/down counter which had been previously loaded with all ones. The address difference is now $[01_{16}]$ and the servo continues as Lock Servo Loop (DLSL) is not yet high and Forward Slow (DFWD) has changed as the result of FFWS.

The servo is now operating in the normal mode, and on the next count-up pulse, the up/down counter goes to zeros, the address difference goes to zero, and the servo locks at track 000.

The heads will be moved, under servo control, towards track 000. When the heads are within 1/4 track, Lock Servo Loop (DLSL) goes high and triggers the Settle Time Busy one-shot (TBZY), resetting the Busy Latch

(FBZY). The servo, acting as a position servo, causes the heads to be centered in track 000 during the Settle Time Busy time. When the Settle Time Busy one-shot (TBZY) times out, the busy signal to the interface ends, indicating a seek complete.

2.6 UNLOAD SEQUENCE, NORMAL

The following paragraphs and Figure 2-6* describe the sequence of events involved in the normal unload sequence of the D5000.

The unload sequence is initiated when the operator places the START/STOP switch in the STOP position. This causes General File Reset (DGFR) when the unit is not wiring or erasing. The Load Latch (FLDL) and the Down To Speed Latch are reset when Load Latch is reset, clearing Load Head F-F (FLHD) which removes the ready condition and extinguishes the READY lamp. The Reverse Slow Latch (FRVS) is also set by FLHD and this causes Reverse Slow (DRVS). The servo unloads the heads and backs the positioner away from the disk.

When the Heads Up (DHSU) signal goes high, the Motor Enable (DMTE) will go low and de-energize the motor and apply the brake. When the disk speed is low enough that the Down To Speed Timer (TDTS) times out, the Down To Speed Latch (FDTS) is set, and the Unload Latch (FUNL) is reset, although normally the latch is already in this state. As a result of Down To Speed Latch, the door is unlocked and the brake is de-energized.

The servo continues to hold the heads retracted as Reverse Slow (FRVS) latch remains set as FLHD is low. The unit will go to a SAFE condition when the disk completes its deceleration cycle. The cartridge receiver handle can be lowered and the disk removed at this time.

*Foldout drawing, see end of this section.

2.7 EMERGENCY UNLOAD SEQUENCE

Emergency unload conditions can be caused by any of the following conditions.

(1) Disk does not come up to 80 percent of speed during Load sequence.

(2) Positioner is stalled during the second 20 second period, of Load sequence. (i.e., after disk is up to speed.)

(3) If disk speed falls below 80 percent of normal speed when heads are loaded.

(4) Relieves File Unload command from interface.

(5) Position transducer indicates that positioner is outside of normal operating range ($\leq$ Trk -1-1/2 or $\geq$ Trk 204) after a restore (address initalize) or a Load sequence was previously accomplished.

(6) If a normal seek operation exceeds 160 milliseconds.

(7) If position transducer lamp burns out.

(8) If head selection network fails thus causing more than one head to be selected.

If one or more of these unload conditions exist, the events described in the following paragraphs and Figure 2-7* will occur.

The Unload Latch (FUNL) is set by the prevailing unload condition. This immediately results in de-energizing the retract relay causing the retract capacitor to retract the heads. A signal is placed on the Unload Emergency line indicating an emergency. The Load Latch (FLDL) is reset which clears the Load Heads F-F (FLHD. Clearing FLHD removes the ready condition and turns off the READY lamp. The Reverse Slow

*Foldout drawing, see end of this section.

(FRVS) Latch is set by FLHD which in turn causes Reverse Slow (DRVS). (The positioner, however, is not under control of the servo.)

If the motor was enabled by DMTE at the time of the Unload condition, then Down to Speed Latch (FDTS) will be reset. When the Heads Up (DHSU) signal comes high, then the motor will be de-energized (it may or may not be rotating) and the brake will be energized.

When the disk speed is low enough that the Down to Speed Timer (TDTS) times out, then the Down to Speed Latch (FDTS) is set. Setting the Down to Speed Latch (FDTS) unlocks the door and de-energizes the brake.

As a result of setting the Unload Latch (FUNL) the servo remains disconnected because the retract relay is still de-energized. The relay will be energized (reconnecting the servo which is conditioned for Reverse Slow) when Unload Latch (FUNL) is reset. This sequence will occur if the START/STOP switch is placed to STOP and the Down to Speed Timer (TDTS) times out.

2.8 MEDIA HANDLING

Disk cartridges are precision devices that require careful handling and controls to insure data integrity. The following precautions are offered to maintain the quality and lengthen the life of the disk cartridge.

NOTE

Disk cartridges may contain information that is essential to the user's system and should be protected as much as possible.

(1) Clean the protective covers periodically to remove any build-up of dust or dirt with a clean, lint-free cloth.

(2) Replace all broken cartridge doors.

(3) Institute a periodic media cleaning program. See Table 4-1.

(4) Keep all foreign objects from the disk surface. Should a cartridge become damaged, have it inspected by your maintenance personnel prior to using.

(5) Do not depress the cartridge housing when the disk is operating in the unit. This can cause the disk to come in contact with the cover.

(6) All liquids, such as coffee or other beverages should be kept off and away from the disk drives. In case liquids are spilled on the media, your maintenance personnel should immediately review the condition of the media to determine the extent of damage.

(7) Ashes and tobacco are prime sources of area and disk contamination. Tobacco and accessories should be kept out of the disk storage and operating area.

(8) The operator should check the cartridge door to ensure it is closed. If it is open, a slight pressure will close it and provide a dust seal.

(9) The cartridge, when not in use, should be placed on a flat surface free from other objects to guard against disk damage and cartridge warpage.

(10) Allow two hours for disk conditioning when it is first introduced to the machine room environment to stabilize at a temperature of 65^{o} to 90^{o} F and to a relative humidity of 20 to 80 percent. The conditioning time is required to ensure correct track registration for data recording and retrieval.

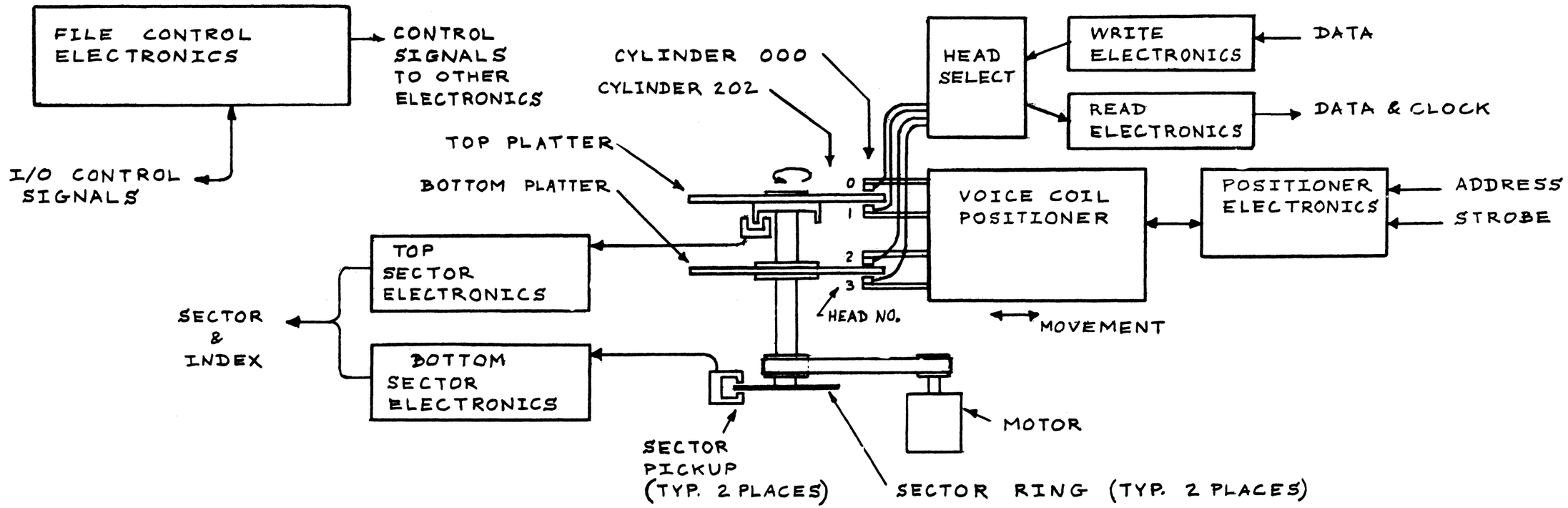
2.9 MEDIA STORAGE

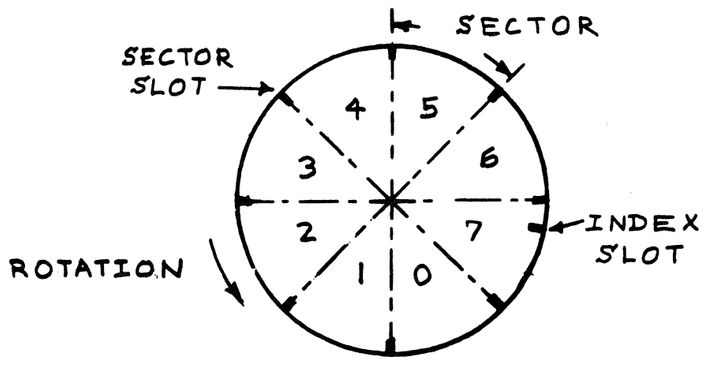
Disk cartridges used frequently are best stored in the machine room or similar environmental conditions. Environment is 65° to 90° F at 20 to 80 percent relative humidity.

For long term storage, the disk cartridges are best stored in their original shipping containers. When so stored the disks may be stacked on edge. When a disk is shipped from site to site, it is recommended that the original shipping container be used.

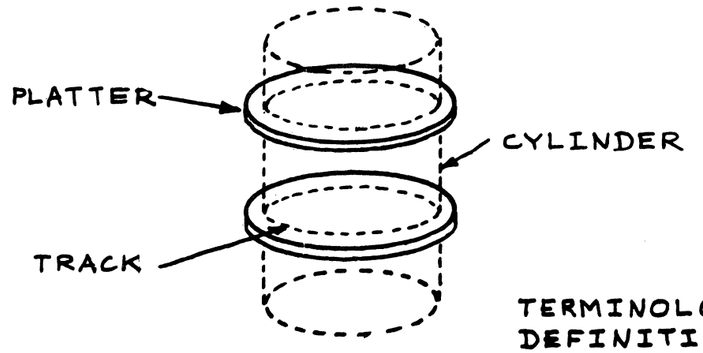
The disk cartridge storage and shipping specifications are:

(1)	Disk with cover	Weight	4.13 pounds
		Diameter	15.0 inches
		Height	1.5 inches
(2)	Shipping Container	Length	19.9 inches
		Height	6.5 inches
(3)	Temperature Range	Shipping	40-150° F
		Operating	65-90° F
(4)	Relative Humidity	Shipping	20-90 percent
		Operating	20-80 percent





SECTOR DESIGNATIONS
(8 SECTORS, TOP VIEW)



TERMINOLOGY DEFINITIONS

Figure 2-1. D5000 Disk File, Basic Block Diagram

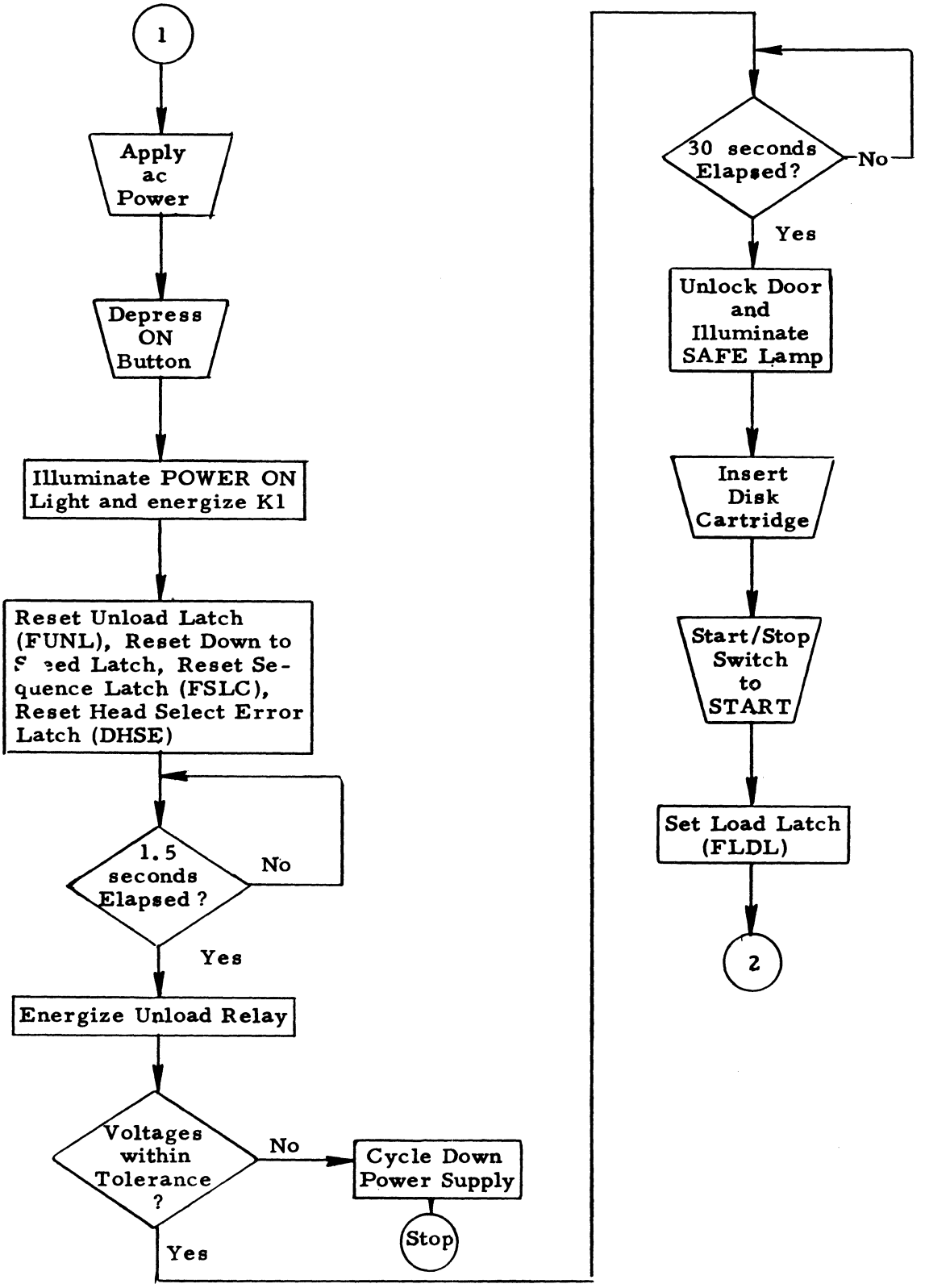


Figure 2-2. Power-Up Sequence

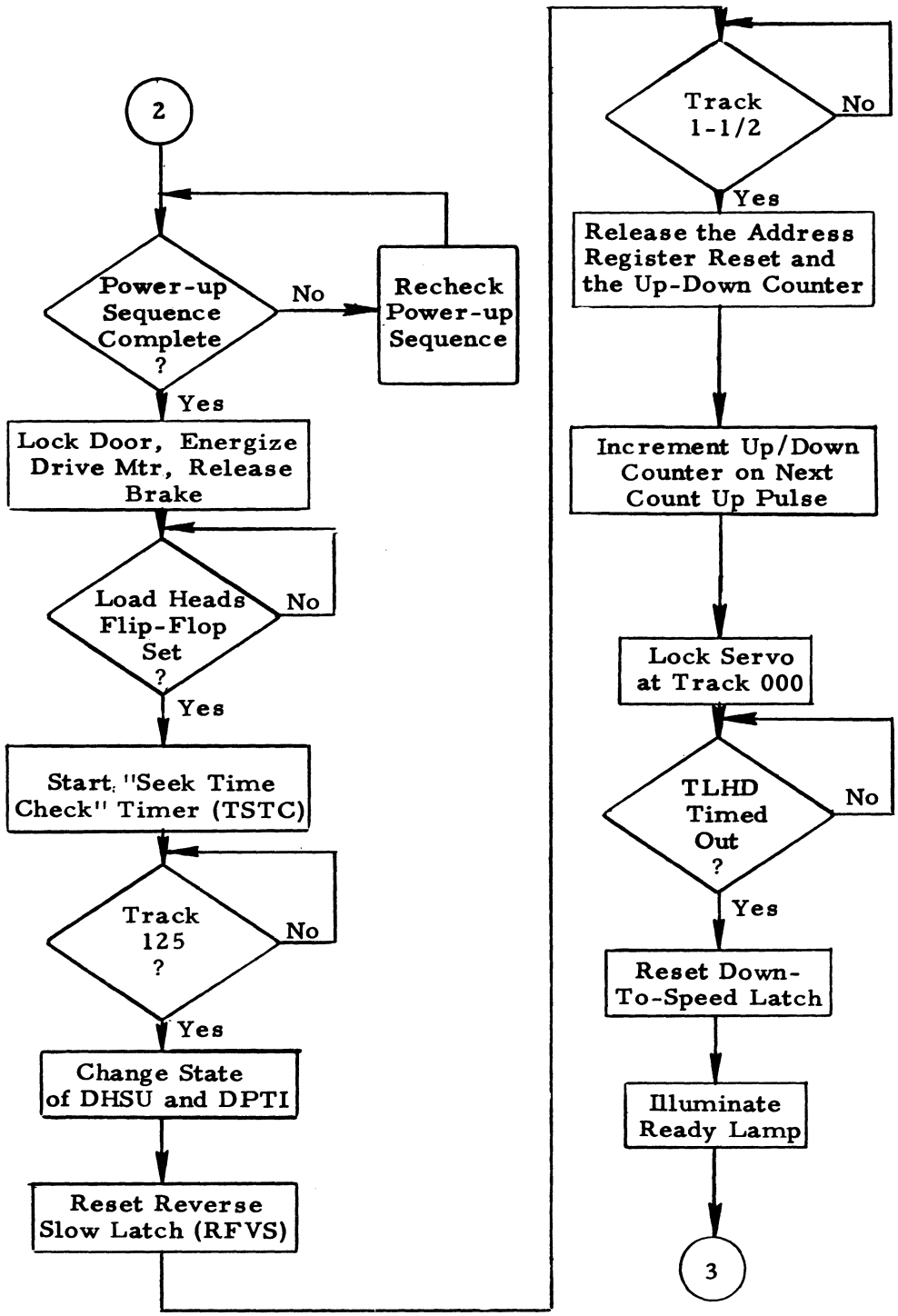


Figure 2-3. Load Sequence, Normal

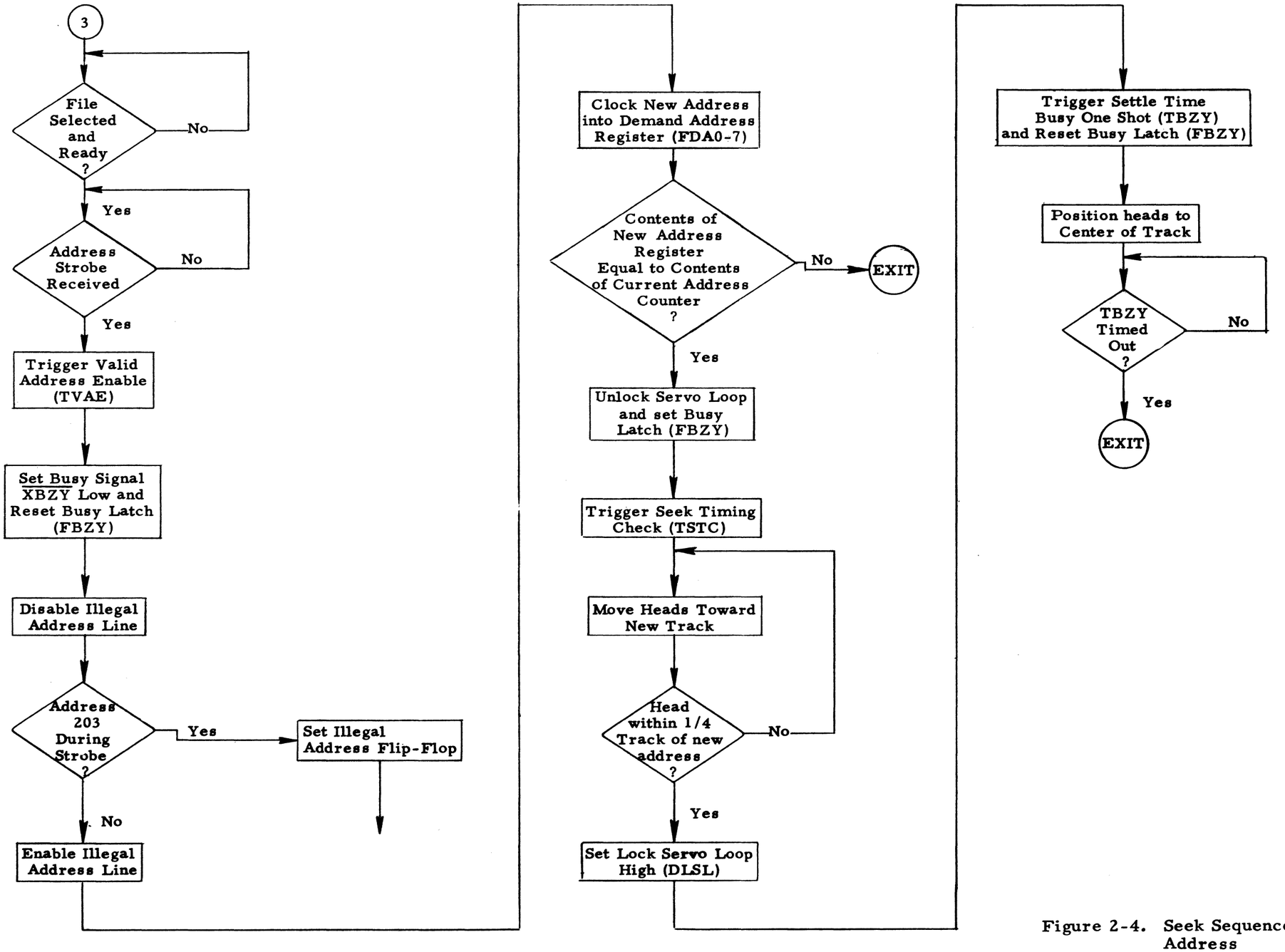


Figure 2-4. Seek Sequence, Normal Address

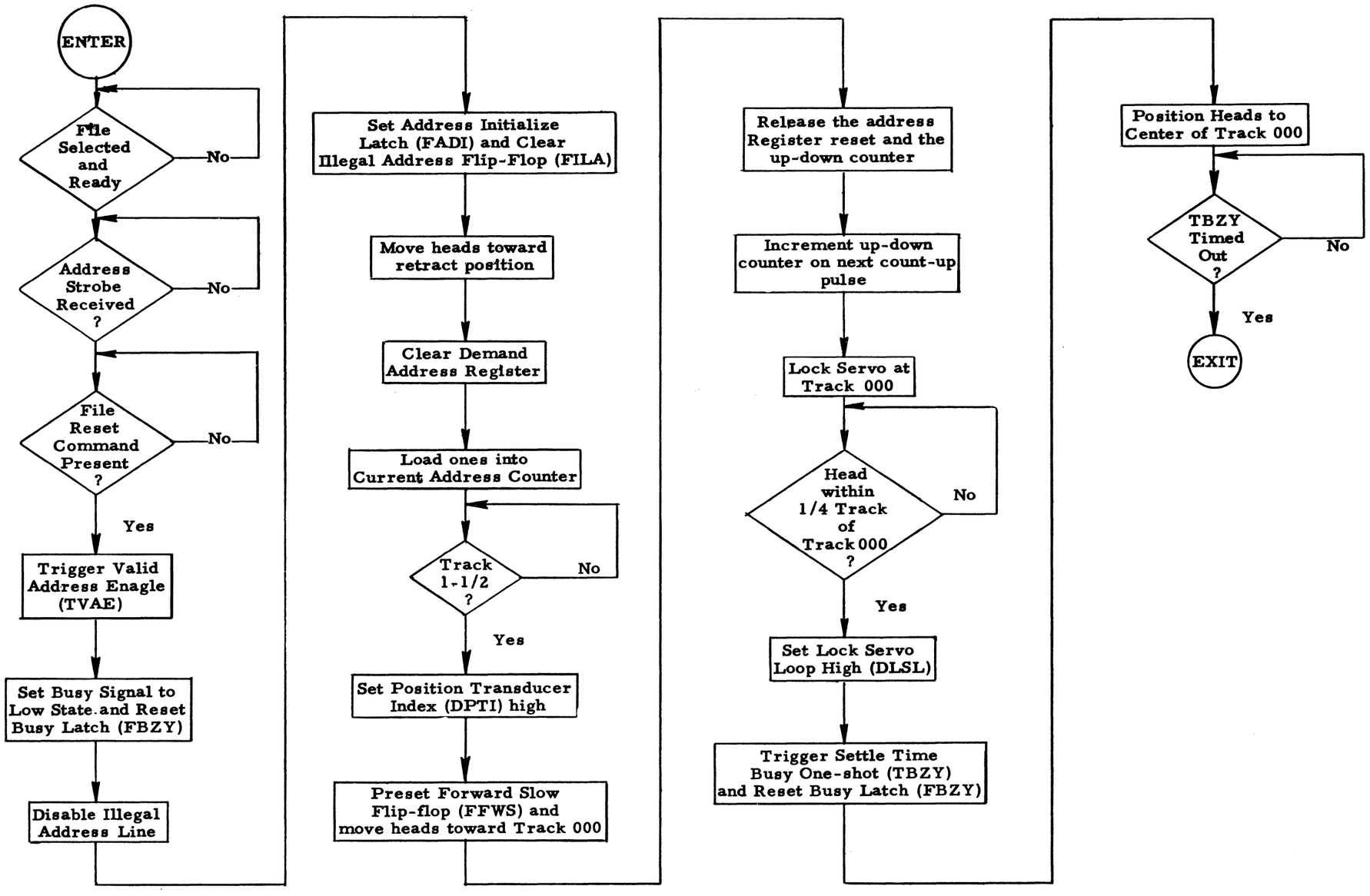


Figure 2-5. Seek Sequence, Restore to Initial Cylinder

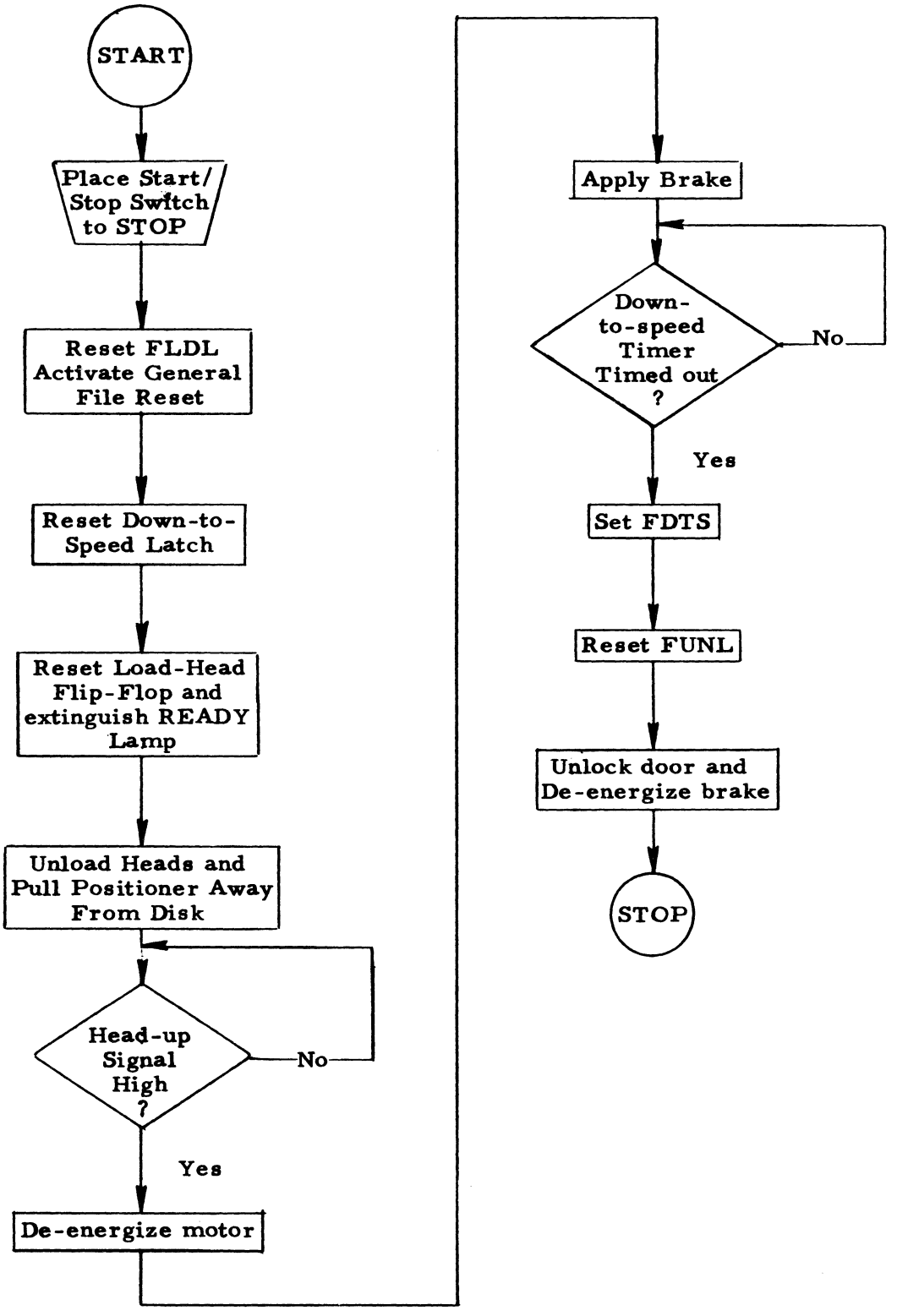


Figure 2-6. Unload Sequence, Normal

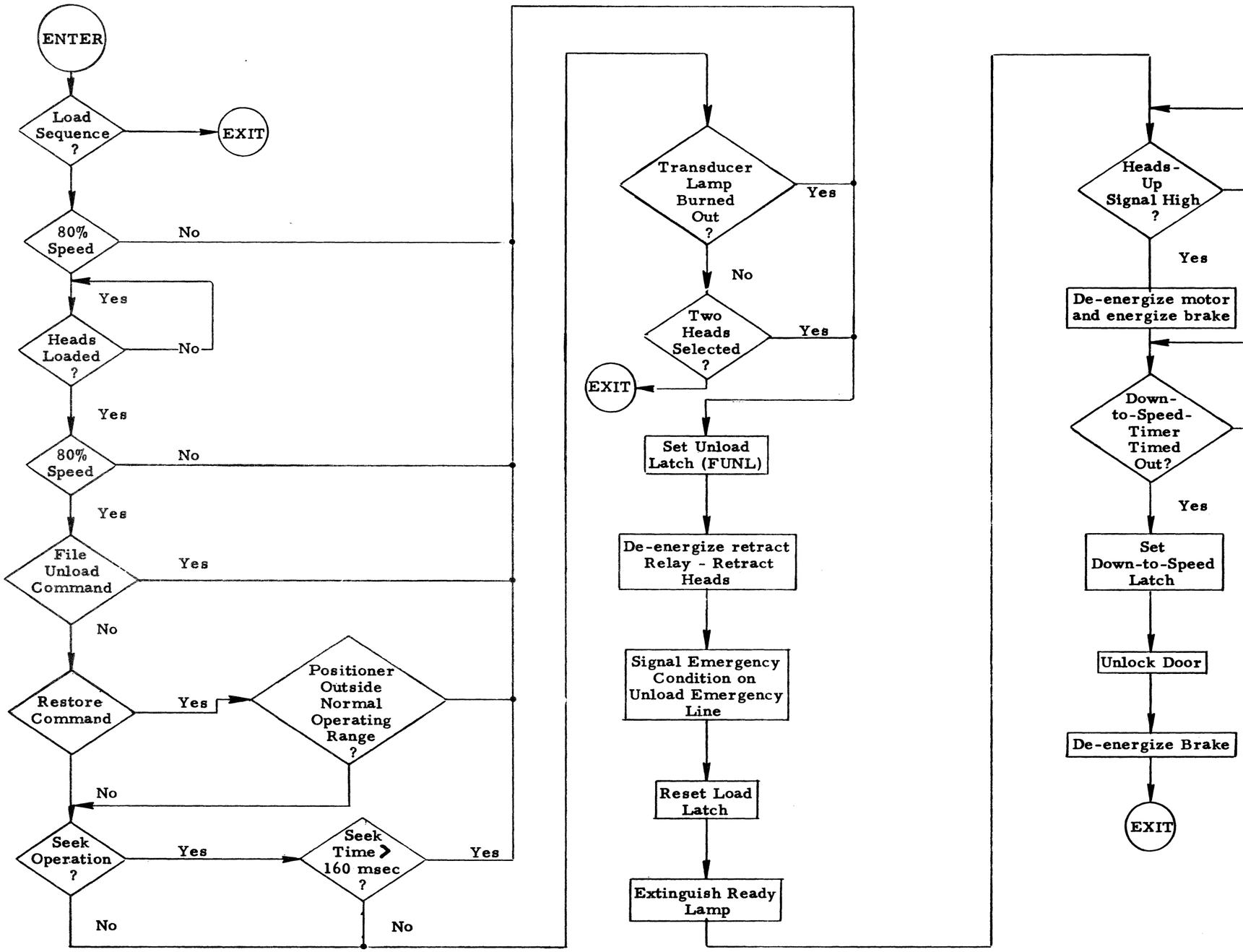


Figure 2-7. Emergency Unload Sequence

SECTION III
SHIPPING AND INSTALLATION

3.0 SHIPPING AND INSTALLATION

3.1 SHIPPING SPECIFICATION

The D5000 units, when shipped from PERTEC Peripheral Equipment, are contained in a specially designed container. The container is designed to absorb normal vibration and shock loads encountered by common commercial carriers.

Anticipated shock and vibration loads are as follows.

Shock	10 g's at 11 ± 1 ms
Vibration	5 g's at 1 to 300 Hz

The D5000 units are also enclosed within a sealed polyethylene bag to protect against dust and moisture.

3.2 UNPACKING

(1) When received, the customer should thoroughly inspect the exterior of the shipping container for obvious physical damage. Any noticeable damage should be noted on the shipper's bill of lading.

(2) Open the shipping container and the polyethylene bag covering the D5000. Remove the device from the bag.

(3) Remove top cover from the unit. Carefully remove all the packing material from around the recording heads.

(4) Remove tape from the relay at the rear of the unit.

(5) Ensure that the PWB's located on top and to the side of the positioner are fully seated in their connectors. Replace top cover.

(6) Remove the plastic face panel from the front of the unit.

(7) Remove the tape securing the module assembly. Swing out module and remove PWB keeper bar and store it for future shipping. Ensure that all PWB's are completely seated in their connectors. Untape the internal I. O. cable from the bottom of the unit and plug it into slot IOCA in the module. If the unit has the daisy-chain option, then plug the other I. O. cable into the slot marked IOTER. Check the module and secure it with the pawl fastener.

3.3 INSTALLATION

(1) Slide the unit into a rack enclosure on support rails that meet the requirements outlined in PERTEC Drawing No. 106018. Install two No. 10 flat head screws through the front panel holes to secure the D5000 to the rack mounting rails. Replace the plastic face panel and install its holding screws.

(2) Remove the rear upper shroud from the unit. Remove the tape that is holding the positioner back. Ensure that the positioner is fully retracted before powering up the unit. If it is not fully retracted the power up sequence will not function. Replace the rear skin.

(3) Install the ac and dc power cables and the external user I. O. cable(s). Apply power and check all functions for proper operation.

3.4 PRELIMINARY CHECKS

(1) Check that the face panel is properly screwed in place.

(2) Ensure a one inch minimum clearance has been maintained between the rear of the unit and the rear cover of the rack enclosure. Improper clearance will cause poor air circulation within the unit.

(3) Check all I.O., ac and dc cables to determine they are not routed over any sharp corners or are pinched between cabinet and disk chassis.

NOTE

Compatibility between units can only be assured by performing the alignment setforth in Paragraphs 4.15.10 after installation.
tion.

Whenever the unit is moved after the first installation, this procedure should be repeated.

SECTION IV

MAINTENANCE

4.0 MAINTENANCE

4.1 SAFETY

Personal safety cannot be overemphasized. To ensure your own safety, make it an everyday practice to follow safety rules and good operating practices.

AC power is still present on terminals inside the machine even though the drive motor is not powered. Be cautious when servicing the machine since objects can contact line voltages despite the safety shield and covers provided.

4.2 HEAD CLEANING AGENT

Use only isopropyl alcohol for cleaning read/write heads. Other types of alcohol may cause damage and/or contamination because of impurities. The isopropyl alcohol is a flammable liquid, so keep only the quantity needed for use.

Keep the plastic bottle containing isopropyl alcohol in a sealed metal container except when in use.

When shipping isopropyl alcohol, comply with the appropriate regulations (noted on the container) for shipment of flammable liquids.

4.3 PRECAUTIONS

There are many ways a machine can be damaged by improper operation or improper servicing techniques. These are described in the text under the appropriate servicing procedure. The most significant of these are listed below.

4.3.1 DISK CARTRIDGE HANDLING

Maintain cleanliness while handling the disk cartridge. The cartridge door which receives the read/write heads must never be unlatched and opened when the cartridge is out of the machine except when using the disk cartridge cleaning fixture to clean the disk. Also, the air valve located on the bottom surface of the cartridge must never be opened. Disk surfaces can be seriously damaged if foreign particles are introduced inside the cartridge.

Avoid taking apart the disk cartridge. The disk cartridge assembly is a semi-permanently encased unit.

Never subject a disk cartridge to top loading or store it on a protruding object. These handling practices could deform the diaphragm which centers the disk within the cartridge housing. Damage to the diaphragm renders the cartridge unusable and can cause damage to read/write heads.

4.3.2 INSERTING OR REMOVING DISK CARTRIDGE

Always apply dc power before inserting the cartridge. The safe lamp will be illuminated to indicate that dc power is on, ac power to the drive motor is turned off, and the carriage is in its fully retracted position.

4.3.3 CE RESTRICTED TRACKS ON DISK CARTRIDGE

Do not write on the CE disk cartridge at tracks 090 through 110. This band contains pre-recorded test tracks 095, 100, and 105 which will be destroyed. Any other tracks may be used for test purposes.

4.3.4 READ/WRITE HEADS

Avoid touching the gliding surface of read/write heads. Acids from the skin can etch and ruin the head. If head is accidentally touched, clean with isopropyl alcohol.

Do not load heads manually at any time except during read/write head cleaning operation.

4.3.5 DC POWER

The +5v dc, +12v dc, ±24v dc, and -26v dc power must be applied to, and removed from, the machine within 50 milliseconds of each other to prevent damage to internal circuits of the machine. The power supply general reset signal must be longer than the 50 millisecond stabilization period.

4.3.6 CABLE AND PWB REMOVAL

The following Note and Caution must be observed.

NOTE

DC power must be turned off before removing the I/O cable to avoid loss of customer data and before removing or inserting printed wiring boards.

CAUTION

PWB'S ARE NOT TO BE REMOVED WHEN DC POWER IS ON.

4.4 REFERENCE DATA

4.4.1 DISK CARTRIDGE DESCRIPTION

(1) Number of disk surfaces

D5101, D5201	2
D5121, D5221	4 (one fixed disk and one removable)

(2) Tracks per surfaces (accessible including spares) 203

(3) Track spacing 0.010 inches

(4) Outside diameter of disk 14.025 ±0.005 inches

(5) Recording media magnetic oxide

(6) Disk material aluminum

4.4.2 HEADS, TYPES

(1) Type

D5101, D5121	tunnel erase
D5201, D5221	transverse erase

(2) Number

D5101, D5201	2 (1 per surface)
D5121, D5221	4 (1 per surface)

(3) Read/write width

D5101, D5121	0.0075 ±0.0005 inches
D5201, D5221	0.007 + 0.0005 inches

(4) Total erase width

D5101, D5121	0.0109 ±0.0004 inches
D5201, D5221	0.0142 inches maximum

(5) Erase tunnel width

D5101, D5121	0.0059 ±0.0002 inches
D5201, D5221	0.0038 inches maximum each side of head

(6) Distance from read/write gap to erase gap

D5101, D5121	0.045 ±0.002 inches
D5201, D5221	0.019 inches maximum

4.4.3 RECORDING MODES

(1) Mode — double frequency

(2) Density (outer track) nominal

D5101, D5121	704 bits/inch
D5201, D5221	1524 bits/inch

(3) Density (inner track) nominal

D5101, D5121	1026 bits/inch
D5201, D5221	2207 bits/inch

4.4.4 TRACK ACCESS TIME

(1) Maximum (inner to outer track) — 110 milliseconds maximum

(2) Minimum (adjacent tracks) — 15 milliseconds

(3) Average — 60 milliseconds

4.4.5 SPINDLE ROTATION

(1)	Speed (counterclockwise)	1500 ±30 RPM
(2)	Latency maximum (1 revolution)	40 ±0.8 milliseconds
(3)	Latency average (1/2 revolution)	20 ±0.4 milliseconds

4.4.6 DATA TRANSFER – BIT RATE

(1) Data bit rate

D5101, D5121	720,000 data bits/seconds
D5201, D5221	1,562,500 data bits/seconds

4.5 GENERAL MAINTENANCE

The objective of any maintenance program is to provide maximum machine readiness with a minimum of downtime. To provide this type of reliability it is necessary to perform preventive maintenance at specified intervals. Refer to Table 4-1.

4.5.1 VISUAL INSPECTION

Inspect for corrosion, dirt, wear, cracks, binds, and loose connections in wiring and on hardware while conducting an inspection.

4.5.2 ELECTRONIC CIRCUITS

Using appropriate test programs or test equipment, and when assisted by oscilloscope checking, are all effective ways of locating potential circuit troubles.

Table 4-1

Preventive Maintenance Schedule

Location Operation	*Freq/ Months	Operation
Read/Write Heads	6	Clean and inspect read/write heads for scratches and build up of oxide. Inspect head leads for damage.
Carriage Rail	6	Clean carriage rail with lint-free tissue and isopropyl alcohol.
Spindle Assembly	6	Clean each pole piece of the magnetic chuck with lint-free tissue dampened with isopropyl alcohol. Magnetic particles may be removed with adhesive tape.
Inlet Air Filter	6	Remove filter from inlet air duct located in back of machine and replace. See Paragraph 4.14.3.
Drive Belt Tension	4	Check and adjust. See Paragraph 4.14.13 for Corrective Maintenance.
Voice Coil Positioner	-	Do not touch or move the positioner (or its adjustments). No maintenance is required unless trouble has been experienced.
Absolute Air Filter	12	Replace. See Paragraph 4.14.4 of Corrective Maintenance.
Read/Write Heads	5	Check read/write radial head alignment using CE disk cartridge. Refer to Paragraph 4.15.9.
Removable Disk	6	See Paragraph 4.14.21.
Fixed Disk (dual disk only)	6	See Paragraph 4.14.22.
Base Plate Casting and Covers	12	Inspect for cleanliness and loose parts. Clean as necessary with a vacuum cleaner.
Lubricate Static Discharge bracket	4	Apply lubricant between contact screw on end of disc shaft & grounding bracket

*The preventive maintenance frequency is determined by machine in service time computed at 200 hours-per-month. Actual frequency of cleaning and filter replacement is determined by cleanliness of the operating environment. The suggested frequency can be altered according to experience in a given area.

page 1 of 5

4.5.3 MECHANICAL MAINTENANCE

Two basic preventive maintenance functions performed on any mechanical or electromechanical machine are cleaning and inspection. Do not perform more than the recommended preventive maintenance on equipment that is operating within specification.

4.5.4 CLEANLINESS

Cleanliness is essential for maintaining machines that use disks which rotate between read/write heads.

Minute particles of dust can accumulate and become trapped between the flying heads and the disk. The accumulated dust causes the disk surface to become scored, and this condition results in an unusable track, head damage, or both.

Accumulated foreign matter can also cause the read/write heads to fly at a greater distance from the actual disk surface. This will severely impair the retrieval of data and result in improper writing.

4.6 PREVENTIVE MAINTENANCE

Specified maintenance intervals are recommended for a disk being used in a normal operating environment. If the disk is operated in a dusty or smoky environment, it may need a more frequent maintenance schedule.

Table 4-1 enumerates the preventative maintenance and the intervals and the periods at which the various functions should be performed.

NOTE

Do not allow oil to accumulate anywhere on the machine. Oil collects dust and dirt. Do not operate the machine with the top cover removed unless maintenance cannot be performed otherwise. If the machine must be operated with the cover off, replace cartridge with a work cartridge to avoid damage to data.

4.6.1 CLEANING PROCEDURES

The methods of cleaning outlined in this section should be adhered to in order to ensure reliable operation of the Disk Drive.

4.6.1.1 Cleaning Fixed Disk (Dual Disk Only)

(1) Raise positioner into servicing position as outlined in this section.

(2) Remove positioner retract relay (K1) from socket at rear corner of machine.

(3) Turn the dc power on but leave the unit toggle-switch in the stop position.

(4) Pull the carriage forward approximately 1/2 inch to start the disk rotating. Be careful not to cause the heads to load. Hold or prop the carriage in this position so the disk will continue to rotate.

(5) Using the disk cleaning tool, PERTEC No. 632-0002, rub both disk surfaces lightly back and forth with the alcohol moistened pad.

NOTE

Disks in removable cartridges can also be cleaned in this manner or they can be taken apart and cleaned manually.

(6) Put carriage back in fully retracted position.

(7) Turn off the dc power and replace the positioner retract relay.

(8) When the disk has stopped rotating, lower the positioner onto its locating dowels and replace the four black Allen head hold down screws.

4.6.1.2 Cleaning Read/Write Heads (Disk Cartridge Removed)

(1) Remove the top cover from the unit. Remove the four black Allen head screws holding the positioner in place. Hold the positioner assembly by the metal PWB holder on top of the positioner and carefully raise the positioner from its locating dowel by pulling the positioner up and toward the back of the machine pivoting it about the rear support. Put the red support post in the hole in the base plate to hold the positioner up. Care should be taken not to let the PWB on top of the positioner come in contact with the rear shroud.

(2) Wrap a lint-free wiper around cleaning tool, PERTEC No. 623-0002, and dampen with isopropyl alcohol.

(3) Support the back of a read/write head and thoroughly wipe the face of each read/write head with the lint-free wiper dampened with alcohol.

CAUTION

DO NOT TOUCH THE FACE OF THE READ/WRITE HEAD WITH FINGERS. ACIDS EMITTED FROM SKIN CAN ETCH AND RUIN A HEAD. DO NOT LEAVE ANY ALCOHOL RESIDUE ON FACE OF THE READ/WRITE HEAD. DO NOT BLOW ON HEADS. MOISTURE WILL CONTAMINATE THE HEADS.

(4) Use a dental mirror to inspect each head surface after cleaning. Be certain that all dirt is cleaned off. Any remaining material not removed will damage the disks. Wipe head with a dry wiper after cleaning.

(5) Replace the positioner on its locating dowels and replace the four black Allen head hold-down screws.

4.6.1.3 Cleaning Carriage Rail

(1) Wipe carriage rail and carriage center shaft with a lint-free tissue dampened with isopropyl alcohol.

4.6.1.4 Cleaning Glass Slide

CAUTION

WHEN CLEANING GLASS SLIDE DO NOT USE ANY ABRASIVE INSTRUMENTS AS THE SLIDE CAN BE EASILY DAMAGED.

(1) Wipe the glass slide with a lint-free tissue dampened with isopropyl alcohol. Wipe once more with a lint-free tissue to remove any film.

4.6.1.5 Cleaning Spindle Assembly

(1) Clean each pole piece of the magnetic chuck with lint-free tissue dampened with isopropyl alcohol. Magnetic particles can be removed with adhesive tape.

4.6.1.6 Cleaning Base Plate

(1) The base plate casting can be cleaned by vacuuming.

4.7 OPERATION

The content of this section is based on the premise that an understanding of the overall unit leads directly to the most efficient corrective maintenance procedures.

Paragraphs 4.7 through 4.13 explain the theory of operation of the D5000 Series. Figure 4-1 is a functional diagram of the Input/Output Lines. A functional breakdown of the unit is given, and these functional areas are detailed to instruct maintenance personnel in mechanical and electrical operation. Logic and circuit schematics are referenced throughout the discussion. Flow diagrams are at the end of Section II.

4.7.1 CIRCUIT DESCRIPTIONS

4.7.1.1 Definitions

The standard logic levels are: +2.5v to +5.3v true, 0.2 ±0.2v false. The basic logic integrated circuit family used is DTL. If an element is TTL then it is so designated on the schematic. The standard elements are represented as shown on the page following Figure 4-1.

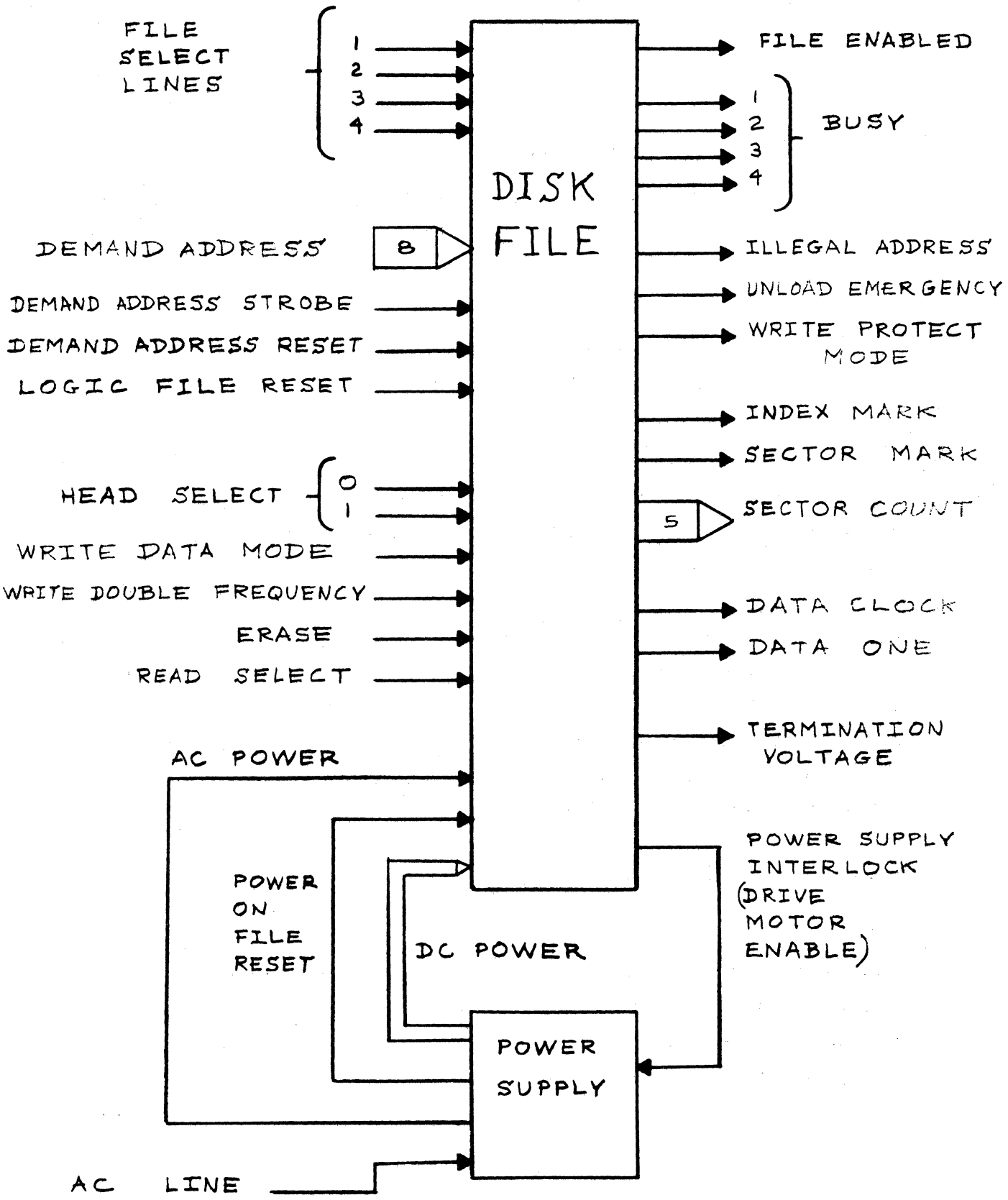
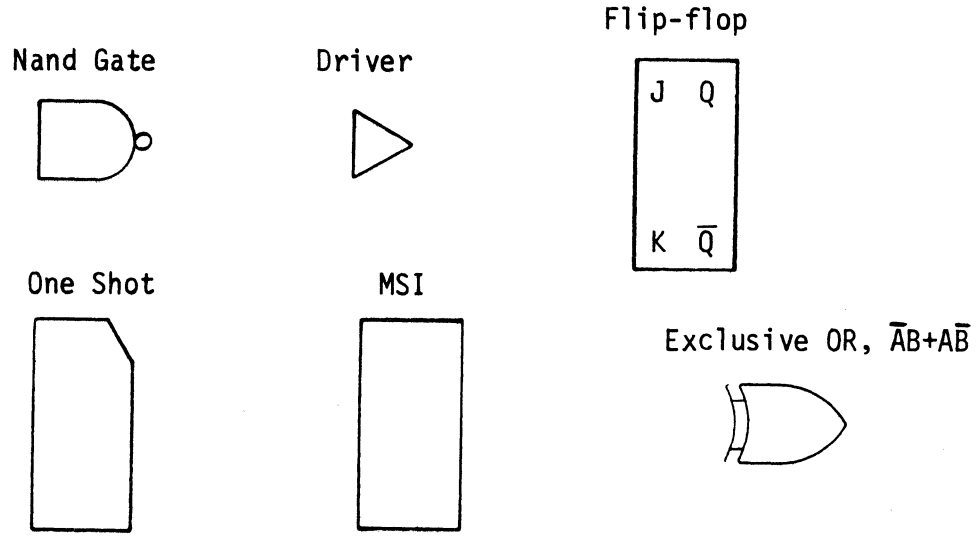
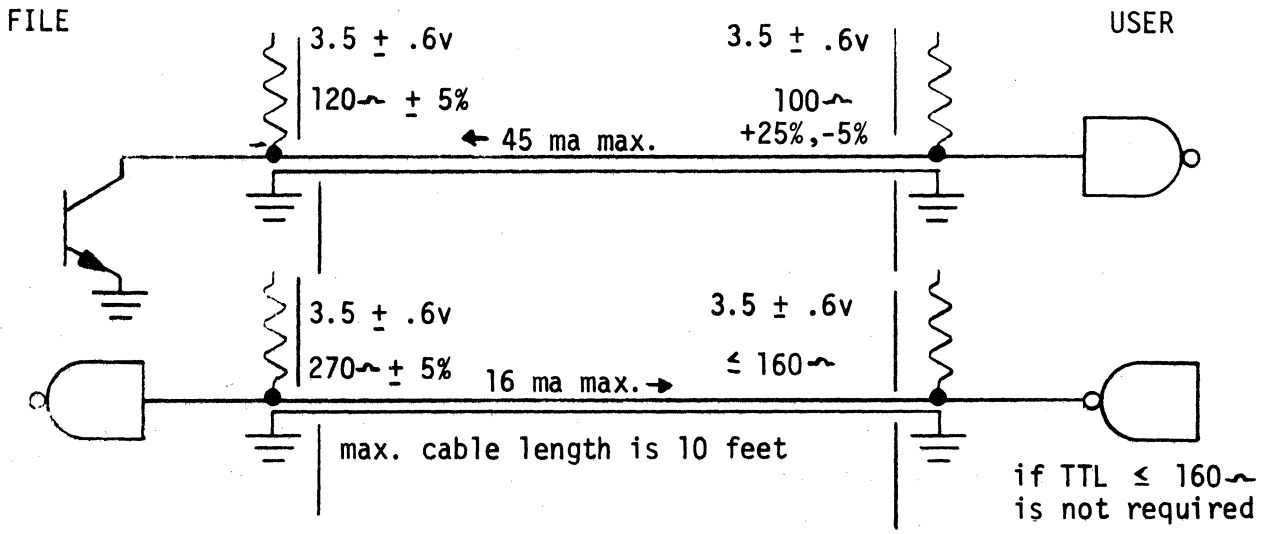


Figure 4-1. D5000 Disk File I/O Lines



4.7.1.2 File-User Interface

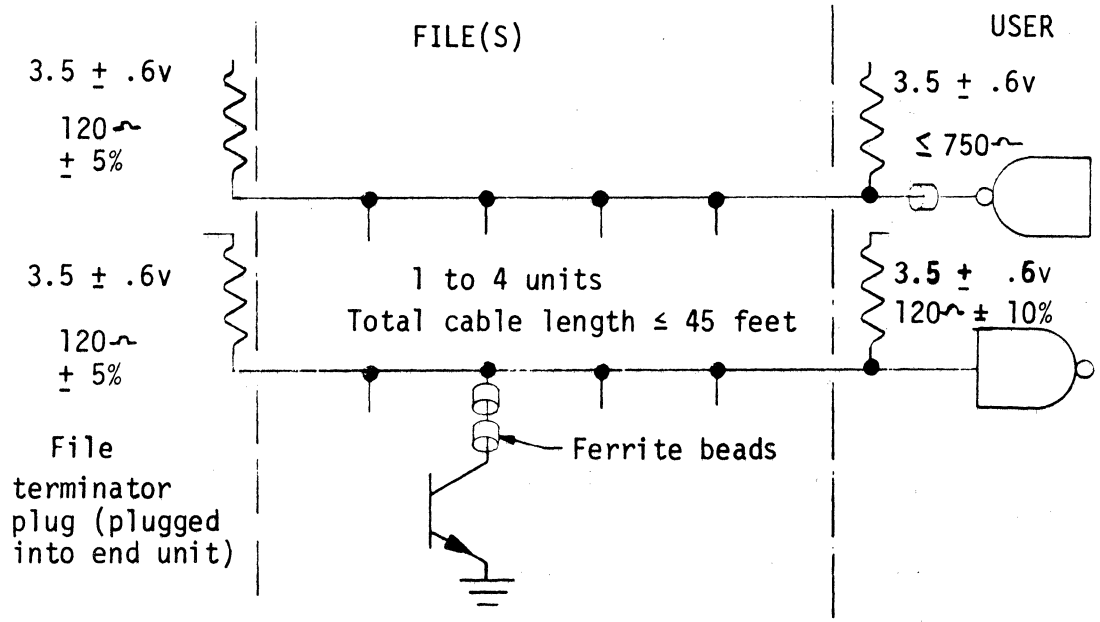
On non-daisy-chain units the following interface is used.



525A

4.7.1.3 Daisy-Chain Interface

On daisy-chain units the following interface is used. See interface information on Drawing No. 106069, Sheets one and two.



4.8 LOGIC

The following explains the logic required for functional operation.

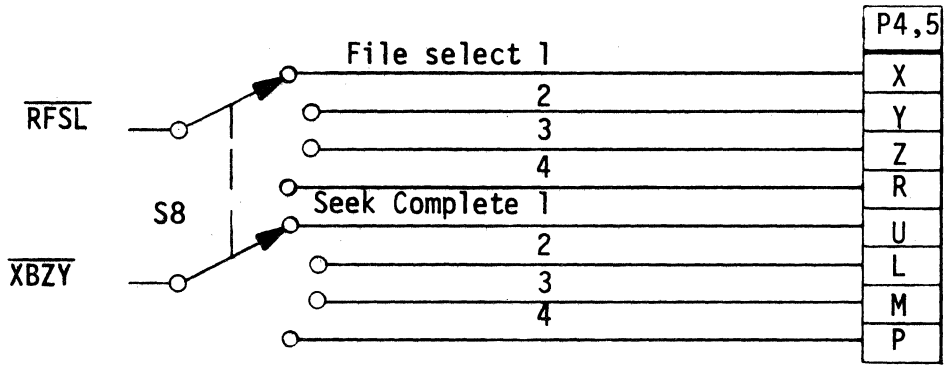
4.8.1 FILE SELECT (Following logic performed in slot 04 on DFDR PWB unless otherwise noted)

When $\overline{\text{RFSL}}$ (file select from user) goes false the user can, after 2 microseconds, use the information at his receivers. RFSL is ANDED with $\overline{\text{DATT}}$ to generate DFSE (file enabled or ready). DFSE generates $\overline{\text{XFSE}}$ (on MB 1 in slot 15) which is sent to the user to indicate that the file unit is enabled and ready. DFSE enables the following received signals in the file unit: write mode ($\overline{\text{RWDM}}$), erase mode ($\overline{\text{RERA}}$), track address strobe ($\overline{\text{RDAS}}$, on MB 2 in slot 19), restore command ($\overline{\text{RDAR}}$, on MB 2 in slot 19). It also enables the following transmitters: index mark ($\overline{\text{XINM}}$, on MB 1 in slot 15), sector mark ($\overline{\text{XSRM}}$, on MB 1 in slot 15), sector

address ($\overline{\text{XSCO-4}}$, on MB 1 in slot 15), seek complete ($\overline{\text{XBZY}}$, on MB 2 in slot 19), write protect mode ($\overline{\text{XWPM}}$) , illegal address ($\overline{\text{XILA}}$, on MB 2 in slot 19), malfunction ($\overline{\text{XULE}}$). DFSE and RRDS (read select) enable the read clock ($\overline{\text{XDCL}}$, on MB 1 in slot 15) and read data ($\overline{\text{XONE}}$, on MB 1 in slot 15) transmitters.

On non-daisy-chained units file select line one is RFSL. The seek complete signal ($\overline{\text{XBZY}}$) is transmitted on seek complete line one.

On daisy-chain units $\overline{\text{RFSL}}$ is generated as shown.



The following received signals are not enabled by file enabled (DFSE). User unload ($\overline{\text{RLFR}}$, on MB 3 in slot 23), track address ($\overline{\text{RDAO-7}}$, on MB 4 in slot 27, write data ($\overline{\text{DWDF}}$), head select line one ($\overline{\text{RHSO}}$) and head select line 2 ($\overline{\text{RHS1}}$, on MB 1 in slot 15).

525A

4.8.2 LOGIC LOAD SEQUENCE (The following logic is performed on MB 3 in slot 23 unless otherwise noted. Refer to Figure 4-2.)

A Load sequence will be initiated after elimination of all the unload conditions. The unload conditions are: power supply reset ($\overline{\text{PPFR}}$), stop switch ($\overline{\text{SULS}}$), disk cartridge out ($\overline{\text{SCAR}}$), emergency unload ($\overline{\text{FUNL}}$). If the unload conditions do not exist (normally obtained by moving the start/stop switch to start) and the down to speed latch (FDTS) is set, then FLDL (load latch) is set. FDTS is set by a 30 second unijunction timer (TDTS, down to speed, on DRDB/B PWB in slot 25). TDTS is used to determine that disk rotation has stopped. It is enabled by the loss of sector pulses (DSTP, from SITB PWB in slot 17) and drive motor (DMTE) off condition. FLDL is ORed with the heads up signal ($\overline{\text{DHSU}}$, from servo PWB VCAC at J6) from the positioner to generate the drive motor signal (DMTE). DMTE causes $\overline{\text{DILK}}$ to go true which locks the door interlock and turns off the safe lamp. DMTE OSD (on DRDB/B PWB in slot 25) drives a triac control circuit which switches ac to the drive motor. DMTE ISE enables a 20 second unijunction timer (TLHD, on DRDB/B in slot 25) which is used as a clock to allow FLDL to set the load heads FF (FLHD). FLHD causes $\overline{\text{DFWS}}$ (forward slow, on MB 2 in slot 19, see Paragraph 4.8.4.7) to become false to allow the positioner to move the heads from the full retract position to track 000. The heads up signal (DHSU) is false at the full retract position (approximately -125 or less). The heads come off the unload ramps to land on the disk surfaces at approximately track -5. The servo will position them over track 000. When TLHD times out again (determined by DHSU being false) FDTS is reset. $\overline{\text{FDTS}}$ and FLHD remove the attention condition (DATT). The ready lamp will light as a result of DATT being false. $\overline{\text{DATT}}$ and RFSL (user file select) generate DFSE (file enabled) on the DFDR PWB in slot 04. DFSE generates $\overline{\text{XFSE}}$ (on MB 1 in slot 15) to inform the user that the file unit is selected and ready.

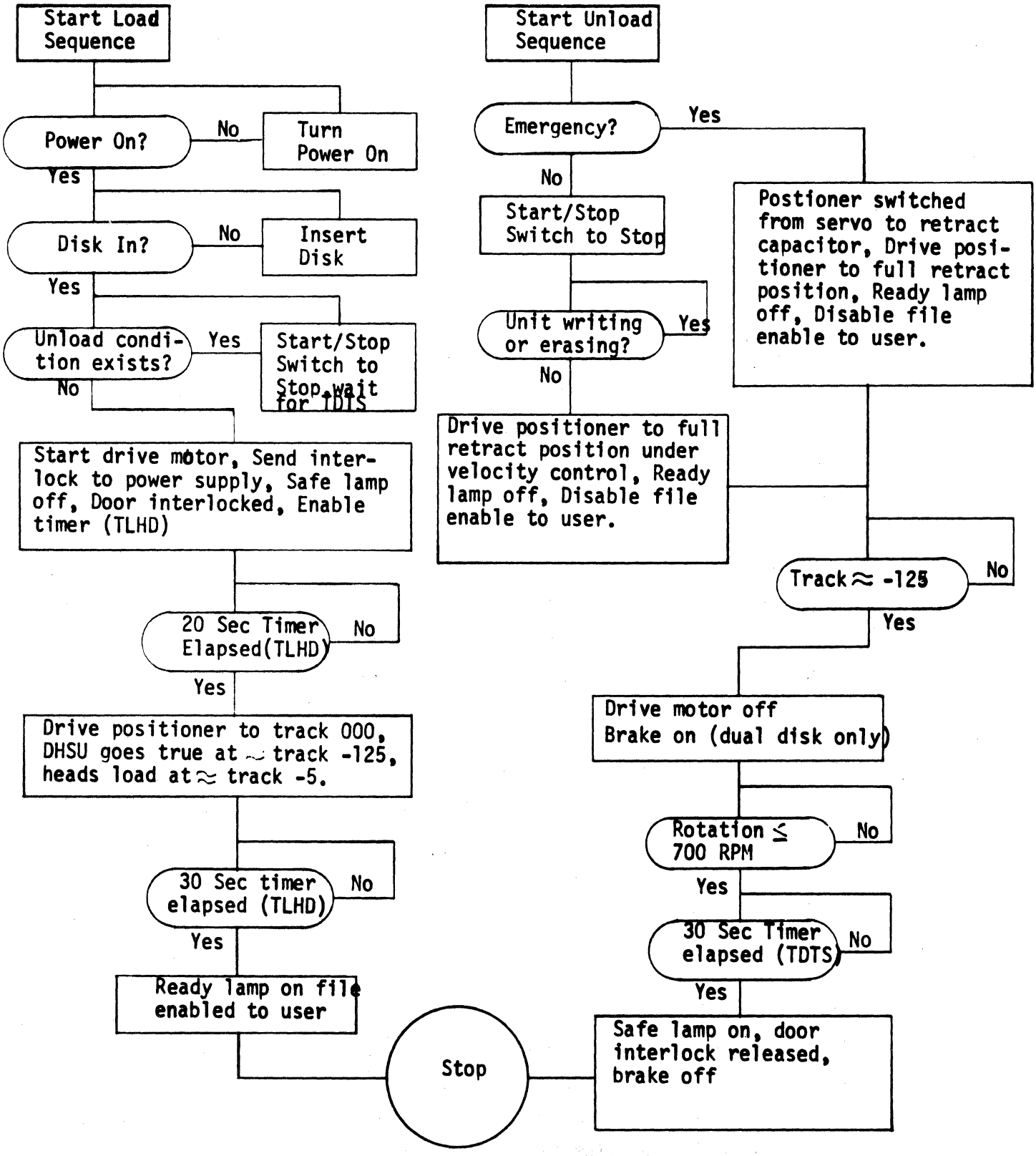


Figure 4-2. Logic Flow Chart

4.8.3 LOGIC UNLOAD SEQUENCE (The following logic is performed on MB3 in slot 23 unless otherwise noted. Refer to Figure 4-2)

When a normal unload (start/stop switch to stop) condition occurs, the load latch (FLDL) is reset. FLDL resets FLHD which in turn sets FRVS (reverse slow, on MB 2 in slot 19, see Paragraph 4.8.4.8) to allow the servo to unload the heads from the disk under velocity control. If an emergency unload condition is detected then FUNL is set. FUNL resets FLDL which in turn resets FLHD. FLHD enables the attention condition DATT which disables the file enabled condition to the user ($\overline{\text{XFSE}}$, on MB 1 in slot 15). The servo is disconnected (DULE) from the positioner (relay K1) and is replaced by a capacitor which dumps its current limited (R5) charge into the positioner to move it back to the full retract position. The capacitor is initially charged to 26v through resistor (R4) and the minus 24v (VN 26) supply. After the heads up signal ($\overline{\text{DHSU}}$, from servo PWB VCAC at J6) goes false (approximately track -125) the drive motor is turned off (DMTE=DHSU or FLDL). $\overline{\text{DMTE}}$ and $\overline{\text{FDTS}}$ enables the brake ($\overline{\text{DBLK}}$) for disk deceleration. The brake (dual disk units only) is on for approximately 35 seconds. DMTE or DSTP (sector time pulse, from SITB PWB in slot 17) keeps the 30 second unijunction timer (TDTS, down to speed, from DRDB/B PWB in slot 25) disabled. DSTP is used to determine when the sector transducer output is below the threshold level established at the detector. If there is a DSTP output the threshold control (DMTE 1SF, to SITB PWB in slot 17) is at 0.2 ±0.2v (drive motor off) and the disk is turning at approximately 700 RPM or faster. After the last DSTP pulse, the 30 second unijunction timer will complete its time out. TDTS will set FDTS (down to speed latch) at the end of the 30 second period. $\overline{\text{DILK}}$ (door interlock, safe lamp) goes false on FDTS and DHSU and $\overline{\text{DMTE}}$ to allow disk pack removal. A description of all unload conditions (all the following logic is performed on MB 3 in slot 23) start on next page.

4.8.3.1 Normal Unload or Preventive Load Conditions

If the start/stop switch is moved to the stop position ($\overline{SULS}$ goes true) and the unit is not in an erase ($\overline{DERA}$) or write data ($\overline{DWDM}$) mode then FLDL is reset to start the normal velocity controlled unload sequence.

If the disk cartridge is removed the FSLC (stop load condition) latch is set by $\overline{SCAR}$ (cartridge switch). FSLC can be reset only if a cartridge is in place and the start/stop switch is in the stop position. After it is reset the unit will load by moving the start/stop switch to the start position.

4.8.3.2 Emergency Unload

If an emergency unload condition is detected then FUNL is set. FUNL is reset by SULS (stop switch) and TDTS (down to speed pulse) or the supply reset ($\overline{PPFR}$). FUNL or $\overline{PPFR}$ causes DULE to go true to disable relay K1 to allow switching in the emergency retract capacitor (C2). The emergency conditions are:

(1) $\overline{PPFR}$ (from power supply) disables K1. $\overline{PPFR}$ goes false on a power up condition, on a loss of ac, or on a dc voltage loss. A plus five volt detector is on the DRDB/B PWB in slot 25 (DULE OSA) to guarantee K1 off during a power down sequence.

(2) If the FLHD (load heads) FF is set and the unit is not up to 80 percent of speed ($\overline{DUTS}$, from SITB PWB in slot 17) then FUNL is set by FUNL NAO8.

(3) If the position transducer lamp is out then $\overline{DSVE}$ (servo error, from servo PWB VCAP at J7) sets FUNL.

(4) If more than one head is selected then $\overline{DHSE}$ (multiple heads selected, from EAHS PWB in slot 03) sets FUNL.

(5) If a normal seek operation continues for more than 160 milliseconds then FUNL is set. DSTC (seek time check, from MB 2 in slot 19) triggers TSTC (160 milliseconds one shot). If DSTC remains true for more than 160 milliseconds then FUNL NAO2 sets FUNL.

(6) If an unload command ($\overline{\text{RLFR}}$) is sent by the user then it sets FUNL. Permanent write errors can be expected in a given data block if the user is performing a write operation when he sends RLFR. This line is normally used for a user emergency power down condition where control of interface lines become marginal or impossible.

(7) If the heads up signal ($\overline{\text{DHSU}}$) from the positioner is true and the unit is not up to 80 percent of speed ($\overline{\text{DUTS}}$, from SITB PWB in slot 17) then FUNL NAO7 sets FUNL.

(8) The position transducer scale has an index area on each end of the scale. This occurs nominally at track 204 and track -1.5. When the positioner is between these extremes then $\overline{\text{DPTI}}$ (position transducer index, from servo PWB VCAC at J6) is true. In the full retrack position DPTI may be true but this is not significant. DPTI is ANDed with $\overline{\text{FADI}}$ (address initialize, on MB 2 in slot 19) to generate DPTE. FADI is set by $\overline{\text{DADI}}$ which is a result of an accepted address register reset (RDAR-user restore command). In other words, DPTE will not go false on a restore command. A restore command (see Paragraph 4.8.4.5) requires usage of the index area for relocating the positioner to track 000. When the unit is loaded and FLHD goes true the reset to FPTE (position transducer error) is removed. The

positioner will move forward into the valid range of the transducer scale. At this time DPTE ISA goes false to set FPTE. If FPTE is set and DTPE ISA goes true again then FPTE and DPTE generate FUNL NAO6 to set FUNL.

(9) If the positioner has not moved within 20 seconds after FLHD is set in the Load sequence then TLHD and FLHD and $\overline{\text{TSTC}}$ and (DHSU or DPTE) generate FUNL NAO9 to set FUNL.

4.8.4 POSITIONER OPERATION

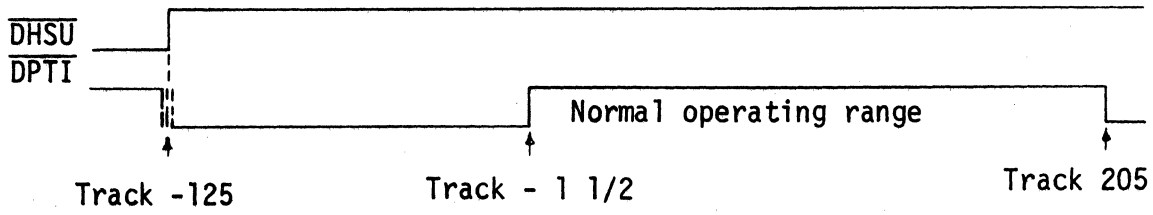
The moving part of the positioner is basically composed of a voice coil, velocity transducer magnet, position transducer scale, and read/write heads. The non-moving part is composed of voice coil magnets, velocity transducer coil, and position transducer photodiode read head. The voice coil has an approximate travel range of 3.5 inches. The normal on line positioning range is approximately 2.1 inches (heads loaded). The heads unloaded (or retracted) range is approximately 1.5 inches. The unload complete range (of full retract position) is when the voice coil is approximately within 0.25 inch of its full reverse travel range.

The velocity transducer coil generates an output of approximately 100 millivolts per inch per second.

The position transducer read head is composed of six photodiodes. They are used to generate the heads up signal ($\overline{\text{DHSU}}$), the position transducer index ($\overline{\text{DPTI}}$), the $\times + 0^{\circ}$ position phase (2 cells), and the $\times + 90^{\circ}$ position phase (2 cells). The various operations are discussed in the following sections.

4.8.4.1 Index Signal

The heads up and position transducer index signal are as shown below.



4.8.4.2 Servo Normal Seek Command

After a unit is enabled (DFSE is true) a seek command from the user ($\overline{\text{RDAS}}$, demand address strobe, on MB 2 in slot 19) will be accepted. This pulse (RDAS) will be between 800 nanoseconds and 2 microseconds wide. It will trigger a 10 microsends one-shot (TVAE, valid address enable) on MB 2 in slot 19. TVAE 1SC and RDAS generate $\overline{\text{DVAE}}$. A trailing edge pulse is generated ($\overline{\text{DVAQ}}$, valid address clock) which allows the demand address register (FDAO-7) on MB 4 in slot 27 to be loaded with the new track address ($\overline{\text{RDAO-7}}$) from the user. The new address is compared with the old address held in the up/down counter (FACO-7, current address). An eight bit subtractor generates the difference (DDFO-7) and direction (DCEC, controlled end carry). DDFO-7 is sent to the VCAP PWB in J7 for generation of a velocity reference. The new difference causes DLSL (lock null, from VCAP PWB in J7) to go false. DLSL is true whenever the positioner is within 1/4 track of its final null position. DCEC is used on MB 2 in slot 19 to generate a direction control ($\overline{\text{DDFR}}$, difference reverse) for the servo. The servo will move according to the information and will generate signals (DPCL, position clock generated from X + 0 phase and DD1R, positioner direction generated from X + 90 phase) which will move the up/down counters (FCAO-7)

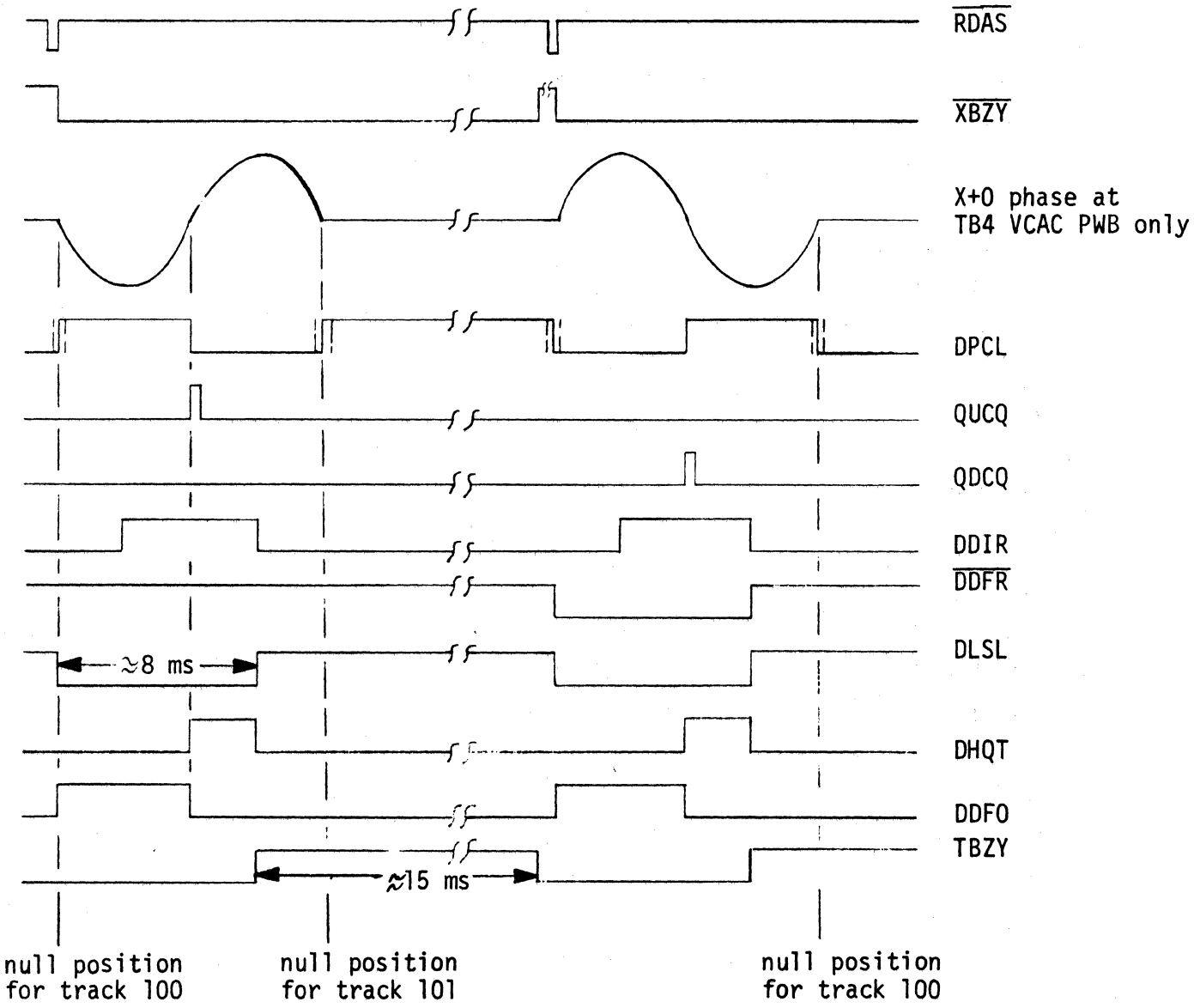
in a direction such that the up/down counters will become equal to the demand address register. When the two registers are equal the positioner is between 1/2 and 1/4 track of its final null position DHQT (half to quarter track from null, from VCAP in J7) goes true. DHQT and DPCL will generate the direction control ($\overline{\text{DDFR}}$, to VCAP PWB in J7) for the servo at distances of 1/2 to 1/4 track from null and DCEC generates direction control for difference greater than 1/2 track. Direction control is not needed from the logic when the positioner is within 1/4 track of null. The timing diagram in Figure 4-3 helps to clarify the operation. It represents a repetitive single track move (for example: track 100 to 101, 101 to 100, etc.).

4.8.4.3 Seek Complete

If the unit is enabled (DFSE is true) and a seek command is received ($\overline{\text{RDAS}}$, demand address strobe, on MB 2 in slot 19) then the 10 microseconds TVAE one-shot (valid address enable) is triggered. The trailing edge of RDAS loads the track address ($\overline{\text{RDAO-7}}$). If there is a difference generated (DDFO-7) then DLSL (lock servo loop) goes false. TVAE and DLSL will set FBZY (file busy). If there is no difference then FBZY is not set. If FBZY is set then it will be reset by TBZY (settle time busy). DLSL goes true (within 1/4 track of null position) at the nulling track to trigger the TBZY one-shot. The seek complete signal ($\overline{\text{XBZY}}$) to the user is generated by DBZY (generated by FBZY or TBZY) or TVAE.

4.8.4.4 Illegal Address

If an address greater than 202 ($\overline{\text{D203}}$, from MB 4 in slot 27) is decoded at the time of the valid address clock (DVAQ, this clock normally loads demand address register) then FILA (illegal address, MB 2 in slot 19) is set. If FILA is being set then DVAQ will be disabled. FILA is also set



For representation only the above waveforms assume the voice coil is moving at constant velocity and nulls with no settle time (X+0 phase at TP4). In actuality the time base is a function of the servo control (position and velocity) and there is overshoot, etc. which necessitates the use of the settle time one-shot.

Figure 4-3. Timing Diagram, Repetitive Single Track Move

if the positioner is presently positioning (DBZY is true, see Paragraph 4.8.4.3). FILA and TVAE and DFSE generate the illegal address signal ($\overline{\text{XILA}}$) to the user. A seek initialize (or restore command, RDAR) will be excepted at any time by the file and will reset FILA.

4.8.4.5 Restore Command

If the file is enabled (DFSE is true) and a seek command is sent ($\overline{\text{RDAS}}$, demand address strobe, on MB 2 in slot 19) then the 10 microseconds valid address one-shot (TVAE, on MB 2 in slot 19) is triggered. RDAS and TVAE generates DVAE. If the restore command signal ($\overline{\text{RDAR}}$, demand address reset) is present then DVAE and RDAR generate $\overline{\text{DADI}}$ (address initialize, on MB 2). $\overline{\text{DADI}}$ sets FRVS (reverse slow). FRVS and $\overline{\text{DFWD}}$ generate $\overline{\text{DRVS}}$ on MB 2 in slot 19. $\overline{\text{DRVS}}$ is sent to the VCAC PWB at J6. This causes the positioner to move in reverse under velocity control (approximately 1.5 in/second). When the index area is reached $\overline{\text{DPTI}}$ (position transducer index) goes false. DPTI and FRVS sets FFWS (forward slow, on MB 2 in slot 19). $\overline{\text{DFWS}}$ (FFWS and FLHD) is sent to the VCAC PWB at J6. It causes the positioner to change direction and go forward under velocity control and null on track 000 as in the load operation. (See Paragraph 4.8.4.7.)

4.8.4.6 Seek Complete on Restore Command

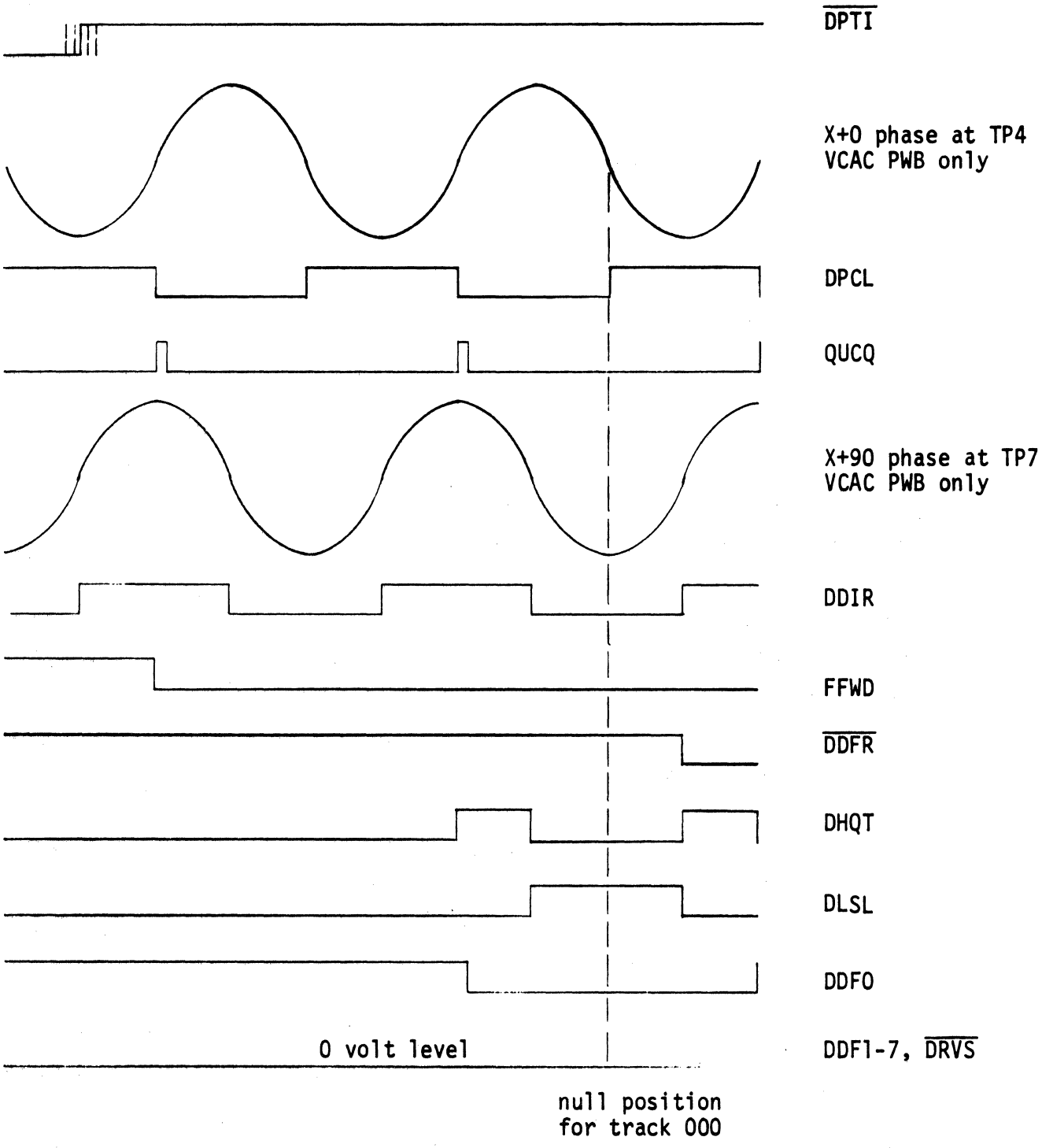
When FRVS or FFWS is set DDAR (demand address reset, on MB 2 in slot 19) is true. DDAR will set the up/down counters and reset the demand address register. This will hold a difference of one in the servo difference lines (DDFO-7). When DDAR goes false the servo will null on track 000 as in the load operation (see Paragraph 4.8.4.7). The seek complete operation, from this point on, is identical to that of the normal seek operation (see Paragraph 4.8.4.3).

4.8.4.7 Servo Logic Load Operation

In an unloaded state FLHD (load heads) or DHSU (heads up) hold FRVS (reverse slow) set. When FLHD becomes set in the sequence FLHD and FRVS will set FFWS (forward slow). FFWS and FLHD generates DFWD which goes to the VCAC PWB at J6. It causes the voice coil to move forward from track -125 or less (DHSU is true) under velocity control (approximately 1.5 inches per second). When $\overline{\text{DPTI}}$ (position transducer index) goes true, FFWS is reset ($\overline{\text{DFWD}}$ goes high) to allow normal servo operation (see Paragraph 4.8.4.2). Normal servo operation entails the use of two registers. One register is the demand address register (FDAO-7). This register is held reset during the load operation by DDAR (demand address reset). DDAR is generated by FFWS or FRVS. The other register is an eight bit up/down counter (FCAO-7). This register is held set by DDAR. This register will roll over from all ones (256) to all zeros to give the servo its home position (track 000) at approximately 1 and 1/2 tracks from the index. When DDAR goes false then the normal servo operation begins. The timing diagram in Figure 4-4 helps to clarify the operation.

4.8.4.8 Servo Unload Operation

When the unit is unloaded FLHD (load heads) will be reset. FLHD resets FRVS (reverse slow, on MB 2 in slot 19). This causes the positioner to move in the reverse direction under velocity control (approximately 1.5 in/second) until $\overline{\text{DHSU}}$ (heads up, from VCAC in J6) goes false. This removes power from the positioner (performed on VCAC PWB) and allows it to come to a rest state (DHSU remains false, approximately track -125 or less).



For representation only the above waveforms assume the voice coil is moving up to and through the null position for track 000. In actuality the time base is a function of the servo control (position and velocity). The voice coil will, in fact, null at track 000 during this operation.

Figure 4-4. Signals During Load Operation

525A

4.9 SECTOR, INDEX CIRCUITRY

The sector/index transducer is a modular assembly composed of a permanent magnet and a coil (see Block Diagram, Figure 4-5). The coil is connected between ground and the SITB PWB. The SITB PWB is composed of a variable threshold level detector (level selected at pin 8) and a peak detector. The two digital detector outputs are ANDed to trigger the sector one-shot (10.5 microseconds positive pulse). The trailing edge triggers the sector time decode one-shot DSTP (1 millisecond positive pulse). If another sector is detected while the sector time decode is true then this is decoded as an index pulse (10.5 microseconds negative pulse). If a sector is detected while the sector time decode is false then this is decoded as a sector pulse (10.5 microseconds negative pulse). See Paragraph 4.8.3 for down to speed use of DSTP. The sector and index pulses control a five bit sector counter. The index pulse will reset the index FF (FINT). The next sector pulse will set FINT and reset the sector counter (FTCO-4). The ripple binary up-counter will count the sector pulses until the next reset pulse. Fig. 4-6.

If the unit has dual disks then two SITB PWB's and two sector counters are used. Head select bit 1 ($\overline{\text{RHS1}}$) from the user will send the contents of the respective counter to the user ($\overline{\text{XSCO-4}}$) as well as the respective sector ($\overline{\text{XSRM}}$) and index ($\overline{\text{XINM}}$) pulses.

The transmitters are enabled by the file enable signal (DFSE). DFSE also generates $\overline{\text{XFSE}}$ to indicate to the user that the file is selected and ready. An approximate leading edge delay of 2 microseconds on the transmitted sector pulse allows stabilization of the sector counter I/O lines prior to the user receiving the sector pulse.

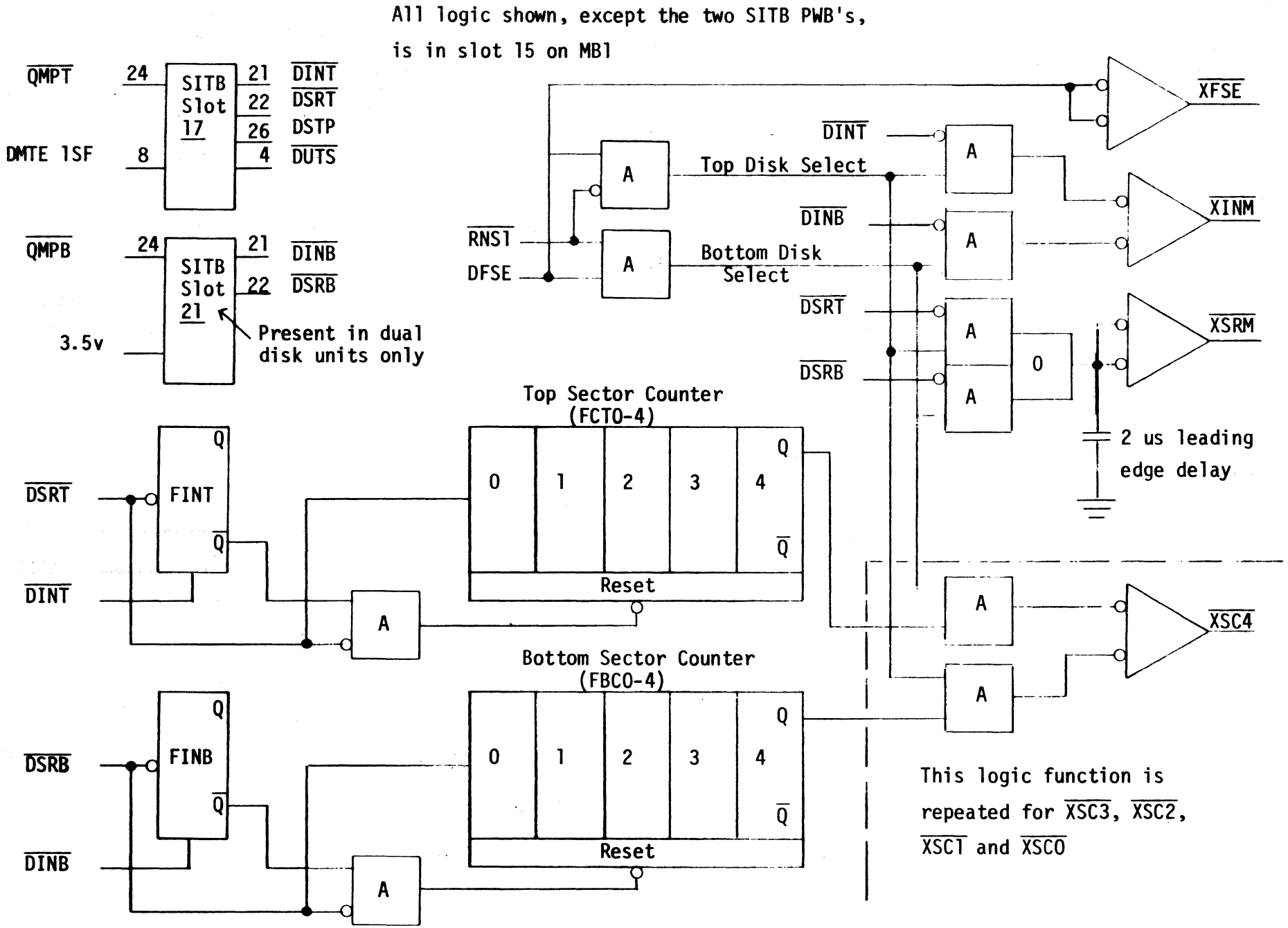
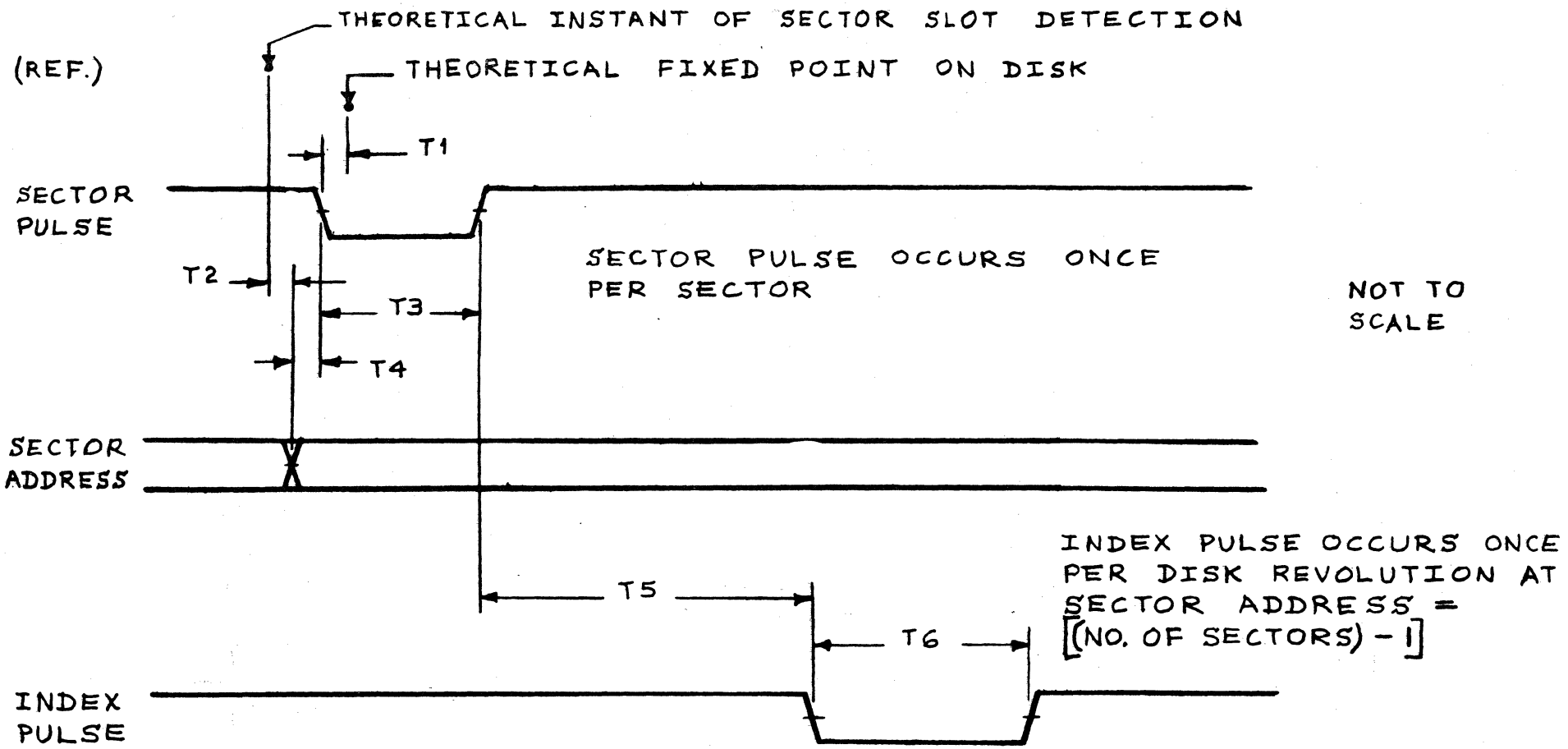


Figure 4-5. Index Circuitry Block Diagram

525A



T1 = 0.0 ± 30 μs (JITTER)

T2: 0.0 < T2 < 0.5 μs

T3 = 8 ± 4 μs

T4 = $1.8^{+1.9}_{-1.5}$ μs

T5 ≈ 600 μs TYP., 8 SECTORS

T6 = 10 ± 4 μs

VALUES LISTED ARE AT INTERFACE

T3 OR T6 WILL BE SHORTENED IF UNIT IS SELECTED DURING PULSE

Figure 4-6. Sector Timing

4.10 READ/WRITE OPERATIONS

The double frequency recording method is used in reading and writing of data. Read/write operations are accomplished by the read/write head, which is sensitive to flux patterns developed at the head gap. During a write operation, a bit is recorded on the disk whenever the coils of the read/write head are switched by the write driver circuits. During a read operation, a clock or data bit is sensed on the disk whenever current direction induced in the coil winding is reversed as a result of a change in polarity of the flux pattern presently passing under the head gap.

4.10.1 DOUBLE FREQUENCY RECORDING

A basic clock frequency signal is encoded in the data pulses to produce a single composite signal at the read/write head. The composite signal presents either a 0-bit condition or a 1-bit condition for each bit-cell time generated by the clock.

The single disk storage uses the double frequency method of magnetic recording (Figure 4-7). This method makes use of a clock frequency to establish the basic bit-cell timing cycle. The insertion of a data pulse between clock pulses in a bit-cell period produces a composite read/write signal which uses only clock pulses for a 0-bit indication, and data pulses for a 1-bit indication. A zero (0) bit-cell-time (clock pulses only) produces a single change in direction of the flux pattern. A one (1) bit-cell-time (data pulse located between two clock pulses) produces a double change in direction of the flux pattern. In either case, the clock signal causes a change in direction of magnetism from plus-to-minus or minus-to-plus polarity, thus causing the storage of a bit. Because both clock and data information are synchronized on a composite signal, double frequency recording is sometimes referred to as "self-clocking."

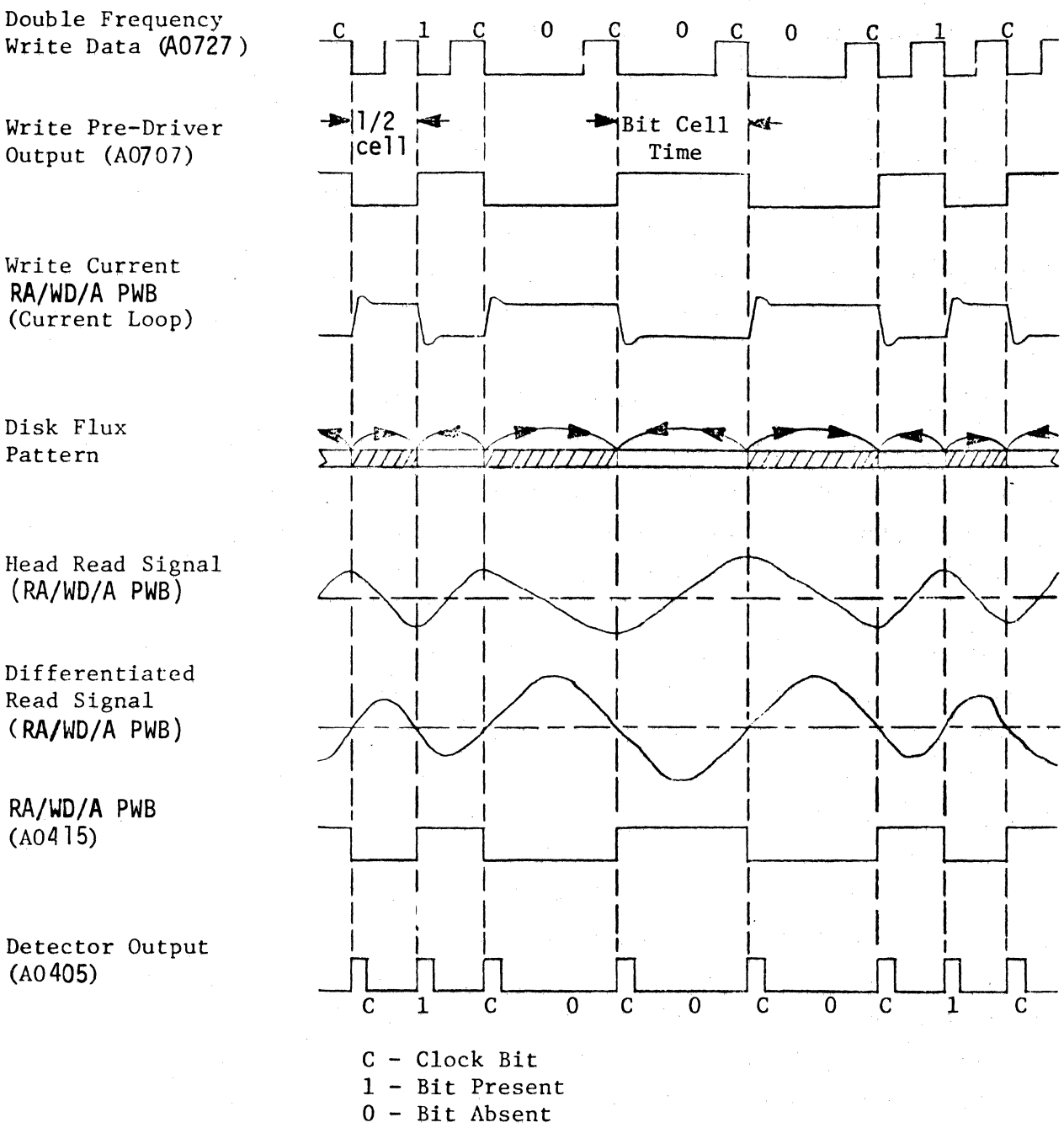


Figure 4-7. Double Frequency Recording Flux and Pulse Relationship

In double-frequency recording, a clock bit is always inserted at the beginning of each bit-cell time to establish the basic recording frequency. A data bit is inserted between clock bits (at twice the frequency) so that the data bit results in two flux reversals within a single bit-cell time. If the data bit is not present, a single flux reversal occurs in a bit-cell time. The recording head is a split-ring core containing a coil winding so that a magnetic field in a given flux direction prevails at the ring gap while the coil is energized. When current flows through the coil, the flux induced in the ring establishes a fringe flux at the gap. As a magnetic recording surface passes by the gap, the fringe flux magnetizes the surface of the disk.

During a write operation, a bit is recorded when the flux direction in the ring is reversed by switching betwen coils of the read/write head. The fringe flux is reversed in the gap, and hence the portion of the flux flowing through the recording medium is reversed. If the flux reversal is considered instantaneous in comparison to the motion of the recording surface, and the gap is observed at the moment of reversal, it can be seen that the portion of the surface that just passed the gap is magnetized in one horizontal direction while the portion directly under the gap is magnetized in the opposite direction. Between these two areas, the flux must reverse 180 degrees; this recorded flux reversal represents a bit.

During the read operation, the gap first passes over an area that is magnetized in one horizontal direction, and a constant flux flow through the ring and the coil. The coil registers no output voltage for this condition. However, when the recorded bit (180 degrees horizontal flux reversal) passes the gap, the flux flowing through the ring and coil must go through a 180 degree reversal. This reversal means that the coil sees a change in flux which results in a voltage output pulse. A write circuit block diagram is shown in Figure 4-8.

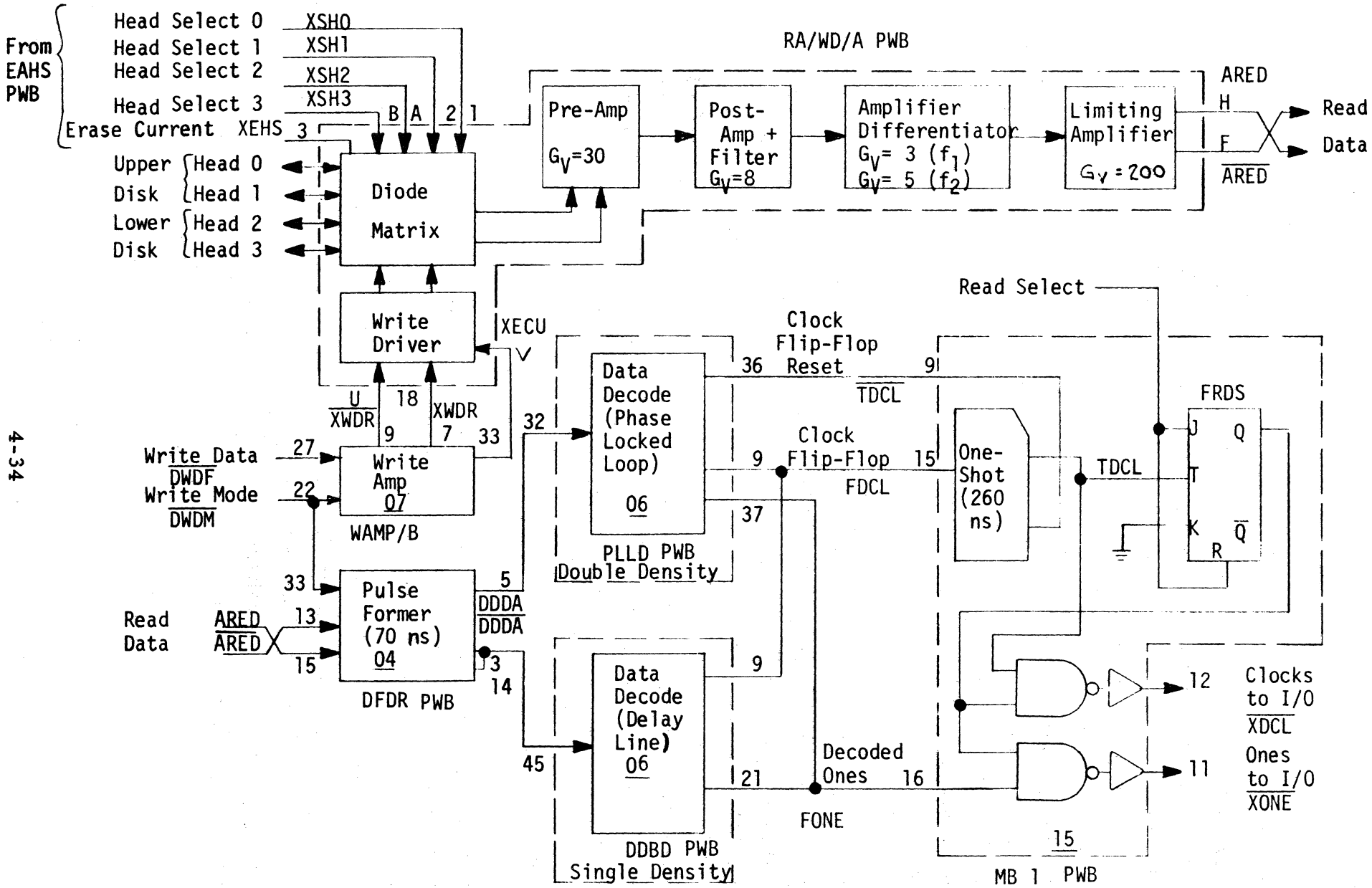


Figure 4-8. Read/Write Amplifier Circuit Block Diagram

4.10.2 HEAD SELECTION

In the D5000, head selection is accomplished by signals from the using system and circuits in the disk drive unit performed by EAHS PWB in slot 03 unless otherwise noted. It is interlocked with read/write circuits to produce a write select error signal if heads are improperly selected.

(1) The head select lines provide for selection of head 0 ($\overline{\text{RHS1}}$ false, RHS0 true) or head 1 ($\overline{\text{RHS1}}$ false, RHS0 false) on the upper disk and head 2 ($\overline{\text{RHS1}}$ true, RHS0 true) or head 3 ($\overline{\text{RHS1}}$ true, RHS0 false) on the lower disk. The head select outputs connect to a diode matrix on the RAWD PWB at J1 which will enable the selected head to the pre-amp or the write drivers. Heads 2 and 3 apply to dual disk units only.

(2) If the head selection circuitry should fail, causing more than one head to be selected, the head select error latch ($\overline{\text{DHSE}}$, EAHS in slot 03) will be set. $\overline{\text{DHSE}}$ sets FUNL (see Paragraph 4.8.3.2) to start an emergency unload sequence. The head select error latch will remain set until the start/stop switch is moved to the stop position and a TDTS (down to speed pulse, from DRDB/B PWB in slot 25) signal occurs.

4.11 WRITE CIRCUITS

Information to be recorded is supplied to the machine via the double frequency write data ($\overline{\text{RWDF}}$) line. See the block diagram in Figure 4-6 for signal location. The writing process is under complete control of the system circuits. Verification by the system of the record address is made by sector designation prior to initiation of the write operation (software function). The machine is conditioned to write when the write enable line ($\overline{\text{DWDM}}$) and erase enable ($\overline{\text{DERA}}$) line are false (at ground).

When the proper head is selected and the write enable ($\overline{\text{DWDM}}$-false) and erase enable ($\overline{\text{DERA}}$-false) are established, the write driver and the write coils are receptive to data pulses. When the write enable line is active (with no write select error) current flows through the write coil and causes all previous data to be erased even though no write data is transmitted.

Write data pulses are supplied from system control circuits to the write trigger ($\overline{\text{RWDF}}$) by way of the double frequency write data line. The write trigger flips with each pulse to provide high/low outputs to the write driver translators. With each flip of the write trigger, current flows in alternate halves of the read/write coil. The switching of write current in each half leg causes magnetic flux reversals on the disk surface. When the erase enable is active (low), erase current will flow through the erase winding.

Because the core of the write coil is effectively wider and placed in front of the erase core, an alternating current through the write coil causes a width of approximately 0.007 (0.0075 for single density) inch to be magnetized in alternate directions. The erase pole following the write pole erases part of the write pattern to leave a recorded band that is approximately 0.0065 (0.0045 for single density) inch wide. Sector and index pulses are continuously transmitted to system control circuits. These pulses are used to control the start of timing for reading or recording data. Any time more than one head is selected during a write operation, a safety latch is set, file ready condition is removed, and the write driver is turned off. The safety latch may be reset by stopping the drive motor and restarting, or by a Customer Engineer.

4.12 READ CIRCUITS

A 'read' command allows read data to be transmitted from the selected track address and section designation to the processing system. See the block diagram in Figure 4-8 for signal location. The reading process is under complete control of the system control circuits. Machine is conditioned to read when a head is selected and the write enable line is inactive (at +5v). Raw read data in the form of a sine-wave signal is supplied through a pre-amplifier to the read amplifier. The read amplifier converts the sine-wave signal to pulses, which are then supplied to data decode circuits. Raw read data is separated into clock and ones by the data decode.

The read amplifier circuit receives differential input signals which range from 781 KHz (all 0's pattern) through 1.562 MHz (all 1's pattern) (360 KHz through 720 KHz for single density). The read amplifier converts the differential signals to pulses at its output which represent data or clock pulses depending upon the signal at the input. Output leads from the heads connect to the input of the preamplifier which is a part of the RA/WD/A card. An approximate 1-10 millivolt peak-to-peak output signal, received from the read/write head, is boosted by the gain of the preamplifier and is then supplied to the read amplifier.

The actual read signal processing begins in the read amplifier. The amplifier filter stage receives a differential signal from the preamplifier. This circuit provides additional amplification and filtering of the read signal. The signal is single-ended during filtering. The output of the amplifier filter stage is supplied to the amplifier differentiator stage.

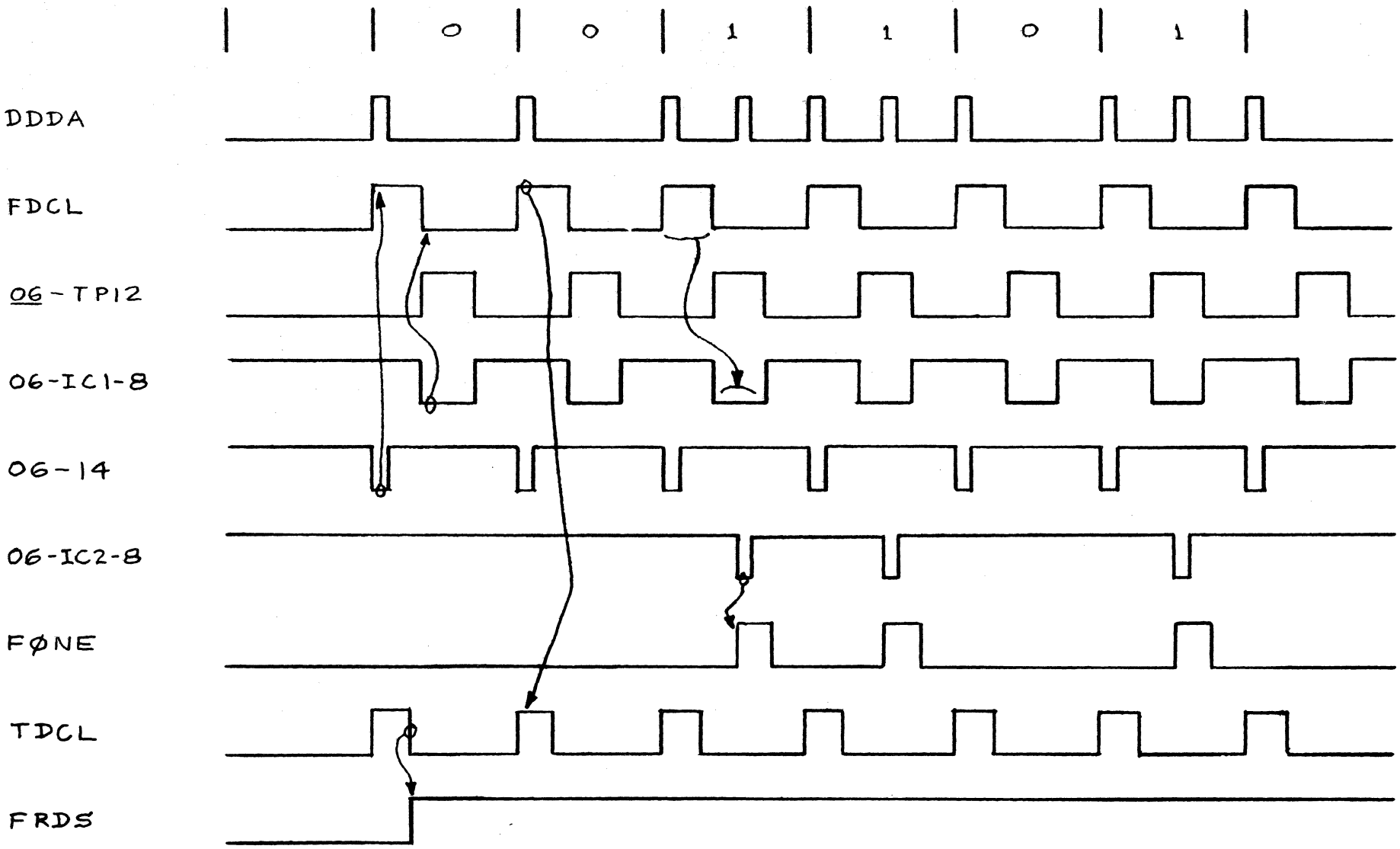
The amplifier differentiator stage amplifies and shifts the signal approximately 60 degrees in time from the input, resulting in data signals whose cross-overs coincide with the positive and negative peaks of the incoming signal. The signal from the amplifier differentiator stage then passes through several stages of limiting which amplifies and limits the signal.

The output from the limiter on the RAWD PWB is coupled to the DFDR PWB (ARED and ARED) which detects each transition in the limited wave-form received and generates a 70 nanoseconds pulse corresponding to each transition. The output from the pulse-forming stage, consisting of a train of interspaced clock and data pulses, is supplied as raw data (DDDA) to the data decode PWB. For double density units, the negative going output ($\overline{\text{DDDA}}$) is used as the input to the PLLD PWB. For single density units, the positive going output (DDDA) is used as input to the DDBD PWB. See Figure 4-9.

4.13 DATA DECODE CIRCUITS

The double density data decode circuit (PLLD) is a phase locked loop (PLL) decoder. It consists of a free running variable frequency oscillator (VFO) which is adjusted in test to 3.250 MHz. The frequency of this oscillator is controlled by the output of the phase detector. The control range of the oscillator is 8 percent about the nominal.

The phase detector is used to compare the phase of the incoming raw data with the phase of the VFO sawtooth output. If the incoming data is higher in frequency than the VFO, then an error voltage is generated by the phase detector which causes an increase in the frequency of the VFO. If the incoming data is lower in frequency than the VFO, then an error voltage is generated by the phase detector which causes a decrease in the frequency of the VFO. The required time for the VFO to lock to the incoming data is 30 microseconds. A trigger is generated from the VFO



NOT TO SCALE

Figure 4-9. Read Timing, Single Density

to toggle the decoding flip-flop which provides the decoding windows for the clocks and ones.

A 95 nanosecond delay line is used to delay the raw data into the center of the decoding windows. The delay line is also used to pulse-form (18 nanosecond) the delayed raw data pulses. The delay line taps are accurately selected in PWB test. The delayed data pulses are used to clock the ones (FONE) and clock (FDCL) flip-flops whose inputs are controlled by the VFO decoding windows. FDCL triggers the data clock one-shot (TDCL) which is ANDed in turn with FRDS (read select) to generate a read clock to the user (XDCL). TDCL also resets the clock FF. FONE is ANDed with FRDS to generate a read data signal to the user (XONE). The VFO decoding flip-flop is polarized by monitoring the data clock one-shot output (TDCL) in a known area of all zeros. If there is no clock output during this time, a retriggerable one-shot (2.6 microseconds) times out and inhibits the VFO decoding flip-flop from toggling on the next VFO clock. The next raw data pulse will then set the clock flip-flop and thereby reset the retriggerable one-shot. The VFO flip-flop is then polorized.

The single density data decode circuit (DDBD) is a fixed window delay line decoder. The clock bit sets a latch whose output drives a tapped delay line. The delay line timing is accurately set in PWB test at 510 nanoseconds. After the first 510 nanoseconds, the output from the delay line resets the latch that drives the delay line. The output from the delay line is a 510 nanoseconds decoding window delayed from the loading edge of the clock by 510 nanoseconds. The output from the latch is a clock bit (FDCL) of 510 nanoseconds duration. The decoded ones trigger a 260 nanoseconds one-shot (FONE). FONE and FDCL are ANDed with FRDS (read select) to generate XONE and XDCL for the user.

4.14 REMOVAL AND REPLACEMENT PROCEDURES

Under normal maintenance conditions, the face panel must be removed to enable the disk drive to be removed from the rack. Paragraph 4.14.1 will describe the procedure to be followed for removing the face panel. All other removals will be written assuming the face panel and disk cartridge have been removed.

When reference is made to the right or left side of the device, the orientation is as viewed from the operator's right or left.

4.14.1 FACE PANEL (Reference Figure 1, Pages VI-3 and VII-3)

(1) Remove the two French oval head screws and remove the face panel. Take care not to break the two small tabs in the upper corners.

4.14.2 CARTRIDGE RECEIVER (Reference Figure 2, Pages VI-5 and VII-5)

(1) Remove the top, left and right side shrouds.

(2) Remove the two leaf springs.

(3) Remove the two shoulder screws from the sides.

(4) Carefully move the magnetic head carriage assembly to the full rear position.

(5) Remove the cartridge receiver by lifting straight up.

(6) Install new cartridge receiver.

4.14.3 INLET AIR FILTER (Reference Figure 6, Pages VI-20 and VII-20)

(1) Remove the rear filter assembly with a blade type screwdriver.

(2) Remove the four wingnuts on the filter assembly.

(3) Remove used filter and replace with new one.

(4) Install new filter.

4.14.4 ABSOLUTE FILTER (Reference Figure 3, Pages VI-11 and VII-11)

(1) Remove the left side access and panel and unlatch the electronic module by turning the thumb screw counter clockwise and swing out.

(2) Reaching through the left access panel and electronic module, disconnect the filter strap buckler.

(3) Reaching through the electronics module, remove absolute filter by sliding it forward.

(4) Install new absolute filter, check to assure direction of air flow is correct per arrow printed on filter.

4.14.5 CAPACITOR, MOTOR START (Reference Figure 6, Pages VI-20 and VII-20)

(1) Remove left access panel.

(2) Remove three wires by disconnecting plug-on terminals from capacitor.

(3) Remove screws on capacitor clamp and remove capacitor.

(4) Replace capacitor and clamp - reconnect wires.

(5) Replace access panel.

4.14.6 POSITIONER DRIVE BOARDS (Reference Figure 2, Page VI-5 and VII-5)

(1) Remove rear Shroud.

(2) Remove board keeper at rear of boards.

(3) Remove board(s).

(4) Replace board(s). The VCAC PWB should be next to the positioner and the VCAP PWB next to the outside edge of the machine.

(5) Replace PWB keeper.

(6) If new PWB's are installed, adjust as outlined in Paragraph 4.15.5.

(7) Replace rear shroud.

4.14.7 EMERGENCY RETRACT CAPACITOR (Reference Figure 2, Page VI-5 and VII-5)

(1) Remove top shroud.

(2) Disconnect wires to (+) and (-) terminals.

(3) Remove three screws holding capacitor bracket - remove capacitor.

(4) Replace capacitor in clamp.

(5) Replace assembly - replace three screws.

(6) Reattach wires to terminals.

(7) Replace top shroud.

4.14.8 HANDLE LOCK SOLENOID (Reference Figure 3, Pages VI-11 and VII-11)

(1) Remove the top and side shrouds.

(2) Remove the cartridge receiver, per Paragraph 4.14.2.

(3) Remove fixed disk, per Paragraph 4.14.20. (5221 and 5121 only.)

(4) Unlatch the module and swing out.

(5) Holding the handle lock solenoid in one hand to prevent it falling, remove the two mounting screws from the tope of the casting.

(6) Disengage the solenoid from the solenoid plunger.

(7) Unsolder the two wires noting that the red wire goes on terminal number 1 and the white wire goes on terminal number 2.

(8) It is not necessary to replace the solenoid plunger with the new one since they are not a matched pair.

(9) Install the new solenoid.

NOTE

Before proceeding with this removal on D5221 and D5121 Disk Drives, any data stored on the fixed disk that is to be retained should be transferred to a removable disk cartridge and then re-entered after reassembly.

4.14.9 START-STOP TOGGLE SWITCH (Reference Figure 2A, Pages VI-6 and VII-6)

(1) Unlatch the module by turning the thumb screw counter-clockwise and swing out.

(2) Using a knurled wrench remove the knurled nut on the front of the start-stop toggle switch and remove the switch.

(3) Unsolder RC suppressor network and resolder to the corresponding terminal of the new switch.

(4) Unsolder one wire at a time and resolder to the corresponding terminal of the new switch.

(5) Install new start-stop toggle switch and close and latch module.

4.14.10 ELECTRIC MODULE PWB'S (Reference Figure 5, Page VI-18 and VII-18)

(1) Unlatch the swing out module by turning the thumb screw.

(2) Using PWB board puller grip the defective PWB and very carefully remove.

(3) When plugging in the new PWB make sure it is completely seated.

(4) Latch module.

CAUTION

THE PWB'S ARE MNEMONIC CODED TO THE SWING OUT MODULE. CHECK FOR PROPER PWB INSTALLATION. THE PWB'S ARE INSTALLED WITH THE COMPONENTS ON THE LEFT SIDE.

4.14.11 BLOWER (Reference Figure 3, Page VI-11 and VII-11)

(1) Remove bottom and right side shroud panels.

(2) Disconnect blower wires from TR-04 and TR-03.

(3) Cut spot ties holding blower wires to harness.

(4) Remove blower mounting bracket and the defective blower.

(5) Install new blower.

4.14.12 POSITIONER (Reference Figure 2, Page VI-5 and VII-5)

(1) Remove the top shroud. Make sure positioner is fully retracted.

(2) Remove the magnetic head plug clamp and unplug the head leads from the PWB board connectors.

(3) Remove the board from connector J5.

(4) Remove the four screws from the PWB mounting plate being careful not to place undue stress on the wires soldered to J5.

(5) Lay the PWB mounting plate carefully aside and secure, being careful not to place undue stress on the wires soldered to J5.

(6) Disconnect and tag the wires to TB4 (on positioner).

(7) Remove the four black Allen screws - remove the pivot block screws.

(8) Lift the positioner straight off the positioning dowel.

(9) Reinstall positioner.

NOTE

Before proceeding with this removal on D5221 and D5121 Disk Drives, any data stored on the fixed disk that is to be retained should be transferred to a removable disk cartridge and then re-entered after reassembly.

4.14.13 DRIVE BELT (Reference Figure 3, Pages VI-11 and VII-11)

(1) Remove the left side shroud and the absolute filter. See Paragraph 4.14.4.

(2) Loosen the three screws holding the drive motor mounting plate.

(3) Move the motor toward the spindle, extending the tension spring. Tighten two of the motor mounting plate screws while there is tension on spring.

(4) When the force is removed from the drive belt it will slip off the two pulleys.

(5) Remove the belt by laying it flat against the timing disk and slipping it through the gap between the timing disk and brake poles one half of the belt at a time.

(6) Install new belt by reversing Step 5 before loosening the two motor mounting plate screws and follow this procedure in reverse for reassembly. The spring will apply proper tension to the belt.

4.14.14 DRIVE MOTOR (Reference Figure 3, Page VI-11 and VII-11)

(1) Remove left side shroud.

(2) Remove drive belt per Paragraph 4.14.13.

(3) Disconnect motor leads from the capacitor and the triac (TR-5) and tag appropriately.

(4) Remove the four screws mounting the motor to the phenolic plate.

(5) Remove the motor by lifting out the top side of the casting.

(6) Remove the pulley by loosening the set screw in the pulley base.

NOTE

Make sure ground strap is reconnected. Adjust pulley height so belt tracks evenly.

4.14.15 CARTRIDGE DOWN SWITCH (Reference Figure 3A, Pages VI-12 and VII-12)

(1) Remove cartridge receiver per Paragraph 4.14.2.

(2) Remove mounting screws.

(3) Disconnect green and white leads from switch - tag appropriately.

(4) Reconnect wires to new switch.

(5) Reverse procedure for reassembly.

(6) Check to ensure that switch makes when a cartridge is installed, adjust switch position if required.

4.14.16 RA/WD/A BOARD (Reference Figure 2, Pages VI-5 and VII-5)

(1) Remove top shroud.

(2) Remove screw holding magnetic head plug clamps.

(3) Unplug head leads.

(4) Remove board.

(5) Reinstall new board, component side up making sure board is completely seated.

(6) Insure that head plugs are replaced in their proper connectors.

4.14.17 HEADS

(1) Remove top shroud.

(2) Remove RA/WD/A PWB per Paragraph 4.14.16.

(3) Remove four Allen screws holding positioner to steel base plate.

(4) Make sure positioner carriage is in far back position.

(5) Carefully lift the front of positioner up off its locating dowel. Pivot the head end of the positioner upward and put the red post in place to hold the positioner up.

(6) Loosen head clamp and remove desired head by sliding it forward out of the comb.

(7) Reinstall new head making sure edge of head stiffner arm is against the reference surface on the head block and is back against the stop. Make sure the load arm rests on the dimple on the gimble spring of the head.

(8) Retighten head clamp.

(9) Clean heads as directed in Paragraph 4.6.1.2.

(10) Adjust heads. See Paragraph 4.15.7.2.

NOTE

Before proceeding with this removal on D5121 and D5221 Disk Drives, any data stored on the fixed disk that is to be retained should be transferred, if possible, to a removable disk cartridge and then re-entered after reassembly. Consult PERTEC Customer Service for user data protection methods (if required) of fixed disk media.

4.14.18 SPINDLE, SINGLE DISK (Reference Figure 3, Pages VI-10 and VII-10)

(1) Remove top and side shrouds.

(2) Remove cartridge receiver per Paragraph 4.14.2.

(3) Remove drive belt per Paragraph 4.14.13.

(4) Remove three hex bolts holding spindle from underside of casting with a socket and extender.

(5) Lift spindle up and out of the casting.

(6) Reassemble.

(7) Check CE alignment according to Paragraph 4.15.6.

4.14.19 SPINDLE, DUAL DISK (Reference Figure 3, Pages VI-10 and VII-10)

(1) Remove top and side skins.

(2) Remove cartridge receiver.

(3) Remove sector disk by removing screw from end of spindle.

(4) Remove disk and disk shroud per Paragraph 4.14.22.

(5) Remove three hex bolts holding spindle from underside of casting with socket and extender.

(6) Lift spindle up and out of casting.

(7) Check CE alignment. See Paragraph 4.15.6.

NOTE

Before proceeding with this removal, any data stored on the fixed disk that is to be retained should be transferred to a removable disk cartridge and then re-entered after reassembly.

4.14.20 FIXED DISK (Reference Figure 3, Pages VI-10 and VII-10)

(1) Remove top and side shrouds.

(2) Remove cartridge receiver per Paragraph 4.14.2.

(3) Remove the cartridge down switch from the disk shroud and lay aside.

(4) Remove the sector pickup assembly from disk shroud and lay aside.

(5) Remove the disk shroud assembly.

(6) Remove six screws holding the disk clamp and lift clamp ring from disk.

(7) Remove disk.

(8) Reinstall new disk.

(9) Reinstall disk clamp and lightly tighten screws.

(10) Center disk. Check by turning spindle by hand.

(11) Tighten screws in an alternating crisscross fashion — not in a rotational fashion.

(12) Clean the disk and heads per Paragraph 4.6.1.1 and 4.6.1.2.

(13) Realign the sector pickup.

NOTE

Before proceeding with this removal, any data stored on the fixed disk that is to be retained should be transferred to a removable disk cartridge and then re-entered after reassembly.

4.14.21 SECTOR TRANSDUCER, REMOVABLE DISK (Reference Figure 3A Page VI-12 and VII-12)

(1) Remove top and side shrouds.

(2) Remove cartridge receiver per Paragraph 4.14.2.

(3) Disconnect sector transducer wires from TB1, located on underside of baseplate, and tag them appropriately.

(4) Remove the mounting screws securing the transducer assembly in place.

(5) Reverse procedure for reinstalling transducer assembly.

(6) The sector transducer alignment should then be adjusted.

4.14.22 SECTOR TRANSDUCER, FIXED DISK (Dual Disk Only) (Reference Figure 2, Page VI-6 and VII-6)

(1) Remove bottom shroud.

(2) Disconnect transducer wires from TB1, located on underside of base plate, and tag appropriately.

(3) Remove the mounting screws that hold the transducer.

(4) Replace the transducer making sure no rubbing with the sector disk occurs.

NOTE

Before proceeding with this removal, any data stored on the fixed disk that is to be retained should be transferred (if possible) to a removable disk cartridge and re-entered after reassembly. Consult PERTEC Customer Service for user data protection method (if required) of fixed disk media.

4.14.23 FRONT PANEL LIGHTS (Reference Figure 2A, Pages VI-6 and VII-6)

(1) Very carefully pull the plastic switch button with the defective light bult out.

(2) Remove the defective bulb and replace with G. E. No. 387 bulb.

(3) Reinsert the plastic switch button.

4.14.24 TRIAC (Reference Figure 6, Page VI-20 and VII-20)

(1) Remove bottom shroud.

(2) Loosen screw holding safety cover and slip cover off.

(3) Remove leads from triac and mark each lead.

(4) Remove two mounting screws from triac and remove.

4.15 ADJUSTMENT AND ALIGNMENT PROCEDURES

4.15.1 PHOTO PICKUP ALIGNMENT, GENERAL

Track position is determined by a lined glass slide mounted on the positioner. As the positioner moves, the lines on the slide pass between a lamp (mounted adjacent to the positioner and below the slide), and a photocell pickup mounted adjacent to the positioner and above the slide. This photocell pickup also has a lined surface whose relationship with the lined slide determines positioner direction.

4.15.2 PHOTO PICKUP FUNCTION

(1) The photo pickup "counts" the number of lines that have been intersected.

(a) It is important that the photo pickup to slide gap is correctly spaced.

(b) It is important that the relationship of lined face of the photo pickup to the lined slide is oriented as shown in Figure 4-10.

(2) The photocell pickup has six photocells mounted in a straight line. The lamp has a filament that emits an elliptical shaped light pattern. All photocells pass through the light field simultaneously and receive equal illumination. It is essential that the lamp is adjusted so light is equally distributed over all photocells.

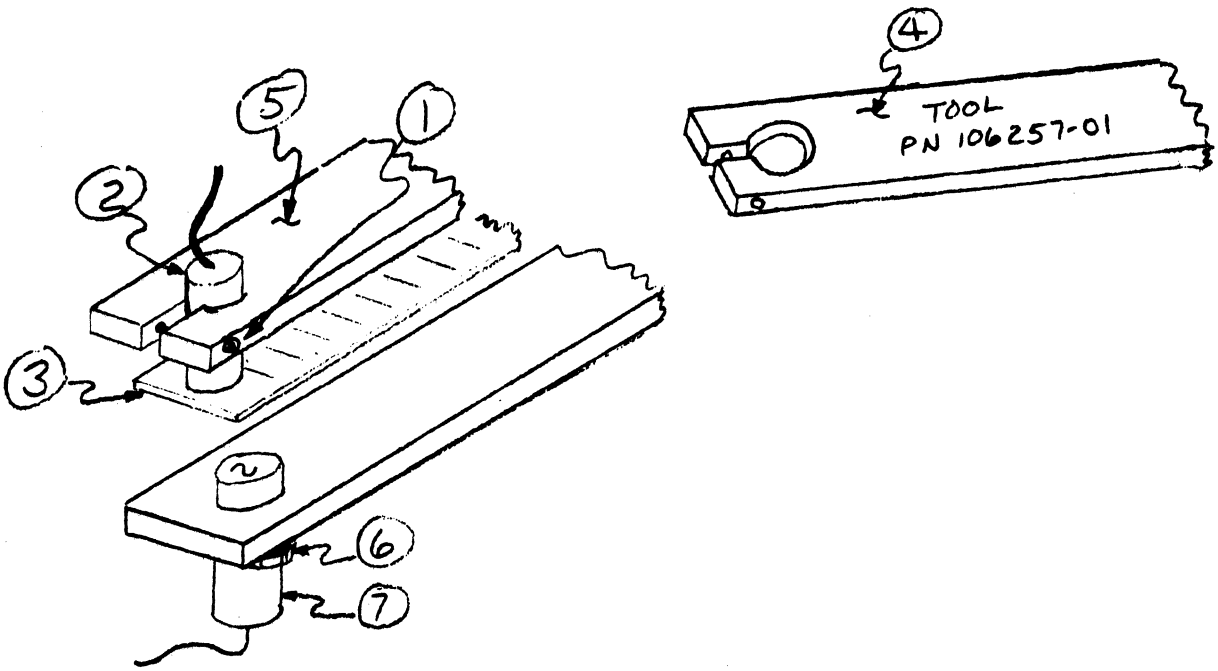
4.15.3 TRACK CONTROL, PHOTOCELLS

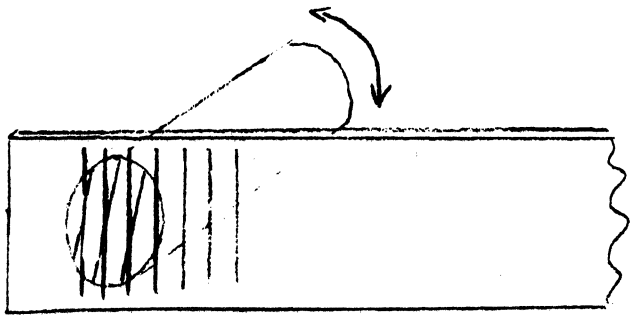
There are two sets of track control photocells, X + 90 and X + 0. X + 90 is a wave form from two photocells and X + 0 is a wave form from two other sets of photocells. The X + 90 waveform is delayed 90 degrees from X + 0 in the forward direction. The X + 90 waveform is advanced 90 degrees from X + 0 in the reverse direction.

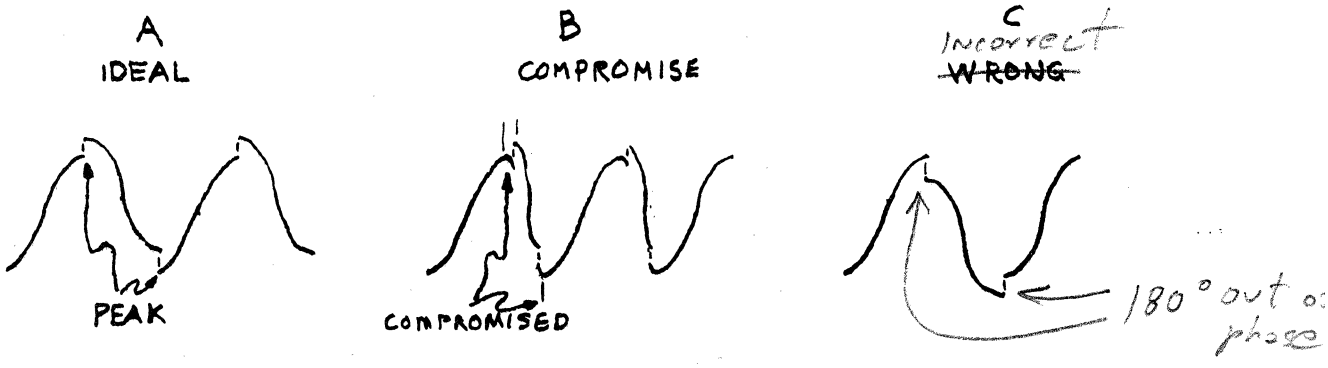
The delays of 90 degrees between X + 0 and X + 90 is determined by the relationship of the photocell pickup lines to the lines on the slide. It is important that X + 90 is adjusted with respect to X + 0.

Waveform X + 0 is used to drive the servo. The track nulling accuracy is dependent upon the drive signal. The input signal amplitude is dependent on the circuit characteristics which vary from disk to disk. It is important that the amplitude of X + 0 be fixed and the same for all machines.

The servo should null out at 0v and be at a null when X + 0 reaches the crossover point. It is important that X + 0 is centered at about 0v.







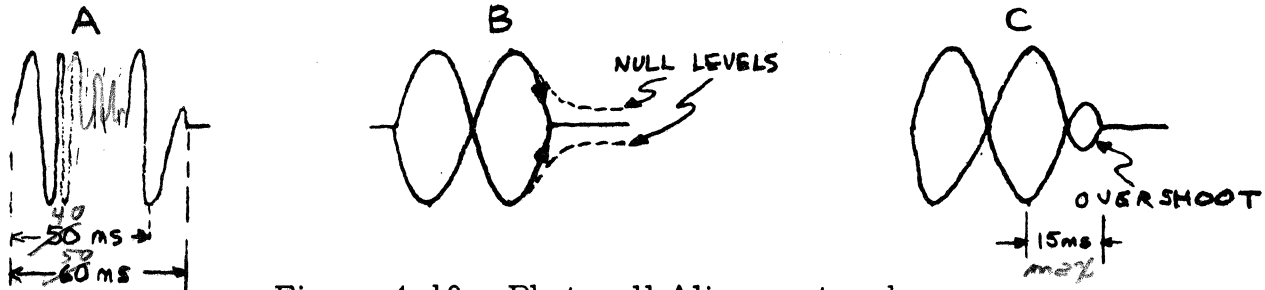


Figure 4-10. Photocell Alignment and Related Waveforms

525A

4.15.4 INDEX, PHOTOCELL

If the positioner is retracted beyond track 0, a signal from the photocell relays this information to the disk actuating mechanism in the form of a signal transition of 0v. It is important that INDEX is adjusted to about 0v.

4.15.5 PHOTO PICKUP ADJUSTMENT PROCEDURE

Perform the following adjustments in the following sequence to obtain correct alignment of the photo pickup assembly. The adjustments are made with power on, the positioner in the raised position, and the emergency unload relay removed.

4.15.5.1 Gap Adjustment

(1) Loosen socket head screw, Item 1, Figure 4-10.

CAUTION

IN THE FOLLOWING STEP, DO NOT USE ANY GAUGING DEVICE THAT WILL SCRATCH THE SLIDE.

(2) Move photo pickup vertically to obtain a 0.010 ± 0.003 inch gap between pickup; Item 2, and lined glass slide, Item 3 of Figure 4-10. Perform Graticule Adjustment.

4.15.5.2 Graticule Adjustment, Course

PERTEC Tool No. 106257 is used to position the photocell pickup, Item 2 in Figure 4-10. To adjust, proceed as follows.

(1) Loosen retaining screw in tool and slip tool down and around photocell and tighten retaining screw.

(2) Loosen holding screw, Item 1, on the positioning arm.

(3) Rotate the photocell pickup until the image created by the intersection of the slide lines and the graticule lines appear to be three lines when moved to the left as the positioner is moved out and away from the frame.

(4) Secure photocell pickup in place, leaving adjusting tool in place. (X + 90 Adjustment must be performed.)

(5) Tighten Item 1 in Figure 4-10 on the ~~tool~~ positioner.

4.15.5.3 Lamp Adjustment

(1) Connect oscilloscope to VCAC TP-7 (Drawing 106039).

(2) Loosen lamp retaining nut, Item 6 of Figure 4-10, by using an open end wrench.

(3) Rotate the lamp, Item 7, while manually moving the positioner in and out until a signal at TP-7 is centered about ground.

(4) Tighten retaining nut, Item 6.

4.15.5.4 X + 90 Adjustment

(1) Connect oscilloscope to VCAC TP-7 and to VCAC TP-2 (Drawing 106039).

(2) Set oscilloscope to internal Sync.

(3) Add algebraically.

(4) Loosen Item 1 of Figure 4-10.

(5) Move positioner slowly FORWARD while performing Step 6.

(6) Rotate tool, Item 4, until the ideal or the compromise waveform is obtained.

Waveform C is not correct and is not to be used.

NOTE

Right slope of X + 90 waveform is displaced above the left slope by the rising edge of X + 0 waveform.

(7) Tighten Item 1.

(8) Remove tool.

4.15.5.5 X + 0 Adjustment

(1) Connect oscilloscope to VCAC TP-4 (Drawing 106039).

(2) Adjust potentiometer R7 (PTG) on VCAC, while moving the positioner, to obtain a 12v peak-to-peak signal.

NOTE

If a 12v peak-to-peak signal cannot be obtained, reposition the photo pickup. In no case should the photo pickup be adjusted to a gap less than 0.007 inches above the disk. Repeat X + 90 adjustment.

(3) Adjust potentiometer R3 (PTB) on the VCAC to center the signal about ground.

4.15.6. INDEX CENTERING ADJUSTMENT

(1) Connect oscilloscope to VCAC TP-3 (Drawing 106039).

(2) Move the positioner out to about the "heads loaded" position. Moving the positioner back and forth in this area will generate a signal at TP-3.

(3) Adjust potentiometer R39 (IXB) on VCAC to center the signal about ground.

(4) Remount the positioner and reinstall the emergency unload relay.

4.15.7 SERVO ALIGNMENT

Positioner drive is determined by a controlled current. The current is derived from a difference between where the positioner should be located and where it is located. The time required for the positioner to reduce this difference must be controlled. It is important that the velocity be correctly set. The output drive signal from the X + 0 amplifier was set at a fixed level to compensate for circuit characteristics. Since this signal is too large to be summed with the feedback signals, the signal may be reduced to some ratio relative to the feedback signals to prevent overshoot oscillations.

The current being applied to the positioner motor is directly related to the force with which the motor is being driven. This force results in velocity. The resulting velocity from the applied current is calculated. This calculated signal, in the form of current feedback, is applied back into the servo loop and summed with the other drive and control signals. If the potential velocity is too great, caused by the applied current being too high, the resulting summed signal will be reduced by a calculated amount. It is important, therefore, that the current feedback is an accurate representation of the potential velocity.

4.15.8 SERVO ADJUSTMENT

The following adjustments are made with the positioner mounted and the emergency unload relay installed. Perform the following setup.

(1) Remove I/O cable and terminating boards from slots A11 and A13.

(2) Install CE board in place of A1. Turn power on.

(3) Connect oscilloscope external Sync to A19, pin 5.

4.15.8.1 Servo Velocity Adjustment

(1) Connect oscilloscope to VCAC TP-4 (Drawing 106039).

(2) Perform a 64 track repetitive seek with CE board.

(3) Adjust R58 (VC) on VCAC to set waveform pattern start time to stop time (lock null) to 50 milliseconds.

4.15.8.2 Servo Loop Gain Adjustment

(1) Connect oscilloscope to VCAC TP-4 (Drawing 106039).

(2) Perform 1 track repetitive seek with CE board.

(3) Adjust R81 (PLG) on VCAC to bring the forward and reverse signal null levels to 0v ± 0.7v. See Figure 4-10.

4.15.8.3 Servo Current Feedback Adjustment

(1) Connect oscilloscope to VCAC TP-4 (Drawing 106039).

(2) Perform 1 track repetitive seek with CE board.

(3) Adjust R49 (vs) on VCAC to obtain some overshoot but not enough to cause oscillations. See Figure 4-10.

NOTE

Total time for a one track seek should not be less than 10 milliseconds, otherwise, there could be a possibility of oscillations occurring.

4.15.8.4 Servo Check

(1) Connect oscilloscope to VCAC TP-4 (Drawing 106039).

(2) Perform a 203 track repetitive incremental seek with the CE board.

(3) Check that the time between the last quarter track of each signal and the point that each signal is settled is less than 15 milliseconds. Repeat Steps (1) and (2) if not.

(4) Perform a 202 track repetitive seek with CE board.

(5) Determine that the time between the last quarter track of the last signal and the point that this signal is settled is less than 15 milliseconds. Repeat Steps (1) and (2) if not.

4.15.9 CE ALIGNMENT

The positioner and disk track positions must be the same.

NOTE

It is essential that the positioner's head be above the disk track indicated by the positioner.

Disk packs are interchangeable between machines and data must be sensed on all machines at a specified (standard) length of time after the sector mark is sensed. The index mark is an orientation point for the first sector mark. The index mark can, therefore, be used as a reference point to determine when data should appear in the first sector.

It is necessary that the delay between the index mark and the appearance of data be set to some standard time on all machines. A CE disk contains a special track written and calibrated to a standard distance from the center of the disk. This point is to be considered as the location of track 100 on the disk. The disk also contains a calibrated index mark-delayed-from-data standard, track 95. A CE disk is used to align the positioner.

4.15.9.1 CE Track 100

The data on track 100 of the CE pack is "tunnel" written. This is best defined by visualizing a data bit that has been erased through the center. Being so erased would leave only the top end, and the bottom end of the data bit remaining.

A series of consecutive data bits would form a track pattern that would appear to have a hole tunneled through the center.

These data bits are written at a very high density to provide a continuous solid pattern. Track 100 on the CE pack is slightly eccentric. The data on track 100 was written about an axis slightly off from true-disk-center. The result is shown in exaggerated form in the upper diagram of Figure 4-11.

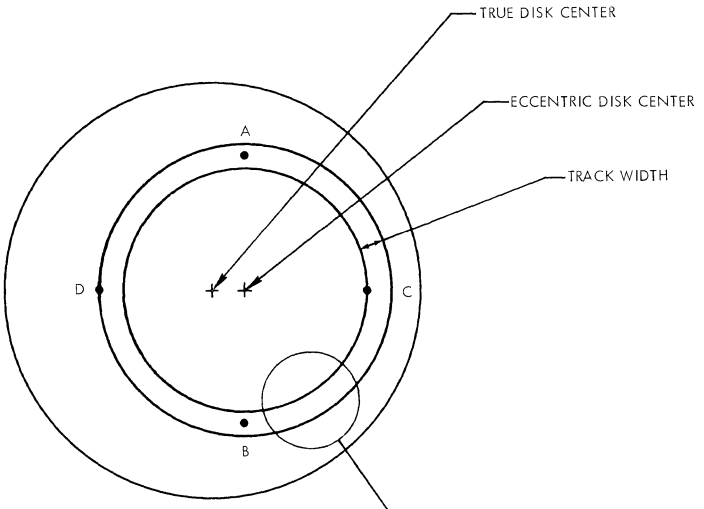
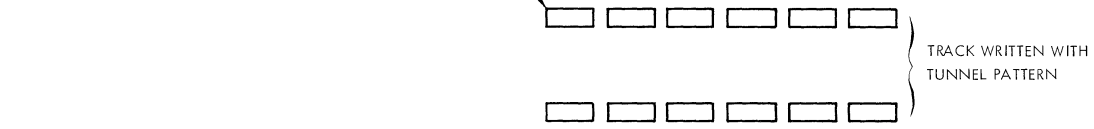
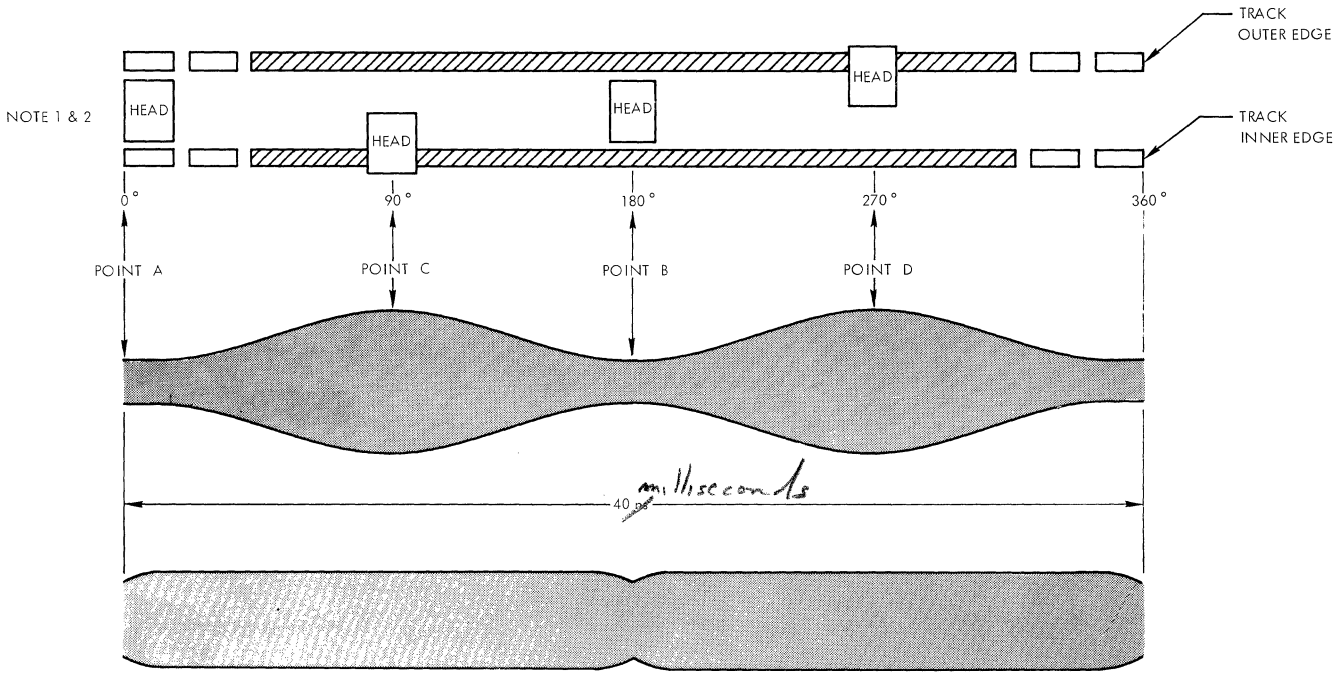


FIGURE 5A





NOTES:

1. (TRACK 100 AMPLIFIED AND PROJECTED IN PLANE).
2. HEAD TO TRACK POSITION VARIATION DUE TO TRACK ECCENTRICITY.

For 2400 rpm Disk Drives time interval is 25 milliseconds

Figure 4-11. Double Density Head to Track Relationship

525A

The radius from true disk center to where the center of track 100 should be is only satisfied at two points, A and B. At point C the true radius is at the outer edge of track 100 and at point D it is at the inner edge. If a head were aligned properly, it would read through the center of this track. With the track being eccentric, the only points where the head would be reading the center of the track would be at A and B, or at the true radius previously described. Since the center is void of the magnetized field, a minimum reading will be obtained here.

At points C and D, a maximum waveform reading will be obtained because the center of the track will not be at the true disk center where the head remained.

At this time the high density inner or outer track edge will be at true disk center, under the head, and producing a maximum output.

Because of the sensitivity of the heads, the null levels at points A and B will not be zero volts. Since the head flies very near both the inner and outer edge of the track at A and B, it will produce a signal nearly equal to the signal produced at points C and D where the head is over a stronger field area. See Notes 1 and 2 on Figure 4-11. (The field at C and D is created by only the edge of one track.) This will result in a minimal lobing effect shown in Figure 4-11. A pattern with no lobes is therefore the most desirable.

If a head cannot be adjusted to obtain the minimal lobeing pattern then the head is not flying sufficiently close to the disk surface. This condition can be caused by either a dirty disk or head, or incorrect head load force.

It should be understood that the pattern described above does not apply to single density units. A single density unit uses the erase heads to read the data. As a result, when the heads are correctly aligned there will always be an equal field under each of the erase heads. The net field difference between the heads will be zero and therefore no signal will be developed. In reality, a field difference of zero cannot be obtained due to the eccentricity of the track.

At one point in the disk revolution one of the erase heads will be between the track edges while the other is past one side. The head between the track edges will tend to pick up the field from the sides of the two edges while the other will pick up the side of the single edge which it is near. See Figure 4-12.

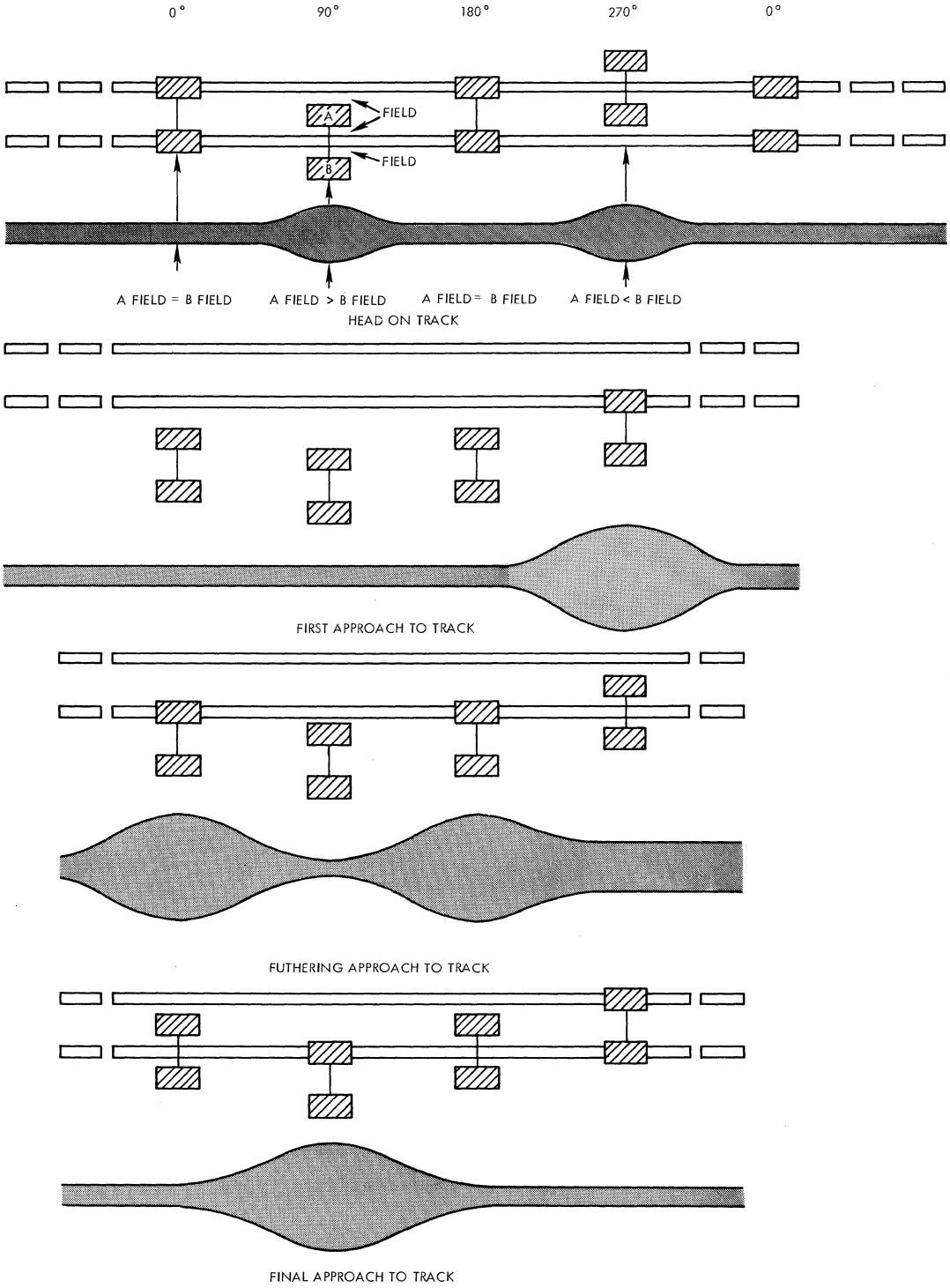
Therefore, the one head will have a slightly greater field which results in a small signal. The same situation occurs 180 degrees later when the other erase head is between the tracks.

The net result is two small signal lobes within 360 degrees. These lobes should be small and equal.

4.15.9.2 CE Track 95

Data is written with read/write heads. The index point is sensed with an index transducer. Data, which is oriented to the index point, must be written or read from the same point on all disks written on any machine.

To assure inter-changeable compatability on all disks, a standard written CE disk track, track 95, is used to determine where the transducer on each disk must be located to make certain the heads are positioned at the start of the data track when the orienting index point is sensed.



NOTES: 1. (TRACK 100 AMPLIFIED AND PROJECTED IN PLANE).
2. HEAD TO TRACK POSITION VARIATION DUE TO TRACK ECCENTRICITY.

Figure 4-12. Single Density Head to Track Relationship

Data on CE track 95 is written 30 microseconds after the index point is sensed. The index transducer on each disk must be positioned so data on CE track 95 is first sensed 30 microseconds after the transducer senses the index. This establishes the same index to data time on all disks.

4.15.10 CE ALIGNMENT

In the following alignment procedure, a CE disk must be inserted. Only the two heads used for the removable disk are aligned. On single density units, a head adaptor, PERTEC Part No. 105069, is installed between the two head cable plugs and the sockets, 0 and 1, of the two heads being adjusted. The sockets are on the RA/WD/A board. The I/O cable, A11, and the terminating board, A13, must be removed from the card cage. The CE board is inserted into A11. Refer to Paragraph 4.16 for the functions of the CE Board and Use.

4.15.10.1 Head Alignment Procedure

Before proceeding, observe the following warning.

WARNING

DISCONNECT THE + (POSITIVE) TERMINAL FROM THE RETRACT CAPACITOR, C2, MOUNTED AT THE TOP RIGHT OF THE UNIT.

Disconnecting the positive terminal to C2 prevents an emergency retract condition from occurring while working on the unit.

Under an emergency retract condition, the carriage will move three inches in less than 100 milliseconds.

The unit must not be left unattended while C2 is disconnected. For if a power failure occurs the heads will not be able to unload and head crashes will result.

CAUTION

IF A SUITCASE TESTER IS BEING USED, BE ABSOLUTELY SURE THAT ANY WRITING OR FORMATTING IS INHIBITED.

Procedure: Sync oscilloscope ON A17, pin 21, negative, 5 ms/cm.

Scope RA/WD/A (J1) TP1 and TP2; set channel A added to channel B; invert one channel, 10 ms/cm (final setting) using X 10 probes.

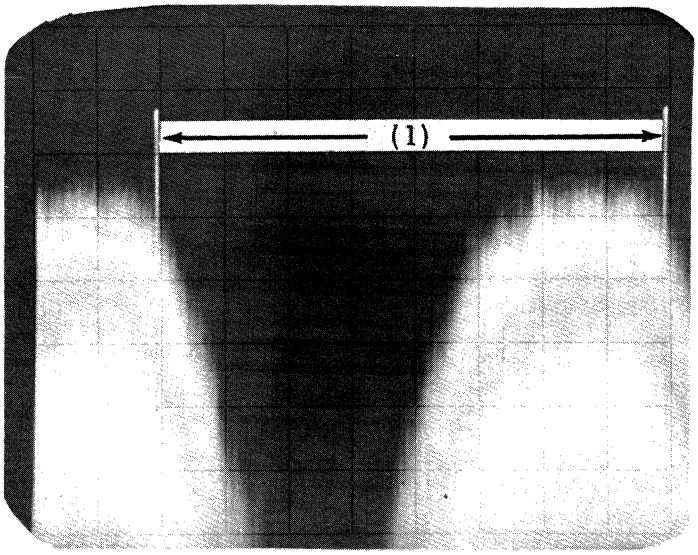
(1) Use CE board to position head to track 100.

(2) Use CE board to select a head.

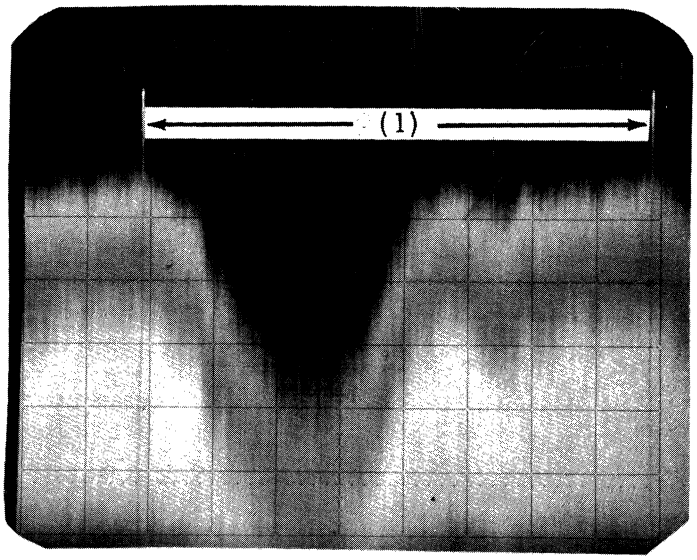
(3) Use head adjustment tool, PERTEC Part No. 106206, to move selected head in or out to obtain patterns shown in Figure 4-13 for double density. Single density patterns are shown by Figure 4-14.

NOTE

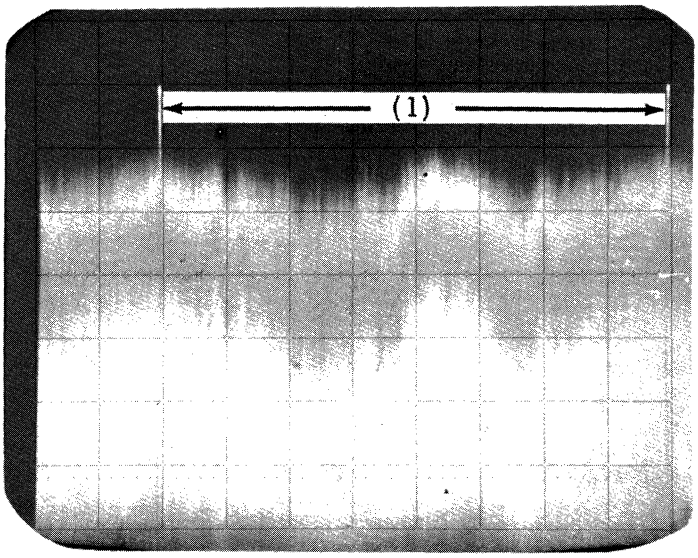
Figure 4-13, Double Density, shows the top peaks of the read signal and not the entire body of the signal.



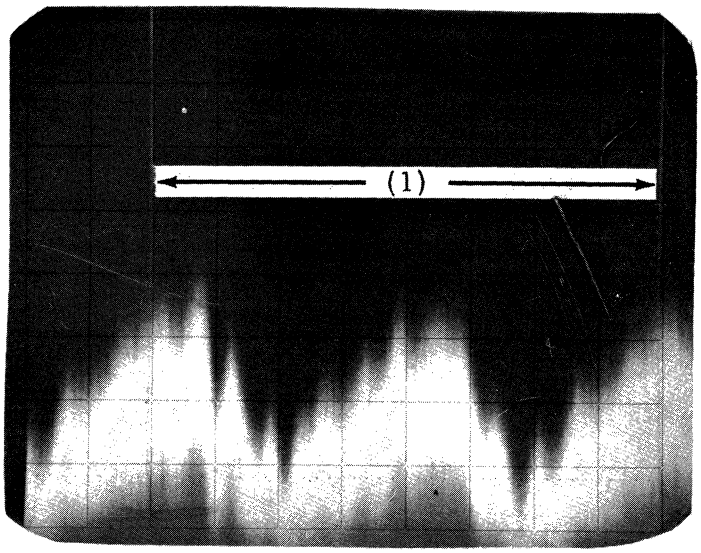
a. Head first approaches track 100 (one lobe)



b. Head nears center of track 100 (lobe time increases)



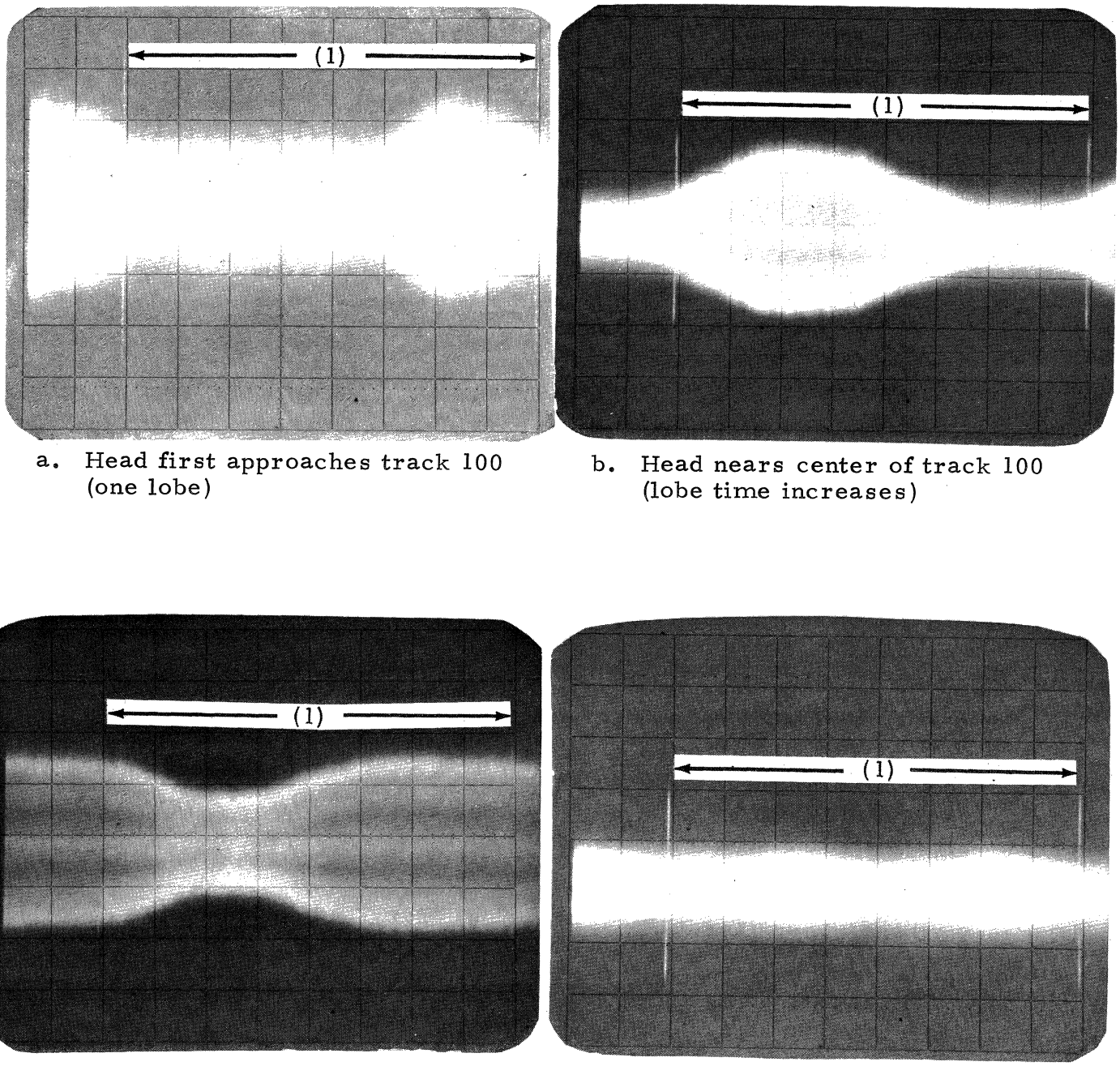
c. Head is at center of track (two shallow but equal valleys)



d. Head is correctly aligned but is dirty, or disk is dirty or has bad head load force.

(1) 40 millisecond interval (vertical white lines) representing one revolution of the disk. on 1500 rpm disk Drive Would be 25ms for 2400 rpm Disk Drive.

Figure 4-13. Double Density CE Alignment



a. Head first approaches track 100 (one lobe)

b. Head nears center of track 100 (lobe time increases)

c. Final approach to track 100.

d. Head centered on track 100.

(1) 40 millisecond interval (vertical white lines) representing one revolution of the disk. 1500 rpm Disk Drive.

Figure 4-14. Single Density CE Alignment

It is desirable to have the envelope formed by these peaks as flat as possible as shown in Figure 4-13.

NOTE

The test points being observed are the outputs of a double ended amplifier; positive and negative peak referenced to ground. The oscilloscope setting inverts one peak. Another oscilloscope setting causes the signals to be added for maximum amplitude.

(4) Reinstall the + (positive) terminal on condenser C2.

(5) On single density units remove the head adaptor block

NOTE

Disk track 105 is identical to disk track 100. It is possible to align the heads on disk track 105 when the disk is addressed to track 100.

After head adjustment is made, it will be necessary to back step five tracks to address 95. At this point, the index to data pattern should be seen, see Figure 4-15. If not, the alignment has not been made on disk track 100 — the address of the position.

4.15.10.2 Index Alignment Procedure

Oscilloscope settings will be the same as for head alignment.

Procedure: Sync oscilloscope ON A17, pin 21, negative, 5ms/cm.

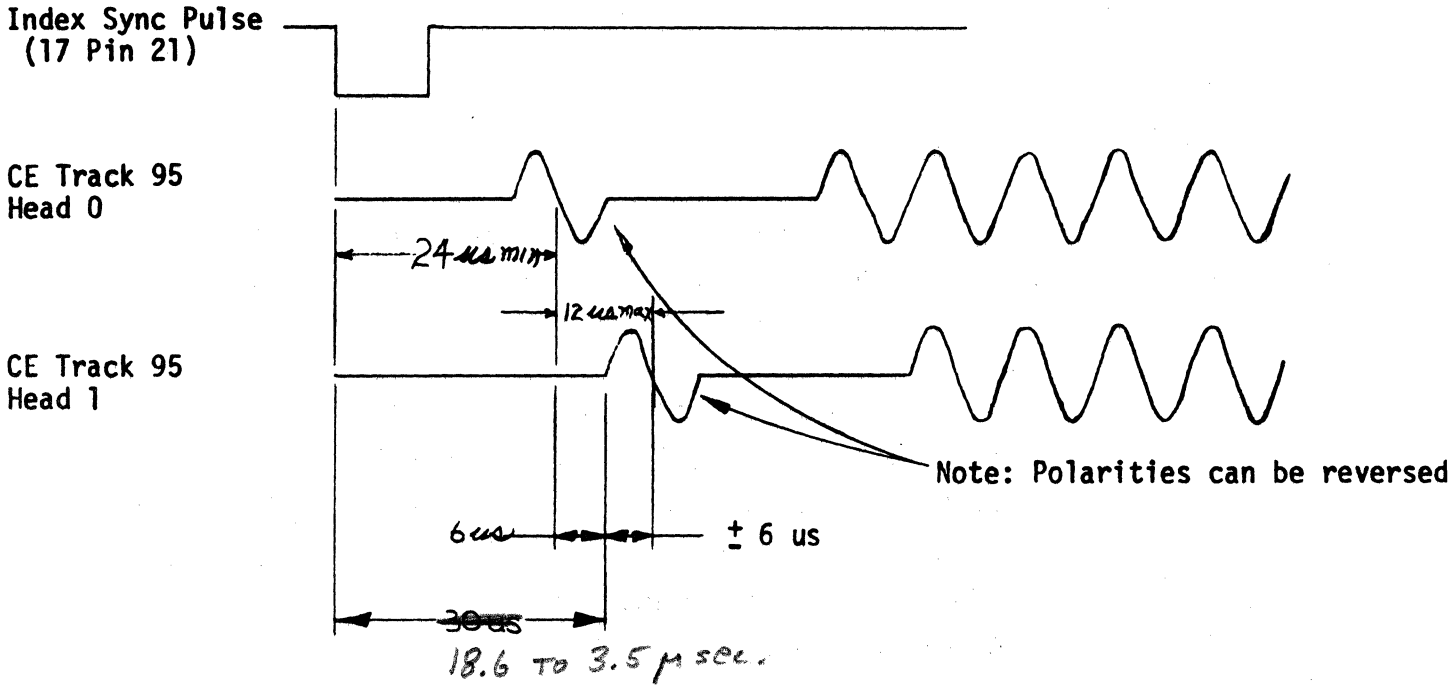


Figure 4-15. Sector Transducer Timing

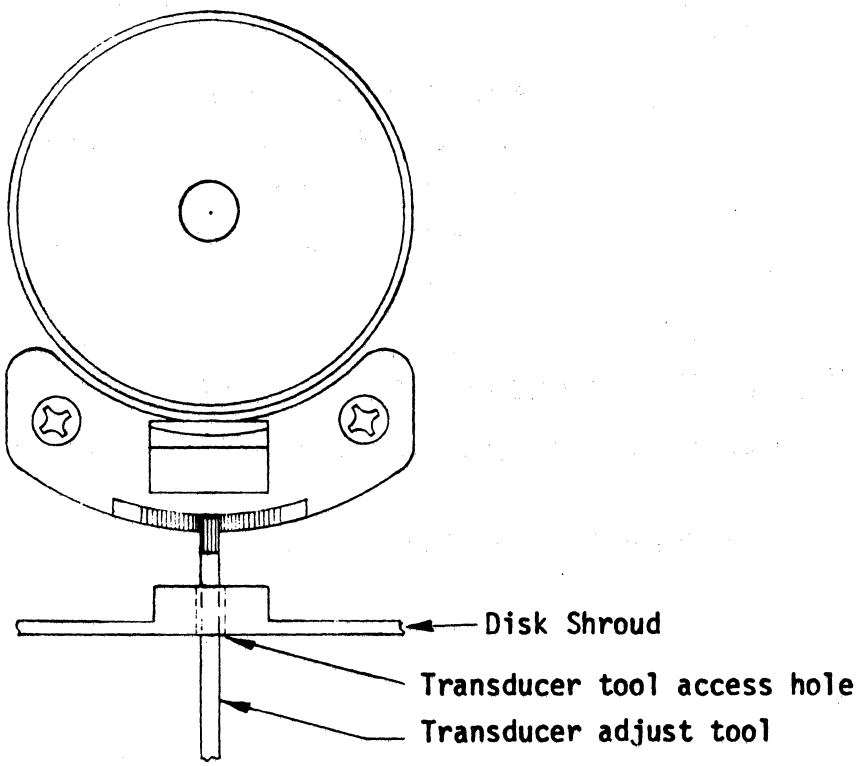


Figure 4-16. Sector Adjust

Scope RA/WD/A (J1) TP1 and TP2; set channel A added to channel B; invert one channel, 50 mv/cm.

(1) Loosen transducer retaining screws, Figure 4-16.

NOTE

This must be done before inserting the CE disk.

(2) Remove the front door.

(3) Use CE board to position to track 95.

(4) Use CE board to select a head.

(5) Use the sector adjustment tool, PERTEC Part No. 105838, to adjust the position of the transducer to obtain the first scope pulse that occurs at 30, 6 microseconds, after the trigger. See Figure 4-15.

(6) Tighten the transducer retaining screws.

NOTE

This can change the position slightly so a timing recheck must be made.

(7) Reinstall the door.

4.16 D5000 CE BOARD FUNCTIONS AND USE

4.16.1 DESCRIPTION

A D5000 CE Board, PERTEC Part No. 106214-01A, is a PCBA used to position, align, and test the D5000 Series Disk Drives only.

The CE board is about 4 by 6 inches in size. It has a small panel attached to the front edge. This panel, about 3/4 inches wide, aids in inserting and removing the CE board into the cardcage. Lettered upon the front panel opposite each switch arm are the switch positions identifying their functions.

The ON/INIT switch is a spring loaded switch, and in the normal position, it is ON. When depressed to the INIT position and then released it will return to the ON position when the actuating pressure is released. The remaining four switches are three-position, detented-switches and remain fixed in position until they are manually repositioned.

4.16.2 SWITCH FUNCTIONS

The spring-loaded ON/INIT switch starts all functions when depressed to the INIT position.

The second switch is a three-position switch performing the functions of SING/RECY/LOAD.

In the SING position, the selected function is performed once and then halted.

In the RECY position the single function is recycled until switched to SING.

NOTE

The SING and RECY functions may be selected after the LOAD function is performed.

The LOAD position loads addresses into the CE board UP/DOWN counter.

The third switch is a three-position switch performing the functions of INC/—/DEC.

The increment decrement switch is used for incrementing or decrementing the UP/DOWN counter in the CE board. It is used in conjunction with the recycle position of the second switch while doing a position on an increasing track address or a decreasing track address.

In the — position, a non-functional position, neither an increment or a decrement address is installed into the counter.

The fourth switch is also a three-position switch with the following positions HDO, CLR, and REP.

In position HDO the output of head zero is selected and either of the other switch positions, CLR or REP, selects the output of head one. This condition exists so after a seek has been initiated, say to track 100, then choosing between the two head outputs to do a CE alignment can be made.

The clear position on this switch overrides the 68, 96, and 202 positions of switch five and loads a zero into the UP/DOWN counter, thus there are four track addresses to select from, either zero, by putting switch four to the CLR position or in addition by placing switch five to 68, 96, or 202 when switch four is not in the CLR position.

The REP position causes alternate seeks from 0 to tracks addressed in the UP/DOWN counter. Thus, if 96 had been loaded into the UP/DOWN counter and the REP position is selected, and the SING/RECY/LOAD switch is at SING, the ON/INIT switch actuated, the seek would first go to 96. The second actuation of the ON/INIT switch would cause the seek to return to 0; the third actuation of the ON/INIT switch would cause the seek to go to 96.

If the second switch is in the RECY position then a single actuation of the ON/INIT switch will cause a continuous 0 to 96 seek between the two tracks.

The unit will stop at the two end points of the seek cycle for a period of 15 milliseconds which is the internal delay time of the machine.

4.16.3 SEQUENCING TO TRACK 100

When CE aligning is done at track 100, set the second switch to LOAD position.

Set the third switch to — (center position).

Set the fourth switch to any other position than CLR.

Set switch five to 96.

Actuating the ON/INIT switch now loads 96 into the UP/DOWN counter. Notice that at this point no function has been performed by the unit.

Position the second switch from LOAD and set it to SING.

Actuate the ON/INIT switch and release; the unit will seek track 96.

Set switch three to INC.

Actuate the ON/INIT switch and release; the unit will seek track 97.

Actuate the ON/INIT switch three more times and the unit will arrive at track 100.

A choice can now be made between head 0 and head 1. If switch four is set to REP, leaving switch two at SING and then actuating the ON/INIT switch, this action would cause a seek back to 0.

If the third switch is now set to DEC and the ON/INIT switch is actuated five successive times the unit will seek from track 99 to track 98, to track 97, to track 96, and then to track 95. At track 95 the data alignment can be made and a choice can be made between head 0 and head 1 by positioning switch four.

4.16.4 OPERATION

The CE board is installed into slot 11 of the cardcage after the removal of the I/O cable and the terminator board from slot 13.

If the disk drive is daisy-chained to other disk drives, the connecting daisy-chain cable is removed from slot 13 when the CE board is used.

The five switches program the CE board and the CE board function is only concerned in seeking. The CE board has no writing capabilities because the writing function is disabled when the board is being used. This provides protection of the CE disk pack during alignment.

4.16.5 INTERACTION OF SWITCHES

If switch four is set to CLR and switch two set to the LOAD position, then by actuating the ON/INIT switch, zero will be loaded into the UP/DOWN counter.

If switch two is positioned to RECY and switch three is set to INC and switch four is set to REP, actuate the ON/INIT switch. A seek to track 1 back to 0, then to track 2 back to 0, then to track 3 back to 0. This

sequence will be repeated until the unit reaches track 202 at which time, because of the illegal address function circuit of the disk drive, the unit will cease to seek.

At this point the UP/DOWN counter in the CE board will roll over to zero and it will count up to all ones. When it rolls over to zero it will repeat the sequence again.

Assume the positioner has been positioned to track 100. If the INC/DEC is set to DEC, and the ON/INIT switch is actuated, a seek will be made to zero and then back to 99, then back to zero and then return to 98 in lessening strokes so the recycle and the repetitive functions work together as well as the increment and decrement function.

To stop a recycling mode is to move the second switch from RECY to SING. If the unit is presently doing a strobe function, that function will be completed and then, because switch two is now set to SING, the strobing will stop and the CE board will be shut off until another set of functions are entered into the UP/DOWN counter.

4.16.6 SUMMARY OF D5000 CE BOARD OPERATIONS

(1) Initialize
- (a) CLR
- (b) LOAD
- (c) INT

(2) Move one or more steps with single step command
- (a) Perform 1.
- (b) HDO
- (c) INC or DEC
- (d) SING
- (e) INIT (once for each track movement)

(3) Move to Track 0
- (a) Perform 1.
- (b) SING
- (c) INIT

(4) Move to Track 68 or 96 or 202
- (a) Perform 1.
- (b) 68 or 96 or 202
- (c) HDO
- (d) LOAD
- (e) INIT
- (f) SING
- (g) INIT

(5) Move to a specific track
- (a) Perform 3, or 4, to obtain one of the four tracks closest to desired track
- (b) Perform 2. (excluding 2. (a)) to single step to desired track

(6) Repeat movement between specific track and Track 0
- (a) Perform 5.
- (b) NOT INC or DEC
- (c) REP
- (d) INIT (once for each movement)

(7) Perform 6. Continuously Automatic
- (a) Perform 6.
- (b) RECY
- (c) INIT

(8) Move between specific track and 0 and increment (or decrement) specific track once on each movement away from track 0 (i. e., 0-100, 0-101, 0-102, etc.)
- (a) Repeat 6. with 6. (b) in INC or DEC

(9) Perform 8. Continuously Automatic
- (a) Perform 8.
- (b) RECY
- (c) INIT

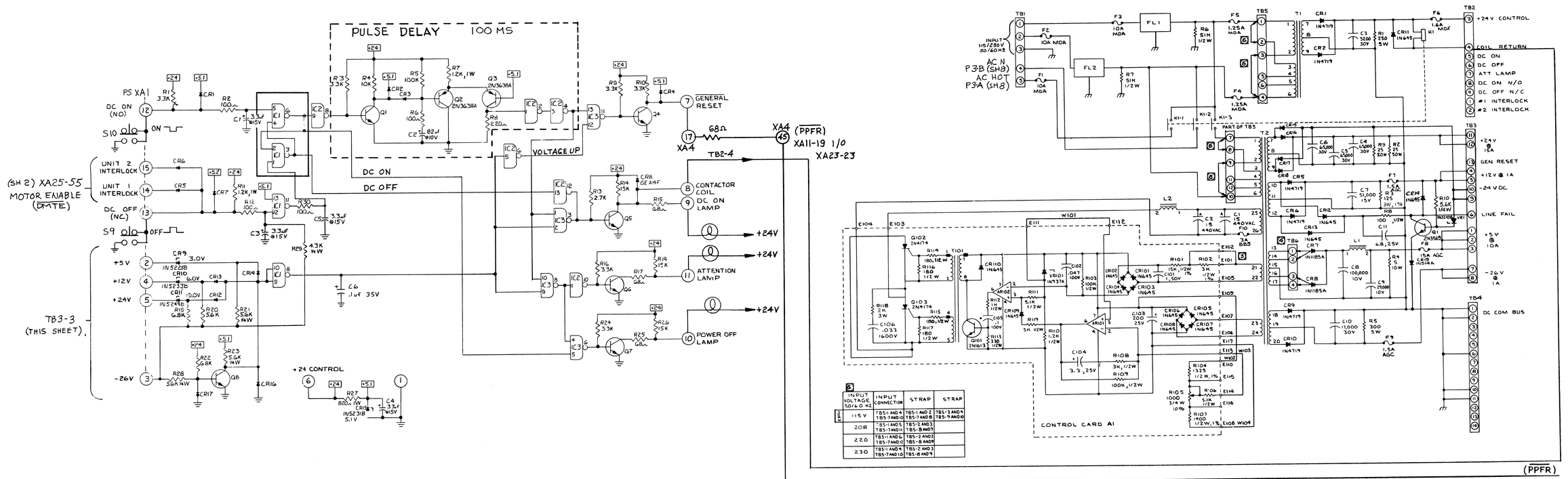
(10) SELECT HEAD (not applicable to repetitive modes 6. -9.)
- (a) Select desired track (3. -5.)
- (b) HDO (head 0) or CLR (head 1)

ARED	Analog, Read
D203	Driver, Received Demand Address 203 or greater
DADI	Driver, Address Initialize
DATT	Driver, Attention
DBCR	Driver, Bottom Sector Counter Reset
DBDS	Driver, Bottom Disk Select
DBLK	Driver, Brake (dual disk only)
DBZE	Driver, Busy enable
DBZY	Driver, Busy
DCEC	Driver, Controlled End Carry
DDAR	Driver, Demand Address Register Reset
DDDA	Driver, Digital Data
DDEC	Driver, delayed end carry
DDF0-7	Driver, difference bit 0 to 7
DDFR	Driver, Difference Reverse
DDIR	Driver, Positioner Direction
DERA	Driver, Erase
DFSE	Driver, File Enabled
DFWD	Driver, Position Forward Slow
DGFR	Driver, General File Reset
DHQT	Driver, Half to Quarter Track From Null
DHSE	Driver, Head Select Error
DHSU	Driver, Heads Up
DILK	Driver, Door Interlock, Safe Lamp
DINB	Driver, Index Bottom Disk
DINC	Driver, Internal Carry
DINT	Driver, Index Top Disk
DLSL	Driver, Lock Servo Loop
DMTE	Driver, Motor Enable
DPCL	Driver, Position Transducer Clock

DPTE	Driver, Position Transducer Error
DPTI	Driver, Position Transducer Index
DPTL	Driver, Position Transducer Limit
DRDS	Driver, Read Select
DRVS	Driver, Position Reverse Slow
DSRB	Driver, Sector Bottom Disk
DSRT	Driver, Sector Top Disk
DSTC	Driver, Seek Timing Check
DSTP	Driver, Sector Timing Pulse
DSVE	Driver, Servo Error
DTCR	Driver, Top Sector Counter Reset
DTDS	Driver, Top Disk Select
DUCP	Driver, Up Count Pulse
DUDB	Driver, Up Down Borrow
DUDC	Driver, Up Down Carry
DULE	Driver, Unload Emergency Relay Drive
DUNL	Driver, Unload
DUTS	Driver, Up to Speed
DVAE	Driver, Valid Address Enable
DVAQ	Driver, Valid Address Clock
DVAR	Driver, Valid Address Reset
DWDM	Driver, Write Data Mode
FADI	Flip Flop (L), Address Initialize
FBCO-4	Flip Flop, Bottom Sector Count bit 0 to 4
FBZY	Flip Flop (L), Busy
FCAO-7	Flip Flop, Current Address bit 0 to 7
FDAO-7	Flip Flop, Demand Address bit 0 to 7
FDCL	Flip Flop, Data Clock
FDTS	Flip Flop (L), Down to Speed
FFWS	Flip Flop (L), Forward Slow

FILA	Flip Flop, Illegal Address
FINB	Flip Flop, Index Bottom Disk
FINT	Flip Flop, Index Top Disk
FLDL	Flip Flop (L), Load Latch
FLHD	Flip Flop, Load Heads
FONE	Flip Flop, Data Ones
FPTE	Flip Flop, Position Transducer Error
FRDS	Flip Flop, Read Select
FRVS	Flip Flop (L), Reverse Slow
FSLC	Flip Flop (L), Stop Load Sequence
FTC0-4	Flip Flop, Top Sector Counter bit 0 to 4
FUNL	Flip Flop (L), Unload
FWPM	Flip Flop (L), Write Protect Mode
PPFR	Power On File Reset
QDCQ	Clock, Down Count
QMPB	Clock, Magnetic Pick-Up Bottom Disk
QMPT	Clock, Magnetic Pick-Up Top Disk
QUCQ	Clock, Up Count
RDA0-7	Receiver, Demand Address bit 0 to 7
RDAR	Receiver, Demand Address Reset
RDAS	Receiver, Demand Address Strobe
RFSL	Receiver, Logic File Select
RHS0-1	Receiver, Head Select bit 0 to 1
RLFR	Receiver, Logic File Reset
RRDS	Receiver, Read select
RWDF	Receiver, Write Double Frequency
RWDM	Receiver, Write Data Mode
SCAR	Switch, Cartridge Removed
SULS	Switch, Unload
SWPM	Switch, Write Protect Mode

TBZY	Timer, Settle Time Busy
TDCL	Timer, Data Clock
TDTS	Timer, Down to Speed
TLHD	Timer, Load Heads
TSTC	Timer, Seek Timing Check
TVAE	Timer, Valid Address Enable
VGRD	Voltage, Ground
VN15	Voltage, Negative 15
VN24	Voltage, Negative 24
VN26	Voltage, Negative 26
VP05	Voltage, Positive 5
VP12	Voltage, Positive 12
VP15	Voltage, Positive 15
VP24	Voltage, Positive 24
VPGC	Voltage, Positive Gate Clamp
XBZY	Transmitter, Busy
XDCL	Transmitter, Data Clock
XECU	Translator, Enable Current Source
XEHS	Translator, Erase Head Select
XILA	Transmitter, Illegal Address
SFSE	Transmitter, File Enabled
XINM	Transmitter, Index Mark
XDNE	Transmitter, Data One
XRDE	Translator, Read Enable
XSC0-4	Transmitter, Sector Count bit 0 to 4
XSH0-3	Trranslator, Select Head 0 to 3
XSRM	Transmitter, Sector Mark
XULE	Transmitter, Unload Emergency
XWDR	Translator, Write Drivers
XWPM	Transmitter, Write Protect Mode



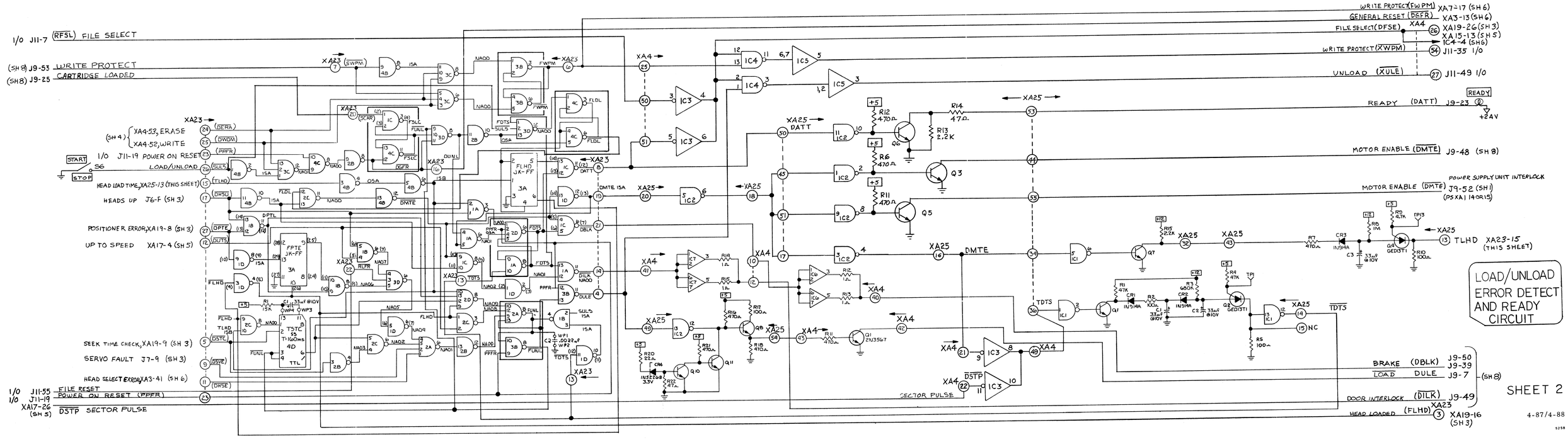
AC/DC CIRCUITS

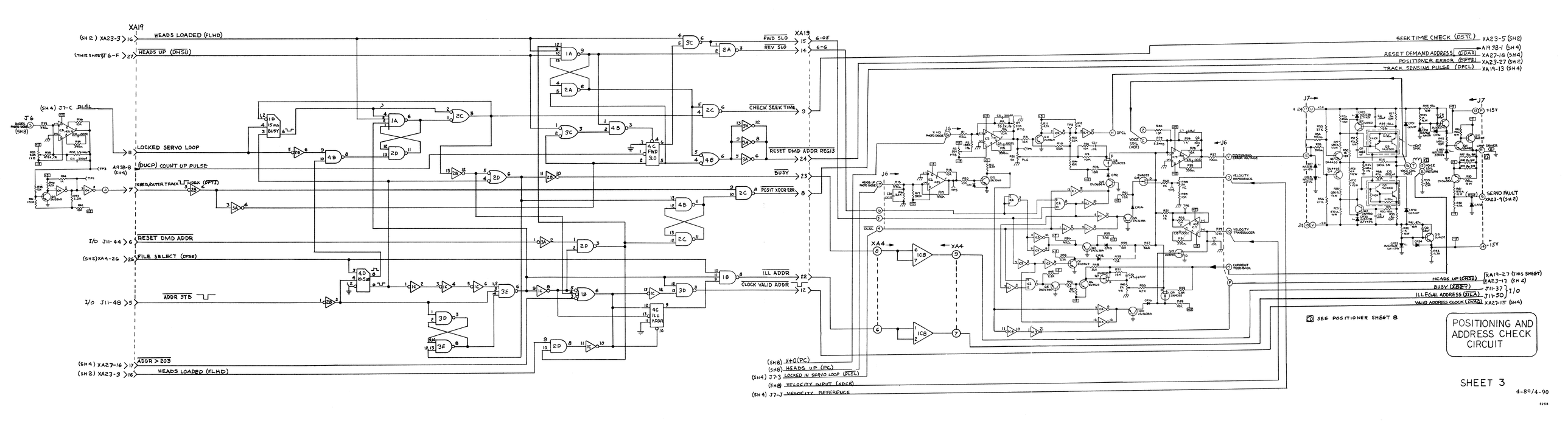
J11-19 I/O
XA23-23 (SH 2)

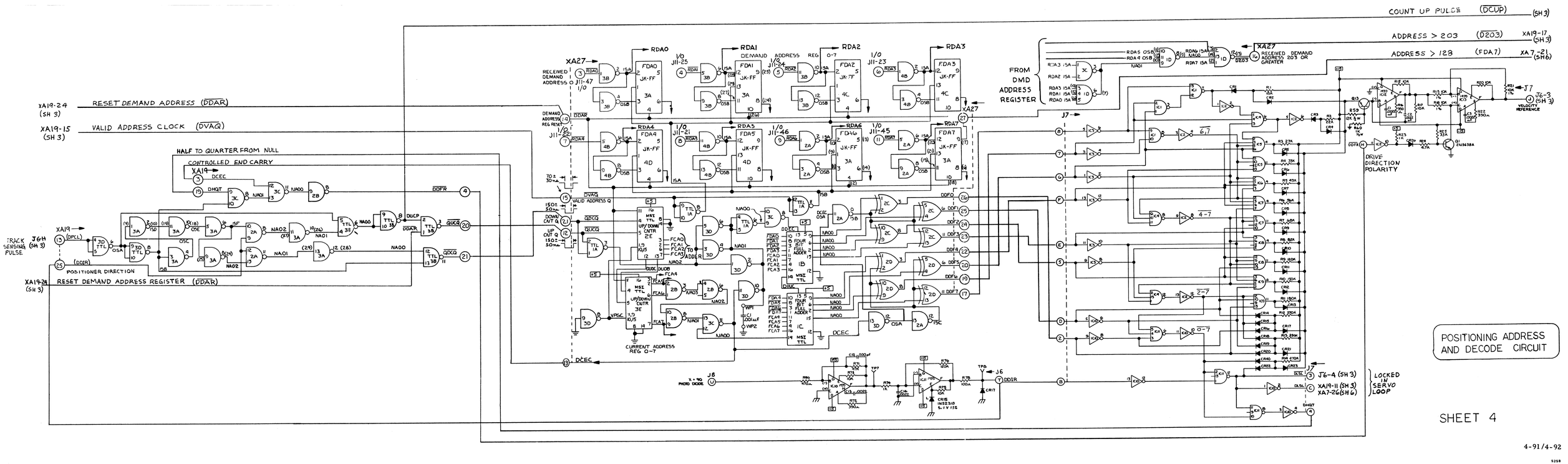
SHEET 1

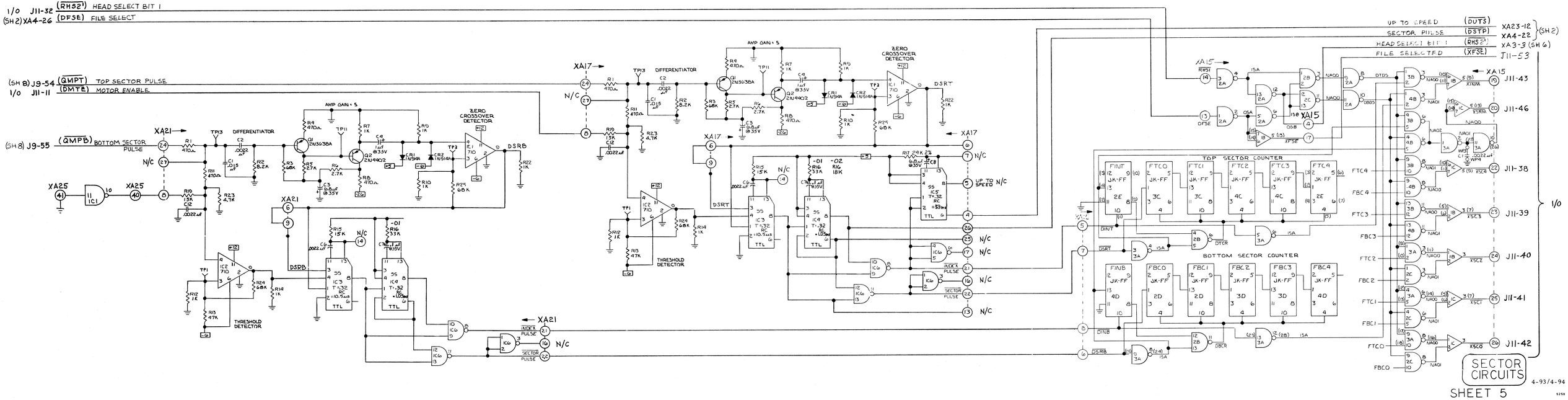
4-85/4-86

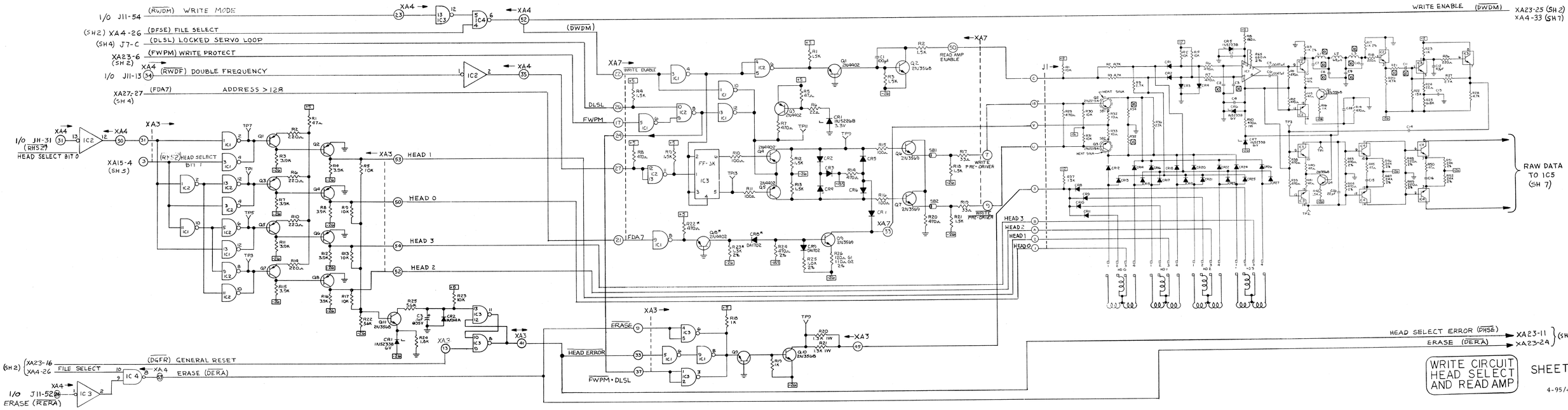
5258

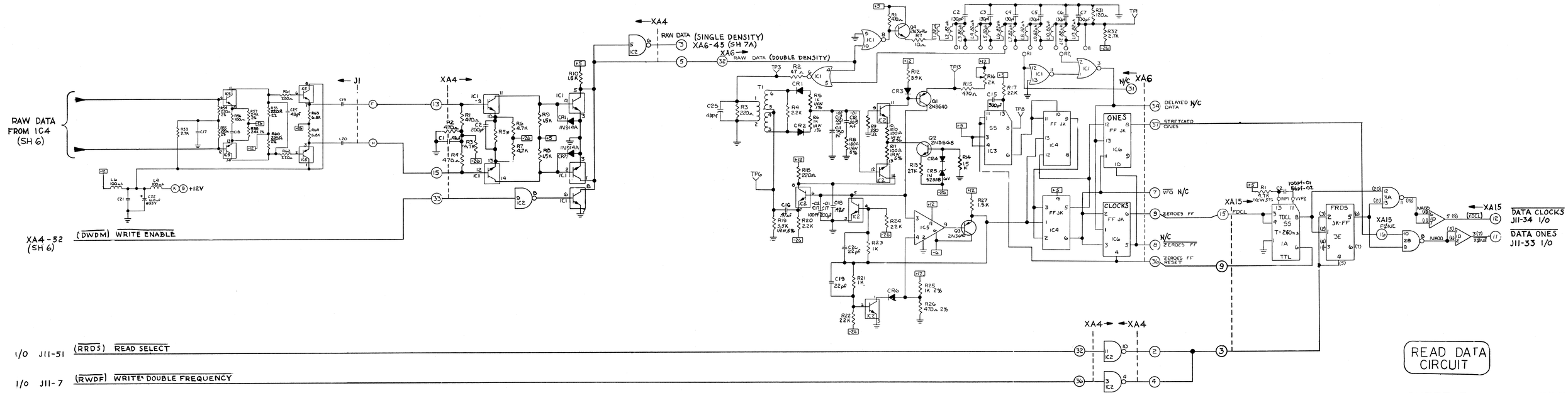

I/O J11-7 (RFSL) FILE SELECT
(SH 8) J9-53 WRITE PROTECT
(SH 8) J9-25 CARTRIDGE LOADED
(SH 4) XA4-53, ERASE
XA4-52, WRITE
I/O J11-19 POWER ON RESET
START
S6
STOP
LOAD/UNLOAD
HEAD LOAD TIME, XA25-13 (THIS SHEET)
HEADS UP J6-F (SH 3)
POSITIONER ERROR, XA19-8 (SH 3)
UP TO SPEED XA17-4 (SH 5)
SEEK TIME CHECK, XA19-9 (SH 3)
SERVO FAULT J7-9 (SH 3)
HEAD SELECT ERROR, XA3-41 (SH 6)
I/O J11-55 FILE RESET
I/O J11-19 POWER ON RESET (PPFR)
XA17-26 (SH 5) DSTP SECTOR PULSE
WRITE PROTECT (FWPM) XA7-17 (SH 6)
GENERAL RESET (DGFR) XA3-13 (SH 6)
FILE SELECT (DFSE) XA19-26 (SH 3)
XA15-13 (SH 5)
IC4-4 (SH 6)
WRITE PROTECT (XWPM) J11-35 I/O
UNLOAD (XULE) J11-49 I/O
READY
READY (DATT) J9-23
+24V
MOTOR ENABLE (DMTE) J9-48 (SH 8)
POWER SUPPLY UNIT INTERLOCK
MOTOR ENABLE (DMTE) J9-52 (SH 1)
(PS XA1 I4 OR I5)
TLHD XA23-15 (THIS SHEET)
LOAD/UNLOAD ERROR DETECT AND READY CIRCUIT
BRAKE (DBLK) J9-50
LOAD DULE J9-7 (SH 8)
DOOR INTERLOCK (DILK) J9-49
HEAD LOADED (FLHD) XA23 (3) XA19-16 (SH 3)
SHEET 2
4-87/4-88


XA19
(SH 2) XA23-3
1C
HEADS LOADED (FLHD)
(THIS SHEET) 6-F
27C
HEADS UP (DHSU)
(SH4) J7-C
PLUG
J6
SHIELD
PHOTO DISC
(SH8)
LOCKED SERVO LOOP
11
(DUCP) COUNT UP PULSE
A19 3B-8
(SH4)
INNER/OUTER TRACK
7
(DPTI)
I/O J11-44
6
RESET DMD ADDR
(SH2) XA4-26
26
FILE SELECT (DFSE)
I/O J11-48
5
ADDR STB
(SH9) XA27-16
17
ADDR > 203
(SH2) XA23-3
16
HEADS LOADED (FLHD)
FWD SLO
REV SLO
CHECK SEEK TIME
RESET DMD ADDR REGIS
BUSY
POSIT XDCR ERR
ILL ADDR
CLOCK VALID ADDR
XA19
15
14
9
24
23
8
22
12
6-05
6-06
SEEK TIME CHECK (DSTC)
XA23-5 (SH2)
A19 3B-1 (SH 4)
RESET DEMAND ADDRESS (DDAR)
XA27-14 (SH4)
POSITIONER ERROR (DPTE)
XA23-27 (SH 2)
TRACK SENSING PULSE (DPCL)
XA19-13 (SH 4)
SERVO FAULT
XA23-9 (SH 2)
HEADS UP (DHSU)
(XA19-27 (THIS SHEET)
(XA23-3 (SH 2)
BUSY (DBSY)
J11-37 I/O
ILLEGAL ADDRESS (DILA)
J11-50 I/O
VALID ADDRESS CLOCK (DVAC)
XA27-15 (SH4)
(SH8) X+0(PC)
(SH8) HEADS UP (PC)
(SH4) J7-3 LOCKED IN SERVO LOOP (DLSL)
(SH8) VELOCITY INPUT (XDCR)
(SH 4) J7-J VELOCITY REFERENCE
XA4
J6
J7
+15V
-15V
SEE POSITIONER SHEET 8
POSITIONING AND ADDRESS CHECK CIRCUIT
SHEET 3
4-89/4-90
9258


COUNT UP PULSE (DCUP) (SH 3)
ADDRESS > 203 (D203) XA19-17 (SH 3)
ADDRESS > 128 (FDA7) XA7-21 (SH 6)
XA19-24 (SH 3) RESET DEMAND ADDRESS (DDAR)
XA19-15 (SH 3) VALID ADDRESS CLOCK (DVAQ)
HALF TO QUARTER FROM NULL
CONTROLLED END CARRY
TRACK SENSING PULSE J6H (SH 3)
POSITIONER DIRECTION
RESET DEMAND ADDRESS REGISTER (DDAR)
RECEIVED DEMAND ADDRESS 0
DEMAND ADDRESS REG RESET
VALID ADDRESS Q
DOWN CNT Q
UP CNT Q
CURRENT ADDRESS REG 0-7
FROM DMD ADDRESS REGISTER
RECEIVED DEMAND ADDRESS 203 OR GREATER
DRIVE DIRECTION POLARITY
VELOCITY REFERENCE
LOCKED IN SERVO LOOP
XA19-11 (SH 3) XA7-26 (SH 6)
POSITIONING ADDRESS AND DECODE CIRCUIT
SHEET 4
4-91/4-92


1/O J11-32 (RHS2') HEAD SELECT BIT 1
(SH2)XA4-26 (DFSE) FILE SELECT
(SH 8) J9-54 (QMPT) TOP SECTOR PULSE
1/O J11-11 (DMTE) MOTOR ENABLE
(SH 8) J9-55 (QMPB) BOTTOM SECTOR PULSE
XA21
XA25
XA17
XA15
TPI3
TP11
TP13
TP1
TP3
DIFFERENTIATOR
AMP GAIN = 5
ZERO CROSSOVER DETECTOR
THRESHOLD DETECTOR
DSRB
DSRT
N/C
INDEX PULSE
SECTOR PULSE
UP TO SPEED (DUTS)
SECTOR PULSE (DSTP)
HEAD SELECT BIT 1 (RHS2')
FILE SELECTED (XFSE)
XA23-12 (SH2)
XA4-22
XA3-3 (SH 6)
J11-53
TOP SECTOR COUNTER
BOTTOM SECTOR COUNTER
FINT
FTC0
FTC1
FTC2
FTC3
FTC4
FINB
FBC0
FBC1
FBC2
FBC3
FBC4
DINT
DINB
DSRT
DTCR
DBCR
J11-43
J11-46
J11-38
J11-39
J11-40
J11-41
J11-42
1/O
SECTOR CIRCUITS
SHEET 5
4-93/4-94


I/O J11-54 (RWDM) WRITE MODE
(SH2) XA4-26 (DFSE) FILE SELECT
(SH4) J7-C (DLSL) LOCKED SERVO LOOP
XA23-6 (SH 2) (FWPM) WRITE PROTECT
I/O J11-13 (RWDF) DOUBLE FREQUENCY
XA27-27 (SH 4) (FDA7) ADDRESS > 128
I/O J11-31 (RHS2) HEAD SELECT BIT 0
XA15-4 (SH 5) (RHS1) HEAD SELECT BIT 1
HEAD 1
HEAD 0
HEAD 3
HEAD 2
(SH2) XA23-16 XA4-26 FILE SELECT
(DGFR) GENERAL RESET
ERASE (DERA)
I/O J11-52 ERASE (RERA)
WRITE ENABLE (DWDM)
XA23-25 (SH 2)
XA4-33 (SH 7)
READ AMP ENABLE
WRITE PRE-DRIVER
HEAD SELECT ERROR (DHSE)
XA23-11 (SH 2)
ERASE (DERA)
XA23-24
RAW DATA TO IC5 (SH 7)
WRITE CIRCUIT HEAD SELECT AND READ AMP
SHEET 6
4-95/4-96


RAW DATA FROM IC4 (SH 6)
XA4-52 (SH 6)
(DWDM) WRITE ENABLE
J1
XA4
XA6
RAW DATA (SINGLE DENSITY) XA6-45 (SH 7A)
RAW DATA (DOUBLE DENSITY)
XA4
XA4
1/0 J11-51 (RRDS) READ SELECT
1/0 J11-7 (RWDF) WRITE DOUBLE FREQUENCY
XA6
N/C
DELAYED DATA
STRETCHED ONES
VFO N/C
ZEROES FF
N/C
ZEROES FF
ZEROES FF RESET
XA15
FDCL
FDNE
XA15
DATA CLOCKS J11-34 I/O
DATA ONES J11-33 I/O
READ DATA CIRCUIT
SHEET 7
4-97/4-98

XA6

XA4-3 (45) DATA (SINGLE DENSITY)
(SH 7)

+5

R1 1.5 K

IC1

35

CLOCKS 8 9

L1 L2 L3 4.7uh

C1 43pf

C2 43pf

C3 43pf

.7 TAPS

500 ns DELAY LINE

L34 L35 4.7uh

C33 43pf

C34 43pf

C35 43pf

R2 330Ω

Q1 2N3646

R5 220Ω

R3 220Ω

R4 12K

-26

IC1

IC2

TP13

TP12 ONES WINDOW

14 N/C

+5 R8 12K C38 43pf

IC3

ONES XA6 DATA 21 J11-33 1/0

CLOCKS J11-34 1/0

EQUIVALENT CIRCUIT

DATA

IC1

IC2

.5μ SEC PULSE DELAY & .5μ SEC PULSE WIDTH

CLOCKS

ONES

IC3

DATA

1.5μ sec

DATA

CLOCKS

SINGLE SHOT PULSE

.5μs .5μs

READ DATA DECODE
SINGLE DENSITY

SHEET 7A

4-99/4-100

5258

P3
(SH 1) TBI-5 A — AC HOT
J9
XA25-44 (SH 2) 48 — MOTOR ENABLE (DMTE)
P3
TBI-4 (SH 1) B — AC NEUT
+5V
3
2
1
4
5
AC SWITCH
DISK MOTOR
(OPTION) WRITE PROTECT
+ 24V
S7
J9
WRITE PROTECT
53 (SH 2)
(OPTION) BRAKE
J9
(SH2) 50 (DBLK)
BOTTOM SECTOR PICKUP
55 XA21-24
(SH 5)
BOTTOM PLATTER
TOP SECTOR PICKUP
54 XA17-24
SAFE
DOOR
DOOR INTERLOCK (DILK)
XA4-12 (SH 2) 49
DOOR LOCK
TOP PLATTER
S5
CARTRIDGE
25 XA23-20 (SH 2)
CARTRIDGE LOADED
J6
INDEX
S
HEADS DOWN
17
(SH 3)
X+90
U (SH4)
X+0
16
PHOTO CELLS
J7
(SH 3) R
+3.1V
-26V
C2
K1
UNLOAD RAMP
GLASS SLIDE
VOICE COIL
CURRENT FEEDBACK
15
5
8
6
4
1
3
DRIVE
16
P3
(SH 1) D
+24V
J9 LOAD (DULE)
XA4-42 (SH 2) 7
N
S
TB3-3
TB3-4
VELOCITY
18
(SH 3)

DISK MECHANICS
SHEET 8

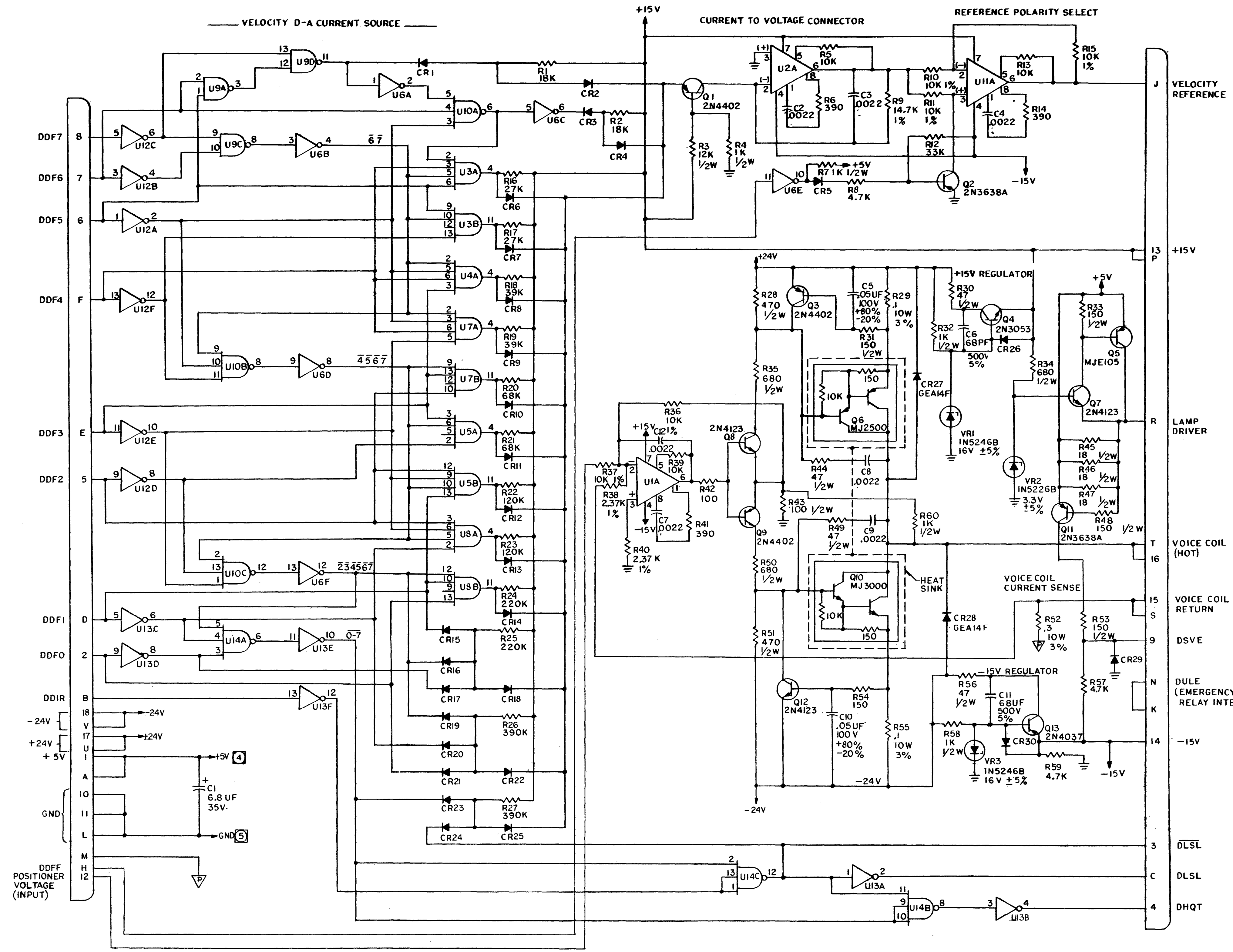
(1) REVERSED ON NEW SERVO CIRCUIT

SECTION V
SCHEMATICS – PCBAs

This section contains the following Schematics and PCBAs.

Slot Location		Description	Dwg. No.
J6	VCAC	Voice coil analog control	106039 or 106267/68
J7	VCAP	Voice coil amplifier	106037 or 106263/64
J1	RA/WD/A	Read amplifier/write driver	106045
XA3	EASH	Erase amp/head select	105737
XA7	WAMP/B	Write amplifier	106088
XA6	PLLD	Phase locked loop decoder (Double Density only)	105774
XA6	DDBD	Data decode (Single Density only)	105197
XA4	DFDR	Raw data former and driver	106006
XA25	DRDB/B	Driver	106076
XA17, XA21	SITB	Sector/index transducer	105987
XA15	MB1	Motherboard	106078
XA19	MB2	Motherboard	106079
XA23	MB3	Motherboard	106080
XA27	MB4	Motherboard	105790
XA13	I/O Cable		-
XA9	Mech Cable		-
File Logic Nomenclature List			-
File Logic Schematic VC			106069
Unit Schematic VC			106070

REV	DESCRIPTION
A	ERN 3-WS
B	ECN 3540



6. FOR ASSEMBLY DRAWING SEE 106264.

5 PIN 7 OF U1,U3,U4,U10,U12,U13 & U14 IS 0V.

4 PIN 14 OF U1,U3,U4,U11,U12,U13 & U14 IS +5V.

3. ALL CAPACITORS IN MICROFARADS $^{+100\%}_{-0\%}$, 1000 V.

2. ALL DIODES ARE IN914A.

1. ALL RESISTORS ARE 5% 1/4 W.

NOTES: UNLESS OTHERWISE SPECIFIED

LAST DESIGNATION USED	NOT USED
C12	
CR30	
Q13	
R60	
U14	
VR3	

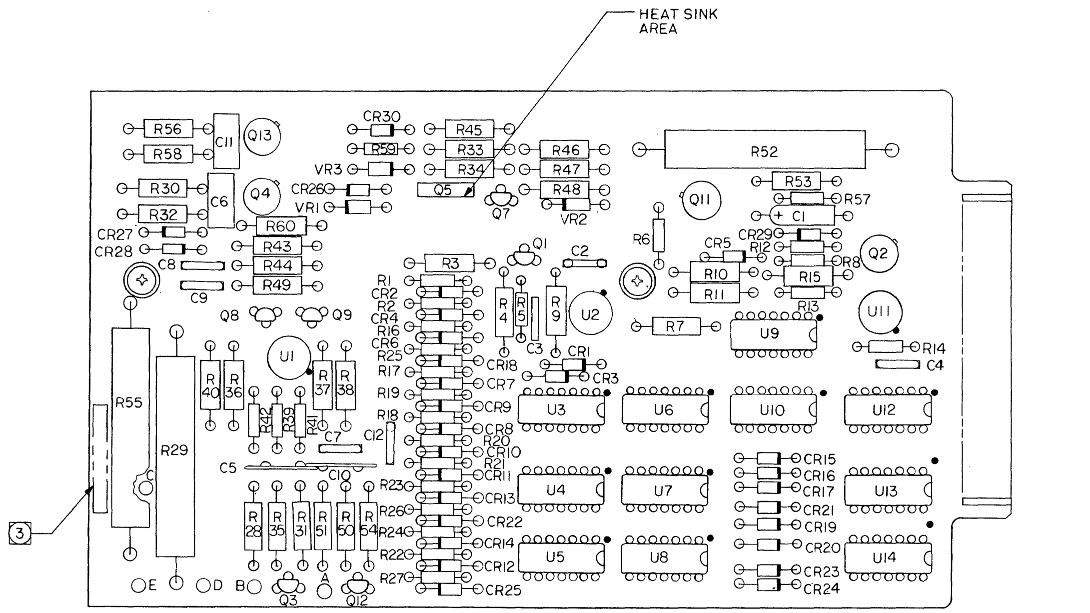
PEC PERIPHERAL EQUIPMENT CORPORATION

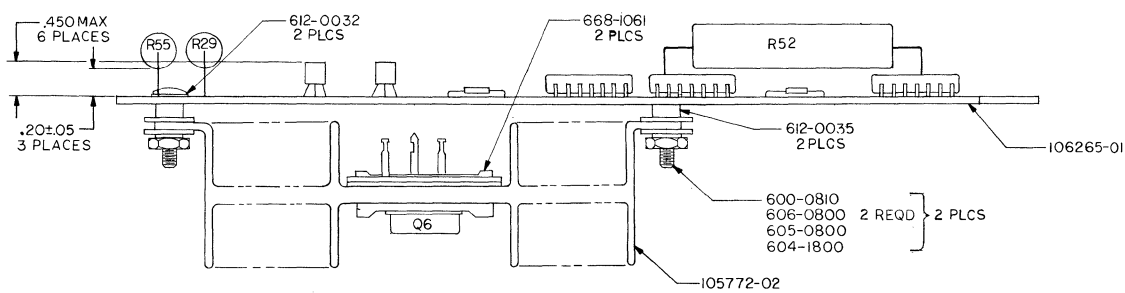
TITLE SCHEMATIC VCAP

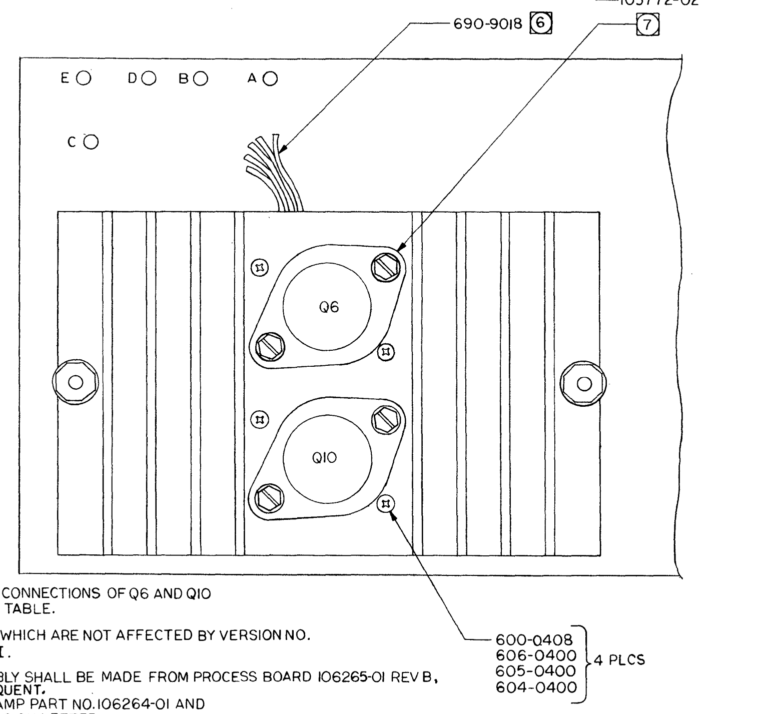
SIZE E DWG NO. 106263 REV B

SCALE NONE DO NOT SCALE DWG SHEET 1 OF 1

REV	DESCRIPTION	DATE	DR	CHK	APPR
A	EEN 3-WS	[illegible]	[illegible]	[illegible]	[illegible]
B	ECN 3540	6-1-72	RAS	[illegible]	[illegible]







6

WIRING TABLE	
FROM	TO
Q6-B	A1-B
Q6-E	A1-D
Q6-C	Q10-C
Q10-C	A1-C
Q10-B	A1-A
Q10-E	A1-E

5 TABLE I

PART NO.	REF DESIGNATION
100-1015	R42
100-1035	R5,13,39
100-1245	R22,23
100-1835	R1,2
100-2245	R24,25
100-2735	R16,17
100-3335	R12
100-3915	R6,14,41
100-3935	R18,19
100-3945	R26,27
100-4725	R8,57,59
100-6835	R20,21
101-1015	R43
101-1025	R4,7,32,58,60
101-1225	R3
101-1515	R31,33,48,53,54
101-1805	R45,46,47
101-4705	R30,44,49,56
101-4715	R28,51
101-6815	R34,35,50
104-1002	R10,11,15,36,37
104-1472	R9
104-2371	R38,40
118-0033	R52
110-0011	R29,55

5 TABLE I CONT'D

PART NO.	REF DESIGNATION
130-6805	C6,11
135-2272	C2,3,4,7,8,9,12
135-5062	C5,10
139-6845	C1
200-3000	Q10
200-3053	Q4
200-3561	Q5
200-3571	Q6
200-3638	Q2,11
200-4037	Q13
200-4402	Q1,3,9
200-4123	Q7,8,12
300-4003	CR27,28
300-9140	CR1-26,29,30
331-0335	VR2
331-1605	VR1,VR3
400-1439	U1,2,11
700-8330	U3,4,5,7,8
700-8360	U6,12,13
700-8460	U9
700-8620	U10,14

7. MINIMUM 90% COVERAGE REQD ON TRANSISTORS Q6,Q10 MOUNTED ON HEATSINK WITH 667-0047 SILICONE COMPOUND, APPLIED BOTH SIDES OF MICA INSULATOR. ALL SCREWS MUST BE TORQUED 10-12 IN. LBS. (TYP 2 PLACES).

6. FOR WIRING CONNECTIONS OF Q6 AND Q10 SEE WIRING TABLE.

5. FOR PARTS WHICH ARE NOT AFFECTED BY VERSION NO. SEE TABLE I.

4. THIS ASSEMBLY SHALL BE MADE FROM PROCESS BOARD 106265-01 REV B, AND SUBSEQUENT.

3. RUBBER STAMP PART NO. 106264-01 AND LATEST REVISION LETTER.

2. ASSEMBLE PER STANDARD MFG METHODS.

1. REF DWGS: SCHEMATIC 106263

NOTES: UNLESS OTHERWISE SPECIFIED.

NEXT ASSY	1ST USED ON
106110	5000
105827	5000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: .XX ± .010 .XXX ± .005 X/X ± 1/32 ANGULAR ± 1/2°
BREAK ALL SHARP CORNERS APPROX. .010
FINISH:

SIGNATURES	DATE
DR [signature]	1-12-72
CHK James B Reaves	2/18/72
DES	
ENGR [signature]	2/22/72
ENGR [signature]	3/6/72

MATL:

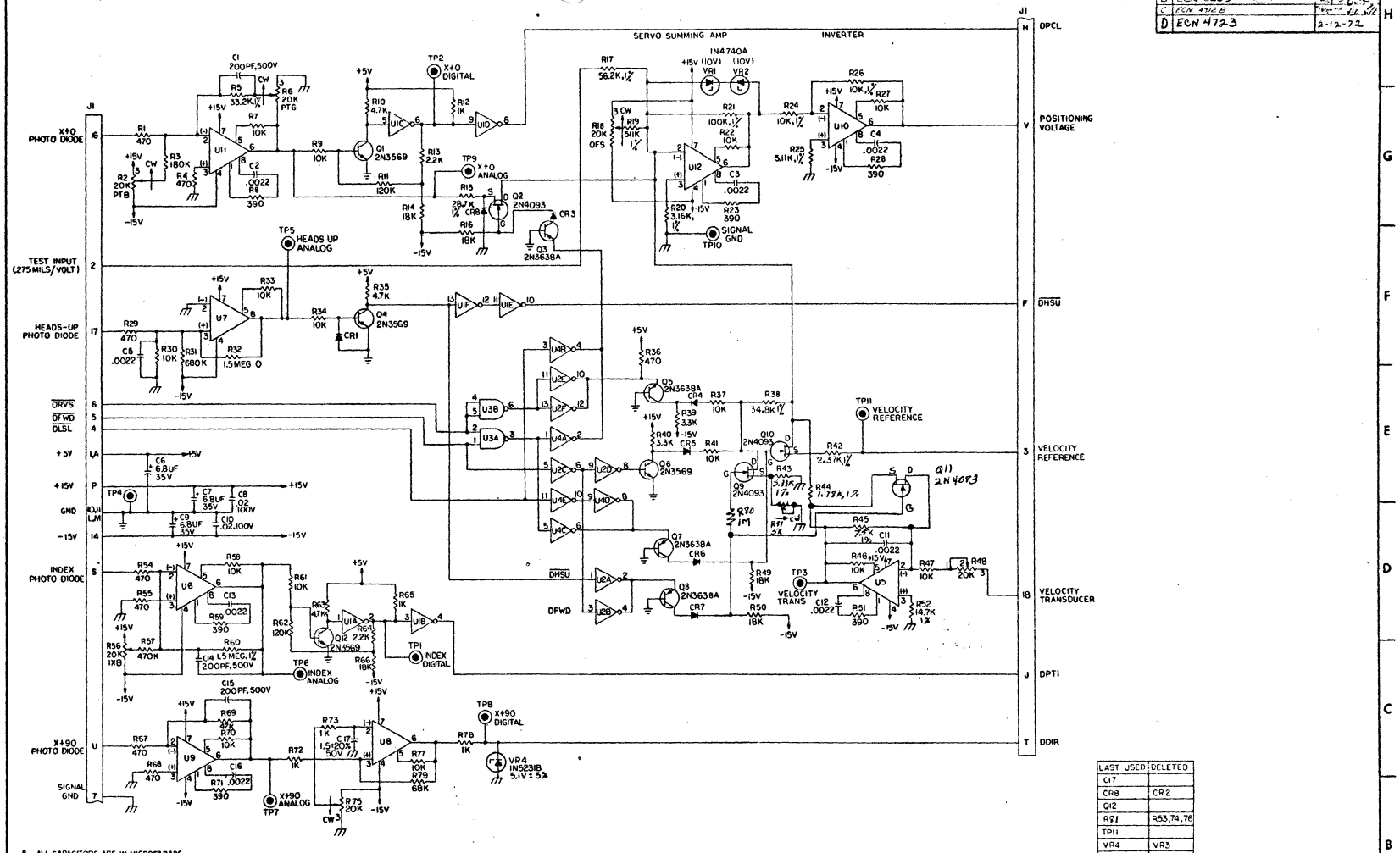
PEC PERIPHERAL EQUIPMENT CORPORATION

TITLE PCBA— VCAP

SIZE E | CODE IDENT. NO. | DWG NO. 106264 | REV B

SCALE 2/1 | DO NOT SCALE DWG | SHEET | OF |

2112



LAST USED	DELETED
C17	
CR8	CR2
Q12	
R97	R53,74,76
TP11	
VR4	VR3
U12	

8. ALL CAPACITORS ARE IN MICROFARADS 1000V, +100 -0 %.
7. ALL DIODES ARE 300-4446(IN4446).
6. FOR ASSEMBLY DRAWING SEE 106268.
5. PIN 7 OF U1,U2,U3 & U4 IS GROUND. PIN 14 OF U1,U2,U3 & U4 IS +5V.
4. ALL NPN TRANSISTORS ARE 200-3569.
3. ALL PNP TRANSISTORS ARE 200-3638.
2. U5 THRU U12 ARE 1439 OP AMPS.
1. ALL RESISTORS ARE IN OHMS, 5%, 1/4W.

NOTES: UNLESS OTHERWISE SPECIFIED

REV	DESCR	DATE	BY	CHK	APPV
A	ECN 3-WS				
B	ECN 3603				
C	ECN 4112 B				
D	ECN 4723	2-12-72			

106268 | SCCO | NEXT ASSY | 1ST USED ON | APPLICATION

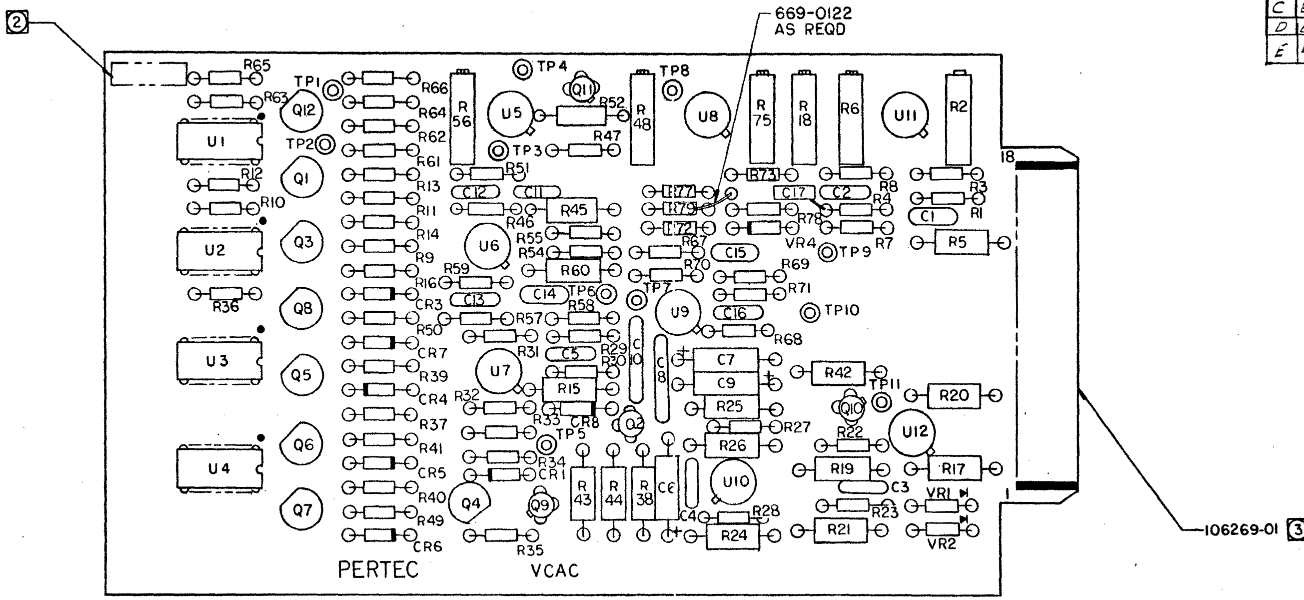
PEC PERIPHERAL EQUIPMENT CORPORATION

TITLE SCHEMATIC VCAC

SIZE E | DWG NO 106267 | REV D | SCALE NONE | SHEET 1 OF 1

8 7 6 5 4 3 2 1

REV	DESCRIPTION	DATE	DR	CHK	APPR
A	ERN 3-WS	[illegible]		[illegible]	[illegible]
B	ECN 3441	[illegible]	BL	[illegible]	[illegible]
C	ECN 3663	5/31/72	[illegible]	[illegible]	[illegible]
D	ECN 4312B	9/8/72	RAS	[illegible]	[illegible]
E	ECN 4723	12-20-72			



5 TABLE I

PART NO.	REF DESIGNATION
100-1025	R12,72,73,65,78,
100-1035	R79,33,34,22,27,37,41,46, R47,58,61,70,77,30
100-1055	R80
100-1245	R62,11
100-1835	R14,16,49,66,50
100-1845	R3
100-2225	R13,64
100-6845	R31
100-3915	R8,71,51,28,23,59
100-1555	R32
100-4715	R1,4 29,54,55,67,68,36
100-4725	R10,35,63
100-4735	R69
100-4745	R57
100-6835	R79
104-2872	R15
104-1002	R26,24
104-1003	R21,
104-1771	R44
104-1504	R60
104-3161	R20
104-3322	R5
104-2371	R42,
104-3482	R38
104-5111	R25, 43
104-5113	R19

5 TABLE I

PART NO.	REF DESIGNATION
104-5622	R17
121-2030	R2,6,56,48,75,18
130-2015	C1,14,15
135-1552	C17
135-2062	C8,10
135-2272	C2,3,4,5,11,12,13,16
139-6845	C6,7,9
200-3569	Q1,4,6,12
200-3638	Q3,5,7,8
200-4093	Q2,9,10,11
300-4446	CR1, 3,4,5,6,7,8
330-1005	VR1,2
104-7502	R45
700-8360	U4,2,1
700-8460	U3
400-1439	U5,7,9,10,11,12,6,8
100-3325	R39,40
123-5020	R81
331-0515	VR4
104-1472	R52

5 FOR PARTS NOT AFFECTED BY VERSION NO. SEE TABLE I.

4. FOR SCHEMATIC SEE DWG 106267.

3 THIS ASSY SHALL BE MADE FROM PROCESS BOARD 106269-01 REV B AND SUBSEQUENT.

2 RUBBER STAMP PART NO. INCLUDING VERSION NO. AND ISSUE LETTER, NEARSIDE.

1. ASSEMBLE PER STANDARD MFG METHODS.

NOTES: UNLESS OTHERWISE SPECIFIED

NEXT ASSY	1ST USED ON
106110	5000
105827	5000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: .XX ± .01 .XXX ± .005 X/X ± 1/32 ANGULAR ± 1/2°
BREAK ALL SHARP CORNERS APPROX. 010

FINISH:

MATL:

SIGNATURES / DATE
DR [illegible] 12/20/72
CHK [illegible] 1/5/73
DES
ENGR [illegible]
ENGR [illegible]

PEC PERIPHERAL EQUIPMENT CORPORATION

TITLE PCBA VCAC ASM BOARD

SIZE D | CODE IDENT NO | DWG NO. 106268 | REV E

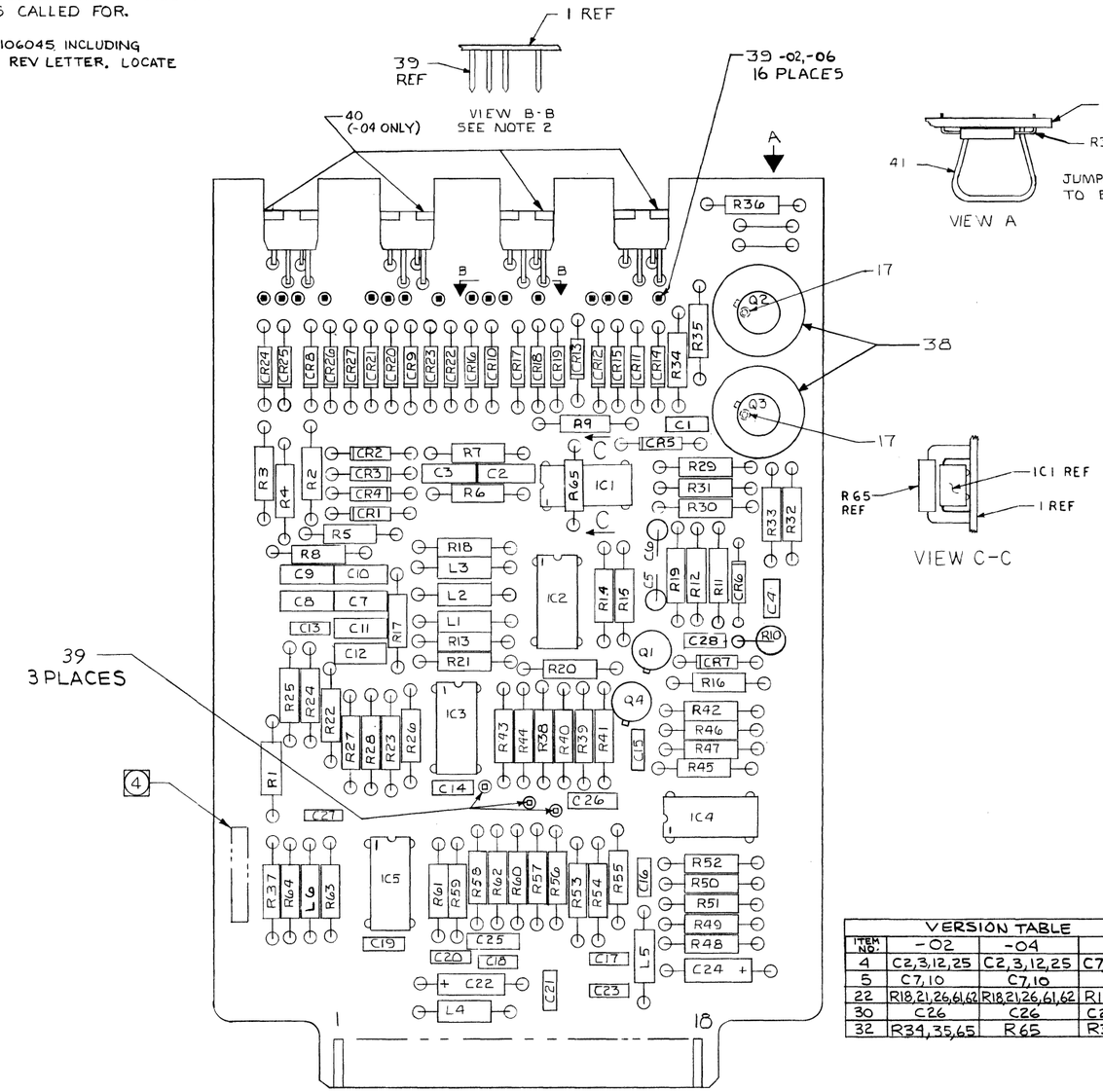
SCALE 2/1 | DO NOT SCALE DWG | SHEET 1 OF 1

NO. 106045

NOTES:

1. DELETED
2. INSTALLATION OF ITEM 39 SHOWN APPLIES TO ALL PLACES ITEM 39 IS CALLED FOR.
3. DELETED
4. RUBBER STAMP PART NO 106045 INCLUDING VERSION NO. AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A1	REC CHG CMD P/N WAS 100001045	7-22-71
B	ECN 2945A	10-12-71
C	ECN 2970	11-20-71
D	ECN 3480	4/22/72



VERSION TABLE			
ITEM NO.	-02	-04	-06
4	C2,3,12,25	C2,3,12,25	C7,10,12,25
5	C7,10	C7,10	C8,9
22	R18,21,26,61,62	R18,21,26,61,62	R18,26,61,62
30	C26	C26	C2,3,26
32	R34,35,65	R65	R34,35,65

QTY -06	QTY -05	QTY -04	QTY -03	QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
							MD5101 & MD5101A	MD5121 & MD5121A	MD5201 & MD5201A	MD5221 & MD5221A	MD2201 (1500 RPM)
2	X	1	X	1	X	47	515-2905	INDUCTOR	EA	L1,L3	24μh
1	X	1	X	1	X	46	130-1515	CAPACITOR	EA	C11	150 pf
1	X	1	X	1	X	45	101-3315	RESISTOR	EA	R21	330Ω ½W 5%
1	1	1	1	1	1	44	101-1525	RESISTOR	EA	R42	1.5K ½W 5%
1	1	1	1	1	1	43	101-1815	RESISTOR	EA	R8	180Ω ½W 5%
1	1	1	1	1	1	42	101-1015	RESISTOR	EA	R56	100Ω ½W 5%
4	4	4	4	4	4	41	690-0022	WIRE STRAND	IN		
1	2	4	1	1	1	40	105705-01	CONN PIN FORMED	EA		
19	3	3	11	19	N	39	653-2612	PIN,CONNECTOR	↑	NOTE 2	
2	2	2	2	2	2	38	650-2230	HEAT SINK			
2	2	2	2	2	2	37	200-2219	TRANSISTOR		Q2,3	2N2219A
2	2	2	2	2	2	36	200-3568	TRANSISTOR		Q1,4	2N3568
6	6	6	6	6	6	35	116-2212	RESISTOR		R48,49,54,55,59,60	220Ω ½W 2%
6	6	6	6	6	6	34	↓ 2432	↑		R46,47,51,52,57,58	2.7K
2	2	2	2	2	2	33	4712			R43,44	470Ω
3	1	1	3	3	3	32	6812			SEE VERSION TABLE	680Ω
2	2	2	2	2	4	31	116-1022	RESISTOR		R13,17	1K ½W 2%
3	1	1	1	1	1	30	130-2215	CAPACITOR		SEE VERSION TABLE	22pf
2	2	2	2	2	2	29	101-1005	RESISTOR		R32,33	10Ω ½W 5%
4	4	4	4	4	4	28	↓ 2725	↑		R27,36,53,9	2.7K
3	3	3	3	3	3	27	6825			R25,63,64	6.8K
1		1		1		26	2205	↓		R24	22Ω
2	2	2	2	2	2	25	101-1535	RESISTOR		R22,37	15K ½W 5%
2	2	2	2	2	2	24	137-4720	CAPACITOR		C56	.0047μf
4	4	4	4	4	4	23	101-4725	RESISTOR		R20,28,2,3	4.7K ½W 5%
4	3	5	3	5	5	22	↓ 2215	↑		SEE VERSION TABLE	220Ω
2	2	2	2	2	2	21	1025			R16,23	1K
6	6	6	6	6	6	20	101-4705			R19,15,40,41,45,50	47Ω ½W 5%
1		1		1		19	102-4715	↓		R10	470Ω 1W 5%
8	8	8	8	8	8	18	101-4715	RESISTOR		R67,9,11,12,38,39,65	470Ω ½W 5%
2	2	2	2	2	2	17	515-1951	FERRITE BEAD			
5	5	5	5	5	5	16	101-1035	RESISTOR		R1,45,30,31	10K ½W 5%
3	3	3	3	3	3	15	515-1015	INDUCTOR		L4,5,6	100 μh
1	1	1		1		14	515-6805	INDUCTOR		L2	68 μh
—	2	2	2	2	2	13	515-3305	INDUCTOR		L1,3	33 μh
4	4	4	4	4	4	12	700-3046	INTEGRATED CKT		IC2-5	RCA 3046
1	1	1	1	1	1	11	700-5733	INTEGRATED CKT		IC1	733 C
3	3	3	3	3	3	10	331-0605	DIODE		CR5,6,7	IN5233B
24	14	24	14	24	14	9	300-1702	DIODE		CR1-4,8-27	GE DA1702
2	2	2	2	2	2	8	139-6845	CAPACITOR		C22,24	6.8μf @ 35V
—	—	—	—	—	1	7	130-1005	↑		C25	10 pf
—	1	1	1	1	1	6	3015			C11	300 pf
2	2	2	2	2	2	5	5605			SEE VERSION TABLE	56 pf
4	4	4	4	4	3	4	4305			SEE VERSION TABLE	43 pf
—	2	2	2	2	2	3	130-6805	↓		C8,9	68 pf
14	14	14	14	14	14	2	135-4742	CAPACITOR	↑	C1,4, 13-21,23,27,28	.47μf
1		1		1	1	1	106046-01	BD ETCHED & DR	EA		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: SPIO

SIGNATURES	DA	MO	YR
DRAWN	6	7	70
CHECKED			
ENG.	14	4	71
MFG.	20	4	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: RA/WD/A ASM

MATL:
FINISH:

SIZE D | DWG NO. 106045 | REV D

SCALE: 2/1 | SHEET 1 | CONT. ON 2

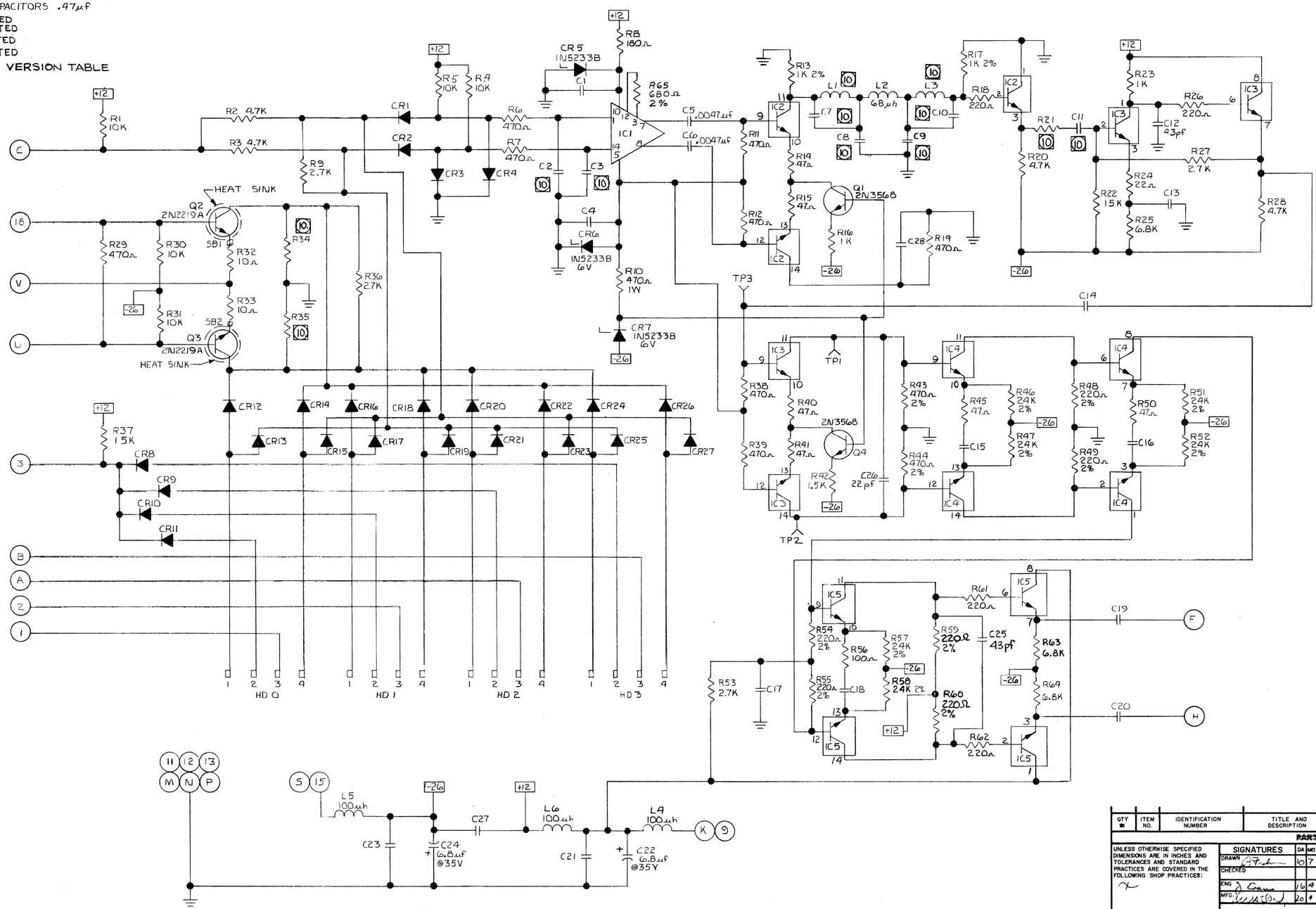
PERTEC PERIPHERAL EQUIPMENT

CMD103

DWG NO. 106045

NOTES: UNLESS OTHERWISE SPECIFIED
1. CHARACTORS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL RESISTORS 1/2 W 5%
4. ALL DIODES GE DA1702
5. ALL CAPACITORS .47μf
6. DELETED
7. DELETED
8. DELETED
9. DELETED
10. SEE VERSION TABLE

REVISIONS		
REV.	C.O. NO.	DATE
–	SEE SHEET 1	



VERSION TABLE			
COMP	-02	-04	-06
R21	220Ω	220Ω	330Ω
R34	680Ω 2%	OMIT	680Ω 2%
R35	680Ω 2%	OMIT	680Ω 2%
C2	43 Pf	43 Pf	22 Pf
C3	43 Pf	43 Pf	22 Pf
C7	56 Pf	56 Pf	43 Pf
C8	68 Pf	68 Pf	56 Pf
C9	68 Pf	68 Pf	56 Pf
C10	56 Pf	56 Pf	43 Pf
C11	300 Pf	300 Pf	150 Pf
L1	33μh	33μh	29 μh
L3	33μh	33μh	29 μh

PERTEC PERIPHERAL EQUIPMENT

QTY ea	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
PARTS LIST					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	10	7	70
CHECKED			
ENG	16	4	71
MFG:	20	1	71

MATL:
FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: RA/WD/A SCH

SIZE D | DWG NO. 106045 | REV D

SCALE: | SHEET 2 | CONT. ON

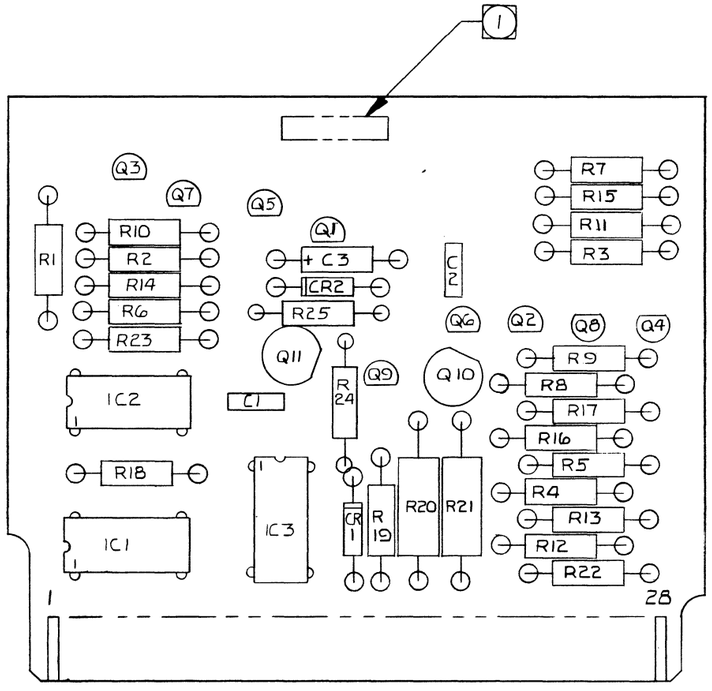
CMD103

DWG NO. 105737

NOTES:

(1) RUBBER STAMP PART NO. 105737-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	7-22-70
A1	REC CHG CMD P/N WAS 100000737	7-9-71
B	ECN 2770	12-21-71 E.I.NO



QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
2	17	102-1325	RESISTOR	EA	R20,21 1.3K 1W 5%
1	16	101-1825			R24 1.8K ½W 5%
2	15	5625			R22,25 5.6K
2	14	1025			R18,19 1K
5	13	1035			R5,9,13,17,23, 10K
8	12	3925			R3,4,7,8,11,12,15,16 3.9K
4	11	2215			R2,6,10,14 220Ω
1	10	101-4705	RESISTOR		R1 47Ω ½W 5%
2	9	200-3568	TRANSISTOR		Q10,11 2N3568
9	8	200-4402	TRANSISTOR		Q1 THRU 9 2N4402
1	7	700-8460	INTEGRATED CIRCUIT		IC3 QUAD-2
2	6	700-8360	INTEGRATED CIRCUIT		IC1,2 HEX INV
1	5	300-9140	DIODE		CR2 IN914A
1	4	331-0605	DIODE		CR1 IN5233B
1	3	139-1055	CAPACITOR		C3 .1μf @35V
2	2	135-4742	CAPACITOR		C1,2 .47μf
1	1	105738-01	BD ETCHED & DR	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SPIO

MATL:

FINISH:

SIGNATURES	DA	MO	YR
DRAWN	24	6	70
CHECKED			
ENG	21	7	70
MFG	22	7	70

G-21

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: EAHS ASM

SIZE C | DWG NO. 105737 | REV B

SCALE: 2/1 | SHEET 1 | CONT. ON 2

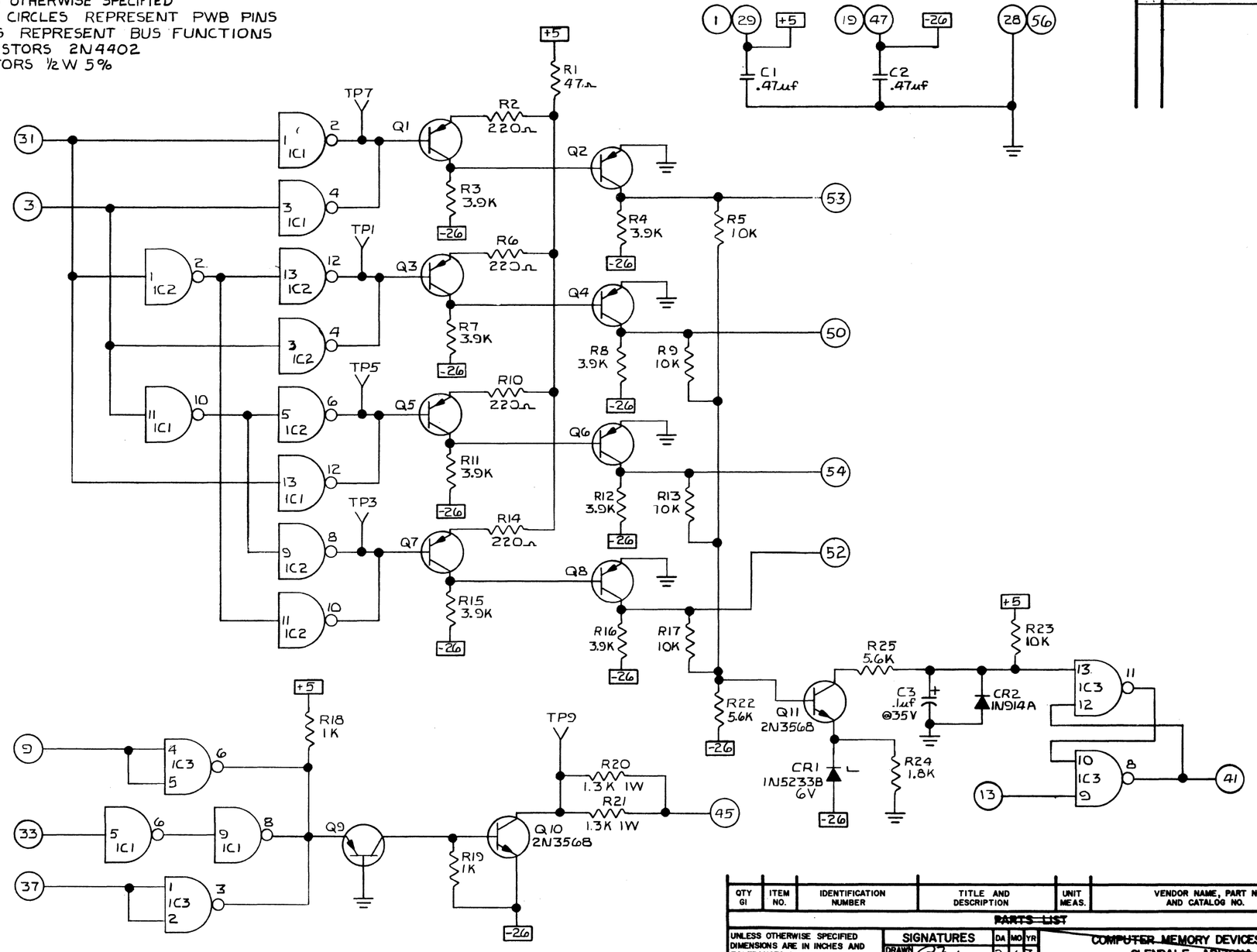
PERTEC PERIPHERAL EQUIPMENT

CMD102

DWG NO. 105737

NOTES: UNLESS OTHERWISE SPECIFIED
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL TRANSISTORS 2N4402
4. ALL RESISTORS ½W 5%

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	



QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
			PARTS LIST		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	20	6	70
CHECKED			
ENG.	21	7	70
MFG.	22	7	70

G-23

MATL:

FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: EAHS SCH

SIZE C | DWG NO. 105737 | REV B.

SCALE: ~ | SHEET 2 | CONT. ON F

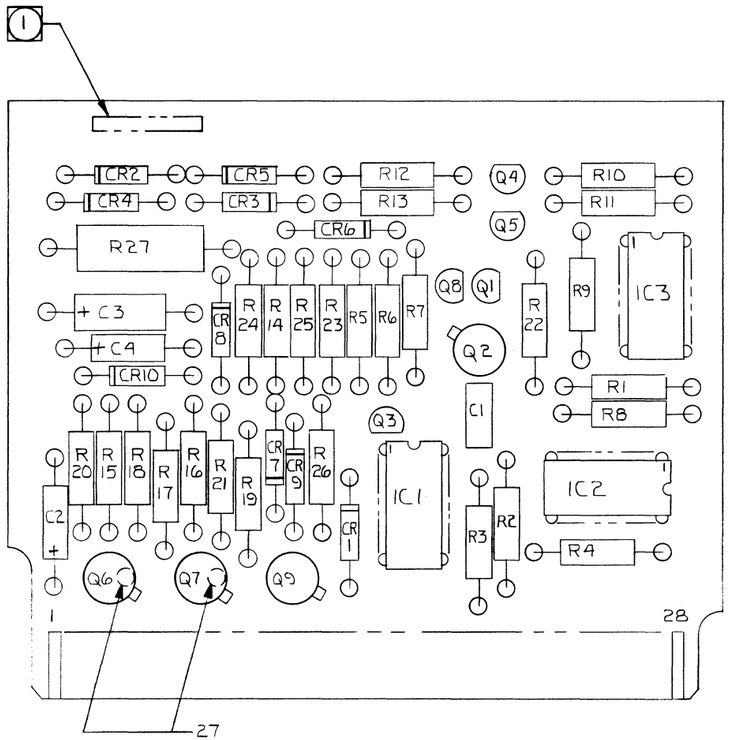
PERTEC PERIPHERAL EQUIPMENT

CMD102

DWG NO. 106088

NOTES:
(1) RUBBER STAMP PART NO. 106088 INCLUDING VERSION NO. AND LATEST REV. LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	5-10-71
A1	REC CHG CMD P/N WAS 10C001088	7-9-71
B	ECN 2948	12-20-71
C	ECN 2970	12-22-71



QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
2	2	27	515-1951	BEAD, FERRITE	EA	SB1,2	
2	2	26	101-3305	RESISTOR		R17,19	33Ω 1/2W 5%
3	3	25	200-3569	TRANSISTOR		Q6,7,9	2N3569
1	1	24	200-5568	TRANSISTOR		Q2	2N3568
4	5	23	200-4402	TRANSISTOR		Q1,3,4,5 & Q8 IN G1	2N4402
1	—	22	116-1112	RESISTOR		R26	110Ω 1/2W 2%
—	1	21	116-1212	↑		R26	120Ω
1	1	20	1022	↑		R25	1.0K
1	1	19	4712	↑		R24	470Ω
—	1	18	116-1322	↑		R23	1.3K 1/2W 2%
1	1	17	103-4715	↑		R27	470Ω 2W 5%
4	4	16	101-1015	↑		R10,11,15,16	100Ω 1/2W 5%
4	5	15	4715	↑		R7,8,14,20 & R22 IN G1	470Ω
1	1	14	2205	↑		R6	22Ω
1	1	13	4705	↑		R5	47Ω
9	9	12	101-1525	RESISTOR		R1,2,3,4,9,12,13,18,21	1.5 K 1/2W 5%
1	1	11	700-3062	INTEGRATED CKT		IC3	TTL DUAL JK-FF
1	1	10	700-8460	INTEGRATED CKT		IC2	DTL QUAD 2
1	1	9	700-8360	INTEGRATED CKT		IC1	DTL HEX INV
1	1	8	330-0755	DIODE		CR10	IM7.5Z52
1	2	7	300-1702	↑		CR9 & CR8 IN G1	DA1702
6	6	6	300-9140	↑		CR2 THRU 7	IN914A
1	1	5	331-0335	DIODE		CR1	IN5226B
1	1	4	139-6845	CAPACITOR		C3	6.8μf @ 35V
2	2	3	139-3343	CAPACITOR		C2,4	3.3μf @ 15V
1	1	2	130-1015	CAPACITOR		C1	100 pf
1	1	1	106089-01	BD ETCHED & DR	EA		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: SP10

SIGNATURES	DA	MO	YR
DRAWN	22	3	71
CHECKED			
ENG.	10	5	71
MFG.	11	5	71

MATL: ——
FINISH: ——

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: WAMP/B ASM

SIZE C | DWG NO. 106088 | REV C

SCALE: 2/1 | SHEET 1 | CONT. ON 2

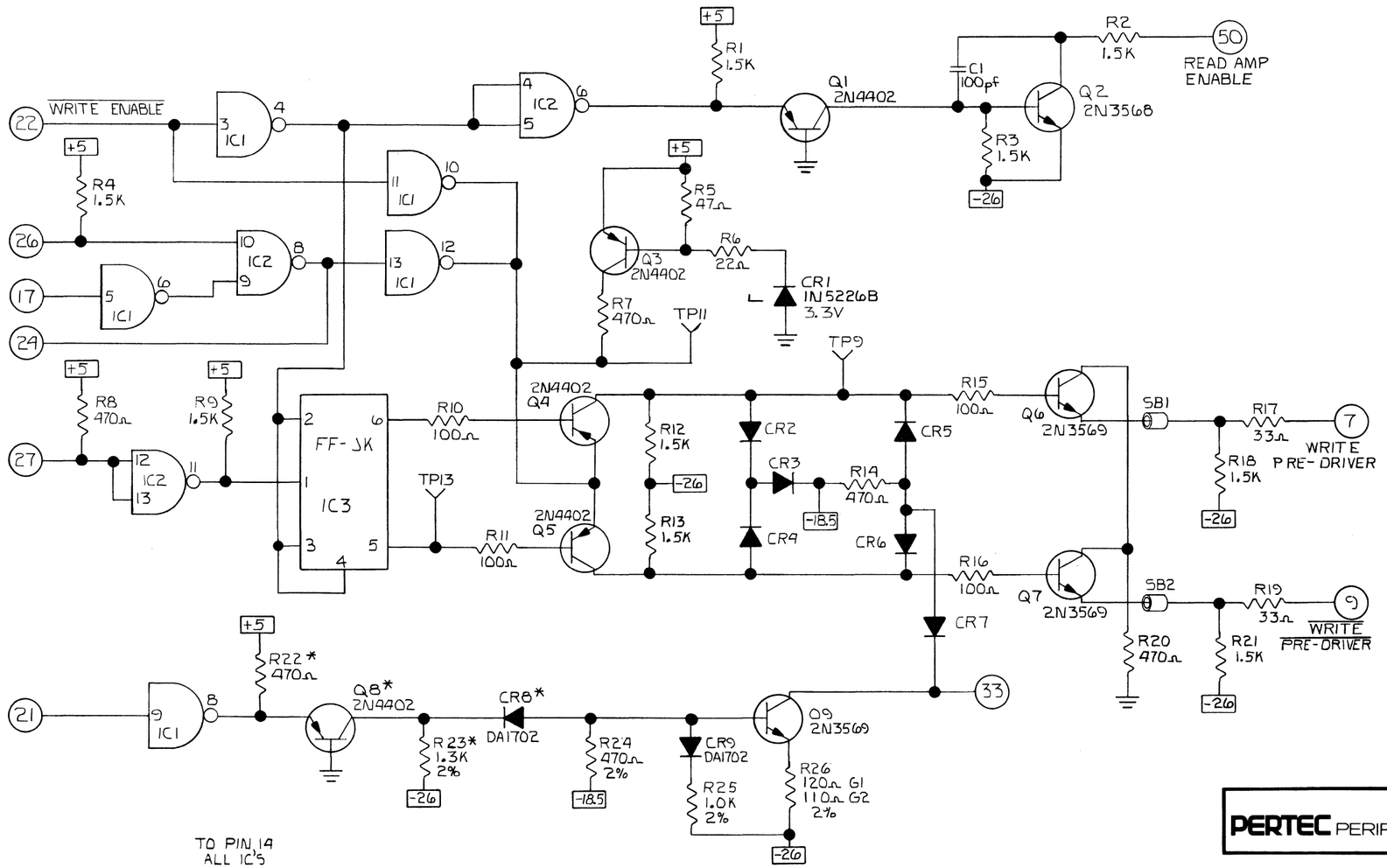
PERTEC PERIPHERAL EQUIPMENT

CMD102

DWG NO. 106088

REVISIONS		
REV	C.O. NO.	DATE
—	SEE SHEET 1	

NOTES: UNLESS OTHERWISE SPECIFIED
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL RESISTORS 1/2W 5%
4. ALL DIODES IN914A
5. * INDICATES COMPONENTS INSTALLED IN G1 ONLY



PERTEC PERIPHERAL EQUIPMENT

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

MATL:

FINISH:

SIGNATURES	DA	MO	YR
DRAWN	18	3	71
CHECKED			
ENG.	10	5	71
MFG.	9	5	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: WAMP/B SCH

SIZE	DWG NO.	REV
C	106088	C

SCALE: —— SHEET 2 CONT. ON F

CMD102

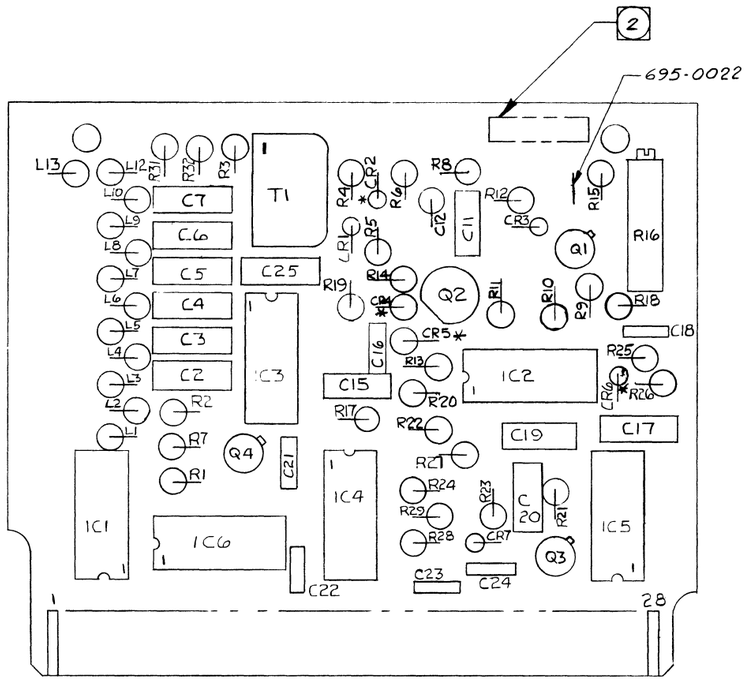
DWG NO. 105774

NOTES:

1. ¥ INDICATES DIODE MOUNTED CATHODE UP.
2. RUBBER STAMP PART NO. 105774 INCLUDING VERSION NO. AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
F	ECN 3264A	2-21-72 G.BREITO

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	12-22-70
B	456	12-23-70
B_1	REC CHG CMD P/N WAS 10C000774	7-9-71
C	000488	7-23-71
C_1	REC CHG - ADDED GROUP -02	7-26-71
D	ECN 2995A	10-12-71
E	ECN 2970	12-27-71 C.LIND



QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
1	1	42	100-3325	RESISTOR	EA	R19	3.3K 1/4W 5%
A/R	A/R	41	695-0022	WIRE, #24 SOLID			
2	2	40	100-1015	RESISTOR	EA	R10,11	100Ω 1/4W 5%
1	—	39	130-1015	CAPACITOR	EA	C17	100 Pf
1	—	38	131-1020	CAPACITOR	EA	C12	.001 uf
1	1	37	100-1815	RESISTOR	EA	R8	180Ω 1/4W 5%
(2)	1	36	130-7515	CAPACITOR	EA	C11, ~~(C11 -02 ONLY)~~	750 Pf
2	2	35	101-2725	RESISTOR		R13,32	2.7K 1/2W 5%
1	1	34	101-3925	RESISTOR		R12	3.9K 1/2W 5%
1	1	33	511-3261	TRANSFORMER		T1 TECHNITROL 11KGB	
2	2	32	130-2215	CAPACITOR		C19, 20	22 Pf
1	1	31	200-3568	TRANSISTOR		Q2	2N3568
2	2	30	200-3640	TRANSISTOR		Q1, 3	2N3640
1	1	29	125-2022	RESISTOR, ADJ		R16	2K ADJ
1	1	28	116-1022			R25	1K 1/2W 2%
1	1	27	116-4712			R26	470Ω 1/2W 2%
3	3	26	101-2235			R22,24,17	22K 1/2W 5%
1	1	25	4705			R2	47Ω 1/2W 5%
4	4	24	1525			R28,29,14,27	1.5K 1/2W 5%
1	1	23	1005			R7	10Ω 1/2W 5%
2	2	22	4715			R1,15	470Ω 1/2W 5%
2	2	21	1025			R21,23	1K
2	2	20	2225			R4,20	2.2K
3	3	19	2215			R3,9,18	220Ω
1	1	18	101-1215			R31	12.0Ω 1/2W 5%
2	2	17	104-1001	RESISTOR		R5,6	1K 1/4W 1%
12	12	16	515-0820	INDUCTOR		L1 THRU 10,12,13	.82μh
1	1	15	200-3646	TRANSISTOR		Q4	2N3646
1	1	14	400-7271	INTEGRATED CIRCUIT		IC5	710C
2	2	13	700-3062			IC4,6	DUAL J K FF
1	1	12	700-7412			IC3	ONE SHOT
1	1	11	700-3046			IC2	RCA 3046
1	1	10	700-3002	INTEGRATED CIRCUIT		IC1	QUAD 2 NOR
2	2	9	331-0605	DIODE		CR5,7	IN5233B
5	5	8	300-1702	DIODE		CR1,2,3,4,6	DA1702
6	6	7	135-4742	CAPACITOR		C 16,18,21,22,23,24	.47 μf
—	1	6	131-1520			C12	.0015 μf
—	1	5	130-2015			C17	200 pf
6	6	4	1315			C2THRU7	130pf
1	1	3	3015			C15	300 pf
1	1	2	130-4305	CAPACITOR		C25	43 pf
1	1	1	105775-01	BD ETCHED & DR	EA		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
SP10

MATL:
FINISH:

SIGNATURES	DA	MO	YR
DRAWN	20	4	70
CHECKED			
ENG.	21	12	73
MFG.	21	12	73

G 21

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: PLLD ASM

SIZE C | DWG NO. 105774 | REV F

SCALE: 2/1 | SHEET 1 | CONT. ON 2

PERTEC PERIPHERAL EQUIPMENT

CMD102

DWG NO. 105774

NOTES: UNLESS OTHERWISE SPECIFIED
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL RESISTORS ½W 5%
4. ALL DIODES DA1702

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	

+5 R1 470Ω Q4 2N3646 R7 10Ω L1 .82uh IC1 9 8 10
C2 130pf L2 .82uh C3 130pf L3 .82uh C4 130pf L4 .82uh C5 130pf L5 .82uh C6 130pf L6 .82uh C7 130pf L7 .82uh R31 120Ω L8 .82uh L9 .82uh L10 .82uh L12 .82uh L13 .82uh TP1 R32 2.7K -26

32 RAW DATA TP3 R2 47Ω IC1 6 4 5
T1 CR1 R5 1K 1/4W 1% R4 2.2K CR2 R6 1K 1/4W 1% C25 43pf R3 220Ω
-02 C12 .001uf -01 C12 .0015 Mf C11 750 Pf R8 180Ω 1/4W 5%
+12 R12 3.9K CR3 Q1 2N3640 TP13 R15 470Ω +12 R16 2K +5 R17 22K C15 300pf
R9 220Ω IC2 R10 100Ω 1/4W 5% R11 100Ω 1/4W 5% Q2 2N3568 CR4 R13 27K CR5 IN 5233B 6V R14 1.5K -26
TP6 +12 R18 220Ω C16 .47uf R19 3.3K 1/4W 5% R20 2.2K -26
-02 C17 100Pf -01 C17 200pf C18 .47uf IC2 R24 22K -26
C20 22pf R23 1K +12 R27 1.5K IC5 Q3 2N3640 -6
C19 22pf R21 1K CR6 +12 R25 1K 2% R26 470Ω 2% R22 22K -26
TO PIN 14 IC'S 1,3,4 & 6

R1 R2 IC1 12 13 11 2 1 3 31
+5 SS IC3 TP8 FF JK IC4 FF JK IC6
+5 FF JK IC4 FF JK IC6

34 DELAYED DATA
37 STRETCHED ONES
7 $\overline{\text{VFO}}$
9 ZEROES FF
8 $\overline{\text{ZEROES FF}}$
36 ZEROES FF RESET

1 29 +5 C21 .47µf 11 39 +12 C22 .47µf 19 47 -26 C23 .47µf R28 1.5K R29 1.5K -6 C24 .47µf CR7 IN5233B 6V 27 28 55 56
TO PIN 7 IC'S 1,3,4 & 6

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
		~~PARTS LIST~~			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	20	4	70
CHECKED			
ENG: G23	2	9	70
MFG	2	9	70

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: PLLD SCH

PERTEC PERIPHERAL EQUIPMENT

MATL:
FINISH:

SIZE	DWG NO.	REV
C	105774	F G
SCALE:	SHEET 2	CONT. ON

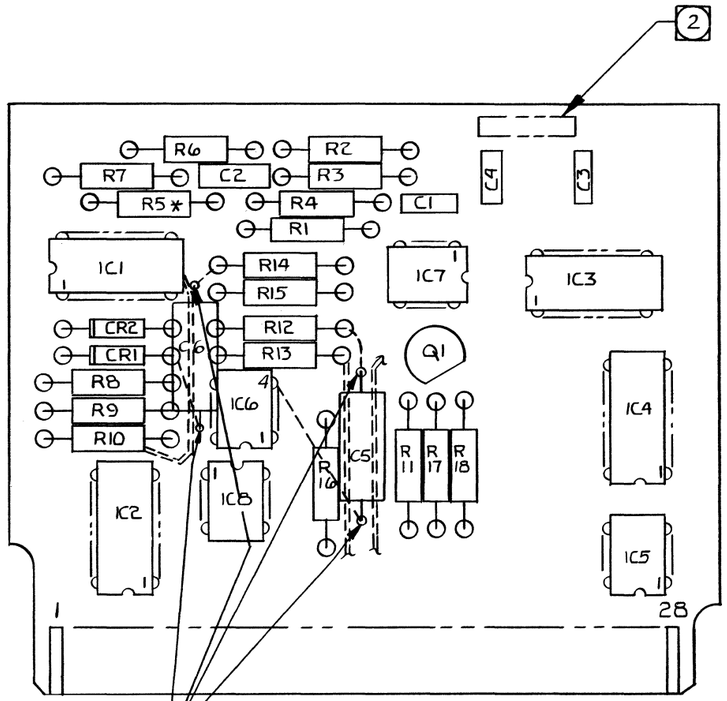
CMD102

DWG NO. 106006

NOTES:

1. * NOT USED G1.
2. RUBBER STAMP PART NO. 106006-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.
3. INSERT LEADS OF C5 & C6 (ITEM 16) THRU .031 DIA HOLES. SLEEVE LEADS USING ITEM 17. SOLDER LEADS OF C6 TO JUNCTION OF R14 & R15 AND TO CR1 & CR2 ANODE JUNCTION, SOLDER LEADS OF C5 TO IC6-4 AND TO JUNCTION OF R12 & R13 ON CIRCUIT SIDE.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A1	REC CHG CMD P/N WAS 10CD01006	7-9-71
B	ECN 2970	12/30/71 C.LIND
C	ECN 3761	6-5-72 JC
D	ECN 3894	7-6-72 JC
E	ECN 4092	9-13-72 JC



A/R	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
3	24	695-0022	WIRE #22	IN		
3	23	668-7717	INSULATOR	EA	Q3,5,1	
1	22	100-2215	RESISTOR	EA	R15	220Ω ¼W 5%
2	21	100-3315	RESISTOR	EA	R12,14	330Ω ¼W 5%
1	20	103-3305	RESISTOR	EA	R13	33Ω 2W 5%
2	19	200-4123	TRANSISTOR	EA	Q2,4	2N4123
2	18	200-5321	TRANSISTOR	EA	Q3.5	2N5321
AR	17	669-0122	SLEEVING	IN		22 GAUGE
	16					
1	15	101-6815	RESISTOR	EA	R16	680Ω ½W 5%
1	14	200-3567	TRANSISTOR	EA	Q1	2N3567
	13					
3	12	1525		EA	R8,9,10,	1.5K
3	11	4725			R6,7,3	4.7K
2	10	6805			R17,18	68Ω
4	9	101-4715	RESISTOR		R1,2,4,11	470Ω ½W 5%
2	8	300-9140	DIODE		CR1,2	IN914A
4	7	700-7545	INTEGRATED CKT		IC5,6,7,8	TTL DUAL DR
1	6	700-8460			IC4	DTL QUAD 2
2	5	700-8360			IC2,3	DTL HEX INV
1	4	700-3046	INTEGRATED CKT		IC1	
1	3	130-2015	CAPACITOR		C2	200pf
3	2	135-4742	CAPACITOR		C1,3,4	.47μf
1	1	106007-01	BD ETCHED & DR	EA		

QTY -01

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
~~SP10~~
101491

SIGNATURES	DA	MO	YR
DRAWN G Frahm	30	12	70
CHECKED			
ENG. D Stabler	20	4	71
MFG. T [illegible]	20	4	71

Q 21

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: DFDR ASM

SIZE C | DWG NO. 106006 | REV E

SCALE: 2/1 | SHEET 1 | CONT. ON 2

MATL:

FINISH:

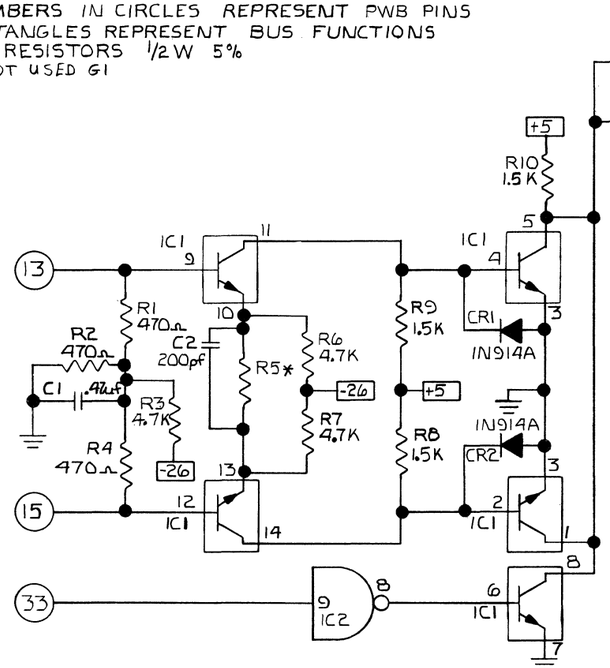
PERTEC PERIPHERAL EQUIPMENT

CMD102

DWG NO. 106006

NOTES: UNLESS OTHERWISE SPECIFIED
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL RESISTORS 1/2W 5%
4. * NOT USED GI

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	



PERTEC PERIPHERAL EQUIPMENT

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
PARTS LIST					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	29	12	70
CHECKED			
ENG. Dan Stabler	30	4	71
MFG. [illegible]	20	4	71

Q 23.

MATL:

FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE:
DFDR SCH
(RAW DATA FORMER & DRIVER PWB)

SIZE	DWG NO.	REV
C	106006	E

SCALE: SHEET 2 CONT. ON F

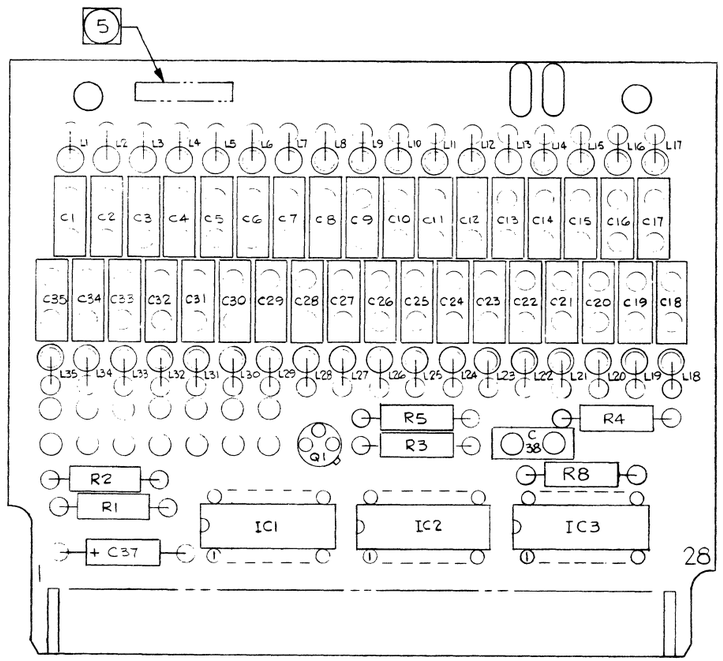
CMD102

DWG NO. 105197

NOTES:

1. DELETED
2. DELETED
3. DELETED
4. SHALL CONFORM TO SPIO EXCEPT MAXIMUM COMPONENT HEIGHT TO BE .50
5. RUBBER STAMP PART NO. 105197-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4/9/67
B	000045	6/4/69
B1	REC CHG, ADD COLOR CODE BLOCK & NOTE	6-20-69 (4)
B_2	REC CHG ADD TOL DIST TO P/N ITEM 4	10-3-69 (3)
C	000253	11-28-69
C_1	REC CHG ADDED NOTE 4	1-14-70 D
D	000311	3-19-70
E	000471	6-22-71 A.J.L
E_1	REC CHG CMD P/N WAS 10C000197	7-9-71
F	ECN 2946	12-16-71
G	ECN 2970	CANCONS



QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
1	17	700-7412	INTEGRATED CIRCUIT	EA	IC3 T.I. SN74122N
~~REF~~	~~16~~	~~10C000117~~	~~DDBD SCH~~		
~~1~~	~~15~~	~~20C000012P1823~~	~~RESISTOR~~	~~EA~~	~~R7 1.8K 1/2W 5%~~
~~1~~	~~14~~	~~" P4723~~	~~"~~	~~"~~	~~R6 4.7K~~
2	13	101-1235			R4,R8 12K
2	12	2215			R3,R5 220Ω
1	11	3315			R2 330Ω
1	10	101-1525	RESISTOR		R1 1.5K 1/2W 5%
~~2~~	~~9~~	~~20B000125 P1~~	~~TRANSISTOR~~		~~Q2,Q3 2N3640~~
1	8	200-3646	TRANSISTOR		Q1 2N3646
2	7	700-7400	INTEGRATED CIRCUIT		IC1,IC2 T.I. SN7400
~~35~~	6	515-0474	INDUCTOR		L1 THRU L35 4.7 UH
~~3~~	5	~~CR8000004P1~~	~~DIODE~~		~~CR1,CR2,CR3 1N914A~~
1	4	139-3343	CAPACITOR		C37 3.3uF 15V
~~1~~	~~3~~	~~20C000002P1031~~	~~CAPACITOR~~		~~C36 100 PF~~
36	2	130-4305	CAPACITOR		C1 THRU C35, C38 43 PF
1	1	105030-01	ETCHED BOARD	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SPIO
SEE NOTE 4

MATL:

FINISH:

SIGNATURES			
DRAWN		3	3	67
CHECKED				
ENG.		9	4	68
MFG.		9	4	68

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: DDBD ASM

SIZE C | DWG NO. 105197 | REV G

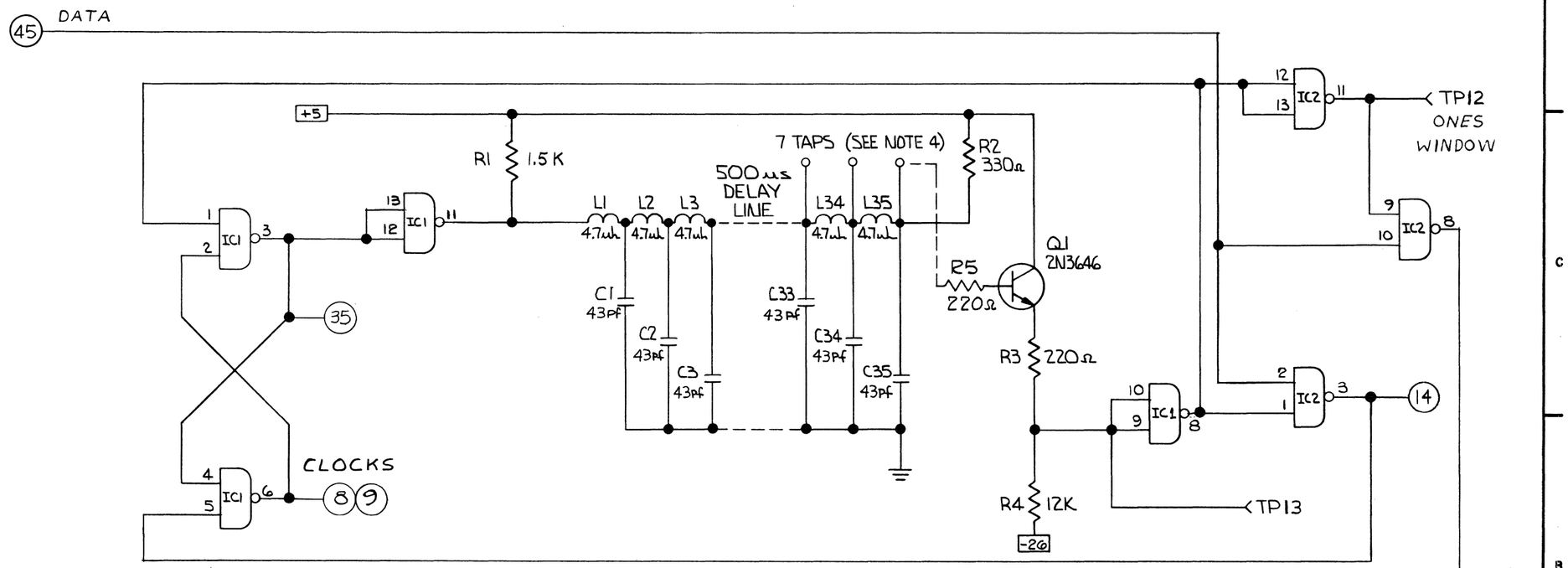
SCALE: 2-1 | SHEET 1 | CONT. ON 2

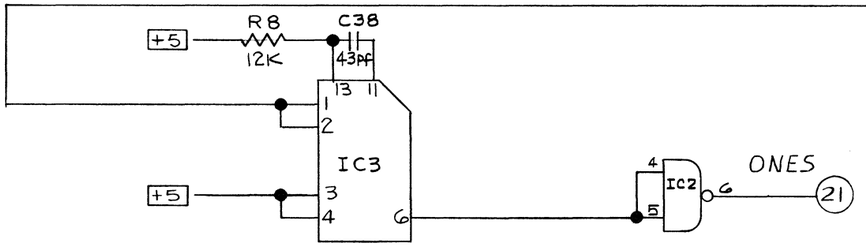
PERTEC PERIPHERAL EQUIPMENT

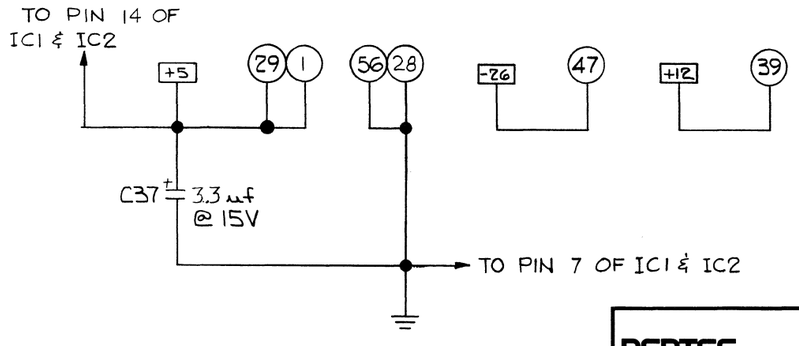
DWG NO. 105197

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS 1/2W ±5%
2. NUMBERS IN CIRCLES REPRESENT PINS.
3. RECTANGLES REPRESENT BUS FUNCTION.
4. SELECT TAP TO GIVE PROPER TIMING AS DESCRIBED IN TEST SPEC #

REVISIONS		
REV	C.O. NO.	DATE
–	SEE SHEET 1	







QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

~~PARTS LIST~~

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: ~

SIGNATURES	DA	MO	YR
DRAWN D. Williams	5	11	68
CHECKED			
ENG. O. Evans	9	4	69
MFG. G. Fisher	9	4	69

MATL: ~
FINISH: ~

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: DATA DECODE SCHEMATIC

SIZE	DWG NO.	REV
C	105197	G

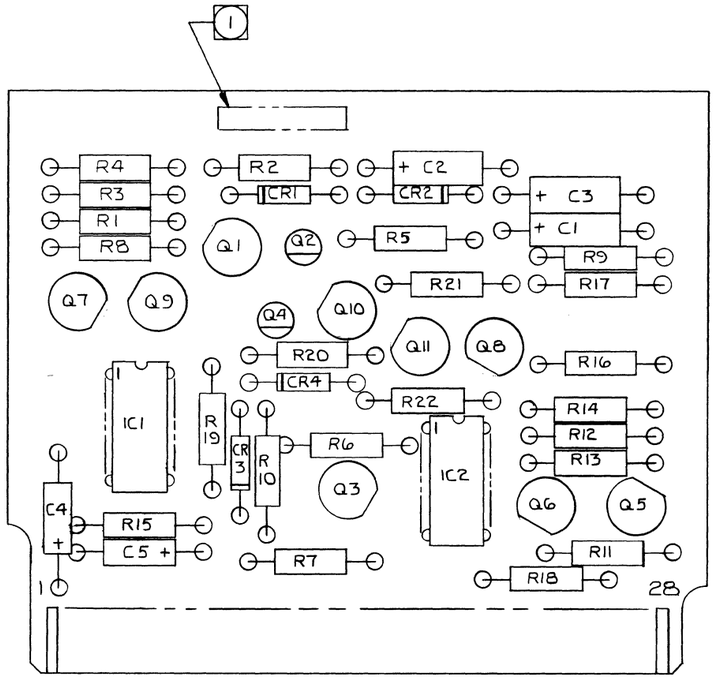
SCALE: NONE SHEET 2 CONT. ON F

DWG NO. 106076

NOTES:

(1) RUBBER STAMP PART NO. 106076-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A1	REC CHG CMD P/N WAS 106001076	7-9-71
B	ECN 2970	12-20-71 GK
C	ECN 3816 RCA	6-28-72



QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
1	—	17	139-8202	CAPACITOR	EA	C3 82µf @ 10V
2	2	16	203-1301	UNIJUNICTION	EA	Q2,4 GED13T1
9	9	15	200-3567	TRANSISTOR	↕	Q1,3,5 THRU 11 2N3567
1	1	19	101-2205	RESISTOR		R20 22Ω 1/2W 5%
2	2	13	↕ 4705	↕		R14,22 47Ω ↕
3	3	12	2225			R13,15,19 2.2K
1	1	11	1055			SEE VERSION TABLE 1M
7	7	10	4715			R6,7,11,12,16,18,21 470Ω
2	1	9	6845			SEE VERSION TABLE 680K
4	4	8	↓ 1015	↓		R2,5,10,17 100Ω ↓
3	3	7	101-4735	RESISTOR		R1,4,9 47K 1/2W 5%
2	2	6	700-8360	INTEGRATED CKT		IC1,2 HEX INV
1	1	5	331-0335	DIODE		CR4 IN5226B
3	3	4	300-9140	DIODE		CR1,2,3 IN914A
2	2	3	139-1045	CAPACITOR		C4,5 1µf @35V
2	3	2	139-3302	CAPACITOR	↓	SEE VERSION TABLE 33µf @10V
1	1	1	106077-01	BD ETCHED & DR	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: SP10

SIGNATURES	DA	MO	YR
DRAWN	9	2	71
CHECKED			
ENG. Don Stabler	20	9	71
MFG.	20	9	71

MATL: ———

FINISH: ———

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: DRBD/B ASM

SIZE C | DWG NO. 106076 | REV C

SCALE: 2/1 | SHEET 1 | CONT. ON 2

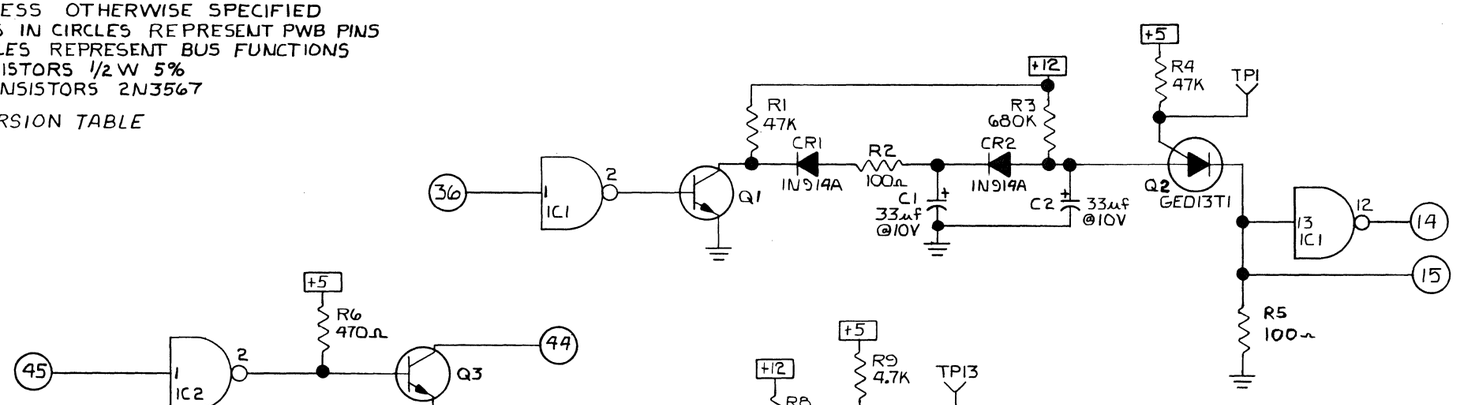
PERTEC PERIPHERAL EQUIPMENT

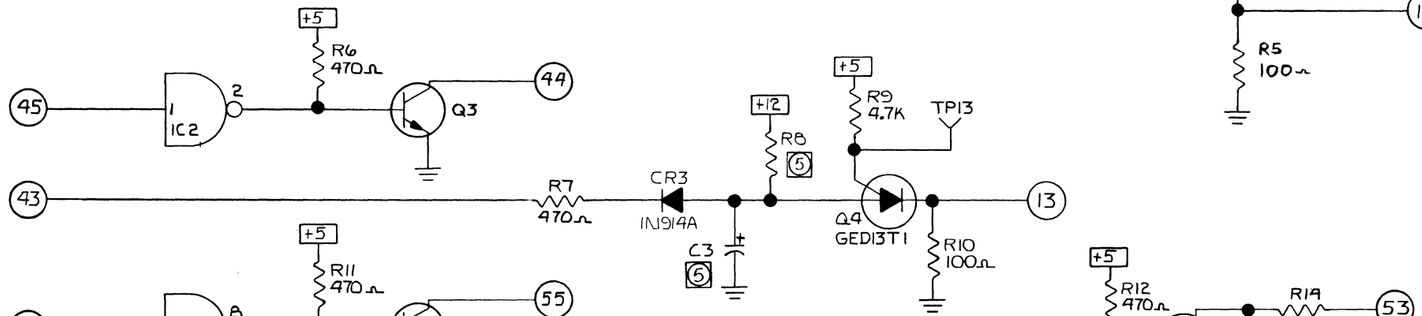
CMD102

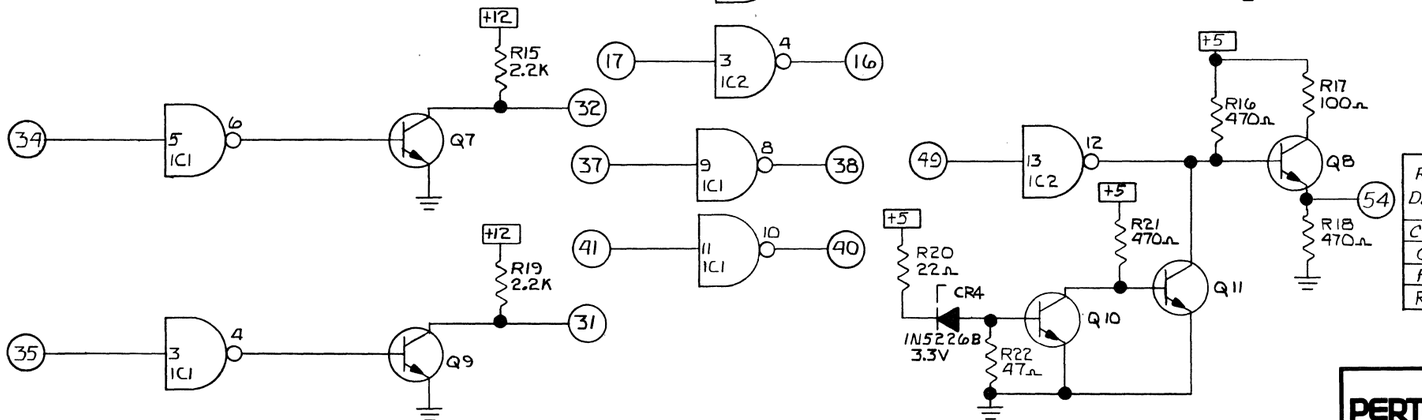
DWG NO. 106076

NOTES: UNLESS OTHERWISE SPECIFIED
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL RESISTORS 1/2 W 5%
4. ALL TRANSISTORS 2N3567
5. SEE VERSION TABLE

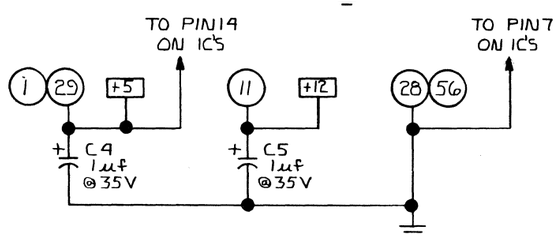
REVISIONS		
REV	C.O. NO.	DATE
—	SEE SHEET 1	







REF DESIG	VERSION TABLE -01 PART NO.	-01 VALUE	-02 PART NO	-02 VALUE
C1,2	139-3302	33uF	139-3302	33uF
C3	139-3302	33uF	139-8202	82uF
R3	101-6845	680K	101-6845	680K
R8	101-1055	1M	101-6845	680K



PERTEC PERIPHERAL EQUIPMENT

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: ———

SIGNATURES	DA	MO	YR
DRAWN B Fisher	3	2	71
CHECKED			
ENG. Don Stubley	30	4	71
MFG. M Watson	23	4	71

MATL: ———
FINISH: ———

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: DRBD/B SCH (DRIVER PWB)

SIZE	DWG NO.	REV
C	106076	C

SCALE: ——— SHEET 2 CONT. ON F

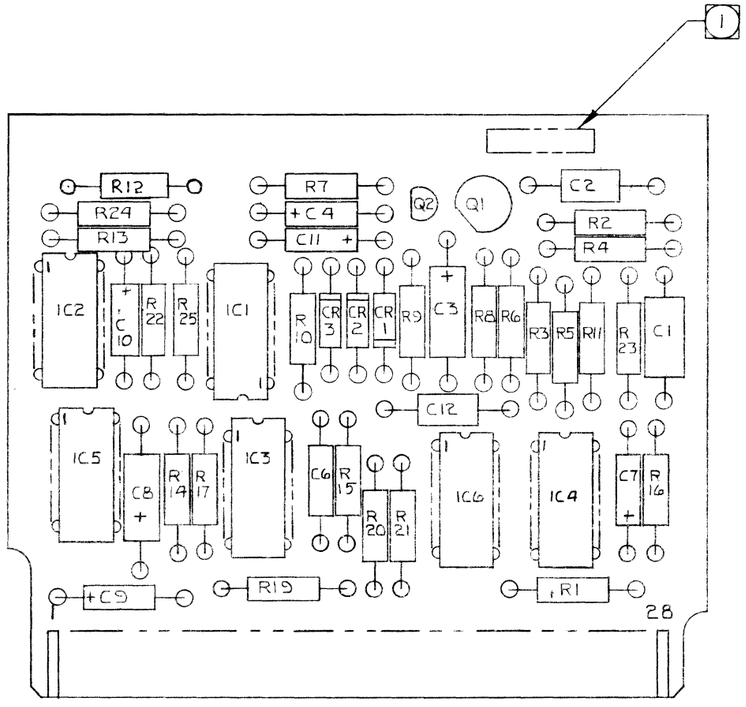
CMD102

DWG NO. 105987

NOTES:

(1) RUBBER STAMP PART NO. 105987 INCLUDING VERSION NO. AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A_1	REC CHG CMD P/N WAS 10C000987	7-9-71
A_2	REC CHG ADDED GROUP -02	7-26-71
B	ECN 2970	12/20/71 G.A.M.D



QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
1	—	25	101-1835	RESISTOR	EA	R16	18K ½W 5%
1	1	24	101-4725	RESISTOR	EA	R23	4.7K ½W 5%
2	2	23	101-1535	RESISTOR	EA	R19,15	15K ½W 5%
1	1	22	101-4735	RESISTOR	EA	R13,	47K ½W 5%
1	1	21	200-4402	TRANSISTOR	EA	Q2	2N4402
1	1	20	200-3638	TRANSISTOR	1	Q1	2N3638A
2	2	19	101-1525	RESISTOR	1	R 20,21,	1.5K ½W 5%
—	1	18	101-3335	1	1	R16	33K ½W 5%
1	1	17	116-2432	1	1	R17	24K ½W 2%
6	6	16	101-1025	1	1	R7,9,10,14,22,12	1 K ½W 5%
2	2	15	2725	1	1	R5,6,	2.7K 1
3	3	14	6835	1	1	R3,24,25	68K 1
1	1	13	8225	1	1	R2	8.2K 1
4	4	12	101-4715	RESISTOR	1	R1,4,8,11	470Ω ½W 5%
1	1	11	700-8460	INTEGRATED CKT	1	IC 6	QUAD 2
3	3	10	700-7412	INTEGRATED CKT	1	IC 3,4,5	RETRIG O.S.
2	2	9	400-7271	INTEGRATED CKT	1	IC1,2	710 C
1	1	8	331-0605	DIODE	1	CR 3	IN5233B
2	2	7	300-9140	DIODE	1	CR1,2,	IN914A
4	4	6	139-1045	CAPACITOR	1	C9,10,11,4,	1μf @35V
1	1	5	137-1530	1	1	C1	.015μf
1	1	4	139-1055	1	1	C7	.1μf @35V
2	2	3	139-6845	1	1	C3,8	6.8μf @35V
3	3	2	137-2220	CAPACITOR	1	C 2,12,6	.0022μf
1	1	1	105988-01	BD ETCHED & DR	EA		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: SP 10

SIGNATURES	DA	MO	YR
DRAWN	7	10	76
CHECKED			
ENG. Don Stables	30	4	71
MFG.	20	4	71

L-21

MATL:

FINISH:

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: SITB ASM

SIZE	DWG NO.	REV
C	105987	B

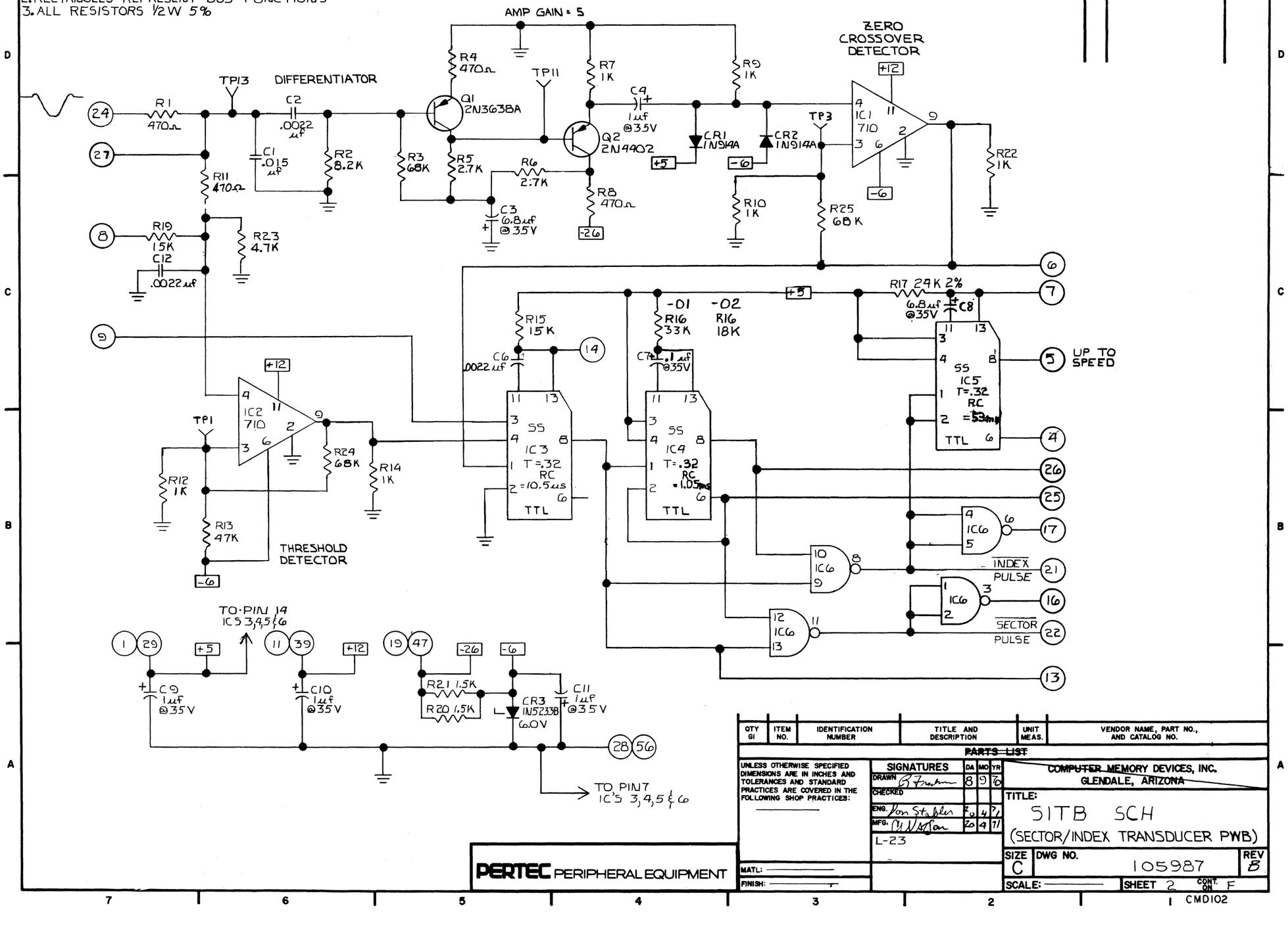
SCALE: 2/1 SHEET 1 CONT. ON 2

CMD102

DWG NO. 105987

NOTES: UNLESS OTHERWISE SPECIFIED
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. ALL RESISTORS 1/2W 5%

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	



QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN B Freeman	8	9	76
CHECKED			
ENG. Don Stahler	20	4	71
MFG. G Watson	20	4	71

L-23

MATL:

FINISH:

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: SITB SCH
(SECTOR/INDEX TRANSDUCER PWB)

SIZE	DWG NO.	REV
C	105987	B

SCALE: | SHEET 2 | CONT. ON F

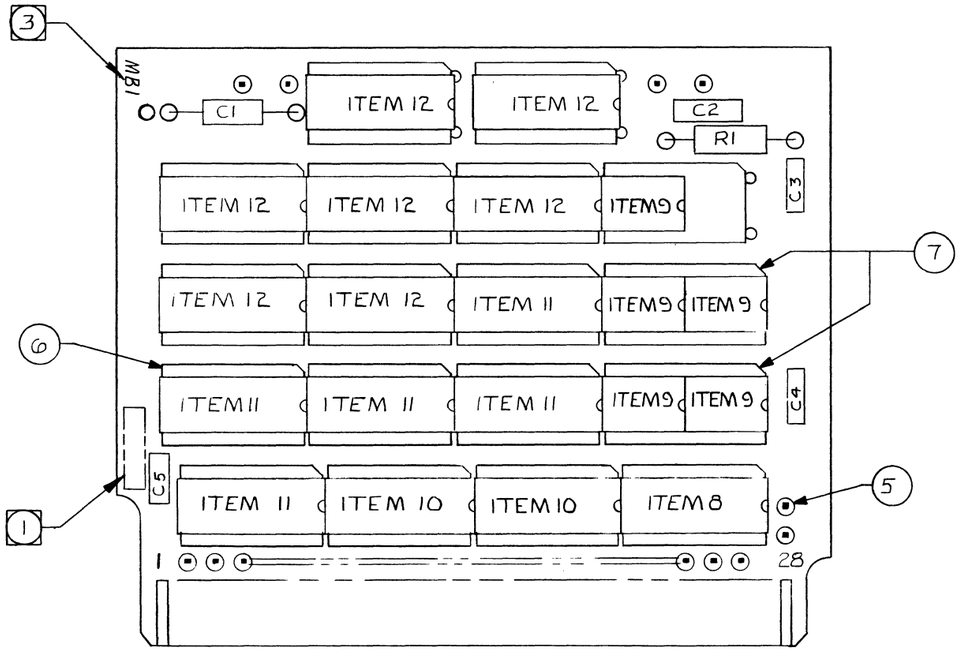
CMD102

DWG NO 106078

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A_1	REC CHG CMD P/N WAS 10C001078	7-9-71
B	ECN 2945A	10-12-71
C	ECN 2974	10-26-71
D	ECN 2970	12-20-71

NOTES:

1. RUBBER STAMP PART NO. 106078 INCLUDING VERSION NO. AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.
2. SOLDER FOUR CORNER PINS OF ITEMS 6 AND 7 TO ITEM 1.
3. RUBBER STAMP MB1 APPROX AS SHOWN.



QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
1	—	16	130-5605	CAPACITOR	EA	C2 56pf
X	X	15	106081-01	WIRE LIST, MB1	—	
400	400	14	691-5030	WIRE, SOLID	IN	
1	1	13	101-4725	RESISTOR	EA	R1 4.7 K ½W 5%
7	7	12	700-8560	INTEGRATED CKT	↕	DUAL JK-FF
5	5	11	700-8460	↕	↕	QUAD 2
2	2	10	700-8360	↕	↕	HEX INV
5	5	9	700-7545	↕	↕	DUAL DRIVER
1	1	8	700-7412	INTEGRATED CKT	↕	ONE SHOT
2	2	7	503-7613	CONNECTOR, IC	↕	16 PIN
16	16	6	503-8358	CONNECTOR, IC	↕	14 PIN
27	27	5	653-2611	PIN, CONNECTOR	↕	
3	3	4	135-4742	CAPACITOR	↕	C3,4,5 .47µf
—	1	3	130-1015	CAPACITOR	↕	C2 100pf
1	1	2	137-2220	CAPACITOR	↓	C1 .0022µf
1	1	1	105789-01	BD ETCHED & DR	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
SP05
SP10

MATL:
FINISH:

SIGNATURES	DA	MO	YR
DRAWN	9	2	71
CHECKED			
ENG. Don Stahler	20	4	71
MFG.	20	4	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MB1 ASM

SIZE C | DWG NO. 106078 | REV D

SCALE: 2/1 | SHEET 1 | CONT. ON 2

PERTEC PERIPHERAL EQUIPMENT

CMD102

DWG NO. 106078

NOTES:
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. NUMBERS IN PARENTHESIS INDICATE ETCHED BD PIN NOS. WHEN THEY DIFFER FROM IC PIN NOS.

PERTEC PERIPHERAL EQUIPMENT

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	

TOP SECTOR COUNTER

BOTTOM SECTOR COUNTER

27	
26	SECTOR COUNT 0 XMITTER
25	SECTOR COUNT 1 XMITTER
24	SECTOR COUNT 2 XMITTER
23	SECTOR COUNT 3 XMITTER
22	SECTOR COUNT 4 XMITTER
21	
20	SECTOR XMITTER
19	INDEX XMITTER
17	FILE ENABLED XMITTER
16	DATA ONE BIT
15	DATA CLOCK
14	HEAD SELECT ONE (TOP DISK)
13	FILE ENABLED
12	DATA CLOCK XMITTER
11	DATA XMITTER
9	DATE CLOCK ONE SHOT
8	INDEX BOTTOM DISK
7	SECTOR TOP DISK
6	SECTOR BOTTOM DISK
5	INDEX TOP DISK
4	HEAD SELECT ONE (TOP DISK)
3	READ SELECT
PIN NO.	NAME

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	8	2	71
CHECKED			
ENG.	20	4	71
MFG	20	4	71

MATL:

FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE:
MB 1 SCH
(MOTHER PWB 1)

SIZE	DWG NO.	REV
C	106078	D

SCALE: SHEET 2 CONT. ON F

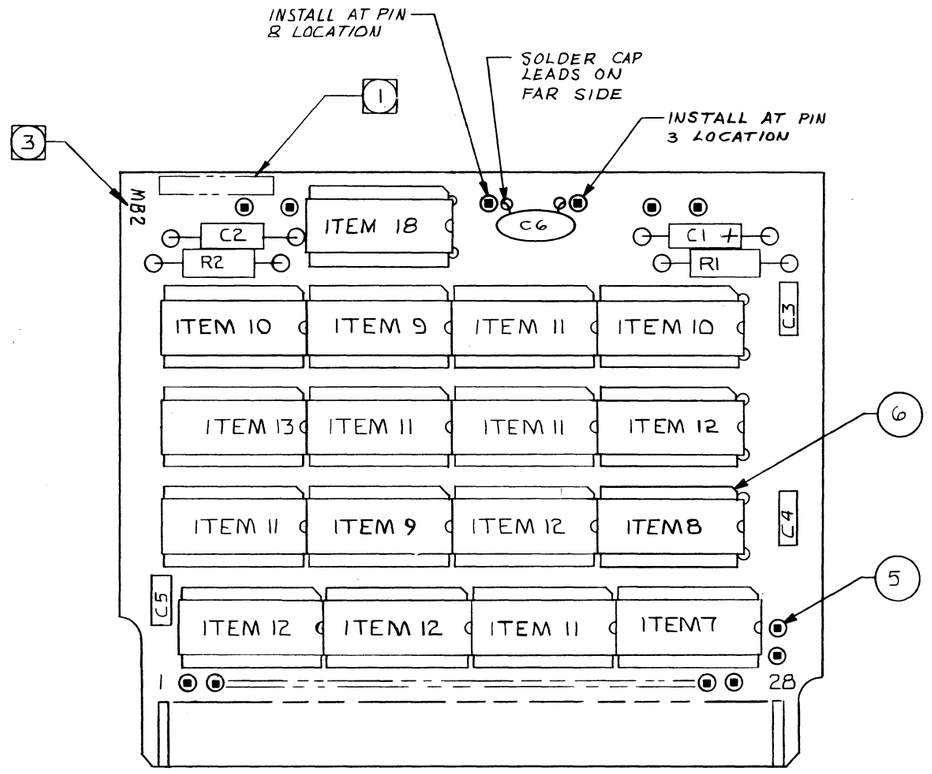
CMD102

DWG NO. 106079

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A_1	REC CHG CMD P/N WAS 10C001079	7-9-71
B	000499	8-13-71
C	ECN 2974	11-9-71
D	ECN 2970	12-20-71 & 1-10-72
E	ECN 3182A	2-23-72

NOTES:

1. RUBBER STAMP PART NO. 106079-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.
2. SOLDER FOUR CORNER PINS OF ITEM 6 TO ITEM 1.
3. RUBBER STAMP MB2 APPROX AS SHOWN.



QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
1	18	700-7420	INTEGRATED CKT	EA	TTL DUAL 4
1	17	130-5615	CAPACITOR	EA	C6 560Pf
X	16	106082-01	WIRE LIST	—	
401	15	691-5030	WIRE, SOLID	IN	
2	14	101-1535	RESISTOR	EA	R1,2 15K 1/2W 5%
1	13	700-8560	INTEGRATED CKT		DUAL JK-FF
4	12	700-8360			HEX INV
5	11	700-8460			QUAD 2
2	10	700-7412			ONE SHOT
2	9	700-7400			TTL QUAD 2
1	8	700-8620			TRIPLE 3
1	7	700-8300	INTEGRATED CKT		DUAL 4
17	6	503-8358	CONNECTOR, IC		14 PIN
29	5	653-2611	PIN, CONNECTOR		
3	4	135-4742	CAPACITOR		C3,4,5 .47μf
1	3	137-2220	CAPACITOR		C2 .0022μf
1	2	139-3343	CAPACITOR		C1 3.3μf@15V
1	1	105789-01	BD ETCHED & DR	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
5P05
5P10

SIGNATURES	DA	MO	YR
DRAWN	23	2	71
CHECKED			
ENG. Don Stabler	20	4	71
MFG.	20	4	71

MATL:
FINISH:

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MB 2

SIZE C | DWG NO. 106079 | REV E

SCALE: 2/1 | SHEET 1 | CONT ON 2

PCBM 1 1 CMD102

DWG NO. 106079

NOTES:
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. NUMBERS IN PARENTHESIS INDICATE ETCHED BD PIN NOS. WHEN THEY DIFFER FROM IC PIN NOS.

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	

PIN NO.	NAME
27	HEADS UP
26	FILE ENABLED
25	POSITIONER DIRECTION
24	DEMAND ADDRESS REG RESET
23	POSITIONER BUSY X MITTER
22	ILLEGAL ADDRESS
21	DOWN COUNT CLOCK
20	UP COUNT CLOCK
19	HALF TO QUARTER TRACK FROM NULL
17	RECEIVED DEMAND ADDRESS 203 OR GREATER
16	LOAD HEADS
15	POSITION FORWARD SLOW
14	POSITION REVERSE SLOW
13	POSITION TRANSDUCER CLOCK
12	VALID ADDRESS CLOCK
11	LOCK SERVO LOOP
9	SEEK TIMING CHECK
8	POSITION TRANSDUCER ERROR
7	POSITION TRANSDUCER INDEX
6	RECEIVED DEMAND ADDRESS RESET
5	RECEIVED DEMAND ADDRESS STROBE
4	DIFFERENCE REVERSE
3	CONTROLLED END CARRY

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	22	2	71
CHECKED			
ENG. Don Stabile	20	4	71
MFG.	26	4	71

MATL:

FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE:
MB2
(MOTHER PWB 2)

SIZE	DWG NO.	REV
C	106079	E

SCALE: SHEET 2 CONT. ON F

PERTEC PERIPHERAL EQUIPMENT

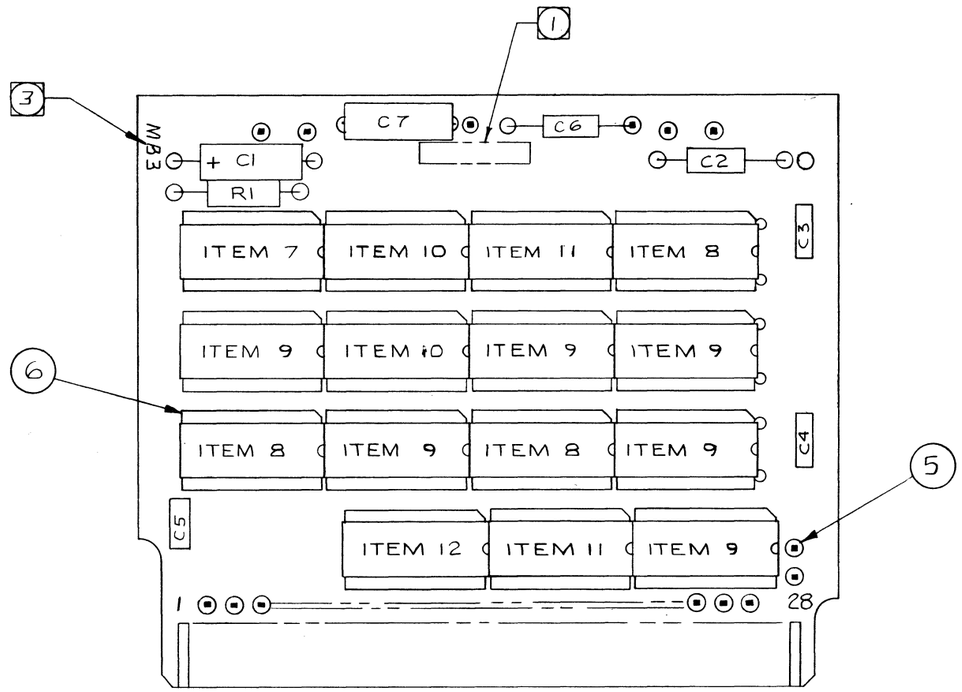
CMD102

DWG NO. 106080

NOTES:

1. RUBBER STAMP PART NO. 106080-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.
2. SOLDER FOR CORNER PINS OF ITEM 6 TO ITEM 1.
3. RUBBER STAMP MB3 APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A1	REC CHG CMD P/N WAS 10C001080	7-9-71
B	ECN 2974	11-9-71
C	ECN 2970	12-21-71 REVISED
D	ECN 3360A	5-2-72
E	ECN 3569	5-2-72



QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
1	16	131-3320	CAPACITOR	EA	C7	.0033 UF
X	15	106083-01	WIRE LIST, MB3	—		
375	14	691-5030	WIRE, SOLID	IN		
1	13	101-1535	RESISTOR	EA	R1	15K 1/2W 5%
1	12	700-8560	INTEGRATED CKT	↕		DUAL JK-FF
2	11	700-8300	↕	↕		DUAL 4
2	10	700-8620	↕	↕		TRIPLE 3
6	9	700-8460	↕	↕		QUAD 2
3	8	700-8360	↕	↕		HEX INV
1	7	700-7412	INTEGRATED CKT	↕		ONE SHOT
15	6	503-8358	CONNECTOR, IC	↕		14 PIN
29	5	653-2611	PIN, CONNECTOR	↕		
3	4	135-4742	CAPACITOR	↕	C3,C4,C5	.47uf
2	3	137-2220	CAPACITOR	↕	C2,C6	.0022uf
1	2	139-3302	CAPACITOR	↕	C1	33uf @ 10V
1	1	105789-01	BD ETCHED & DR.	EA		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
SP05
SP10

MATL:
FINISH:

SIGNATURES	DA	MO.	YR
DRAWN L.F. Bowlin	17	2	71
CHECKED			
ENG. Don Stabler	20	4	71
MFG. W. Morgan	20	4	71

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MB3 ASM

SIZE C | DWG NO. 106080 | REV E

SCALE: 2/1 | SHEET 1 CONT. ON 2

PCBH 1 CMD102

DWG NO. 106080

NOTES:
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
2. RECTANGLES REPRESENT BUS FUNCTIONS
3. NUMBERS IN PARENTHESIS INDICATE ETCHED BD PIN NOS. WHEN THEY DIFFER FROM IC PIN NOS.

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	

PIN NO.	NAME
27	POSITION TRANSDUCER ERROR
26	UNLOAD SWITCH
25	WRITE MODE
24	ERASE MODE
23	POWER SUPPLY RESET
22	LOGIC FILE UNLOAD (EMERGENCY)
21	BRAKE
20	CARTRIDGE SWITCH
19	DRIVE MOTOR ENABLE
17	HEADS UP
16	GENERAL RESET
15	LOAD HEAD TIMER
14	DOOR INTERLOCK
13	DOWN TO SPEED TIMER
12	UP TO SPEED
11	HEAD SELECT ERROR
9	SERVO ERROR
8	ATTENTION
7	WRITE PROTECT SW
6	WRITE PROTECT MODE
5	SEEK TIMING CHECK
4	UNLOAD EMERGENCY RELAY DRIVE
3	LOAD HEADS

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	12	2	71
CHECKED			
ENG. Don Stubler	30	4	71
MFG.	20	4	71

MATL: ——— FINISH: ———

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MB 3 SCH (MOTHER PWB 3)

SIZE C | DWG NO. 106080 | REV E

SCALE: ——— | SHEET 2 | CONT. ON F

PERTEC PERIPHERAL EQUIPMENT

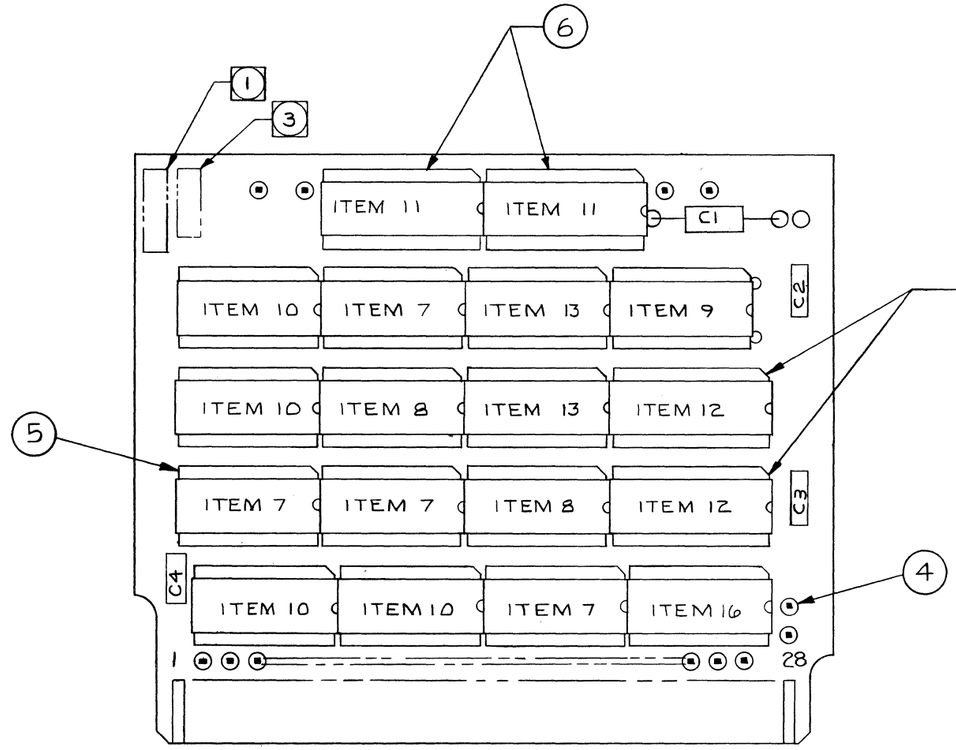
CMD102

DWG NO. 105790

NOTES:

1. RUBBER STAMP PART NO. 105790-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.
2. SOLDER FOUR CORNER PINS OF ITEM 5 AND 6 TO ITEM 1.
3. RUBBER STAMP MB4 APPROX AS SHOWN.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-20-71
A1	REC CHG CMD P/N WAS 10C000790	7-9-71
B	ECN 2974	11-9-71
C	ECN 2970	12-21-71
D	ECN 3320 RCA	6/29/72



QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
1	16	105058-01	INTEGRATED CKT	EA	TTL QUAD 2
X	15	106084-01	WIRE LIST, MB4	—	
400	14	691-5030	WIRE, SOLID	IN	
2	13	700-7486	INTEGRATED CKT	EA	EXCLUSIVE OR
2	12	700-7483			FULL ADDER
2	11	700-7419			UP/DOWN CNTR
4	10	700-8560			DUAL JK-FF
1	9	700-8620			TRIPLE 3
2	8	700-8460			QUAD 2
4	7	700-8360	INTEGRATED CKT		HEX INV
4	6	503-7613	CONNECTOR, IC		16 PIN
13	5	503-8358	CONNECTOR, IC		14 PIN
27	4	653-2611	PIN, CONNECTOR		
3	3	135-4742	CAPACITOR		C2, 3, 4 .47 uf
1	2	137-1020	CAPACITOR		C1 .001 uf
1	1	105789-01	BD ETCHED & DR	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
SP05
SP10

SIGNATURES	DA	MO	YR
DRAWN J. P. Bowler	17	2	71
CHECKED			
ENG. Don S Stabler	20	4	71
MFG. W. J. Sun	20	4	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MB4 ASM

SIZE C | DWG NO. 105790 | REV D

SCALE: 2/1 | SHEET 1 | CONT. ON 2

MATL:

FINISH:

PERTEC PERIPHERAL EQUIPMENT

PCBA 1 CMD102

DWG NO. 105790

DEMAND ADDRESS REG 0-7

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHEET 1	

~~NOTES:~~
RECEIVED DEMAND ADDRESS 0

FDA0 JK-FF 3A
FDA1 JK-FF 3A
FDA2 JK-FF 4C
FDA3 JK-FF 4C
FDA4 JK-FF 4D
FDA5 JK-FF 4D
FDA6 JK-FF 3A
FDA7 JK-FF 3A

3 $\overline{RDA0}$ 1 3B 2 15A
4 $\overline{RDA1}$ 5 3B 6 15A
5 $\overline{RDA2}$ 11 3B 10 15A
6 $\overline{RDA3}$ 1 4B 2 15A
7 $\overline{RDA4}$ 5 4B 6 15A
8 $\overline{RDA5}$ 11 4B 10 15A
9 $\overline{RDA6}$ 1 2A 2 15A
11 $\overline{RDA7}$ 5 2A 6 15A

3 4 OSB 3B
9 8 OSB 3B
13 12 OSB 3B
3 4 OSB 4B
9 8 OSB 4B
13 12 OSB 4B
3 4 OSB 2A
9 8 OSB 2A

DEMAND ADDRESS REG RESET 14 $\overline{DDAR}$

15A

70±30ns
15 $\overline{DVAQ}$ VALID ADDRESS Q
150±50ns
DOWN CNT Q 21 $\overline{QDCQ}$
UP CNT Q 12 $\overline{QUCQ}$
150±50ns

+5
MSI TTL UP/DOWN CNTR 2E
11 16 4 5 1,9 10,15 12 13 14 8
FCA0 FCA1 FCA2 FCA3

TTL 1A 1 3
TTL 1A 9 10 8
TTL 1A 12 13 11
TTL 1A 4 5 6
TTL 1A 10 9 8

NAO0
NAO1
NAO2
NAO3
DUDC DUDB
FCA4

MSI TTL UP/DOWN CNTR 3E
11 16 4 5 1,9 10,15 8 14
FCA5 FCA6 FCA7

2B 2 1 3
2B 4 5 6
2B 10 9 8
3C 13 12 11
3D 9 8
3D 5 6
3D 3 4
3D 1 2
3D 11 10

VPGC
WP1
C1 .001uf
WP2

DDEC
DINC
MSI TTL FOUR BIT FULL ADDER 1B
MSI TTL FOUR BIT FULL ADDER 1C
$\overline{FDA0}$ $\overline{FDA1}$ $\overline{FDA2}$ $\overline{FDA3}$ FCA0 FCA1 FCA2 FCA3
$\overline{FDA4}$ $\overline{FDA5}$ $\overline{FDA6}$ FDA7 FCA4 FCA5 FCA6 FCA7
10 13 5 8 3 1 11 7 4 16 14 9 6 2 15 12

DCEC OSA 11 2A 10 15B
OSA 13 3D 12
15C 13 2A 12
DCEC 13

2C 1 2 3
2C 5 4 6
2C 10 9 8
2C 12 13 11
2D 1 2 3
2D 5 4 6
2D 10 9 8
2D 12 13 11

DDF0 26
DDF1 6 25
DDF2 24
DDF3 11 23
DDF4 22
DDF5 6 20
DDF6 19
DDF7 11 17

DIFFERENCE BETWEEN DEMAND AND CURRENT ADDRESS REG'S

RDA5 OSB (11) (12) (10) 10 11 9 1D 8 (9)
RDA4 OSB
RDA6 15A (3) (14) NAO0 2 13 1 1D 12 (13)
RDA7 15A (2)
NAO1
D203 16 RECEIVED DEMAND ADDRESS 203 OR GREATER

RDA3 15A 1 2 3C 3
RDA2 15A
RDA3 15A (4) RDA1 15A (5) RDA0 15A (6) 3 4 5 1D 6 (7)

1 29 30 +5 28 55 56
C2 .47uf
C3 .47uf
C4 .47uf
TO PIN 14 ALL IC'S EXCEPT AS SHOWN
TO PIN 7 ALL IC'S EXCEPT AS SHOWN

CURRENT ADDRESS REG 0-7

PIN NOS. WHEN THEY DIFFER FROM IC PIN NOS
3. NUMBERS IN PARENTHESIS INDICATE ETCHED BD
2. RECTANGLES REPRESENT BUS FUNCTIONS
1. NUMBERS IN CIRCLES REPRESENT PWB PINS
NOTES:

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

~~PARTS LIST~~

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	16	2	71
CHECKED			
ENG. Don Stabler	20	4	71
MFG. C WATSON	20	4	71

MATL:
FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MB4 SCH (MOTHER PWB4)

SIZE	DWG NO.	REV
C	105790	D

SCALE: SHEET 2 CONT. ON F

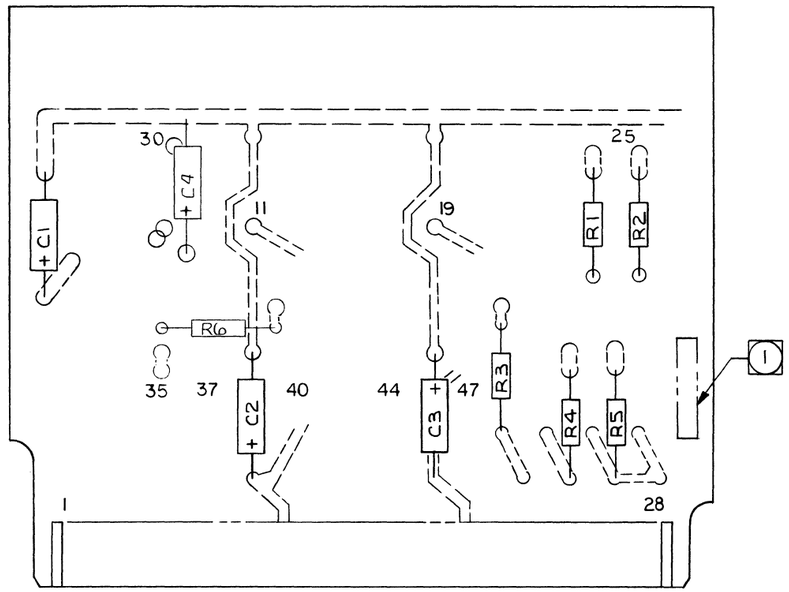
CMD102

DWG NO. 106034

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-21-71
A1	REC CHG ADDED G4	5-26-71
A2	REC CHG CMD P/N WAS 102001034 ADDED GROUP -05 AND SH 3	7-9-71
B	ECN 2970	12-30-71

NOTES:

(1) RUBBER STAMP PART NO. 106034 INCLUDING VERSION NO. AND LATEST REV. LETTER. LOCATE APPROX AS SHOWN. MARKING TO BE VISIBLE AFTER ATTACHING CABLES PER 106026.



-01
(SIG/PWR CABLE)

QTY -05	QTY -04	QTY -03	QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.	
1	—	—	—	—	12	139-1045	CAPACITOR	EA	C1	1 μf 35V
33	—	—	—	—	11	100-1215	RESISTOR	EA	R1 - R33	120Ω ±5% 1/4W
—	—	18	—	—	10	100-2715	RESISTOR	EA	R3-R20	270Ω±5% 1/9W
—	—	—	—	1	9	100-1005	RESISTOR	EA	R6	10Ω ±5% 1/4W
—	—	2	5	—	8	690-5022	WIRE	IN	22 AWG GRN	
—	—	—	—	5	7	100-4715	RESISTOR	EA	R1-R5	470Ω ±5% 1/4W
—	1	15	1	—	6	100-1215	RESISTOR	EA	R2, R21-R34	120Ω±5% 1/4W
—	1	1	1	—	5	101-4705	RESISTOR	EA	R1	47Ω±5% 1/2W
—	2	2	2	—	4	300-9140	DIODE	EA	CR3, CR4	IN914A
—	2	2	2	—	3	300-4003	DIODE	EA	CR1, CR2	A14F
—	4	4	4	4	2	139-1045	CAPACITOR	EA	C1, C2, C3, C4	1 μf 35V
1	1	1	1	1	1	106035-01	BD ETCHED & DR	EA		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
~~SP10~~
101491

SIGNATURES	DA	MO	YR
DRAWN	2	2	71
CHECKED			
ENG.	2	4	71
MFG.	21	4	71

MATL:
FINISH:

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: INTA/A ASM

SIZE C | DWG NO. 106034 | REV B

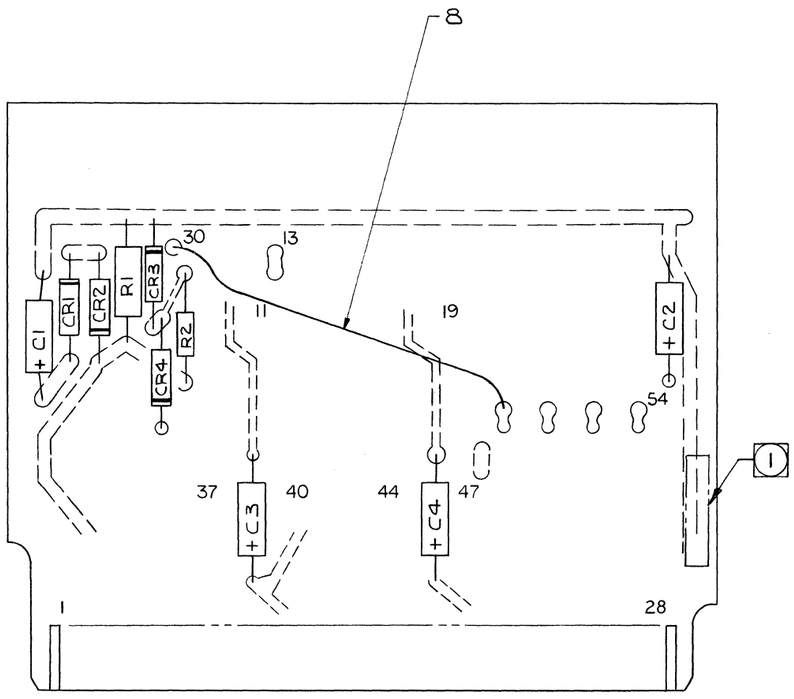
SCALE: NONE | SHEET 1 | CONT. ON 2

CMD102

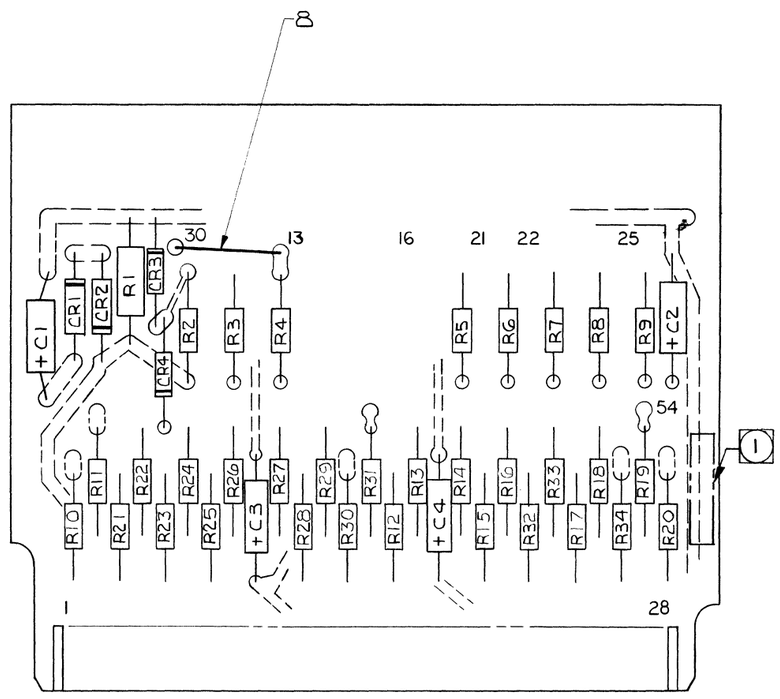
DWG NO. 106034

NOTES:

REVISIONS		
REV	C.O. NO.	DATE
1	SEE SHEET 1	



-02
(IO CABLE - INTERNAL)



-03
(IOTER PWB)

-04
(SAME AS G2 EXCEPT
WIRE ITEM 8 OMITTED)

SEE SHEET 1 FOR PARTS LIST

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
~~SP10~~
10149 1

SIGNATURES	DA	MO	YR
DRAWN	2	2	71
CHECKED			
ENG.	2	11	71
MFG.	21	4	71

MATL:
FINISH:

PERTEC PERIPHERAL EQUIPMENT

~~COMPUTER MEMORY DEVICES, INC.~~
GLENDALE, ARIZONA

TITLE:
INTA/A ASM

SIZE	DWG NO.	REV
C	106034	B

SCALE: NONE SHEET 2 CONT. ON 3

CMD102

DWG NO. 106069

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	5-9-71
A1	REC. CHG. CMD P/N WAS 100001069	7-21-71
B	ECN 3027A RCA	3-2-72
C	ECN 3066 RCA	3-10-72
D	ECN 3445	3-17-72
E	ECN 3783	6-30-72

09 SIG/PWR CABLE 106026-01			SEE NOTE 2	SEE NOTE 1	11 DAISY CHAIN I/O CABLE 106024-02 (NOTE 4) NO DAISY CHAIN 106024-01		13 DAISY CHAIN I/O CABLE 106024-02 (NOTE 4) NO DAISY CHAIN I/O TERM 106034-03		15 MB1 106078-01			19 MB2 106079-01		23 MB3 106080-01		27 MB4 105790-01	
PIN	SIGNAL	FROM-TO			PIN	SIGNAL	SIGNAL	FROM-TO	PIN	SIGNAL	FROM-TO	SIGNAL	FROM-TO	SIGNAL	FROM-TO	SIGNAL	FROM-TO
1	VP05 ISO	TB2-13			1	VP05 ISO	VP05 ISO		1	VP05 ISO		VP05 ISO		VP05 ISO		VP05 ISO	
2	VP05 ISO	TB2-13	NN	1,2	2	3.6V	3.6V		3	DRDS ISO	0402,0404	DCEC ISO	2713	FLHD 15A	1916	RDA0 OSO	1147, 1347
7	DULE 15B	0442, J7-0K	★★	39	7	RFSL OSO	RFSL OSO	0436,0450	4	RHSI OSB	0303	DDFR OSO	0943	DULE ISO	0455,2549	RDA1 OSO	1125, 1325
11	VP12 ISO	TB2-14, BUSS			11	DMTE 15F	DMTE 15F	0416, 1708	5	DINT OSO	1721	RDAS OSO	1148, 1348	DSTC OSO	1909	RDA2 OSO	1124, 1324
13	DDIR ISO	1925, J7-08	W	37	13	RWDF OSO	RWDF OSO	0434	6	DSRB OSO	2122	RDAR OSO	1144, 1344	FWPM ISO	0425, 0717	RDA3 OSO	1123, 1323
14	DHQT ISO	1919, J7-04	D	64	14	VPOB ISO	VPOB ISO	(6)	7	DSRT OSO	1722	DPTI OSO	0931	SWPM OSO	0953	RDA4 OSO	1122, 1322
15	DSVE OSO	2309, J7-09			15				8	DINB OSO	2121	DPTE OSO	2327	DATT ISO	0451, 2550	RDA5 OSO	1121, 1321
16	DLSL ISO	■■			16				9	TDCL OSO	0636	DSTC OSO	2305	DSVE OSO	0915	RDA6 OSO	1146, 1346
19	VN26 ISO	TB2-11, BUSS			19	PPFR OSA	PPFR OSA	0445, 2323	11	XONE OSO	1133, 1333	DLSL ISO	0916, 0726	DHSE OSO	0333, 0341	RDA7 OSO	1145, 1345
21			ъ	24	21	RDA5 OSO	RDA5 OSO	2708	12	XDCL OSO	1134, 1334	DVAQ OSO	2715	DUTS OSO	1704	QUCQ OSO	1920
22			ш	23	22	RDA4 OSO	RDA4 OSO	2707	13	DFSE ISO	0426, 1926	DPCL ISO	0933	TDTS OSO	2514	DCEC ISO	1903
23	DATT 15A	2553, TB1-05	ч	22	23	RDA3 OSO	RDA3 OSO	2706	14	RHSI OSO	1132, 1332	DRVS OSO	0935	DILK OSO NAOO	0441	DDAR OSO	1924
24	SULS OSO	2326, TB1-04	ш	21	24	RDA2 OSO	RDA2 OSO	2705	15	FDCL ISO	0609	DFWD OSO	0934	TLHD ISO	2513	DVAQ OSO	1912
25	SCAR OSO	2320, TB1-06	ч	20	25	RDA1 OSO	RDA1 OSO	2704	16	FONE ISO	0637, 0621	FLHD 15A	2303	DGFR OSO	0313	DZD3 OSO	1917
26	VGRD ISO	TB2-10			26	VGRD ISO	VGRD ISO		17	XFSE OSO	1153, 1353	DZD3 OSO	2716	DHSU OSO	0936, 1927	DDF7 ISO	0942
27	VGRD ISO	TB2-10			27	VGRD ISO	VGRD ISO		19	XINM OSO	1143, 1343	DHQT ISO	0914	DMTE 15A	0444, 2520	DDF6 ISO	0941
28	VGRD ISO	TB2-10, BUSS			28	VGRD ISO	VGRD ISO		20	XRSM OSO	1136, 1336	QUCQ OSO	2712	SCAR OSO	0925	DDF5 ISO	0940
29	VP05 ISO	TB2-13, BUSS			29	VP05 ISO	VP05 ISO		21			QDCQ OSO	2721	DBLK OSO	0410	QDCQ OSO	1921
30					30	RDAS OSO	RWDF OSO		22	XSC4 OSO	1138, 1338	XILA OSO NAOO	0406	RLFR OSO	1155, 1355	DDF4 ISO	0938
31	DPTI OSO	1907, J6-0J	B	62	31	RHSO OSO	RHSO OSO	0431	23	XSC3 OSO	1139, 1339	XBZY OSO NAOO	0408	PPFR OSA	▲▲	DDF3 ISO	0937
32			A	60	32	RHSI OSO	RHSI OSO	1514	24	XSC2 OSO	1140, 1340	DDAR OSO	2714	DERA OSO	0309 0453	DDF2 ISO	0944
33	DPCL ISO	1913, J6-0H	J	58	33	XONE OSO	XONE OSO	1511	25	XSC1 OSO	1141, 1341	DDIR ISO	0913	DWDM OSO	0452	DDF1 ISO	0945
34	DFWD OSO	1915, J6-05	H	56	34	XDCL OSO	XDCL OSO	1512	26	XSCO OSO	1142, 1342	DFSE ISO	0426, 1513	SULS OSO	0924	DDFO ISO	0946
35	DRVS OSO	1914, J6-06	E	54	35	XWPM OSO	XWPM OSO	0454	27			DHSU OSO	0936, 2317	DPTE OSO	1908	FDA7 ISO	0721
36	DHSU OSO	●●	T	44	36	XSRM OSO	XSRM OSO	1520	28	VGRD ISO		VGRD ISO		VGRD ISO		VGRD ISO	
37	DDF3 ISO	2723, J7-0E	★★	46	37	XBZY OSO	XBZY OSO	0409	29	VP05 ISO		VP05 ISO		VP05 ISO		VP05 ISO	
38	DDF4 ISO	2722, J7-0F	b	35	38	XSC4 OSO	XSC4 OSO	1522	30	VP05 ISO		VP05 ISO		VP05 ISO		VP05 ISO	
39	DBLK 05A	0950	a	34	39	XSC3 OSO	XSC3 OSO	1523	55	VGRD ISO		VGRD ISO		VGRD ISO		VGRD ISO	
40	DDF5 ISO	2720, J7-06	e	33	40	XSC2 OSO	XSC2 OSO	1524	56	VGRD ISO		VGRD ISO		VGRD ISO		VGRD ISO	
41	DDF6 ISO	2719, J7-07	h	32	41	XSC1 OSO	XSC1 OSO	1525									
42	DDF7 ISO	2717, J7-0B	m	31	42	XSCO OSO	XSCO OSO	1526									
43	DDFR OSO	1904, J7-0H	l	29	43	XINM OSO	XINM OSO	1519									
44	DDF2 ISO	2724, J7-05	p	27	44	RDAR OSO	RDAR OSO	1906									
45	DDF1 ISO	2725, J7-0D	r	26	45	RDA7 OSO	RDA7 OSO	2711									
46	DDF0 ISO	2726, J7-02	s	25	46	RDA6 OSO	RDA6 OSO	2709									
47			y	19	47	RDA0 OSO	RDA0 OSO	2703									
48	DMTE OSO	2544, TR-01	z	17	48	RDAS OSO	RDAS OSO	1905									
49	DILK OSO	0412, TB2-05	BB	15	49	XULE OSO	XULE OSO	0427									
50	DBLK 05A	0440, TB2-02	CC	13	50	XILA OSO	XILA OSO	0407									
51	PPFR OSO	0417, TB2-12	EE	11	51	RRDS OSO	RRDS OSO	0432									
52	DMTE OSC	2555, TB2-03	FF	9	52	RERA OSO	RERA OSO	0424									
53	SWPM OSO	2307, TB1-03	JJ	7	53	XFSE OSO	XFSE OSO	1517									
54	QMPT OSO	1724, TB1-02	KK	5	54	RWDM OSO	RWDM OSO	0423									
55	QMPB OSO	2124, TB1-01	MM	3	55	RLFR OSO	RLFR OSO	2322									
56	VGRD ISO	TB2-10, BUSS			56	VGRD ISO	VGRD ISO										

■■ 1911, 0726, J7-0C
●● 1927, 2317, J6-0F

(DUAL DISK ONLY)

BOTTOM DISK SECTOR RING
0V
-2.5±.8V

VGRD
VP05 (+5)
VP12 (+12)
VN26 (-26)
QMPB OSO 0955

28,56 9 6
1,29 21
11,39
19,47 22
24
8 21
SITB

DSRB OSO NAOO
DINB OSO (10±4μs) 1508
DSRB OSO (10±4μs) 1506

DSRB OSO NAO1
41 25 40

TOP DISK SECTOR RING
0V
1.4±.4V

VGRD
VP05 (+5)
VN12 (+12)
VN26 (-26)
QMPT OSO 0954

28,56 9 6
1,29 4
11,39 21
19,47 22
24
8 17 26
SITB

DSRT OSO NAOO
DUTS OSO 2312
DINT OSO (10±4μs) 1505
DSRT OSO (10±4μs) 1507
DSTP ISO (1ms)

1311 1111 0416 68Ω 0444
1μf 1μf
DMTE 15A 2319
20 25 18
OSB
17 25 16
ISE
34 25 32 NAOO 43
30 SEC TIMER 25 14
TDTS OSO 2313 DOWN TO SPEED
4±1.5ms

20 SEC TIMER 25 13
TLHD ISO 2315 LOAD HEADS
4±1.5ms AT 1.2V LEVEL

DRIVE MOTOR ENABLE (TURNS TRIAC ON)
OSD 0948
44 25 45

POWER SUPPLY INTERLOCK (IF AT 0 VOLTS)
OSC 0952
55 25 51

XILA OSO NAOO 1922
6 04 7
XILA OSO 1150, 1350

XBZY OSO NAOO 1923
8 04 9
XBZY OSO 1137, 1337

NAOO 2314
41 04 12
DILK OSO 0949
SAFE LAMP, DOOR INTERLOCK

DULE ISO 0455, 2304
49 25 54
OSA
43 04 42
ISB 0907
EMERGENCY UNLOAD RELAY

DBLK OSO 2321
10 04 40
0939 10Ω 5%, 1/4W
+ 1.0μf 35V −
DBLK OSA 0950
BRAKE (BRAKE IS ON DUAL DISK ONLY)

DATT ISO 0451, 2308
50 25 53
DATT 15A 0923
READY LAMP COMES ON WHEN AT 0 VOLT LEVEL

22 04 49 *
21 04 49 *
NAOO 36
30 SEC TIMER 25 14
TDTS OSO 2313 DOWN TO SPEED
4±1.5ms

RA/WD/A
P1
0 1 2 3 4

ERASE
R/W
HEAD 0 (UPPER HEAD UPPER DISK)
R/W

ERASE
R/W
HEAD 1 (LOWER HEAD UPPER DISK)
R/W

(DUAL DISK ONLY)

ERASE
R/W
HEAD 2 (UPPER HEAD LOWER DISK)
R/W

ERASE
R/W
HEAD 3 (LOWER HEAD LOWER DISK)
R/W

0639 VP12
0911
0919 VN26
0747
0756 VGRD
0928
0756

P J1
9,K
15,S
13,P
11,M
B
A
2
1
3
C
11
U
18
V
12
H
F

DGFR OSO 2316
VN26 (-26) 19,47 13
VP05 (+5) 1,29
DHSE OSO 2311 41
33
RHSI OSB 1504 3
RHSO OSO 1131, 1331 31 04
30 15A
31 03 EAHS
9 37 28,56
45
XSH3 P
XSH2
XSH1 P
XSHO
XEHS P
XRDE
VGRD

RRDS OSO 1151, 1351
32 04 2
DRDS ISO 1503

RERA OSO 1152, 1352
24 04 *
36 04 4 *
DERA OSO 2324
53
DLSL OSA
24 50
26 19,47 VN26(-26)
1,29 VP05(+5)
27 07 9 XWDR P
21 7 XWDR
33 XECU
28,56 VGRD ARED
WAMP/B
22

PIN 0426 TO 1513, 1926
RFSL OSO 1107, 1307
50 04 *
DFSE ISO
RWDF OSO 1113, 1313
34 04 *
35 15A
FDA7 ISO 2727
FWPM ISO 0425, 2306
52
DWDM OSO 2325
DATT ISO 2308, 2550
51 04 *
RWDM OSO 1154, 1354
23 04 *

XWPM OSO 54 1135, 1335
04 *
25 04 *
FWPM ISO 2306, 0717

XULE OSO 27 1149, 1349
04 *
04 55 *
DULE ISO 2304, 2549

PPFR OSA 2323
1319 1119 68Ω 0445 0417
1μf 1μf
PPFR OSO 0951 POWER SUPPLY RESET (600ms)

FDCL ISO 1515
FONE ISO 1516

(SINGLE DENSITY ONLY)
28,56 VGRD
9 1,29 VP05 (+5)
06
11,39 VP12 (+12)
21 19,47 VN26 (-26)
DDBD 45

TDCL OSO 1509

(DOUBLE DENSITY ONLY)
27,55
9 28,56 VGRD
06
1,29 VP05 (+5)
11,39 VP12 (+12)
37 19,47 VN26 (-26)
PLLD 7 DEL DATA
36 34 VFØ
32

DDDA OSO

04 13
33 15
DFDR 56
1,29,38 VP05 (+5)
19,47 VN26 (-26)
5 28,56 VGRD
3 14
P ARED VGRD

DDDA 15A

★★ FILE SELECT 1 2 3 4
SEEK COMPLETE 1 2 3 4
A B C 58 C

CONDUCTOR NO. ON EXT CABLE ONLY, P4,5	NOTE 1
X	39
Y	40
Z	41
R	42
LL	46
L	48
M	50
P	52

58 IS PRESENT IN DAISY CHAINED UNITS ONLY.
— — SHOWS CONNECTIONS FOR NON-DAISY CHAIN UNITS.

RFSL OSO 1107, 1307
XBZY OSO 1137, 1337

NOTES: SEE SHT 2

PERTEC PERIPHERAL EQUIPMENT

QTY ●	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN R FRAHM	16	3	71
CHECKED			
ENG Ron Stalla	7	5	71
MFG.	9	5	71

MATL:
FINISH:

COMPUTER MEMORY DEVICES, INC. GLENDALE, ARIZONA

TITLE: FILE LOGIC VC

SIZE D | DWG NO. 106069 | REV E

SCALE: | SHEET 1 | CONT. ON 2

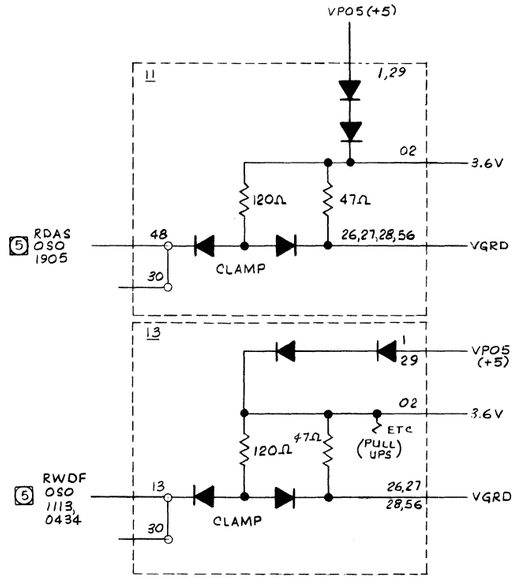
CMD103

NOTES:

1. CONDUCTOR NUMBER - CONDUCTORS IN RIBBON CABLE ARE NUMBERED SEQUENTIALLY STARTING WITH BOTTOM WIRE. GROUNDS ARE CONDUCTORS 4,6,8,10,12,14,16,18,28, 30, 36, 38, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61 AND 63.
2. CONTACT DESIGNATIONS ON P4 (ALSO P5 IN DAISY CHAIN UNITS), GRDS ARE ON CONTACTS: LL, HH, DD, AA, &, c, S, V, N, F, K AND C.
3. * DENOTES CONNECTIONS INTERNAL TO DFDR PWB AT SLOT 04.
4. VARIATIONS:
   - A. NON DAISY CHAIN, NON FORMATTER UNITS.
     ALL R___ SIGNALS HAVE 270Ω PULL UP RESISTORS TO +3.6V. ALL X___ SIGNALS HAVE 120Ω PULL UP RESISTORS TO +3.6V. THESE PULL UP RESISTORS ARE ON TERMINATOR BOARD 106034-03 WHICH PLUGS INTO SLOT 13. USE I/O CABLE 106024-01 IN SLOT 11.
   - B. DAISY CHAIN, NON FORMATTER.
     ALL R___ AND X___ SIGNALS HAVE 120Ω PULL UP RESISTORS TO +3.6V. THESE PULL UP RESISTORS ARE IN TERMINATOR PLUG 106085-01 WHICH PLUGS INTO P5 ON END UNIT OF DAISY CHAIN. USE 106056-01 AND PLUG INTO SLOTS 11 AND 13.
   - C. SINGLE DISK DRIVE FOR USE WITH FORMATTER.
     ALL R___ SIGNALS HAVE 220Ω PULL UP RESISTORS TO +5V AND 330Ω RESISTORS TO GROUND (ALL X___ SIGNALS HAVE NO TERMINATORS). THESE RESISTORS ARE ON THE I/O TERMINATING BOARD 102552-02 WHICH PLUGS INTO SLOT 13. USE I/O CABLE 106024-01 IN SLOT 11.
   - D. DAISY CHAIN, FORMATTER USED AS SINGLE DISK, OR LAST UNIT ON DAISY CHAIN.
     ALL R___ SIGNALS AND X___ SIGNALS HAVE 220Ω PULL UP RESISTORS TO +5V AND 330Ω RESTORS TO GROUND. THESE RESISTORS, EXCEPT FOR SIGNALS RFSL AND XBZY ARE ON I/O TERMINATING BOARD 102552-01 WHICH PLUGS INTO SLOT 13. USE 106056-01 IN SLOTS 11 AND 12 (SLOT 12 IS UNUSED). THE CABLE FROM P4 PLUGS INTO SLOT 11. USE TERMINATOR PLUG 102564-01 WHICH PLUGS INTO P5. THE TERMINATING RESISTORS FOR RFSL AND XBZY ARE IN THE TERMINATOR PLUG.
   - E. DAISY CHAIN, FORMATTER.
     ALL R___ SIGNALS AND X___ SIGNALS HAVE 220Ω PULL UP RESISTORS TO +5V AND 330Ω RESISTORS TO GROUND. ALL TERMINATING RESISTORS ARE ON 102552-01 IN LAST UNIT OF DAISY CHAIN, EXCEPT TERMINATIONS FOR THE RFSL AND XZBY LINES OF EACH UNIT OF THE DAISY CHAIN. THESE RESISTORS ARE IN THE TERMINATOR PLUG 102564-01 WHICH PLUGS INTO P5 ON END UNIT OF DAISY CHAIN. USE 106056-01 AND PLUG INTO SLOTS 11 AND 13, EXCEPT ON END UNIT WHICH IS CONNECTED AS IN 4D, ABOVE.

[5] CLAMPING CIRCUITS SHOWN ARE IN ALL VARIATIONS. CLAMPING CIRCUIT FOR RDAS IS ON PCB IN SLOT 11 (106024-01 OR 106056-01 DEPENDING ON VARIATION). CLAMPING CIRCUIT FOR RWDF IS ON PCB IN SLOT 13 (106034-03, 102552-01 OR 102552-02 DEPENDING ON VARIATION). IN DAISY CHAIN THE END UNIT HAS CLAMPING CIRCUIT FOR RDAS AND RWDF. CONNECTIONS FROM 1148 AND 1313 TO 1330 ARE NOT ON 106056-01.

[6] CONNECTION USED IN CONJUCTION WITH DISK FORMATTER, FOR TERMINATION VOLTAGE BUSS.



REVISIONS					
REV	DESCRIPTION	DATE	DR	CHK	APPR
	SEE SHEET 1				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES:
.XX ± .01
.XXX ± .005
X/X ± 1/32
ANGULAR ± 1/2°
BREAK ALL SHARP CORNERS
APPROX. 010

SIGNATURES		DATE
DR	H. F. Buist	3/10/72
CHK		
DES		
ENGR		
ENGR		

PEC PERIPHERAL EQUIPMENT CORPORATION

TITLE
FILE LOGIC VC

NEXT ASSY	1ST USED ON
APPLICATION	

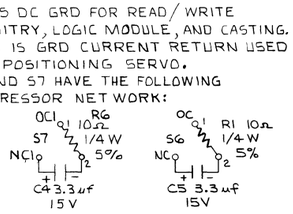
FINISH:
MATL:

SIZE	CODE IDENT. NO.	DWG NO.	REV
D		106069	E
SCALE ——	DO NOT SCALE DWG	SHEET 2 OF 2	

DWG NO. 106070

NOTES:

1. GRD 1S DC GRD FOR READ/WRITE CIRCUITRY, LOGIC MODULE, AND CASTING. GRD1 IS GRD CURRENT RETURN USED FOR POSITIONING SERVO.
2. S6 AND S7 HAVE THE FOLLOWING SUPPRESSOR NET WORK:



REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	5-9-71
A1	REC. CHG, CMD P/N WAS 100001070	7-27-71
B	ECN 3027A	3-2-72
C	ECN 3312	3-14-72
D	ECN 3883	7-12-72
E	ECN 4095	9-1-72

WITH WRITE PROTECT OPTION LAMP C2 IS MOVED TO D2.

SWITCH S7 (WITH RESISTOR AND WIRE) IS INSTALLED

+5, TRIAC, TR, DMTE OSD, AC CORD, WH (RED, 50HZ), BL, BLOWER, BD, BLK (YEL, 50HZ), DR MOTOR, RED (GRN, 50HZ), C1

L2, D2, R3 47Ω 1/2W 5%, SAFE, A1, C2, A2, OC2, S7, NC2, DOOR INTERLOCK, L1, READY, OC1, NC1, NOTE 2, OC, S6, NC, OC, S5, NC

TB1

DILK OSO, R2 47Ω 1/2W 5% CR5, +24, C3 1uf 35V, GRD, GRD

P3: 110 (220) VAC HOT AC (A), ACN NEUTRAL (B), VGRD 1S1 GRD1 (C), VGRD 1S1 GRD1 (E), VN24 1S0 (F), VP24 1S0 (D)

TB2

CR2, R5 2.7Ω, 1%, 5W

J7-10,L
J7-10,L
J7-18,V
J7-17,U
J7-1

CR1 BRK — BRAKE IS ON DUAL DISK ONLY

-24 +24

GRD, R4 150Ω 10W 10%, -26, +5, +12

P2: VP12 1S0 (B), VGRD 1S0 (C), VN26 1S0 (E), DMTE OSC (F), VP05 1S0 (A), PPFR 0S0 (D)

C2 28,500 uf 30V — EMERGENCY RETRACT CAPACITOR

+24, CR4, K1 — K1 ENERGIZED (DRIVE AT 0 VOLT LEVEL) CONNECTS SERVO TO COIL

TB3

J6-7 GRD 1
J6-18 VELOCITY INPUT
J6-17 HEADS UP PHOTODIODE
J6-5 INDEX PHOTODIODE
J6-16 X+0 PHOTODIODES
J6-U X+90 PHOTODIODES

3.1 V, L3, GRD 1, GRD 1, BLK, YEL, GRN, WH, RED

SCALE IS ATTACHED TO CARRIAGE

BLK STATIONARY VELOCITY TRANSDUCER COIL MT1

MOVING COIL, VELOCITY TRANSDUCER MAGNET, AND R/W HEADS MT2 — CARRIAGE

MOVING POSITION SCALE

POSITION TRANSDUCER READ HEAD V1

RETURN ← CURRENT FOR REVERSE POSITIONER DIRECTION

HOT

VOICE COIL RETURN
VOICE COIL HOT
EMERGENCY UNLOAD RELAY
LAMP 3.1 V

+5	J6-A
DDIR (X+90 DIGITAL)	J6-T
POSITIONING ERROR VOLTAGE	J6-V
+15	J6-P
-15	J6-14
DLSL (LOCK SERVO LOOP)	J6-04
CURRENT FEEDBACK	J6-15
VELOCITY REFERENCE	J6-03
GRD 1	J6-11,M
VOICE COIL HOT	J6-0C
GRD 1	J6-07
+24	TB2-6
GRD 1	TB2-8
GRD 1	TB2-8
-24	TB2-7
+5	TB2-13
GRD 1	

VCAP PWB J7 — MTG SCREW

+5	J7-A
DDIR (X+90 DIGITAL)	J7-B
POSITIONING ERROR VOLTAGE	J7-12
+15	J7-P
-15	J7-14
DLSL (LOCK SERVO LOOP)	J7-03
CURRENT FEEDBACK	J7-15
VELOCITY REFERENCE	J7-J
GRD1	J7-11,M
VOICE COIL HOT	J7-16
GRD 1	J7-11
	TB3-3

VCAC PWB J6

MODULE PWB SLOT 09

25	SCAR OSO	(CARTRIDGE SWITCH-REMOVABLE DISK OUT)
24	SULS OSO	(UNLOAD SWITCH – START/STOP)
55	QMPB OSO	(MAGNETIC PICK UP, BOTTOM SECTOR RING)
54	QMPT OSO	(MAGNETIC PICK UP, TOP SECTOR RING)
53	SWPM OSO	(WRITE PROTECT SWITCH)
23	DATT 1SA	(READY LAMP COMES ON WHEN AT 0 VOLT LEVEL)
51	PPFR OSO	(POWER SUPPLY RESET, 600 ms)
52	DMTE OSC	(POWER INTERLOCK, IF AT 0 VOLT LEVEL)
48	DMTE OSD	(DRIVE MOTOR ENABLE, TURNS TRIAC ON)
50	DBLK OSA	(BRAKE)
49	DILK OSO	(DOOR INTERLOCK, SAFE LAMP)
56	VGRD 1S0	(GRD)
56	VGRD 1S0	(GRD)
19	VN26 1S0	(-26)
29	VP05 1S0	(+5)
29	VP05 1S0	(+5)
11	VP12 1S0	(+12)
7	DULE 15B	(EMERGENCY UNLOAD RELAY)
13	DDIR 1S0	(POSITIONER DIRECTION)
14	DHQT 1S0	(HALF TO QUARTER TRACK FROM NULL)
15	DSVE OSO	(SERVO ERROR – LAMP OUT)
16	DLSL 1S0	(LOCK SERVO LOOP)
37	DDF3 1S0	
38	DDF4 1S0	
40	DDF5 1S0	
41	DDF6 1S0	
42	DDF7 1S0	
43	DDFR OSO	(DIFFERENCE REVERSE)
44	DDF2 1S0	
45	DDF1 1S0	
46	DDF0 1S0	

DIFFERENCE BETWEEN DEMAND AND CURRENT ADDRESS REGISTER

31	DPTI OSO	(POSITION TRANSDUCER INDEX)
33	DPCL 1S0	(POSITION TRANSDUCER CLOCK)
34	DFWD OSO	(POSITION FORWARD SLOW)
35	DRVS OSO	(POSITION REVERSE SLOW)
36	DHSU OSO	(HEADS UP)

INDEX DIGITAL
X+0 DIGITAL
HEADS UP DIGITAL

TB3-4	VELOCITY TRANSDUCER
TB3-5	HEADS UP PHOTODIODE
TB3-6	INDEX PHOTODIODE
TB3-7	X+0 PHOTODIODE
TB3-8	X+90 PHOTODIODE

QTY	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN R. L. Booth	31	3	71
CHECKED			
ENG. Jon Stobbe	7	8	71
MFG.	9	8	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: UNIT SCHEMATIC VC (5000 SERIES)

SIZE D | DWG NO. 106070 | REV E

SCALE: | SHEET 1 | CONT. ON F

MATL:

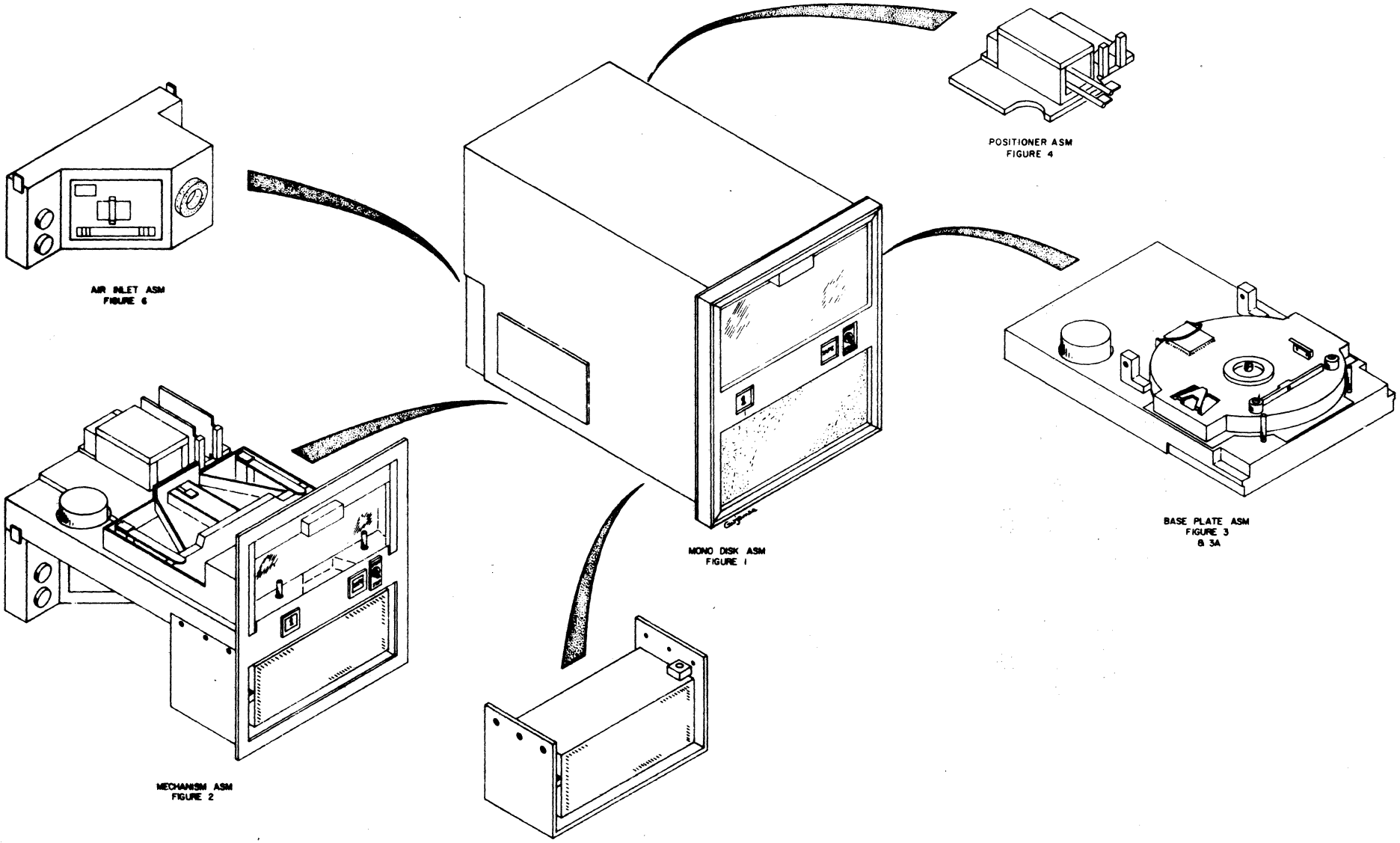
FINISH:

PERTEC PERIPHERAL EQUIPMENT

CMD103

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 6, Air Inlet Assembly See List 2-5 for next assembly				
-1	10R000525G1	105525-01	Housing	1
-2	10C001033G1	106033-01	Comp. Mtg Plate	1
-3	TBD000156P1412	657-1514	Terminal Board	1
-4	C0C000101P1	140-3050	Capacitor	1
-5	CCB000185P1	664-1851	Capacitor Clamp	1
-6	CRB000011P1	300-4003	Diode	2
-7	R0C000147P15187	118-1510	Resistor	1
-8	R0C000147P27934	117-0027	Resistor	1
-9	SVB000049P22	669-0122	Sleeving	14"
-10	LGC000048P05221	656-0011	Lug Ring	8
-11	CNC000090P1	503-9001	Conn. Round (P2)	1
-12	CNC000090P2	503-9002	Conn. Round (P3)	1
-13	10A000093P1	105093-01	Gasket Blower	1
-14	10C000594P2	105594-02	Filter Retainer	1
-15	CCC000052P025	661-0014	Cable Clamp	1
-16	10B001032P1	106032-01	Panel	1
-17	SCC000110P0606	608-0606	Screw Thd Form 6x3/8 lg	12
-18	GAA000086P01042	667-0030	Gasket	43"
-19	WAC000120P06	605-0600	Washer Lock 6	2
-20				
-21	SCC000088P06101	606-0610	Screw Pan Hd 6-32x5/8 lg	2
-22	SCC000088P08081	600-0808	Screw Pan Hd 8-32x1/2 lg	3
-23	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	7
-24	WAC000120P08	605-0800	Washer Lock 8	5
-25	WAC000119P082	606-0800	Washer Flat 8	3
-26	FLA000087P2	614-0002	Air Filter	1
-27	10D000997G1	105997-01	Filter Grille Assy	1
-28	QTC000085P00001	615-0048	Retainer Qt	4
-29	QTC000085P2201	615-0044	Stud Qt	4
-30	QTC000085P00004	615-0046	Stud Ejector	4
-31	QTC000085P00005	615-0045	Wear Washer	4
-32	NUC000148P06	615-0037	Nut Wing	4
-33	10B001090P1	106090-01	Cover	1
-34	SWB000300P2	527-0001	Switch Triac	1
-35	JCC000164P022	657-1642	Jumper Clip	1

THE FOLLOWING PARTS EXPLOSIONS AND PARTS LIST APPLY TO THE MD5121, MD5121A, MD5221, AND MD5221A (DUAL DISK)


AIR INLET ASM
FIGURE 6
POSITIONER ASM
FIGURE 4
MONO DISK ASM
FIGURE 1
BASE PLATE ASM
FIGURE 3
& 3A
MECHANISM ASM
FIGURE 2
ELECTRONIC MODULE ASM
FIGURE 5

VISUAL I

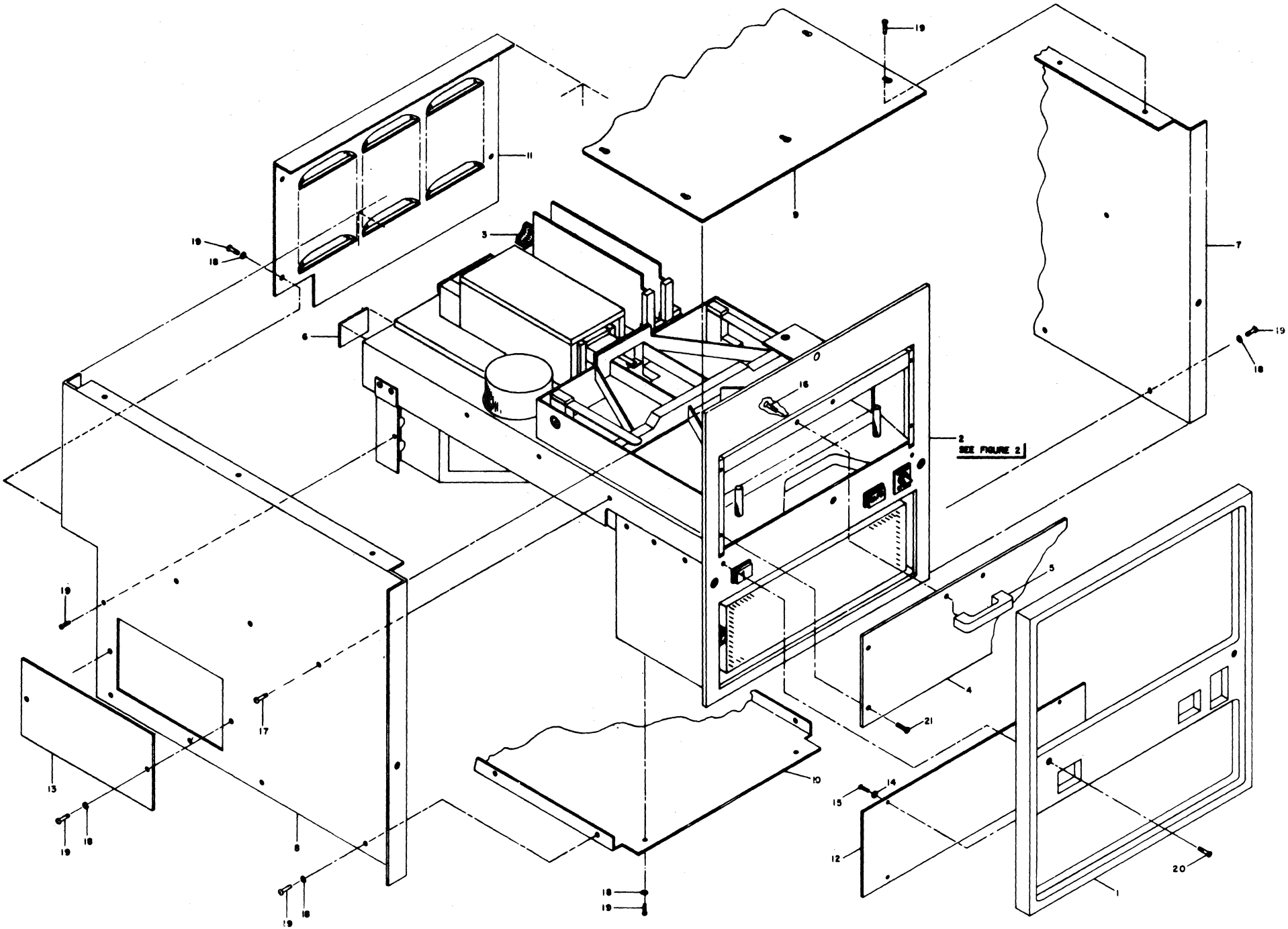


FIGURE 1. MONO DISK ASM. SEE LIST 1.

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 1, Dual Disk Assembly Final Assembly				
-1	10D000582P2	105582-02	Face Panel	1
-2	10R000827G1	526-0003	Model MD5121 Mechanism Assy	
	10R000827G3	526-0003	Model MD5121A Mechanism Assy	1
	10R000837G2	526-0004	Model MD5221 Mechanism Assy	1
	10R000837G4	526-0004	Model MD5221A Mechanism Assy	1
-3	10D001024G1	106024-01	I.O. Harness	1
-4	10B000634P3	105634-03	Door	1
-5	10C001192G1	106192-01	Handle Assy	1
-6	10B000371P18	105371-18	Model MD5121 S.N. Tag	1
	10B000371P20	105371-20	Model MD5121A S.N. Tag	1
	10B000371P19	105371-19	Model MD5221 S.N. Tag	1
	10B000371P21	105371-21	Model MD5221A S.N. Tag	1
-7	10D000621G1	105621-01	Shroud R.H. Side	1
-8	10D000621G2	105621-02	Shroud L.H. Side	1
-9	10D000360P1	105360-01	Shroud Top	1
-10	10C000624G1	105624-01	Shroud Bottom	1
-11	10C001091P1	106091-01	Shroud Rear	1
-12	10B000592P3	105592-03	Filler Panel	1
-13	10B000633P1	105633-01	Access Panel	2
-14	WAC000119P042	606-0400	Washer Flat No. 4	4
-15	SCC000110P0404	608-0404	Screw Thd Form 4x1/4 lg	4
-16	SCC000313P0820	608-0820	Screw Thd Form 8x1-1/4 lg	2
-17	SCC000088P10041	600-0004	Screw Pan Hd 10-32x1/4 lg	6
-18	WAC000120P08	605-0800	Washer Lock No. 8	27
-19	SCC000088P08081	600-0808	Screw Pan Hd 8-32x1/2 lg	33
-20	SCC000256P0812	624-0812	Screw Fr Oval 8-32x0.750 lg	2
-21	SCC000256P0604	624-0604	Screw Fr Oval 6-32x0.250 lg	2

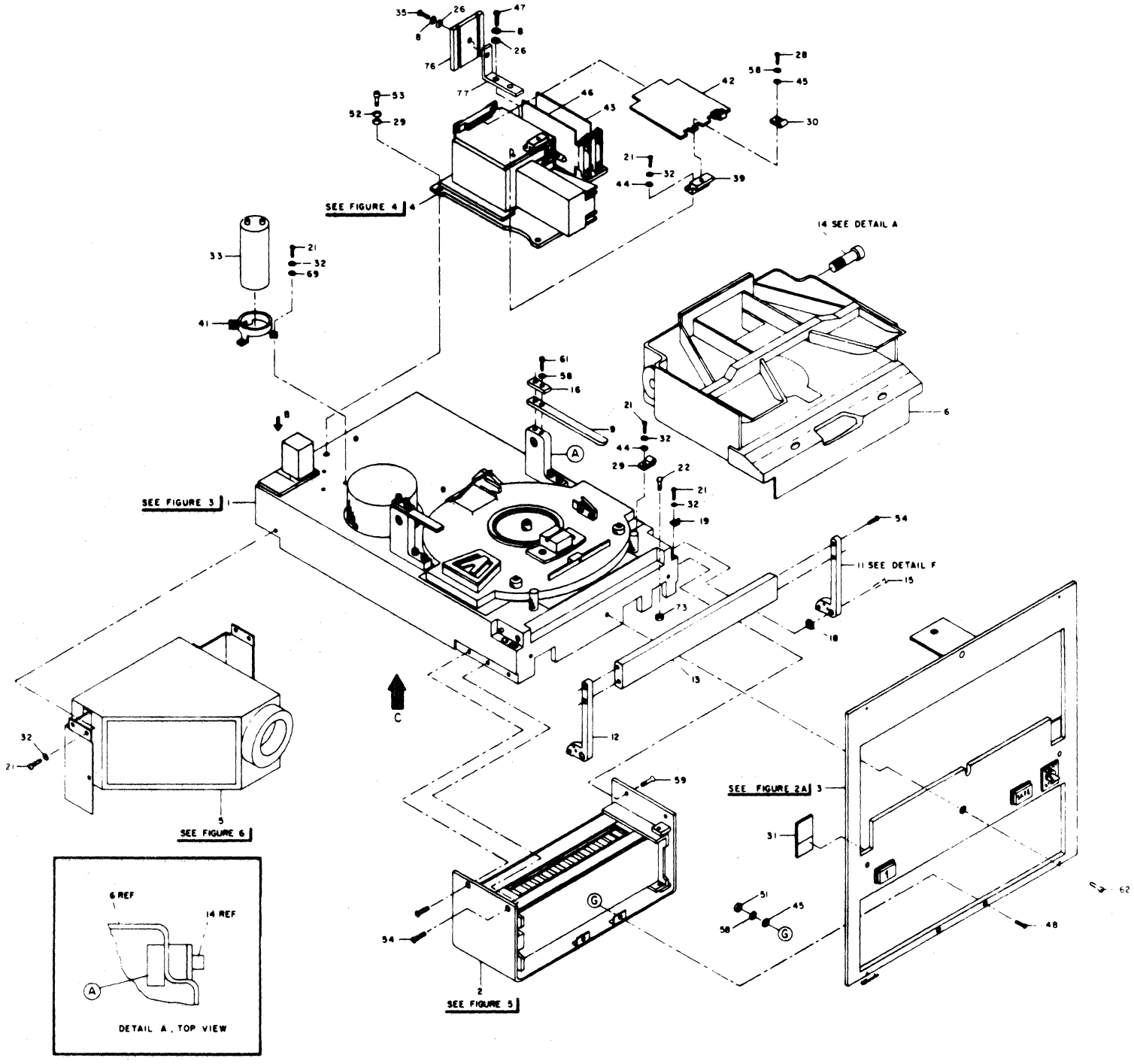


FIGURE 2. MECHANISM ASM SEE LIST 2
SHEET 1 OF 2.

525A

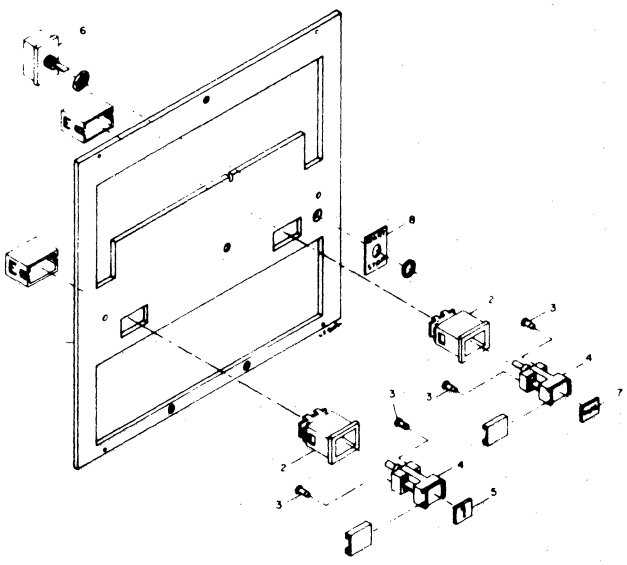
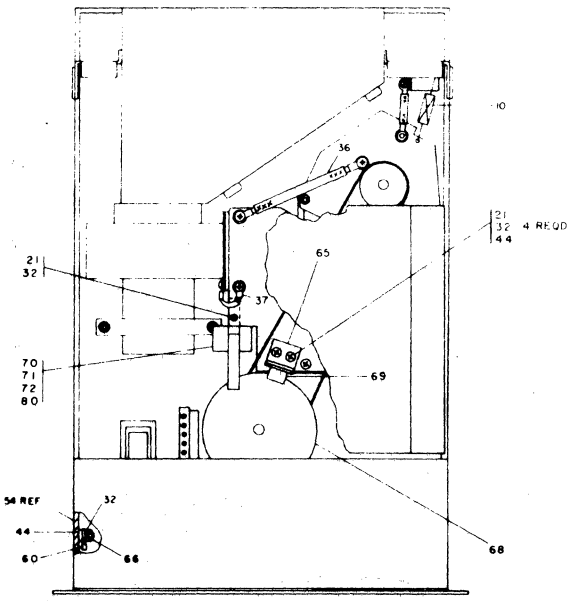
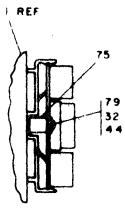
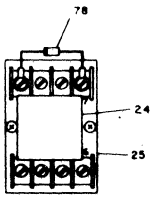


FIGURE 2A. FRONT PANEL ASM. SEE LIST 2A.

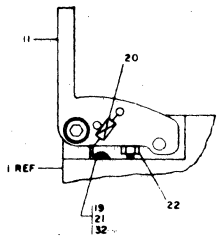


DETAIL C OF FIGURE 2.





DETAIL B OF FIGURE 2



DETAIL F OF FIGURE 2.

FIGURE 2. MECHANISM ASM. SEE LIST 2.
SHEET 2 OF 2

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 2, Mechanism Assembly See List 1-2 for next assembly				
-1	10D000934G1	105934-01	Model MD5121 Base Plate Assy	1
	10D000934G3	105934-03	Model MD5121A Base Plate Assy	1
	10D000934G2	105934-02	Model MD5221 Base Plate Assy	
	10D000934G4	105934-04	Model MD5221A Base Plate Assy	1
-2	10D000230G11	105230-11	Elec. Mod. Assy	1
-3	10D000627G3	105627-03	Front Panel Assy	1
-4	10D001087G1	106087-01	Positioner Assy	1
-5	10D001025G1	106025-01	Air Inlet Assy	1
-6	10D000635G2	105635-02	Receiver Assy	1
-7	10C000370G8	105370-08	Ground Strap	1
-8	WAC000120P10	605-1000	Washer Lock 10	3
-9	10A000077P1	105077-01	Spring	2
-10	SRC000035P005	616-3505	Spring	1
-11	10C000628G3	105628-03	Cam and Handle	1
-12	10C000628G4	105628-04	Cam and Handle	1
-13	10B000596P1	105596-01	Tie Bar	1
-14	SCC000047P0812	615-0812	Shoulder Screw	2
-15	SCC000047P0606	615-0606	Shoulder Screw	2
-16	10A000054P1	105054-01	Spring Keeper	2
-17	SVB000070P03	669-7003	Sleeving Shrink	18"
-18	WAC000169P03	612-0037	Washer	2
-19	10A000277P1	105277-01	Bracket	2
-20	SRC000035P006	616-3506	Spring	2
-21	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	19
-22	SCB000098P1406	621-1406	Screw Hex Hd 1/4-20x3/8 lg	2
-23	LGC000048P05181	656-0010	Lug Ring	9
-24	K0C000102P3112	502-3112	Relay	1
-25	SKC000105P1	502-1051	Relay Socket	1
-26	WAC000119P102	606-0001	Washer Flat 10	3
-27	10A000254P1	105254-01	Washer	4
-28	SCC000088P06121	600-0612	Screw Pan Hd 6-32x3/4 lg	2
-29	CCC000052P018	661-0013	Cable Clamp	1
-30	CCC000335P01	661-0021	Cable Clamp	2
-31	10A000664P1	105664-01	Gasket	2
-32	WAC000120P08	605-0800	Washer Lock 8	21
-33	C0C0000347P2	134-2859	Capacitor	1
-34	10C001026G1	106026-01	Cagle Sig/Pwr	1
-35	SCC000088P10121	600-0012	Screw Pan Hd	1
-36	10C000370G4	105370-04	Ground Strap	1
-37	10C000370G5	105370-05	Ground Strap	1
-38	10A000460P1	105460-01	Washer	2
-39	10B000019P1	105019-01	Board Bracket	2

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 2, Mechanism Assembly (continued)				
-40	LGC000048P05141	656-0008	Lug Ring	2
-41	CCC000346P1	664-0002	Capacitor Clamp	1
-42	10D001045G4	106045-04	Model MD5121 and 5121A RAWD/A PWB Assy	1
	10D001045G2	106045-02	Model MD5221 and 5221A RAWD/A PWB Assy	
-43	10D001037G1	106037-01	VCAP PWB Assy	1
-44	WAC000119P082	606-0800	Washer Flat 8	12
-45	WAC000119P062	606-0600	Washer Flat 6	2
-46	10D001039G1	106039-01	VCAC PWB Assy	1
-47	SCC000088P10061	600-1006	Screw Pan Hd 10-32x3/8 lg	2
-48	SCC000121P0606	627-0606	Screw Flat Hd 6-32x3/8 lg	2
-49	CLC000184P20062	693-0010	Cable Shielded	60"
-50	CLC000124P2205	693-0005	Cable	30"
-51	NUC000122P061	604-0600	Nut Hex 6	2
-52	10A000254P2	105254-02	Washer	4
-53	SCC000043P14081	602-1408	Screw Allen Hd 1/4-20x1/2	6
-54	SCC000121P0810	627-0810	Screw Flat Hd 8-32x5/8 lg	5
-55	10C000020G1	105020-01	Model MD5121 and 5121A Connector Clamp (not required for Model MD5221 and 5221A)	1
-56	HIC000040P2	526-0003	Model MD5121 Read/Write Head	1
		526-0002	Model MD5121A Read/ Write Head	1
	HIC000322P2	526-0001	Model MD5221 Read/Write Head	1
		526-0004	Model MD5221A Read/ Write Head	1
-57	LGC000048P05221	656-0011	Lug Ring	7
-58	WAC000120P06	605-0600	Washer Lock 6	2
-59	SCC000121P0806	627-0806	Screw Flat Hd 8-32x3/8 lg	3
-60	HIC000040P1	526-0004	Model MD5121 Read/Write Head	2
	HIC000040P1	526-0004	Model MD5121A Read/Write Write Head	2
	HIC000322P1	526-0002	Model MD5221 Read/Write Head	2
	HIC000322P1	526-0002	Model MD5221A Read/Write Head	2
-61	SCC000043P06101	602-0610	Screw Allen Hd 6-32x5/8 lg	4
-62	SCC000121P0808	627-0808	Screw Flat Hd 8-32x1/2 lg	1
-63	10C000835P1	105835-01	Model MD5121 and 5121A Timing Disk	1
	10C000835P3	105835-03	Model MD5221 and 5221A Timing Disk	1

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 2, Mechanism Assembly (continued)				
-64				
-65	10B000981P1	105981-01	Bracket Mtg	1
-66	NUC000122P081	604-0800	Nut Hex 8	1
-67	WAC000119P142	606-0007	Washer Flat 1/4	2
-68	WAC000119P081	606-0005	Washer Flat 8	3
-69	TDC000339P1	520-0001	Sector Trans	1
-70	10B000990P1	105990-01	Bottom Pole	
-71	10B000991P1	105991-01	Top Pole	1
-72	10C000992P3	105992-03	Coil	1
-73	NUC000122P141	604-0140	Nut Hex 1/4	2
-74	LGC000048P04221	656-0006	Lug Ring	1
-75	10A000274P2	105274-02	Spacer Tube	2
-76	10B001097P1	106097-01	PWB Keeper	1
-77	10B001098P1	106098-01	PWB Keeper Support	1
-78	CRB000011P1	300-4003	Diode	1
-79	SCC000088P08121	600-0812	Screw Pan Hd 8-32x3/4	2
-80	SCC000043P06121	602-0612	Screw Allen Hd 6-32x3/4	2
List 2A, Front Panel Assembly See List 2-3 for next assembly				
-1	10C000570P2	105570-02	Front Panel	1
-2	SWB000082P5	508-0003	Switch Housing	2
-3	DSB000084P1	659-8401	Lamp	4
-4	SWC000083P64	509-0003	Display Module	2
-5	10B000058P11	105058-11	Switch Insert	1
-6	SWC0000170P213	507-0002	Switch Toggle	1
-7	10D000163P003	105163-03	Switch Insert	1
-8	10B000057P1	105057-01	Switch Plate	1

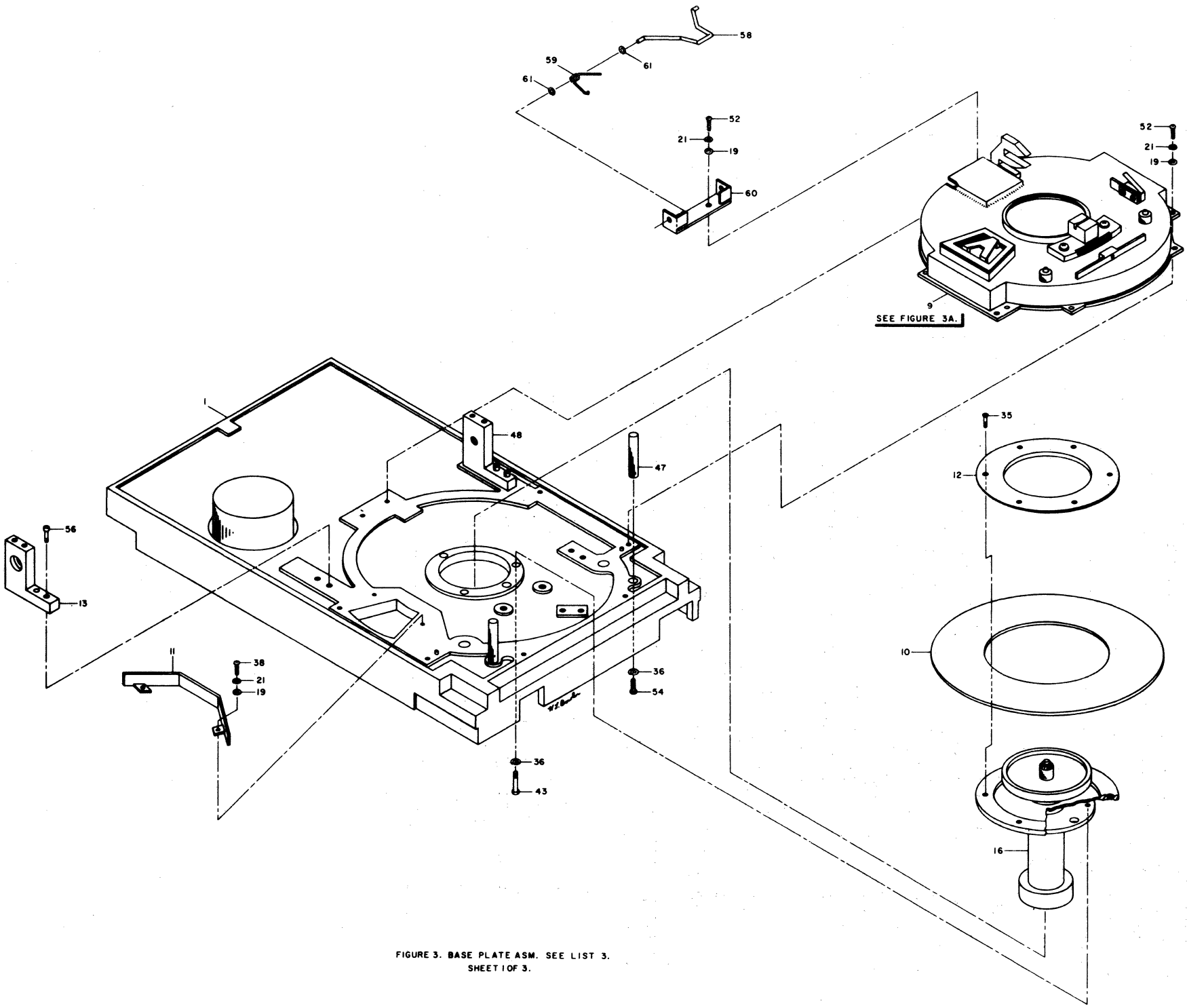


FIGURE 3. BASE PLATE ASM. SEE LIST 3.
SHEET 1 OF 3.

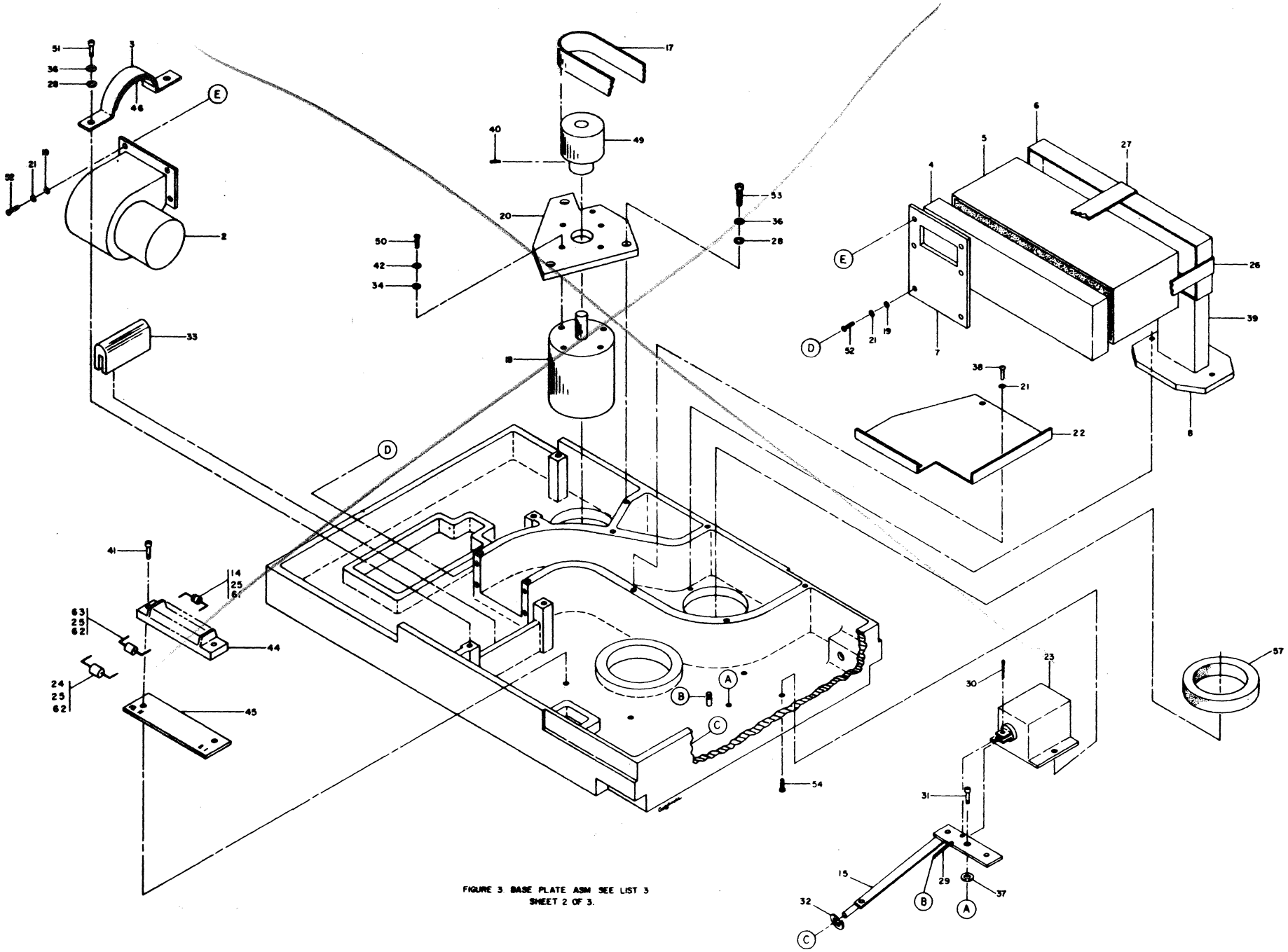


FIGURE 3. BASE PLATE ASM SEE LIST 3
SHEET 2 OF 3.

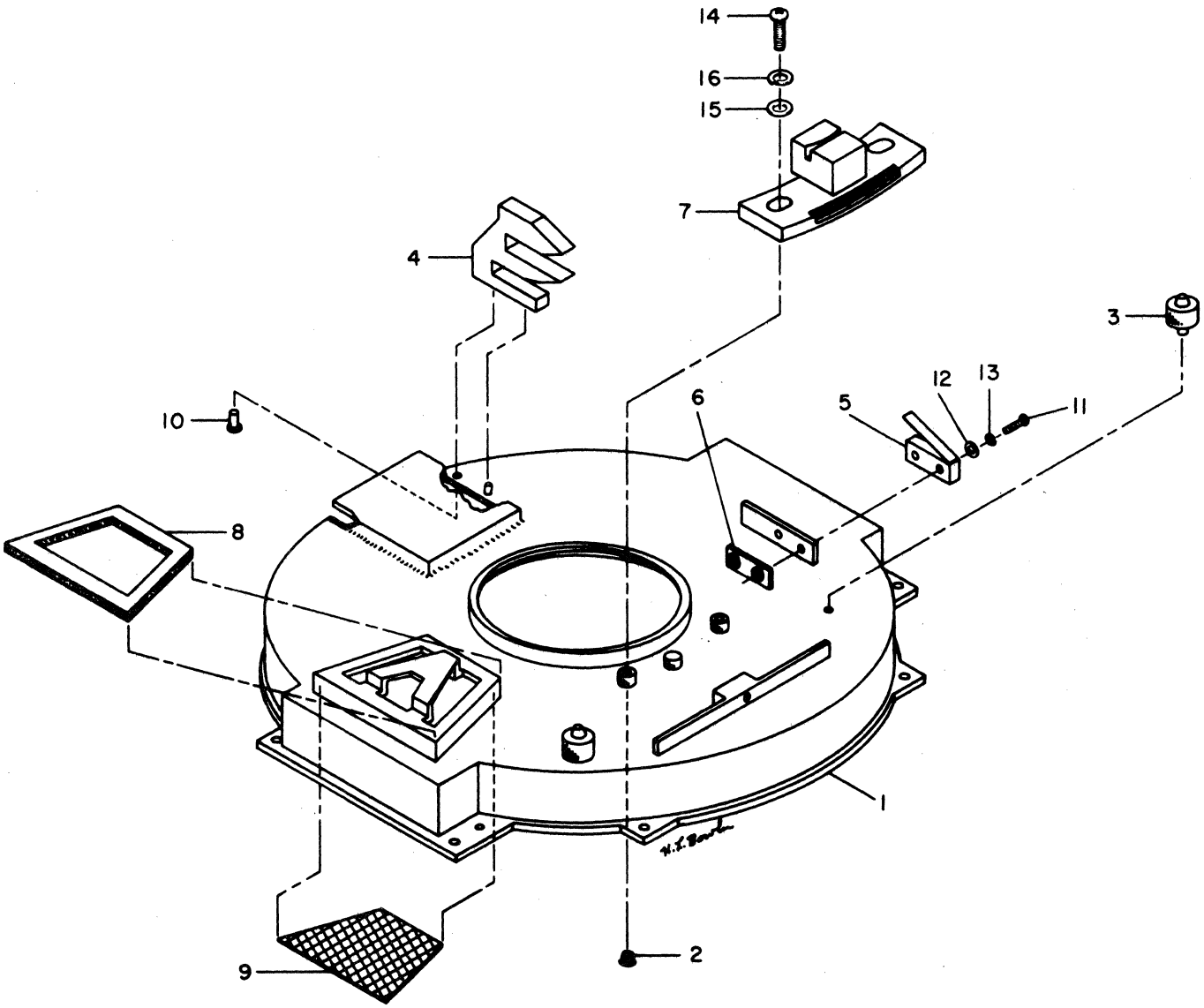


FIGURE 3A. DISK SHROUD ASM. SEE LIST 3A.
SHEET 3 OF 3.

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 3, Base Plate Assembly See List 2-1 for next assembly				
-1	10R001027G1	106027-01	Base Plate	1
-2	BLC000028P3	518-2803	Model MD5121 and 5221 Blower	1
	BLC000028P4	518-2806	Model MD5121A and 5221A Blower	1
-3	10A000355P1	105355-01	Blower Clamp	1
-4	10C001014P1	106014-01	Inlet Plenum	1
-5	FLC000341P1	521-0002	Air Filter	1
-6	10C001013P1	106013-01	Outlet Plenum	1
-7	10B001010P1	106010-01	Inlet Flange	1
-8	10B001011P1	106011-01	Outlet Flange	1
-9	10D000833G1	105833-01	Disk Shroud Assy	1
-10	DMC000332P1	522-0006	Model MD5121 and 5121A Disk Magnetic	1
	DMC000332P2	522-0007	Model MD5221 and 5221A Disk Magnetic	1
-11	10C000972G1	105972-01	Baffle	1
-12	10C000823P1	105823-01	Disk Clamp	1
-13	10C000343P2	105343-02	Pivot Block	1
-14	CRB000011P1	300-4003	Diode	1
-15	10C000275G1	105275-01	Lock Assembly	1
-16	10C000822G1	105822-01	Spindle Assy	1
-17	BTB000057P1	610-0015	Model MD5121 and 5221 Timing Belt	1
	—	610-0014	Model 5121A and 5221A Timing Belt	1
-18	B0C000301P1	519-0009	Model 5121 and 5221 Motor	1
	—	519-0008	Model 5121A and 5221A Motor	1
-19	WAC000119P082	606-0800	Washer Flat 8	10
-20	10C001054P1	106054-01	Plate, Motor Mtg	1
-21	WAC000120P08	605-0800	Washer Lock 8	18
-22	10C000998G1	105998-01	Air Pass Cover	1
-23	SEC000060P0242	517-6242	Solenoid	1
-24	R0C000012P4703	101-4705	Resistor	1
-25	LGC000048P05221	656-0011	Lug Ring	6
-26	10C001016G1	106016-01	Strap Assy	1
-27	10C001016G2	106016-02	Strap Assy	1
-28	WAC000119P142	606-0007	Washer Flat 1/4	5
-29	SRC000035P004	616-3504	Spring	1
-30	PIC000059P0106	609-5901	Cotter Pin	1
-31	SCC000047P0410	615-0410	Shoulder Screw	1
-32	RRC000032P04	611-3204	Retaining Ring	1
-33	GRB000112P2	660-1122	Gasket Strip	1
-34	WAC000119P102	606-0001	Washer Flat 10	4

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 3, Base Plate Assembly (continued)				
-35	SCC000121P0606	627-0606	Screw Flat Hd 6-32x3/8 lg	6
-36	WAC000120P14	605-1400	Washer Lock 1/4	10
-37	10A000274P1	105274-01	Lock Spacer	1
-38	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	10
-39	10C001012P1	106012-01	Down spout	1
-40	SCB000113P10041	603-0002	Screw Set	1
-41	SCC000043P08081	602-0808	Screw Allen Hd 8-32x1/2 lg	2
-42	WAC000120P10	605-1000	Washer Lock 10	4
-43	SCC000098P1412	621-1412	Screw Hex Hd	3
-44	TBD000156P1212	657-1512	Terminal Board	1
-45	MSC000160P12022	657-1522	Marker Strip	1
-46	GAA000086P04084	667-0036	Gasket	5
-47	10B000394P1	105394-01	Protecting Pin	2
-48	10C000343P3	105343-03	Pivot Block	1
-49	10C001064P1	106064-03	Model MD5121 and 5221 Pulley	1
	—	106064-05	Model MD5121A and 5221A Pulley	1
-50	SCC000088P10121	600-0012	Screw Pan Hd 10-32x3/4 lg	4
-51	SCC000043P14081	602-1408	Screw Allen Hd 1/4-20x1/2 lg	2
-52	SCC000088P08081	600-0808	Screw Pan Hd 8-32x1/2 lg	8
-53	SCC000043P14121	602-1412	Screw Allen Hd 1/4-20x3/4 lg	3
-54	SCC000088P14101	600-1410	Screw Pan Hd 1/4-20x5/8 lg	2
-55	SCC000088P10081	600-1008	Screw Pan Hd 10-32x1/2 lg	2
-56	SCC000043P14161	602-1416	Screw Allen Hd 1/4-20x1" lg	4
-57	10A000159P4	105159-04	Gasket	1
-58	10B001092P1	106092-01	Door Opener	1
-59	10A001093P1	106093-01	Spring	1
-60	10B000067P2	105067-02	Brkt Door Opener	1
-61	RRC000032P05	611-3205	Retaining Ring	2
-62	SVB000049P22	669-0122	Sleeving	6"
-63	C0C00003P10451	139-1045	Capacitor	1

GND STRAP
SEE ERRATA pg 3 of 5
" " 4 of 5

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 3A, Disk Shroud Assembly See List 3-9 for next assembly				
-1	10R000830P1	105830-01	Disk Shroud	1
-2	1NB000317P102	615-0039	Insert	2
-3	10A000831P1	105831-01	Guide Pin	2
-4	10B000832P1	105832-01	Disk Guide	1
-5	SWC000092P3	506-9203	Switch	1
-6	10C000259G1	105259-01	Nut Plate	1
-7	10C000986G1	105986-01	Sector Pickup	1
-8	10A000094P1	105094-01	Gasket	1
-9	10B000996P1	105996-01	Filter	1
-10	PIC000361P0406	614-0040	Groove Pin	2
-11	SCC000088P02061	600-0206	Screw Pan Hd 2-56x3/8 lg	2
-12	WAC000119P022	606-0200	Washer Flat 2	2
-13	WAC000120P02	605-0200	Washer Lock 2	2
-14	SCC000088P10081	600-1008	Screw Pan Hd 10-32x1/2 lg	2
-15	WAC000119P102	606-0001	Washer Flat 10	2
-16	WAC000120P10	605-1000	Washer Lock 10	2

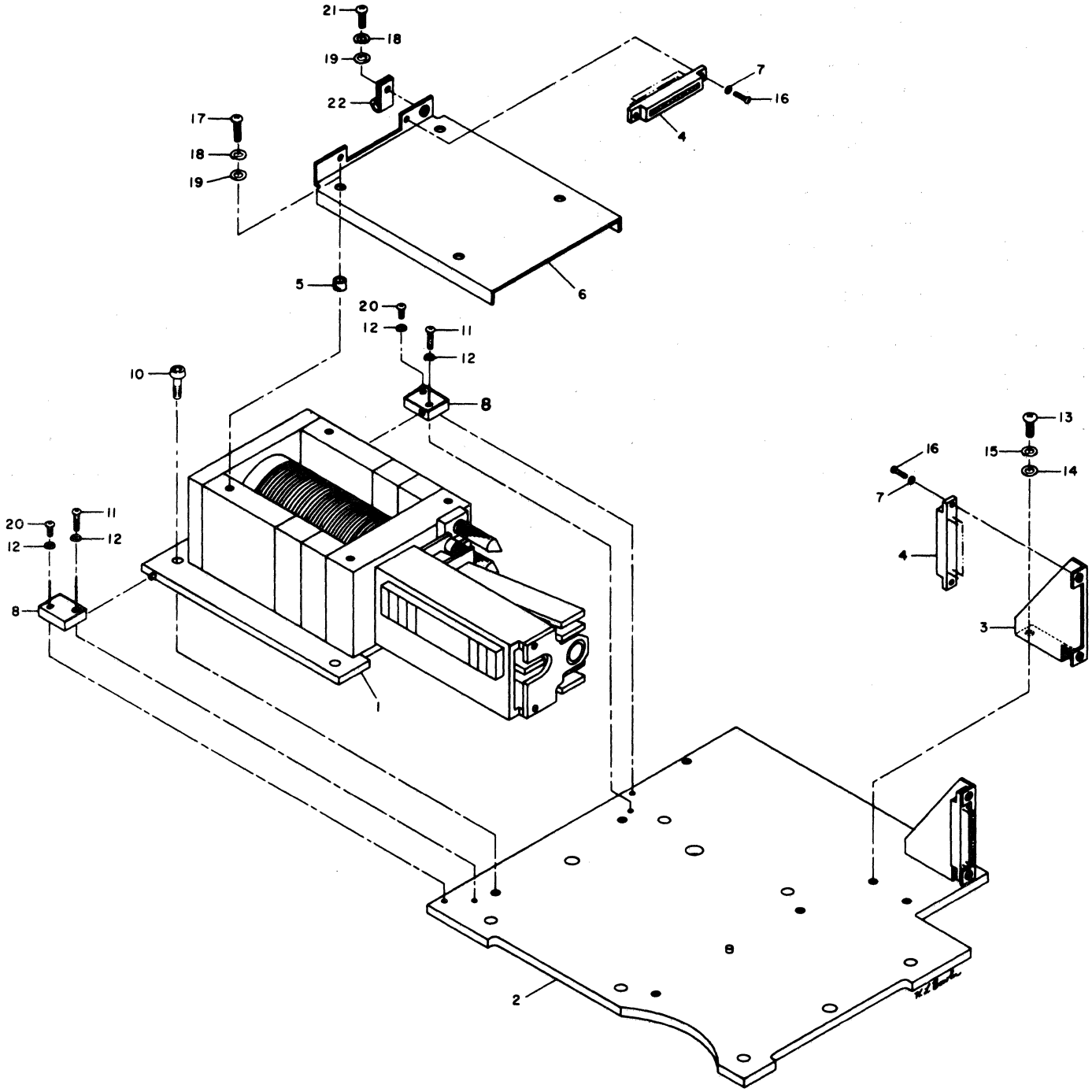
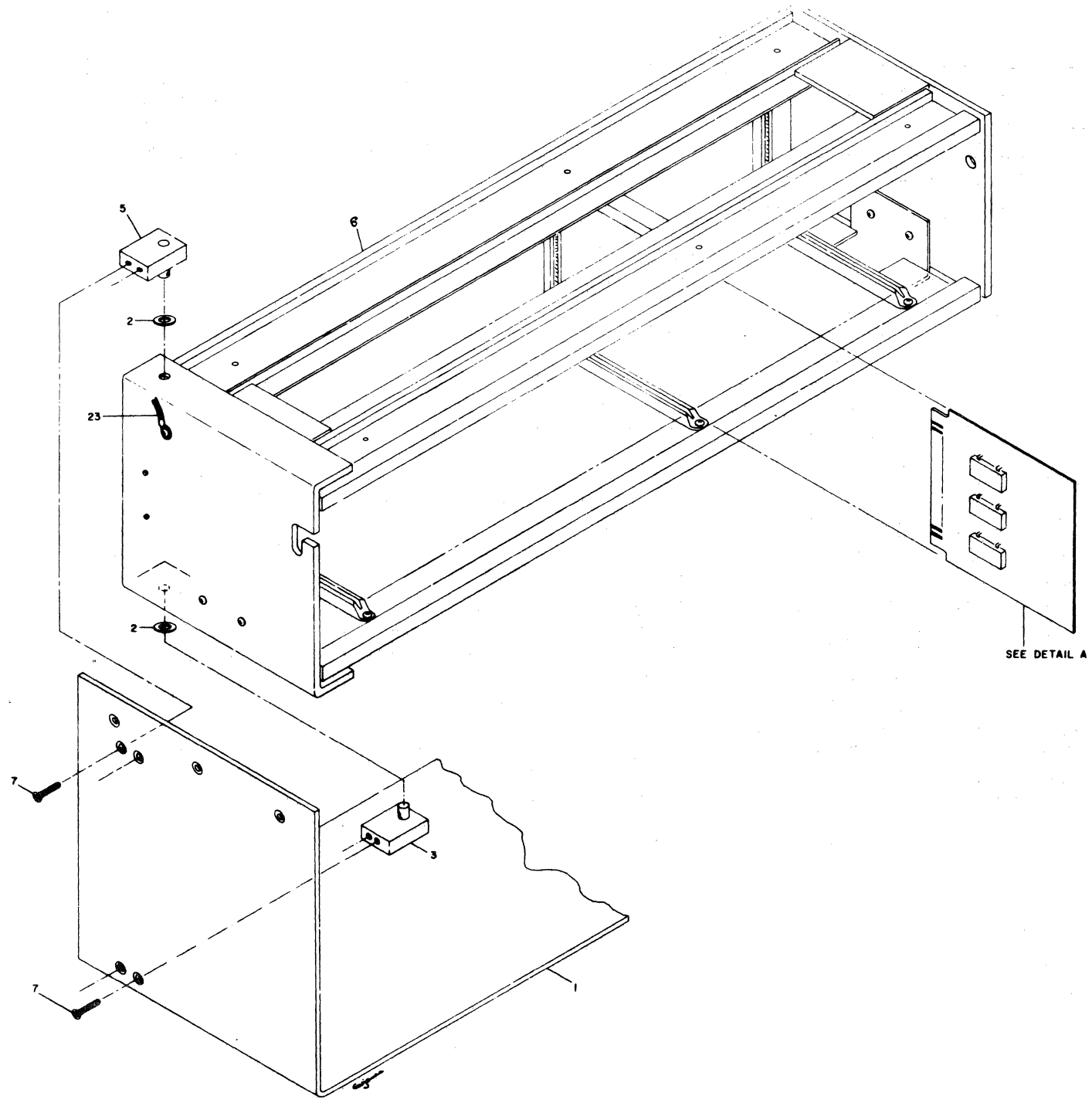


FIGURE 4. POSITIONER ASM. SEE LIST 4.

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 4, Positioner Assembly See List 2-4 for next assembly				
-1	10D001161G1	106161-01	Positioner	1
-2	10D001041G1	106041-01	Base Plate	1
-3	10C001044G1	106044-01	Conn. Mtg Brkt	2
-4	CNC000248P4	503-2484	Connector	3
-5	SPC000139P23	612-0036	Spacer Tube	4
-6	10C001042G1	106042-01	Plate	1
-7	WAC000119P041	606-0004	Washer Flat 4, Narrow	6
-8	10B001075P1	106075-01	Pivot Block	2
-9				
-10	SCC000366P10081	602-0008	Screw Allen Hd 10-32x1/2 lg	4
-11	SCC000088P06141	600-0614	Screw Pan Hd 6-32x7/8 lg	2
-12	WAC000120P06	605-0600	Washer Lock	4
-13	SCC000088P10061	600-1006	Screw Pan Hd 10-32x3/8 lg	4
-14	WAC000119P102	606-0001	Washer Flat 10	4
-15	WAC000120P10	605-1000	Washer Lock	4
-16	SCC000088P04081	600-0408	Screw Pan Hd 4-40x1/2 lg	6
-17	SCC000088P08101	600-0810	Screw Pan Hd 8-32x5/8 lg	4
-18	WAC000120P08	605-0800	Washer Lock 8	5
-19	WAC000119P082	606-0800	Washer Flat 8	5
-20	SCC000088P06061	600-0606	Screw Pan Hd 6-32x3/8 lg	2
-21	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	1
-22	CCC000052P025	661-0014	Cable Clamp	1



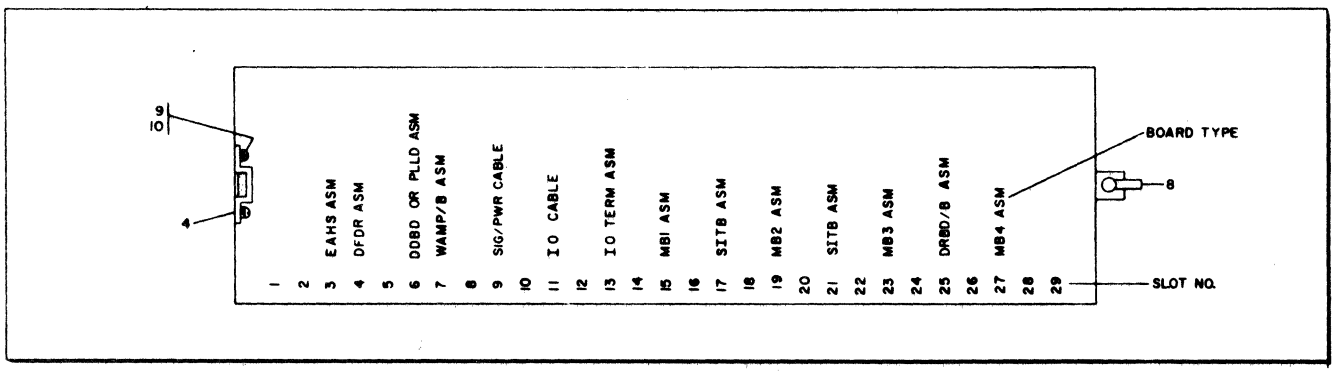
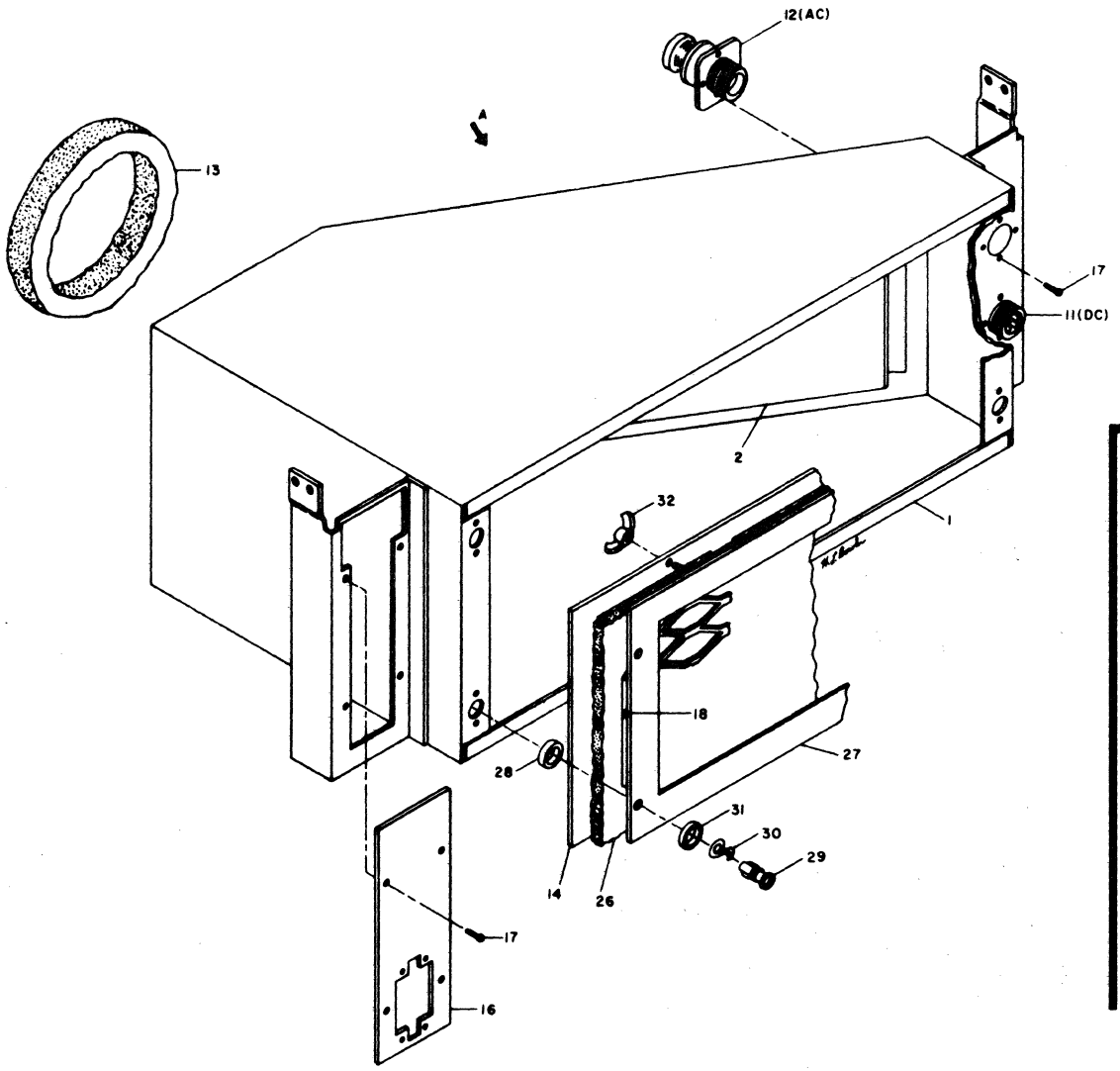
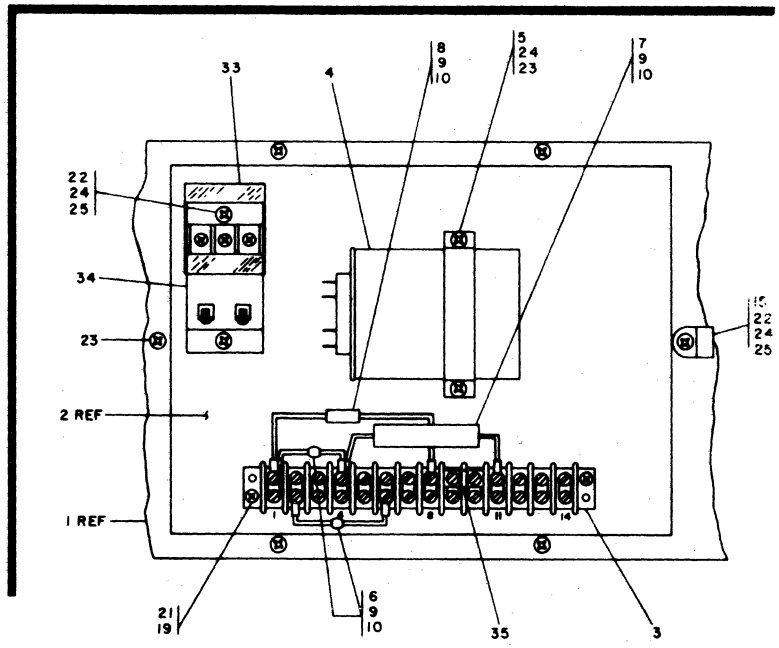


FIGURE 5. ELECTRONIC MODULE ASM. SEE LIST 5.

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 5, Electronic Module Assembly See List 2-2 for next assembly				
-1	10D000250G2	105250-02	Brkt, Elec. Mod.	1
-2	10A000254P1	105254-01	Washer	2
-3	10A000258G2	105258-02	Hinge Block Assy	1
-4	10A000346P4	105346-04	Clamp, Cable	1
-5	10A000258G1	105258-01	Hinge Block Assy	1
-6	10D000201G1	105201-01	Module Assy	1
-7	SCC000121P0608	627-0608	Screw Flat Hd 6-32x1/2 lg	4
-8	LAB000069P1	615-6901	Fastener, Pawl	1
-9	SCC000088P06061	600-0606	Screw Pan Hd 6-32x3/8 lg	2
-10	WAC000120P06	605-0600	Washer Lock 6	2
-11	10C001088G2	106088-02	Model MD5121 and 5121A WAMP/B Assy	1
	10C001088G1	106088-01	Model MD5221 and 5221A WAMP/B Assy	1
-12	10C001006G1	106006-01	DFDR Assy	1
-13	10C001034G3	106034-03	I.O. Terminal Assy	1
-14	10C001078G1	106078-01	MB1 Assy	1
-15	10C000987G1	105987-01	SITB Assy	2
-16	10C001079G1	106079-01	MB2 Assy	1
-17	10C001080G1	106080-01	MB3 Assy	1
-18	10C001076G1	106076-01	DRBD/B Assy	1
-19	10C000790G1	105790-01	MB4 Assy	1
-20				
-21	10C000197G1	105197-01	Model MD5121 and 5121A DDBD Assy	1
	10C000774G1	105774-01	Model MD5221 and 5221A PLLD Assy	1
-22	10C000737G1	105737-01	EAHS Assy	1
-23	10C000370G9	105370-09	Ground Strap	1





VIEW A

FIGURE 6. AIR INLET ASM. SEE LIST 6

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 6, Air Inlet Assembly See List 2-5 for next assembly				
-1	10R000525G1	105525-01	Housing	1
-2	10C001033G1	106033-01	Comp. Mtg. Plate	1
-3	TBD000156P1412	657-1514	Terminal Board	1
-4	C0C000101P2	140-5050	Capacitor	1
-5	CCB000185P1	664-1851	Capacitor Clamp	1
-6	CRB000011P1	300-4003	Diode	2
-7	R0C000147P15187	118-1510	Resistor	1
-8	R0C000147P27934	117-0027	Resistor	1
-9	SVB000049P22	669-0122	Sleeving	14"
-10	LGC000048P05221	656-0011	Lug Ring	8
-11	CNC000090P1	503-9001	Conn. Round (P2)	1
-12	CNC000090P2	503-9002	Conn. Round (P3)	1
-13	10A000093P1	105093-01	Gasket Blower	1
-14	10C000594P2	105594-02	Filter Retainer	1
-15	CCC000052P025	661-0014	Cable Clamp	1
-16	10B001032P1	1060032-01	Panel	1
-17	SCC000110P0606	608-0606	Screw Thd Form 6x3/8 lg	12
-18	GAA000086P01042	667-0030	Gasket	43"
-19	WAC000120P06	605-0600	Washer Lock 6	2
-20				
-21	SCC000088P06101	606-0610	Screw Pan Hd 6-32x5/8 lg	2
-22	SCC000088P08081	600-0808	Screw Pan Hd 8-32x1/2 lg	3
-23	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	7
-24	WAC000120P08	605-0800	Washer Lock 8	5
-25	WAC000119P082	606-0800	Washer Flat 8	3
-26	FLA000087P2	614-0002	Air Filter	1
-27	10D000997G1	105997-01	Filter Grille Assy	1
-28	QTC000085P00001	615-0048	Retainer Qt	4
-29	QTC000085P2201	615-0044	Stud Qt	4
-30	QTC000085P00004	615-0046	Stud Ejector	4
-31	QTC000085P00005	615-0045	Wear Washer	4
-32	NUC000148P06	615-0037	Nut Wing	4
-33	10B001090P1	106090-01	Cover	1
-34	SWB000300P2	527-0001	Switch	1
-35	JCC000164P022	657-1642	Jumper Clip	1

SECTION VIII

SPECIAL TOOLS AND SPARE PARTS LIST

Special Tools List
Applies to both 50 Hz and 60 Hz Drives

CMD Part No. Reference	PERTEC Part No.	Description	No. of Drives 1-10	11-20	21-30	31-50	51-100
DCC000225P1	522-0005	CE Disk Cartridge	1	2	3	4	10
10C001050G1	106050-01	CEBD PWB Assy	1	2	3	4	10
10C000616G1	105616-01	PWB Extender	1	1	2	2	4
10B000838G1	105838-01	Adjust Tool Sector	1	2	3	5	10
10C000069G1	105069-01	Head Adapter, Single Density Only, D5101A and 5121A	1	2	3	5	10
ACB000348P1	623-0002	Cleaning Tool Head, Dual Disk Only, D5121A and 5221A	1	4	8	16	32
ACB000348P2	623-0003	Cleaning Pad Dual Disk Only, D5121A and 5221A	50	100	150	200	400
-	105598-01	PWB Extractor	1	1	1	1	1
-	106206-01	Head Adjustment Tool	1	1	1	1	1
-	106257-01	Photocell Adjustment Tool	1	1	1	1	1

Spare Parts List

The following list shows the recommended quantities of spare parts for on-site repairs of the 5000 Series Drives.

CMD PART No. Reference	PERTEC Part No.	Description	No. of Drives 1-10	11-20	21-30	31-50	51-100
10C000197G1	105197-01	DDBD PWB Assy, Single Density Only, MD5101A and MD5121A	1	1	2	3	5
10C001006G1	106006-01	DFDR PWB Assy	1	1	2	3	5
10C001076G1	106076-01	DRBD/B PWB Assy	1	1	2	3	5
10C000737G1	105737-01	EAHS PWB Assy	1	1	2	3	5
10C001034G3	106034-03	IOTER PWB Assy	1	1	2	3	5
10C001078G1	106078-01	MB1 PWB Assy	1	1	2	3	5
10C001079G1	106079-01	MB2 PWB Assy	1	1	2	3	5
10C001080G1	106080-01	MB3 PWB Assy	1	1	2	3	5
10C000790G1	105790-01	MB4 PWB Assy	1	1	2	3	5
10C000774G1	105774-01	PLLD PWB Assy	1	1	2	3	
		Double Density Only, MD5201A and 5221A	1	1	2	3	5
10D001045G3	10645-02	RA/WD/A PWB Assy MD5201 and MD5201A	1	1	2	3	
10C001045G5	106045-04	RA/WD/A PWB Assy MD5101 and MD5101A	1	1	2	3	
10D001045G4	106045-04	RA/WD/A PWB Assy MD5121 and 5121A	1	1	2	3	5
10D001045G2	106045-02	RA/WD/A PWB Assy MD5221 and 5221A	1	1	2	3	5
10C001088G2	106088-02	WAMP/B PWB Assy Single Density Only, MD5101A and 5121A	1	1	2	3	5
10C001088G1	106008-01	WAMP/B PWB Assy Double Density Only, MD5201A and 5221A	1	1	2	3	5
10C000987G1	105987-01	SITB PWB Assy	1	1	2	3	5
10D001039G1	106039-01	VCAC PWB Assy	1	1	2	3	5
10D001037G1	106037-01	VCAP PWB Assy	1	1	2	3	5

Recommended Spare Parts List (continued)

CMD Part No. Reference	PERTEC Part No.	Description	No. of Drives 1-10	11-20	21-30	31-50	51-100
DMC000040P1	526-0003	Read/Write Head, Single Density Only, MD5101A and 5121A	2	4	4	6	8
DMC000040P2	526-0004	Read/Write Head, Single Density Only, MD5101A and 5121A	2	4	4	6	8
HIC000322P1	526-0001	Read/Write Head, Double Density Only, MD5201A	2	4	4	6	8
	526-0003	Read/Write Head, Double Density Only, MD5221A	2	4	4	6	8
HIC000322P2	526-0002	Read/Write Head, Double Density Only, MD5201A	2	4	4	6	8
	526-0004	Read/Write Head, Double Density Only, MD5221	2	4	4	6	8
P0D000342P1	106087	Positioner Assy	1	1	1	2	2
DMC000333P1	522-0006	Disk Magnetic, MD5121	1	1	2	4	5
DMC000333P2	522-0007	Disk Magnetic, MD5221A	1	1	2	4	5
10D000833G1	105883-01	Disk Shroud Assy, Dual Disk Only, MD5121A and 5221A	0	1	1	1	2
SWC000092P3	506-9203	Switch (S5)	1	1	1	2	3
SWC000170P0213	507-0002	Switch Toggle (S6)	1	1	2	3	5
SWB000300P2	527-0001	Switch Triac	1	1	1	2	2
C0C000101P2	140-5050	Capacitor ac (C1)	1	1	1	2	2
C0C000347P2	134-2859	Capacitor (C2)	1	1	1	2	2
K0C000102P3112	502-3112	Relay (K1)	1	1	1	1	2
DSB000084P1	659-8401	Switch Lamp	10	10	10	20	30
DSB000374P1	659-3741	Lamp Pos. Transducer	2	2	3	4	5
10D000635G3	105634-03	Receiver Assy, Single Disk Only, MD5101A and 5201A	0	1	1	1	2
10D000635G2	105635-02	Receiver Assy, Dual Disk Only, MD5121A and MD5221A	0	1	1	1	2

Recommended Spare Parts List (continued)

CMD Part No. Reference	PERTEC Part No.	Description	No. of Drives 1-10	11-20	21-30	31-50	51-100
10C000320G2	105320-02	Spindle Assy, Single Disk Only, MD5101A and 5201A	1	1	1	1	2
10C000822G1	105822-01	Spindle Assy, Dual Disk Only, MD5121A and 5221A	1	1	1	1	2
FLC000341P1	521-0002	Absolute Filter	5	10	15	25	50
FLC000087P2	614-0002	Filter	20	40	60	100	200
10C000986G1	105986-01	Sector Pick Up Assy	1	1	1	1	2
10D000582P2	105582-02	Face Panel	0	1	2	2	4
10B000634P3	105634-03	Door Panel	0	0	1	1	2
B0C000135P1	519-0009	Driver Motor, Single Disk 60 Hz Only, MD5101 and MD5201	0 0	0 0	1 1	1 1	2 2
B0C000385P1	519-0008	Driver Motor, 50 Hz Only, MD5101A, 5201A, 5121A, and 5221A	0	0	1	1	2
B0C000301P1	501-0009	Driver Motor, Dual Disk 60 Hz Only, MD5121 and MD5221	0	0	1	1	2
BLC000028P3	518-2803	Blower, 60 Hz Only, MD5101, 5201, 5121, and 5221	0	0	1	1	2
BLC000028P6	518-2806	Blower, 50 Hz Only, MD5101A, 5201A, 5121A, and 5221A	0	0	1	1	2
BTB000057P2	610-0015	Drive Belt, Single Disk 60 Hz Only, MD5101 and 5201	1	2	3	5	10
BTB000057P5	610-0014	Drive Belt, 50 Hz Only, MD5101A, 5201A, 5121A, and 5221A	1	2	3	5	10
BTB000057P1	610-0015	Drive Belt, Dual Disk 60 Hz Only, MD5121 and 5221	1	2	3	5	6

IX. Power Supply (PS 9004, PS 9004A)

The PS 9004 and PS 9004A Power Supplies, as shown in Fig. 1, Page IX-6 provide the required AC and DC voltages for the MD 5000 Series. Each supply is capable of supplying one or two MD 5000's. The installation schematic is shown in Fig. 6.

The PS 9004A may, in addition, be wired for use with 220 VAC, 50 Hz and used in conjunction with the MD 5000A Series. The cable requirements for both supplies are shown in Fig. 2 Page IX- 7. References below to 115 VAC, 60 Hz also apply to 220 VAC, 50 Hz for the PS 9004A. References to the MD 5000 Series below also apply to the MD 5000A Series.

A. Functional Description

The supply is composed of three subassemblies.

The first is the basic supply which provides the +5 VDC, +12 VDC, -26 VDC, -24 VDC, +24 VDC, +24 VDC control and the AC loss sense at TB3. The basic supply also provides switched 115 VAC at TB1. A schematic of the basic supply in the PS 9004 is shown in Fig. 4. A schematic of the basic supply in the PS 9004A is shown in Fig. 3.

The basic supply is energized by means of the contactor which is activated by grounding TB2-4. The +24 VDC control voltage is not switched by the contactor and thus provides operational voltage to the PSDT circuit board whenever input AC is provided to TB1. The AC loss sense voltage is used to monitor the input power to the power supply.

The second subassembly is the PSDT circuit board which provides sequencing and monitor functions to the power supply as well as drive to the panel lights and contactor. A schematic of the PSDT circuit board is shown in Fig. 5.

The third subassembly is the front panel which contains an ON switch combined with an ON light, and an OFF switch combined with OFF and ATTENTION lights.

When the supply is energized with 115 VAC input at TB1, the PSDT circuit board provides a ground at TB2-6 and TB3-13 to light the OFF light and give a general file reset to the MD 5000. When the ON switch is depressed, a momentary ground is applied to terminal 12 of the PSDT circuit board (via TB2-9) to sequence the power supply on. TB2-4 is grounded to energize the supply, TB2-5 is grounded to light the ON light, and TB2-6 goes to 24 VDC to turn off the OFF light. The general file reset (TB3-13) is held low for 1.5 sec ± 30% after the supply is energized and then rises to 5.8 ± .6v to allow the MD 5000 to come to a SAFE condition. When the OFF switch is depressed a momentary open is provided to terminal 13 of the PSDT circuit board (via TB2-8) to cycle the supply off. The off light is turned on and a general reset is sent to the MD 5000 (ground at TB3-13). If the power supply is in an ON condition and a ground is applied at terminal 15 or 14 of the PSDT board (via TB2-1 and TB2-2 respectively), the supply can not be sequenced to an OFF condition by depressing the

OFF switch. This function provides an interlock so that the supply can not be turned off when the MD 5000 is in a READY condition. A monitor function is also provided by the PSDT circuit board. All five DC supplies are monitored, as well as the AC loss sense voltage. (The -24V sense, the AC loss sense and the +12 VDC supply are "OR'ed" in the basic supply and provided to the PSDT board at terminal 4). If any supply should fail or if either the fuse in the +12 VDC output or the fuse in the -26 VDC output should blow, the PSDT will send a general file reset to the MD 5000 and sequence the supply to an ATTENTION condition.

In the ATTENTION condition, the power supply is de-energized and the OFF and ATTENTION lights are both lit. In order to restart the power supply from an ATTENTION condition, the OFF switch must first be depressed in order to sequence the power supply to an OFF condition, then the ON switch may be used to turn the supply on.

An additional monitor feature of the PSDT board protects the MD 5000 against input AC failure. The AC loss sense will, upon failure, sequence the power supply to an ATTENTION condition. This will occur within 35 ms after loss of input AC power. The MD 5000 will retract the carriage thereby unloading the heads before the DC voltages fail. Thus, data stored on the disk, will not be lost upon an input AC power failure.

B. Reference Data

1. Operation Conditions

   This supply is capable of operating under any or all of the following conditions:

   A. Line Voltage - 115 VAC $\pm$ 10% (PS 9004, PS 9004A)

   \- 220 VAC $\pm$ 10% (PS 9004A)

   B. Line Frequency - 60 $\pm$ 0.6 Hz (PS 9004, PS 9004A)

   \- 50 $\pm$ 1.0 Hz (PS 9004A)

   C. Ambient Temperature - 10° C to 55° C

   D. Relative Humidity - 20% to 80%

2. Terminal Assignments

Voltage	Terminal Board and Pin No's
115 VAC	TB1-1
115 VAC (neutral)	TB1-2
Earth Ground	TB1-3
115 VAC (neutral)	TB1-4
Controlled 115 VAC	TB1-5

2. Terminal Assignments - Continued

Voltage	Terminal Board and Pin No's
+5	TB3-1,2,3
+12	TB3-4,5
AC Loss Sense	TB3-6
-26	TB3-7,8
-24	TB3-9,10
+24	TB3-11,12
General Reset	TB3-13
Ground Buss	TB4
Unit 1 Interlock	TB2-1
Unit 2 Interlock	TB2-2
+24 Control Voltage	TB2-3
Control Relay	TB2-4
DC on lamp	TB2-5
DC off lamp	TB2-6
Attention Lamp	TB2-7
DC on contact - NO	TB2-8
DC off Contact - NC	TB2-9

3. DC Voltage Outputs

Voltage	Maximum Variation	Load Change (% of rated current)	Rated Current
+12	± 5%	20% to 100%	1 amp
-26	± 5%	20% to 100%	1 amp
+5	± 5%	10% to 100%	10 amps
± 24	(+15%,-7%)	1% to 100%	13 amps
+24 Control	(±15%)	40% to 100%	1 amp

525A

SPARE PARTS LIST

The following list shows the recommended quantities, to be stocked at each site and in each region, of spare parts used on a PS9004A Power Supply.

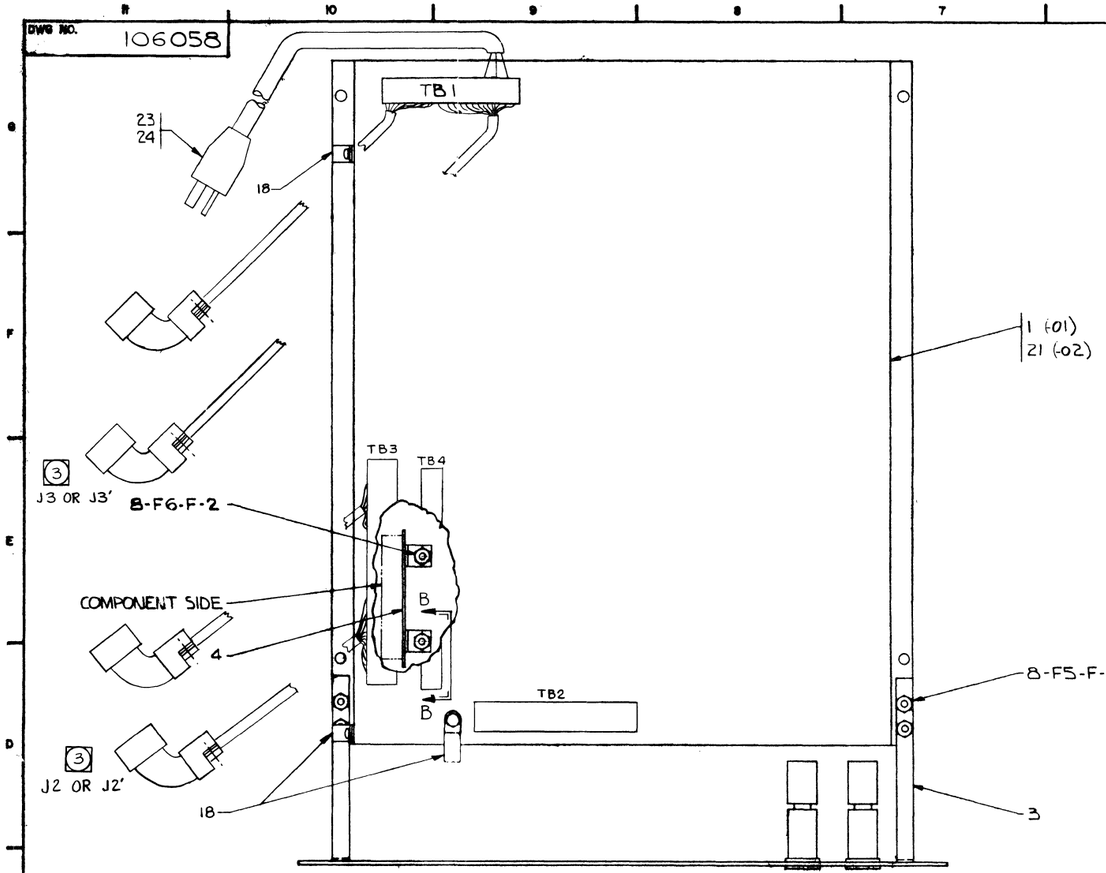
CMD Part No. Reference	PERTEC Part No.	Description	Quantity at Site	Quantity at Reg.
10D001058G2	106058-02	Power Supply	0	1
10D001059G1	106059-01	Inter Cable Assy (P2)	0	1
10D001059G2	106059-02	Inter Cable Assy (P3)	0	1
10C000339G1	105339-01	PSDT PWB	0	1
SWC000081P01	506-8101	Switch Module	2	6
SWB000082P5	508-0003	Switch Housing	1	4
SWC000083P04	509-0001	Display Module	1	4
SWC000083P62	509-0002	Display Module	1	4
DSB000084P1	659-8401	Lamp	4	10
F0B000204P32	663-3700	Fuse (10 amp)	5	10
F0B000204P19	663-3612	Fuse (1.25 amp)	10	20
F0B000204P20	663-3615	Fuse (1.5 amp)	5	10
F0B000204P21	663-3616	Fuse (1.6 amp)	5	10
F0B000204P33	663-3750	Fuse (15 amp)	10	20
F0B000312P01	663-3618	Fuse (3 amp)	5	10

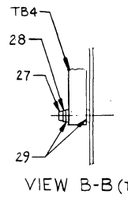
SPARE PARTS LIST

The following list shows the recommended quantities, to be stocked at each site and in each region, of spare parts used on a PS9004 Power Supply

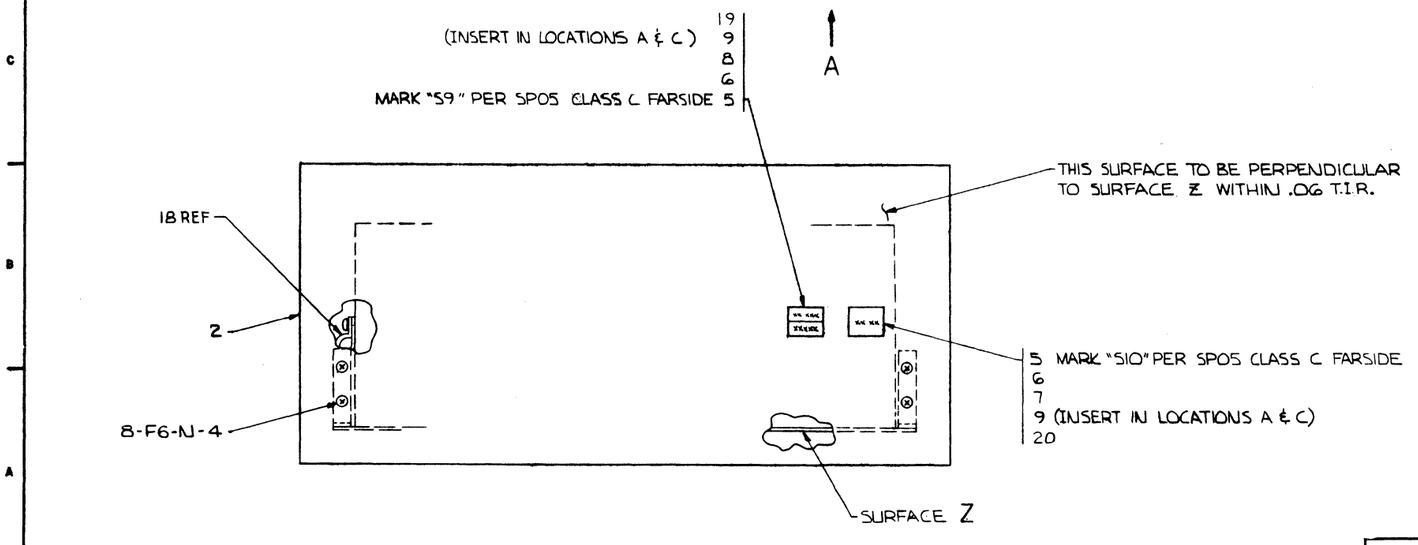
CMD Part No. Reference	PERTEC Part No.	Description	Quantity at Site	Quantity at Reg.
10D001058G1	106058-01	Power Supply	0	1
10D001059G1	106059-01	Inter Cable Assy (P2)	0	1
10D001059G2	106059-02	Inter Cable Assy (P3)	0	1
10C000339G1	105339-01	PSDT PWB	0	1
SWB000081P01	501-8101	Switch Module	2	6
SWB000082P5	508-0003	Switch Housing	1	4
SWC000083P05	509-0001	Display Module	1	4
SWC000083P62	509-0002	Display Module	1	4
DSB000084P1	659-8401	Lamp	4	10
F0B000204P32	663-3700	Fuse (10 amp)	5	10
F0B000204P19	663-3612	Fuse (1.25 amp)	10	20
F0B000204P18	663-3618	Fuse (1 amp)	5	10

DWG NO. 106058





VIEW B-B (TYP)



NOTES:

1. ENGINEERING NOTICES 052 AND 053 MUST BE INCORPORATED INTO THIS ASM.
2. DELETED
3. SEE TOP ASSY FOR APPLICABLE NOMENCLATURE, PART NO. AND REF DESIGNATION.

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	2-15-71
B	000461	5-14-71
C	000472	6-9-71
C1	REC CHG CMD P/N WAS 106061DS8	8-3-71
D	ECN 2895 VJH	12-14-71
E	ECN 2994 LP	Changed per ECN

DC OFF ATTN	DC ON

VIEW A

SEE NOTE 1

QTY -02	QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
4	4	29	668-0603	WASHER, SHOULDER	EA	
2	2	28	606-0007	WASHER, #8	EA	
2	2	27	602-0812	SCREW, HEX HD 8-32	EA	
X	X	26	106254	PWR SUP WIRING DIAG	—	
~~HO~~	—	~~25~~	~~692-3791~~	~~POWER CORD~~	~~IN~~	~~16AWG 3 COND~~
3	3	24	656-0014	LUG RING	EA	
1	1	23	692-2717	POWER CORD	EA	
~~X~~		~~22~~	~~106086-01~~	~~WL POWER SUPPLY~~	—	
1	—	21	525-0001	POWER SUPPLY	EA	
1	1	20	105163-04	SWITCH INSERT	EA	
1	1	19	105163-05	SWITCH INSERT	EA	
3	3	18	661-0017	CABLE CLAMP	EA	
1	1	17	656-0025	LUG RING	EA	#10 #22 AWG
50	50	16	690-9022	WIRE STRANDED	IN	WHT #22 AWG
25	25	15	690-5022	WIRE STRANDED	IN	GRN #22 AWG
50	50	14	690-2022	WIRE STRANDED	IN	RED #22 AWG
50	50	13	690-0022	WIRE STRANDED	IN	BLK #22 AWG
X	X	12	T50041	TEST SPEC	—	
X	X	11	106061-01	WL POWER SUPPLY	—	
6	6	10	656-0016	LUG RING	EA	#6 #22 AWG
4	4	9	659-8401	LAMP		
1	1	8	509-0001	DISPLAY MODULE		
1	1	7	509-0002	DISPLAY MODULE		
2	2	6	508-0003	SWITCH HOUSING		
2	2	5	506-8101	SWITCH MODULE		
1	1	4	105339-01	PSDT ASM		
2	2	3	105015-01	BRACKET		
1	1	2	105342-02	PANEL		
—	1	1	525-0002	POWER SUPPLY	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:
SP 08
SP 05

SIGNATURES	DA	MO	YR
DRAWN	15	2	71
CHECKED			
ENG.	15	2	71
MFG.	15	2	71

MATL:
FINISH:

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: POWER SUPPLY

SIZE	DWG NO.	REV
D	106058	E

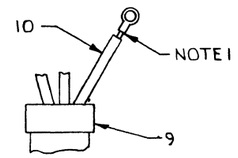
SCALE: 1/2 SHEET 1 CONT. ON F

PERTEC PERIPHERAL EQUIPMENT

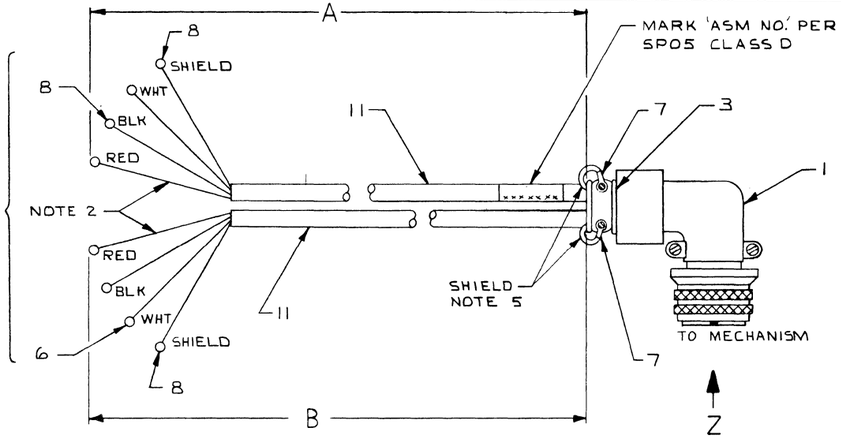
DWG NO. 106059

NOTES:
1. SHIELD TO BE UNWRAPPED, TWISTED, SLEEVED AND LUGGED.
2. STRIP OUTSIDE COVERING BACK 7.0".
3. STRIP OUTSIDE COVERING BACK 2.0".
4. STRIP OUTSIDE COVERING BACK 3.0".
5. STRIP OUTSIDE COVERING BACK 2.0" THIS END. SHIELD TO BE 4.0" LONG.
6. DO NOT CONNECT SHIELD TO CONNECTOR. CUT SHIELD CLOSE TO CONNECTOR AND INSULATE USING ITEM 10.
7. IDENTIFY WITH P/N 106059-(APPLICABLE DASH NO).

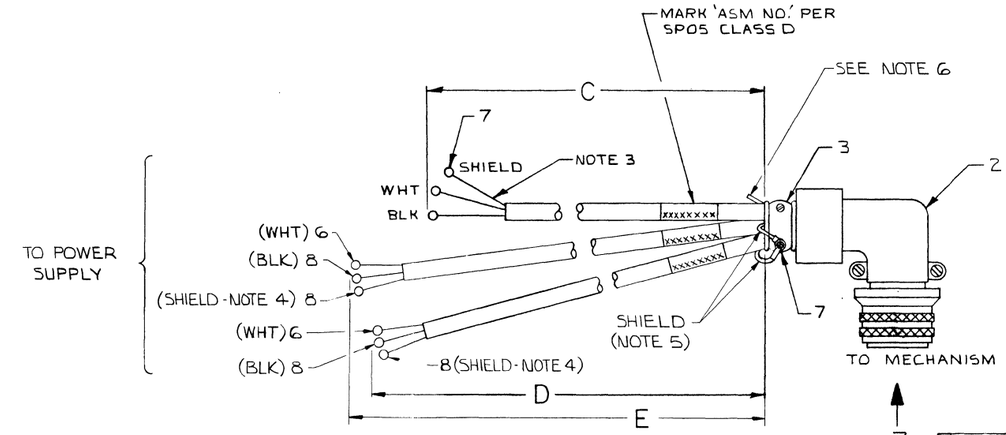
REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	4-8-71
A1	REC CHG. CMD P/N WAS 100001059	8-4-71
B	ECN 2994	12-21-71



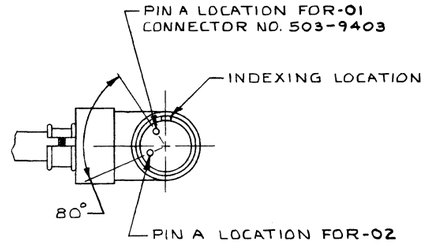
DETAIL Y
FOR ALL CABLE ENDS



VIEW FOR-01 OR-03



VIEW FOR-02 OR-04



VIEW Z

DASH NO.		LENGTH IN INCHES	MARK WIRE TERM PER SPOS CLASS C RED	BLACK	WHITE	SHIELD
-01	A	151.5±1	PSTB3-05	PSTB4-07	PSTB3-08	PSTB4 MTG SCR
	B	151.5±1	PSTB3-02	PSTB3-13	PSTB2-01	PSTB4 MTG SCR
-02	C	128.5±1	—	PSTB1-05	PSTB1-04	PSTB1-03
	D	147.5±1	—	PSTB4-12	PSTB3-12	PSTB4 MTG SCR
	E	147.5±1	—	PSTB4-12	PSTB3-10	PSTB4 MTG SCR
-03	A	75 ± 1	PSTB3-04	PSTB4-07	PSTB3-07	PSTB4 MTG SCR
	B	75 ± 1	PSTB3-01	PSTB3-13	PSTB2-02	PSTB4 MTG SCR
-04	C	64 ±1	—	PSTB1-05	PSTB1-04	PSTB1-03
	D	73 ±1	—	PSTB4-10	PSTB3-11	PSTB4 MTG SCR
	E	73 ±1	—	PSTB4-10	PSTB3-09	PSTB4 MTG SCR

DASH NO.		LENGTH FROM END OF WIRE TO CABLE RED	BLACK	WHITE	SHIELD
-01	A	5.00	6.00	3.50	3.25
	B	6.50	1.75	5.50	3.25
-02	C	—	1.50	2.00	2.50
	D	—	2.00	2.75	2.00
	E	—	2.00	4.25	2.00
-03	A	5.00	6.00	3.50	3.25
	B	6.50	1.75	5.50	3.25
-04	C	—	1.50	2.00	2.50
	D	—	2.00	2.75	2.00
	E	—	2.00	4.25	2.00

QTY -04	QTY -03	QTY -02	QTY -01	ITEM NO	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
—	155	—	310	11	693-0009	CABLE, SHIELDED	IN	16 AWG, 3 COND
24	12	24	12	10	669-7004	SLEEVING, SHRINK	IN	
6	3	6	3	9	669-7007	SLEEVING, SHRINK	IN	
4	3	4	3	8	656-0023	LUG RING	EA	
3	2	3	2	7	656-0015	LUG RING	EA	
4	5	4	5	6	656-0014	LUG RING	EA	
X	X	X	X	5	106061-01	WL POWER SUPPLY	—	
215	—	430	—	4	693-0008	CABLE, SHIELDED	IN	16 AWG, 2 COND
1	1	1	1	3	503-1234	CLAMP CONNECTOR	EA	
1	—	1	—	2	503-9404	CONNECTOR 90°	EA	AC
—	1	—	1	1	503-9403	CONNECTOR 90°	EA	DC

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING MCP PRACTICES: SPOS

SIGNATURES	DA	MO	YR
DRAWN: W. Jones	16	2	71
CHECKED:			
ENG: [illegible]	8	4	71
MFG: W. K. Johnson	5	4	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: INTER CABLE ASM

MATL:
FINISH:

PERTEC PERIPHERAL EQUIPMENT

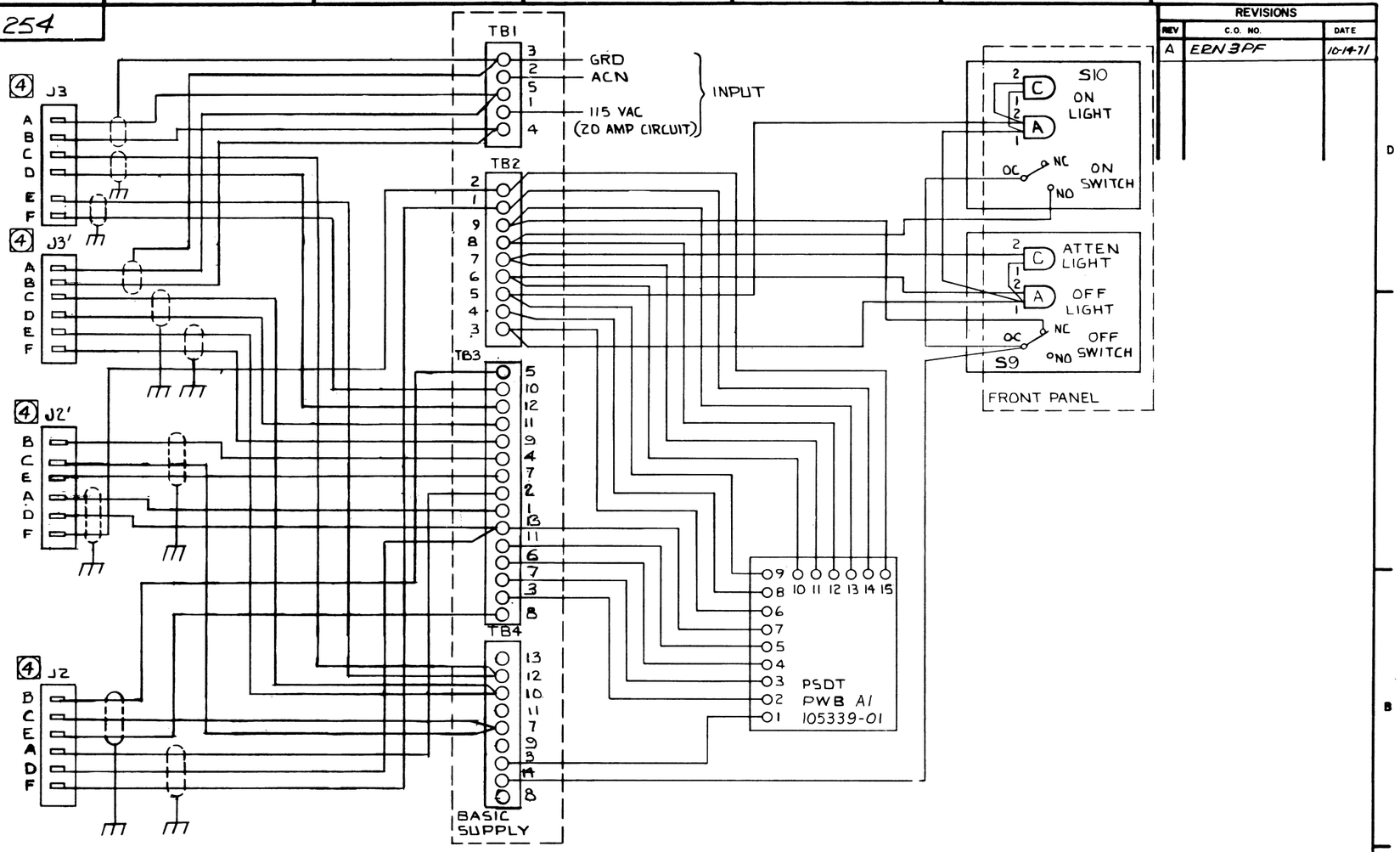
SIZE D | DWG NO. 106059 | REV B
SCALE: NONE | SHEET 1 | CONT. ON F

CMD103

DWG NO. 106254

NOTES:

REVISIONS		
REV	C.O. NO.	DATE
A	EBN3PF	10-14-71



NOTES:

1. EACH SHIELD OF J2, J3, J2' AND J3' IS CONNECTED TO THE SHELL OF THE CONNECTOR AND TO THE CHASSIS OF THE POWER SUPPLY UNLESS OTHERWISE SHOWN.
2. J2 AND J3 ARE DC AND AC CONNECTORS OF THE FIRST DRIVE CONNECTED TO THE POWER SUPPLY. J2' AND J3' ARE THE CONNECTORS FOR THE SECOND DISK DRIVE.
3. REFERENCE DRAWINGS: ASSEMBLY 106058
   WIRELIST 106061
4. UNLESS OTHERWISE SPECIFIED ALL WIRES ARE INCLUDED IN CABLE ASSEMBLY 106059. SEE TOP ASSEMBLY FOR VERSION
5. SEE WIRE LIST FOR WIRE SIZE, COLOR AND TYPE.

PERTEC PERIPHERAL EQUIPMENT

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SIGNATURES	DA	MO	YR
DRAWN	13	10	71
CHECKED	11	2	71
ENG	11	2	71
MFR.	11	3	71

MAT'L:

FINISH:

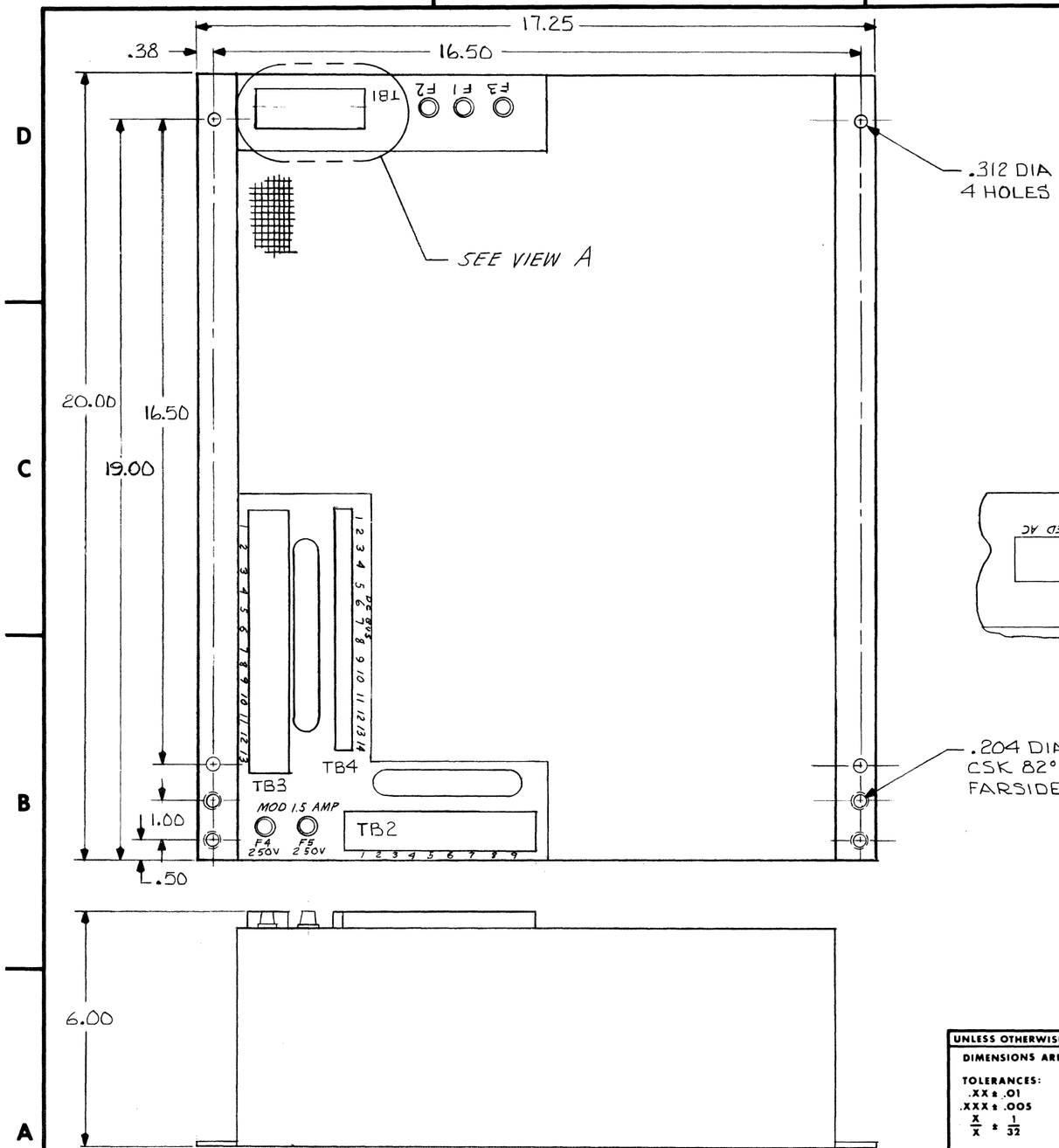
COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

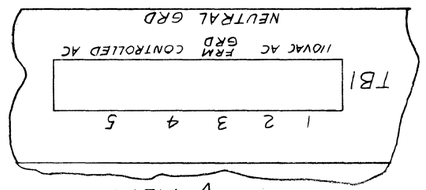
TITLE: WIRING DIAGRAM — POWER SUPPLY (5000)

SIZE	DWG NO.	REV
C	106254	A

SCALE: —— SHEET 1 CONT. ON F

REVISIONS					
REV	DESCRIPTION	DATE	DR	CHK	APPR
A	ERN 3-PK	10/24/72	JKR	RR	[illegible]





VIEW A
SCALE NONE

NOTES: SEE SHT 2

COMPONENT DRAWING

UNLESS OTHERWISE SPECIFIED	THE INFORMATION HEREON IS THE PROPERTY OF PERIPHERAL EQUIPMENT CORPORATION. NO REPRODUCTION OR UNAUTHORIZED USE SHALL BE MADE	PEC PERIPHERAL EQUIPMENT CORPORATION
DIMENSIONS ARE IN INCHES TOLERANCES: .XX ± .01 ANGULAR ± ½° .XXX ± .005 X/X ± 1/32 BREAK ALL SHARP CORNERS APPROX. 010	SIGNATURES / DATE DR [illegible] 10-29-71 CHK [illegible] 11/1/71 DES ENGR [illegible] 11/2/71 ENGR [illegible] 11/2/71	TITLE POWER SUPPLY (115V 60HZ) PS 9004
NEXT ASSY / 1ST USED ON APPLICATION	FINISH: / MATL:	SIZE C / CODE IDENT. NO. / DWG NO. 106255 / REV A SCALE 1/2 +NOTED / DO NOT SCALE DWG / SHEET 1 OF 2

DWG NO. 106255

NOTES:

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	10-20-71

HIGHEST REF DES	REF DES DELETED
R 10	
C 13	
CR 19	
Q 1	
L2	
T 3	
VR 1	
TB 6	
FL 1	
K 1	
F 5	

5. TEST PER TS0042.

(4) +24 V LOADING
TB6-1,-2,-3, AND-4 ARE LOAD RANGING TAPS
USE TB6-2 AND TB6-3 FOR+24V@LOW CURRENT.
USE TB6-1 AND TB6-4 FOR+24V@ HIGH CURRENT
WHEN SECOND DRIVE IS USED THE VOLTAGE SHOULD BE CHECKED AND TAPS CHANGED IF NECESSARY

(3) +5V LOADING
TB5-1,-2,-3. AND-4 ARE LOAD RANGING TAPS.
USE TB5-3 AND TB5-4 FOR+5@LOW CURRENT
USE TB5-2 AND TB5-5 FOR+5@ MEDIUM CURRENT
USE TB5-1 AND TB5-6 FOR+5@ HIGH CURRENT.
WHEN SECOND DRIVE IS USED THE VOLTAGE SHOULD BE CHECKED AND TAPS CHANGED IF NECESSARY

2. PARTIAL REF DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUB ASSEMBLY DESIGNATIONS.

1. FOR ASSEMBLY SEE SHEET 1.

NOTES: UNLESS OTHERWISE SPECIFIED

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

MATL:
FINISH:

SIGNATURES	DA	MO	YR
DRAWN Quang Tan	20	10	71
CHECKED			
ENG. S Schell	2	11	71
MFG.			

PERTEC PERIPHERAL EQUIPMENT

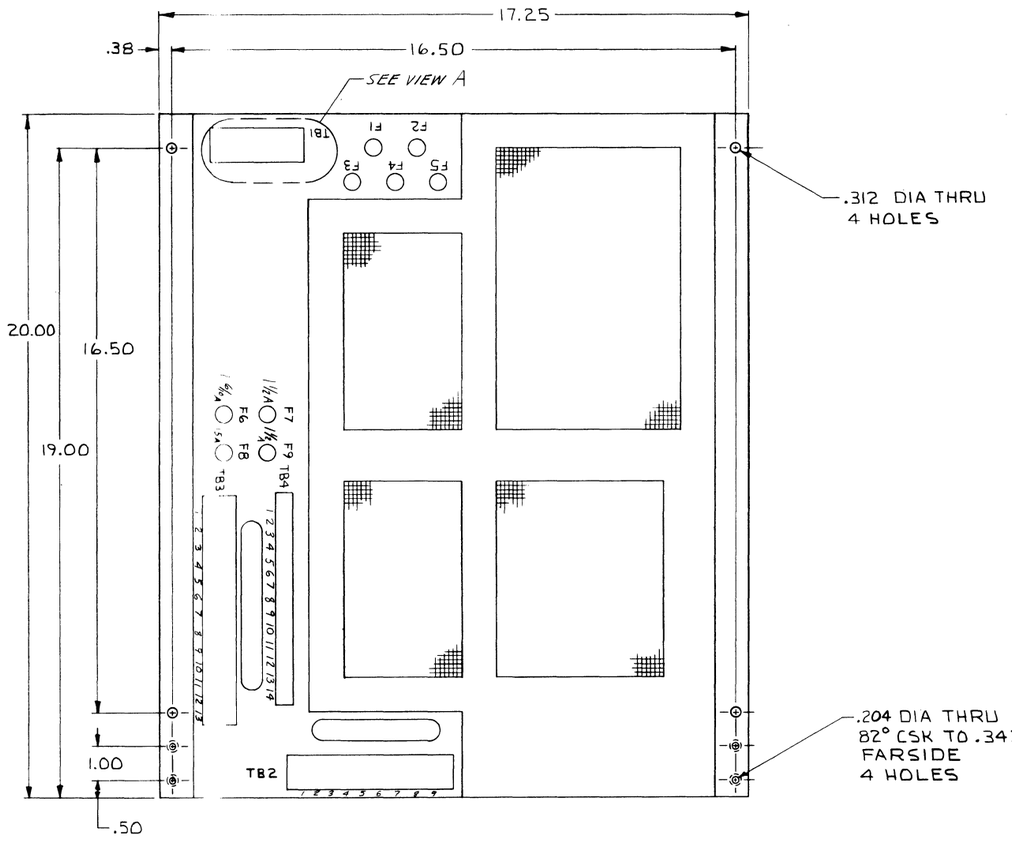
COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

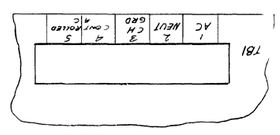
TITLE: SCHEMATIC—
PWR SUPPLY (115V 60HZ)
(PS 9004)

SIZE C | DWG NO. 106255 | REV A

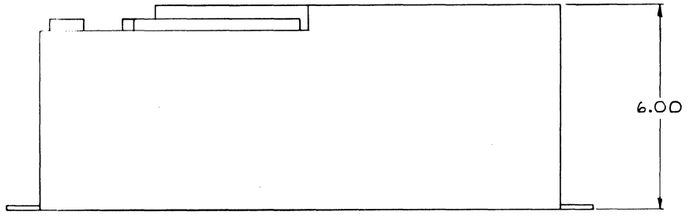
SCALE: | SHEET 2 | CONT. ON 2

DWG NO. 106256





VIEW A
SCALE NONE



NOTES:

1. POWER SUPPLY SHOULD BE RECIEVED WIRED FOR 115 VAC, 60 HZ USE. MODIFICATIONS TO VOLTAGE AND FREQUENCY PER NOTE 3 AND TABLE
2. TEST PER TS0041.
3. WHEN SWITCHING FREQUENCY (50 HZ OR 60 HZ) INPUT ON A1 MUST BE SWITCHED TO PROPER POINT E101 FOR 50 HZ, E102 FOR 60 HZ
4. +5 LOADING
   TB6-1, -2, -3, -4 ARE LOAD RANGING TAPS.
   USE TB6-2 AND TB6-3 FOR +5 @ LOW CURRENT.
   ADJUST +5 WITH VOLTAGE ADJ POT R106.
   USE TB6-1 AND TB6-4 FOR +5 @ HIGH CURRENT.
   ADJUST +5 WITH VOLTAGE ADJ POT R106.
   WHEN SECOND DRIVE IS USED THE VOLTAGE SHOULD BE CHECK AND TAPS CHANGED IF NECESSARY
5. UNLESS OTHERWISE SPECIFIED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
   ALL RESISTORS VALUES ARE IN OHMS ±5%
6. UNIT SHOWN WIRED FOR 115 VAC 60 HZ. FOR WIRING OTHER VOLTAGES SEE TABLE
7. PARTIAL REF DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION.

REVISIONS		
REV	C.O. NO.	DATE
A	ERN 3-PK	10-20-71
B	ECN 3299 PK	4/10/72 PK

COMPONENT DRAWING

QTY GI	ITEM NO	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: SP09

SIGNATURES	DA	MO	YR
DRAWN	20	10	71
CHECKED	11	2	71
ENG	11	2	71
MFG	11	2	71

MATL:
FINISH:

PERTEC PERIPHERAL EQUIPMENT

COMPUTER MEMORY DEVICES, INC.
~~GLENDALE,~~ ARIZONA

TITLE: POWER SUPPLY (115/230V-50/60HZ) (PS9004 & PS9004A)

SIZE D | DWG NO. 106256 | REV B

SCALE: 1/2 SIZE | SHEET 1 | CONT. ON 2

DWG NO. 106256

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	10-20-71

INPUT 115/230V 50/60HZ

TB1 · F1 10A MDA · F2 10A MDA · F3 10A MDA · FL1 · FL2 · R6 51K 1/2W · R7 51K 1/2W · F4 1.25A MDA · F5 1.25A MDA · TB5 · T1 · CR1 IN4719 · CR2 IN4719 · C3 5200 30V · R1 250 5W · CR11 IN645 · K1 · F6 1.6A MDX

TB2
- 3 +24V CONTROL
- 4 COIL RETURN
- 5 DC ON
- 6 DC OFF
- 7 ATT LAMP
- 8 DC ON N/O
- 9 DC OFF N/C
- 1 #1 INTERLOCK
- 2 #2 INTERLOCK

K1-1 · K1-2 · K1-3 · PART OF TB5 · T2 · CR15 · CR16 · CR17 · CR18 · C6 65,000 30V · C5 65,000 30V · C4 65,000 30V · R9 25 50W · R2 25 50W

TB3
- 11 / 12 +24V @ 15A
- 13 GEN RESET
- 4 / 5 +12V @ 1A
- 10 -24V DC
- 9 LINE FAIL
- 1 / 2 / 3 +5V @ 10A
- 7 / 8 -26V @ 1A

L3 1mhy RFI CHOKE · L2 · C2 15 440VAC · C1 15 440VAC · F10 3A BBS · W101 · E104 · E103 · E111 · E112 · E102 · E101 · E105 · E109 · E107 · E106 · E117 · E113 · W103 · W102 · E110 · E115 · E114 · E116 · E108 W104

CR5 IN4719 · CR6 IN4719 · CR12 IN645 · CR13 IN645 · C7 51,000 15V · F7 1.5A AGC · R3 125 3W, 1% · R8 100, 1/2W · C11 6.8, 25V · CR14 IN645 · R10 5.6K 1/4W · IN5298 VR1 · Q1 2N3569 · F8 15A AGC · CR19 IN914A

TB6 · CR7 IN1185A · CR8 IN1185A · L1 · C8 100,000 10V · C9 29,000 10V · R4 5 10W

CR9 IN4719 · CR10 IN4719 · C10 17,000 30V · R5 300 5W · F9 1.5A AGC

TB4 · DC COM BUS

Q102 2N4174 · R114 180, 1/2W · R116 180 1/2W · T101 · Q103 2N4174 · R115 180, 1/2W · R117 180 1/2W · R118 2K 3W · C106 .033 1600V · CR110 IN645 · VR101 IN937A · C102 .047 100V · R103 100K 1/2W · AR102 · R112 1K 1/2W · R111 5.1K 1/2W · CR109 IN645 · C105 .1 100V · Q101 2N1613 · R113 330 1/2W · R119 3K 1/2W · AR101 · R110 1.2K 1/2W · C104 3.3, 25V · R108 3K, 1/2W · R109 100K, 1/2W

CR101 IN645 · CR102 IN645 · CR103 IN645 · CR104 IN645 · R101 15K, 1/2W 1% · C101 1,50V · R102 3K 1/2W 1% · CR105 IN645 · CR106 IN645 · CR107 IN645 · CR108 IN645 · C103 200 25V · R104 1325 1/2W, 1% · R106 5.1K 1/2W · R105 1000 3/4W 10% · R107 1900 1/2W, 1%

CONTROL CARD A1

6

INPUT VOLTAGE 50/60 HZ	INPUT CONNECTION	STRAP	STRAP
115 V	TB5-1 AND 4 TB5-7 AND 10	TB5-1 AND 2 TB5-7 AND 8	TB5-3 AND 9 TB5-9 AND 10
208	TB5-1 AND 5 TB5-7 AND 11	TB5-2 AND 3 TB5-8 AND 9	
220	TB5-1 AND 6 TB5-7 AND 12	TB5-2 AND 3 TB5-8 AND 9	
230	TB5-1 AND 4 TB5-7 AND 10	TB5-2 AND 3 TB5-8 AND 9	

HIGHEST REF DES		REF DES DELETED
A1		
C11	C106	
CR19	CR110	
F9		
FL2		
K1		
L3		
Q1	Q103	
R10	R117	
T2	T101	
TB5		
VR1	VR101	
	W104	
	E117	

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
			~~PARTS LIST~~		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: SP09

SIGNATURES — DRAWN · CHECKED · ENG · MFG. — DA MO YR

MATL: · FINISH:

COMPUTER MEMORY DEVICES, INC. GLENDALE, ARIZONA

TITLE: POWER SUPPLY (115V/230V-50/60HZ) (PS9004 & PS9004A)

SIZE D · DWG NO. 106256 · REV B · SCALE: · SHEET 2 · CONT ON F

PERTEC PERIPHERAL EQUIPMENT

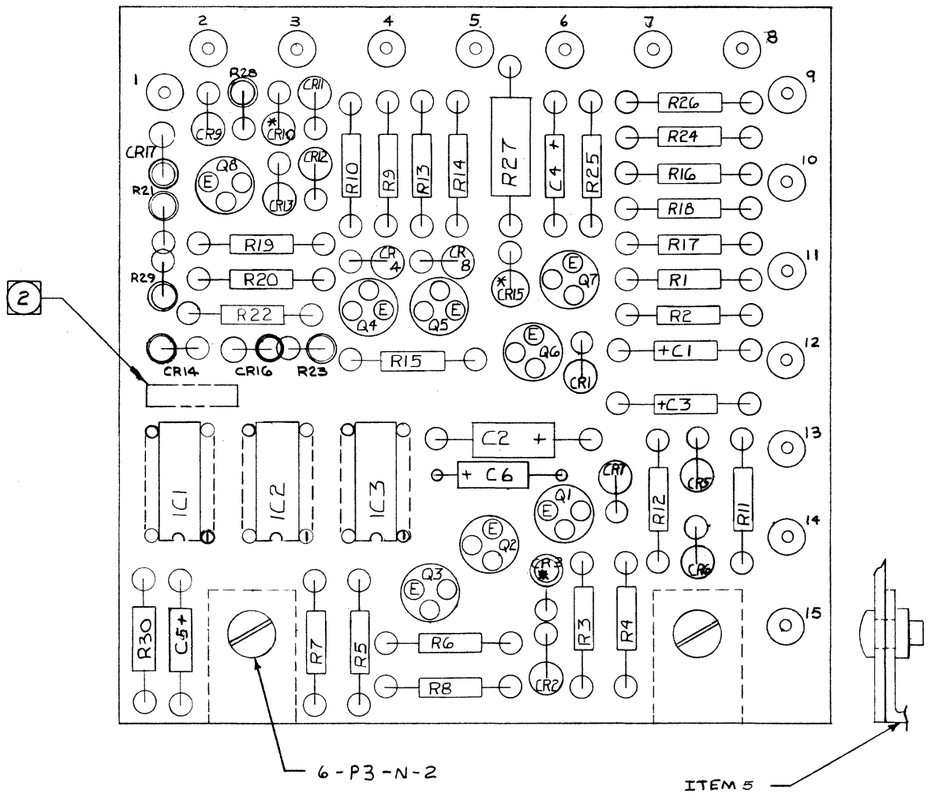
DWG NO. 105339

NOTES:

1. ⏚ INDICATES DIODE MOUNTED CATHODE UP.

(2) RUBBER STAMP PART NO. 105339-01 AND LATEST REV LETTER. LOCATE APPROX AS SHOWN.

REVISIONS			REVISIONS		
REV	C.O. NO.	DATE	REV	C.O. NO.	DATE
E2	REC CHG ADDED IT. 38,39	2-24-71 GS	A	ISSUED	7-1-69
F	000960	3-12-71	B	000101	7-21-69
G	000462	5-25-71	B_1	REC CHG: ADDED # TO CR3	8-5-69
G_1	REC CHG CMD P/N WAS 10C000339	7-9-71	C	000216	10-27-69
H	ECN 2970	12-10-71 E.LIND	D	000253	11-28-69
J	ECN 3120	6-30-72 RAS	E	000290	1-16-70
K	ECN 3375	6-30-73 RAS	E_1	REC CHG: ADDED IT 37	6-9-70



REF	39	106086-01	WL POWER SUPPLY	—	
REF	38	106061-01	WL POWER SUPPLY	—	
REF	37	105010-01	WL POWER SUPPLY	—	
1	36	139-1055	CAP TANT	EA	C6. .1 uf @ 35V
40	35	690-9022	WIRE #22AWG	IN	
40	34	0022			
40	33	2022			
40	32	5022			
40	31	690-1022	WIRE #22AWG	IN	
2	30	113-1225	RESISTOR, WIREWOUND	EA	R7, 11 1.2K 1W 5%
1	29	100-4325	RESISTOR	EA	R29 4.3K ¼W 5%
1	28	101-5625			R20 5.6K ½W 5%
	27				
1	26	102-8215	RESISTOR	EA	R27 820Ω 1W 5%
3	25	100-5625			R23, 21, 28 5.6K ¼W 5%
2	24	101-6825			R22, 19 6.8K ½W 5%
3	23	6805			R15, 17, 25 68Ω
3	22	1535			R14, 18, 26 15K
1	21	2215			R8, 220Ω
1	20	2725			R13 2.7K
1	19	1045			R5 100K
1	18	1035			R4 10K
4	17	1015			R2, 6, 12, 30 100Ω
6	16	101-3325	RESISTOR		R1, 3, 9, 10, 16, 24 3.3K ½W 5%
1	15	700-8360	INTEGRATED CIRCUIT		IC2 MC836P
2	14	700-8460	INTEGRATED CIRCUIT		IC1, 3 MC846P
2	13	200-3638	TRANSISTOR		Q2, 3 2N3638A
6	12	200-3569	TRANSISTOR		Q1, 4, 5, 6, 7, 8 2N3569
~~REF~~	~~11~~	~~10C000341~~	~~PSDT SCH~~		
1	10	331-0515	DIODE		CR15 IN5231B
1	9	331-1905			CR11 IN5249B
1	8	331-0605			CR10 IN5233B
1	7	331-0305			CR9 IN5225B*
1	6	300-4003	DIODE		CR8 GEA14F
2	5	105437-01	BRACKET		
12	4	300-9140	DIODE		CR1, 2, 3, 4, 7, 12, 13, 5, 6, 14, 16, 17. IN914A
1	3	139-8202	CAPACITOR		C2 82uf @10V
4	2	139-3343	CAPACITOR		C1, 3, 4, 5 3.3uf @15V
1	1	105340-01	ETCHED BOARD	EA	
QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

SP10
SP05

MATL:

FINISH:

SIGNATURES	DA	MONTH	69
DRAWN	10	4	69
CHECKED			
ENG.	30	6	69
MFG.	1	7	69

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: PSDT ASM

SIZE C | DWG NO. 105339 | REV K

SCALE: 2-1 | SHEET 1 CONT ON | 2

PERTEC PERIPHERAL EQUIPMENT

DWG NO. 105339

REVISIONS		
REV	C.O. NO.	DATE
	SEE SHT 1	

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ½W 5%
2. ALL DIODES IN914A
3. ALL TRANSISTORS 2N3569
4. NUMBERS IN CIRCLES REPRESENT BOARD TERMINALS
5. RECTANGLES REPRESENT BUS FUNCTIONS

DC ON (NO) 12 — R1 3.3K — +24 — +5.1 — CR1 — R2 100Ω — C1 3.3uf @15V — IC1 5,6,4 — IC2 9,8

R3 3.3K — R4 10K — +24 — +5.1 — CR2 — CR3 — R5 100K — R7 1.2K, 1W — Q1 — Q2 2N3638A — Q3 2N3638A — +5.1 — R6 100Ω — C2 82uf @10V — R8 220Ω

IC2 2,1 — IC2 4,3 — IC3 13,12,11 — +24 — R9 3.3K — R10 3.3K — +5.1 — CR4 — Q4 — 7 GENERAL RESET

IC1 2,1,3 — IC2 5,6

UNIT 2 INTERLOCK 15 — CR6
UNIT 1 INTERLOCK 14 — CR5
DC OFF (NC) 13 — +5.2 — CR7 — +24 — R11 1.2K, 1W — R12 100Ω — +5.1 — IC1 13,12,11 — R30 100Ω — C5 3.3uf @15V — C3 3.3uf @15V — R29 4.3K ¼W

IC2 13,12 — IC3 1,2,3 — +24 — R13 2.7K — R14 15K — CR8 GE A14F — 8 CONTACTOR COIL — R15 68Ω — 9 DC ON LAMP — Q5

+5V 2 — CR9 3.0V IN5225B
+12V 4 — CR10 6.0V IN5233B — CR13
+24V 5 — CR11 19.0V IN5249B — CR12
CR14 — IC1 10,9,8 — R19 6.8K — R20 5.6K — R21 5.6K ¼W

IC3 10,9,8 — IC2 11,10 — +24 — R16 3.3K — R17 68Ω — R18 15K — Q6 — 11 ATTENTION LAMP

+24 — R22 6.8K — +5.1 — R23 5.6K ¼W — -26V 3 — R28 5.6K ¼W — Q8 — CR16 — CR17

IC3 4,5,6 — +24 — R24 3.3K — R26 15K — R25 68Ω — Q7 — 10 POWER OFF LAMP

+ 24 CONTROL 6 — +24 — R27 820Ω 1W — CR15 IN5231B 5.1V — +5.1 — C4 3.3uf @15V — 1

C6 .1uf 35V

PERTEC PERIPHERAL EQUIPMENT

QTY GI	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
			~~PARTS LIST~~		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES: X

MATL: X
FINISH: X

SIGNATURES	DA	MO	YR
DRAWN	9	4	69
CHECKED			
ENG.	10	7	69
MFG.	10	7	69

~~COMPUTER MEMORY DEVICES, INC.~~
GLENDALE, ARIZONA

TITLE: PSDT SCH

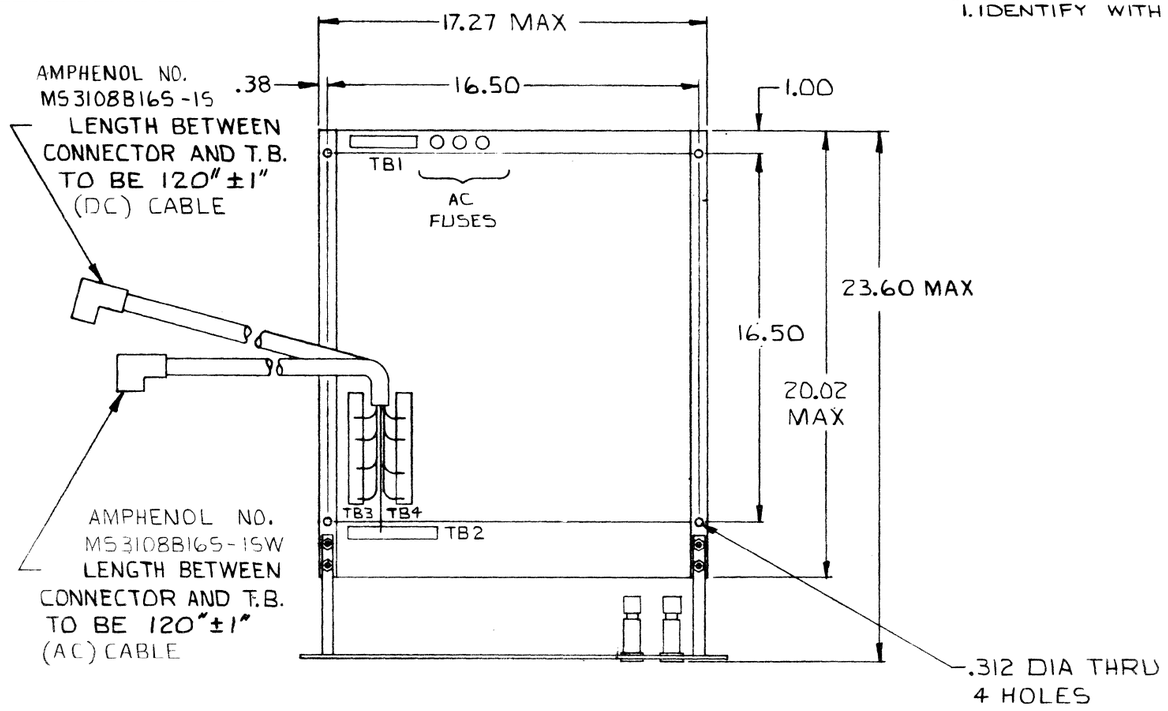
SIZE	DWG NO.	REV
C	105339	K

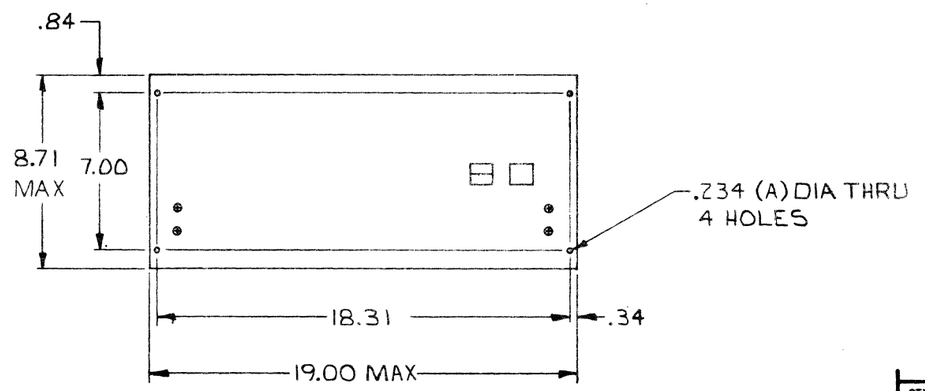
SCALE: X — SHEET 2 — CONT. ON F

DWG NO. 106060

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	2-2-71
A_1	REC CHG. CMD P/N WAS 10C001060	7-19-71
B	ECN 3366 R/A	9-8-72

NOTE-
1. IDENTIFY WITH P/N 106060-01.





WEIGHT: 100 LBS MAX

QTY	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

MATL:

FINISH:

SIGNATURES	DA	MO	YR
DRAWN	21	1	71
CHECKED			
ENG.	27	1	71
MFG	2	2	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

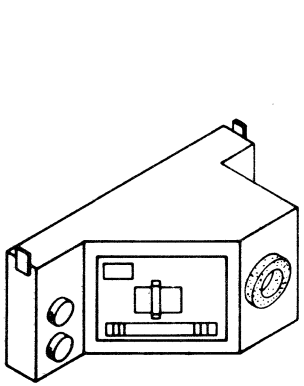
TITLE:
PS INSTALLATION
(PS 9004 AND PS9004A)

SIZE C | DWG NO. 106060 | REV B

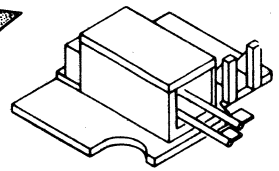
SCALE: NONE | SHEET 1 | CONT. ON F

PERTEC PERIPHERAL EQUIPMENT

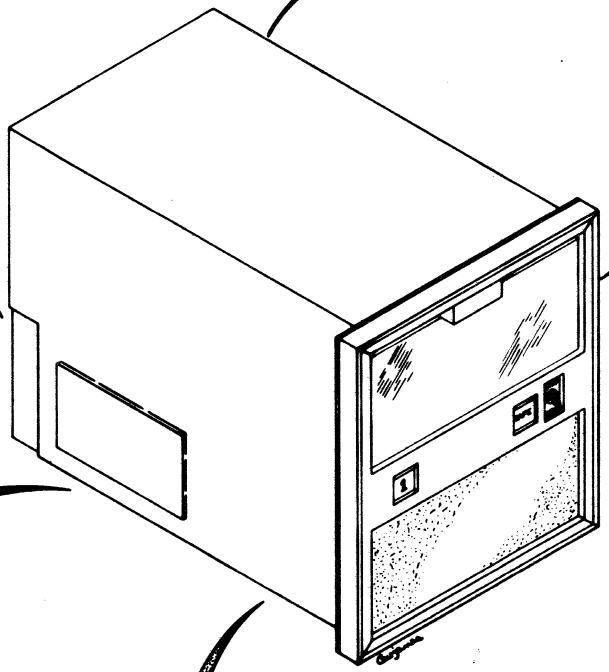
THE FOLLOWING PARTS EXPLOSIONS AND PARTS LIST APPLY TO THE MD5101, MD5101A, MD5201, AND MD5201A (SINGLE DISK)



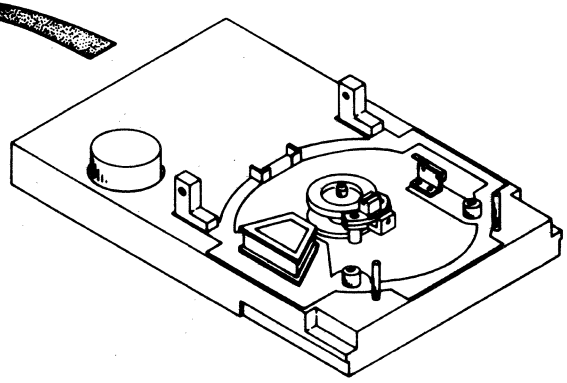
AIR INLET ASM
FIGURE 6



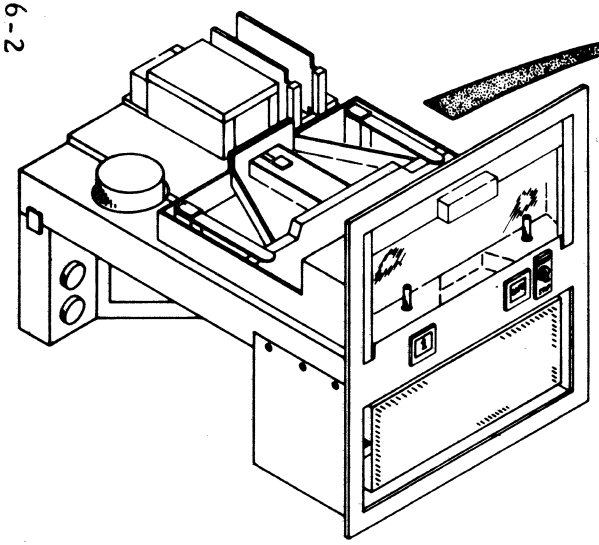
POSITIONER ASM
FIGURE 4



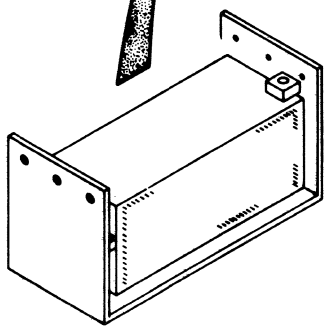
MONO DISK ASM
FIGURE 1



BASE PLATE ASM
FIGURE 3
& 3A



MECHANISM ASM
FIGURE 2



ELECTRONIC MODULE ASM
FIGURE 5

VISUAL I

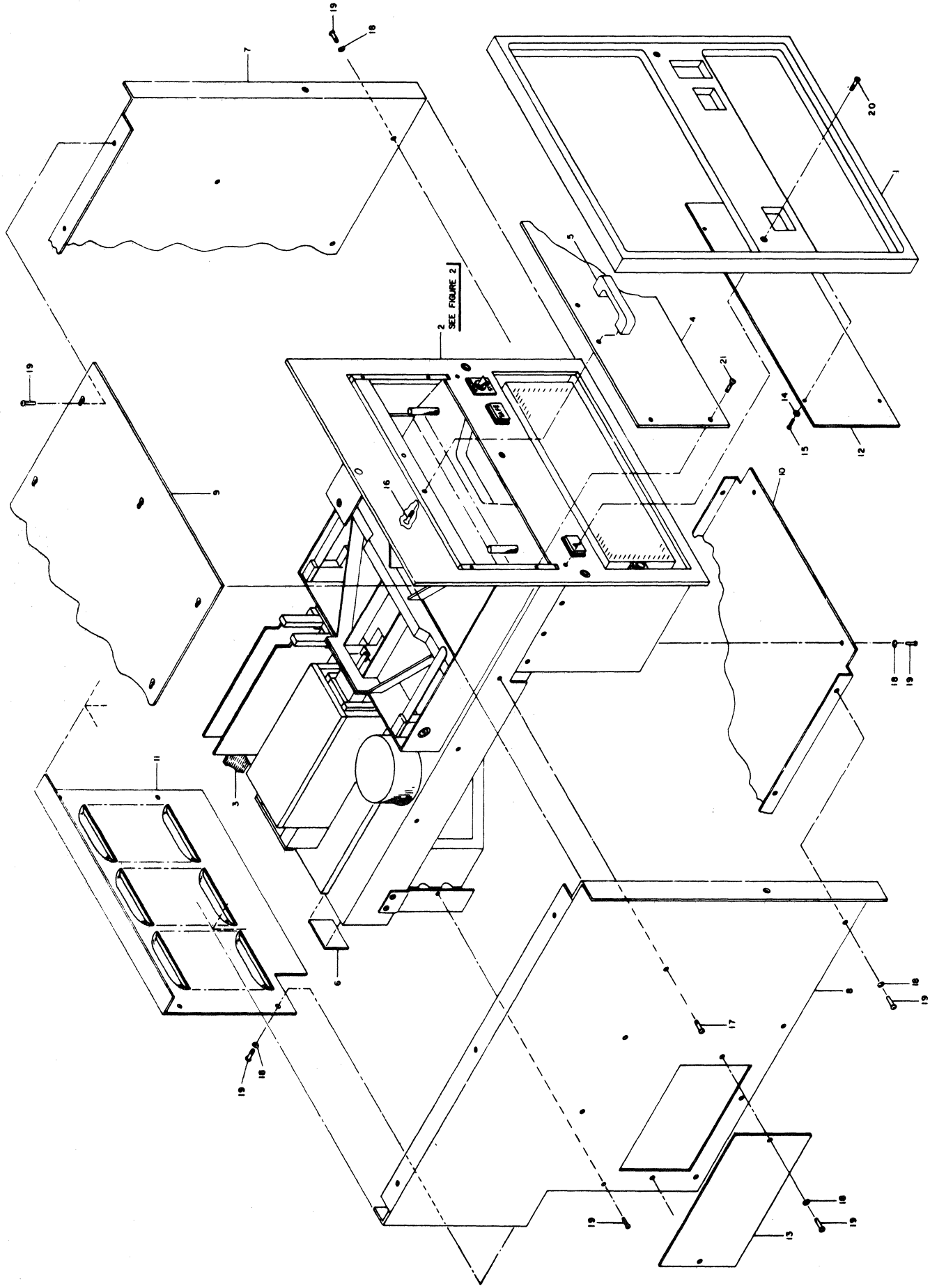


FIGURE 1 DUAL DISK ASM SEE LIST 1

525A

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 1, Mono Disk Assembly, Final Assembly				
-1	10D000582P2	105582-02	Face Panel	1
-2	10R001110G1	106110-01	Model MD5101 Mechanism Assy	1
	10R001110G3	106110-03	Model MD5101A Mechanism Assy	1
	10R001110G2	106110-02	Model MD5201 Mechanism Assy	1
	10R001110G4	106110-04	Model MD5201A Mechanism Assy	1
-3	10D001024G1	106024-01	I.O. Harness	1
-4	10B000634P3	105634-03	Door	1
-5	10C001192G1	106192-01	Handle Assy	1
-6	10B000371P14	105371-14	Model MD5101 S.N. Tag	1
	10B000371P16	105371-16	Model MD5101A S.N. Tag	1
	10B000371P15	105371-15	Model MD5201 S.N. Tag	1
	10B000371P17	105371-17	Model MD5201A S.N. Tag	1
-7	10D000621G1	105621-01	Shroud R.H. Side	1
-8	10D000621G2	105621-02	Shroud L.H. Side	1
-9	10D000360P1	105360-01	Shroud Top	1
-10	10C000624G1	105624-01	Shroud Bottom	1
-11	10C001091P1	106091-01	Shroud Rear	1
-12	10B000592P3	105592-03	Filler Panel	1
-13	10B000633P1	105633-01	Access Panel	2
-14	WAC000119P042	606-0400	Washer Flat No. 4	4
-15	SCC000110P0404	608-0404	Screw Thd Form 4x1/4 lg	4
-16	SCC000313P0820	608-0820	Screw Thd Form 8x1-1/4 lg	2
-17	SCC000088P10041	600-0004	Screw Pan Hd 10-32x1/4 lg	6
-18	WAC000120P08	605-0800	Washer Lock No. 8	27
-19	SCC000088P08081	600-0800	Screw Pan Hd 8-32x1/2 lg	33
-20	SCC000256P0812	624-0812	Screw Fr Oval 8-32x0.750 lg	2
-21	SCC000256P0604	624-0604	Screw Fr Oval 6-32x0.250 lg	2

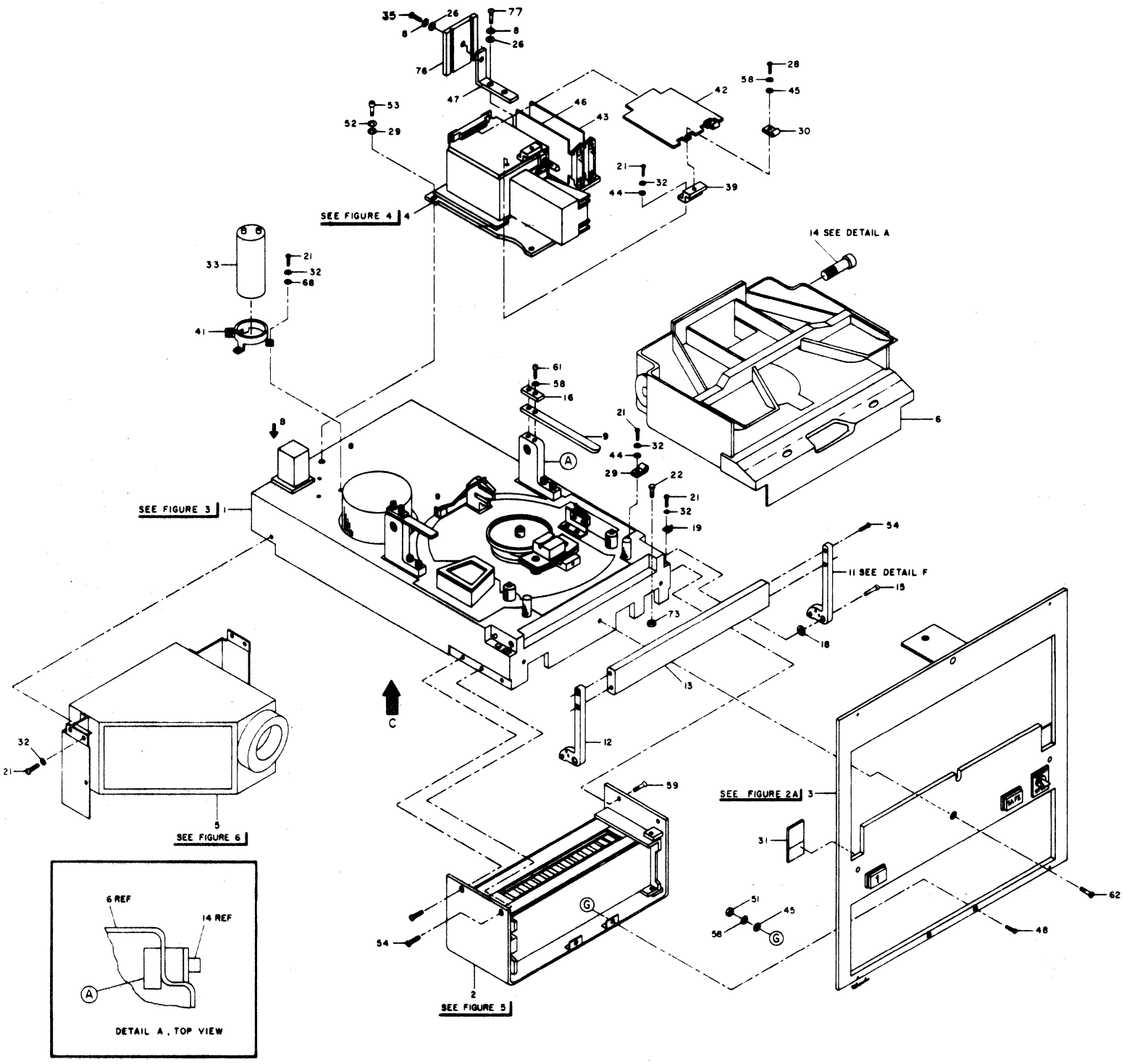


FIGURE 2. MECHANISM ASM SEE LIST 2.
SHEET 1 OF 2.

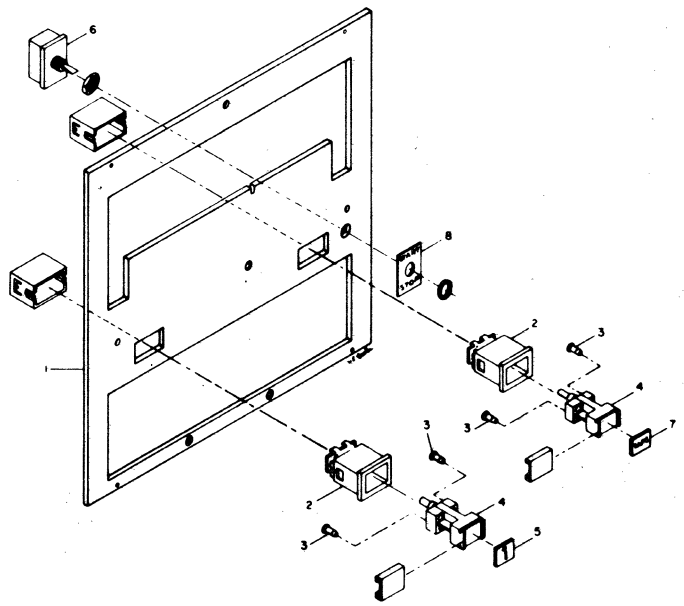
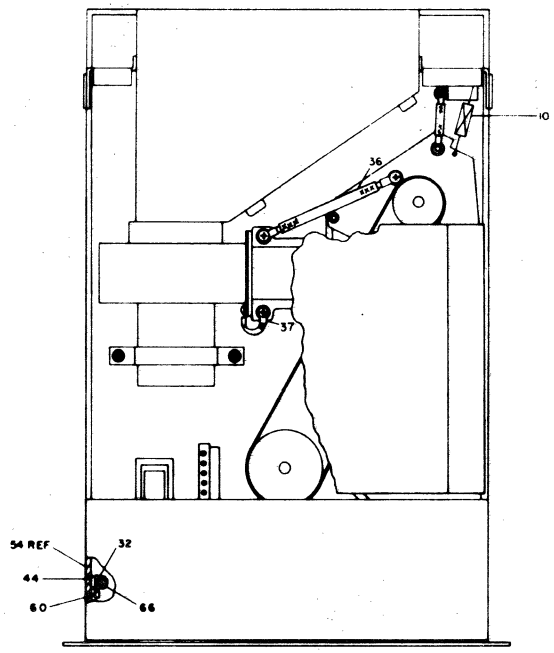
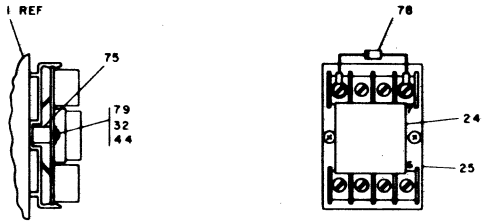


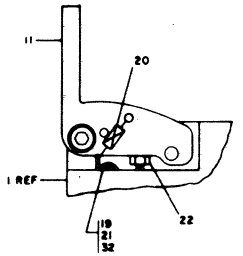
FIGURE 2A. FRONT PANEL ASM. SEE LIST 2A.



DETAIL C OF FIGURE 2.



DETAIL B OF FIGURE 2



DETAIL F OF FIGURE 2.

FIGURE 2. MECHANISM ASM. SEE LIST 2
SHEET 2 OF 2

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 2, Mechanical Assembly (continued)				
-43	10D001037G1	106037-01	VCAP PWB Assy	1
-44	WAC000119P082	600-0800	Washer Flat 8	8
-45	WAC000119P062	606-0800	Washer Flat 6	2
-46	10D001039G1	106039-01	VCAC PWB Assy	1
-47	10B001098P1	106098-01	PWB Keeper Support	1
-48	SCC000121P0606	627-0606	Screw Flat Hd 6-32x3/8 lg	2
-49	CLC000184P20062	693-0010	Cable Shielded	60"
-50	CLC000124P2205	693-0005	Cable	30"
-51	NUC000122P061	604-0600	Nut Hex 6	2
-52	10A000254P2	105254-02	Washer	4
-53	SCC000043P14081	602-1408	Screw Allen Hd 1/4-20x1/2	6
-54	SCC000121P0810	627-0810	Screw Flat Hd 8-32x5/8 lg	5
-55	10C000020G1	105020-01	Model MD5101 and MD5101A Connector Clamp (not required for Model MD5201 and 5201A)	
-56	HIC000040P2	526-0004	Model MD5101 Read/Write Head	1
		526-0003	Model MD5101A Read/ Write Head	1
		526-0002	Model MD5201 Read/Write Head	1
		526-0001	Model MD5201A Read/ Write Head	1
-57	LGC000048P05221	656-0011	Lug Ring	7
-58	WAC000120P06	605-0600	Washer Lock 6	2
-59	SCC000121P0806	627-0806	Screw Flat Hd 8-32x3/8 lg	3
-60	HIC000040P1	526-0003	Model MD5101 Read/Write Head	1
		526-0004	Model MD5101A Read/ Write Head	1
		526-0001	Model MD5201 Read/Write Head	1
		526-0002	Model MD5201A Read/ Write Head	1
-61	SCC000043P06101	627-0806	Screw Allen Hd 6-32x5/8 lg	4
-62	SCC000121P0808	627-0808	Screw Flat Hd 8-32x1/2 lg	1
-63				
-64				
-65				
-66	NUC000122P081	604-0800	Nut Hex 8	1
-67	WAC000119P142	606-0007	Washer Flat 1/4	2
-68	WAC000119P081	606-0005	Washer Flat 8	3
-69				
-70				
-71				
-72				

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 2, Mechanical Assembly See List 1-2 for next assembly				
-1	10D001120G1	106120-01	Model MD5101 and 5201 Base Plate Assy	1 1
	10D001120G2	106120-02	Model MD5101A and 5201A Base Plate Assy	1
-2	10D000230G11	105230-11	Elec. Mod. Assy	1
-3	10D000627G3	105627-03	Front Panel Assy	1
-4	10D001087G1	106087-01	Positioner Assy	1
-5	10D001025G2	106025-02	Air Inlet Assy	1
-6	10D000635G3	105635-03	Receiver Assy	1
-7	10C000370G8	105370-08	Ground Strap	1
-8	WAC000120P10	605-1000	Washer Lock No. 10	2
-9	10A000077P1	105077-01	Spring	2
-10	SRC000035P005	616-3505	Spring	1
-11	10C000628G3	105628-03	Cam and Handle	1
-12	10C000628G4	105628-04	Cam and Handle	1
-13	10B000596P1	105596-01	Tie Bar	1
-14	SCC000047P0812	615-0812	Shoulder Screw	2
-15	SCC000047P0606	615-0606	Shoulder Screw	2
-16	10A000054P1	105054-01	Spring Keeper	2
-17	SVB000070P03	659-7003	Sleeving Shrink	18"
-18	WAC000169P03	612-0037	Washer	2
-19	10A0001094P1	106094-01	Bracket	2
-20	SRC000035P006	616-3506	Spring	2
-21	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	13
-22	SCB000098P1406	621-1406	Screw Hex Hd 1/4-20x3/8 lg	2
-23	LGC000048P05181	656-0010	Lug Ring	9
-24	K0C000102P3112	502-3112	Relay	1
-25	SKC000105P1	502-1051	Relay Socket	1
-26	WAC000119P102	606-0001	Washer Flat No. 10	2
-27	10A000254P1	105254-01	Washer	4
-28	SCC000088P06121	600-0612	Screw Pan Hd 6-32x3/4 lg	2
-29	CCC000052P018	661-0013	Cable Clamp	1
-30	CCC000335P01	661-0020	Cable Clamp	2
-31	10A000664P1	105664-01	Gasket	2
-32	WAC000120P08	605-0800	Washer Lock No. 8	15
-33	C0C000347P2	134-2859	Capacitor	1
-34	10C001026G1	106026-01	Cable Sig/Pwr	1
-35	SCC000088P10121	600-0012	Screw Pan Hd 10-32x3/4 lg	1
-36	10C000370G4	105370-04	Ground Strap	1
-37	10C000370G5	105370-05	Ground Strap	1
-38	10A000460P1	105460-01	Washer	2
-39	10B000019P1	105019-01	Board Bracket	2
-40	LGC000048P05141	656-0008	Lug Ring	2
-41	CCC000346P1	664-0002	Capacitor Clamp	1
-42	10D001045G5	106045-04	Model MD5101 and 5101A RAWD/A PWB Assy	1
	10D001045G3	106045-02	Model MD5201 and 5201A RAWD/A PWB Assy	1

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 2, Mechanical Assembly (continued)				
-73	NUC000122P141	604-0140	Nut Hex 1/4	2
-74	LGC000048P04221	656-0006	Lug Ring	1
-75	10A000274P2	105274-02	Spacer Tube	2
-76	10B001097P1	106097-01	PWB Keeper	1
-77	SCC000088P10061	600-1006	Screw Pan Hd 10-32x3/8 lg	1
-78	CRB000011P1	300-4003	Diode	1
-79	SCC000088P08121	600-0812	Screw Pan Hd 8-32x3/4	2
List 2A, Front Panel Assy, See List 2-3 for next assembly				
-1	10C000570P2	105570-02	Front Panel	1
-2	SWB000082P5	508-0003	Switch Housing	2
-3	DSB000084P1	659-8401	Lamp	4
-4	SWC000083P64	509-0003	Display Module	2
-5	10B000058P11	105058-11	Switch Insert	1
-6	SWC000170P213	507-0002	Switch Toggle	1
-7	10D000163P003	105163-03	Switch Insert	1
-8	10B000057P1	105057-01	Switch Plate	1

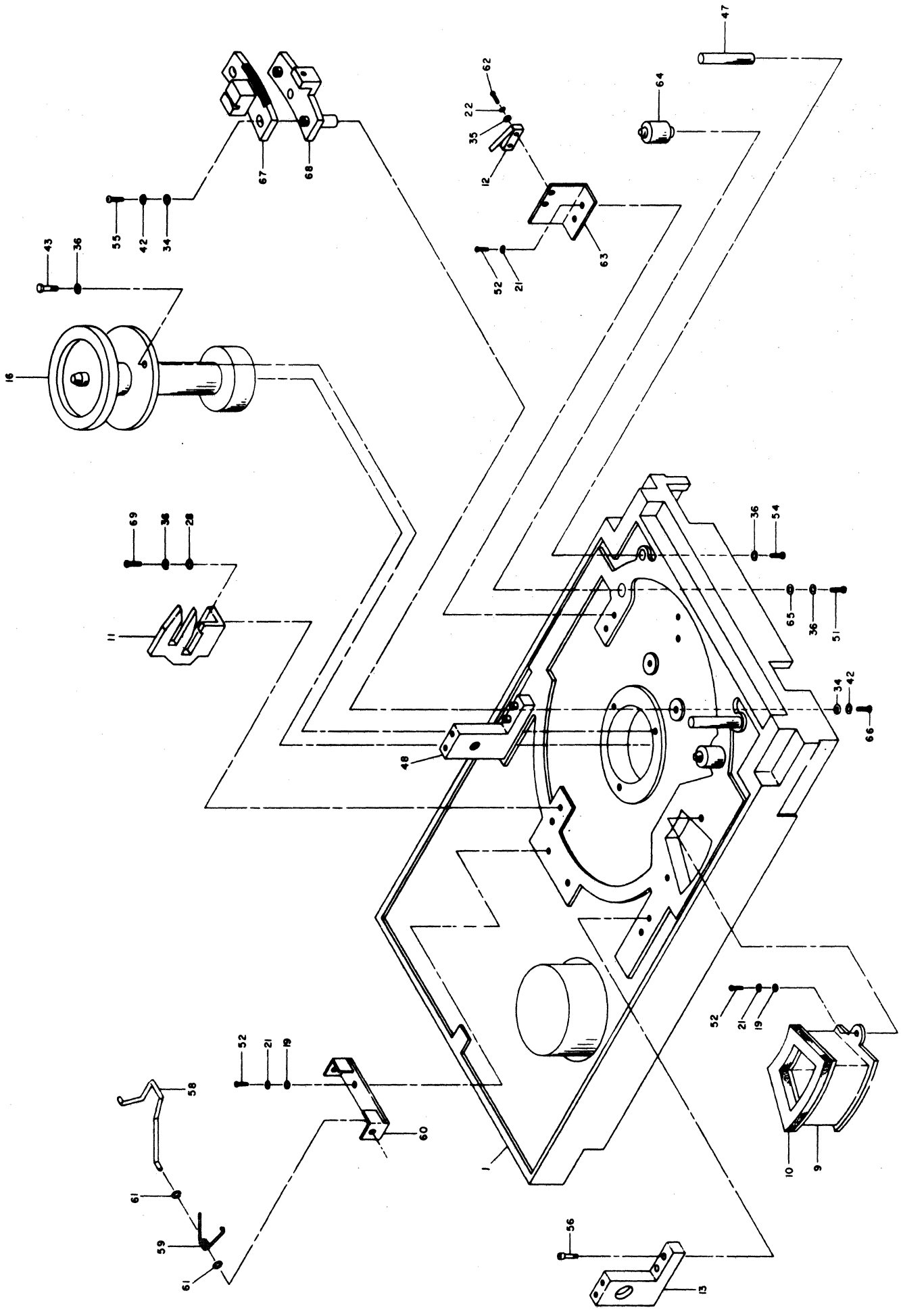


FIGURE 3. BASE PLATE ASM. SEE LIST 3.
SHEET 1 OF 2.

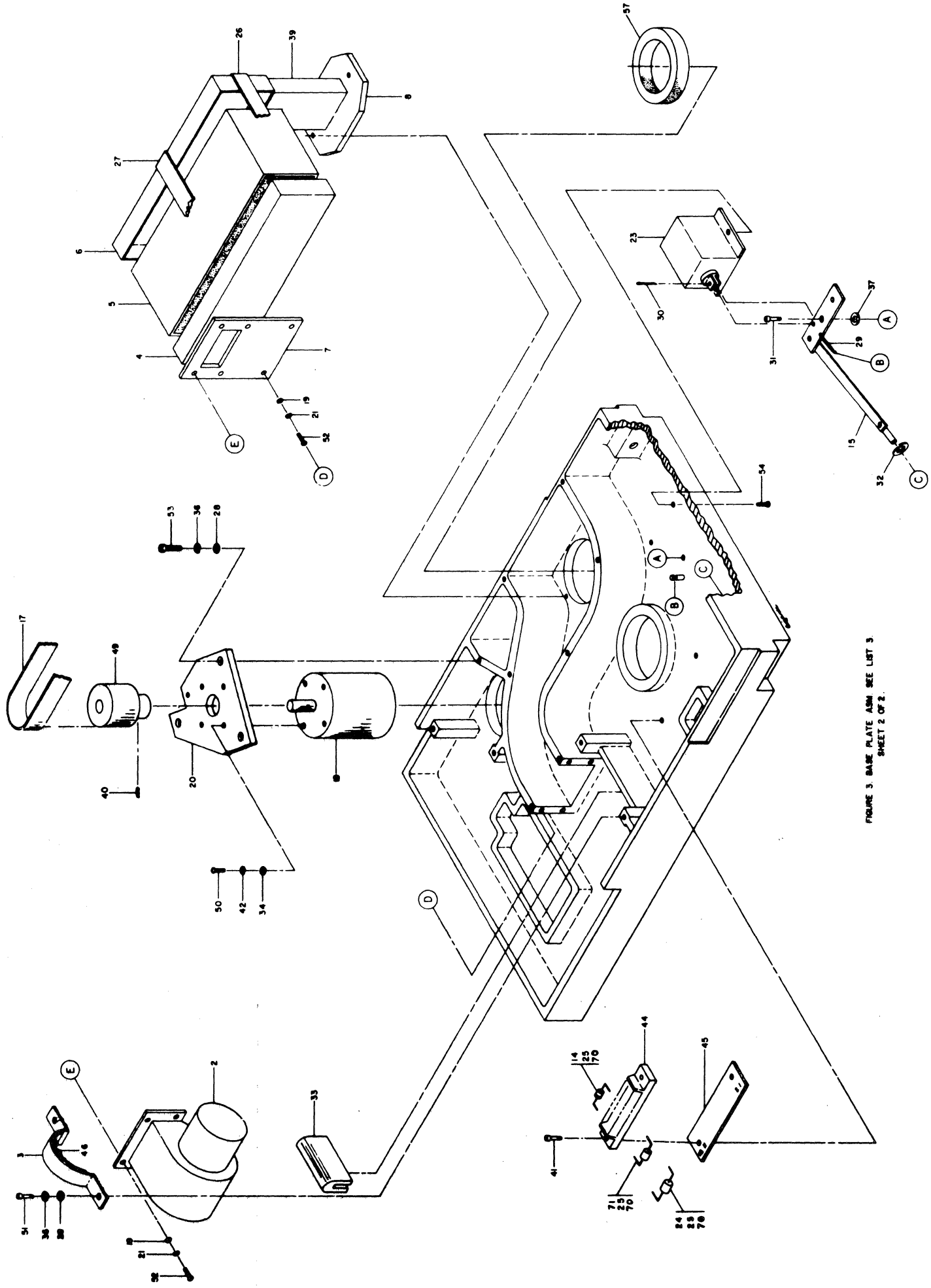


FIGURE 3. BASE PLATE ASM SEE LIST 3.
SHEET 2 OF 2.

525A

NOTES

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 3, Base Plate Assembly See List 2-1 for next assembly				
-1	10R001027G1	106027-01	Base Plate	1
-2	BLC000028P3	518-2803	Model MD5101 and 5201 Blower	1
	BLC000028P4	518-2806	Model MD5101A and 5201A Blower	1
-3	10A000355P1	105355-01	Blower Clamp	1
-4	10C001014P1	106014-01	Inlet Plenum	1
-5	FLC000341P1	521-0002	Air Filter	1
-6	10C001013P1	106013-01	Outlet Plenum	1
-7	10B001010P1	106010-01	Inlet Flange	1
-8	10B001011P1	106011-01	Outlet Flange	1
-9	10C000333G1	105333-01	Air Duct Assy	1
-10	10A000094P1	105094-01	Gasket	1
-11	10C000396P1	105396-01	Disk Guide	1
-12	SWC000092P3	506-9203	Switch	1
-13	10C000343P2	105343-02	Pivot Block	1
-14	CRB000011P1	300-4003	Diode	1
-15	10C000275G1	105275-01	Lock Assy	1
-16	10C000320G2	105320-02	Spindle Assy	1
-17	BTB000057P	610-0015	Model MD5101 and 5201 Timing Belt	1
		610-0014	Model MD5101A and 5201A Timing Belt	1
-18	B0C000135P	519-0009	Model MD5101 and 5201 Motor	1
		519-0008	Model MD5101A and 5201A Motor	1
-19	WAC000119P082	606-0800	Washer Flat 8	8
-20	10C001054P1	106054-01	Plate, Motor Mtg	1
-21	WAC000120P08	605-0800	Washer Lock 8	8
-22	WAC000120P02	605-0200	Washer Lock 2	2
-23	SEC000060P0242	517-6242	Solenoid	1
-24	R0C000012P4703	101-4705	Resistor	1
-25	LGC000048P05221	656-0011	Lug Ring	6
-26	10C001016G1	106016-01	Strap Assy	1
-27	10C001016G2	106016-02	Strap Assy	1
-28	WAC000119P142	606-0007	Washer Flat 1/4	7
-29	SRC000035P004	616-3504	Spring	1
-30	PIC000059P0106	609-5901	Cotter Pin	1
-31	SCC000047P0410	615-0410	Shoulder Screw	1
-32	RRC000032P04	611-3204	Retaining Ring	1
-33	GRB000112P2	660-1122	Gasket Strip	1
-34	WAC000119P102	606-0001	Washer Flat 10	8
-35	WAC000119P022	606-0200	Washer Flat 2	2
-36	WAC000120P14	605-1400	Washer Lock 1/4	12
-37	10A000274P1	105274-01	Lock Spacer	1

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 3, Base Plate Assembly (continued)				
-38	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	6
-39	10C001012P1	106012-01	Down Spout	1
-40	SCB000113P10041	603-0002	Screw Set	1
-41	SCC000043P08081	602-0808	Screw Allen Hd 8-32x1/2 lg	2
-42	WAC000120P10	605-1000	Washer Lock 10	8
-43	SCC000098P1412	621-1412	Screw Hex Hd	3
-44	TBD000156P1212	657-1512	Terminal Board	1
-45	MSC000160P12022	657-1522	Marker Strip	1
-46	GAA000086P04084	667-0036	Gasket	5
-47	10B000394P1	105394-01	Protecting Pin	2
-48	10C000343P3	105343-03	Pivot Block	1
-49	10C0001064P1	106064-03	Model MD5101 and 5201 Pulley	1
		106064-05	Model MD5101A and 5201A Pulley	1
-50	SCC000088P10121	600-0012	Screw Pan Hd 10-32x3/4 lg	4
-51	SCC000043P14081	602-1408	Screw Allen Hd 1/4-20x1/2 lg	4
-52	SCC000088P08081	600-0808	Screw Pan Hd 8-32x1/2 lg	10
-53	SCC000043P14121	600-1412	Screw Allen Hd 1/4-20x5/8 lg	3
-54	SCC000088P14101	600-1410	Screw Pan Hd 1/4-20x5/8 lg	2
-55	SCC000088P10081	600-0008	Screw Pan Hd 10-32x1/2 lg	2
-56	SCC000043P14161	602-1416	Screw Allen Hd 1/4-20x1" lg	4
-57	10A000159P4	105159-04	Gasket	1
-58	10B001092P1	106092-01	Door Opener	1
-59	10A001093P1	106093-01	Spring	1
-60	10B001208P1	106208-01	Bracket Door Opener	1
-61	RRC000032P05	611-3205	Retaining Ring	2
-62	SCC000088P02061	600-0206	Screw Pan Hd 2-56x3/8 lg	2
-63	10B001106G1	106106-01	Switch Bracket	1
-64	10A000831P1	105831-01	Guide Pin	2
-65	WAC000119P143	606-0008	Washer Flat Large 1/4	2
-66	SCC000088P10101	600-1010	Screw Pan Hd 10-32x5/8 lg	2
-67	10C000986G1	105986-01	Sector Pickup	1
-68	10C001107G1	106107-01	Sector Mount	1
-69	SCC000088P14121	600-1412	Screw Pan Hd 1/4-20x3/4 lg	2
-70	SVB000049P22	669-0122	Sleeving	6"
-71	C0C000003P10451	139-1045	Capacitor	1

NOTES

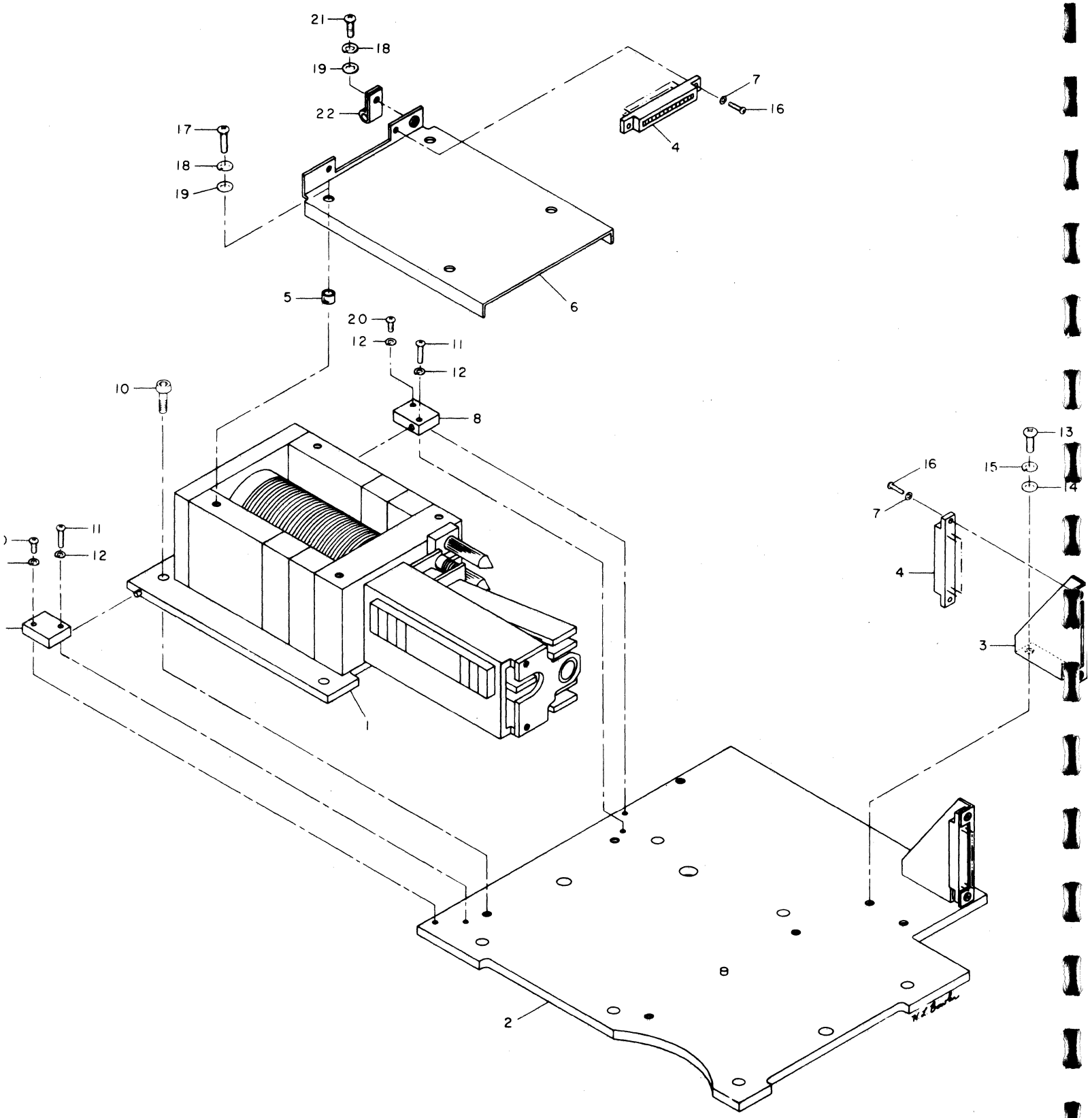
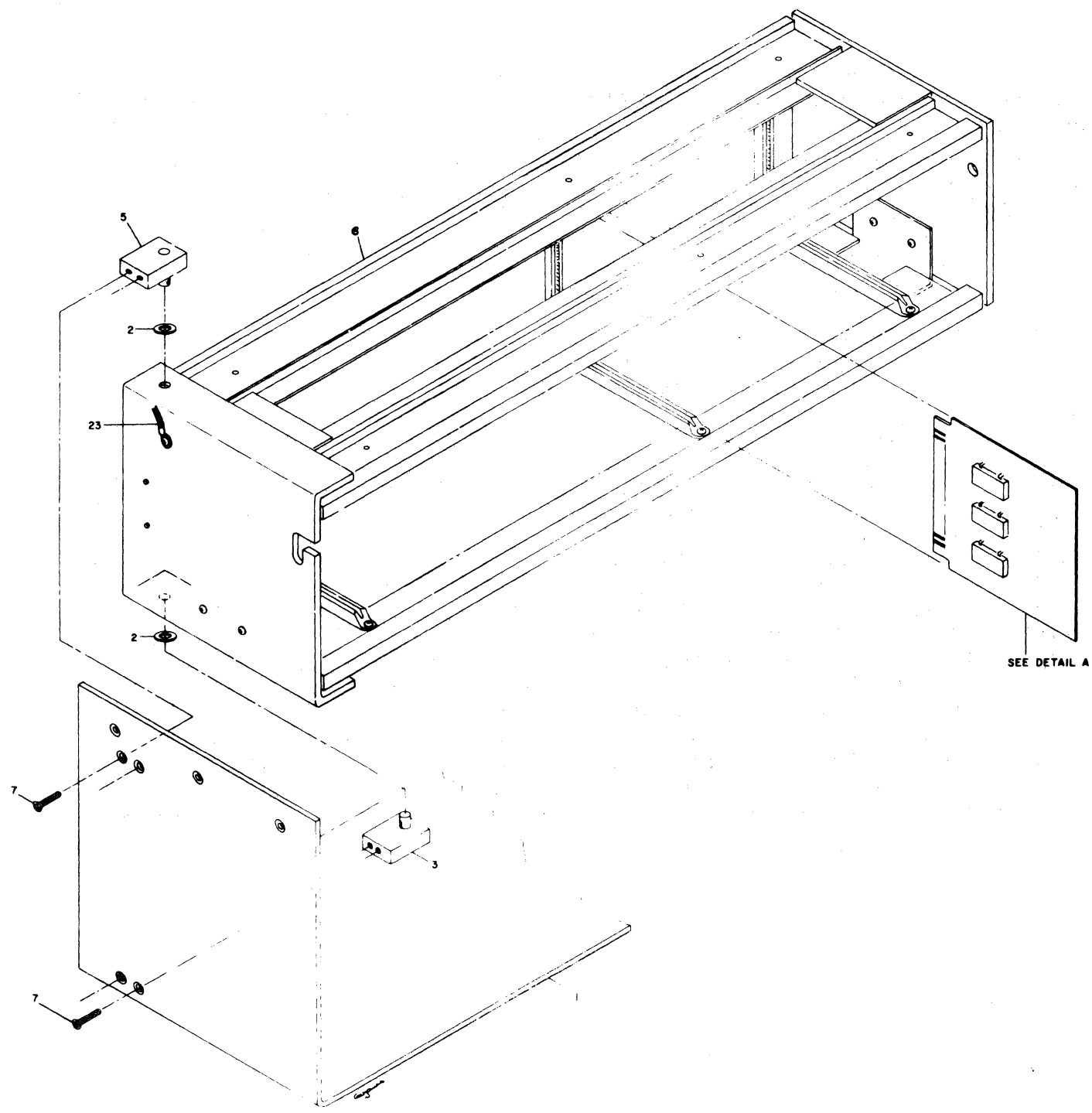


FIGURE 4. POSITIONER ASM. SEE LIST 4.

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 4, Positioner Assembly See List 2-4 for next assembly				
-1	10D001161G2	106161-02	Positioner	1
-2	10D001041G1	106041-01	Base Plate	1
-3	10C001044G1	106044-01	Conn. Mtg Bracket	2
-4	CNC000248P4	503-2484	Connector	3
-5	SPC000139P23	612-0036	Spacer Tube	4
-6	10C001042G1	106042-01	Plate	1
-7	WAC000119P041	606-0004	Washer Flat 4 Narrow	6
-8	10B001075P1	106075-01	Pivot Block	2
-9				
-10	SCC000366P10081	602-0008	Screw Allen Hd 10-32x1/2 lg	4
-11	SCC000088P06141	600-0614	Screw Pan Hd 6-32x7/8 lg	2
-12	WAC000120P06	605-0600	Washer Lock	4
-13	SCC000088P10061	600-1006	Screw Pan Hd 10-32x3/8 lg	4
-14	WAC000119P102	606-0001	Washer Flat 10	4
-15	WAC000120P10	605-1000	Washer Lock	4
-16	SCC000088P04081	600-0408	Screw Pan Hd 4-40x1/2 lg	6
-17	SCC000088P08101	600-0810	Screw Pan Hd 8-32x5/8 lg	4
-18	WAC000120P08	605-0800	Washer Lock	8
-19	WAC000119P08	606-0800	Washer Flat 8	5
-20	SCC000088P06061	600-0606	Screw Pan Hd 6-32x3/8 lg	2
-21	SCC000088P08061	600-0806	Screw Pan Hd 8-32x3/8 lg	1
-22	CCC000052P025	661-0014	Cable Clamp	1



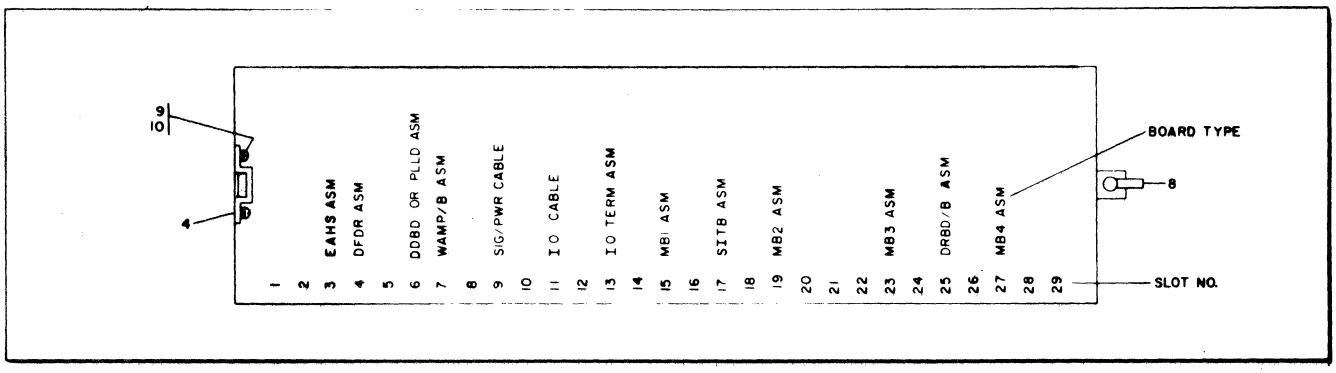
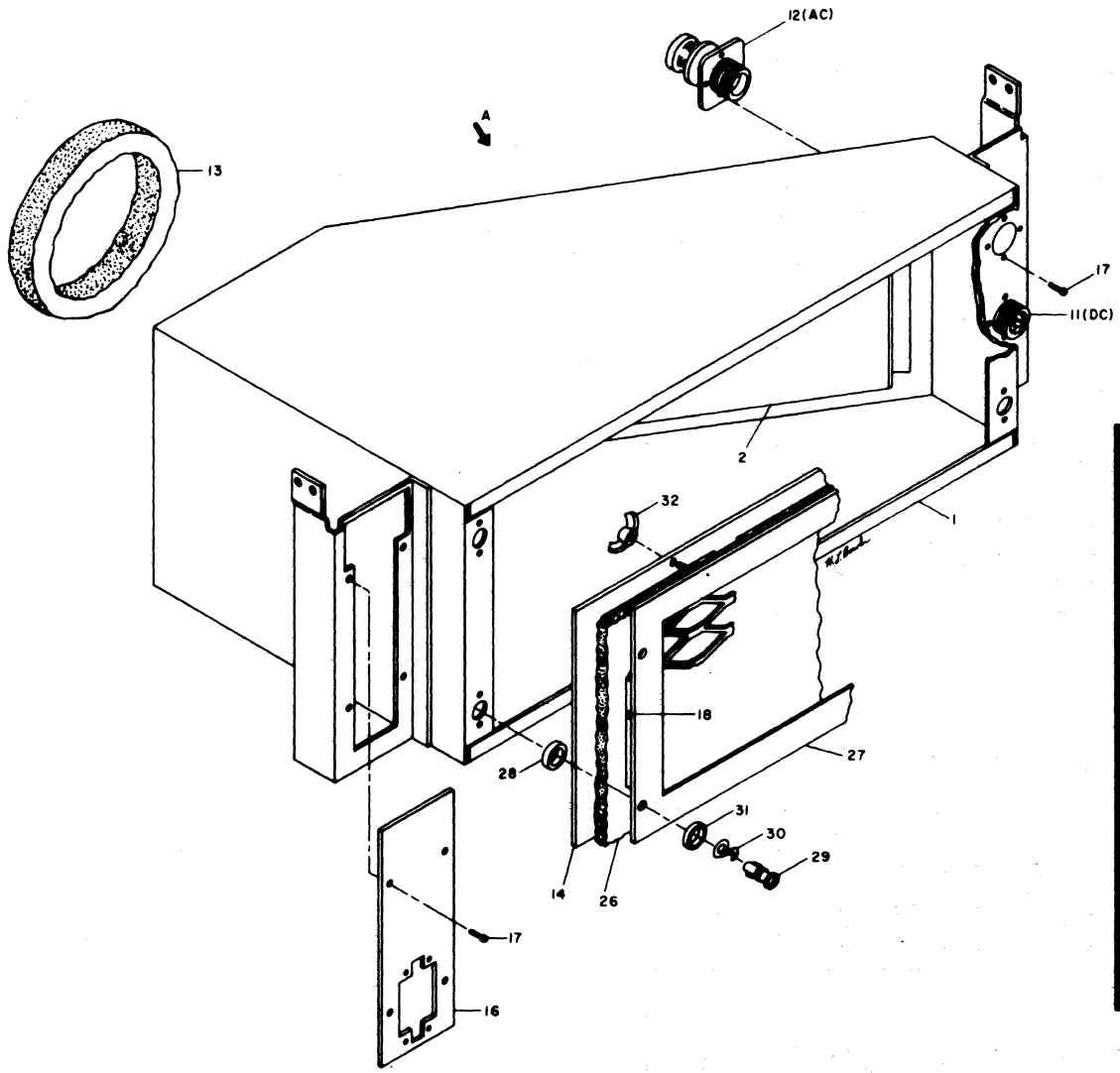
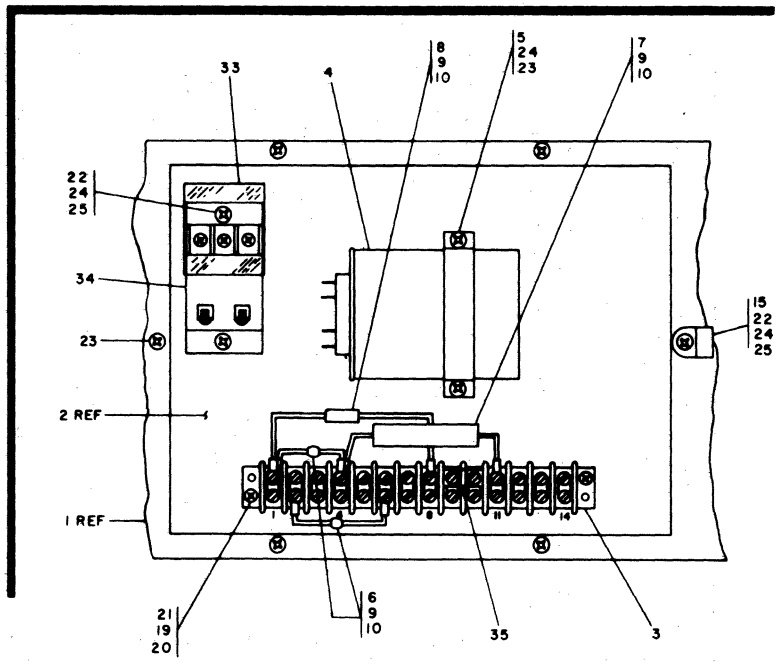


FIGURE 5. ELECTRONIC MODULE ASM. SEE LIST 5.

List and Index No.	CMD Part No. Reference	PERTEC Part No.	Description	Recom'd Qty per Assy
List 5, Electronic Module Assembly See List 2-2 for next assembly				
-1	10D000250G2	105250-02	Bracket, Elec. Mod	1
-2	10A000254P1	105254-01	Washer	2
-3	10A000258G2	105258-02	Hinge Block Assy	1
-4	10A000346P4	105346-04	Clamp, Cable	1
-5	10A000258G1	105258-01	Hinge Block Assy	1
-6	10D000201G1	105201-01	Module Assy	1
-7	SCC000121P0608	627-0608	Screw Flat Hd 6-32x1/2 lg	4
-8	LAB000069P1	615-6901	Fastener, Pawl	1
-9	SCC000088P06061	600-0606	Screw Pan Hd 6-32x3/8 lg	2
-10	WAC000120P06	605-0600	Washer Lock 6	2
-11	10C001088G2	106088-02	Model MD5101 and 5101A WAMP/B Assy	1
	10C001088G1	106088-01	Model MD5201 and 5201A WAMP/B Assy	1
-12	10C001006G1	106006-01	DFDR Assy	1
-13	10C001034G3	106034-03	IO Terminal Assy	1
-14	10C001078G1	106078-01	MB1 Assy	1
-15	10C000987G1	105098-01	SITB Assy	2
-16	10C001079G1	106079-01	MB2 Assy	1
-17	10C001080G1	106080-01	MB3 Assy	1
-18	10C001076G1	106076-01	DRBD/B Assy	1
-19	10C000790G1	105790-01	MB4 Assy	1
-20				
-21	10C000197G1	105197-01	Model MD5101 and 5101A DDBD Assy	1
	10C000774G1	105774-01	Model MD5201 and 5201A PLLD Assy	1
-22	10C000737G1	105737-01	EAHS Assy	1
-23	10C000370G9	105370-09	Ground Strap	1





VIEW A

FIGURE 6. AIR INLET ASM. SEE LIST 6

This table lists the conversion of CMD to PERTEC drawing numbers. "S" signifies Schematic drawing, and "A" signifies Assembly drawing.

CMD Dwg No. Reference	PERTEC Dwg No.	Description
10D01018	106018	Outline
10D001039	106039 (S and A)	VACA
10D001037	106037 (S and A)	Servo Power Amplifier
10D001045	106045 (S and A)	RA/WD/A
10C000737	105737 (S and A)	EAHS
10C001088	106088 (S and A)	WAMP/B
10C000774	105774 (S and A)	PLLD
10C001006	106006 (S and A)	DFDR
10C000197	105197 (S and A)	DDBD
10C001076	106076 (S and A)	DRBD
10C000987	105987 (S and A)	SITB
10C001078	106078 (S and A)	MB1
10C001079	106079 (S and A)	MB2
10C001080	106080 (S and A)	MB3
10C000790	105790 (S and A)	MB4
10D001069	106069 (S)	File Logic VC
—	106070 (S)	Unit Schematic
10D001058	106058 (S)	Power Supply
10D001059	106059 (S)	Inter Cable Assy
—	106255 (S)	PS9004
—	106256 (A)	PS9004, PS9004A
10C000339	105339 (S and A)	PSDT
—	106060 (S)	PSI Installation

DWG NO. 106055

NOTES:

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	6-7-71
A1	REC CHG-CMD P/N WAS 10C001055	7-19-71

MODIFICATION 500

THIS MODIFICATION PROVIDES A "WRITE PROTECT" CAPABILITY, IN ALL 5000 SERIES DISK DEVICES, BY ACTIVATING THE WRITE PROTECT SWITCH, LOCATED IN PLACE OF THE "SAFE" INDICATOR ON THE FRONT PANEL.

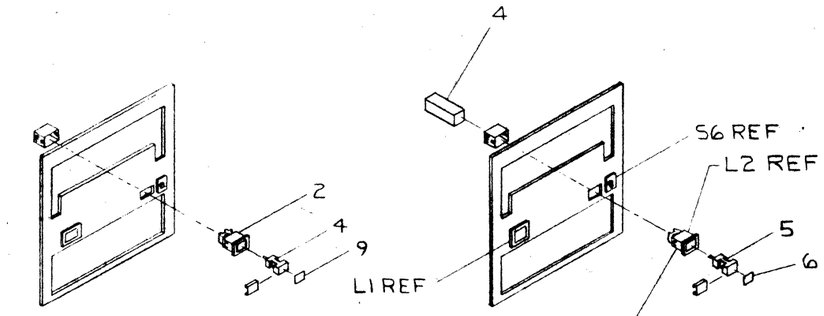
ALL WIRING, INTERNAL TO THE HARNESS AND BACKPANEL, HAS BEEN INCORPORATED INTO EACH BASIC DEVICE.

TO INCORPORATE THIS FEATURE THE FOLLOWING INSTRUCTIONS ARE TO BE FOLLOWED.

1. DELETE ONE(1) OF ITEM 4 DISPLAY MODULE AND DELETE ITEM 9 SWITCH INSERT, AS SHOWN IN DETAIL A, FROM 105627-03 FRONT PANEL ASM.
2. USING ONE (1) ITEM 2 SWITCH HOUSING, AS SHOWN IN DETAIL A, FROM 105627-03 FRONT PANEL ASM, ASSEMBLE THE SWITCH, AS SHOWN IN DETAIL B, AND CHANGE THE LAMPS FROM ITEM 4 IN DETAIL A TO ITEM 5 IN DETAIL B AT LOCATIONS L2-A AND L2-D.
3. WIRE PER WIRING DIAGRAM AS SHOWN IN DETAIL C.

TEST SPECIFICATION

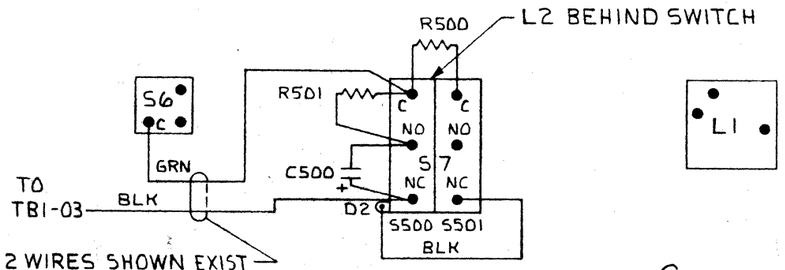
1. ASSURE NORMAL FUNCTION OF START/STOP SWITCH AND SAFE LIGHT (SAFE LIGHT IS NOW UPPER HALF OF L2).
2. INSURE THAT WHEN THE WRITE PROTECT LAMP IS OFF THAT THE SIGNAL AT CONTACT E OF P4 (ALSO P5 IF DAISY CHAIN UNIT) IS AT 5V+.5V WHEN TERMINATED TO +5V±5% WITH A 68Ω ±5% RESISTOR.
3. ASSURE THAT WHEN THE WRITE PROTECT SWITCH IS DEPRESSED:
   A. THE WRITE PROTECT LIGHT IS ILLUMINATED.
   B. THE SIGNAL AT CONTACT E OF P4 (ALSO P5 IF DAISY CHAIN UNIT) IS AT .2 +.2V WHEN TERMINATED TO +5V±5% WITH A 68Ω ±5% RESISTOR.
4. IDENTIFY WITH P/N 106055-01



DETAIL A
ITEM NUMBERS IN THIS DETAIL APPLY TO THE PARTS LIST ON 105627-03 FRONT PANEL ASM

REMOVE REAR CAP BEFORE INSTALLING ITEM 4

DETAIL B



DETAIL C
REAR VIEW OF FRONT PANEL
EXISTING WIRING NOT SHOWN
REF WIRE LIST 106068.

PERTEC PERIPHERAL EQUIPMENT

QTY	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
8	7	690-0022	WIRE STRANDED	IN	22 GA BLK
1	6	105163-07	INSERT	EA	SAFE - WRITE PROTECT
1	5	509-0001	DISPLAY MODULE		
1	4	506-8110	SWITCH MODULE		S500 & S501
1	3	139-3343	CAPACITOR		C500 3.3uf
1	2	100-1005	RESISTOR		R501 10Ω 1/4W 5%
1	1	100-4705	RESISTOR	EA	R500 47Ω 1/2W 5%

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

MATL:

FINISH:

SIGNATURES	DA	MO	YR
DRAWN	27	5	71
CHECKED			
ENG.	7	6	71
MFG.	7	6	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MOD 500

SIZE C | DWG NO. 106055 | REV A1

SCALE: NONE | SHEET 1 | CONT. ON F

CMD102

DWG NO. 106062

NOTES:

REVISIONS		
REV	C.O. NO.	DATE
A	ISSUED	2-3-71
A1	REC CHG CMD P/N WAS 108001062	7-13-71

MODIFICATION 506

THIS MODIFICATION PROVIDES A 24 SECTOR-TIMING DISK IN PLACE OF THE STANDARD 16 SECTOR-TIMING DISK.

TO INCORPORATE THIS FEATURE THE FOLLOWING INSTRUCTIONS ARE TO BE FOLLOWED.

1. REMOVE THE 16 SECTOR-TIMING DISK, ITEM 68, OF MECHANISM ASM 105827-01.
2. INSTALL 24 SECTOR-TIMING DISK, ITEM 1, OF THIS MOD.
3. MARK "MOD 506" ON SERIAL NO. TAG.

QTY -01	ITEM NO.	IDENTIFICATION NUMBER	TITLE AND DESCRIPTION	UNIT MEAS.	VENDOR NAME, PART NO., AND CATALOG NO.
1	1	105835-04	TIMING DISK	EA	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES AND STANDARD PRACTICES ARE COVERED IN THE FOLLOWING SHOP PRACTICES:

MATL: ———

FINISH: ———

SIGNATURES	DA	MO	YR
DRAWN DWJones	19	1	71
CHECKED			
ENG Marvin Tesch	2	2	71
MFG [illegible]	3	2	71

COMPUTER MEMORY DEVICES, INC.
GLENDALE, ARIZONA

TITLE: MOD 506

SIZE	DWG NO.	REV
B	106062	A1

SCALE: ——— SH. 1 CONT. ON F

PERTEC PERIPHERAL EQUIPMENT

CMD101

ADDENDUM
IMPROVED POSITIONER SERVO CIRCUIT

PERTEC Model D5000
Disk Memory Drive
Manual No. 102525

Issue Date: April, 1972

To improve the VCAC and VCAP Servo operation a revised ground plane circuit was incorporated into the circuit boards. This improvement eliminates the oscillations that introduced unstable operating conditions that occurred in the former VCAC circuits when the Servo loop approached critical adjustment.

The improved design incorporates an operational amplifier that is more stable and provides more control over the Servo driving current. Simplified alignment procedure is also provided.

The Schematic Drawing Number for the new VCAC is 106267, and the PCBA Drawing Number is 106268.

The Schematic Drawing Number for the new VCAP is 106263, and the PCBA Drawing Number is 106264.

NOTE

The VCAC and VCAP PCBAs described in this Addendum may be used in all D5000 Disk Memory Drives provided that both the old-type boards (Assemblies 106037 and 106039) are replaced with the new-type boards (Assemblies 106264 and 106268) and provided that the red wire on TB3-4 and the black wire on TB3-3, located on the positioner terminal board, are reversed.

To install the new Servo circuit, perform the following steps.

(1) Disconnect all power to the D5000 Disk Memory Drive.

(2) Remove old VCAC PCBA and replace it with the new VCAC PCBA, 106268.

(3) Remove old VCAP PCBA and replace it with the new VCAP PCBA, 106264.

(4) Replace the red wire on TB3-4 with the black wire from TB3-3. The red and the black wires are from the velocity transducer. (TB3-3 will be red and TB3-4 will be black.)

(5) Apply power and allow a 15 minute warm-up period.

(6) Perform Servo alignment procedure described in the following paragraphs.

SERVO ALIGNMENT PROCEDURE

INDEX, PHOTOCELL

If the positioner is retracted beyond track 0, an output from the photocell relays this information to the positioner actuating mechanism in the form of an output voltage of about 0 volts. It is important that this INDEX voltage be adjusted as close to 0 volts as possible.

Photo Pickup Adjustment Procedure

Adjustments are made in the following sequence to ensure correct alignment of the photo pickup assembly. The adjustments are made with power on, the positioner in the raised position, and the emergency unload relay removed. PERTEC Tool No. 106257 is used to position the photocell pickup.

Gap Adjustment

(1) Loosen socket head screw, (① Figure A-1).

CAUTION

IN THE FOLLOWING STEP, DO NOT USE ANY GAUGING DEVICE THAT WILL SCRATCH THE SLIDE.

(2) Move photo pickup vertically to establish a 0.010 ± 0.003 inch gap between pickup (② Figure A-1) and the lined glass slide (③ Figure A-1). Proceed with the graticule adjustment.

Graticule Adjustment, Course

Position the photocell pickup (② Figure A-1) as follows.

(1) Loosen retaining screw in the positioning tool and slip the tool down and around photocell and tighten.

(2) Loosen holding screw (① Figure A-1) on the positioning arm.

(3) As the heads are moved out, rotate the photocell pickup until the shadows created by the intersection of the slide lines and the graticule lines appear to be three lines moving to the left as viewed from the front of the disk.

(4) Maintain gap distance of 0.010 ± 0.003 inches between glass slide and the pickup.

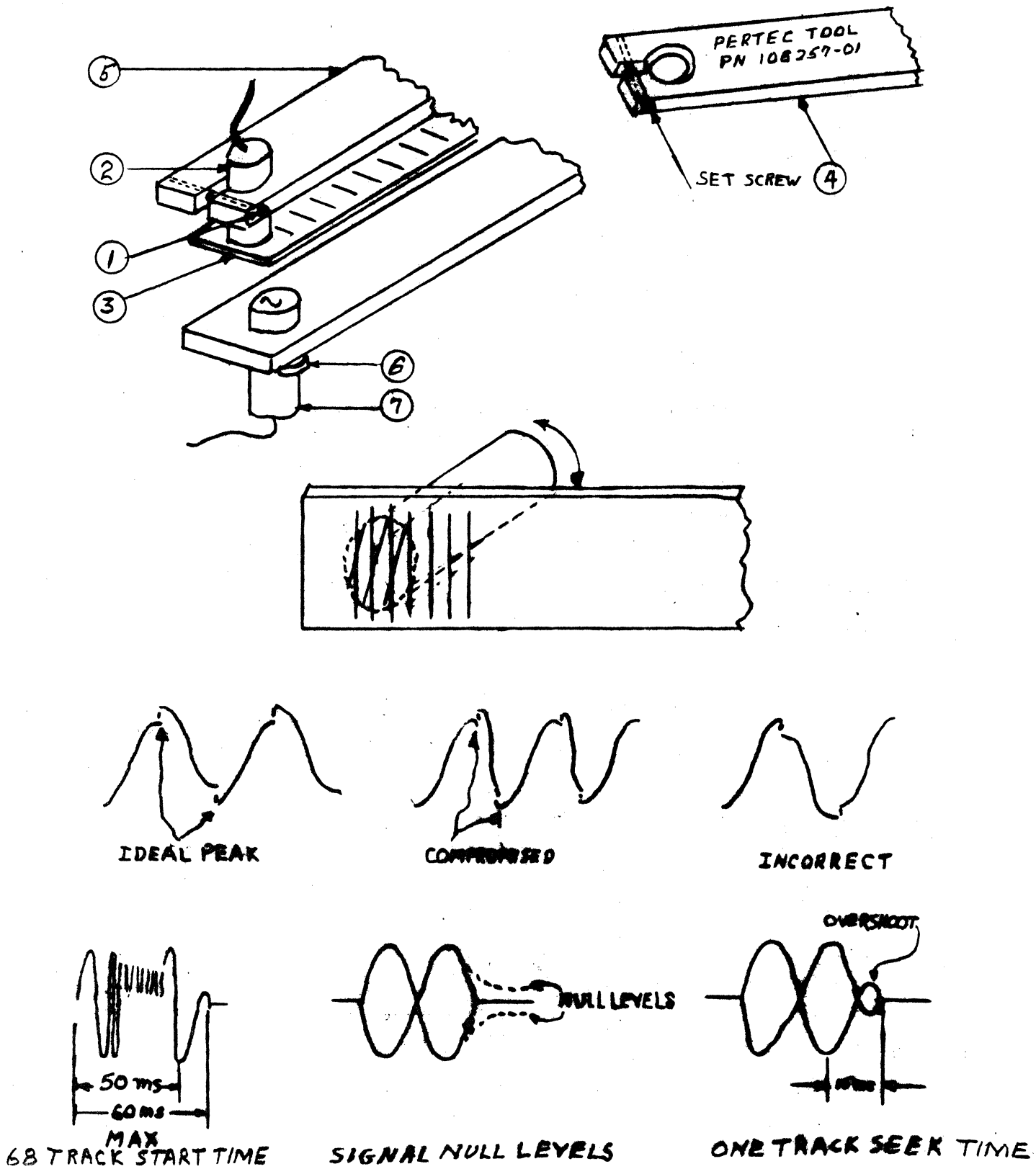


Figure A-1. Photocell Alignment and Related Waveforms

X + 90 Adjustment

(1) Connect oscilloscope to VCAC TP-7. Refer to Figure A-2.

NOTE

A waveform will be generated when the heads are moved.

(2) Rotate positioning tool to obtain a maximum output signal from photocell.

(3) Secure photocell by tightening holding screw (① Figure A-1).

(4) Loosen lamp retaining nut (⑥ Figure A-1) by using an open end wrench.

(5) Rotate the lamp (⑦ Figure A-1) until a signal at TP-7 is centered about ground.

(6) Tighten retaining nut (⑥ Figure A-1).

X + 0 Adjustment

(1) Connect oscilloscope to VCAC TP-9. Refer to Figure A-2.

NOTE

A waveform will be generated when the heads are moved.

(2) Adjust potentiometer R2 (PTB) on the VCAC PCBA to center the signal about ground.

(3) Adjust potentiometer R6 (PTG) on the VCAC PCBA to obtain a 12 volt peak-to-peak signal.

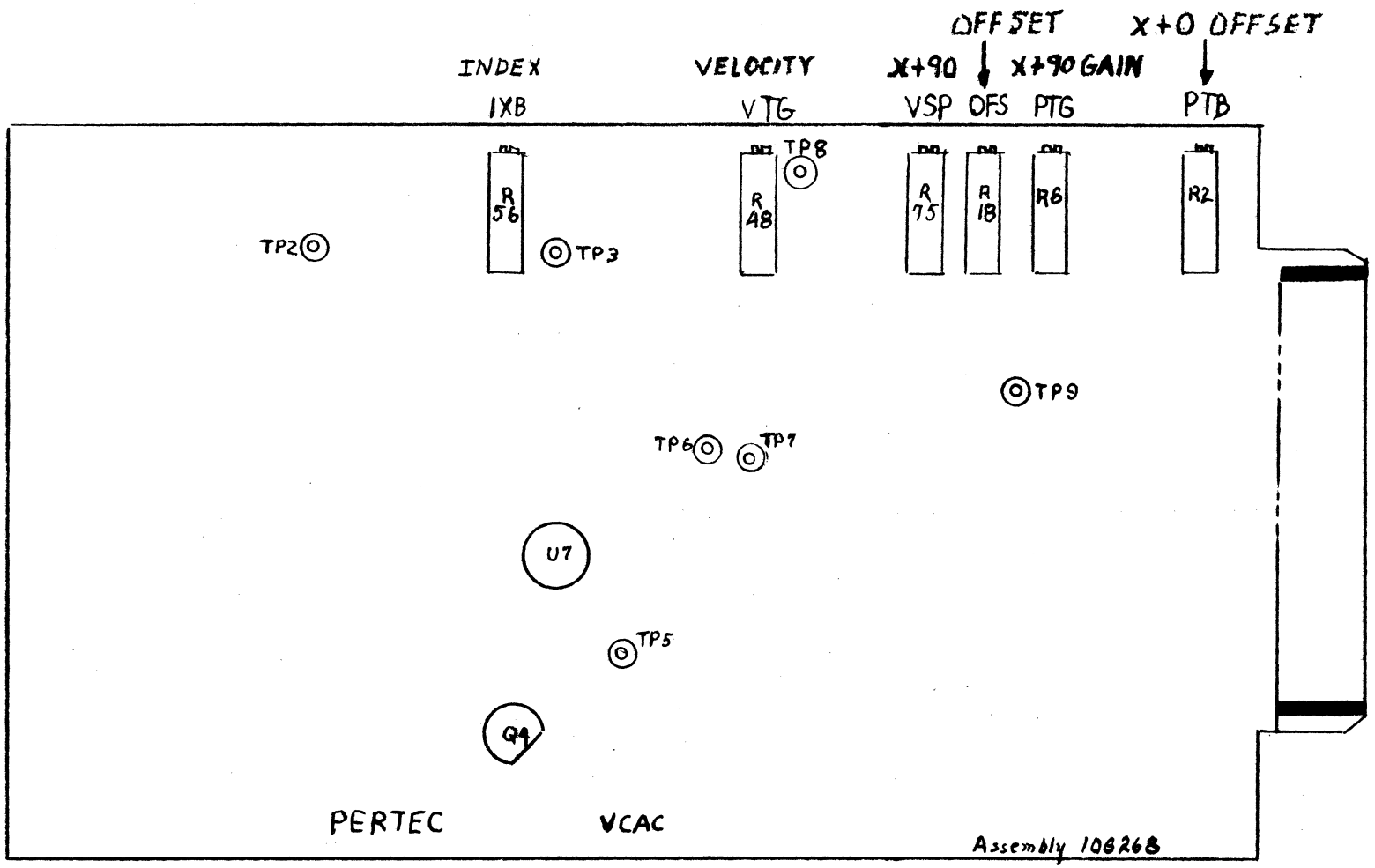


Figure A-2. Test Points and Servo Adjustment Locations on VCAC Board

X + 0 / X + 90 Phasing Check

(1) Connect oscilloscope input channels A and B to VCAC TP-7 (X + 90 analog) and to VCAC TP-2 (X + 0 digital). See Figure A-2.

(2) Set oscilloscope to internal Sync.

(3) Set oscilloscope switch to add algebraically, channels A and B.

(4) Move heads slowly FORWARD and observe the waveform. The waveform, as shown in Figure A-1, should approach either the IDEAL or COMPROMISE condition. If the waveform does not represent the IDEAL or COMPROMISE condition, perform Step (6). The digital waveform at TP-2 should occur as close as possible to the analog peak shown at TP-7.

NOTE

The incorrect waveform of Figure A-1 illustrates a waveform that is 180^{o} out of phase.

(5) Loosen the holding screw on the positioning arm (① Figure A-1).

(6) Rotate the positioning tool until the IDEAL or the COMPROMISE waveform is obtained.

NOTE

Right slope of X + 90 waveform is displaced above the left slope by the rising edge of X + 0 waveform.

(7) Tighten the holding screw on the positioning arm (① Figure A-1).

(8) Remove the positioning tool.

(9) Recheck X + 90 Adjustment, Step (5).

(10) Recheck X + 0 Adjustments.

Lock Servo Loop Window Adjustment

The X + 90 digital signal defines the range of Lock Servo Loop. It is important that the range of Lock Servo Loop is defined within the decreasing slope of the X + 0 analog signal.

(1) Connect oscilloscope to VCAC TP-9 and VCAC TP-8, Figure A-2.

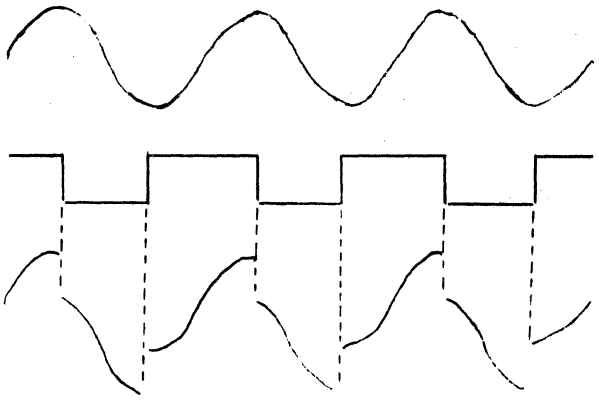
(2) Sync internally on VCAC TP-8.

(3) Set oscilloscope switch to add algebraically, channels A and B.

NOTE

Waveform polarity will be correct only when the heads are moved out from the retract position.

(4) Adjust R-75 (VSP) until only the decreasing analog slope is displaced from the analog signal.



Index Centering Adjustment

(1) Connect oscilloscope to VCAC TP-6, Figure A-2.

(2) Move the positioner out to the "heads loaded" position. Moving the positioner back and forth in this area will generate a signal at TP-6.

(3) Adjust potentiometer R56 (IXB) on VCAC to center the signal about ground.

(4) Remount the positioner and reinstall the emergency unload relay.

Heads Up Check

(1) Connect oscilloscope to VCAC TP-5, Figure A-2.

(2) Note the signal transition that occurs as the positioner is moved out from the retract position is more than 8 volts negative on the negative peak and more than 8 volts positive on the positive peak.

(3) If it is not, the discrepancy in the signal transition voltage is likely to be in the amplifier, U7, on VCAC PCBA.

Velocity Transducer Phasing Check

This check applies only to newly installed positioners.

(1) Connect oscilloscope to VCAC TP-3, Figure A-2.

(2) Observe a negative signal transition as the carriage is moved out from the retract position.

(3) If there is not a negative signal observed, reverse the red and black wires on TB3-3 and TB3-4 located on the positioner.

Voice Coil Phasing Check

This check applies only to newly installed positioners.

(1) Connect the negative lead of a voltmeter to TB3-10 and a positive lead to TB3-9 on the positioner.

(2) A positive deflection of about 0.5 volts should occur as the positioner is moved out from the retracted position.

(3) If the deflection is negative reverse TB3-9 and 10 on the positioner.

SERVO ALIGNMENT

Positioner drive is determined by a controlled current. This current is derived from a difference between the address where the positioner should be located and the address where the positioner is located. The time required for the positioner to reduce this difference must be controlled. It is important that the velocity of the positioner be correctly set.

The output drive signal from the X = 0 amplifier was set at a fixed level to compensate for circuit characteristics. Since this signal is too large to be summed with the feedback signals, the signal may be reduced to some ratio relative to the feedback signals to prevent overshoot oscillations.

Servo Adjustment

Servo adjustments are made with the positioner mounted and the emergency unload relay installed. Prepare the disk as follows.

(1) Ensure all power to machine is OFF.

(2) Remove I/O cable and terminating boards from slots A11 and A13.

(3) Remove positive connection to emergency retract capacitor.

(4) Install CE Board in slot A11.

(5) Turn power ON.

(6) Connect oscilloscope external SYNC to A19, pin 5.

Servo Velocity Coarse Adjustment

(1) Connect oscilloscope to VCAC TP-9, Figure A-2.

(2) Perform 1 track repetitive seek with CE Board.

(3) Adjust R48 (VTG) on VCAC to obtain a signal width of 5 to 10 milliseconds.

Servo Velocity Adjustment

(1) Connect oscilloscope to VCAC TP-9.

(2) Perform a 68 track repetitive seek with CE Board.

(3) Adjust R48 (VTG) on VCAC to set waveform pattern start time to stop time (lock null) from 40 to 50 milliseconds. See Figure A-1.

Servo Offset Gain Adjustment

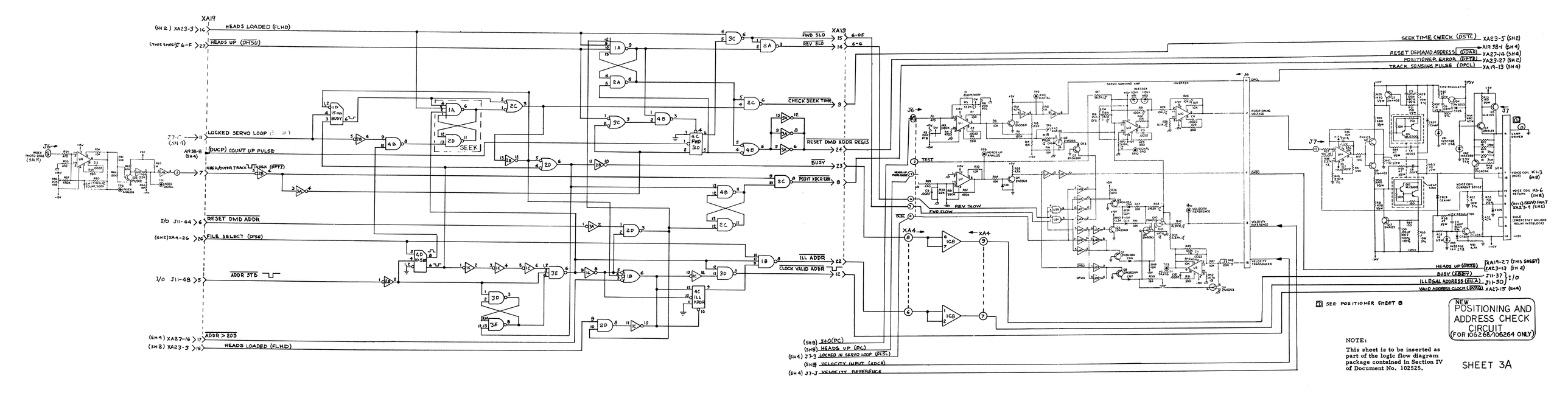
(1) Connect oscilloscope to VCAC TP-9, Figure A-2.

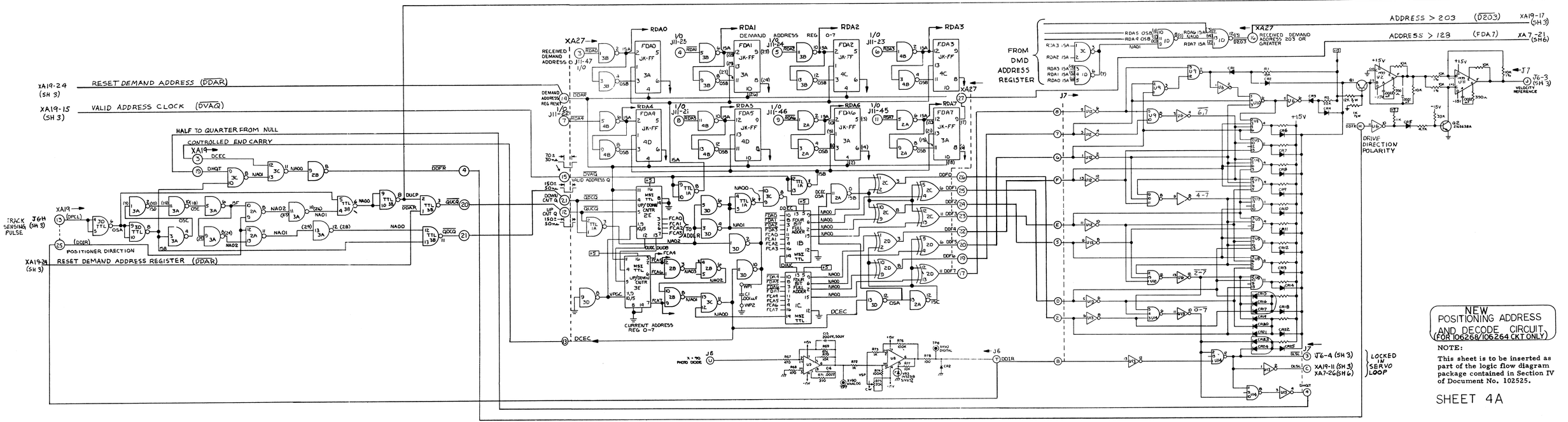
(2) Perform 1 track repetitive seek with CE Board.

(3) Adjust R18 (OFS) on VCAC to bring the forward and reverse signal null levels to 0v ± 0.7v.

(4) Turn power OFF.

(5) Reconnect positive connection to emergency retract capacitor.


XA19
HEADS LOADED (FLHD)
HEADS UP (DHSU)
LOCKED SERVO LOOP (DLSL)
(DUCP) COUNT UP PULSE
INNER/OUTER TRACK INDEX (DPIX)
RESET DMD ADDR
FILE SELECT (DFSE)
ADDR STB
ADDR > 203
HEADS LOADED (FLHD)
FWD SLO
REV SLO
CHECK SEEK TIME
RESET DMD ADDR REGIS
BUSY
POSIT XDCR ERR
ILL ADDR
CLOCK VALID ADDR
SEEK
FWD SLO
SEEK TIME CHECK (DSTC)
RESET DEMAND ABORRES (DDAR)
POSITIONER ERROR (DPTR)
TRACK SENSING PULSE (DPCL)
HEADS UP (DHSU)
BUSY (FBSY)
ILLEGAL ADDRESS (DILA)
VALID ADDRESS CLOCK (DVAC)
SEE POSITIONER SHEET B
NEW
POSITIONING AND ADDRESS CHECK CIRCUIT
(FOR 106268/106264 ONLY)
NOTE:
This sheet is to be inserted as part of the logic flow diagram package contained in Section IV of Document No. 102525.
SHEET 3A


COUNT UP PULSE (DCUP) (SH 3)
ADDRESS > 203 (D203) XA19-17 (SH 3)
ADDRESS > 128 (FDA7) XA7-21 (SH 6)
XA19-24 (SH 3) RESET DEMAND ADDRESS (DDAR)
XA19-15 (SH 3) VALID ADDRESS CLOCK (DVAQ)
HALF TO QUARTER FROM NULL
CONTROLLED END CARRY
TRACK SENSING J6H (SH 3) PULSE
POSITIONER DIRECTION
RESET DEMAND ADDRESS REGISTER (DDAR)
RECEIVED DEMAND ADDRESS
DEMAND ADDRESS REG RESET
VALID ADDRESS Q
CURRENT ADDRESS REG 0-7
FROM DMD ADDRESS REGISTER
RECEIVED DEMAND ADDRESS 203 OR GREATER
VELOCITY REFERENCE
DRIVE DIRECTION POLARITY
LOCKED TO SERVO LOOP
J6-4 (SH 3)
XA19-11 (SH 3)
XA7-26 (SH 6)
NEW POSITIONING ADDRESS AND DECODE CIRCUIT (FOR 106268/106264 CKT ONLY)
NOTE:
This sheet is to be inserted as part of the logic flow diagram package contained in Section IV of Document No. 102525.
SHEET 4A

ERRATA SHEET

PERTEC MODEL D5000
Disk Memory Drive
Manual No. 102525

Issue Date: August 1972
Reference: CS Product Support

Incorporate these changes into subject manual.

Item 1. Page 4-6A. Table 4-1. Preventive Maintenance Schedule.

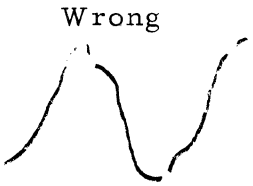
Add to Table:

Location Operation	Freq/ Months	Operation
Lubricate Static Discharge Bracket	4	Apply lubricant between contact screw on end of disk shaft and grounding bracket.

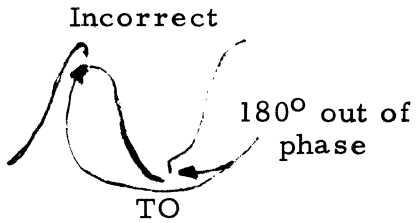
Item 2. Page 4-55, Figure 4-10. Photocell Alignment and Related Waveforms.

Correct or add to Figure 4-10

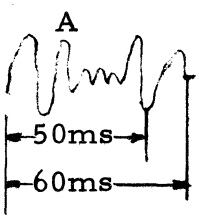
FROM



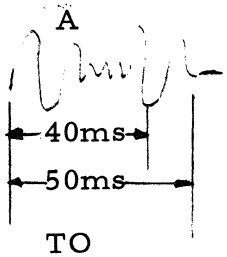
TO



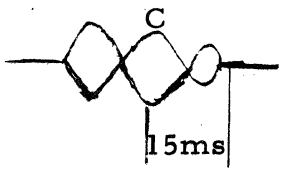
FROM



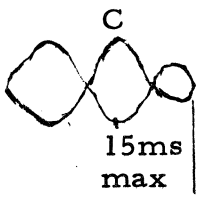
TO



FROM



TO



ERRATA SHEET

Item 3. Page 4-57. Paragraph 4.15.5.2 Graticule Adjustment, Course

Step (5) Correction

FROM	TO
Tighten Item 1 in Figure 4-10 on the tool.	Tighten Item 1 in Figure 4-10 on the positioner.

Item 4. Page 4-63. Figure 4-11. Double Density Head to Track Relationship.

Correct time interval call out between two envelopes.

FROM	TO
40 ns	40 milliseconds

Add notation:
For 2400 rpm Disk Drives time interval is 25 milliseconds.

Item 5. Page 4-69. Figure 4-13. Double Density CE Alignment.

Clarification of time interval.

In all four illustrations, the interm defined by ⊢——/——⊣ represents a 40 millisecond interval, or one revolution of the disk on a 1500 rpm Disk Drive; it also represents a 25 milliseconds interval, or one revolution of the disk for a 2400 rpm Disk Drive.

Item 6. Page 4-70. Figure 4-14. Single Density CE Alignment.

Clarification of time interval.

In all four illustrations the interm defined by ⊢——/——⊣ represents a 40 millisecond interval, or one revolution of the disk on a 1500 rpm Disk Drive; it also represents a 25 millisecond interval, or one revolution of the disk for a 2400 rpm disk drive.

Item 7. Page 4-72. Figure 4-15. Sector Transducer Timing

Correct time interval

FROM	TO
30μsec	18.6 to 3.5 μsec

Item 8. Page 7-14.

Add to parts list as follows:

These parts are required to add grounding strap and to provide suitable ground contact to the end of the rotating disk shaft. See revised Figure on Page 7-11.

	Qty.	PERTEC Part No.	Description
-64	1	606-0001	Flat Washer*
-65	1	605-0000	Lock Washer*
-66	1	106293-01	Screw, Contact
-67	1	665-0006	Lubricant
-68	1	106292-01	Bracket, Grounding Strap
-69	1	106008-01	Disk Keeper**
-70	2	600-2807	No. 8-32 Pan Head, 7/16" Screw
-71	2	605-0800	No. 8 Lock Washer
	As Req'd	667-0008	Loctite, Grade C

*Not required for Dual Platter Disk

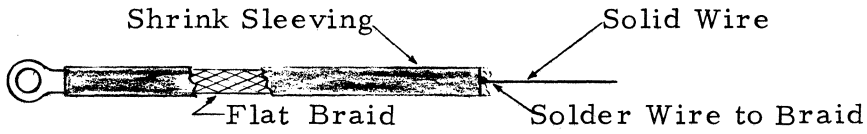
**Dual Platter Disk Only

Item 9. Page 7-14

Add to parts list as follows:

This makes a ground strap which is used between XJ7 connector and ground.

	Qty	PERTEC Part No.	Description
-72	1	656-0026	Lug Ring
-73	1 inch	695-0022	Solid Wire
-74	5 inches	669-7007	Shrink Sleeving
-75	5 inches	697-0003	Flat Braid



Item 10. Voltage Check

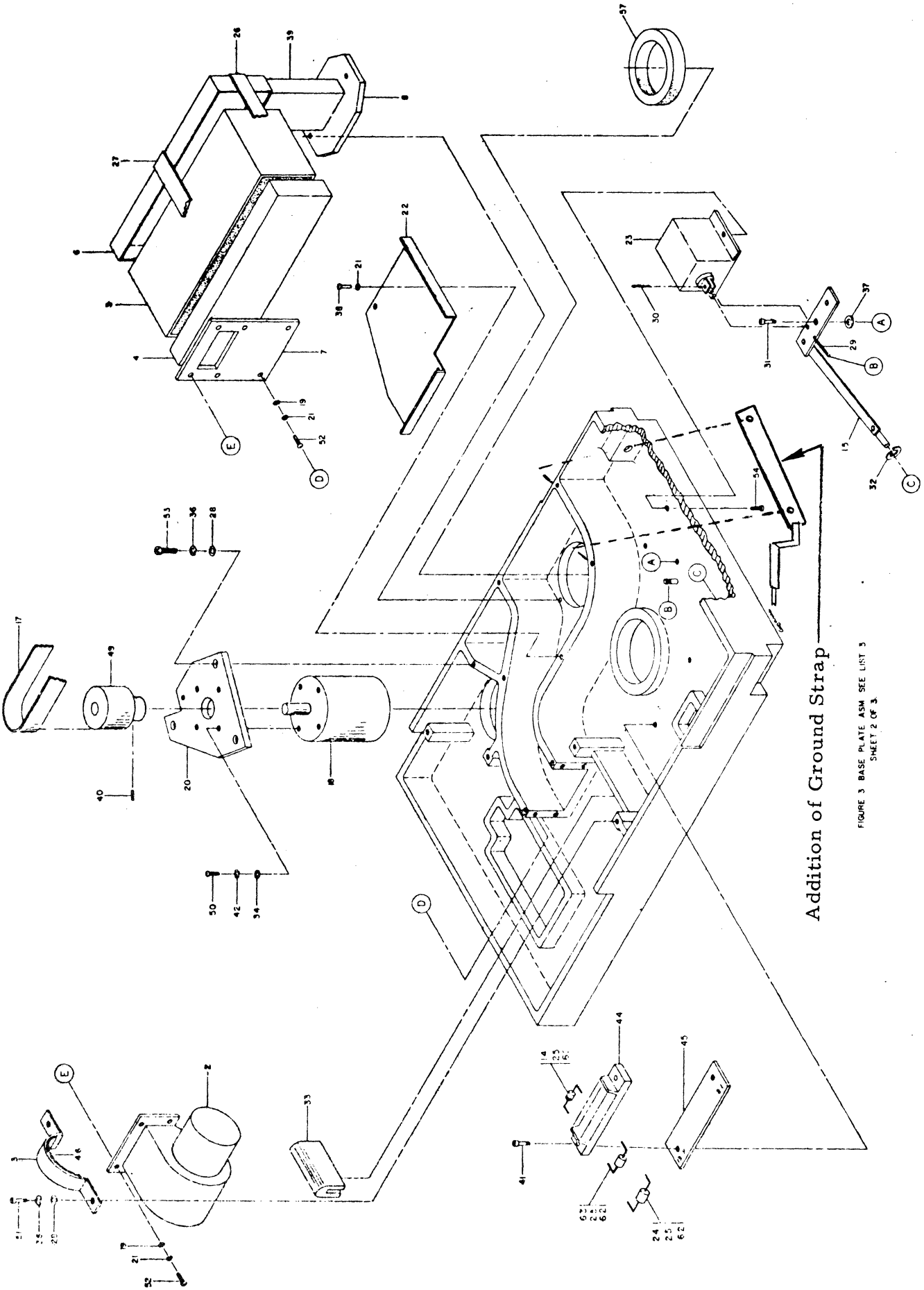
When Servo PCBA's, part numbers 106264 and 106268 are replaced with part numbers 106264C and 106268B, the supply voltage must be checked.

Voltage is set by adjusting the 5 volt control on the power supply.

Using a Digital Voltmeter, set a voltage of $4.75\ ^{+0.05}_{-0.00}$ volts between +5.0v buss pins, 1 or 29 and ground pins 28 or 56, on the card cage.

This voltage will supply an operating voltage of between +11.4 to +12.6v for the servo circuits.

Item 11. Page 7-11. Replace Page 7-11 in Manual with this Revised page.



PERTEC PERIPHERAL EQUIPMENT

9600 IRONDALE AVENUE • CHATSWORTH, CALIFORNIA 91311 • PHONE (213) 882-0030 • TWX (910) 494-2093