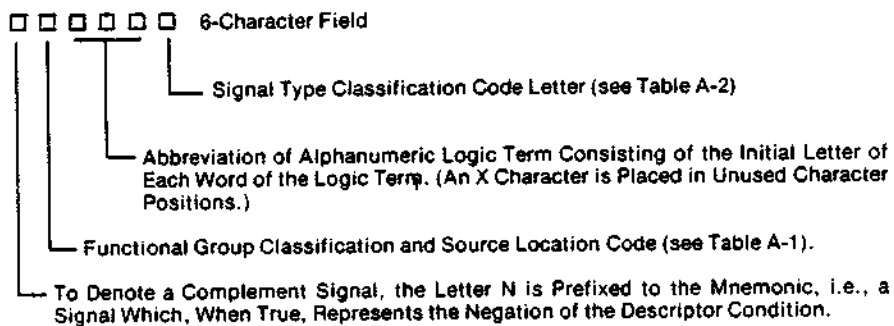


## APPENDIX A D3000 MNEMONICS

A D3000 mnemonic term consists of a 6-character field and is defined in Figure A-1; Figure A-1 should be used in conjunction with Tables A-1 and A-2 for interpretation of the D3000 mnemonics scheme. The D3000 mnemonics are listed in Table A-3.



**Note:**

The numeral zero (0) has no slash through it; the alphabet O has a slash through it and is presented as  $\emptyset$ .

Figure A-1. Mnemonic Construction

**Table A-1  
Functional Group Classification**

Symbol	Definition
I	Interface
R	Read/Write PCBA
C	Components Group (Base Assy Components)
S	Servo PCBA
L	Logic PCBA

**Table A-2  
Signal Type Classification**

Symbol	Definition
F	Flip-Flop Output
L	Latch Flip-Flop Output*
G	Gate Output, Active Pullup or Open Collector with Pullup to + 5v; Includes Transistors
S	Switch or Relay Contact Generated Signals
A	Analog Signals and Returns, Shields and Similar Signals
1,2,3,etc.	Buffering Levels of 1 through 9
R	Receiver, Line Receiver Input
D	Driver, Line Driver Output
T	Translator, Open Collector Gate Output without Pullup, or Pullup to Other than + 5v such as Special Logic Levels
*Used only if latch is mechanized by cross-couple gates.	

**Table A-3**  
**D3000 Mnemonics**

Mnemonic	Logic Term Name	Mnemonic	Logic Term Name
CBPRS	Brushes Parked (Switch) Return	IRCXD	Read Clock
CBPSS	Brushes Parked Switch	IRDXD	Read Data
CCR1S	Cartridge (Switch) Return No. 1	IREXR	Read Enable
CCR2S	Cartridge (Switch) Return No. 2	IRICR	Restore Initial Cylinder
CCS1S	Cartridge Switch No. 1	IRXXD	Ready
CCS2S	Cartridge Switch No. 2	ISC0D	Sector Count Bit 0
CLMRA	Lower Magnetic (Sensor) Return	ISC1D	Sector Count Bit 1
CLMSA	Lower Magnetic Sensor Signal	ISC2D	Sector Count Bit 2
CLP0S	Lower Protect (Switch) On	ISC3D	Sector Count Bit 3
CLSRS	Lower (Protect) Switch Return	ISC4D	Sector Count Bit 4
CLSSA	Lower Sensor Shield	ISC5D	Sector Count Bit 5
CRSRS	Run/Stop (Switch) Return	ISC6D	Sector Count Bit 6
CRSSS	Run/Stop Switch	ISPYD	Sector Pulse
CSSRS	(Unit) Selector Switch Return	ISSDR	Start/Stop Disk Drive
CUESA	Upper Electronic Sensor Signal	IT0MR	Track Offset Minus
CUMSA	Upper Magnetic Sensor Signal	IT0PR	Track Offset Plus
CUP0S	Upper Protect (Switch) On	IUS1R	Unit Select No. 1
CUS1S	Unit Selector (Switch) No. 1 Position	IUS2R	Unit Select No. 2
CUS2S	Unit Selector (Switch) No. 2 Position	IUS3R	Unit Select No. 3
CUS3S	Unit Selector (Switch) No. 3 Position	IUS4R	Unit Select No. 4
CUS4S	Unit Selector (Switch) No. 4 Position	IWDSR	Write Data Signal
CUSRA	Upper Sensor Return	IWEXR	Write Enable
CUSRS	Upper (Protect) Switch Return	LAD0G	Address Difference Bit 0
CUSSA	Upper Sensor Shield	LAD1G	Address Difference Bit 1
IAEUR	Activate Emergency Unload	LAD2G	Address Difference Bit 2
IBS1D	Busy Seeking No. 1	LAD3G	Address Difference Bit 3
IBS2D	Busy Seeking No. 2	LAD4G	Address Difference Bit 4
IBS3D	Busy Seeking No. 3	LAD5G	Address Difference Bit 5
IBS4D	Busy Seeking No. 4	LAD6G	Address Difference Bit 6
ICASR	Cylinder Address Strobe	LAD7G	Address Difference Bit 7
ICD0R	Cylinder Demand (Address) Bit 0	LADEG	Address Difference Extension Bit
ICD1R	Cylinder Demand (Address) Bit 1	LAEXG	Any Emergency
ICD2R	Cylinder Demand (Address) Bit 2	LAPXG	Address Pulse
ICD3R	Cylinder Demand (Address) Bit 3	LBCEG	Brake Cycle Enable
ICD4R	Cylinder Demand (Address) Bit 4	LBCFF	Brake Cycle Enable Flip-Flop
ICD5R	Cylinder Demand (Address) Bit 5	LBMEG	Brush Motor Enable
ICD6R	Cylinder Demand (Address) Bit 6	LBPEG	Brush Parking Error
ICD7R	Cylinder Demand (Address) Bit 7	LBPSL	Brushes Parked Switch Signal
ICDER	Cylinder Demand (Address) Extension	LBSXG	Busy Signal
IDPDD	Dual Platter Drive	LBTFP	Busy Time Flip-Flop
IDTDD	Double Track Drive	LC01F	Clock No. 01
IEEXR	Erase Enable	LC02F	Clock No. 02
IFPYD	File Protected	LC03F	Clock No. 03
IHSXR	Head Select	LC04F	Clock No. 04
IICAD	Illegal Cylinder Address	LC08F	Clock No. 08
IIPXD	Index Pulse	LC09F	Clock No. 09
IMDXD	Malfunction Detected	LC09G	Clock No. 09
IPSXR	Platter Select	LC10F	Clock No. 10

Table A-3  
D3000 Mnemonics (Continued)

Mnemonic	Logic Term Name	Mnemonic	Logic Term Name
LC13F	Clock No. 13	LLØX3	Logic One (No. 3)
LC17F	Clock No. 17	LLØX4	Logic One (No. 4)
LC20F	Clock No. 20	LLØX5	Logic One (No. 5)
LCCIG	Cartridge Correctly Inserted	LLØX6	Logic One (No. 6)
LCØUG	Clear Or Unload	LLPLT	Lower Protect Lamp (Drive)
LDACG	Demand Address Clear	LLPNG	Load + Purge Not
LDAMG	Demand Address Most (Significant) Bit	LLPXG	Load + Purge
LDMEG	Drive Motor Enable	LNLPG	Not Load + Purge
LDPSG	Dual Platter Signal	LNRSG	Not Run + Sequence Not
LDRCG	Delayed Ready Condition	LP05A	Plus 05 Volts Power Indicator Voltage
LDRXG	Disk Rotating	LP10A	Plus 10 Volts Lamp Power
LDSEG	Disk Speed Error	LP5VA	Plus Five Volts Signal
LDSFG	Disk Starting Fault	LPCFF	Purge Cycle Flip-Flop
LEBXF	End Busy	LPCXG	Power Clear
LECEG	Erase Current Enable	LPIRA	Power Indicator Return
LEØFG	Emergency Or Failure Condition	LPLEG	Position Limit Error
LERFF	End (of) Run Flip-Flop	LPLFF	Phase Lock Flip-Flop
LES DG	Enabled Selected Drive	LPMXG	Position Mode
LEUCG	Emergency Unload Command	LRECG	Read Enable Control
LEUEG	Emergency Unload Enable	LRFFF	Run Flip-Flop
LEUFF	Emergency Unload Flip-Flop	LRLDT	Ready Lamp Driver
LFDX1	Forward Direction	LRØFF	Restore Operation Flip-Flop
LFPML	File Protect Mode	LRS M1	Reverse Slow Mode
LFSM1	Forward Slow Mode	LRSPG	Run Switch Pulse
LHLEG	Head Loading Error	LRXDT	Run (Lamp) Driver
LHRXG	Heads Retracted	LRXXG	Ready
LIAXG	Illegal Address	LSARG	Selected and Ready
LIMS1	Increase Motor Speed	LSCFF	Sequence Control Flip-Flop
LL1DA	LED No. 1 Drive	LSCRG	Speed Count Reset
LL2DA	LED No. 2 Drive	LSDMG	Start Drive Motor
LLAXG	Load Address	LSLDT	Safe Lamp Driver
LLCMG	Lock Cartridge Mechanism	LSNHG	Sequence + Not Heads Retracted
LLDPG	Lower Detector Pulse	LSØTF	Speed Out (Of) Tolerance
LLDRA	LED Drive Return	LSTEG	Seek Time Error
LLHFF	Load Heads Flip-Flop	LSTPF	Sequence Timing Pulse Flip-Flop
LLMEG	Lower Multiplexer Enable	LSXXG	Selected
LLNPG	Load + Not Purge	LTØMG	Track Offset Minus
LLØL1	Logic One Level (No. 1)	LTØPG	Track Offset Plus
LLØL2	Logic One Level (No. 2)	LTSCG	Transfer Speed Count
LLØL3	Logic One Level (No. 3)	LUDPG	Upper Detector Pulse
LLØL4	Logic One Level (No. 4)	LUHSG	Upper Head Select
LLØL5	Logic One Level (No. 5)	LUMEG	Upper Multiplexer Enable
LLØL6	Logic One Level (No. 6)	LUPLT	Upper Protect Lamp Drive
LLØL7	Logic One Level (No. 7)	LUPSG	Upper Platter Select
LLØL8	Logic One Level (No. 8)	LVREG	Velocity Reference Enable
LLØL9	Logic One Level (No. 9)	LWDF T	Write Double Frequency
LLØX1	Logic One (No. 1)	LWMXG	Write Mode
LLØX2	Logic One (No. 2)	LWØEG	Write Or Erase

**Table A-3**  
**D3000 Mnemonics (Continued)**

Mnemonic	Logic Term Name
RRCSG	Read Clock Signal
RRDSG	Read Data Signal
RWECSG	Write Emergency Condition
S10SS	10 Volts Switched
SHRXG	Heads Retracted
SPCSA	Power Clear Signal
SPQCG	Position Quadrature Clock
SPRCG	Position Reference Clock
SPTFG	Position Transducer Failure
SPTIG	Position Transducer Index
TRHCG	Ready Hold Control



**APPENDIX B  
FAULT-ISOLATION PROCEDURES**

**B1 GENERAL**

Appendix B contains troubleshooting procedures which can be used as an aid in fault isolation. The required test equipment for use with these troubleshooting procedures is listed in Paragraph B2. The Troubleshooting Procedure chart appears in Paragraph B3 as Table B-2.

All references to paragraph numbers preceded by the letter B refer to paragraphs in this Appendix, as do references to figures and tables. All references to the manual refer to PERTEC Manual No. 104630, Models D3300 and D3400 Disk Drives. Table B-1 is a Trouble Location Guide listing specific problems and their location, by problem number, in the Troubleshooting Procedure chart.

Table B-1  
Trouble Location Guide

General Trouble Indicator:	Reference — Table B-2
<p><b>Emergency Unload</b> NOTE: An emergency unload is one of the following:</p> <ul style="list-style-type: none"> <li>a. The positioner retracts during operation.</li> <li>b. Pressing the RUN/STOP pushbutton does not start the disk drive motor.</li> <li>c. The positioner does not load the heads.</li> </ul> <p><b>Specific Troubles:</b></p> <ul style="list-style-type: none"> <li>1. SAFE lamp does not light.</li> <li>2. Pressing RUN/STOP pushbutton does not start motor.</li> <li>3. Emergency Unload relay, K1 on Servo PCBA, does not engage.</li> <li>4. Spindle speed does not change to purge cycle during startup.</li> <li>5. Heads do not load properly.</li> <li>6. Disk drive does not go into ready state.</li> <li>7. READY lamp lights but positioner does not seek.</li> <li>8. Heads unload when trying to write.</li> <li>9. Disk Drive does not read data properly.</li> <li>10. Disk drive has incorrect sector count.</li> <li>11. Positioner seeks to wrong track location.</li> <li>12. Heads crash.</li> </ul>	<p>Problems 13—22 which provide instructions for locating specific cause of trouble.</p> <p>Problem 1</p> <p>Problem 2</p> <p>Problem 3</p> <p>Problem 4</p> <p>Problem 5</p> <p>Problem 6</p> <p>Problem 7</p> <p>Problem 8</p> <p>Problem 9</p> <p>Problem 10</p> <p>Problem 11</p> <p>Problem 12</p>

## **B2 TEST EQUIPMENT REQUIRED**

Test equipment required for testing and troubleshooting are:

- (1) Oscilloscope, dual trace, with at least 100 MHz bandwidth and a horizontal module with a Delayed Sweep mode.  
Minimum sweep rate:  $\leq 50$  ns/division.  
Vertical and horizontal sensitivity:  $\pm 3$  percent accuracy.
- (2) Three calibrated X10 test probes with ground clips.
- (3) One X1 test probe with ground clip.
- (4) Digital Volt Meter, Fairchild 7050 ( $\pm 0.1$  percent specified accuracy) or equivalent, with test leads.
- (5) PERTEC Hand-Held Disk Exerciser, Model TE-D01.
- (6) PERTEC Emergency Unload Status Monitor, Part No. 895490-01.

## **B3 TROUBLESHOOTING PROCEDURE CHART**

Table B-2, Troubleshooting Procedure Chart, lists common problems, probable causes, and recommended repairs.



Table B-1  
Troubleshooting Procedure Chart

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
<p>1. SAFE lamp does not light.</p>	<ol style="list-style-type: none"> <li>1. Defective lamp.</li> <li>2. Positioner has moved out, away from fully retracted position.</li> <li>3. Power supply voltages not within tolerances.</li> <li>4. Disk rotation detector counter circuitry (on Logic PCBA) continues to indicate rotation after disk has stopped.</li> <li>5. Brake cycle enable flip-flop U384-15 on Logic PCBA does not go high; therefore, the brake cycle enable circuit is not enabling the safe mode.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace lamp.</li> <li>2. Push positioner back to fully retracted position.</li> <li>3. Refer to Power Supply Fault Isolation Procedure, Paragraph 86.</li> <li>4. Check U283-15 on Logic PCBA. If U283-15 is low when the disk has stopped rotating, and U284-2 is also low, replace the Logic PCBA. If U283-15 is low and U284-2 is high, refer to Recommended Repair column, Problem 21.</li> <li>5. If U384-15 is low when U384-3 is high, replace Logic PCBA.</li> </ol>
<p>2. Pressing RUN/STOP pushbutton does not start motor.</p>	<ol style="list-style-type: none"> <li>1. Cartridge interlock switch is defective or other problem exists in interlock system.</li> <li>2. Emergency unload abort.</li> <li>3. RUN/STOP pushbutton does not set U364-15 high.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check cartridge interlock switch; check cartridge interlock system. Refer to Paragraph 6.15 in manual, Cartridge Interlock System — Front Load models; or Paragraph 6.16 for Top Load models. Check logic level at J109-2 (Logic PCBA). If low, replace the Logic PCBA. If high, replace the RUN/STOP pushbutton.</li> <li>2. Check logic level at U306-8 on Logic PCBA. If high, see Recommended Repair column, Problem 14. A low at U306-8 indicates an absence of the emergency unload condition.</li> <li>3. Check logic level at U447-5 while pressing the RUN/STOP pushbutton. If U447-5 stays high, replace the RUN/STOP pushbutton. Replace the Logic PCBA if the following conditions occur simultaneously:             <ol style="list-style-type: none"> <li>a. U47-5 is low (Logic PCBA).</li> <li>b. U364-15 stays low (Logic PCBA).</li> <li>c. An emergency unload is not present.</li> <li>d. The SAFE lamp is lit.</li> </ol> </li> </ol>

Table B-2  
 Troubleshooting Procedure Chart (Continued)

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR																			
<p>3. Emergency unload relay, K1, on Servo PCBA, does not engage.</p>	<p>1. Emergency unload condition being activated prevents K1 relay from engaging during purge cycle.</p> <p>2. Defective relay or defective relay engage circuit.</p> <p>3. -20v dc at J212-3 out of tolerance.</p>	<p>1. Refer to Recommended Repair column, Problem 14.</p> <p>2. Replace relay K1 (Servo PCBA). If still not engaging, check logic level at J202-32. If low, relay driver circuit is defective; replace the Servo PCBA. If J202-32 is high and does not go low when going into purge cycle, replace the Logic PCBA.</p> <p>3. Check the following:</p> <ol style="list-style-type: none"> <li>Check fuses F1, F2, F3, and F4. Refer to Power Supply assembly drawing 103581 for fuse location.</li> <li>Refer to Servo PCBA drawing 102811 for test point locations. Use an oscilloscope or digital voltmeter to check voltages as follows.                     <table border="1" data-bbox="787 693 917 1039"> <thead> <tr> <th>Test Point</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>TP4</td> <td>+5v dc ± 0.25v dc</td> </tr> <tr> <td>TP12</td> <td>-5v dc ± 0.25v dc</td> </tr> <tr> <td>TP21</td> <td>+10v dc ± 0.8v dc</td> </tr> <tr> <td>TP25</td> <td>-10v dc ± 0.8v dc</td> </tr> </tbody> </table> </li> <li>If voltage at TP4 is incorrect, adjust variable resistor R158. If voltage at TP12 is incorrect, adjust variable resistor R167. Both resistors are shown at the upper left corner of drawing 102811.</li> <li>If any voltage cannot be correctly adjusted, check the input voltages at J212, as follows.                     <table border="1" data-bbox="1055 630 1136 1039"> <tbody> <tr> <td>J212-8</td> <td>+10v dc</td> <td>-0.5 + 5v dc</td> </tr> <tr> <td>J212-11</td> <td>+20v dc</td> <td>-3.0 + 5v dc</td> </tr> <tr> <td>J212-3</td> <td>-20v dc</td> <td>-5.0 + 3v dc</td> </tr> </tbody> </table> </li> <li>If any voltage specified in Step 3d is not present, replace the power supply; otherwise go to Step 3f.</li> <li>If one of the voltages is not correct, disconnect all boards that are powered from the Servo PCBA. If voltages are correct after boards are disconnected, begin reconnecting boards one at a time until an incorrect voltage is measured. Replace board causing the problem.</li> <li>If voltage at TP21 is incorrect, check Q26 on the heatsink. If Q26 is defective, replace it. If Q26 checks good, replace the Servo PCBA.</li> </ol>	Test Point	Voltage	TP4	+5v dc ± 0.25v dc	TP12	-5v dc ± 0.25v dc	TP21	+10v dc ± 0.8v dc	TP25	-10v dc ± 0.8v dc	J212-8	+10v dc	-0.5 + 5v dc	J212-11	+20v dc	-3.0 + 5v dc	J212-3	-20v dc	-5.0 + 3v dc
Test Point	Voltage																				
TP4	+5v dc ± 0.25v dc																				
TP12	-5v dc ± 0.25v dc																				
TP21	+10v dc ± 0.8v dc																				
TP25	-10v dc ± 0.8v dc																				
J212-8	+10v dc	-0.5 + 5v dc																			
J212-11	+20v dc	-3.0 + 5v dc																			
J212-3	-20v dc	-5.0 + 3v dc																			

**Table B-2**  
**Troubleshooting Procedure Chart (Continued)**

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
<p>3. Emergency unload relay, K1, on Servo PCBA, does not engage. (Continued)</p>		<p>h. If voltage at TP25 is incorrect, check Q33. If Q33 is defective, replace it. If Q33 checks good, replace the Servo PCBA.</p> <p>i. If voltage at TP4 is incorrect, check Q24 and Q25. If either transistor is defective, replace it. If both transistors check good, replace the Servo PCBA.</p> <p>j. If voltage at TP12 is incorrect, replace the Servo PCBA.</p>
<p>4. Spindle speed does not change to purge cycle during startup.</p>	<p>1. Lower magnetic transducer misaligned.</p>	<p>1. Refer to Paragraph 6.18.3 in manual for alignment instructions for Front Load models, and Paragraph 6.18.2 for Top Load models.</p> <p>NOTE: Purge cycle refers to a 10% increase in spindle speed within 25 seconds after startup. To see if disk drive goes into purge cycle, check the waveform at TP2 (Logic PCBA) with oscilloscope.</p> <p>1500 rpm = 40 ms between pulses Purge cycle = 36 ms between pulses 2400 rpm = 25 ms between pulses Purge cycle = 22.5 ms between pulses (Spindle speed returns to normal after heads are loaded and before READY lamp lights.)</p>
<p>5. Heads do not load properly.</p>	<p>2. Lower magnetic transducer output out of tolerance.</p> <p>3. Purge cycle flip-flop U344-15 on Logic PCBA stays low beyond 25 ms.</p>	<p>2. Check the magnetic transducer voltage waveform on oscilloscope at U409-2. The positive swing must be +600 mv or more positive. The negative swing must be -400 mv or more negative. If the output is out of tolerance (output too low), replace magnetic transducer assembly.</p> <p>3. If run flip-flop U364-15 (Logic PCBA) goes high and U344-15 stays low for more than 25 seconds, replace the Logic PCBA.</p>
	<p>1. Positioner shipping restraint is not removed.</p> <p>2. Positioner is not adjusted correctly.</p> <p>3. Emergency unload.</p>	<p>1. Remove shipping restraint.</p> <p>2. Adjust positioner. Refer to Paragraph 6.8 in manual, Static Positioner Adjustments.</p> <p>3. Refer to Recommended Repair column, Problem 3.</p>

Table B-2  
 Troubleshooting Procedure Chart (Continued)

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
6. Disk drive READY lamp does not light.	<ol style="list-style-type: none"> <li>1. Defective READY lamp.</li> <li>2. Defective ready circuit on Logic PCBA.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace READY lamp.</li> <li>2. Replace Logic PCBA.</li> </ol>
7. READY lamp lights but positioner does not seek.	<ol style="list-style-type: none"> <li>1. Disk drive thumbwheel Unit Select Switch is not set on proper unit number.</li> <li>2. Disk drive is not selected although Unit Select Switch is set to the correct number.</li> <li>3. Busy logic circuit (Logic PCBA) does not go into non-busy state.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rotate Unit Select Switch to proper setting. Setting number must match computer select interface line number. (If the TE-D01 Exerciser is used, unit 1 is automatically selected.)</li> <li>2. If the Unit Select Switch is set correctly and U328-11 is low (Logic PCBA), replace Unit Select Switch. If problem remains, replace Logic PCBA.</li> <li>3. Check logic level at U263-6 on Logic PCBA. If low, the disk drive is constantly busy. Therefore, the exerciser is not allowed to send new track information to the disk drive. This causes the positioner to stop seeking. Replace the Logic PCBA.</li> </ol>
8. Heads unload when trying to write.	<ol style="list-style-type: none"> <li>1. Write emergency condition when going into Write mode.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the head that is selected when disk drive unloads. Refer to Paragraph 6.22 in manual for head replacement instructions. If problem persists, replace the Read/Write PCBA.</li> </ol>
9. Disk drive does not read data properly.	<ol style="list-style-type: none"> <li>1. If Exerciser Model TE-D01 is used, exerciser switches set to wrong values.</li> <li>2. Read/Write PCBA misaligned.</li> <li>3. Defective circuit on Read/Write PCBA.</li> <li>4. Incorrect index and sectoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set exerciser switches to 1500 rpm and 2200 bpi, or to 2400 rpm and 2200 bpi.</li> <li>2. Refer to Paragraph 6.12 in manual, Read Decode Adjustments.</li> <li>3. Replace Read/Write PCBA.</li> <li>4. Check for Index Indication and correct number of sectors. Set exerciser switch to select upper disk. On Logic PCBA, check index indication at TP2. Correct 1500 rpm indication is one pulse per 40 ms, correct 2400 rpm indication is * pulse per 25 ms. Check sector count at TP3. Correct 1500 rpm sector count is * pulses per 40 ms, correct 2400 rpm sector count is * pulses per 25 ms. If the wrong number of sectors are observed, check output waveform of upper photoelectric transducer for possible out-of-tolerance output. Positive swing shall be +1.5v or more positive. Negative swing shall be -1.0v or more negative. If output is out of tolerance, replace transducer. If output is within tolerance but trouble persists, replace Logic PCBA.</li> </ol>

\*Number of pulses is the same as the sector count for the unit used.

Table B-2  
Troubleshooting Procedure Chart (Continued)

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
<p>9. Disk drive does not read data properly. (Continued)</p>		<p>Set exerciser switch to select lower disk. Check Index indication at TP2. Correct 1500 rpm indication is one pulse per 40 ms, correct 2400 rpm indication is one pulse per 25 ms. Check sector count at TP3. Correct 1500 rpm sector count is * pulses per 40 ms, correct 2400 rpm sector count is * pulses per 25 ms. If the wrong number is observed, check phase lock loop as instructed in Paragraph 6.11 in manual. If the phase lock loop cannot be adjusted, check the lower magnetic transducer output voltage waveform on an oscilloscope. The positive swing must be +600 mv or more positive. Negative swing must be -400 mv or more negative. If the output is out of tolerance (output too low), replace the magnetic transducer assembly. If the lower magnetic transducer output is within tolerance, replace Logic PCBA.</p>
<p>10. Disk drive has incorrect sector count. (Correct sector count is indicated by waveform at TP3 on Logic PCBA as follows: 1500 rpm = * pulses per 40 ms. 2400 rpm = * pulses per 25 ms.</p>	<p>5. Defective Read channel.</p> <p>1. Front Load Models — Upper photoelectric transducer has incorrect output.</p> <p>Top Load Models — Upper magnetic transducer has incorrect output.</p> <p>2. Sector electronics on Logic PCBA has malfunction.</p> <p>3. Disk cartridge has defective sector ring.</p> <p>4. Lower magnetic transducer output out of tolerance.</p> <p>5. Defective sector phase lock loop (Logic PCBA).</p>	<p>5. Refer to Paragraph 67, Read/Write Troubleshooting Guide.</p> <p>1. Check upper photoelectric transducer output waveform at U425-6 on Logic PCBA. Positive swing shall be +1.5v or more positive. Negative swing shall be -1.0v or more negative. If output is out of tolerance, replace transducer. If output is within tolerance, replace Logic PCBA.</p> <p>Check upper magnetic transducer output at U425-6. Positive swing shall be +1.5v or more positive. Negative swing shall be -1.0v or more negative. If output is out of tolerance, replace the magnetic assembly.</p> <p>2. Replace the Logic PCBA.</p> <p>3. If sector ring has scratches on outer edges, replace the disk cartridge.</p> <p>4. Check the magnetic transducer voltage waveform on oscilloscope at U409-2. The positive swing must be +600 mv or more positive. Negative swing must be -400 mv or more negative. If the output is out of tolerance (output too low), replace magnetic transducer assembly.</p> <p>5. Adjust phase lock loop as instructed in Paragraph 6.11 in manual. If the adjustment cannot be made, replace the Logic PCBA.</p>

\*Number of pulses is the same as the sector count for the unit used.

Table B-2  
 Troubleshooting Procedure Chart (Continued)

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
11. Positioner seeks to wrong track location.	<ol style="list-style-type: none"> <li>1. Positioner improperly adjusted on Servo PCBA.</li> <li>2. Address logic on Logic PCBA does not count track location correctly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to Paragraph 6.7 in manual, Positioner Servo Calibration.</li> <li>2. Replace Logic PCBA.</li> </ol>
12. Heads crash.	<ol style="list-style-type: none"> <li>1. Dirty heads and/or dirty disk surfaces.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean heads and disk surfaces. Refer to Paragraph 6.4.1 in manual, Cleaning the Heads, and Paragraph 6.4.2, Cleaning the Fixed Disk. If heads cannot be cleaned, replace heads. If disk surfaces cannot be cleaned, replace disk.</li> </ol>
13. Emergency unload caused by speed out-of-tolerance error.	<ol style="list-style-type: none"> <li>1. Defective RUN/STOP pushbutton.</li> <li>2. Defective Logic PCBA.</li> <li>3. Defective Servo PCBA.</li> <li>4. Defective Drive Motor and/or Motor Control PCBA.</li> </ol>	<ol style="list-style-type: none"> <li>1. If logic level at U447-5 is high, replace RUN/STOP pushbutton.</li> <li>2. If logic level at U447-5 is low, and logic level at U385-11 is low, replace Logic PCBA. If logic level at U447-5 is low, and U385-11 is high, and TP24 is also high, replace Logic PCBA.</li> <li>3. If U447-5 is low, U385-11 is high, TP24 is low, and TP22 is high, replace the Servo PCBA.</li> <li>4. If U447-5 is low, U385-11 is high, TP24 is low, and TP22 is low, and the drive belt is not binding, replace Motor Control PCBA. If problem persists, replace Drive Motor. If the drive belt binds, readjust it (refer to Paragraph 6.19 in manual).</li> </ol>
14. Emergency unload caused by head loading error.	<ol style="list-style-type: none"> <li>1. Plug P205 on Servo PCBA.</li> <li>2. Defective flex strip on positioner.</li> <li>3. Defective Logic PCBA.</li> <li>4. Positioner binding.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check if P205 is properly connected to J205.</li> <li>2. Replace flex strip.</li> <li>3. Press RUN/STOP pushbutton. If logic level at U364-15 on Logic PCBA is low, replace Logic PCBA. If logic level at U364-15 does not go high within 25 seconds after pressing RUN/STOP pushbutton, replace Logic PCBA.</li> <li>4. Free the binding positioner.</li> </ol>

Table B-2  
 Troubleshooting Procedure Chart (Continued)

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
15. Emergency unload caused by disk speed error (after drive is in Ready mode)	<ol style="list-style-type: none"> <li>1. AC motor speed out of tolerance.</li> <li>2. Defective Logic PCBA.</li> <li>3. Defective Motor Control PCBA and/or Drive motor.</li> <li>4. Defective Servo PCBA.</li> <li>5. Lower magnetic transducer gap out of tolerance.</li> <li>6. AC voltage output of magnetic pickup out of tolerance.</li> <li>7. Defective Logic PCBA.</li> <li>8. Defective lower magnetic transducer.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust AC motor speed control (refer to Paragraph 6.6 3.3 in manual).</li> <li>2. Check transducer output at U409-2 on Logic PCBA. If output is +600 mv or more, or -400 mv or more negative, and pulse train is not present at TP24 (on Logic PCBA), replace Logic PCBA.</li> <li>3. If pulse train is present on TP24 (Logic PCBA), check pulse train at TP22 (Servo PCBA). This should be 100 Hz for 50 Hz units and 120 Hz for 60 Hz units. If observed pulses are correct, replace Motor Control PCBA. If trouble persists, replace Drive Motor.</li> <li>4. If observed pulses are not as stated above, replace Servo PCBA.</li> <li>5. If voltage at U409-2 (Logic PCBA) is within tolerance, check that lower magnetic transducer gap is within tolerance (refer to Paragraph 6.18.3). If needed, set gap within tolerance according to Paragraph 6.18.3. If gap cannot be set within tolerance, replace lower magnetic transducer.</li> <li>6. Check if speed control adjustment is within tolerance (refer to Paragraph 6.6.3 in manual). Readjust speed control (R212) on Servo PCBA according to Paragraph 6.6.3.3 if necessary.</li> <li>7. If speed control is within tolerance and the problem persists, replace Logic PCBA.</li> <li>8. Check if lower transducer gap is within tolerance (refer to Paragraph 6.18.3 in manual). If transducer gap cannot be set within tolerance, replace lower magnetic transducer.</li> </ol>
16. Emergency unload caused by Position Transducer Lamp failure	<ol style="list-style-type: none"> <li>1. Defective Logic PCBA.</li> <li>2. Defective Servo PCBA.</li> <li>3. Defective Position Transducer Lamp and/or defective Power Supply.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check logic level at U327-5 (Logic PCBA). If low, replace Logic PCBA.</li> <li>2. Observe Position Transducer Lamp. If lamp is lit, replace Servo PCBA.</li> <li>3. If Position Transducer Lamp is not lit, check voltage on J203-10 (Servo PCBA). If voltage is within +11.5v and -9.3v, replace transducer lamp.</li> </ol> <p>If voltage on J203-10 (Servo PCBA) is not within tolerance, refer to the Recommended Repair column, Problem 3.</p>
17. Disk tries to write through two heads simultaneously	<ol style="list-style-type: none"> <li>1. Defective Read/Write PCBA or defective heads.</li> </ol>	<ol style="list-style-type: none"> <li>1. If a low logic level exists at U306-12, check heads for shorts or opens. If heads are good, replace the Read/Write PCBA.</li> </ol>

**Table B-2**  
**Troubleshooting Procedure Chart (Continued)**

PROBLEM	PROBABLE CAUSE	RECOMMENDED REPAIR
18. Write or erase current is on but not enabled	1. Defective Read/Write PCBA or defective heads.	1. Check heads for shorts or opens. If heads are good, replace the Read/Write PCBA.
19. To determine if an emergency unload is internal or external to the disk.	1. Computer/compiler, external to disk, defective. 2. Defective Logic PCBA.	1. Check logic level at U50-13 (Logic PCBA). If U50-13 is low, trouble is in the external device. 2. If U50-13 remains high while U306-3 (Logic PCBA) is low, replace the Logic PCBA.
20. Positioner takes longer than 200 msec to complete a seek to a new track location (Seek Time Error)	1. Foreign matter on voice coil and/or scale. 2. Defective bearing on Positioner Assembly or defective Logic PCBA.	1. Remove foreign matter from voice coil and/or scale. 2. Check for any obstruction that would prevent free movement of carriage. If problem persists, replace Logic PCBA.
21. Loss of power (power clear emergency unload).	1. +5v dc and $\pm 20v$ dc out of tolerance.	1. If U405-8 (Logic PCBA) is high, determine whether the +5v and $\pm 20v$ dc are within tolerance (refer to Paragraph 6.6.2 in manual). If voltages are out of tolerance, refer to the Recommended Repair column, Problem 3. If voltages are within tolerance, the Power Clear circuit is malfunctioning. Replace the servo PCBA.
22. Emergency unload caused by Position Limit error.	1. Misadjusted index balance, defective Servo PCBA, or defective Transducer Assembly. 2. Defective Positioner Scale. 3. Defective Q18/Q19.	1. Check that a low level exists on TP3 from track —1.5 through track 204. Adjust index balance, if needed, according to Paragraph 6.8.5. If index balance cannot be accomplished, replace Servo PCBA. If index cannot be adjusted, replace Position Transducer Assembly. 2. If a high level exists on TP3 from track —1.5 through track 204, check to see if scale is scratched. Replace scale if necessary (refer to Paragraph 6.7 in manual). 3. Connect jumper from TP1 to U13-4 on Servo PCBA (this locks positioner into Position Mode). If positioner does not lock into Position Mode, check Q18 and Q19 on the heat sink. If either Q18 or Q19 is defective, replace the defective transistor. If Q18 and Q19 check good, replace the Servo PCBA.