Index Pulse Detector Replacement

The index pulse detector comprises an LED and a phototransistor assembly. To replace the LED:

- a. Disconnect cables from disk drive.
- b. Remove disk drive from mounting and place on clean work surface.

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SECOND VILLAGE

- c. Manually move ejector to latched position and place door in closed position.
- d. Unsolder wires from terminals of LED housing, noting position and polarity of wires.
- e. Remove retaining ring securing defective LED housing.
- f. Lift housing off pin of floppy disk guide.
- g. Install replacement LED, housing, and retaining ring, and while observing diode polarity, carefully solder wires as removed.

To replace phototransistor assembly:

- h. Remove two (2) screws attaching head load mechanism to carrier and carefully place on clean work surface. Do not allow top head to drop on lower head.
- i. Remove bezel and raise carrier slowly while unlatching trip ejector pins.
- j. Remove four (4) screws and raise floppy disk guide assembly up and out of way.
- k. Remove index detector mounting screw and washer.
- 1. Unsolder wires from phototransistor assembly observing wire to pin identification.
- m. Install replacement assembly in reverse order of removal.

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n. Install guide assembly, lower carrier assembly, and install bezel and head load mechanism, in reverse order.

Lapset proces its sequence to wardy the Head I also meets

o. Perform Index Pulse Detector Check and Alignment procedures.

Write-Protect Detector Check

To check the write-protect detector and associated logic:

a. Insert non write-protect floppy disk in disk drive (write-protect hole covered).

has rough replacement photograph and

Printed Circuit Board (PCM) Replaces

di Disconnect pluggies, Pl. Pilmi

- b. Turn on ac and dc input power.
- c. With voltohmmeter, measure logical 0 voltage level (+2.4 to +5.5-volt) at WRT PROTECT interface connector J3 pin 44.
 - d. Remove non write-protect disk and insert write-protect disk (hole open).
 - e. With voltohmmeter, measure logical 1 voltage level (0.0 to +0.4-volt) at J3 pin 44; verifying write-protect circuit functions properly.

Write-Protect Detector Replacement mort esides sallostmossics and sallostmossics

The write-protect detector comprises an LED and a phototransistor assembly,

awith altibution.

To replace the LED:

- a. Disconnect cables from disk drive.
 - b. Remove disk drive from mounting and place on clean work surface.
 - c. Disconnect plugs Pl, P2, P5 and P6 and remove PCB.
 - d. Locate LED wires (red and white), loosen holder ring and gently, but firmly, pull LED from snap-in holder recessed in deck assembly.
 - e. Identify and remove push-on terminals from defective LED and install same wires on replacement LED, one at a time.
 - f. Insert LED in snap-in holder in deck assembly.
 - g. Install PCB and connect plugs Pl, P2, P5 and P6.

To replace phototransistor assembly:

- h. Perform steps a. and b.
- Locate phototransistor assembly, identify wires, and remove push-on terminals.
- j. Remove single pan-head screw and lift assembly straight up from deck assembly guide pin hole.

k. Install replacement phototransistor assembly in guide pin hole and tighten up against side alignment block.

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To replace photogrammers assembly:

Locale phototram

terminale.

Perform steps a and b.

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- 1. Install push-on terminals, one at a time, observing polarity.
- m. Perform Write-Protect Detector Check.

Printed Circuit Board (PCB) Replacement

The PCB contains the logic circuitry for the disk drive, is easily accessible and can be removed and replaced quite readily.

To replace the PCB: The rest of the rest o

- a. Turn off all ac and dc power to disk drive.
- b. Disconnect controller cables from connector J3 (Signal), J4 (DC), and J7 (AC).
- c. Remove disk drive from mounting and place on clean work surface.
- d. Disconnect plugs Pl, P2, P5 and P6.
- e. Remove four (4) pan-head screws from corners of PCB. Lift PCB up and away from deck assembly.

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Hernity, pull like from some in acider recessed in deck assembly.

identify and seemove gash-on terminals from defective LED and diagram

Remove single markes screw and life assembly straight up from door

- f. Install replacement PCB in reverse order.
- g. Install disk drive.

illy wires, and remove puck-on

Part Names

SECTION 2 ILLUSTRATED PARTS BREAKDOWN

GENERAL

This section provides an illustrated parts breakdown of all assemblies and parts in the Floppy Disk Drive. The entire unit is sequentially listed in one continuous indentured breakdown, with all attaching hardware.

Description

Figures 2-1 through 2-9 illustrate all assemblies and their parts. Parts identified by item number correspond to item numbers in the parts list. Figure 2-10 illustrated the PCB assembly and all parts are identified by reference designator.

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PURPOSE

The purpose of this section is to provide a complete listing of all items of the disk drive, in assembly breakdown order, to aid maintenance personnel. The illustrations and parts list are related for use in identification, requisitioning, storing, and issuing of replacement parts.

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ORDERING PARTS

Parts will be supplied by Siemens Corporation upon receipt of an order specifying the part number and description as listed in this section.

INDENTURED PARTS LIST - MODEL FDD 200-8N

The parts list provides an indentured listing of all parts of the Model FDD 200-8N Floppy Disk Drive, in an assembly breakdown order, with attaching parts. For

all assemblies, except the PCB, the list is divided into five columns of MALTERATED PARTE BREAKING information:

Item

Part Number

Description

Indent

Potensies of

Quantity

and installed of replacement parts

Parts will be sapolied to bien

Item Number

in one could nuous

The number assigned to a line item part. All numbers are sequential, starting from the number 1. Major assemblies and parts are called out on illustrations, except for the PCB.

Indent

A number assigned for the assembly order of breakdown and subordinate piece parts. All indentured numbers show relationship to next higher assembly. The PCB parts list does not have Indent numbers.

Description The Higgsee

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This column is prepared to graphically indicate the indenture and fully describe the item. This description should be included when ordering. The PCB description column is not indentured.

Part Number

and stocing

The manufacturers part number of the item. This number must be included when ordering.

Quantity

The quantity used per assembly. the part number and swarf price as listed in this section

Ref Desig

The reference designator column is used in the PCB parts list only. This column lists the reference designator of all identical parts having the same part number and description. The parts are listed in alpha-numeric order. All option parts are listed by option.

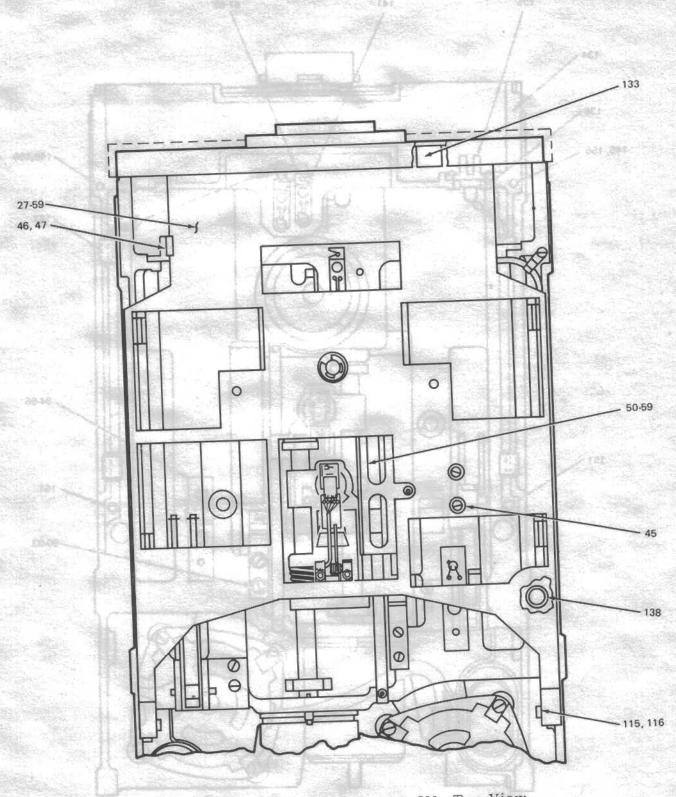


Figure 2-1. Model FDD 200-8N, Top View

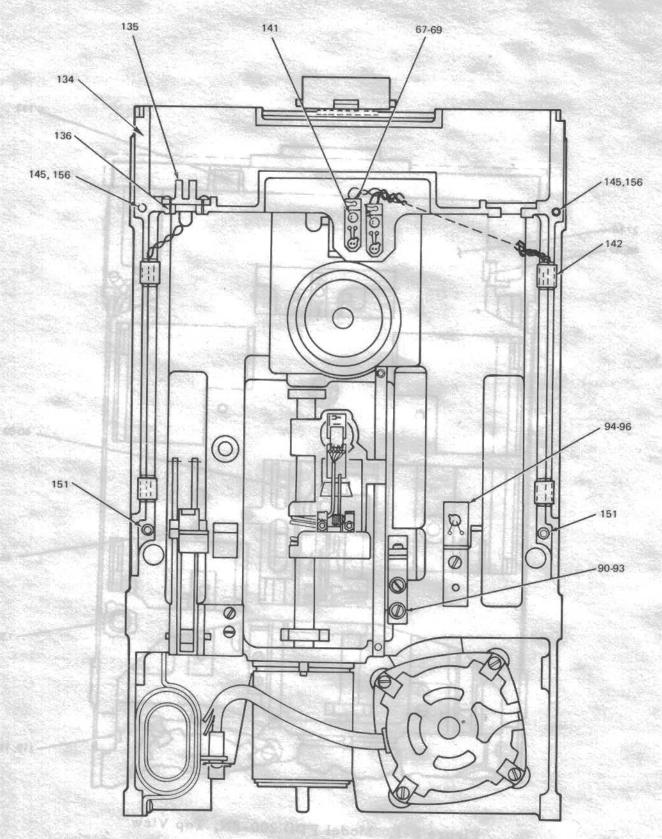


Figure 2-2. Top View, Carrier Assy Removed for Clarity

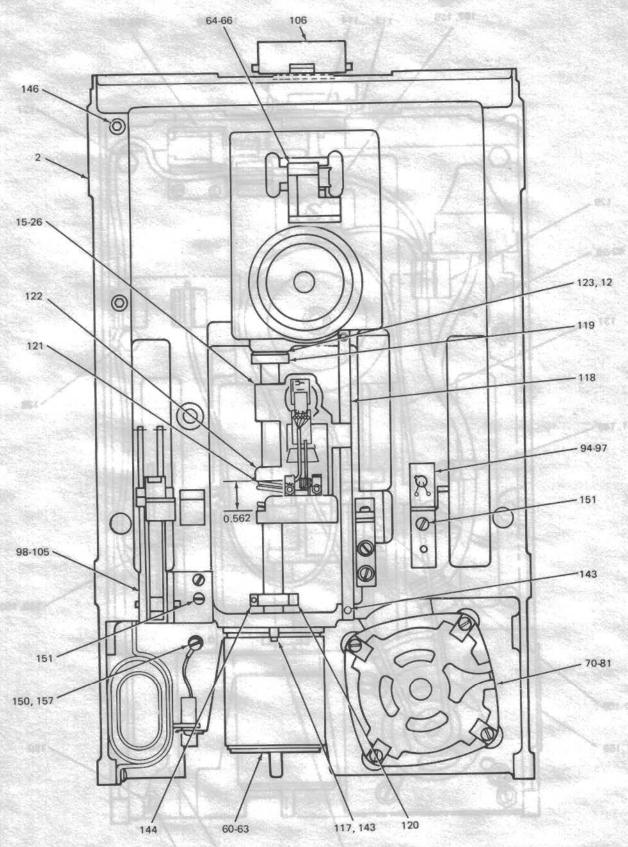


Figure 2-3. Top View, Floppy Disk Guide Removed for Clarity

Figure 2-67

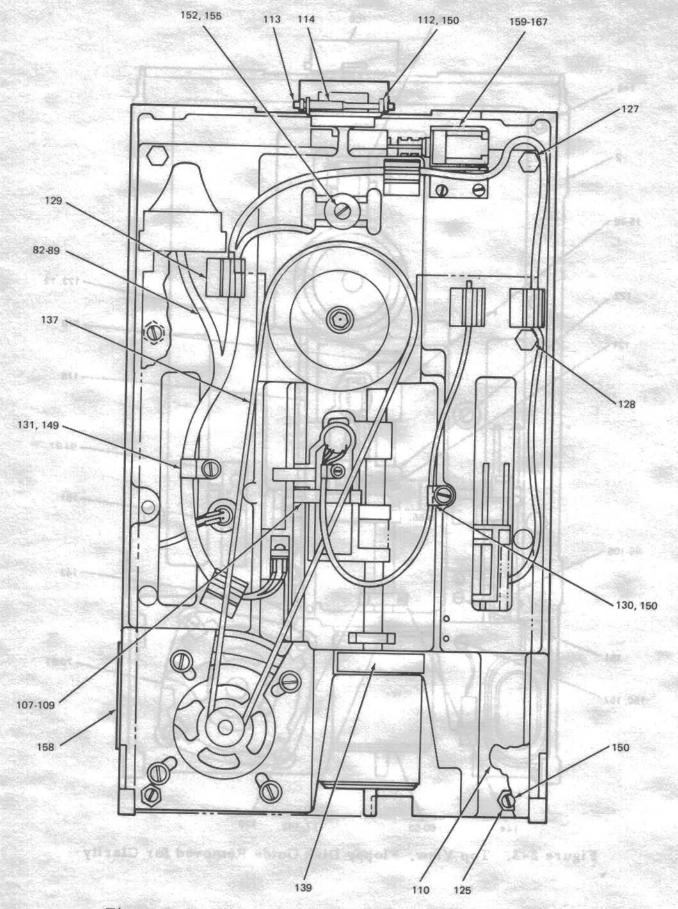


Figure 2-4. Bottom View, PCB Removed for Clarity

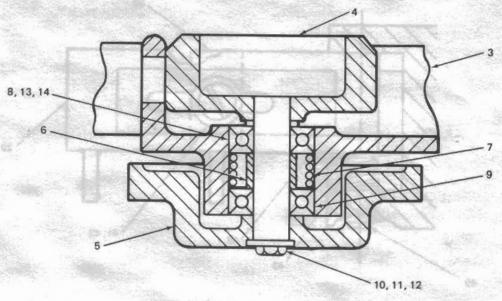


Figure 2-5. Deck Spindle Assy, Cutaway View

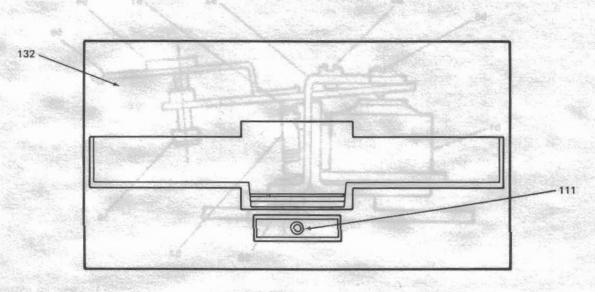


Figure 2-6. Front View, Access Door Closed

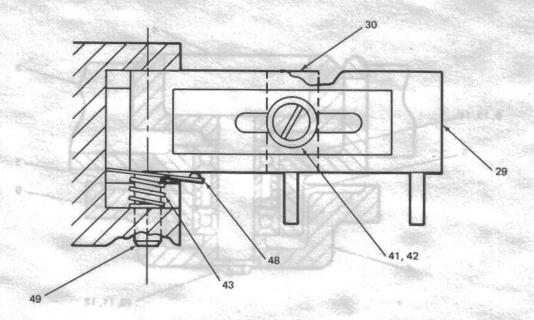


Figure 2-7. Trip Ejector Assy

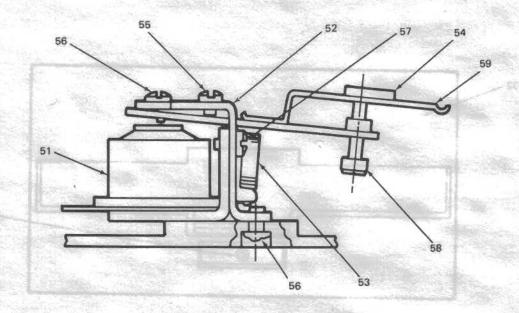


Figure 2-8. Head Engage Assy

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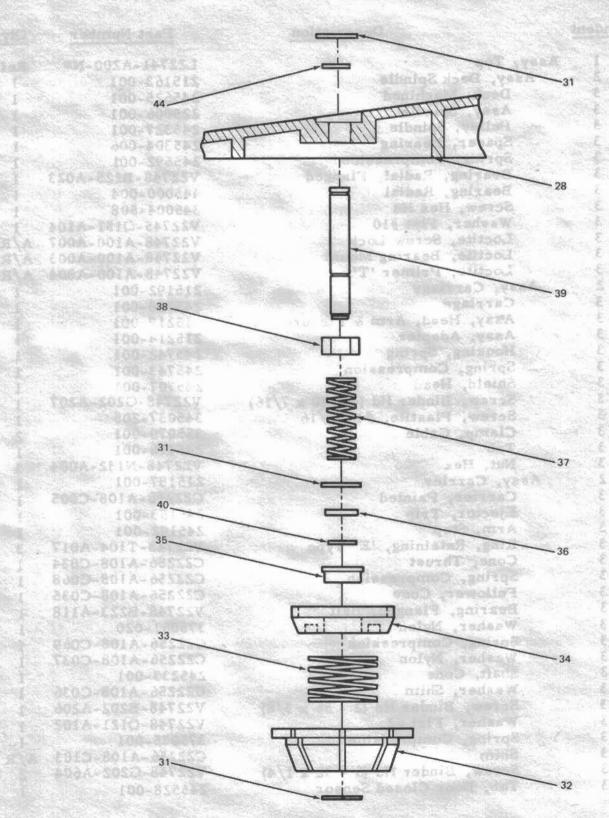


Figure 2-9. Cone Assembly, Exploded View

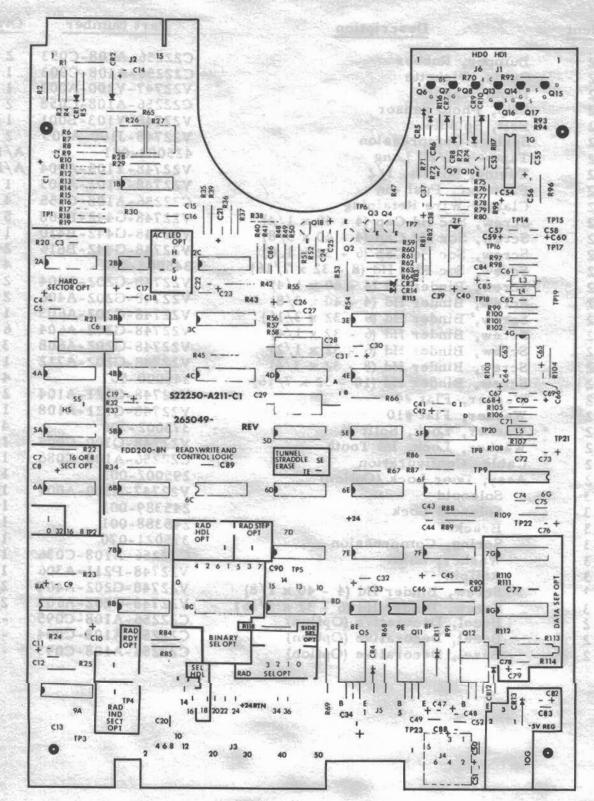
Item	Indent	Description	Part Number	Qty	
1	1	Assy, Top	L22741-A200-N*	Pof	
2	2	Assy, Deck Spindle	215163-001	Ref	
3	3	Deck, Machined	245625-001	1	
4	3	Assy, Spindle	225006-001	1	
5	3	Pulley, Spindle	245327-001	1	
6	3	Spacer, Bearing	245304-006	1	
7	3	Spring, Compression	245592-001	1	
8	3	Bearing, Radial, Flanged	V22748-B225-A023	1	
9	3	Bearing, Radial	445000-004	1	
10	3	Screw, Hex Hd	345004-508	1	
11	3	Washer, Flat #10		1	
12	3	Loctite, Screw Lock	V22745-Q151-A104	1	
13	3	Loctite, Bearing Mount	V22748-A100-A007	A/R	
14	3	Loctite, Primer 'T'	V22748-A100-A003		
15	2	Assy, Carriage		A/R	
16	3	Carriage	215192-001		
17	3	Assy, Head, Arm & Flexure	245708-001	1	
18	3	Assy, Adapter	215217-001	1	
19	3	Housing, Spring	215214-001	1	
20	3	Spring, Compression	245742-001	1	
21	3	Shield, Head	245743-001	1	
22	3		245707-001	1	
23	3	Screw, Binder Hd $(4 - 40 \times 7/16)$ Screw, Plastite, $\#4 \times 5/16$	V22748-G202-A207	1	
24	3	Clamp, Cable	345037-205	1	
25	3	Tab	355070-001	2	
26	3	Nut, Hex	245476 -001	1	N. P
27	2	Assy, Carrier	V22748-N132-A004	3	
28	3	Carrier, Painted	215187-001	1	
29	3	Ejector, Trip	C22256-A108-C005	1	
30	3	Arm, Stop	245153-001	1	
31	3		245192-001	1	
32	3	Ring, Retaining, 'E' Type Cone, Thrust	V22748-T104-A017	3	
33	3		C22256-A108-C034	1	
34	3	Spring, Compression	C22256-A108-C068	1	
35	3	Follower, Cone	C22256-A108-C035	1	
36	3	Bearing, Flanged, Ball	V22748-B223-A118	1	
37	3	Washer, Nylon	375061-020	1	
38	3	Spring, Compression	C22256-A108-C069	1	
39	3	Washer, Nylon	C22256-A108-C037	1	
40	3	Shaft, Cone	245233-001	1	
41	3	Washer, Shim	C22256-A108-C036	1	
42	3	Screw, Binder Hd (2 - 56 x 3/8)	V22748-B202-A206	1	
43	3	Washer, Flat #2	V22748-Q121-A102	-1	
44	3	Spring, Compression	375035-001	1	
45	3	Shim	C22256-A108-C103	A/R	
46	3	Screw, Binder Hd (6 - 32 x 1/4)	V22748-G202-A604	2	
10		Tab, Door Closed Sensor	245528-001	1	

Efrigure 2-9. Cone Assembly, Espioded View

Item	Indent	Description	Part Number	Qty
47	3	Screw, Binder Hd (4 - 40 x 3/16)	V22748-G202-A403	1
48	3		245712-001	1
49	3		C22256-A108-B046	11
50	3	Assy, Head Engage	215153-002	1
51	4	Relay, 24 VDC roansectories	465000-001	1
52	4	100-ETA Bracket, Relay Mtg	245181-001	2/1
53	104	Spring, Extension		-1
54	4		C22256-A108-C052	11
55	4	Screw, Binder Hd (3 - 48 x 3/16)		-1
56	4	100-210 Screw, Binder Hd (3 - 48 x 1/8)		2
57	4	Screw, Binder Hd (5 - 40 x 1/4)		72
58	4	400-481 Screw, Hex Soc Hd (4 - 40 x 1/2)		81
59	4	100 Lifter, Pressure Pad		01
60	2	Assy, Stepper Motor		01
61	3		105055-001	11
62	3		V22747-X101-A100	SOL
63	3		V22747-X300-A003	4
64	2	Assy, Index Sensor		401
65	3	Housing, Phototransistor	245552-002	-1
66	3		V22747-V200-A005	2
67	2		C22256-A108-B181	2
68	3	Housing, LED	C22256-A108-B903	1
69	3	일 - 다른 사람들은 100 HT	V22747-V200-A002	011
70	2	Assy, Spindle Motor (115V, 60 Hz)		1
70	2	Assy, Spindle Motor (230 V, 50 Hz)	215193-002	1
70	2	Assy, Spindle Motor (115V, 50 Hz)		Î
70	2	Assy, Spindle Motor (230V, 60 Hz)		î
71	3		215135-001	٤1
71		Assy, Motor (230V, 50 Hz)		1
71			215135-002	211
71		1 DECEMBER 1 DE LA COMPONIO DEL COMPONIO DE LA COMPONIO DEL COMPONIO DE LA COMPONIO DEL COMPONIO DE LA COMPONIO DEL COMPONIO DE	215135-004	1
72	4		305017-004	1
72	THE PART OF THE PA	100-110 Capacitor, 2 µF (230V)	305017-001	1
73	4	Boot, Capacitor	V22748-Y109-A001	011
74	4		245657-001	011
75	Printer and the second	Connector A C	325014-001	11
76	4	Connector, A.C. doleseroni	V22748 C202 - 4404	2
77	- Saul 6 (2.55)	Screw, Binder Hd (4 - 40 x 1/4)	245470 001	1
		Locking Tab, Connector		2
78	- A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Screw, Binder Hd (6 - 32 x 1/4)		4
79	4	Standoff		
80	4	Screw, Binder Hd (8 - 32 x 5/8)	V22748-G202-A710	4
81	4	Washer, Flat #8	V22748-Q121-A107	4
82	2	Assy, Harness	215191-002	1 A / P
83		Wire, 26 AWG, Twisted Pair	225047 001	
84	3		325047-001	11
85	3		325025-001	1
86	8030-1	Terminal, Crimp	355048-001	2

87 3 Terminal, Crimp 355049-001 88 3 Terminal, Crimp 355052-001 89 3 Terminal, Crimp 355046-001 90 2 Assy, Track '00' Sensor 215156-001 91 3 Switch, Photosensor 505015-001 92 3 Bracket, Switch 245475-001 93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	Qty_
88 3 Terminal, Crimp 355052-001 89 3 Terminal, Crimp 355046-001 90 2 Assy, Track '00' Sensor 215156-001 91 3 Switch, Photosensor 505015-001 92 3 Bracket, Switch 245475-001 93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	8
89 3 Terminal, Crimp 355046-001 90 2 Assy, Track '00' Sensor 215156-001 91 3 Switch, Photosensor 505015-001 92 3 Bracket, Switch 245475-001 93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	24
90 2 Assy, Track '00' Sensor 215156-001 91 3 Switch, Photosensor 505015-001 92 3 Bracket, Switch 245475-001 93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	10
91 3 Switch, Photosensor 505015-001 92 3 Bracket, Switch 245475-001 93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	1
92 3 Bracket, Switch 245475-001 93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	i
93 3 Screw, Binder Hd (4 - 40 x 1/4) V22748-G202-A 94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	î
94 2 Assy, Write Protect 295001-001 95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	
95 3 Holder, Transistor 245326-001 96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	1
96 3 Transistor, Photo 505014-001 97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	i
97 3 Diode, Light Emitting 335012-001 98 2 Assy, Ejector 215152-004	- 1
98 2 Assy, Ejector 215152-004	i
	î
99 3 Latch, Ejector 245146-001	1 14
100 3 Block, Guide Rods 245147-001	i
101 3 Carriage, Ejector 245148-002	i
102 03 1017 Pin, Pivot 245404-001	~ 1
103 203 Spring, Compression 245021-010	î
104 3 Ring, Retaining 375029-002	4
105 3 Spring, Compression 245021-009	1 1
106 2 Assy, Button Release 235005-004	1
107 2 Assy, Spring Clip 215221-001	i
108 3 Spring Clip 245593-001	64
109 3 Slide Block 245594-001	i
110 2 Assy, Read/Write and Control Logic, 265049-xxx PCB	01 07
111 2 Diode, Light Emitting 335020-001	PG 2
112 2 Bracket, Button Mtg 245583-001	01
113 2 Pin, Pivot C22256-A108-C	039 1
114 2 Spring, Torsion C22256-A108-C	
115 2 Shaft, Carrier (SH 0) C22256-A108-C	
116 2 Ring, Retaining V22748-T133-A	
117 2 Cleat, Motor Mtg 375032-005	3
118 2 Rod, Guide (7015) 74 2 245012-001	1
119 2 Stop, Inner 245663-001	- 1
120 2 Stop, Outer 245009-001	1
121 2 Spring, Compression 245021-005	1
122 2 Nut, Preload 1 245010-002	01
123 2 Bearing, Flanged, Ball V22748-B223-A1	118 1
124 2 Washer, Shim C22256-A108-C0	
125 2 Standoff, M/F, 5/16 375043-205	2
126 2 Standoff, M/F, 7/16 - 8 1-8 1-8 375074-001	02
127 2 Standoff, Thd, 1 15/16	2
128 2 Standoff, Thd, 1 7/16 375076-001	2
129 2 Clamp, Cable, Adhesive V22748-Y100-A(
13C 2 Clamp, Cable, Nylon 355004-002	1
131 2 Clamp, Cable, Nylon 355004-004	1
132 2 Bezel, Painted C22256-A108-C0	

Item	Indent	Description	Part Number	Qty
133	2	Bumper, Rubber	C22256-A108-C053	2
134	2	Guide, Diskette	C22256-A108-C003	1
135	2	Photo Sensor	V22747-V200-A003	1
136	2	Clip, Photo Sensor	C22256-A108-C058	2
137	2	Belt, Spindle	V22748-Y103-B001	1
138	2	Spring, Compression	V22748-J100-A003	2
139	2	Tape - 1 1/2" Long	425004-001	A/R
140	2	Tubing, Shrink, 1/2	V22748-Y105-A004	A/R
141	2	Fastener, Push-on	V22748-T101-A003	1
142	2	Clamp, Wire Retaining	C22256-A108-C055	4
143	2	Screw, Soc Hd Cap (4 - 40 x 1/2)	V22748-G442-B408	5
144	2	Screw, Soc Hd Cap (4 - 40 x 5/8)	V22748-G442-B410	1
145	2	Screw, Soc Hd Cap (6 - 32 x 1.0)	V22748-G442-B616	2
146	2	Screw, Soc Flat Hd (8 - 32 x 7/16)	345003-408	4
147	2	Screw, Binder Hd (4 - 40 x 1/4)	V22748-G202-A404	2
148	2	Screw, Binder Hd (4 - 40 x 3/8)	V22748-G202-A406	2
149	2	Screw, Binder Hd (6 - 32 x 3/16)	V22748-G202-A603	1
150	2	Screw, Binder Hd $(6 - 32 \times 1/4)$	V22748-G202-A604	6
151	2	Screw, Binder Hd (6 - 32 x 1/2)	V22748-G202-A608	3
152	2	Screw, Binder Hd (8 - 32 x 3/4)	V22748-G202-A712	1
153	2	Screw, Binder Hd (10 - 32 x 7/16)	345000-507	4
154	2	Washer, Flat #4	V22748-Q121-A104	2
155	2	Washer, Flat #10	V22748-Q121-A108	1
156	2	Washer, Lock, Split #6	375002-300	4
157	2	Washer, Lock, Int Tooth	V22748-Q300-C005	1
158	2	Cable, Configuration	C22256-A108-C086	1
159	2	Assy, Door Lock (Option)	295002-001	1
160	3	Solenoid	V22747-K300-A001	1
161	3	Solenoid Lock	245389-001	1
162	3	Bracket	245388-001	1
163	3	Spring, Compression	375021-070	1
164	3	Washer, Shim	C22256-A108-C036	1
165	3	Rollpin	V22748-P211-A306	1
166	3	Screw, Binder Hd (4 - 40 x 1/8)	V22748-G202-A404	
167	3	Screw, Binder Hd (6 - 32 x 3/16)	V22748-G202-A603	2
168	2	Bezel, Decorative (Option)	C22256-A108-C095	
169	2	Bezel, Decorative (Option)	C22256-A108-C094	100
170	2	Bezel, Decorative (Option)	C22256-A108-C093	



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Figure 2-10. Read/Write and Control Logic, PCB Assy

Part Number	Description	Qty
305029-225	Capacitor, Tant, 2.2 μf, 10%, 35V	29
305028-103	Capacitor, Disc, 0.01 μf, 20%, 100V	
305033-336	Capacitor, Tant, 33 µf, 10%, 10 V	2
305029-685	Capacitor, Tant, 6.8 µf, 10%, 35V	3
305032-151	Capacitor, Mylar, 0.15 µf, 5%, 100V	2
305024-222	Capacitor, Cer, 2200 pf, 10%, 100V	2
305024-104	Capacitor, Cer, 0.1 µf, 10%, 50V	4
305024-561	Capacitor, Cer, 560 pf, 10%, 200 V	1
305024-820	Capacitor, Cer, 82 pf, 10%, 200V	1
305024-221	Capacitor, Cer, 220 pf, 10%, 200 V	1
305024-122	Capacitor, Cer, 1200 pf, 10%, 200V	1
305024-271	Capacitor, Cer, 270 pf, 10%, 200V	1
305024-151	Capacitor, Cer, 150 pf, 10%, 200V	1
335010-001	Diode, 1N4001	6
335000-001	Diode, Zenner 1N752A	1
335011-001	Diode, 1N4444	7
495004-104	Inductor, 100 µh	3
495004-823	Inductor, 82 µh	2
495004-224	Inductor, 220 µh	1
505001-001	Transistor, 2N3906	6
505018-001	Transistor, T1P31A	3
505017-001	Transistor, 2N5114	4
505002-001	Transistor, 2N3904	2
505004-001	Transistor, 2N5460	2
475017-222	Resistor, 1/4W, 5%, 2.2K	5
475017-131	Resistor, 1/4W, 5%, 1300 ohm	2
475017-101	Resistor, 1/4W, 5%, 100 ohm	3
475017-512	Resistor, 1/4W, 5%, 5.1K	7
	305029-225 305028-103 305028-103 305033-336 305029-685 305032-151 305024-222 305024-104 305024-820 305024-221 305024-122 305024-122 305024-151 335010-001 335010-001 335011-001 495004-104 495004-823 495004-224 505001-001 505018-001 505018-001 505017-001 505002-001 505004-001 475017-222 475017-131 475017-101	305029-225 Capacitor, Tant, 2.2 μf, 10%, 35V 305028-103 Capacitor, Disc, 0.01 μf, 20%, 100V 305029-685 Capacitor, Tant, 33 μf, 10%, 10V 305029-685 Capacitor, Tant, 6.8 μf, 10%, 35V 305032-151 Capacitor, Mylar, 0.15 μf, 5%, 100V 305024-222 Capacitor, Cer, 2200 pf, 10%, 100V 305024-104 Capacitor, Cer, 0.1 μf, 10%, 50V 305024-561 Capacitor, Cer, 560 pf, 10%, 200V 305024-820 Capacitor, Cer, 82 pf, 10%, 200V 305024-221 Capacitor, Cer, 220 pf, 10%, 200V 305024-122 Capacitor, Cer, 1200 pf, 10%, 200V 305024-121 Capacitor, Cer, 1200 pf, 10%, 200V 305024-151 Capacitor, Cer, 150 pf, 10%, 200V 305024-151 Capacitor, Cer, 150 pf, 10%, 200V 335010-001 Diode, 1N4001 335000-001 Diode, 1N4404 495004-104 Inductor, 100 μh 495004-823 Inductor, 82 μh 505001-001 Transistor, 2N3906 505018-001 Transistor, 2N3906 505018-001 Transistor, 2N3904 505004-001 Transistor, 2N5114 505002-001 Transistor, 2N5460 475017-222 Resistor, 1/4W, 5%, 2.2K 475017-131 Resistor, 1/4W, 5%, 1300 ohm 475017-101 Resistor, 1/4W, 5%, 100 ohm

Ref Designator	Part Number	Description	Qty
R10, 11, 12, 13, 15, 16, 36, 37, 40	475013-226	Resistor, 1/8W, 1%, 22.6K	9
R14, 38	475017-187	Resistor, 1/8W, 1%, 18.7K	2
R17, 23, 24, 48, 71, 72	475017-473	Resistor, 1/4W, 5%, 47K	8 6
R25, 34, 45, 51, 57, 66, 67, 77, 79, 81, 82, 86, 87	475017-102	Resistor, 1/4W, 5%, 1K	13
R26, 27	475025-503	Resistor, Variable, 50K	2
R28, 29, 30, 39, 75, 76	475017-104	Resistor, 1/4W, 5%, 100K	01.016
R32, 115	475017-103	Resistor, 1/4W, 5%, 10K	- 2
R33 Woot Talluerout	475017-153	Resistor, 1/4W, 5%, 15K	1
R41 7001 1001 10 0000	475012-442	Resistor, 1/8W, 1%, 4.42K	1
R42, 95, 96, 103, 104	475017-100	Resistor, 1/4W, 5%, 10 ohm	5
R47 Troos and 1 do oc	475011-620	Resistor, 1W, 5%, 56 ohm	1
R49	475013-562	Resistor, 1/8W, 1%, 56.2K	s al
R50	475017-113	Resistor, 1/4W, 5%, 11K	- 1
R52	475017-271	Resistor, 1/4W, 5%, 270 ohm	1 1
R54	475017-100	Resistor, 1/4W, 5%, 390 ohm	Tana L
R56	475012-511	Resistor, 1/8W, 1%, 5.11K	1
R58	475012-196	Resistor, 1/8W, 1%, 1.96K	- 1
R59	475012-169	Resistor, 1/8W, 1%, 1.69K	1
R60	475013-100	Resistor, 1/8W, 1%, 10.5K	
R61,63	475012-140	Resistor, 1/8W, 1%, 1.40K	2 2
R62,64	475016-274	Resistor, 1/8W, 1%, 274 ohm	2
R68,69,91	475011-510	Resistor, 1W, 5%, 51 ohm	3
R70, 92	475012-487	Resistor, 1/8W, 1%, 4.87K	2
R73,74	475017-471	Resistor, 1/4W, 5%, 470 ohm	2
R78,80	475017-472	Resistor, 1/4W, 5%, 4.7K	1 - 2
R84	475017-331	Resistor, 1/4W, 5%, 330 ohm	1
R85	475017-221	Resistor, 1/4W, 5%, 220 ohm	0.01
R88,89	475017-470	Resistor, 1/4W, 5%, 47 ohm	2
R90	475012-187	Resistor, 1/8W, 1%, 1.87K	1
R93, 94, 115	475013-100	Resistor, 1/8W, 1%, 10.0K	3

RE, E.J., 19, 35, 11, 13 475017.512 Resistor, 1/4W, 35, 5, 1K.

14.197

Ref Designator	Part Number	Description	Qty
R97,98	475016-402	Resistor, 1/8W, 1%, 402 ohm	2
R99,100	475016 - 301	Resistor, 1/8W, 1%, 301 ohm	2
R101,102	475016-154	Resistor, 1/8W, 1%, 154 ohm	2
R105, 106	475016 - 365	Resistor, 1/8W, 1%, 365 ohm	2
R107,108	475012-301	Resistor, 1/8W, 1%, 3.01K	2
R109	475012-110	Resistor, 1/8W, 1%, 1.10K	1
8A	385008-001	Retrig. Multivibrator 74123	1
9A, 4E, 6E, 5F, 6F	385006-001	D-Type Flip-Flop 7474	5
1B,2C	385032-001	Comparator LM339	2
2B, 8E, 9E	385014-001	Peripheral Driver 75453	3
3B,6D,5E	385113-001	NOR Gate 7402	3
4B . Att. Dist. 0	385017-001	Exclusive OR Gate 7486	1
5B,7F	385001-001	NAND Gate 7400	2
6B,6C	385015-001	AND Gate 7408	2
7B,8B	385023-001	NAND Buffer 7438	2
3C,4C	385206-001	Up/Down Binary Counter 74191	2
8C	385073-001	Decoder 7442	1
4D,5D,8F	385002-001	Multivibrator 74121	3
7D	385016-001	OR Gate 7432	1
8D	475018-001	Resistor Network	1
3E 8615 1163 1160	835018-001	Buffer/Driver 7407	1
7E	385019-001	AND Gate 7411	1
2F	385020-001	Inverting Buffer/Dr. 7406	
IG,4G	385003-001	Video Amplifier 733C	2
6G	385026 - 001	Multivibrator 8720	0111
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Ref Designator	Part Number	Description	Qty
HARD SECTOR OPTIO			
min IP , W	Resistor, dest.	100, 310014 001	
6A	385006-001	IC, D-Type Flip-Flop 7474	1
5A	385001-001	IC, NAND Gate 7400	1
2A,4A	385002-001	IC, Monostable, Multivibrator 74121	2 (3)
C3 (\$147 Tals	adiv 305024-104	Capacitor, Rect., 0.1 μf , $\pm 10\%$, 50 V	A1
C5,C7	305028-103	Capacitor, Disc, 0.01 μf, ±20%, 100V	2
C4, C8	305029-225	Capacitor, Tant, 2.2 μf , $\pm 10\%$, 35 V	2
C6	305032-151	Capacitor, Mylar, 0.15 μf, ±5%, 100V	#1 ##
R20	475012-590	Resistor, Fixed, 5.90K, $\pm 1\%$, $1/8W$	1
R21	475013-348	Resistor, Fixed, 34.8K, $\pm 1\%$, $1/8W$	1
R22	475017-102	Resistor, Fixed, 1K ±5%, 1/4W	31
FM DATA SEPARATO	R OPTION	385043-001 385043-001	\$1C
8G	385002-001	IC, Monostable Multivibrator 74121	QV.
7G	385023-001	IC, NAND Buffer Open Coll. 7438	-135 1
C77	305024-221	Capacitor, Rect., 220 pf, ±10%, 200V	1
C78	305028-103	Capacitor, Disc, 0.01 \(\mu f, \pm 20\%, 100 \text{V}	1
C79	305029-225	Capacitor, Tant, 2.2 \(\mu f, \pm 10\%, 35 \text{V} \)	1
R110, 111, 112	475017-102	Resistor, Fixed, 1K ± 5%, 1/4W	3
R113	475013-100	Resistor, Fixed, 10.0K, $\pm 1\%$, $1/8W$	1
R114	475010-253	Resistor, Variable 25K	1
			NEUT

SECTION 3 DIAGRAMS

GENERAL

This section contains the logic diagram of the Model FDD 200-8N Floppy Disk Drive to aid maintenance personnel.

Diagram Number

Title

125058-001

Read/Write and Control Logic, PCB Assy

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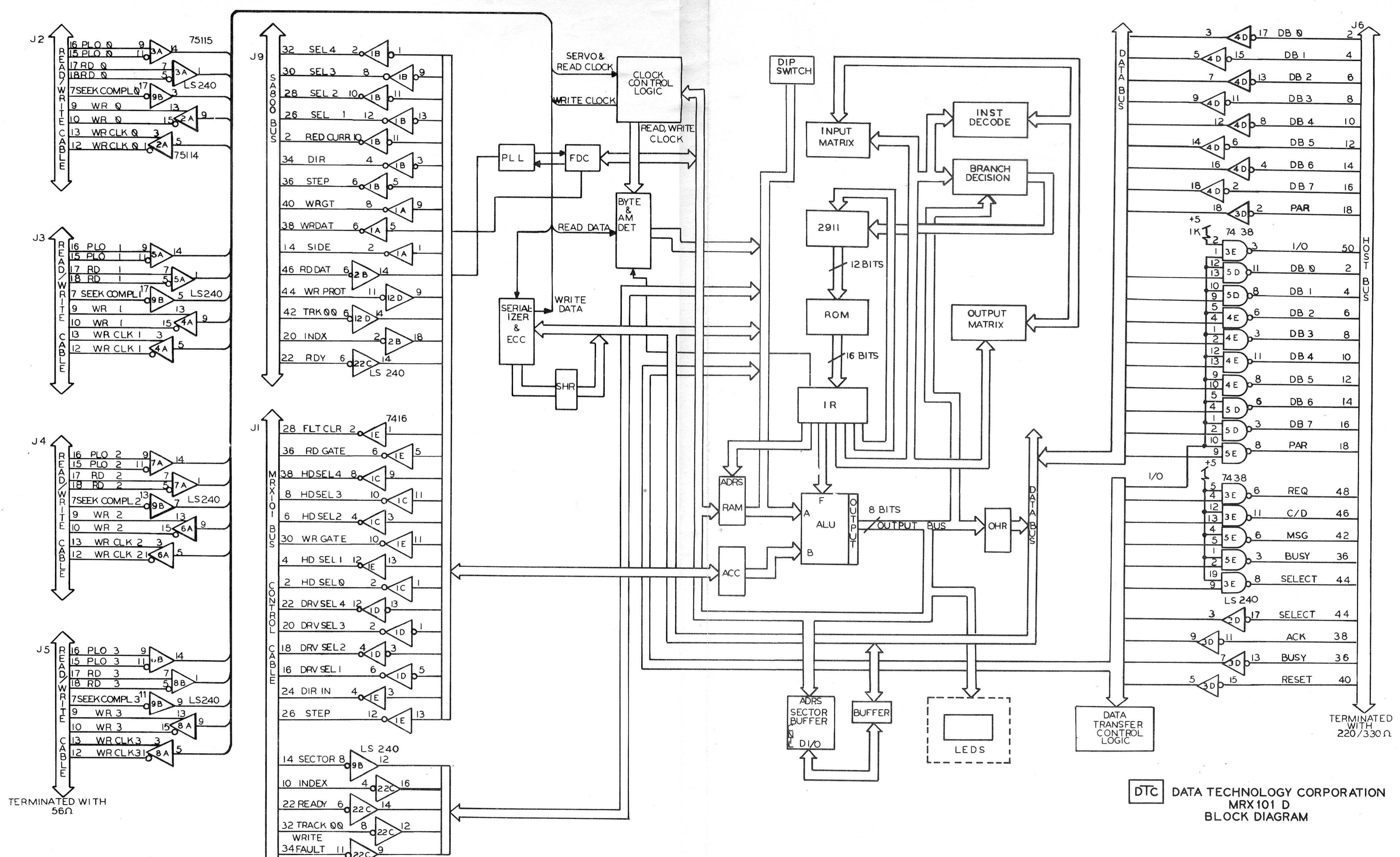
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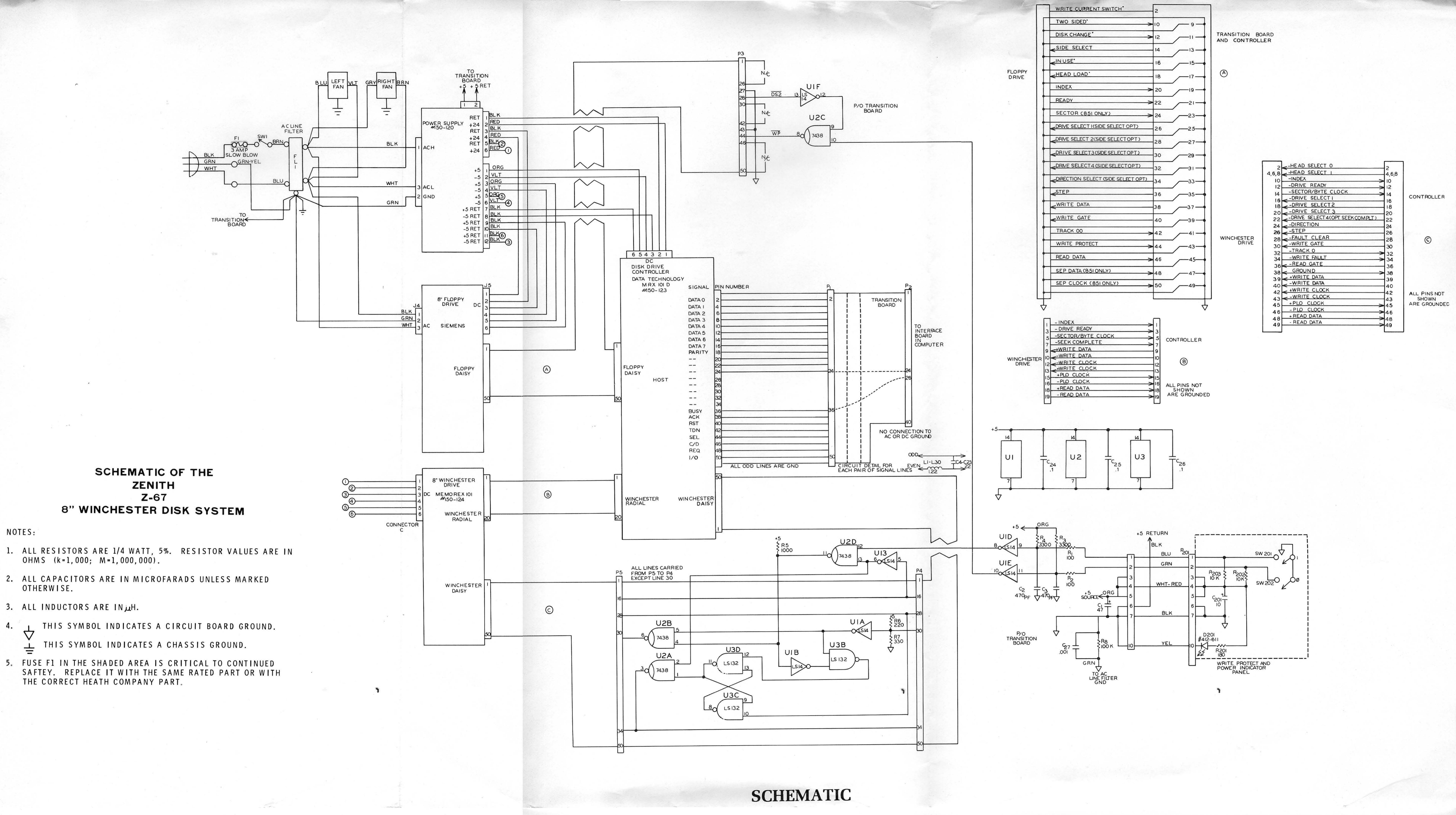
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DATA TECHNOLOGY CORPORATION MRX101D CONTROLLER SPECIFICATION FOR MEMOREX 101 DISK DRIVES

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	TABLE OF CONTENTS		
1.0	ECHTCATION	EXAMPLE CONTROLLER SP FOR MIRMORES 101 DIS	
2.0	MRX101D CONTROLLER		
	2.1 Features2.2 System Configuration2.3 Theory of Operation	All Sel Tibung	
3.0	HOST BUS 3.1 Signal Definitions 3.2 Theory of Operation		
4.0	COMMANDS/PROGRAMMING		

- 4.1 Command Format
- 4.2 Status Format
- 4.3 Logical Address Computation
- 4.4 Error Code Table
- 5.0 ELECTRICAL/MECHANICAL SPECIFICATIONS
- DIAGNOSTIC PHILOSOPHY 6.0
 - 6.1 Error Indicators
 - 6.2 Additional Microdiagnostics
- APPENDIX A MEMOREX 101 SECTOR FORMAT
- APPENDIX B HOST I/O CONNECTOR PIN ASSIGNMENT
- APPENDIX C PROM SET & SWITCH DEFINITIONS
- APPENDIX D MRX101D CONTROLLER POWER CONNECTIONS
- APPENDIX E PARITY JUMPER SETTING
- APPENDIX F ERROR INDICATORS

INTRODUCTION THE SECOND AS SECOND AS

The MRX101D Controller consists of a microprocessor-based controller with on-board data separator logic (for FDD), that is able to control a maximum of four disk drives. The controller has two disk drive interface ports. One port connects to the Memorex 101 type disk drives, and the other connects to floppy disk drives. The floppy drive I/O port works with industry standard single or dual head floppy disk drives. The floppy disk track formats are IBM 1D/2D compatible.

terms resource only bedress street

Commands are issued to the controller over a bidirectional bus connected to the host computer. The data separator/"serdes" logic serializes bytes and converts to MFM data, and deserializes MFM data into 8-bit bytes for the double density floppy drives.

Due to the micro-programmed approach utilized in the controller, extensive diagnostic capabilities are implemented. This methodology increases fault isolation efficiency and reduces system down time. Error detection and correction will tolerate media inperfections up to 4-bit burst errors on the Memorex 101 disk A second buffer to provide the controller to wining

volume some of the second and the second and the

MRX101D CONTROLLER A bidirectional but between the controller and boots a wide

Features of alleg notisonogeness and beliefes try oliginis a nonedline disentation evidence are interest the breatment baset

OVERLAPPED SEEK In multiple drive configurations the host can issue seeks to different drives without waiting for the first drive to complete its seek.

AUTOMATIC SEEK AND VERIFY SMINER CHARLES IN THE SMINES

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A seek command is implied in every data transfer command (READ, WRITE, CHECK, etc.). If the heads are not positioned over the correct cylinder, a seek is initiated, and a cylinder verification is performed after the seek completes.

SHOTOR BUTTONS

FAULT DETECTION

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he a had sector or walle-profected

Two classes of faults are flagged to improve error handling:

- Controller faults
- Disk faults

AUTOMATIC HEAD and CYLINDER SWITCHING If, during a multi-block data transfer, the end of a track is reached, the controller automatically switches to the next track. If the end of a cylinder is reached, the controller issues a seek and resumes the transfer.

DATA ERROR
DETECTION AND
CORRECTION

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If a data error is detected during a disk data transfer, the MRX101D will determine whether or not the error is correctable. If uncorrectable, the MRX101D will indicate this. If the error is correctable, either a pointer and mask can be requested by the host for applying the correction or the error can be automatically corrected by the MRX101D.

LOGICAL TO PHYSICAL UNIT CORRELATION Logical Unit Number (LUN's) are independent of physical port numbers. All accesses specify LUN's.

ON BOARD SECTOR BUFFER A sector buffer is provided on the controller to eliminate the possibility of data overruns during a data transfer.

EFFICIENT HOST PROTOCOL

A bidirectional bus between the controller and host provides a simple, yet efficient communication path. In addition, a high level command set permits effective command initiation.

SECTOR INTERLEAVING

Sector interleaving is programmable up to 32 ways.

elgitless ad

ODD PARITY

BEIGHT HALL TRADE

The 8 data bits on the interface bus can have odd parity. Depending on user preference, parity can be disabled.

NUMBER OF DRIVES

militare error bandanu

The controller will connect to a maximum of four (4) drives. The drives can be any combination of Memorex 101 and/or industry standard floppy disk drives.

BAD SECTOR/ WRITE-PROTECT SECTOR

A sector can be flagged as a bad sector or write-protected sector in the specified ID field. (Memorex 101 only)

TRACK FORMATS

Maria Benefit Com

Memorex 101: NRZ

256 Bytes/Sector, 40 Sectors/Track

IBM 1D/2D: Track format for floppy disk drives can be selected under program control in real time. The track formats are:

- 1) Single-density, single-sided
- 2) Single-density, double-sided or silver all the side of the side
- Double-density, single-sided and additional and a significant states are significant sta
 - 4) Double-density, double-sided

military than eath of button probatigmore have III Refer to Section 4.0 for details. I to reconsigned and

thing bad dilw maken it fall nottements lie and Uror Kins

2.2 System Configuration

Refer to Figure 2-1. The controller and data separator comprise a single PCB. A maximum of (4) drives may be connected to the controller. The floppy control cable is connected to connector J9. The Memorex 101 control cable is connected to connected to connected to either J2, J3, J4, or J5. Connector J6 is connected to the host interface board. All cables are the mass terminated type.

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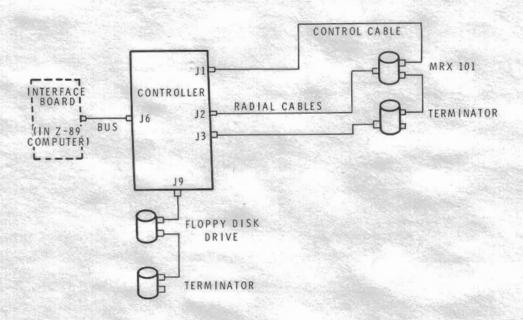


Figure 2-1

2.3 Theory of Operation

SACTARIMES!

Disk commands are issued to the MRX101D via the host bus following a defined protocol. The host initiates a command sequence by selecting the controller on the bus. If the controller is not busy, it requests command bytes from the host for task execution. (Command structure is described in Section 4.0). Depending on the type of command, the controller will request up to 10 bytes. Upon reception of the last command byte, the controller begins execution of the command.

Memers 101 MRS

For the data transfer commands, a check is performed on the disk address and status flagged if it exceeds the drive limits. The data is stored in a sector buffer before transfer to the host or disk drive. This buffer eliminates any possibility of data overruns between the host and the disk.

Upon completion of the command, the controller will send completion status to the host. (Further delineation of the completion status may be requested by issuing the appropriate sense commands.)

Odd parity is generated by the MRX101D for all information that it puts on the I/O bus. If enabled, the MRX101D flags all information that it receives with bad parity.

Saint to Figure 2.4. The controller and data apparator of fifting the of age PCE of figure man, of (4) of

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2.3.1 Electrical Interface

The electrical interface to the Memorex 101 drive will conform to the specification described in the Memorex 101 interface specification.

The electrical interface to the MRX101D Host Bus is described in the following sections.

Send status byte la-

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3.0 MRX101D HOST BUS

The MRX101D Host Bus is a negative-logic, bidirectional, 8-bit data bus utilizing odd parity. The electrical interface consists of an open collector bus terminated on each end by a 220/300 ohm resistor network. The controller regulates transfers across the bus which eliminates data overruns that could occur during data transfers.

The term "asserted" means that the signal on the host bus is between 0 V and 0.8 V. The term "deasserted" means that the signal on the host bus is between 2.5 V and 3.5 V (negative or low true logic).

entitioner waits 250 on for his celum below timing out

3.1 Signal Definition Season Moltmen CAST days not reputed ad being XXA

3.1.1 Unidirectional Signals Driven By Controller

Carried States of the Contract	
I/O	Input/Output. When asserted, the data on the bus is driven by the controller. When deasserted, the data on the bus is driven by the interface board. The interface board uses this line to enable its drivers onto the data bus.
C/D	Command/Data. When asserted, the data transmitted across the bus are the command bytes. When deasserted, the data are the disk data bytes.
BUSY	This bit is asserted as a response to the SEL line from the interface board and to indicate that the host bus is currently in use.
MSG	Message. When asserted along with C/D and I/O, indicates that the command is completed. This bit is always followed with the assertion of REQ.

REQ

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Request. This bit operates in conjunction with I/O, C/D, & MSG. When asserted and I/O is asserted, REQ will mean that the data on the host bus is driven by the controller. When asserted and I/O is deasserted, REQ will mean that the data is driven by the H/A.

I/O	C/D	MSG	Meaning	
d	a	d	Get command from H/A	
d	d	d	Get data from H/A	
a	d	d	Send data to H/A	SOFTHATESM OF
a	a	d	Send status byte to H/A	
$\vdash \vdash_{\mathcal{A}} a_{\mathcal{A}}$	a	a a	Command done to H/A	The AUPTOR DISE Business
COO PRO	a	a a	Command done to 11/A	WHEN APPLIES TTERL MARRY BULL

a=asserted, d=deasserted

3.1.2 Unidirectional Signals Driven By Interface Board

ACK

Acknowledge This bit is asserted as a response to REQ from the controller. The timing requirements on this signal with respect to the data is described in REQuest section. ACK must be returned for each REQ assertion. Once REQ has been asserted, the

controller waits 256 µs for ACK return before timing out.

RST

Reset When asserted, this bit forces the controller to the beginning of its microcode.

Any error status request will result in invalid information after RST has been asserted.

All signals to the drives are deasserted. RST must be asserted for a minimum of 250 ns

and a maximum of 10 \mus.

smon and that automated the one the title goods be seen and W. or

(183) in moltween out drive hoppilled avew hash tid and T. hetelog

SEL Select When asserted, it indicates the beginning of the command transaction. The H/A asserts SEL to gain the attention of the controller. The controller will return BUSY

This bir is asserted as a response to the ballbedrate that the first less is correctly in sea.

within 1 µs.

3.1.3 Bidirectional Data

DB (7-0,P) — Data lines 7 thru 0 represent the eight data bits. (DB0=1sb). Parity is represented by P. The controller utilizes odd parity (the number of asserted bits on the host bus is always odd).

3.2 Theory of Operation

Whenever the interface board has a command for the controller, it performs a selection sequence to gain the attention of the controller. The sequence is as follows (refer to Figures 3-1, 3-2, and 3-3):

The interface board asserts SEL and DB0 (controller address bit) on the host bus. It then waits for the controller to respond with BUSY. Upon reception of BUSY, the interface board deasserts SEL. The controller now has control of the host bus.

After the controller asserts BUSY, it then asserts C/D to indicate command mode transfer, and deasserts I/O to indicate output and to fetch the command bytes from the interface board. The command bytes are transferred over the host bus with the REQ/ACK handshake protocol until all command bytes are transferred to the controller. (The command byte fetch mode ends after the last REQ pulse from the controller is deasserted.)

For data transfer, the controller deasserts the C/D line to indicate data mode. Depending on the command type (read/write disk) the I/O bit on the host bus is asserted or deasserted by the controller, and the data is transferred (a byte at a time) with the same REQ/ACK handshake protocol. After all the data bytes have been transferred, a completion status is placed on the data bus by the controller — C/D and I/O are asserted. REQ is asserted and the controller waits for ACK from the interface board. After the status byte transfer, the controller places zeros on the data bus and asserts C/D, I/O and MSG along with REQ to indicate to the host that the command is complete (this action can be used to generate an interrupt on the host system). After the interface board responds with ACK, the controller deasserts REQ, BUSY and all other lines. This completes the command execution and the controller is now ready to be selected for the next command.

Timing Requirements for Controller Selection

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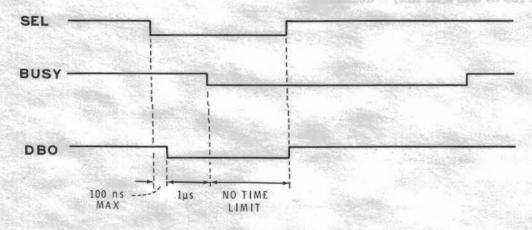
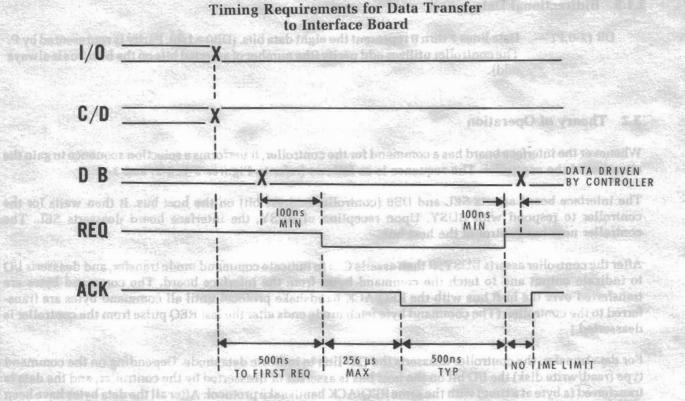


Figure 3-1

Note: SEL must be deasserted before the controller asserts REQ.

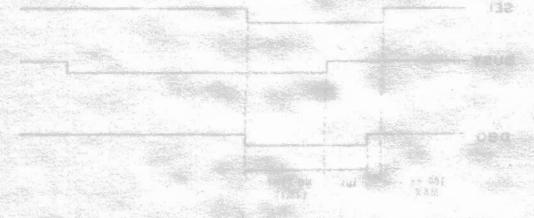


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Note 1: For Status Byte Transfer (I/O, C/D asserted and MSG deasserted); or Interrupt Byte Transfer (MSG, I/O, C/D asserted), REQ is asserted 500 ns (typical) after the assertion of any of the above bits.

the tribe sented like the property of the control or used to generate to interrupt on the best system). After the

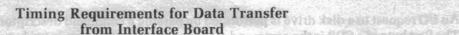
2: Data driven by the controller is stable 100 ns min at the interface board end before REQ is asserted, and 100 ns min after REQ is deasserted.



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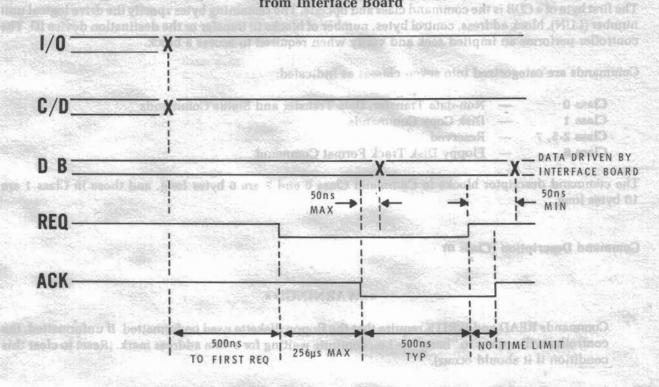


Figure 3-3

- Note 1: Data driven by the interface board is stable 50 ns max at the interface board end after ACK is asserted, and 50 ns min after REQ is deasserted.
 - 2: For command mode transfers, SEL must be deasserted before ACK is asserted. This sequence follows the selection protocol.

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4.0 COMMANDS

An I/O request to a disk drive is performed by passing a command descriptor block (CDB) to the controller. The first byte of a CDB is the command class and opcode. The remaining bytes specify the drive logical unit number (LUN), block address, control bytes, number of blocks to transfer or the destination device ID. The controller performs an implied seek and verify when required to access a block.

Commands are categorized into seven classes as indicated:

Class 0 — Non-data Transfer, Data Transfer and Status Commands

Class 1 — Disk Copy Commands

Class 2-5, 7 — Reserved

Class 6 — Floppy Disk Track Format Command

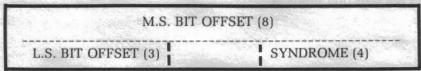
The command descriptor blocks in Command Class 0 and 7 are 6 bytes long, and those in Class 1 are 10 bytes long.

Command Description (Class 0)

WARNING!

Commands READ and WRITE require that the floppy diskette used be formatted. If unformatted, the controller will appear to "hang" — i.e., continue waiting for a data address mark. (Reset to clear this condition if it should occur).

Opcode (Hex)	Description
00	Test drive ready. Selects the drive and verifies drive ready.
01	Recalibrate. Positions the R/W arm to Track 00, clears possible error status in the drive.
02	Request Syndrome. Returns the offset and syndrome for data field error correction. The two bytes are as follows:



The bit offset is relative from the first data bit, i.e., Bit 7 of Byte 0.

Request Sense. This command must be issued immediately after an error. It returns 4 bytes of drive and controller sense for the specified LUN. (See copy block for exception).

Format Drive. Formats all blocks with ID field according to interleave factor and data fields.

The data field contains E5 Hex.

05 Reserved.

06

Format Track. Formats the specified track with bad block flag cleared in all blocks of that track. Writes E5 Hex in the data fields.

Allege Commands

07	Format Bad Sector. Formats the specified sector ID with bad sector flag (Bit 7 in head byte) set.
08	Read. Reads the specified number of blocks starting from initial block address given in the CDB. (See Warning above!)
09	Write-protect the sector. Writes the specified sector ID field with write-protected flag. (Bit 6 in head byte) set. (See Warning above!)
0A	Write. Writes the specified number of blocks starting from initial block address given in the CDB.
ов	Seek. Initiates seek to specified block and immediately returns completion status before the seek is complete for those drive's capable of overlap seek.

Command Description (Class 1)

Opcode (Hex)	Description	a de la companya de l
00	Copy Block. Co	pies the number of sectors from the source drive to the destination drive.

Command Description (Class 6)

Opcode	Description
(Hex)	

00

Define Floppy Disk Track Format. The Track format code in byte 5 of the CDB defines the track format for the LUN. The Track Format Codes are as follows:

Track Format Code (Hex)	Track Format Description
00	Single-density, single-sided. All tracks — FM recording, 128 bytes/sector, 26 sectors/track.
01	Single-density, double-sided. All tracks — FM recording, 128 bytes/sector, 26 sectors/track.
06	Double-density, single-sided. Side 0, cylinder 0 — FM recording. 128 bytes/sector, 26 sectors/track. All other tracks — MFM recording, 256 bytes/sector, 26 sectors/track.
07	Double-density, double-sided. Side 0, cylinder 0 — FM recording, 128 bytes/sector, 26 sectors/track. All other tracks — MFM recording, 256 bytes/sector, 26 sectors/track.

NOTE: If track format information for floppy is not specified after each reset or power-on, the default mode will be as follows:

Switch Setting	Mode with any side should be of
10 (dual-head FDD)	Single-density, single-sided (same as track format code 00)
11 (single-head FDD)	Single-density, single-sided (same as track format code 00)

limit, initializa seek, to apecified block and inmultimally returns complete on status balons that

and a second district many surpose states block produces with

Refer to Appendix C, "Switch Set-up Instructions", to set up the switches.

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Comment Description (Class 1)

Charinand Description (Classic

Track Found (make

4.1 Command Format

4.1.1 Class 0 Commands

Byte	7 6 5 4 3 2 1 0	
0	0 0 0 opcode	Description of
1	LUN logical adr2*	Copy Black, On
2	logical adr1*	
3	logical adr0*	
4	number of blocks	is sest.) philipin
5	control	AND PARTY.
	Control of the Contro	and the same of th

^{*} Refer to section 4.3 for Logical Address Computation LUN = Logical Unit Number for the drive — 0, 1, 2, or 3.

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256 bytes solut, 20 sectory/bask.

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LOGICAL ADR (0-2)

= Logical Sector Address of specified sector. LOGICAL ADR0 is the LSB. Sectors start at zero (cy1=head=sector=0). After the end of the track is reached, the next logical sector is located on the next track. If the end of the cylinder is reached, the next logical sector is located on the first track on the next cylinder.

NUMBER OF BLOCKS

= Contains the number of blocks (sectors) to transfer per command. Also indicates the Interleave factor for Format, Check Track commands only.

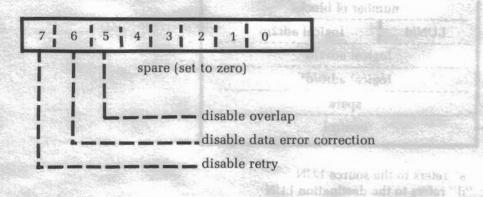
Congresseds in this group

in 5715(2 m m w

Track Fornest Cade"

us 6 Cummand

CONTROL BYTE is defined as follows:



Commands in this group

- a) NOP
- b) Format Drive
- c) Check Format
- d) Request Sense
- e) Request Syndrome
- f) Recalibrate
- g) Read Block(s)
- h) Write Protect Sector
- i) Write Block(s)
- i) Format Track
- k) Format Bad Sector
- l) Seek

4.1.2 Class 1 Commands

de li the and altibut

7	6	5	4	3	2	1	0		
0	0	1		(pcod	е	milyo d		
last d	LUN/s logical adr2/s*						l entrin		
logical adr1/s*									
logical adr0/s*									
number of blocks									
LUN/d logical adr2/d*									
logical adr1/d*									
		lo	gical	adr0	d*				
4122	717		sp	are					
			COI	ntrol		013001			
	 	0 0 LUN/	0 0 1 LUN/s lo nu LUN/d	0 0 1 LUN/s logical logical number LUN/d logical logical sp	0 0 1 logical adr1, logical adr0, number of blo logical adr1, logical adr1, logical adr1, logical adr1,	0 0 1 opcod LUN/s logical ad logical adr1/s* logical adr0/s* number of blocks LUN/d logical adr1/d* logical adr0/d* spare	0 0 1 opcode LUN/s logical adr2/s* logical adr1/s* logical adr0/s* number of blocks LUN/d logical adr2/d* logical adr1/d* logical adr0/d* spare		

[&]quot;s" refers to the source LUN

Commands in this group

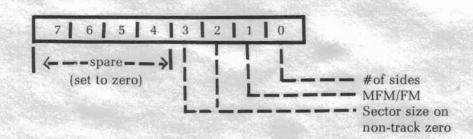
a) Copy Block

4.1.3 Class 6 Commands



NOTE: See Class 6 Command Description for more information and default modes for floppy drives.

^{*}Track Format Code byte is defined as follows:



[&]quot;d" refers to the destination LUN

^{*}Refer to section 4.3 for Logical Address Computation

4.2 Status Format

4.2.1 Completion Status Byte



Bit 0 Parity error during transfer from host to controller.

Bit 1 Error occurred during command execution.

Bit 2-4 Spare (set to zero).

Bit 5-7 Logical unit number of the drive.

Hook Administ Value and the first topical Sector Addison in bytes y thru 8 created the

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1.3 Legillal Address Comprisitific

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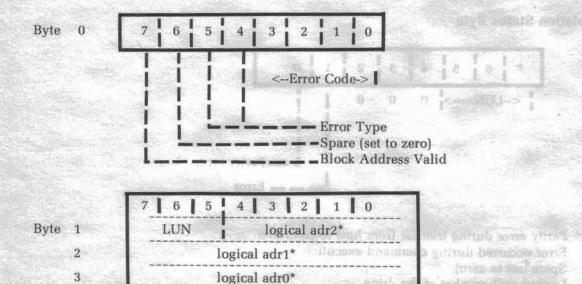
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4.2.2 Drive and Controller Sense



*Refer to section for Logical Address Computation

Block Address Valid — Indicates that the Logical Sector Address in bytes 1 thru 3 contain the block at which the error occurred.

Error Type — Indicates the general type of error.

Error Code — The actual error interpretation.

LUN — The Logical Unit Number of the erring drive.

4.3 Logical Address Computation

The Logical address is computed as follows:

Logical adr = (CYADR * HDCYL + HDADR) * SETRK + SEADR (see note)

Where: CYADR = cylinder address

HDADR = head address

SEADR = sector address

HDCYL = number of heads per cylinder

SETRK = number of sectors per track

Bit 0 of Logical adr0 = the least significant bit.

Bit 4 of Logical adr2 = the most significant bit.

NOTE: SEADR = (SEADR - 1) for IBM track format.

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4.4 ERROR CODE TABLE

Type 0 (Drive) Error Codes

- 0 No status
 1 No index signal
 2 No seek complete
 3 Write fault
- Write fault
 Drive not ready
 Drive not selected.
- 6 No Track 00

Type 1 (Controller) Error Codes

- 0 ID read error. ECC error in the ID field.
- 1 Uncorrectable data error during a read.
- 2 ID Address Mark not found.
- 3 Data Address Mark not found.
- 4 Record not found. Found correct cylinder and head but not sector.
- 5 Seek error. R/W head positioned on a wrong cylinder and/or selected a wrong head.
- 6 DMA Data time out error. No acknowledge within 256 μs.
- 7 Write protected.
- 8 Correctable data field error.
- 9 Bad block found.
- A Format Error. The controller detected that during the Check Track command, the format on the drive was not as expected.

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Type 2 (Command) Error Codes

- Invalid Command received from the host.
- 1 Illegal disk address. Address is beyond the maximum address.
- 2 Illegal function for the specified drive.
 - e.g. Check Track command does not apply for floppy disks with IBM track format.

5.0 ELECTRICAL/MECHANICAL SPECIFICATION

Physical Parameters

Width	8.5 inches
Length	13.5 inches
Height	0.49 inches
Weight	1.12 lbs.

Environmental Parameters

Temp. (degree) F/C	Operating 32/0 to 131/55	Storage -40/-10 to 167/75
Relative Humidity (@ 40 degrees F, wet bulb temp no condensation)	10% to 95%	10% to 95%
Altitude	sea level to 10K feet	sea level to 15K feet

Power Requirements

Methe protected.

Correctable data field

Voltage @ current	+5 VDC @ 4.6A (max)
	-5 VDC @ 500 mA (max)
	+24 VDC @ 100 mA (max)

6.0 DIAGNOSTIC PHILOSOPHY

The controller contains 8 diagnostic LED error indicators. Each time an error occurs the controller deposits a value in the LEDs and returns a failure status to the host adaptor. The LED value can be decoded, but the error it indicates will be available to the host software. The errors that are returned by the controller is very detailed. As a result preliminary fault isolation is made fairly easily, narrowing the failure to the particular interface portion of the controller.

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APPENDIX A

MEMOREX 101 SECTOR FORMAT

Usage

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The track layout for the Memorex 101 (typical for 40 sectors) is shown below.

11	S	C	h	S	e	е	е	14	S	256	e	e	e	6
bytes	У	У	d	е	C	C	C	bytes	у	256 bytes data	C	C	C	bytes
00's	n	1		C	C	C	C	00's	n	data	С	С	C	00's
	C	533		- 17	2	1	0		C		12	1	0	

sync, cyl, hd, sec, 00, ecc0, ecc1, ecc2 = 1 byte

Track Capacity = 12000 bytes

298 bytes/sector

Number of cylinders = 243

Number of heads = 4

Number of drives = one, any drive select value

Step Rate (buffered mode) = $100 \mu s$ period

Head Settling Time (after Seek Complete) = 25 ms

APPENDIX B HOST I/O CONNECTOR PIN ASSIGNMENT

The Host I/O Bus uses a 50-pin connector (AMP P/N 2-87227-5 or equivalent). The unused signal pins are considered to be spares for future use. The pin assignments are as follows:—

	Delia contrata de la companya del companya del companya de la comp		
Signal	Pin Number	all merchants as	Intelescendentals in
	autyd au 191		
DATA0	4 00 4 3	1 Mar 1 1 2 2 2 100	
DATA1	4		
DATA2	6		
DATA3	8		
DATA4	10		
DATA5	12		
DATA6	14	alvd.f	
DATA7	16		
PARITY	18		Track Capacity = 12300 bytes
	20		
-	22		The second secon
	24		
	26	Future	THE REAL PROPERTY OF THE PROPERTY OF
	28	Usage	
	30		F = absed to wide. A
	32		
AND CALLES	34		Number of drives - one any drive sales
BUSY	36		
ACK	38		ring the Office Inhom benefit and anti-
RST	40		
TDN	42	和斯里斯 平山	Hand Southing Plate 1996; Sook Consplate
SEL	44		
C/D	46		
REQ	48		
I/O	50		

NOTE: All signals are negative-true, and all odd pins are connected to ground. The signal lines are terminated with 220 ohms to 5 V and 330 ohms to ground.

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A - 9 - enable odd partty ab

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APPENIENS S

APPENDIX C

PROM SET AND SWITCH DEFINITION

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Prom Set AM12

CUSTOMER FIRMWARE: (DIP SWITCH set-up procedure)

Location: 16B

Switch Bits

Field

Definition

8 7	6 5	4 3	2 1
LUN 0	LUN 1	LUN 2	LUN 3
Drive	Drive	Drive	Drive
Type	Type	Type	Type

- 1. All FDD-100-8 drives are 26 sectored/track @128 bytes/sector (FM).
- All FDD-200-8 drives are 26 sectors/track @128 bytes/sector (FM) for track 00, and 26 sectors @256 bytes all others.

Example:

Location: 16B

8 7	6 5	4 3	2 1
LUN 0 Drive Type	LUN 1 Drive Type	LUN 2 Drive Type	LUN 3 Drive Type
on on	off on	off off	on on

Drive 0 is set up for Memorex 101

Drive 1 is set up for FDD-200-8

Drive 2 is set up for (FDD-100-8) (FM only)

Drive 3 is set up for Memorex 101

APPENDIX D MRX101D CONTROLLER POWER CONNECTIONS

- 1) +24 V @ 100 mA
- 2) Gnd
- 3) Gnd
- 4) -5 V @ 500 mA

Warning!

The Controller can only accept -5 V. No provisions have been made for other voltages on this pin.

- 5) +5 V @ 4.6 A
- 6) Gnd

PARITY JUMPER SETTING

APPENDIX E

Parity jumper W1 at location 6D:

A-B = enable odd parity checking and generation

B-C = disable parity

Congregation

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All Phil and habitus are 16 sectional track With bytaclement in the

All-Pint rolls diese ere 25 section and 6712 on discour (End) for frest 80, and 35 sectors

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AUN 6 LUN 1. COM 2 CARN CONTROL OF TYPE TYPE TYPE TYPE CONTROL OF THE CONTROL OF

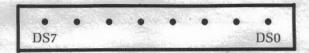
Determination for Memores vittering and Street in the Start Tip 200-8. There is a set up for (2005-100-8) (Filt only) Drive 3 to set up for Memores.

APPENDIX F

ERROR DISPLAY IN LEDS

Once the controller detects an error, the error display maintains the error indication even though subsequent tests are performed correctly. In this way the controller can be left running for a long period of time. However, only the last error is displayed on the LED's. To reset the error display, stop the test and start again.

The table below lists the error indications as displayed by the controller.



Error Code (HEX, DS0 is LSB)	Interpretation
00	No error
01	No Index from drive
02	No Track 00 from drive
03	Sector Address Out of Bounds
04	Hard Disk not selected
05	No Seek Complete from Hard Disk
06	No ID Address Mark
07	No Data Address Mark
08	Seek Error (Cylinder or Head not correct)
09	Sector not found
0A	ID ECC error
OB	No ACK from Host Adaptor
0C	Invalid Command (controller will only accept 5 bytes of the command).
0D	Incorrect DATA MARK
0E	Incorrect ID MARK
0F	Incorrect cylinder address from drive
10	Incorrect sector address from drive
11	Incorrect head address from drive
12	Uncorrectable Data Error
13	Correctable Data Error
14	Drive not READY
15	Write fault
16	not used
17	Drive write protected
18	RAM diagnostic error
19 — 1F	not used
20	Parity Error from host adaptor. If this error occurs, the host adaptor has a fault in the parity generation circuitry.
21	Bad Block detected from drive
22	Invalid function for this type
81	Fatal Error Code. Controller detected more than one Seek Complete signal asserted on the drive interface to the Memorex 101. Only "RESET" from the host cable will clear this condition. The controller will ignore all commands after detecting this error.



Dear Customer:

Along with your electronic equipment, you will find a set of six tabs and the Winchester Disk System's manuals in a binder.

Place the tabs into the Manual as follows:

A SAN ORDER DE CONTRACTOR - LOS			
GENERAL	Before the	Winchester	Disk System

Operation Manual and after the Preface

(located on Page III).

FLOPPY DISK Before the Siemens Floppy Drive Manual.

RIGID DISK Before the Memorex Winchester Disk Drive

Manual.

CONTROLLER Before the Data Technology Corporation

Controller Manual.

INTERFACE Before the Z-89-67 Interface Board

Installation Manual (not included with

the Z-67 Winchester Disk System).

MISCELLANEOUS Before any notes you may wish to keep

in the binder.

Thank you,

ZENITH DATA SYSTEMS

YOUR ZENITH DATA SYSTEMS PRODUCTS 90 DAY LIMITED WARRANTY

Welcome to the ZENITH DATA SYSTEM family. We believe that you have purchased one of the finest computer products available. Please read this carefully. It is a Limited Warranty as defined in the U.S. Consumer Product Warranty and Federal Trade Commission Improvement Act. This warranty gives you specific legal rights, and you may also have other rights that vary from State to State within the U.S.A.

ZENITH DATA SYSTEMS (ZDS) RESPONSIBILITY

SERVICE LABOR—For a period of 90 days from the date of purchase, ZDS will pay for service labor by a ZDS-approved service center when needed as a result of defective workmanship and material in ZDS equipment excluding Software.

PARTS—New or rebuilt replacements for factory-defective parts will be supplied for 90 days from the date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period.

NOT COVERED—The above warranty does not extend to installation and adjustment at User's location, nor to any equipment which does not bear a serial number, or which has been subjected to misuse, abuse, neglect, accident, improper installation application, or alteration including, but not limited to electrical, mechanical, or cosmetic (including removal of ZDS nameplates, logos, trademarks, or identification, or the attachment of any non-ZDS nameplate, logo, trademark or identification), without the expressed written authority of ZDS, or subjected to negligence in use, storage, transportation or handling.

This warranty covers only ZENITH DATA SYSTEM products and is not extended to other equipment or components that customer uses in conjunction with our products.

THE ABOVE WARRANTIES COVERING EQUIPMENT ARE IN LIEU OF ALL OTHER WARRANTIES TO USERS EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES ARE EXPRESSLY EXCLUDED AND NEGATED.

DAMAGES—UNDER NO CIRCUMSTANCES SHALL ZDS BE LIABLE IN ANY WAY TO THE USER FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT LIMITED TO, ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORSEABLE AND WHETHER OR NOT BASED ON BREACH OF WARRANTY, CONTRACT, OR NEGLIGENCE IN CONNECTION WITH THE SALE OF SUCH EQUIPMENT. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

OWNERS RESPONSIBILITY

EFFECTIVE WARRANTY DATE—Warranty begins on the date of purchase to the first purchaser or lessee at retail. For your convenience, keep the dealer's dated bill of sale or invoice as evidence of the sale. The proof of purchase must be provided when Warranty service is requested.

OPERATING MANUAL—Read Your Operating Manual Carefully so that you will understand the operation of your equipment.

OWNERS REGISTRATION—Please fill out your Owner Registration card.

WARRANTY SERVICE—For Warranty service information, contact your ZDS dealer, HEATH KIT ELECTRONIC CENTER, or any ZDS approved service center. Parts and service labor that are ZDS's responsibility under this warranty will be provided. Other service is at the User's expense. If you have any problem in obtaining satisfactory warranty service, write to:

Customer Services ZENITH DATA SYSTEMS, CORPORATION, 1000 Milwaukee Ave. Glenview, IL 60025

(See reverse side for other Service Information)



REPAIR SERVICE INFORMATION

The following ZENITH DATA SYSTEMS service facilities are available to you in the event you need them for computer equipment repair.

For prompt service, refer to:

- Zenith Data System Authorized Repair Service—
 In the Yellow Pages under "Data Processing Equipment"
- HeathKit Electronic Centers—
 In the White Pages or in the Yellow Pages under "Data Processing Equipment"
- · Zenith Data Systems Factory Repair Service-

Zenith Data Systems Service Operations 11000 Seymour Ave. Franklin Park, Il. 60131

If you are shipping your equipment to the factory repair service, it must be returned in the original shipping materials for proper protection. If you no longer have the shipping carton, contact the factory repair service and they will ship you one. We regret we must charge you for this service.

Before you return equipment to be repaired to the factory service center, you must obtain a repair authorization number for your protection. To receive your repair authorization number, contact the Factory Repair Service in writing or via the telephone. This number will expedite your service and allow ZDS to watch for the delivery of your equipment.

• If you are unable to locate a service facility, call:

ZENITH DATA SYSTEMS Service Operations 11000 Seymour Ave. Franklin Park, Il. 60131 (312) 671-7550 Ext. 336

For service or replacemen, parts after warranty, please see your authorized ZDS Repair Service, HEATH KIT Electronics Center or Factory Repair Service.

YOUR ZENITH DATA SYSTEMS COMPUTER HARDWARE PRODUCTS

90 DAY LIMITED WARRANTY

Welcome to the ZENITH DATA SYSTEMS family. We believe that you have purchased one of the finest computer products available. Please read this carefully. It is a Limited Warranty as defined in the U. S. Consumer Product Warranty and Federal Trade Commission Improvement Act. This warranty gives you specific legal rights, and you may also have other rights that vary from State to State within the U. S. A.

ZENITH DATA SYSTEMS (ZDS) RESPONSIBILITY

SERVICE LABOR — For a period of 90 days from the effective warranty date, ZDS will pay for service labor by a ZDS-approved service station when needed as a result of defective workmanship and material in ZDS computer hardware products.

PARTS — New or rebuilt replacements for factory-defective parts will be supplied for 90 days from the effective warranty date. Replacement parts are warranted for the remaining portion of the original warranty period.

NOT COVERED — The above warranty does not extend to installation and adjustment at User's location, nor to any computer hardware products which does not bear a serial number, or which has been subjected to misuse, abuse, neglect, accident, improper installation application, or alteration including, but not limited to electrical, mechanical, or cosmetic (including removal of ZDS nameplates, logos, trademarks, or identification, or the attachment of any non-ZDS nameplate, logo, trademark or identification), without the expressed written authority of ZDS, or subjected to negligence in use, storage, transportation or handling.

APPLICABILITY OF WARRANTY — This warranty covers only ZENITH DATA SYSTEMS computer hardware products and is not extended to other computer hardware products or components that customer uses in conjunction with our products. This Warranty does not cover computer software products nor damage to computer hardware products caused by computer software products. This Warranty applies only to the first end-user of the ZENITH DATA SYSTEMS computer hardware product who becomes such either by purchase at retail or by lease. This Warranty is not assignable.

DAMAGES — UNDER NO CIRCUMSTANCES SHALL ZDS BE LIABLE IN ANY WAY TO THE USER FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT LIMITED TO, ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORSEEABLE AND WHETHER OR NOT BASED ON BREACH OF WARRANTY, CONTRACT, OR NEGLIGENCE IN CONNECTION WITH THE SALE OF SUCH COMPUTER HARDWARD PRODUCTS. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

OWNERS RESPONSIBILITY

EFFECTIVE WARRANTY DATE - Warranty begins on the date of purchase at retail by, or leased to, the first end user, as the case may be. For your convenience, keep the dealer's dated bill of sale or invoice as evidence of the sale. The proof of purchase must be provided when Warranty service is requested.

OPERATING MANUAL — Read Your Operating Manual Carefully so that you will understand the operation of your computer hardware products.

OWNER'S REGISTRATION - Please fill out your Owner Registration card and return it by mail to ZDS.

WARRANTY SERVICE — For Warranty service, contact your ZDS dealer, HEATHKIT ELECTRONIC CENTER, or any ZDS approved service station. Parts and service labor that are ZDS's responsibility under this warranty will be provided. Other service is at the User's expense. If you have any problem in obtaining satisfactory warranty service, write to:

Customer Services ZENITH DATA SYSTEMS, CORPORATION 1000 Milwaukee Ave. Glenview, Il 60025

(See reverse side for other Service Information)



SERVICE INFORMATION

In the event service is required on any ZENITH DATA SYSTEMS Computer Hardware Products, please refer to:

- Listing of Authorized Zenith Data Systems Service Stations accompanying the product.
- ZENITH DATA SYSTEMS Authorized Service Stations In the Yellow Pages under "Data Processing Equipment".
- HeathKit Electronic Centers In the White Pages or in the Yellow Pages under "Data Processing Equipment".

If you are unable to locate a service station locally, call ZENITH DATA SYSTEMS, Customer Services Assistance:

Area Code (312) 671-7550

If service is not available locally, or if you wish, arrangements can be made to return your Computer Hardware Products to the factory for service. For your protection, you must obtain a Return Authorization Number from the Factory Service Station before your Computer Hardware Products are returned. The Return Authorization Number must appear on the carton and packing list in order to expedite processing through the factory service center. To obtain a Return Authorization Number, please contact:

ZENITH DATA SYSTEMS Service Department 11000 Seymour Ave. Franklin Park, Il 60131 (312) 671-7550

If you are shipping your Computer Hardware Products to the Factory Service Station, it must be returned in the original shipping materials for proper protection, transportation prepaid, to the above address. If you no longer have the shipping materials, you may contact the Factory Service Station and arrangements will be made to ship the materials to you. We regret, we must charge you for this service.

In addition to the Return Authorization Number, remember to include a copy of your proof of purchase with the product in order to substantiate warranty.

You will be notified of any charges prior to servicing on any items that are out of warranty or do not have proof of purchase.



ZDS SERVICE CENTERS

ALABAMA

Boaz

All American TV 218 N. Hwy 431 Boaz, AL 35957 205-593-5201

ALASKA

Eagle River

Alaska Business Systems SR 193H Eagle River, AK 99577 907-694-3044

ARIZONA

Phoenix

Desert TV Svc. & Sales 3339 E. Shea Blvd. Phoenix, AZ 85028 602-996-6640

Heathkit Electronic Center 2727 W. Indian School Rd. Phoenix, AZ 85017 602-279-6247

ARKANSAS

Little Rock

Standard Computer 11311 Arcade Dr., #200 Little Rock, AR 72212 501-224-6660

CALIFORNIA

Anahelm

Heathkit Electronic Center 330 E. Ball Rd. Anaheim, CA 92805 714-776-9420

Cerritos

Secured Computer Systems 12011 Aclare St. Cerritos, CA 90701 213-924-6741

Chula Vista

Aztec TV Service 836 Broadway Chula Vista, CA 92011 714-427-5100

Daly City

King Plaza Electronics 107 King Plaza Ct. Daly City, CA 94015 415-878-4953

El Cerrito

Heathkit Electronic Center 6000 Portrero Ave. El Cerrito, CA 94530 415-236-8870

CALIFORNIA (Cont'd.)

El Cajon

El Cajon Television Ctr. 695 N. Second St. El Cajon, CA 92021 714-444-9404

Encinitas

Encinitas Television Inc. 1140 First St. Encinitas, CA 92024 714-753-4186

Fremont

House of Color TV, Inc. 40931 Fremont Blvd. Fremont, CA 94538 408-656-6511

Hayward

Television City Service 230 Jackson St. Hayward, CA 94544 415-538-2244

Hollywood

Home Entertainment & Mfg. 12034 Vanowen St. N. Hollywood, CA 91605 213-982-4393

Los Angeles

American Transvideo ATV 1229 N. Highland Ave. Los Angeles, CA 90038 213-468-8700

Heathkit Electronics Center 2309 S. Flower St. Los Angeles, CA 90007 213-749-0261

Mountain View

House of Color TV, Inc. 801 W. El Camino Real Mountain View, CA 94040 415-967-2556

North Highlands

C & S Television 6108 Watt Ave. North Highlands, CA 95660 916-332-1811

Pomona

Heathkit Electronic Center 1555 N. Orange Grove Ave. Pomona, CA 91767 714-623-3543

Redwood City

Heathkit Electronic Center 2001 Middlefield Rd. Redwood City, CA 94063 415-365-8155

CALIFORNIA (Cont'd.)

Sacramento

Electronic Laboratories 2311 C. St. Sacramento, CA 95816 916-444-0115

Heathkit Electronic Center 1860 Fulton Ave. Sacramento, CA 95825 916-486-1575

San Diego

(Le Mesa) Heathkit Electronic Center 8363 Center Dr. Le Mesa, CA 92041 714-461-0110

San Francisco

Blyco Electronics, Inc. 827 Irving St. San Francisco, CA 94122 415-731-1265

Lum-Buckles

410 Townsend St. San Francisco, CA 94107 415-495-0339

San Jose

(Campbell) Heathkit Electronic Center 2350 S. Bascom Ave. Campbell, CA 95008 408-377-8920

Santa Clara

House of Color TV, Inc. 5145 Stevens Creek Santa Clara, CA 95050 408-248-8228

Valley Computer SVC., Inc. 5145 Stevens Creek Blvd. Santa Clara, CA 95050 408-248-8228

Woodland Hills

Heathkit Electronic Center 22504 Ventura Blvd. Woodland Hills, CA 91364 213-883-0531

COLORADO

Arvada

Showcase Service 9110 Ralston Rd. Arvada, CO 80002 303-425-1034

Effective June, 1981 COLORADO (Cont'd.)

Denver

Contact TV Repair Inc. 3133 W. Alameda Ave. Denver, CO 80219 303-934-2321

Heathkit Electronic Center 5940 W. 38th Ave. Denver, CO 80212 303-422-3408

Tele-Vue Service 454 S. Federal Denver, CO 80219 303-935-2455

CONNECTICUT

Danbury

Wicks Radio & TV Service 3 W. Redding Rd. Danbury, CT 06810 203-743-0949

Hartford

ATV Corp. 1918 Park St. Hartford, CT 06106 203-233-6295

(Avon)

Heathkit Electronic Center 395 W. Main St. (Rt. #44) Avon, CT 06001 203-678-0323

FLORIDA

Clearwater

"Jersey Jim" Towers TV 512 US Hwy 19 S Clearwater, FL 33516 813-461-7500

Ft. Lauderdale

Eddy's Radio & TV 1110 N.E. 4th Ave. Ft. Lauderdale, FL 33304 305-763-2964

Largo

SOS Television 13850 Walsingham Rd. Largo, FL 33540 813-581-3040

Mlami

(Hialeah) Heathkit Electronic Center 4705 W. 16th Ave. Hialeah, FL 33012 305-823-2280

FLORIDA (Cont'd.)

T.V. Doctors 1538 W. 49th St. Hialeah, FL 33012 305-558-8861

Orlando

Jack's TV Service 3223 Curry Ford Rd. Orlando, FL 32806 305-898-8692

Panama City

Midway Electronics, Inc. 231 Tyndall Parkway Panama City, FL 32401 904-763-5541

Pensacola

Data Equipment Center 888 W. Michigan Ave. Pensacola, FL 32505 904-432-8696

Tampa

Heathkit Electronic Center 4019 W. Hillsborough Ave. Tampa, FL 33614 813-886-2541

GEORGIA

Atlanta

Heathkit Electronic Center 5285 Roswell Rd. Atlanta, GA 30342 404-252-4341

Ellaville

Ellaville Radio & TV P.O. Box 3 Ellaville, GA 31806 912-937-2309

Marietta

Trulove TV, Inc. 1264 Austell Rd. Marietta, GA 30060 404-427-2016

Smyrna

TV Analysts Inc. 2844 Atlanta St. Smyrna, GA 30080 404-432-2194

HAWAII

Honolulu

Film Services of Hawaii 205 Kalini St. Honolulu, HI 96819 808-848-2444

IDAHO

Coolin

Roy's Electronic Service P.O. Box 62 Coolin, ID 83821 208-443-2097

ILLINOIS

Bloomington

P.K. Systems Inc. 113 N. Center St. Bloomington, IL 61701 309-828-6031

Champaign

Bandy TV Service Co. 909 Bloomington Rd. Champaign, IL 61820 217-351-2194

Chicago

Bell Television, Inc. 4625 N. Kedzie Ave. Chicago, IL 60625 312-588-5000

Heathkit Electronic Center 3462-66 W. Devon Ave. Chicago, IL 60645 312-583-3920

Rex TV Svc. Co. Inc. 6011 S. Pulaski Chicago, IL 60629 312-735-2929

Zenith Distributing Corp./III 500 N. Michigan Suite 1430 Chicago, IL 60611 312-527-9600

Collinsville

Bell TV & Elec. Svc. 620 W. Main Collinsville, IL 62234 618-345-8070

Danville

Danville Private Phone Co. 902 Skyline Danville, IL 61832 217-442-0971

Decatur

Schuerman Radio Co. 128 S. Illinois St. Decatur, IL 62521 217-423-3936

Downers Grove

Heathkit Electronic Center 224 Ogden Ave. Downers Grove, IL 60515 312-852-1304

ILLINOIS (Cont'd.)

Minooka

Loreno TV & Electronics PO Box 116 RRZ Wapella Minooka, IL 60447 815-467-4555

Rockford

Ackerman's Color Spec. 7830 N. 2nd St. Rockford, IL 61111 815-633-1513

Springfield

Micropower Computer Sys. 1422 S. Fifth Springfield, IL 62703 217-544-4108

INDIANA

Carmel

Computroller Inc. 620 S. Range Line Rd. Carmel, IN 46032 317-846-8463

Columbus

Millers T.V. Sales & Service Inc. 1144 N. Marr Rd. Columbus, IN 47201 812-372-4866

Evansville

Porter Barnes 4700 Jackson Ave. Evansville, IN 47715 812-479-0875

Goshen

Kindy Inc. 216 N. Main Goshen, IN 46526 219-533-7140

Indianapolis

Aid Electronics Service, Inc. 4721 N. Franklin Rd. Indianapolis, IN 46226 317-547-1384

Heathkit Electronic Center 2112 E. 62nd St Indianapolis, IN 46220 317-257-4321

Lafayette

Beesons TV 325 So. Sagamore Parkway Lafayette, IN 47905 317-447-6992

INDIANA (Cont'd.)

Marion

Gunyon Electronics 402 N. Branson St. Marion, IN 46952 317-664-4434

Rochester

Kline's TV & Appliance 126 E. 9th Rochester, IN 46975 219-223-4808

IOWA

Dubuque

Harold's Radio & Television Service Inc. 101 Main Dubuque, IA 52001 319-557-8653

Milford

Plagman TV 919 Okoboji Milford, IA 51351 712-338-2164

Shelby

Country Side TV RFD #1 Shelby, IA 51570 712-544-2653

Waterloo

Belle Business Systems 2036 E. Ridgeway Waterloo, IA 50702 319-232-7728

KANSAS

Kansas City

(Mission) Heathkit Electronic Center 5960 Lamar Ave. Mission, KS 66202 913-362-4486

Manhattan

Midwest Appl. Ctr., Inc. 624 Tuttle Creek Blvd. Manhattan, KS 66502 913-776-6650

Mankato

Don's Electronic Service 119 N. Commercial Mankato, KS 66956 913-378-3300

Mulvane

Mulvane Radio & TV Inc. 205 Main St. Mulvane, KS 67110 316-777-1041

KENTUCKY

Hebron

Northern KY Communication 512 Bullock Lane Hebron, KY 41048 606-689-7451

Louisville

Factory Elec. Svc. Corp. 3818 Cane Run Rd. Louisville, KY 40211 502-774-3286

Heathkit Electronic Center 12401 Shelbyville Rd. Louisville, KY 40243 502-245-7811

Key Systems Inc. 727 Executive Park Louisville, KY 40207 502-897-3332

Lyndon TV 8058 Lagrange Rd Louisville, KY 40222 502-425-7928

LOUISIANA

Metairie

Mc Cann Electronics 100 Division St. Metairie, LA 70001 504-837-7272

New Orleans

(Kenner) Heathkit Electronic Center 1900 Veterans Memorial Hwy. Kenner, LA 70062 504-467-6321

Kelton Video Service Inc. 3138 Paris Ave. New Orleans, LA 70119 504-944-2468

MARYLAND

Baltimore

Heathkit Electronic Center 1713 E. Joppa Rd. Baltimore, MD 21234 301-661-4446

Suburban Computer Service 7206 Harford Rd. Baltimore, MD 21234 301-444-6000

Ellicott City

Mel's TV & Elec., Inc. 20 Normandy Shopping Ctr. Ellicott City, MD 21043 301-465-5220

MARYLAND (Cont'd.)

Linthicum

Lee's TV & Elec. Svcs. 231 N. Hammonds Ferry Rd. Linthicum, MD 21090 301-789-8668

Rockville

Heathkit Electronic Center 5542 Nicholson Lane Rockville, MD 20852 301-881-5420

Silver Spring

Computer Age, Inc. 9433 Georgia Ave. Silver Spring, MD 20910 301-388-6565

MASSACHUSETTS

Boston

Ferranti-Dege Inc. 455 Brookline Ave. Boston, MA 02215 617-232-2550

(Peabody)

Heathkit Electronic Center 242 Andover St. Peabody, MA 01960 617-531-9330

(Wellesley)

Heathkit Electronic Center 165 Worcester Ave. Wellesley, MA 02181 617-237-1510

Cambridge

Bromley Engineering 883 Cambridge St. Cambridge, MA 02141 617-661-3144

Ferranti-Dege

1300 Massachusetts Ave. Cambridge, MA 02138 617-547-8600

Canton

Consumers' TV & Appl. Svc. 60 Shawmut Rd. Canton, MA 02021 617-828-6677

Charlestown

Computer City 175 Main St. Charlestown, MA 02129 617-242-3350

Chicopee

Custom Electronics Inc. 238 Exchange St. Chicopee, MA 01013 413-592-4761

MASSACHUSETTS (Cont'd.)

North Attleboro

Gemini Radio & TV 16 B. So. Washington St. No. Attleboro, MA 02760 617-695-7302

MICHIGAN

Detroit

Heathkit Electronic Center 18645 W. Eight Mile Rd. Detroit, MI 48219 313-535-6480

Heathkit Electronic Center 18149 E. Eight Mile Rd. E. Detroit, MI 48021 313-772-0416

Dearborn Heights

Mike's TV 20300 Vanborn Dearborn Heights, MI 48125 313-274-6160

Grand Rapids

Electronic City Svc. Co. 2039 S. Division Grand Rapids, MI 49507 616-452-0411

Kalamazoo

Bob Moore Television Inc. 2730 Portage St. Kalamazoo, MI 49001 616-381-4215

Lansing

Reilly Electronics, Inc. 901 Cleveland St. Lansing, MI 48906 517-485-9551

Lincoln Park

Sterling Electronics, Inc. 1477 Drive Lincoln Park, MI 48146 313-382-1111

Taylor

Mike's TV 20447 Vandorn Taylor, MI 48180 313-274-6160

Wayne

M&M Radio & TV Svc. 32328 Michigan Ave. Wayne, MI 48184 313-728-0618

MINNESOTA

Bloomington

Accudata, Inc. 9701 Penn Ave., #108 Bloomington, MN 55431 612-881-0623

Minneapolis

(Hopkins) Heathkit Electronic Center 101 Shady Oak Rd. Hopkins, MN 55343 612-938-6371

Reis Targo TV & Appl. Inc. 2206 4th Ave., South Minneapolis, MN 55404 612-870-7707

St. Louis

H & H TV & Electronics 2625 Louisiana Ave. S. St. Louis Park, MN 55426 612-929-1721

St. Paul

Heathkit Electronic Center 1645 White Bear Ave. St. Paul, MN 55106 612-778-1211

MISSISSIPPI

Tylertown

Blackwells TV 518 Bellak Ave. Tylertown, MS 39667 601-876-3771

MISSOURI

St. Louis

(Bridgeton)
Heathkit Electronic Center
3794 McKelvey Rd.
Bridgeton, MO 63044
314-291-1850

Kansas City

Red Bridge Electronics 3505 Red Bridge Rd. Kansas City, MO 64137 816-765-4131

Wornall TV & Electronics 8901 Washington Kansas City, MO 64114 816-333-6262

Maryland Heights

Broad Brother's Inc. 2037 Dorsett Village Maryland Heights, MO 63043 314-878-6565

MISSOURI (Cont'd.)

Mt. Vernon

Conway Enterprise Inc. 214 E. Business Loop Mt. Vernon, MO 65712 417-466-2580 or 2589

St. Joseph

Euler Television, Inc. 3111 N. Belt Hwy St. Joseph, MO 64506 816-279-1212

St. Louis

Bell Radio TV Serv., Inc. 4829 Goodfellow Blvd. St. Louis, MO 63120 314-383-1212

Miller Electronics, Inc. 2926 Telegraph Rd. St. Louis, MO 63125 314-487-2733

Z-Data Systems Svc. Co. 9669 Page St. Louis, MO 63132 314-427-1617

MONTANA

Great Falls

Tom's TV Rt. 1 West, Box 236D Great Falls, MT 59403 406-761-2006

NEBRASKA

Geneva

Lichti TV & Appl., Inc. P.O. Box 203 Geneva, NE 68361 402-759-3179

Norfolk

Empire Electronics, Inc. 303 N 4th St. Norfolk, NE 68701 402-371-6870

Ogallala

Home Electronic Svc. Co. Box 657 - 112 W. 1st Ogallala, NE 69153 308-284-2025

Omaha

Heathkit Electronic Center 9207 Maple St. Omaha; NE 68134 402-391-2071

NEVADA

Sparks

Olander's 655 Greenbrae Rd. Sparks, NV 89431 702-358-2690

NEW JERSEY

Dover

A.B.C. Electronics 84 N. Sussex St. Dover, NJ 07801 201-361-8932

Edison

ACA TV & Electronics, Inc. 2076 Woodbridge Ave. Edison, NJ 08817 201-985-7000

Fairfield

Peripheral Maint, Inc. 16 Passaic Ave. Unit 6 Fairfield, NJ 07006 201-227-8411

Fair Lawn

Heathkit Electronic Center 35-07 Broadway (Rt. 4) Fair Lawn, NJ 07410 201-791-6935

Hawthorne

Volt Laboratories, Inc. 1244 Mc Bride Ave. Hawthorne, NJ 07507 201-785-9364

Howell

South Jersey TV Svc. Inc. 2347 Route #9 Howell, NJ 07731 201-363-5550

Lakehurst

Naval Air Engineering Center Building 410 NAEC Lakehurst Lakehurst, NJ 08733 201-323-7738

Maplewood

J. C. Electronics Inc. 2001 Springfield Ave. Maplewood, NJ 07040 201-763-4970

Newark

Electronic Svcs. Unitd. 260 Washington St. Newark, NJ 07102 201-624-0568

NEW JERSEY (Cont'd.)

Ocean

Heathkit Electronic Center 1013 State Hwy. 35 Ocean, NJ 07712 201-775-1231

Paramus

Aveco, Inc. 171 Route 4 Paramus, NJ 07652 201-845-3360

Secaucus

Zenith Distributing 200 Meadowland Parkway Secaucus, NJ 07094 212-330-9000

NEW YORK

Brooklyn

AAA Installation & Maintenance 408 Dewitt Ave. Brooklyn, NY 11207 212-649-8300

Circle TV Lab., Inc. 1008 Utica Ave. Brooklyn, NY 11203 212-345-5656

Whirlaway Appliance Svc. 455 Kings Highway Brooklyn, NY 11223 212-339-8279

Urban Video Corp. 234 Brighton Beach Ave. Brooklyn, NY 11235 212-769-5500

Bronx

Best-Vue Service Corp. 2307 White Plains Rd. Bronx, NY 10467 212-882-5542

Buffalo

(Amherst) Heathkit Electronic Center 3476 Sheridan Dr. Amherst, NY 14226 716-835-3090

Cohoes

Sawyer Elec. Co., Inc. 141 Remsen St. Cohoe³, NY 12047 518-237-2206

Coram

Delman TV Service, Inc. 270 Middle Country Rd. Coram, NY 11727 516-698-1600

NEW YORK (Cont'd.)

Flushing

DAC Data Systems 43-67 147 St. Flushing, NY 11355 212-358-9400

Hicksville

Accurate TV Co., Ltd. 25 Bloomingdale Rd. Hicksville, NY 11801 516-681-9444

Jericho, LI

Heathkit Electronic Center 15 Jericho Turnpike Jericho, LI, NY 11753 516-334-8181

Kingston

E.L.S. Video Corp. Kings Mall, Route 9W Kingston, NY 12401 914-336-5241

Newburgh

CSI Electronic Svc., Inc. 1134 Union Ave. Newburgh, NY 12550 914-564-4300

Plainview

Datamedic Corporation 303 Sunnyside Blvd. Plainview, NY 11803 516-349-1133

Richmond Hill

Planet Electronics Corp. 88-04 102nd St. Richmond Hill, NY 11418 212-847-1000

Rochester

Heathkit Electronic Center 937 Jefferson Rd. Rochester, NY 14623 716-424-2560

White Plains

(N. White Plains)Heathkit Electronic Center7 Reservoir Rd.N. White Plains, NY 10603 914-761-7690

Yonkers

Bryn Mawr TV & Elec., Inc. 334 S. Broadway Yonkers, NY 10705 914-965-4248

NORTH CAROLINA

Winston-Salem

Accu-Tek 3070 Healy Dr. Winston-Salem, NC 27103 919-768-2149

OHIO

Cincinnati

Amer. Trans Vision Corp. 11387 Landan Lane Cincinnati, OH 45246 513-771-2901

Applied Data Management 435 Dayton St. Cincinnati, OH 45214 513-579-8899

(Woodlawn) Heathkit Electronic Center 10133 Springfield Pike Woodlawn, OH 45212

513-771-8850

Knodel-Tygrett 3250 Spring Grove Ave. Cincinnati, OH 45225 513-591-2000

Cleveland

Heathkit Electronic Center 78100 Chagrin Blvd. Cleveland, OH 44122 216-292-7553

Columbus

Amateur Radio Sales & Service 2187 E. Livingston Ave. Columbus, OH 43209 614-236-1625

Heathkit Electronic Center 2500-Morse Rd. Columbus, OH 43229 614-475-7200

Cuyahoga Falls

Cuy-Tech Inc. 1013 Portage St. Cuyahoga Falls, OH 44221 216-929-1799

Parma

Electra-Sound, Inc. 6076 State Rd. Parma, OH 44134 216-888-4200

OHIO (Cont'd.)

Toledo

Heathkit Electronic Center 48 S. Byrne Rd. Toledo, OH 43615 419-537-1887

Toledo TV 5115 Lewis Toledo, OH 43612 419-476-2004

Xenia

W. S. Electronics 334 W. Church St. Xenia, OH 45385 513-376-4348

OKLAHOMA

Oklahoma City

Harry's TV & Sound Center 2101 W. Hefner Rd. Oklahoma City, OK 73120 405-755-4000

Heathkit Electronic Center 2727 Northwest Expressway Oklahoma City, OK 73112 405-848-7593

Tulsa

B&J Lek-Tronic Svc., Inc. 3127 S. Sheridan Tulsa, OK 74145 918-665-0533

OREGON

Beaverton

Computer Development Inc. 6700 S.W. 105th Beaverton, OR 97005 503-646-1599

Mt. Angel

Tony's TV Service 140 E. Charles St. Mt. Angel, OR 97362 503-845-2858

Portland

Electrical Distributing Inc. P.O. Box 2720 140 N.W. 14th Portland, OR 97209 503-226-4044

Electromatic, Inc. 6110 NE Union Ave. Portland, OR 97211 503-282-7751

OREGON (Cont'd.)

Mc Cray Enterprises 7215 NE Sandy Blvd. Portland, OR 97213 503-288-5356

Portland Electronics Co. 4505 SE Belmont St. Portland, OR 97215 503-234-8065

PENNSYLVANIA

Frazer

(Chester County)
Heathkit Electronic Center
630 Lancaster Pike (Rt. 30)
Chester County, PA 19355
215-647-5555

Philadelphia

Heathkit Electronic Center 6318 Roosevelt Blvd. Philadelphia, PA 19149 215-288-0180

Peirce-Phelps (VDS) 2000 N. 59th St. Philadelphia, PA 19131 215-879-7181

S&S TV Service, Inc. 4314 Megargee St. Philadelphia, PA 19136 215-331-3400

Mercury TV Svc. Co. 6844 Bustleton Ave. Philadelphia, PA 19149 215-331-2123

Tesco, Inc. 9237 Roosevelt Blvd. Philadelphia, PA 19114 215-677-5000

Pittsburgh

Heathkit Electronic Center 3482 Wm. Penn Hwy. Pittsburgh, PA 15235 412-824-3564

Laurence TV, Inc. 1513 Forbes Ave. Pittsburgh, PA 15219 412-391-2220

PENNSYLVANIA (Cont'd.)

St. Marys

Radaelli TV 481 Brussels St. Marys, PA 15857 814-781-1554

RHODE ISLAND

Providence

(Warwick)
Heathkit Electronic Center
558 Greenwich Ave.
Warwick, RI 02886
401-738-5150

TENNESSEE

Hendersonville

Harold's TV 115A Stadium Dr. Hendersonville, TN 37075 615-824-0096

Knoxville

Warren's Audio-Video Svc. 2540 Sutherland Ave. Knoxville, TN 37919 615-546-1121

Morristown

Briggs TV, Inc. 1120 S. Cumberland Morristown, TN 37814 615-586-7901

TEXAS

Amarillo

Al TV Service 5610 I-40 West Amarillo, TX 79106 806-352-8571

Dallas

Heathkit Electronic Center 2715 Ross Ave. Dallas, TX 75201 214-826-4053

El Paso

Bueno Video 670 Alameda Ave. El Paso, TX 79905 915-772-6624

Houston

Heathkit Electronic Center 1704 W. Loop N. Houston TX 77008 713-869-5263

TEXAS (Cont'd.)

Mc Allen

Mc Allen Television Co. 314 S. 16th St. Mc Allen, TX 78501 512-682-4295

San Antonio

Computers, Etc., Inc. 642A West Rhapsody San Antonio, TX 78216 512-340-1471

Heathkit Electronic Center 7111 Blanco Rd. San Antonio, TX 78216 512-341-8876

Post TV & Appliance Inc. 6740 San Pedro San Antonio, TX 78216 512-824-7581

Webster

Douglas Electronics 1578 Hwy. 3M Webster, TX 77598 713-486-1616

UTAH

Salt Lake City

(Midvale) Heathkit Electronic Center 58 E. 7800 South Midvale, UT 84047 801-566-4626

VERMONT

Burlington

Vermont Hardware Co., Inc. 180 Flynn Ave. Burlington, VT 05401 802-864-6835

VIRGINIA

Alexandria

Heathkit Electronic Center 6201 Richmond Hwy. Alexandria, VA 22303 703-765-5515

Arlington

Dumas Electronic Co. 3508 Lee Highway Arlington, VA 22207 703-524-9815

597-2330 2nd edition

VIRGINIA (Cont'd.)

Newport

Warwick Electronics 10723 Jefferson Ave. Newport, VA 23601 703-595-5491

Norfolk

(Virginia Beach)
Heathkit Electronic Center
1055 Independance Blvd.
Virginia Beach, VA 23455
804-460-0997

WASHINGTON

Seattle

A Admiral TV 5953 California SW Seattle, WA 98136 205-937-5544

Harry's Radio & TV 2205 4th Ave. So. Seattle, WA 98134 206-622-2301

Heathkit Electronic Center 505-8th Ave. N. Seattle, WA 98109 206-682-2172

Loyal Heights TV 7735 24th N.W. Seattle, WA 98117 206-783-9744

Magnolia Microsystems 2812 Thorndyke Ave., West Seattle, WA 98199 206-285-7266

Spokane

AMFAC Electric Supply Co. 3420 E. Ferry Ave. Spokane, WA 99202 509-534-0611

Solid State Services 1604 N. Smith St. Spokane, WA 99207 509-534-8088

WEST VIRGINIA

Clarksburg

Allman Electronics Lab Rt. 4, Box 503 Clarksburg, WV 26301 304-623-1597

Vienna

Buds Sales & Service 821 23rd St. Vienna, WV 26105 304-295-4151

WISCONSIN

Big Bend

Cisler's TV P.O. Box 127 Big Bend, WI 53103 414-662-2866

Eau Claire

Erickson's TV 3335 London Rd. Eau Claire, WI 54701 715-832-7143

La Crosse

Wellstein & Sons 215 N. 3rd St. La Crosse, WI 54601 608-784-6868

Milwaukee

Heathkit Electronic Center 5215 W. Fond du Lac Milwaukee, WI 53216 414-873-8250

Star Television & Appliance 514 W. Lincoln Ave, Milwaukee, Wt 53207 414-672-1242

Ripon

Paul's TV 646 Douglas, P.O. Box 37 Ripon, WI 54971 414-748-7500

