WANG

1502

CUSTOMER ENGINEERING SERVICE HANDBOOK

2200

729-1097-A

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729-1097-A

Preface

The 2200 Service Handbook gives concise information to assist customer engineers in rapid information retrieval for the majority of 2200 System computer service needs at customer sites.

Second Edition (February 1984)

This edition updates and revises information for VP, SVP, MVP/MVPA/MVPC, and LVP/LVPC systems.

2200
DOCUMENT REVISION STATUS

PAGE	DATE
iii through vi	Changed Issue 09-30-83
2V-1 through 2V-102	Changed Issue 09-30-83

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REFERENCE DOCUMENTS

All Models

WLI No.	Title
729-0551	Field Level Maintenance Guide 2200 (03-0063)
729-0583	Model 2200VP/2600 Field-Level Maintenance Manual, Volume 1
729-0583-1	Model 2200VP/2600 Field-Level Maintenance Manual, Volume 2
729-0584	Model 2200MVP Maintenance Manual (03-0071-1)

REFERENCE DOCUMENTS

All Models

WLI No.	Title
729-0935	2200SVP Computer Product Maintenance Manual
729-0935-1	PSN: Update to 729-0935
729-0602	2200LVP Product Maintenance Manual

OPERATING SYSTEM SOFTWARE PACKAGES

All Models

Model	Rel.	Diskette WLI No.
VP	2.6	195-0033-3
MVP	2.5	195-0049-3
SVP	2.6	195-2163-5
LVP	2.5	195-2162-5

DIAGNOSTIC PACKAGES

VP/MVP

WLI No.	Title
702-0138A	2200 CPU Diagnostics
702-0128A	2200 General Disk Exerciser*
702-0146A	2200 Multi-Disk Exerciser*
702-0119	2221W Line Printer Diagnostic*
702-0097A	2228D T/C Diagnostic Rev. 1 Boards*
702-0097C	2228D T/C Diagnostic Rev. 2 Boards and Up*
195-2685-3	2228 D/E/F Power-Up Error Interpreter*
195-2607-3	2228E/F T/C Diagnostic
702-0145	2235 Dot Matrix Printer*
702-0118	2236 DE/DW "QA" Diagnostic with System*

*Also included in the LVP/SVP System Exerciser (732-0002C).

DIAGNOSTIC PACKAGES

VP/MVP

WLI No.	Title
702-0173	2245 Dot Matrix Printer*
702-0078	Mass Storage Diagnostic
702-0109A	850/Winchester VCO Adjustment*
702-0110A	850/851/DSDD Disk Alignment*
702-0194A	Universal Keyboard Test
195-2551-3	Kennedy Tape Diagnostic

*Also included in the LVP/SVP System Exerciser (732-0002C).

DIAGNOSTIC PACKAGES

SVP/LVP

WLI No.	Title
732-0002C	LVP/SVP System Exerciser
732-0010A	2200 CPU Diagnostics
732-0008A	2200 General Disk Exerciser*
732-0013A	2200 Multi-Disk Exerciser*
732-0006	2228D T/C Diagnostic Rev. 1 Boards*
732-0012	2236 DE/DW "QA" Diagnostic with System*
732-0003A	850/Winchester VCO Adjustment*
732-0004A	850/851 DSDD Disk Alignment*
732-0009A	LVP/SVP Phase Lock Loop Adjustment*

*Also included in the LVP/SVP System Exerciser.

MODEL SPECIFICATIONS

VP/VPA

DATA MEMORY OPTIONS

Model	Memory Size (KBytes)
2200VP-1	16
2200VP-2	32
2200VP-3	48
2200VP-4	64

MODEL SPECIFICATIONS

MVP/MVPA/MVPC

DATA MEMORY OPTIONS (CONT)

Model	Memory Size (KBytes)
2200MVP-4	16
2200MVP-8	32
2200MVP-12	48
2200MVP-16	64
2200MVP-24	96
2200MVP-32	128
2200MVP-48	192
2200MVP-64	256
2200MVPC-16	64
2200MVPC-32	128
2200MVPC-48	192
2200MVPC-64	256
2200MVPC-96	384
2200MVPC-128	512

MODEL SPECIFICATIONS

SVP/LVP/LVPC

DATA MEMORY OPTIONS (CONT)

Model*	Memory Size (K-Bytes)
2200SVP-8	32
2200SVP-16	64
2200SVP-32	128
2200LVP-8	32
2200LVP-16	64
2200LVP-32	128
2200LVP-64	256
2200LVPC-16	64
2200LVPC-32	128
2200LVPC-48	192
2200LVPC-64	256
2200LVPC-96	384
2200LVPC-128	512

*Letter following model number indicates option:

Option Codes

(All 1 MByte diskette plus the following:)
X - -
A - 1-Mbyte diskette
B - one 2-Mbyte Winchester drive
C - one 4-Mbyte Winchester drive
D - one 8-Mbyte Winchester drive
E - one 20-Mbyte Winchester drive
F - one 40-Mbyte Winchester drive

MODEL SPECIFICATIONS

All Models

NOTE

PCBs 7588 and 7588-1 can only be used in a chassis with 210-7498 or 210-6798 E-Rev 3 motherboards.

CONTROL MEMORY OPTIONS

Model	Slot 1 (KBytes)	Slot 2 (KBytes)	Memory (KBytes)
VP	8	8	16
VP	16	(open)	16
SVP	16	na	16
SVP	32	na	32
MVP/MVPA	12	8	20
MVP/MVPA	32	(open)	32
MVPC	32	32	64
LVP	32	(open)	32
LVPC	32	32	64

MODEL SPECIFICATIONS

VP/VPA/MVP/MVPA/MVPC

SYSTEM UPGRADE DIFFERENCES

VP	MVP	Item
210-6793	210-6793-1	Registers
210-6788	210-6788-1	Control Memory
--	177-3236-1 (289-0029)	2236MXD Controller

VP/MVP	VPA/MVPA	Item
--	270-0452	Chassis
--	210-7397	Regulator

MVP/MVPA	MVPC	Item
--	270-0465	Chassis
210-6790	210-7797	Instruction Counter
--	210-7796	Extended Memory *
	210-6791-1	Stack

*210-7796 installed between control memory and data memory PCBs.

MODEL SPECIFICATIONS

LVP/LVPC

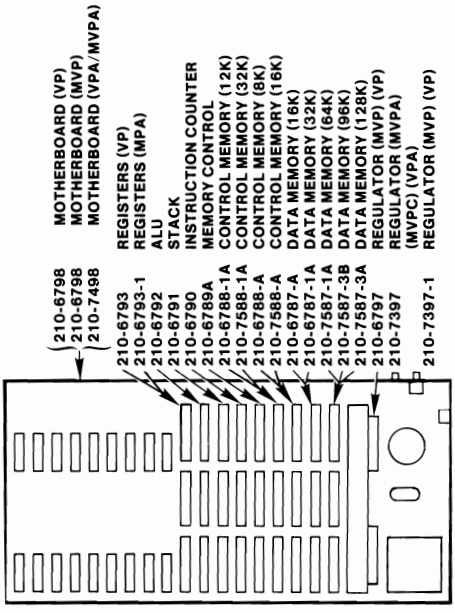
SYSTEM UPGRADE DIFFERENCES (CONT)

LVP	LVPC	Item
--	270-0467	Chassis
210-7698 (3 I/O slot) 210-7699 (9 I/O slot)	210-7799	Motherboard
210-6790	210-7797	Instruction Counter
--	210-7796	Extended Memory *
--	210-8794	Disk Interface
--	210-6791-1	Stack

*210-7796 installed between control memory and data memory PCBs.

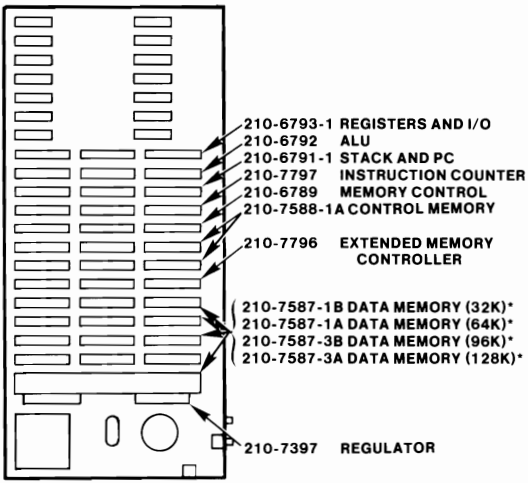
PCB COMPLEMENTS

VP/VPA/MVP/MVPA



PCB COMPLEMENTS

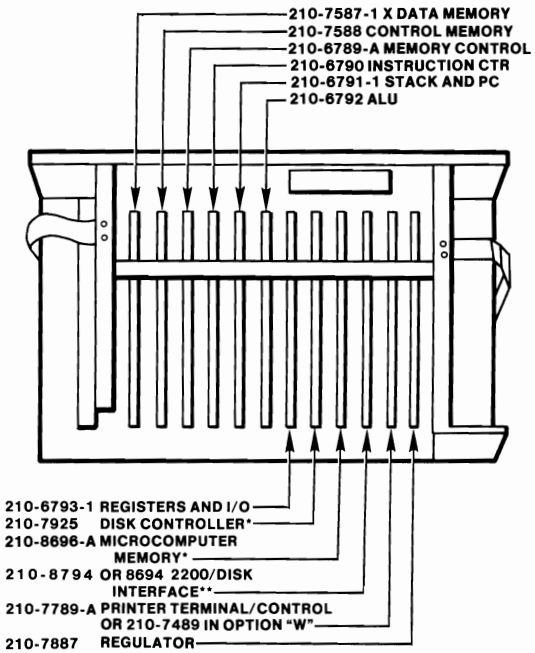
MVPC



*VARIOUS COMBINATIONS OF BOARDS POSSIBLE (CONFIGURATION DEPENDENT).

PCB COMPLEMENTS

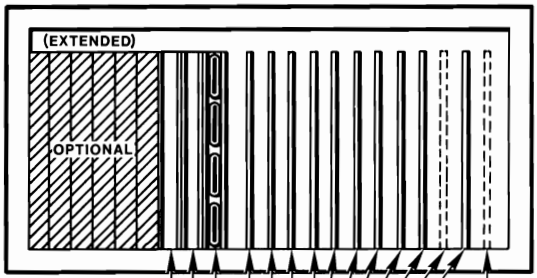
SVP



* SLOTS VACANT IN SINGLE-DPU BOARD MODEL.
** 210-7890-A IN SINGLE DPU MODEL.

PCB COMPLEMENTS

LVP



CONTROLLERS
TELECOM.
210-7630

DISK
210-6541-2

MXD
(4 TERM.)
177-3236-1

DPU DISK INTERFACE
210-8694

DPU MICROCOMPUTER
210-8696-A

DPU DISK CONTROLLER
210-8695-A

REGISTERS
210-6793-1

DATA MEMORY
(EXPANSION)
210-7587-XX*

CONTROL MEMORY
(EXPANSION)
210-7588-1A

MEMORY CONTROLLER
210-6789-A

INSTRUCTION COUNTER
210-6790

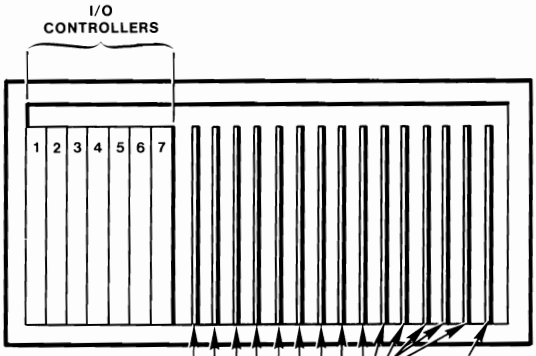
STACK & PC
210-6791

ALU
210-6792

*210-7587-1A, 1B, 3A, OR 3B

PCB COMPLEMENTS

LVPC



*210-7587-1A, 1B, 3A OR 3B

PCB COMPLEMENTS

VP/MVP/LVP

I/O OPTIONS

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2201	Output Writer	X	-	-
2201L	Character Printer	X	X	X
2202	Plotting Output Writer	X		
2203	Punched Tape Reader	X	-	-
2207A	RS-232-C I/O Interface with Selectable Baud Rate	X	-	-
2209	Nine-Track Mag. Tape Drive	X	-	-
2209AV	Nine-Track Mag. Tape Drive	X	X	X
	(1600 BPI-PE)	X	X	X
2210B	CRT/Keyboard/ Minidiskette	X	-	-
2211M	Printer Multiplexer	X	X	X
2212	Analog Flatbed Plotter	X	-	-
2215	Basic Keyword Keyboard	X	-	-

PCB COMPLEMENTS

VP/MVP/LVP

I/O OPTIONS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2216A	Executive Video Display	X	-	-
2221	Line Printer	X	X	X
2221W	Matrix Line Printer	X	X	X
2222	Alphanumeric Typewriter Keyboard	X	-	-
2223	Alphanumeric Basic Keyword Keyboard	X	-	-
2226A,B	Combination Video Display, u/l-case Keyword Keyboard	X	-	-
2227B	Buffered Asynchronous Communications Controller	X	X	X
2228B,C,D	Binary Synchronous Communications Controller	X	X	X
2230-1,2,3	Fixed/Removable Disk Drive	X	-	-
2230MXA	Master Daisy Chain Disk Mux Controller	X	X	X
2230MXB	Slave Daisy Chain Disk Mux Controller	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O OPTIONS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2231	Line Printer	X	X	X
2231W-1,2,6	Matrix Line Printers	X	X	X
2231W-3	Aux. Printer for the 2282 Graphics Terminal	X	X	X
2232A/B	Digital Flatbed Plotter	X	X	X
2233	Matrix Line Printers	X	X	X
2234,34A	Hopper-Feed Punched Card Reader	X	-	-
2235	Matrix Line Printer	X	X	X
2236D,DE,DW	Interactive Terminal	X	X	X
2336DE,DW	Interactive Terminal	X	X	X
2240-1,-2	Dual Removable Flexible Disk Drive	X	X	X
2241	Thermal Printer	X	X	X
2242	Single Removable Flexible Disk Drive	X	-	-
2243	Triple Removable Flexible Disk Drive	X	-	-
2244,44A	Hopper-Feed, Mark-Sense Punched Card Reader	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O OPTIONS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2245	Matrix Line Printer	X	X	X
2251	Matrix Line Printer	X	X	X
2252,2252A	Scanning Input Interface	X	-	-
2254	IEEE 488 Interface	X	-	-
2260,60BC,60C	Fixed/Removable Disk Drives	X	X	X
2261,61W	Matrix Line Printer (240 lpm)	X	X	X
2270	Removable Diskette Disk Drive	X	-	-
2270A-1,-2,-3	IBM 3740-Compatible Diskette Drive	X	X	X
2271,2271-P	Bidirectional Output Writer	X	X	X
2272-1,-2	Triple Pen Drum Plotter	X	X	X
2273	Band Printer	X	X	X
2280-1,-2,-3	Fixed Removable Disk Drive (Phoenix)	X	X	X
2281	Daisy Output Writer	X	X	X
2281P	Daisy Plotting Output Writer	X	X	X
2281W	Wang Daisy Output Writer	X	X	X
2282	Graphics CRT Plotter	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2201	210-6741	X	-	-
	210-7042	X	-	-
2201L	210-7079	X	X	X
	212-3012	X	X	X
	210-7042 (was 6742)	X	-	-
	210-7342	X	X	X
2202	210-6741	X	-	-
	210-7042 (was 6742)	X	-	-
2203	210-6374	X	-	-
2209	210-6394	X	-	-
2209AV	212-2209A	X	X	X
2212	210-7042 (was 6742) 210-6741	X	-	-

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2221	210-6741	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-6379 (was 6329)	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
	210-6742	X	-	-
2221W	210-6379	X	X	X
	210-6741	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
	210-6742	X	-	-
2226	210-7042 (was 6742)	X	-	-
	210-6741	X	-	-
	212-2216	X	-	-
2226B	210-7042 (was 6742)	X	-	-
	210-6741	X	-	-
	212-2216	X	-	-

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2227B	177-2227-B or 289-0128	X	X	X
2228B	177-2228-B	X	X	X
2228C	177-2228-C	X	X	X
2228D	212-2228-D	X	X	X
2230-1, -2,-3	210-6375	X	-	-
	212-3012	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	-	-
	210-6541	X	-	-
	210-6741	X	-	-
	210-6742	X	-	-
	210-7342	X	-	-
2230MXA	187-2225-A	X	X	X
2230MXB	187-2225-B	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2231	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2231W	210-7042-A	X	-	-
-1,2,6	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2231W-3	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2232A,B	210-6561	X	X	X
2233	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2234,34A	210-6534 (was 6225)	X	-	-
2235	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2236D,DE, DW	177-3236-1	-	X	X
	212-3012	X	X	X
2336 DE,DW	177-3236-1	-	X	X
	212-3012	X	X	X
2240-1-2	210-6375	X	X	X
	210-6541	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2241	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2242	210-6375	X	X	X
	210-6541	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
	210-7042-2	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2243	210-6741	X	-	-
	210-7042 (was 6742)	X	-	-
	210-6541-1	X	-	-
	210-6541-2	X	X	X
2244,44A	210-6534-A (was 6522)	X	-	-
2245	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2251	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	212-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2252,2252A	210-6533	X	-	-
2260	210-6541	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2260BC,C	212-2260C2	X	X	X
	212-2260C5	X	X	X
	212-2260C1	X	X	X
	212-2260C4	X	X	X
	212-2260C	X	X	X
	212-2260C3	X	X	X
2261,61W	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2262-1,2,3	210-6533	X	-	-
	210-6592	X	-	-
2270	210-6541	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2270A1,2,3	210-6541-2	X	X	X
	210-7342	X	X	X
	210-3012	X	X	X
2271	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	210-3012	X	X	X
2272-2	210-6379	X	X	X
	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2273	210-6741	X	-	-
	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2280-1,2,3	210-6541-2	X	X	X
	210-3012	X	X	X
2281	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER BOARD COMPLEMENTS (CONT)

Option	WLI No.	VP VPA	MVP MVPA MVPC	LVP LVPC
2281P	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2281W	210-7042-A	X	-	-
	210-7042-2	X	X	X
	210-7079	X	X	X
	210-7342	X	X	X
	212-3012	X	X	X
2282	210-6742	X	-	-
	210-7042-A	X	-	-
	210-7042-2	X	X	X

PCB COMPLEMENTS

VP/MVP/LVP

I/O CONTROLLER MOTHER/DAUGHTER ASSEMBLIES

Assy WLI No.	Daughterboard	Motherboard
212-3012	210-2816A	210-7515
212-2209A	210-7142	210-7141
212-2216-A6	210-6312A	210-6529-1A
212-2216-B6	210-7011	210-7010A
212-2228-D	210-7659-A	210-7658A
212-2260C	210-7487A	210-7686
212-2260C1	210-7487B	210-7686
212-2260C2	210-7487C	210-7686
212-2260C3	210-7487A	210-7688
212-2260C4	210-7487B	210-7688
212-2260C5	210-7487C	210-7688

SWITCH SETTINGS

All Models

DEVICE ADDRESSING*

Device	Address(es)
Keyboards	001, 002, 003, 004
CRT Units	005, 006, 007, 008
Tape Cassette Units	10A, 10B, 10C, 10D, 10E, 10F
Printers	215, 216
Disk Units	310, 320, 330
Card Reader	517
Hopper-Feed Card Readers	628
Paper Tape Readers	618
Teletype	019, 01A, 01B Input; 01D, 01E, 01F Output

* Each device has unique address. System with one class of device uses first device address for class. Additional devices of that class have addresses sequentially assigned. After setting device address, use pencil to print hex address next to switches.

SWITCH SETTINGS

All Models

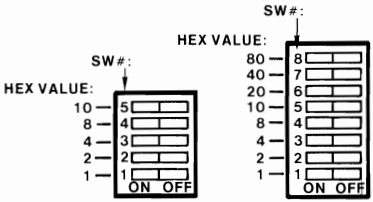
DEVICE ADDRESSING (CONT)

Device	Address(es)
Teletype Tape Units	41D, 41E, 41F
Telecommunications Output	01C, 01D, 01E, 01F
Parallel I/O Interface	23A, 23C, 23E Input; 23B, 23D, 23F Output
BCD Input Interface	25A, 25B, 25C, 25D, 25E, 25F
Digitizer	25A, 25B, 25C, 25D, 25E, 25F
Nine-Track Tape Unit	07B, 07D, 07F
22C32 MVP/LVP Triple Controller	00 (first terminal) 40 (fifth terminal) 80 (ninth terminal) C0 (13th terminal)

SWITCH SETTINGS

All Models*

ADDRESS SETTING ON PERIPHERAL DEVICE I/O CONTROLLER BOARDS



* Except SVP and LVP.

SWITCH SETTINGS

All Models*

CONTROLLER ADDRESS VALUES

	Switch Numbers
High order:	8 7 6 5
Low order:	4 3 2 1
(Hex)	(Binary)
0	0 0 0 0
1	0 0 0 1
2	0 0 1 0
3	0 0 1 1
4	0 1 0 0
5	0 1 0 1
6	0 1 1 0
7	0 1 1 1
8	1 0 0 0
9	1 0 0 1
A	1 0 1 0
B	1 0 1 1
C	1 1 0 0
D	1 1 0 1
E	1 1 1 0
F	1 1 1 1
High order value:	80 40 20 10
Low order value:	8 4 2 1

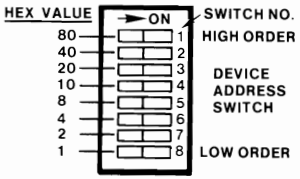
Where 1 =ON, 0 =OFF

* Except SVP

SWITCH SETTINGS

All Models

2200/DISK INTERFACE (DPU), WLI NO. 210-8694



SWITCH SETTINGS

SVP/LVP/LVPC

MICROCOMPUTER/MEMORY WLI NO. 210-8696-X*

Configuration	Switches 1 2 3 4 5 6 7 8
Diskette drive only**	1 1 0 1 1 0 1 1
2/4MB Winchester only**	1 1 0 0 1 1 1 1
8MB Winchester only**	1 0 0 1 1 1 1 1
2/4MB Winchester and diskette drive	1 1 0 0 1 0 1 1
8MB Winchester and diskette drive	1 0 0 1 1 0 1 1
16MB Quantum and Diskette	1 1 0 1 1 0 1 0
32MB Quantum and Diskette	1 0 0 1 1 0 1 0
Removable drive only**	1 1 0 1 1 0 1 1
Fixed diskette drive only	1 0 0 0 1 1 1 1
Fixed and removable diskette drives	1 0 0 0 1 0 1 1

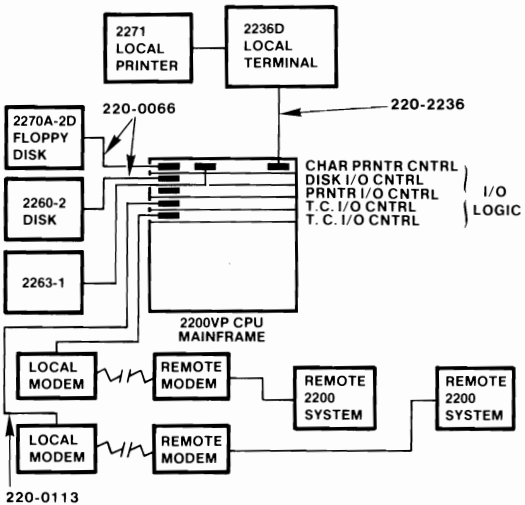
* -A for 4 or 8MB; -B for 2 or 8MB Winchester disk drives.

** For test purposes only.

CABLING

VP/VPA

VP/VPA CONFIGURATION

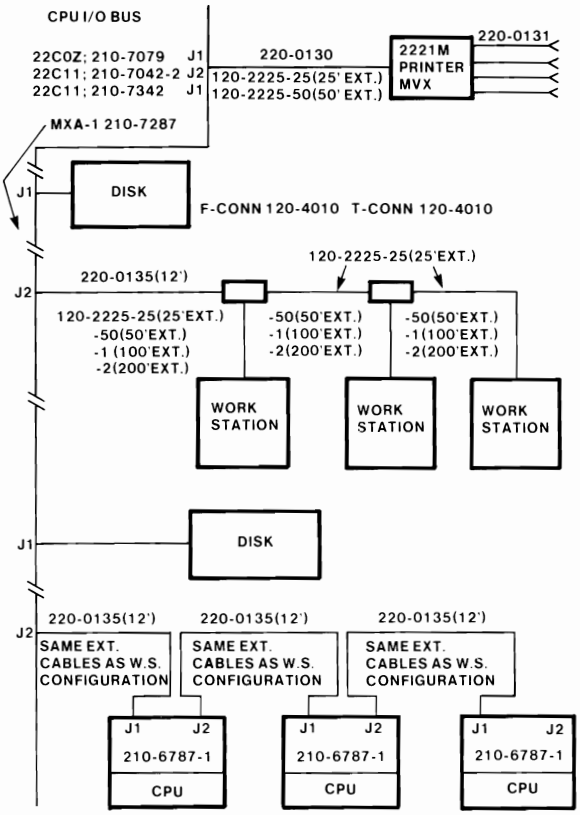


CABLING

MVP/MVPA/MVPC

MVP CONFIGURATION

Multiplexer Interface

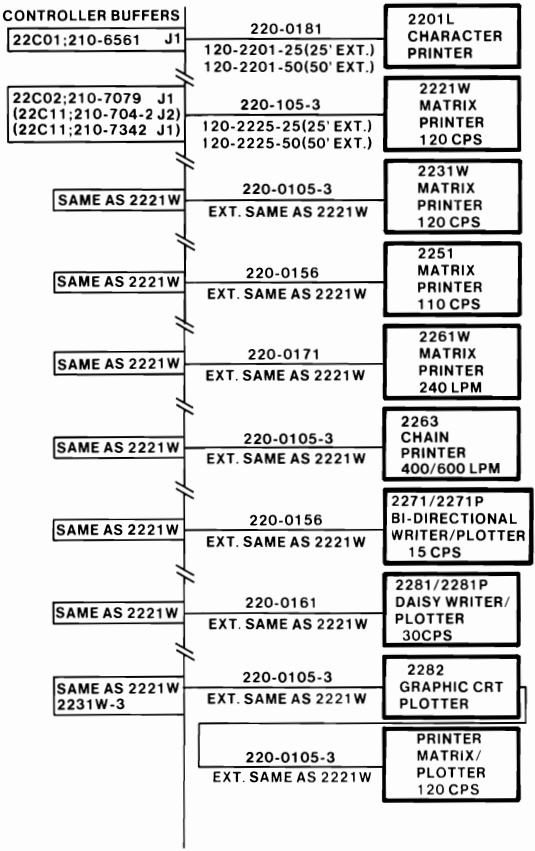


CABLING

MVP/MVPA/MVPC

MVP CONFIGURATION (CONT)

Printer Interface

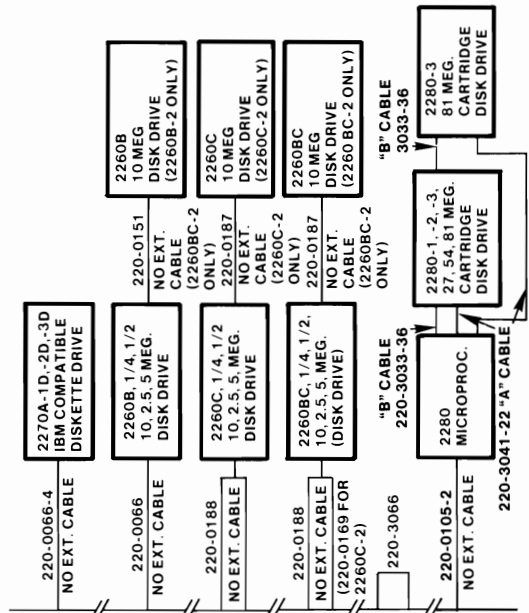


CABLING

MVP/MVPA/MVPC

MVP CONFIGURATION (CONT)

Disk Interface

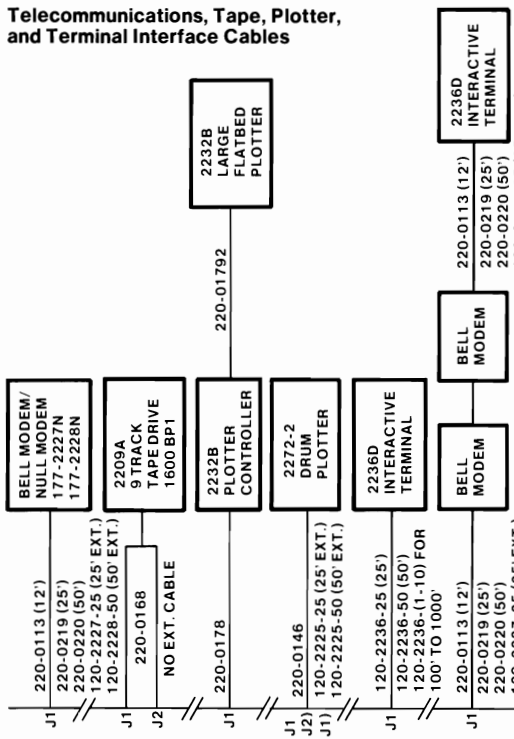


CABLING

MVP/MVPA/MVPC

MVP CONFIGURATION (CONT)

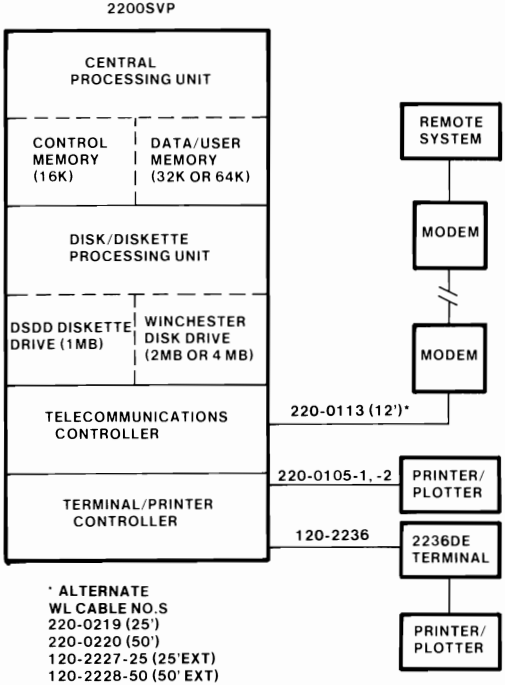
Telecommunications, Tape, Plotter, and Terminal Interface Cables



CABLING

SVP

SVP CONFIGURATION

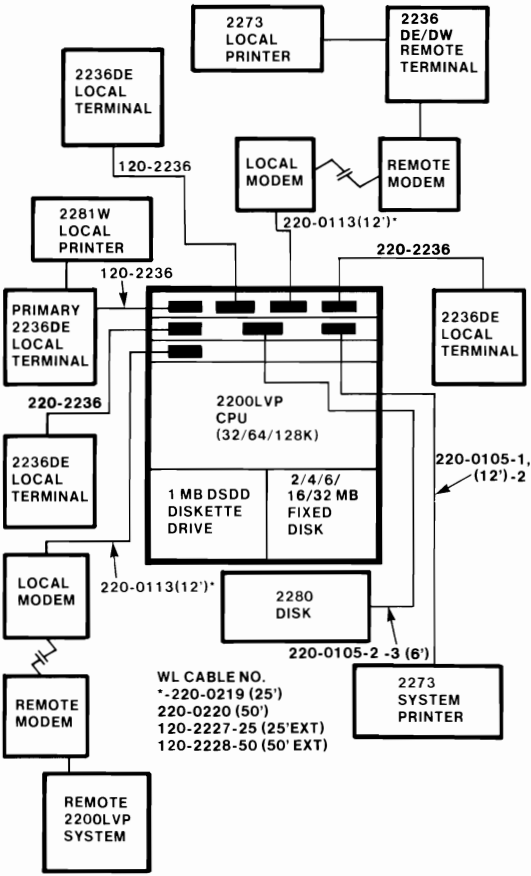


* ALTERNATE
WL CABLE NO.S
220-0219 (25')
220-0220 (50')
120-2227-25 (25'EXT)
120-2228-50 (50' EXT)

CABLING

LVP/LVPC

LVP CONFIGURATION



PROMS

All Models

PCB WLI No.	Description	Model/ Application	Part No.	Location
210-6789-A*	Memory Control	All Models	378-2045 R4	L24
			378-2046 R4	L25
			378-2047 R4	L26
210-7789-A	Terminal/Printer Controller	SVP	378-4093 R1	L43
			378-4092 R1	L44
210-8695 and 210-7925	Disk Controller	LVP	378-4224 R2	L1
			378-4225 R0	L2
			378-2560 R1	L3
210-8696	Microcomputer	LVP	378-4223 R8 (or 378-4230 R9)	L26
			378-4222 R9	L27
			378-4221 R9	L28
			378-4220 R9	L29
210-7890	Dual DSDD Diskette	SVP, LVP	378-4260 R2	L14
			378-6002 R2	L15

*210-6789 PROMs must have same rev. level.

MAJOR FUNCTIONS ON BOARDS

All Models

WLI No. 210-6793-1

- Registers and I/O
- K Register
- Address Bus
- I/O Clock Generator

WLI No. 210-6792

- ALU Function Decoder
- RAM Data In Register
- System Timing

WLI No. 210-6791

- Stack and PC Subroutine and Stack Register
- PC Registers
- Mini-Instruction Decoder

WLI No. 210-6790 or 210-7797

- Instruction Counter
- IC Register
- Refresh Counter
- Memory Bank Select
- Wolf Trap

WLI No. 210-7796

- Extended Memory Control
- Memory Select to Additional 256K

MAJOR FUNCTIONS ON BOARDS

All Models

WLI No. 210-6789

- Memory Control
- Instruction Decoder Register
- RAM Data Out Register
- Bootstrap PROMs
- RAM Timing
- RAM Parity Timing

WLI No. 210-6788/7588

- Control Memory
- Memory Select
- Address Buffer
- I/O Buffer

WLI No. 210-6787/7587

- Data Memory
- Address Buffer
- I/O Buffer

WLI No. 210-6797/7397

- Power Supply Regulator (VP, MVP Only)
- Regulated Voltages
- Power-On Reset

MAJOR FUNCTIONS ON BOARDS

SVP/LVP/LVPC

DPU MICROPROCESSOR
AND MEMORY (Z80A's)
WLI No. 210-7696/8696

- DPU ALU
- DPU RAM
- DPU Select Decode Logic
- Parity Generating/Checking Logic

DISK CONTROLLER
WLI No. 210-7695/8695/7925

- Serial-to-Parallel Converter
- Parallel-to-Serial Converter
- All DPU Timing

DISK INTERFACE
WLI No. 210-7694/8694/8794

- VCO
- Data Clock Separator
- Read/Write Clock
- Disk Addressing Logic

I/O CONTROLLER
WLI No. 210-7789

- Terminal I/O Logic
- Printer I/O Logic

MAJOR FUNCTIONS ON BOARDS

SVP/LVP/LVPC

DUAL DSDD DISKETTE CONTROLLER
WLI No. 210-7890

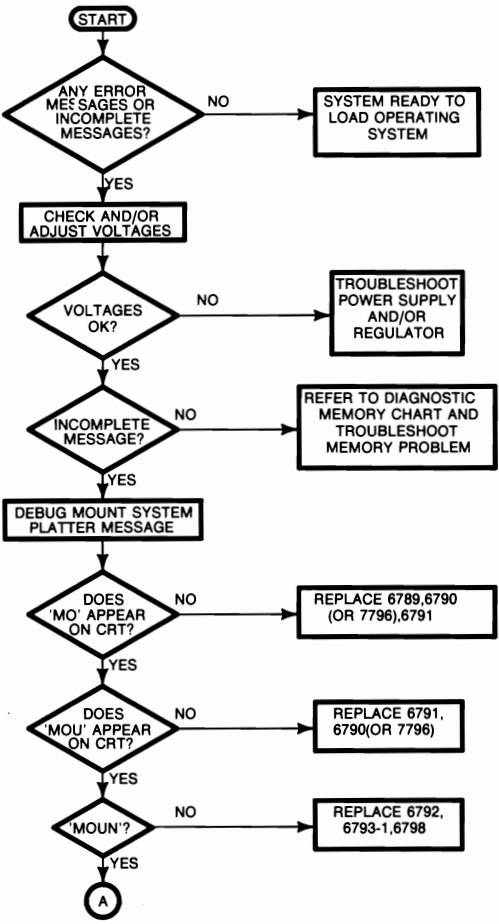
- Disk I/O Logic for two DSDD Diskettes

POWER SUPPLY REGULATOR
WLI No. 210-7697 (LVP)
WLI No. 210-7887 (SVP)

- Regulated Voltages
- Power On Reset

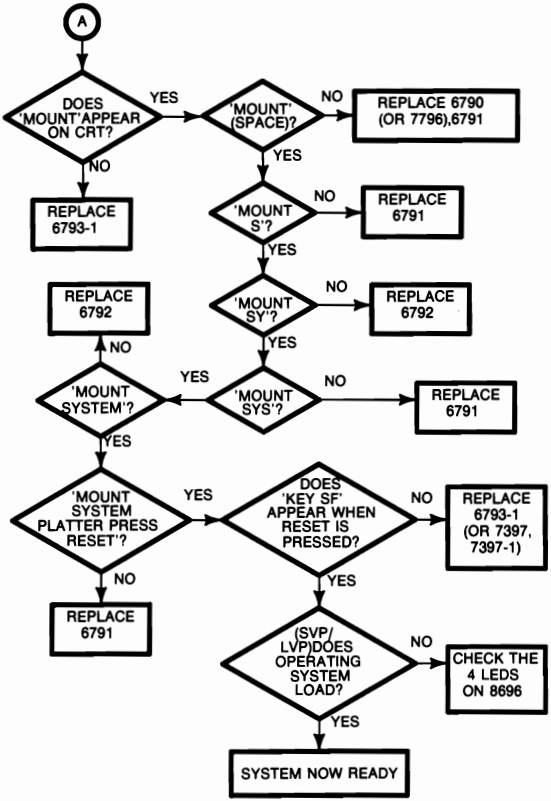
TROUBLESHOOTING FLOWCHART

All Models



TROUBLESHOOTING FLOWCHART

All Models



ERROR CODES

SVP/LVP/MVP

NONRECOVERABLE ERRORS (BASIC-2)

MISCELLANEOUS

Code	Description
A01	Memory exceeded (overlap: text and symbol table)
A02	Memory exceeded (overlap: text and value stack)
A03	Memory overflow (LISTDC, MOVE, COPY)
A04	Stack overflow (operator stack)
A05	Program line too long
A06	Program protected
A07	Illegal immediate mode statement
A08	Statement not legal here
A09	Program not resolved

ERROR CODES

SVP/LVP/MVP

NONRECOVERABLE ERRORS (BASIC-2)

SYNTAX

Code	Description
S10	Missing left parenthesis
S11	Missing right parenthesis
S12	Missing equal sign
S13	Missing comma
S14	Missing asterisk
S15	Missing ">" character
S16	Missing letter
S17	Missing hex digit
S18	Missing relational operator
S19	Missing required word
S20	Expected end of statement
S21	Missing line number
S22	Illegal PLOT argument
S23	Invalid literal string
S24	Illegal expression or missing variable
S25	Missing numeric scalar variable
S26	Missing array variable
S27	Missing numeric array
S28	Missing alpha array
S29	Missing alphanumeric variable

ERROR CODES

SVP/LVP/MVP

NONRECOVERABLE ERRORS (BASIC-2)

PROGRAM

Code	Description
P32	Starting address greater than ending address
P33	Line number conflict
P34	Illegal value
P35	No program in memory
P36	Undefined line number or CONTINUE illegal
P37	Undefined special function subroutine
P38	Undefined FN function
P39	FN nested too deep
P40	No corresponding "FOR" or "NEXT" statement
P41	RETURN without GOSUB
P42	Illegal image
P43	Illegal matrix operand
P44	Matrix not square
P45	Operand dimensions not compatible
P46	Illegal microcommand
P47	Missing buffer variable
P48	Illegal device specification
P49	Interrupt table full
P50	Illegal dimensions or variable length
P51	Variable or value too short
P52	Variable or value too long
P53	Noncommon variables already defined
P54	Common variable required
P55	Undefined variable
P56	Illegal subscripts
P57	Illegal STR arguments
P58	Illegal field/delimiter specification
P59	Illegal redimension

ERROR CODES

SVP/LVP/MVP

RECOVERABLE ERRORS (BASIC-2)

COMPUTATION

Code	Description
C60	Underflow
C61	Overflow
C62	Division by zero
C63	Zero divided by zero, or zero raised to zero power
C64	Zero raised to negative power
C65	Negative number raised to noninteger power
C66	Square root of negative value
C67	LOG of zero
C68	LOG of negative value
C69	Argument too large

EXECUTION

Code	Description
X70	Insufficient data
X71	Value exceeds format
X72	Singular matrix
X73	Illegal INPUT data
X74	Wrong variable type
X75	Illegal number
X77	Invalid partition reference

ERROR CODES

SVP/LVP/MVP

RECOVERABLE ERRORS (BASIC-2)

DISK

Code	Description
D80	File not open
D81	File full
D82	File not in catalogue
D83	File already catalogued
D84	File not scratched
D85	Index full
D86	Catalog end error
D87	No end-of-file
D88	Wrong record type
D89	Sector address beyond EOF
I90	Disk hardware error (X'CO' not rec'd)
I91	Disk hardware error
I92	Disk hardware error (timeout)
I93	Disk format error
I94	Format key engaged
I95	Device error
I96	Data error
I97	Longitudinal redundancy check
I98	Illegal sector address or platter not mounted
I99	Read-after-write error

ERROR CODES

SVP/LVP

210-8696-A DPU

Diagnostic Test	LED Code	Probable Order of Failure
Z80 CPU	0001	210-8696* 210-8695 or 210-8694
PROM Check Sum	0010	210-8696 or PROMs 210-8695 or 210-8694
2200 Status Register	0011	210-8696 or 210-8694 210-8695
Basic Parity Function	0100	210-8696 or 210-8694 210-8695
Simplified Moving Inversions toggle with:	1101	210-8696 or RAMs 210-8695 or 210-8694
	0000 - L46 0001 - L45 0010 - L44 0011 - L43 0100 - L42 0101 - L41 0110 - L40 0111 - L39 1000 - L38	
Parity Circuit Exerciser	0101	210-8696 210-8695 or 210-8694

*210-7694, 7695, and 7696 are original DPU boards; 210-7696 does not have LEDs.

ERROR CODES

210-8696-A DPU (CONT)

Diagnostic Test	LED Code	Probable Order of Failure
DMA	0110	210-8696 or L25 210-8694 210-8695
CTC	0111	210-8696 or L37 210-8694 210-8695
Static Disk Status Register	1000	210-8694 210-8696 Cables/drive malfunction 210-8695
8695	1001	210-8695 or PROMs 210-8696 210-8694 or 210-8695 210-8696
Read/Write Frequency Clock	1010	210-8694 or 210-8695 210-8696
SA850	1011	210-8694, SA850, switches, or cables 210-8696 210-8695
SA1000	1100	210-8694, SA1000, switches, or cables 210-8696 210-8695
CPU Failure	1111	

ERROR CODES

All Models

CONTROL MEMORY ERRORS 6788/7588 BOARDS

Bit Error Code Format

BECM aaaa xxxxxx PASS pppp

where:

aaaa = address

xxxxxx = XOR of read and expected data

pppp = number of pass at time error occurred

Address Error Code Format

AECM aaaa aaaa xxxxxx PASS pppp
where:

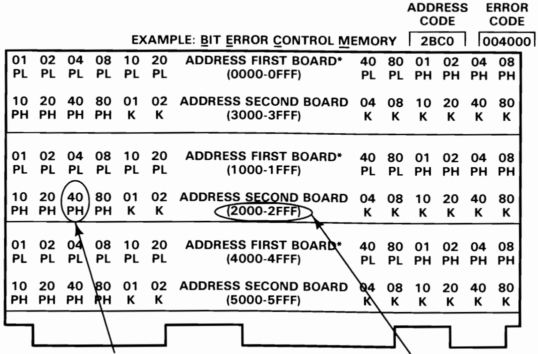
aaaa aaaa = conflicting addresses
xxxxxx = XOR of read and expected data

pppp = number of pass at time error occurred

ERROR CODES

All Models

POWER-UP FIRMWARE AND USER DIAGNOSTICS (SINGLE BIT ERRORS) – CONTROL MEMORY 6788



01 PL	02 PL	04 PL	08 PL	10 PL	20 PL	ADDRESS FIRST BOARD* (0000-0FFF)	40 PL	80 PL	01 PH	02 PH	04 PH	08 PH
10 PH	20 PH	40 PH	80 PH	01 K	02 K	ADDRESS SECOND BOARD (3000-3FFF)	04 K	08 K	10 K	20 K	40 K	80 K
01 PL	02 PL	04 PL	08 PL	10 PL	20 PL	ADDRESS FIRST BOARD* (1000-1FFF)	40 PL	80 PL	01 PH	02 PH	04 PH	08 PH
10 PH	20 PH	40 PH	80 PH	01 K	02 K	ADDRESS SECOND BOARD (2000-2FFF)	04 K	08 K	10 K	20 K	40 K	80 K
01 PL	02 PL	04 PL	08 PL	10 PL	20 PL	ADDRESS FIRST BOARD* (4000-4FFF)	40 PL	80 PL	01 PH	02 PH	04 PH	08 PH
10 PH	20 PH	40 PH	80 PH	01 K	02 K	ADDRESS SECOND BOARD (5000-5FFF)	04 K	08 K	10 K	20 K	40 K	80 K

2) USE ERROR CODE TO IDENTIFY FAILED CHIP
(00:40:00)
K:PH:PL

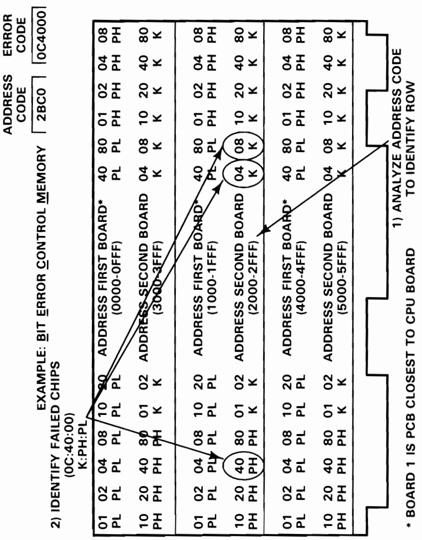
1) ANALYZE ADDRESS CODE
TO IDENTIFY ROW

* BOARD 1 IS PCB CLOSEST TO CPU BOARD

ERROR CODES

All Models

POWER-UP FIRMWARE AND USER DIAGNOSTICS (MULTIPLE BIT ERRORS) – CONTROL MEMORY 6788

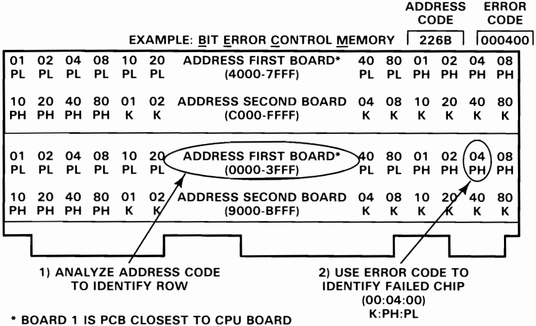


* BOARD 1 IS PCB CLOSEST TO CPU BOARD

ERROR CODES

All Models

POWER-UP FIRMWARE AND USER DIAGNOSTICS (SINGLE BIT ERRORS) – CONTROL MEMORY 7588

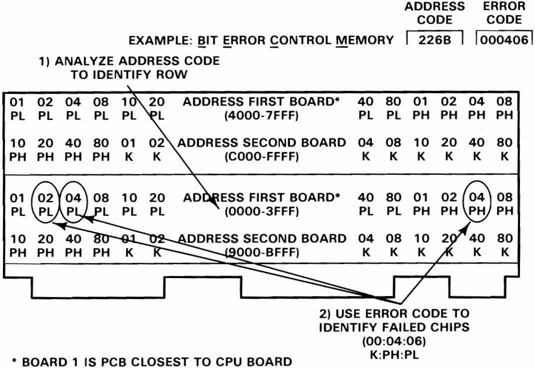


* BOARD 1 IS PCB CLOSEST TO CPU BOARD

ERROR CODES

All Models

POWER-UP FIRMWARE AND USER DIAGNOSTICS (MULTIPLE BIT ERRORS) — CONTROL MEMORY 7588



01 PL	02 PL	04 PL	08 PL	10 PL	20 PL	ADDRESS FIRST BOARD* (4000-7FFF)	40 PL	80 PL	01 PH	02 PH	04 PH	08 PH
10 PH	20 PH	40 PH	80 PH	01 K	02 K	ADDRESS SECOND BOARD (C000-FFFF)	04 K	08 K	10 K	20 K	40 K	80 K
01 PL	02 PL	04 PL	08 PL	10 PL	20 PL	ADDRESS FIRST BOARD* (0000-3FFF)	40 PL	80 PL	01 PH	02 PH	04 PH	08 PH
10 PH	20 PH	40 PH	80 PH	01 K	02 K	ADDRESS SECOND BOARD (9000-BFFF)	04 K	08 K	10 K	20 K	40 K	80 K

* BOARD 1 IS PCB CLOSEST TO CPU BOARD

ERROR CODES

All Models

CONTROL MEMORY ERRORS 6788/7588 BOARDS (CONT)

Data Bus Shorts

Error code example:

BECM 1000 040010

(K bit 04 and PL bit 10 are shorted.)

BANK/PAGE ADDRESSING

Error code example:

AECM 1000 5000 FFFFFF

(Banks 1000 and 5000 access the same bank.)

Address Lines Short Test

DATA AND ASSOCIATED ADDRESS LINE

A0	X001 = 010000
A1	X002 = 020000
A2	X004 = 040000
A3	X008 = 080000
A4	X010 = 100000
A5	X020 = 200000
A6	X040 = 400000
A7	X080 = 800000
A8	X100 = 030000
A9	X200 = 060000
A10	X400 = 0C0000
A11	X800 = 180000

ERROR CODES

All Models

CONTROL MEMORY ERRORS 6788/7588 BOARDS (CONT)

Address Lines Short Test (Cont)

Error code example:

AECM 1080 1010 FFFFFF

(Bank 1000 has A4 and A7 shorted together.)

Banks tested begin at bank 1000 and proceed in 4K increments to memory end. Bank 0000 is tested following program relocation to 1000. Location 0001 (A0 in the first bank) is not checked.

Testing A7 - A11 on PCB 7588 actually tests address lines at multiplexer.

Address Lines or Open Pins Test

ADDRESS LINE ASSOCIATED WITH ADDRESS

X001>A0	X010>A4	X100>A8
X002>A1	X020>A5	X200>A9
X004>A2	X040>A6	X400>A10
X008>A3	X080>A7	X800>A11

X in addresses displayed =0 - F.

Error code examples:

AECM 4080 4000 FFFFFF

(Bank 4000 has A7 open or stuck low for entire bank.)

AECM 4008 4000 000004

(Bank 4000 has A3 open on PL 04-bit RAM.)

ERROR CODES

All Models

CONTROL MEMORY ERRORS 6788/7588 BOARDS (CONT)

Address Multiplexer Test For 16K RAM Chip Boards (7588 Only)

Data and Address Line Associated For 7588 PCB (16K RAMs)

A0	X001 =010000
A1	X002 =020000
A2	X004 =040000
A3	X008 =080000
A4	X010 =100000
A5	X020 =200000
A6	X040 =400000
A7	X080 =800000
A8	X100 =030000
A9	X200 =060000
A10	X400 =0C0000
A11	X800 =180000
A12	1000 =300000
A13	2000 =600000
A12+A13	3000 =C00000

Simple Marching Ones (1s)

Error code example:

BECM 2344 000002

(PL 02-bit RAM is bad.)

24-Bit Moving Inversions

Error code example:

BECM 2344 000002

(The PL bit 02 at address 2344 is bad.)

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS

Bit Error Code Format

BEDM bb.aaaa
Even =>xx Odd =>xx PASS pppp

where:

bb =bank address
aaaa =address
xx =XOR of read and expected data for even and odd
pppp =number of pass at time error occurred

Address Error Code Format

AEDM bb.aaaa bb.aaaaxx PASS pppp

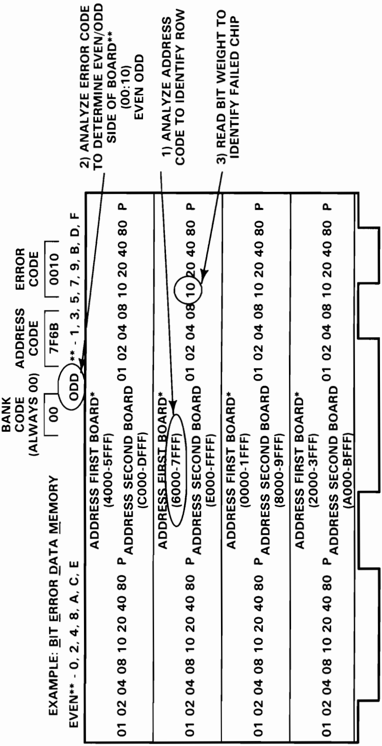
where:

bb =bank address (code)
aaaa =address (two conflicting addresses)
xx =XOR of read and expected data (see test error examples)
pppp =number of pass at time error occurred

ERROR CODES

All Models

POWER-UP FIRMWARE DIAGNOSTICS (SINGLE BIT ERRORS) — DATA MEMORY 6787



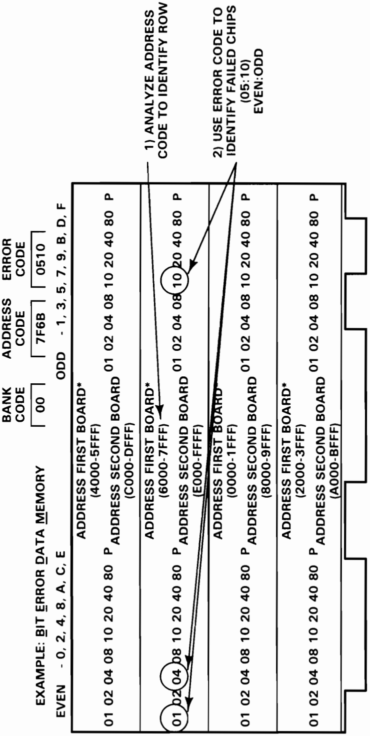
* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

**IF 2-DIGIT ERROR CODE APPEARS, READ LAST DIGIT OF ADDRESS CODE TO DETERMINE EVEN OR ODD SIDE OF BOARD.

ERROR CODES

All Models

POWER-UP FIRMWARE DIAGNOSTICS (MULTIPLE BIT ERRORS) — DATA MEMORY 6787

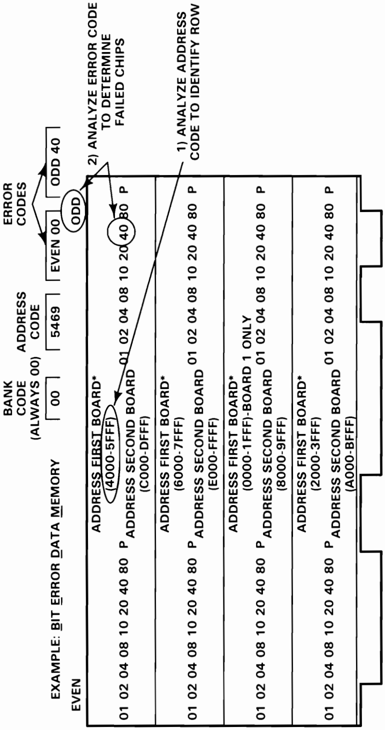


* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

ERROR CODES

All Models

USER DIAGNOSTICS (SINGLE BIT ERRORS) – DATA MEMORY 6787

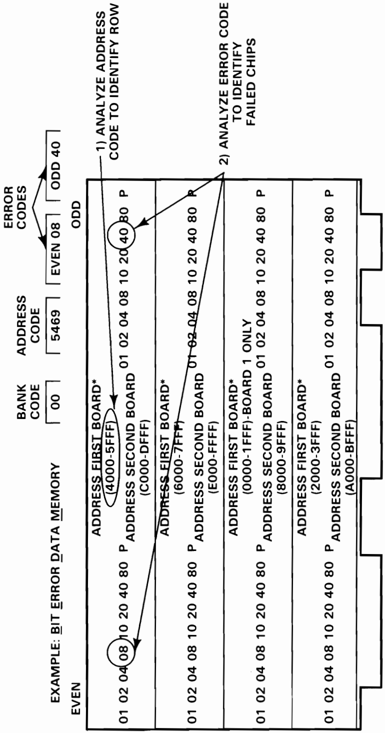


* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

ERROR CODES

All Models

USER DIAGNOSTICS (MULTIPLE BIT ERRORS) — DATA MEMORY 6787

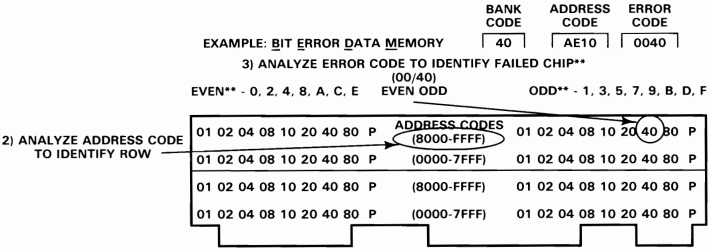


* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

ERROR CODES

All Models

POWER-UP FIRMWARE DIAGNOSTICS (SINGLE BIT ERRORS) — DATA MEMORY 7587



EXAMPLE: BIT ERROR DATA MEMORY

BANK CODE	ADDRESS CODE	ERROR CODE
40	AE10	0040

3) ANALYZE ERROR CODE TO IDENTIFY FAILED CHIP**

(00/40)

EVEN** - 0, 2, 4, 8, A, C, E — EVEN ODD — ODD** - 1, 3, 5, 7, 9, B, D, F

2) ANALYZE ADDRESS CODE TO IDENTIFY ROW

	ADDRESS CODES	
01 02 04 08 10 20 40 80 P	(8000-FFFF)	01 02 04 08 10 20 40 80 P
01 02 04 08 10 20 40 80 P	(0000-7FFF)	01 02 04 08 10 20 40 80 P
01 02 04 08 10 20 40 80 P	(8000-FFFF)	01 02 04 08 10 20 40 80 P
01 02 04 08 10 20 40 80 P	(0000-7FFF)	01 02 04 08 10 20 40 80 P

1) ANALYZE BANK CODE TO IDENTIFY BOARD

BANK CODE	BOARD
00	1*, BOTTOM 2 ROWS
80	2, BOTTOM 2 ROWS
40	1*, TOP 2 ROWS
C0	2, TOP 2 ROWS

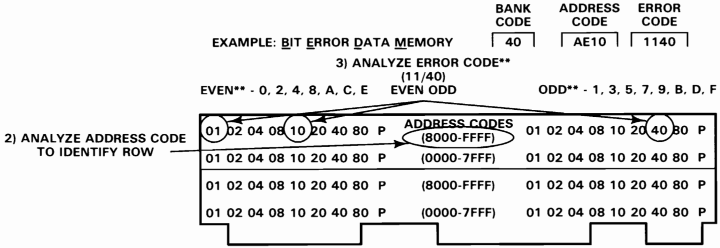
* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

**IF 2-DIGIT ERROR CODE APPEARS, READ LAST DIGIT OF ADDRESS CODE TO DETERMINE EVEN OR ODD SIDE OF BOARD.

ERROR CODES

All Models

POWER-UP FIRMWARE DIAGNOSTICS (MULTIPLE BIT ERRORS) DATA MEMORY — 7587



1) ANALYZE BANK CODE TO IDENTIFY BOARD

BANK CODE	BOARD
00	1*, BOTTOM 2 ROWS
80	2, BOTTOM 2 ROWS
40	1*, TOP 2 ROWS
C0	2, TOP 2 ROWS

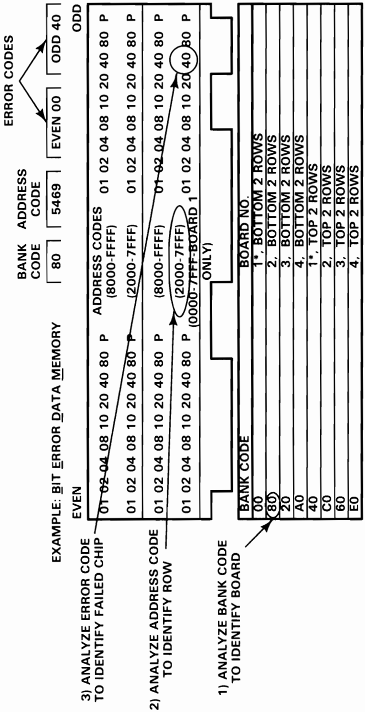
* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

**IF 2-DIGIT ERROR CODE APPEARS, READ LAST DIGIT OF ADDRESS CODE TO DETERMINE EVEN OR ODD SIDE OF BOARD.

ERROR CODES

All Models

USER DIAGNOSTICS (SINGLE BIT ERRORS) DATA MEMORY — 7587



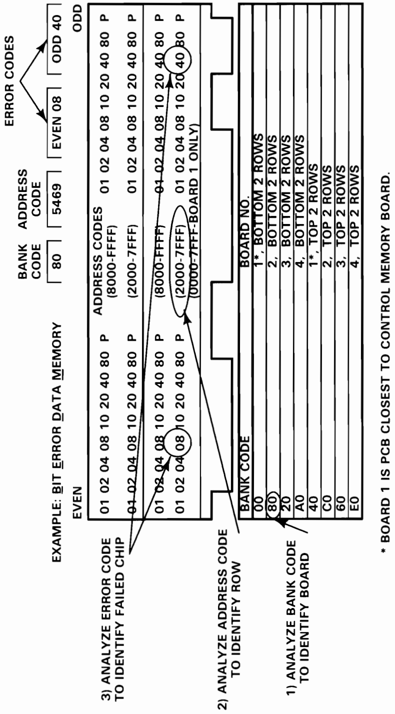
BANK CODE	BOARD NO.
00	1*, BOTTOM 2 ROWS
80	2, BOTTOM 2 ROWS
20	3, BOTTOM 2 ROWS
A0	4, BOTTOM 2 ROWS
40	1*, TOP 2 ROWS
C0	2, TOP 2 ROWS
60	3, TOP 2 ROWS
E0	4, TOP 2 ROWS

* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

ERROR CODES

All Models

USER DIAGNOSTICS (MULTIPLE BIT ERRORS) DATA MEMORY — 7587



BANK CODE	BOARD NO.
00	1*, BOTTOM 2 ROWS
80	2, BOTTOM 2 ROWS
20	3, BOTTOM 2 ROWS
A0	4, BOTTOM 2 ROWS
40	1*, TOP 2 ROWS
C0	2, TOP 2 ROWS
60	3, TOP 2 ROWS
E0	4, TOP 2 ROWS

* BOARD 1 IS PCB CLOSEST TO CONTROL MEMORY BOARD.

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

7587 Data Memory Chart

NOTE

For 6787, address for each page will be first address in 8K page (row of chips). For 7587, address used will be 2000 or A000 for two 32K pages in each 64K bank.

Bottom Two Rows		Top Two Rows	
Bank Code	Board No.	Bank Code	Board No.
00	1	40	1
80	2	C0	2
20	3	60	3
A0	4	E0	4

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

Data Bus Stuck Test

Error code example:

BEDM 80.2000 Even =>00 Odd =>20

20 bit on odd side of board in bank 80 cannot have One or Zero written to or read from.

Data Bus Shorts Test

Error Code example:

BEDM 80.2000 Even =>00 Odd =>20

(The 20 bit on the odd side of the board in bank 80 is shorted to another data line.)

Bank/Page Addressing Test

Error code example:

AEDM 80.2000 80.A000 FF

(Page 2000 and A000 in bank 80 access the same page.)

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

Parity Generator Test

Error code example:

BEDM 80.2000 Even =>00 Odd =>00

(Parity RAM on the even or odd side of the board in bank 80 is bad, or the parity generator on the 6789 board is not working.)

Address Line Shorts Test

Error code example:

AEDM 40.2080 40.2010 FF

Page 2000 in bank 40 has A83 and A86 (A3 and A6 for 6787) shorted together.

Address Lines or Open Pins Test

Error code example:

AEDM 40.2080 40.2000 FF

(Page 2000 of bank 40 has A86 - A6 for 6787 - open or stuck low for the entire page.)

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

Address Multiplexer Test for 6787 Board (4K RAMS)

NOTE

A8 and A10 wired wrong on 6787 board. Errors will be reported as shown below.

Address Lines	Error Codes
A0	X002=01
A1	X004=02
A2	X008=04
A3	X010=08
A4	X020=10
A5	X040=20
A6	X080=40
A7	X100=80
A10	X200=03
A9	X400=06
A8	X800=0C
A11	1000=18

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

Address Multiplexer Test for 16K RAM Chip Boards (7587 Only)

Address Lines	Error Codes
A80	X002=01
A81	X004=02
A82	X008=04
A83	X010=08
A84	X020=10
A85	X040=20
A86	X080=40
A0	X002=01
A1	X004=02
A2	X008=04
A3	X010=08
A4	X020=10
A5	X040=20
A6	X080=40
A7	X100=80
A8	X200=03
A9	X400=06
A10	X800=0C
A11	1000=18
A12	2000=30
A13	4000=80
A12 +A13	6000=C0

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

Address Multiplexer Test for 16K RAM Chip Boards (7587 Only) (Cont)

Error code example:

AEDM 00.3000 00.2000 FF

(Page 2000 at bank 00 has A11 open or stuck low on the address multiplexer.)

Simple Marching Ones/Zeroes

Error code example:

BEDM 80.2344 Even =>00 Odd =>20

(The 20 bit on the odd side of the board in bank 80 at address 2344 is bad.)

8-Bit Moving Inversions

Error code example:

BEDM 80.2345 Even =>00 Odd =>20

(20 bit on odd side of board in bank 80 at address 2345 is bad.)

ERROR CODES

All Models

DATA MEMORY ERRORS 6787/7587 BOARDS (CONT)

NOTE

A8 and A10 wired wrong on 6787 board. Errors will be reported as shown below.

Data and Address Lines for 7587 Board (16K RAMS)

Error Code	Address Lines
X002	A80
X004	A81
X008	A82
X010	A83
X020	A84
X040	A85
X080	A86

Data and Address Lines for 6787 Board (4K RAMS)

Error Code	Address Lines
X002	A0
X004	A1
X008	A2
X010	A3
X020	A4
X040	A5
X080	A6
X100	A7
X200	A10
X400	A9
X800	A8
1000	A11

ERROR CODES

All Models

CPU 8-BIT REGISTERS TEST

Error Type 1

Register TT XOR =(xxxx) PASS =pppp

Caused when register TT fails to hold the test pattern.

Error Type 2

TT and CC XOR =(xxxx) PASS =pppp

Caused when, while testing register TT, register CC was found not to have expected contents.

TT =Register under test

CC =Conflict register

xxxx =XOR of expected and actual patterns

pppp =Current pass number at time of error

ERROR CODES

All Models

AUXILIARY MEMORY TEST

Error Type 1

Aux #TT XOR =(xxxx) PASS =pppp

Caused when auxiliary register TT fails to hold the test pattern.

Error Type 2

Aux #TT and aux. CC XOR =(xxxx) PASS = pppp

While testing register TT, register CC was found not to have expected contents.

Error Type 3

Stack and Aux #TT XOR =(xxxx) PASS = pppp

While testing register, TT, the stack is found not to contain contents expected.

ERROR CODES

All Models

STACK MEMORY TEST

Error Type 1

Aux #TT Failure XOR =(xxxx) PASS = pppp

(Auxiliary register TT fails to hold test pattern.)

Error Type 2

Stack Failure XOR =(xxxx) PASS =pppp

(Stack fails to hold test pattern.)

LATEST PCB E-REV LEVELS

VP/VPA/MVP/MVPA/MVPC

PCB No.	Highest Revision Levels
	1 2 3 4 5 6 7 8 9 10 11 12 13 14
210-6798	X
210-6793	X (MVP,MVPA,MVPC)
210-6792	X
210-6791	X
210-6790	X
210-6788	X
210-7588-1	X
210-7588	X
210-6787-1	X
210-6787-2	X
210-7587-1	X
210-7587-2	X
210-7587-3	X
210-6797	X

LATEST PCB E-REV LEVELS

SVP/LVP/MVP

PCB No.	Highest Revision Levels
	1 2 3 4 5 6 7 8 9 10 11 12 13 14
210-6790	X
210-7796	X
210-6791	X
210-6792	X
210-6793-1	X
210-7587-1	X
210-7587-2	X
210-7587-3	X
210-7588(16K)	X
210-7588-1(32K)	X
210-7225	X
210-7694	X
210-7695A	X

LATEST PCB E-REV LEVELS

SVP/LVP/MVP

PCB No.	Highest Revision Levels
	1 2 3 4 5 6 7 8 9 10 11 12 13 14
210-7696A	X
210-7788	X
210-7698	X
210-7797	X
210-7887	X
210-6797	X
210-8694	X
210-8695	X

ADJUSTMENTS AND RELATED TEST POINTS

VP/VPA/MVP/MVPA/MVPC

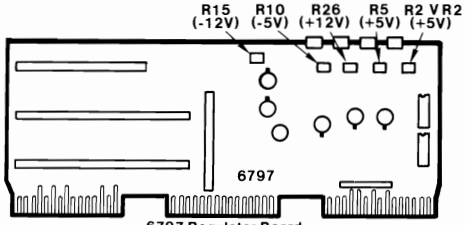
CPU POWER SUPPLY REGULATORS

Model	WLI No.
VP/VPA/MVP/ MVPA/MVPC	210-6797, 210-7397, 210-7397-1
SVP	210-7887
LVP/LVPC	210-7697

ADJUSTMENTS AND RELATED TEST POINTS

VP/VPA/MVP/MVPA

210-6797 REGULATOR



6797 Regulator Board

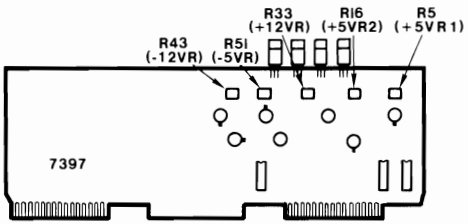
Pin*	Voltage	Limits			Pot.	Ripple (mV p-p)
J1	+5VR1	+4.95	to	+5.05	R2	15mV
L1	+5VR2	+4.95	to	+5.05	R5	15mV
M1	+12VR	+11.95	to	+12.05	R26	15mV
N1	−12VR	−11.95	to	−12.05	R15	35mV
S1	−5VR	−4.95	to	−5.05	R10	25mV

* Test pins located on rear of motherboard.

ADJUSTMENTS AND RELATED TEST POINTS

VP,VPA,MVP,MVPA

210-7397, 210-7397-1 REGULATORS



7397 Regulator Board

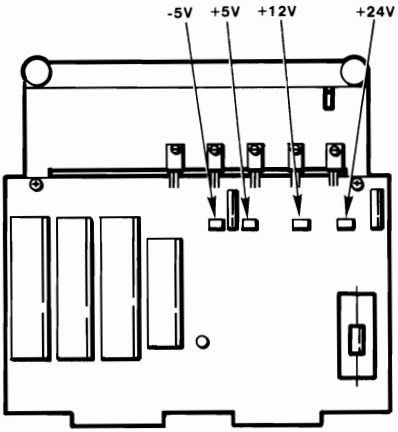
Pin*	Voltage	Limits	Pot.	Ripple (mV p-p)
J1	+5VR1	+4.95 to +5.05	R5	15mV
L1	+5VR2	+4.95 to +5.05	R16	15mV
M1	+12VR	+11.95 to +12.05	R33	15mV
N1	−12VR	−11.95 to −12.05	R43	35mV
S1	−5VR	−4.95 to −5.05	R51	25mV

* Test pins located on rear of motherboard.

ADJUSTMENTS AND RELATED TEST POINTS

SVP

210-7887 REGULATOR, POTENTIOMETERS AND VOLTAGE LIMITS



Voltage	Limits			Ripple (mV p-p)
+ 5	+ 4.75	to	+ 5.25	100
+ 12	+ 11.70	to	+ 12.40	100
+ 24	+ 21.60	to	+ 26.40	100
− 5	− 4.75	to	− 5.25	100
− 12*	− 11.50	to	− 12.50	100

NOTE

Checking ripple with multimeter records rms values, not p-p.

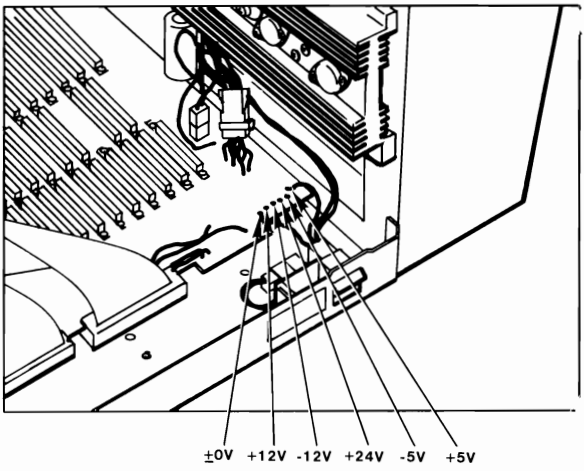
When increasing RAM capacity or adding additional disk drive, recheck all voltages; readjust when necessary. If voltage levels of +5V or +12V drop 0.3V, +24V is shut off and unit remains in initialized state.

* Not adjustable with SVP or LVP models.

ADJUSTMENTS AND RELATED TEST POINTS

SVP

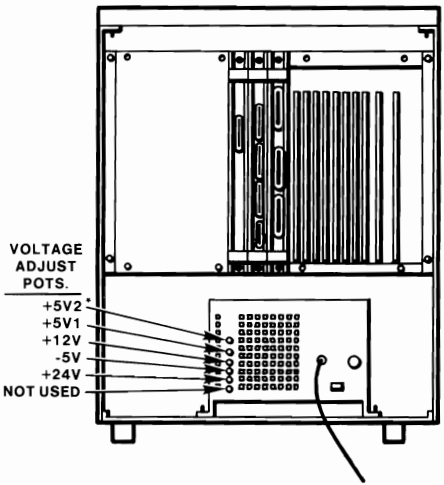
210-7887 REGULATOR TEST POINTS



ADJUSTMENTS AND RELATED TEST POINTS

LVP/LVPC

210-7697 REGULATOR, POTENTIOMETERS AND VOLTAGE LIMITS



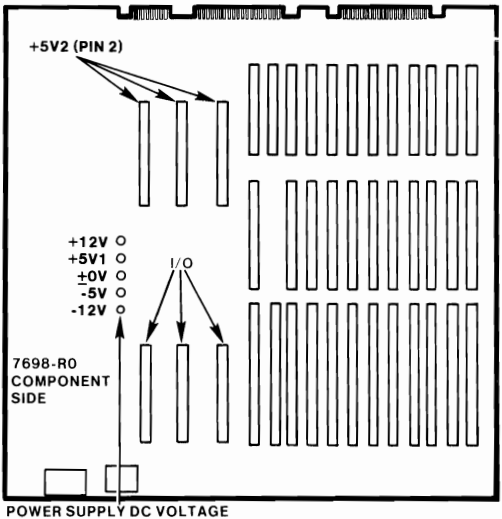
VOLTAGE	LIMITS
+5V2	+4.95 TO +5.05
+5V1	+4.95 TO +5.05
+12V	+11.95 TO +12.05
-5V	-4.95 TO -5.05
+24V	+21.60 TO +26.40

* LVPC ONLY

ADJUSTMENTS AND RELATED TEST POINTS

LVP/LVPC

210-7697 REGULATOR TEST POINTS

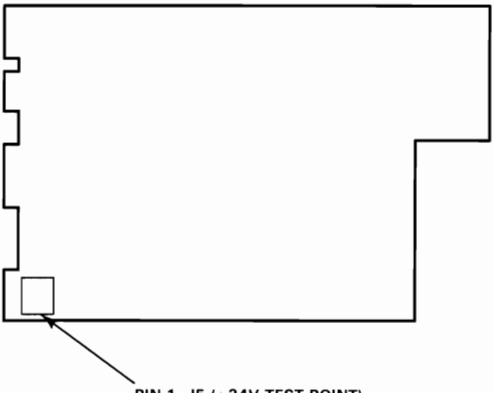


POWER SUPPLY DC VOLTAGE TEST POINTS

ADJUSTMENTS AND RELATED TEST POINTS

LVP/LVPC/SVP

WINCHESTER DISK + 24V TEST POINT



COMMONLY USED PARTS

All Models

NOTE
See PCB COMPLEMENTS for PCBs.

WLI No.	Description
270-0157	Heat Sink (LVP)
270-0355	VP/MVP chassis assembly
270-0356	Heatsink assembly, VP/MVP chassis
270-0452	VPA/MVPA chassis assembly
270-0465	MVPC chassis assembly
270-0467	LVPC chassis (7 I/O slots)
270-0564	Heatsink assembly, VPA/MVPA chassis
270-0617	Power Supply assembly
278-4024	Quantum drive (20 Mbyte)
278-4025	Quantum drive (40 Mbyte)

COMMONLY USED PARTS

All Models

NOTE
See PCB COMPLEMENTS for PCBs.

WLI No.	Description
278-4013	Winchester drive (2 Mbyte and 4 Mbyte)
278-4014	Winchester drive (8 Mbyte)
278-4015	DSDD diskette drive
278-4018	Winchester Drive (2 Mbyte)
279-0371	LVP chassis (3 I/O slots)
279-0372	LVP chassis (9 I/O slots)
300-3050	124 Kuf capacitor (Power Supply)
300-3068	8.2 uf capacitor, (Power Supply)
300-3074	7300 uf 40V capacitor
300-3087	161 uf 10V capacitor
300-3203	4 uf 660V capacitor
325-0026	RESET key on keyboard
325-2405	All normal keys

COMMONLY USED PARTS

All Models

NOTE
See PCB COMPLEMENTS for PCBs.

WLI No.	Description
325-2407	Oak Key Switch
360-1025SB	2.5A system fuse
360-1150	15A in-line heat-sink fuse
375-1048	2N5301 transistor on heat sink
375-1055	2N5924 transistor on heat sink
380-3000	1N1200A diode on heat sink
400-1009	Fan assembly
400-1013	Fan LVP
400-1003	Fan SVP
400-1001	Fan MVP I/O section

NOTES

NOTES

USER COMMENTS AND FEEDBACK

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