

TECH SUPPORT

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technical memo

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.1

TO: MARK 3 Users
FROM: Hardware Customer Support
DATE: May 20, 1982
SUBJ: MARK 3 CPU UPGRADABILITY FOR 64KB MEMORY EXPANSION BOARD

In order to Field Upgrade a MARK 3 CPU from 32KW (64KB) to 64KW (128KB) an expansion (piggyback) board must be added to the CPU board.

Before this expansion board is added, the CPU board must meet certain minimum requirements:

Hardware Revision:

Any A or B Revision CPU board that has been brought up to ECO #465 can be field upgraded. If the board has a jumper from 3H pin 6 to 2F pin 1 (part of ECO #465), the ECO is installed.

Any Revision C board can be field upgraded.

REV letter is located on extractor end of board "CPU 200000 _ _ _ _".

Fixture:

CPU must have connector at P3 installed.

Any CPU boards that do not meet these conditions should be returned to POINT 4 for upgrade if expansion is desired. Call POINT 4 for a Return Authorization Number.

technical memo

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.2

TO: MARK 3 Users
FROM: Hardware Customer Support
DATE: May 20, 1982
SUBJ: MARK 3 PIB UPGRADABILITY FOR PORT EXPANSION BOARD

In order to Field Upgrade a MARK 3 PIB for expanded ports, an expansion (piggyback) board must be added to the PIB.

Before this expansion board is added, the following requirements must be met:

Hardware minimum revision:

Revision REV B or later - (REV A boards can not be expanded; REV A boards have tape interface connector (J1) mounted on a mini-PCB.) REV B or later boards have rev letter marked on board, behind J1, following part number "PIB 21000 _ _ _ _".

ECO #465 must be installed on CPU board (see HICS.1).

Fixture:

Connector J9 must be installed.

Firmware:

CPU must have microcode REV 4. The REV 4 microcode handles expanded memory and/or expanded ports.

technical memo

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.3

TO: MARK 3 and LOTUS 700 Users
FROM: Hardware Customer Support
DATE: May 27, 1982
SUBJ: USING CDC 9455 LARK DISC DRIVE WITH
POINT 4 DISC CONTROLLERS

To use the CDC 9455 LARK disc drive with the LOTUS 700 or MARK 3 disc controllers, the following requirements must be met:

LARK POWER SUPPLY MODULE

Jumper W6 (SEEK ON HEAD CHANGE option) on I/O adapter board:

- With LOTUS 700, jumper W6 must be installed
- With MARK 3, it is preferred that W6 is removed (will work)

The enclosed illustration shows the location of W6 on various revision boards.

LOTUS 700

Head-select PROM at location 22c must be "4" for LARK drive.

MARK 3

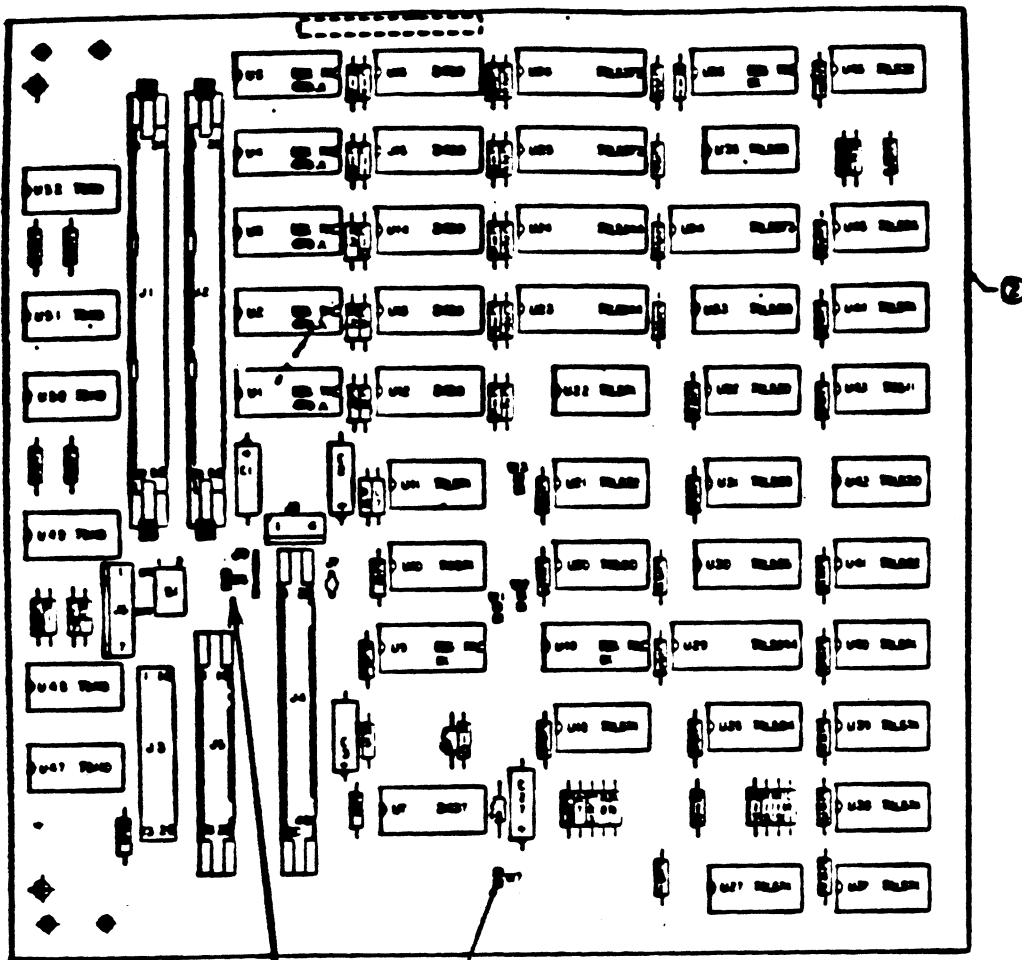
MARK 3 PIB does not require any changes.

MARK 3 CPU MANIP PROMs for use with LARK should be:

- For 32K-word (64KB) systems: C5E1 and C6E1
- For 64K-word (128KB) systems: C5E4C and C6E4C
(-4C PROMs will work in 32KW or 64KW systems)

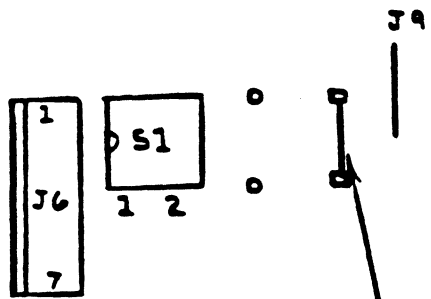
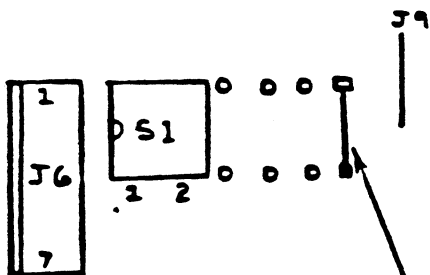
MARK 3 CPU MICROCODE PROMs for use with LARK:

Locations	32KW (64KB)	64KW (128KB)
8B,9B,10B 13B,14B,9C 10C	REV 3A, e.g., C8B3A, C9B3A, C10B3A, etc.	REV 4A, e.g., C8B4A, C9B4A C10B4A, etc.
Location 11B	C11B5	C11B6



W6 PUSH ON JUMPER

MAY ALSO LOOK LIKE ONE OF THE FOLLOWING:



UNIT SEL.

SWITCH	1	2	UNIT
OFF	OFF	0	
ON	OFF	1	
OFF	ON	2	
ON	ON	3	

**TABLE 1. LOTUS 700/710 HEAD SELECT PROM GUIDE
(DRIVES SUPPORTED UNDER IRIS 8.2)**

Drive	PROM Code	No. of Heads (Decimal)	Size (MB)	Type
Ampex DFR-932	F	2	32	CMD
Ampex DFR-964	F	4	64	CMD
Ampex DFR-996	F	6	96	CMD
Ampex DM-940	E	5	40	SMD
Ampex DM-980	E	5	80	SMD
Ampex DM-9160	E	5	160	SMD
Ampex DM-9300	S	19	300	SMD
Ball BD-80	E	5	80	SMD
CDC 9448-32	F	2	32	CMD
CDC 9448-64	F	4	64	CMD
CDC 9448-96	F	6	96	CMD
CDC 9455 (Lark)	4	4	16	LMD
CDC 9457 (Lark 2)	4	4	50	LMD
CDC 9710	E	5	80	SMD
CDC 9715	J	10	168	SMD
CDC 9760	E	5	40	SMD
CDC 9762	E	5	80	SMD
CDC 9766	S	19	300	SMD
Century Data T-82	E	5	80	SMD
Century Data T-302	S	19	300	SMD
Century Data T-306	S	19	300	SMD
Fujitsu M-2283	H	8	135	SMD
Fujitsu M-2284	J	10	168	SMD
Fujitsu M-2294	P	16	335.5	SMD
Fujitsu M-2312K	G	7	84	SMD
Fujitsu M-2322K	J	10	168	SMD
Priam 3450	E	5	35	SMD
Priam 7050	E	5	70	SMD
Priam 3350	C	3	34	SMD
Priam 6650	C	3	68	SMD

Additional information may be found in the IRIS R8 Peripherals Handbook.

II. PROM TEST

To determine PROM coding and whether it is working properly, run the LOGIC TEST of the controller diagnostics (DC700). The test prints out a mapping of the Head Select PROM (loc. 22C) and the sector PROM (loc. 19C).

EXAMPLE:

PROM TEST RESULTS

DRV	LAST SECTOR	LAST SURFACE	
		VOL 0	VOL 1
0	31	4	65535
1	31	18	65535
2	31	0	4
3	31	3	65535

where:

All numbers are counting from zero (0).

DRV is the port number on LOTUS 700/710 Controller.

LAST SECTOR is the number of sectors; 31 (counting from zero) indicates 32 sectors.

LAST SURFACE:

	VOL 0	VOL 1	DRV TYPE	PROM CODE
4	(5 heads)	65535 (no heads)	80-MB SMD	E
18	(19 heads)	65535 (no heads)	300-MB SMD	S
0	(1 head)	4 (5 heads)	96-MB CMD	F
3	(4 heads)	65535 (no heads)	16-MB Lark	4

VOL 1 applies only to CMD-type drives. For an SMD drive, 65535 will always appear in this column.

III. DISC DIAGNOSTICS (DC700 PROGRAM)

- A. The DRIVE TEST writes on all surfaces of the disc so back-ups must be performed before running the test.
- B. To run the LOGIC TEST, the drives must be off line and the I/O cables may have to be disconnected.

IV. DISCUTILITY PROGRAM

- A. All existing data is written over when formatting, so back up all disc packs before formatting.
- B. If, at the beginning of a format, you get an "Illegal Command" error, it may mean the cables are connected incorrectly or the Head Select PROM is for another type drive.

V. GENERAL USAGE NOTES

- A. Another brand or type of disc controller can be used concurrently with a LOTUS 700/710 if its device code is other than 27.
- B. For a LOTUS 700/710 Controller, drives may be set for up to 32 sectors.
- C. A disc drive being used with an MCT SMC-902 controller is set for 33 sectors; the sectoring will have to be changed before using the LOTUS 700/710 Controller with that drive.
- D. A LOTUS 700/710 will not work with a Century Data TTL interface (T50, T80, T300). It will work with the SMD interface (T52, T82, T302).
- E. Disc packs formatted with any other brand of controller are not compatible with the LOTUS 700/710 format.

technical memo

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.5

TO: MARK 3 Users
FROM: Hardware Customer Support
DATE: August 26, 1982
SUBJ: UPGRADING MARK 3 TO 128KB MEMORY

A MARK 3 may be field-upgraded from 64KB (32KW) to 128KB (64KW) of memory by installing the 64KB Memory Expansion Board on the CPU board.

Before this expansion board is added, the CPU board must meet certain minimum requirements:

CPU Board Revision:

Any A or B Revision CPU board that has been brought up to ECO #465 can be field-upgraded. If the board has a jumper from 3H pin 6 to 2F pin 1 (part of ECO #465), the ECO is installed. If not, the board should be returned to POINT 4 for installation of all ECOs through #465. Call POINT 4 for a Return Authorization Number.

Any Revision C board can be field upgraded.

NOTE

REV letter is located on extractor end of board "CPU 2000 _".

Software Revision:

For IRIS users, this option requires version R7.5 (or later).

Required CPU Board Components (see Figure 1 for locations):

1. 50-pin connector at P3 (located between i.c. 10E and 14E) - if connector is missing, one must be installed.

POINT 4 P/N = 500350
BERG P/N = 65610-150

2. Microcode proms at locations 8B, 9B, 10B, 13B, 14B, 9C, 10C must be Rev 4, i.e., C8B4A, C9B4A, C10B4A, etc.

NOTE

Prom at location 11B should be C11B6.

3. MANIP/Self-Test proms at location 5E and 6E should be:

C5E4A and C6E4A - Archive Tape Boot Capability

C5E4C and C6E4C - Cassette Tape Boot Capability

4. Memory Expansion Board, POINT 4 P/N 20103.

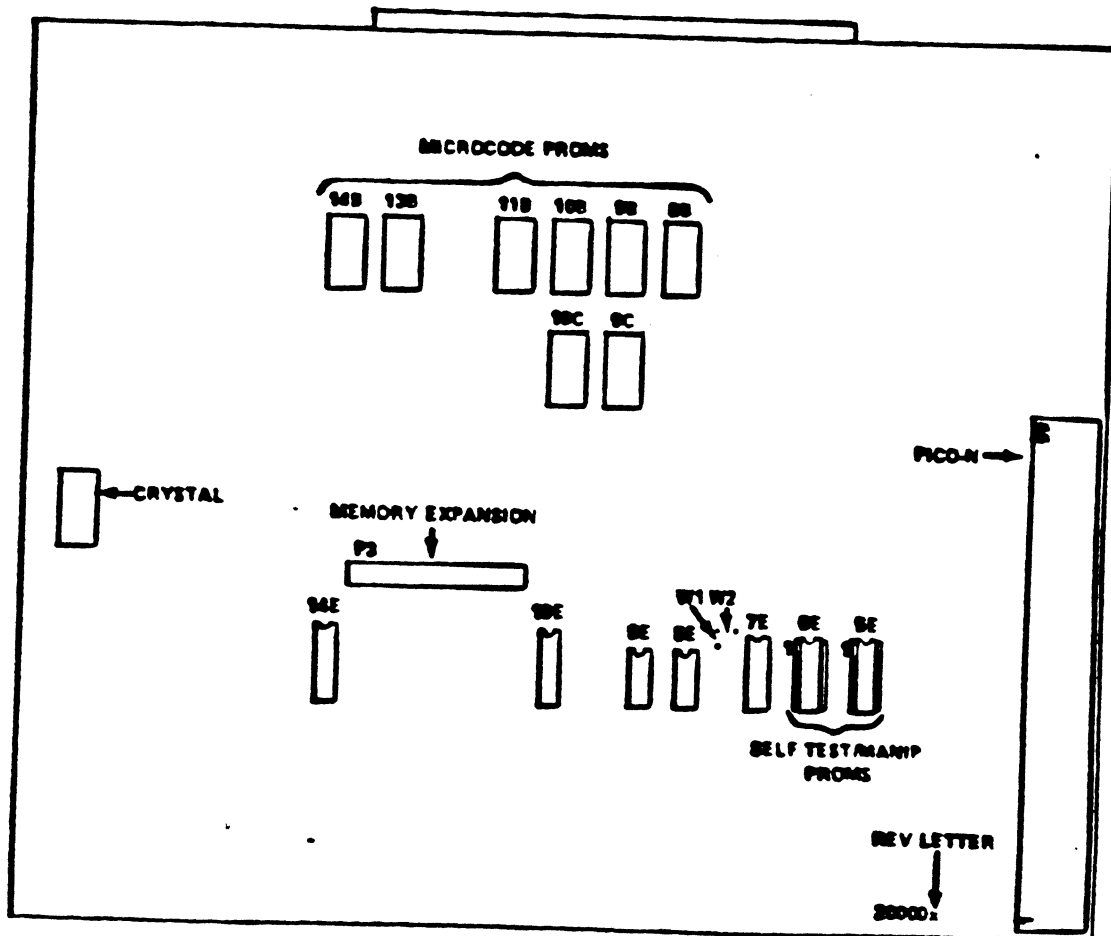


Figure 1. MARK 3 CPU Board

Procedure:

1. Run Self-Test on the CPU. Run Diagnostics on all devices on the PIB. Run both boards under the operating system.
2. Remove CPU board from chassis.
3. Install 50-pin connector at P3, if necessary.
4. Move W1 jumper (located between 7E and 8E) to W2 position.

NOTE

W1/W2 jumper must be set to one or the other, never both.

W1 position is for 64KB (32KW) maximum
W2 position is for 128KB (64KW) maximum

5. Install correct Microcode proms.
6. Install correct MANIP proms.
7. Plug in Memory Expansion Board, connecting to 50-pin connector, and secure with 2 screws (see Figure 2).
8. Make sure that all pluggable devices are fully inserted.
9. Reinstall CPU board in chassis.
10. Run Self-Test on the CPU. Run Diagnostics on all devices on the PIB. Run both boards under the operating system.
11. For IRIS users, modifications to Config File will be required to take advantage of additional memory space. Consult IRIS Manager Manual for information on adjusting 402 (NPLC), 403 (NPUC), 610 (TOPW) and other parameters you may wish to change.

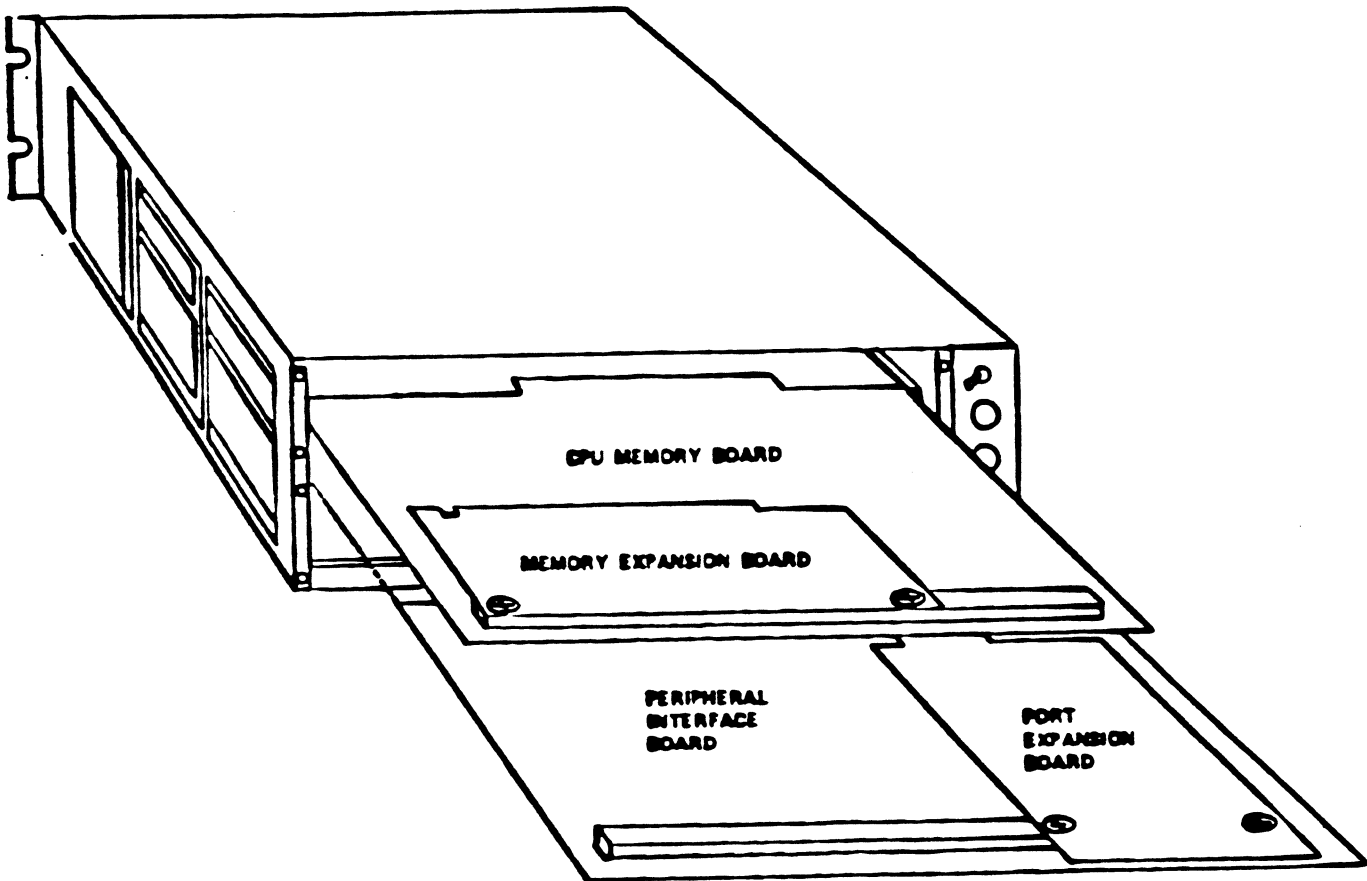


Figure 2. 64KB Memory Expansion Board Installation

technical memo

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.6

TO: MARK 3 Users
FROM: Hardware Customer Support
DATE: August 26, 1982
SUBJ: UPGRADING MARK 3 TO SEVEN PORTS

A MARK 3 may be field-upgraded to seven ports by installing the Port Expansion Board on the PIB board.

Before this expansion board is added, the following requirements must be met:

PIB Board Revision:

Revision A PIB boards require a factory modification before the Port Expansion Board can be installed. Call POINT 4 for a Return Authorization Number.

Any Revision B (or later) PIB board can be field-upgraded.

NOTE

Rev B or later boards have rev letter marked on board, behind J1, following part number "PIB 21000 _".

CPU Board Revision:

Rev A and B CPU boards must have ECO #465 installed. If the board has a jumper from 3H Pin 6 to 2F Pin 1 (part of ECO #465), the ECO is installed. If not, the board should be returned to POINT 4 for installation of all ECOs through #465. Call POINT 4 for a Return Authorization Number.

Rev C or later CPU board does not require any ECOs to use expansion boards.

NOTE

Rev letter is located on extractor end of board "CPU 20000 _".

Software Revision:

1. For IRIS users, this option requires version R7.5 (or later).
2. 7-Port MUX Driver.

NOTE

For systems using IRIS, the IRIS System Manager should determine which driver is on the system. From the Manager account, at the system prompt (#), enter

```
#DSP <CTRL-E>key<CTRL-E> <RETURN>  
F$MMUX <RETURN>  
D10201: . . . . <ESC>
```

where

key is the password for DSP

Contents of location 10201 in \$MMUX =
11234 = 7-Port Driver
11214 = 4-Port Driver

The 4-port MUX drivers cannot be expanded.
Replace, if necessary.

Required CPU Board Components (see Figure 1 for locations):

1. Microcode proms at locations 8B, 9B, 10B, 13B, 14B, 9C, and 10C must be Rev 4, i.e., C8B4A, C9B4A, C10B4A, etc.

NOTE

Prom at location 11B should be 11B6.

Required PIB Board Components (see Figure 2 for locations):

1. Connector at J9 - if missing, one must be installed.

POINT 4 P/N = 500350
BERG P/N = 65610-150

2. DIP headers or push-on plugs to set baud rate on expansion ports.
3. Port Expansion Board, POINT 4 P/N 21100.

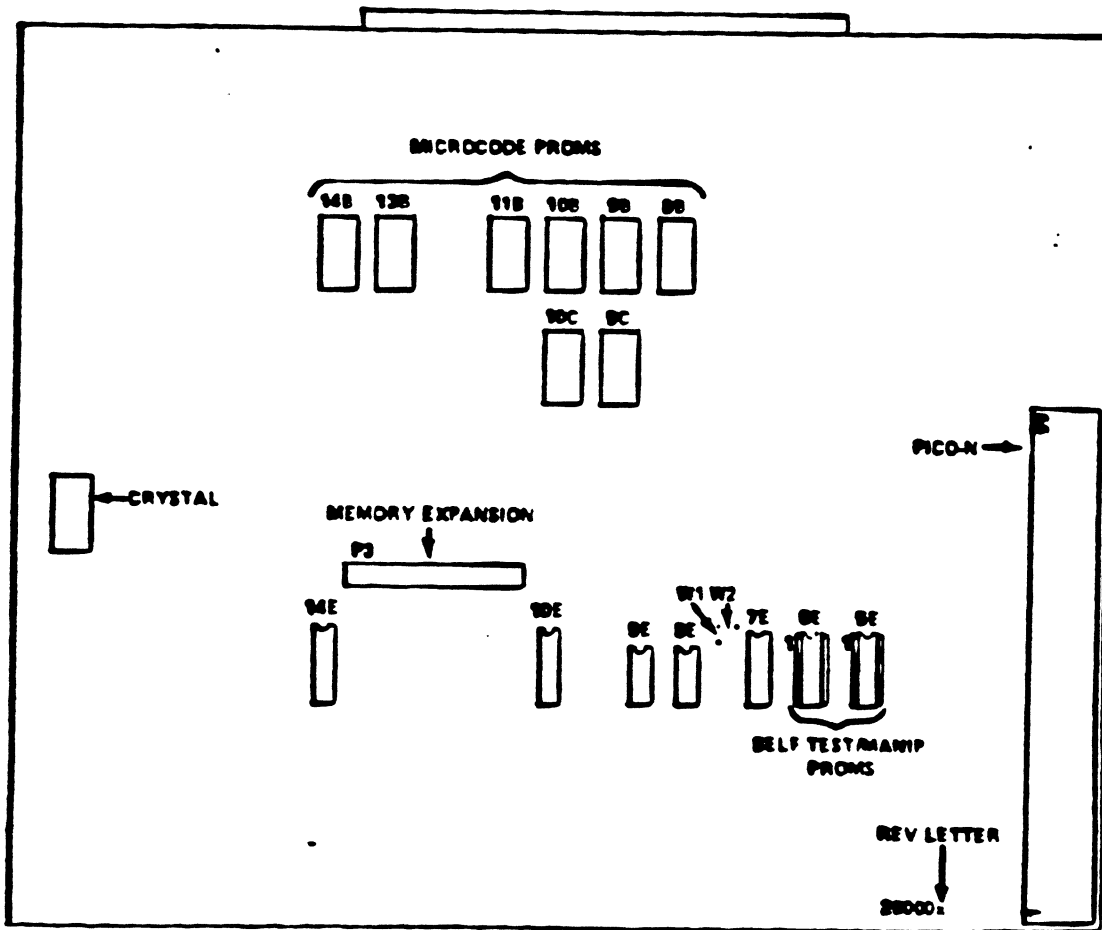


Figure 1. MARK 3 CPU Board

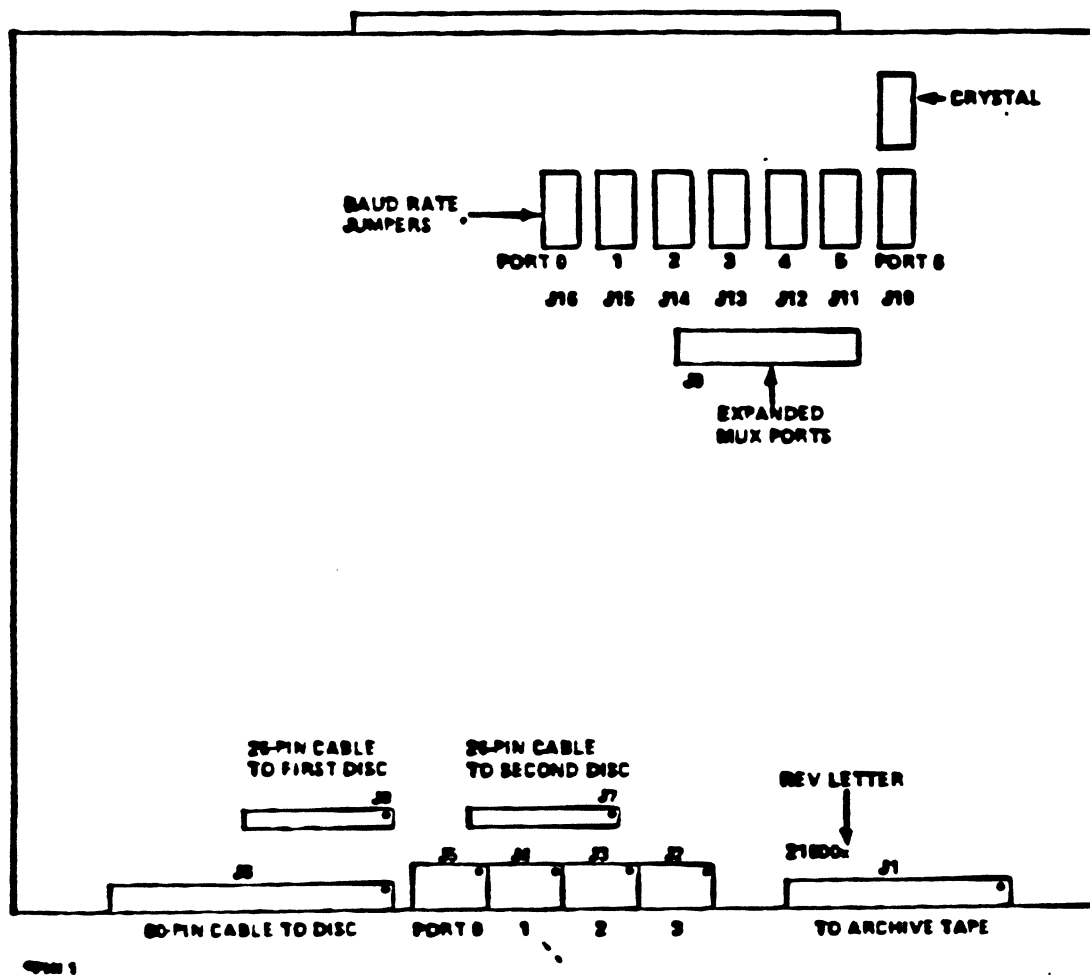


Figure 2. Peripheral Interface Board

Procedure:

1. Run Self-Test on the CPU. Run Diagnostics on all I/O devices on the PIB. Run both boards under the operating system.
2. Remove CPU board from chassis:
 - a. Install correct Microcode prompts in CPU board.
 - b. Make sure that all pluggable devices are fully inserted.
 - c. Reinstall CPU board in chassis and test CPU board.
3. Remove PIB board from chassis.
 - a. Install header plug at J9, if necessary.
 - b. Install Port Expansion Board, connecting to 50-pin connector on PIB, and secure with screws (see Figure 3).
 - c. Install baud rate jumpers at locations J10, J11, J12.
 - d. Make sure that all pluggable devices are fully inserted.
 - e. Reinstall PIB board in chassis and attach cables (see cabling considerations which follow).
4. Run MARK 3 Diagnostics on all I/O devices to ensure operation.
5. IPL system - Make appropriate changes to \$MMUX attributes or replace MUX driver (System Manager function).
6. Re-IPL system and test.

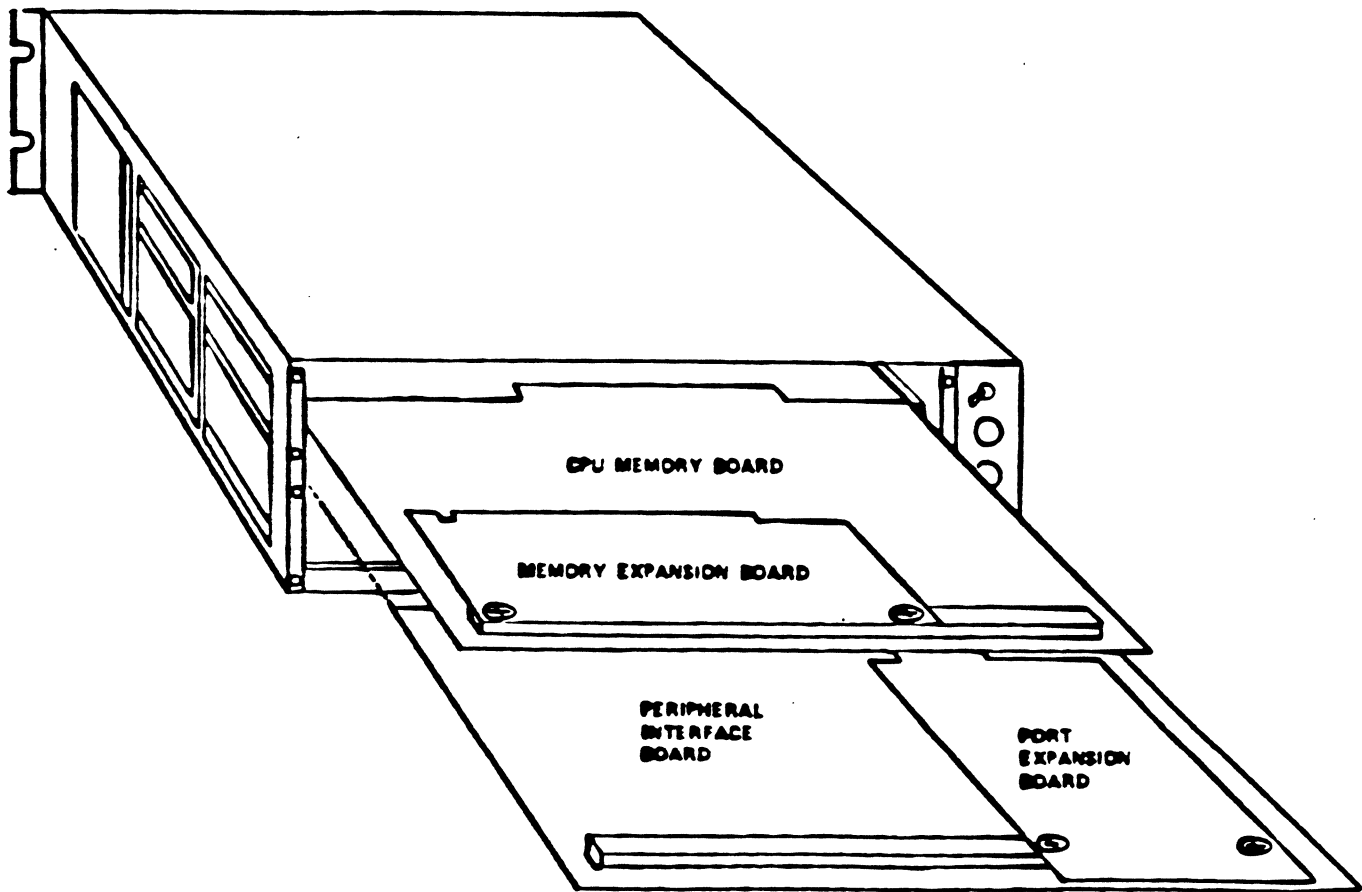


Figure 3. Port Expansion Board Installation

Cabling Considerations:

The MUX ports on Revisions A through C of the PIB board have two status inputs and no output. MUX ports on Revision D PIBs and all Port Expansion Boards have one status input and one control output. The new output bit is particularly useful for modem control (DTR).

Cables for Rev A-C PIBs have pins 2 and 5 jumpered together. The jumper should be removed for new-style ports (Rev D (or later) and for all Port Expansion Board ports).

Table 1 is a guide for cable, port type, and device usage. Cables are for standard configuration; nonstandard devices may have different cabling requirements.

Figures 4 through 6 illustrate standard cable wiring for the MARK 3.

The PIB or Expansion Board end of the MUX cable uses a 6-pin connector:

	<u>Molex P/N</u>	<u>POINT 4 P/N</u>
Connector, 6-pin	09-50-3061	500106
Pin, crimp type (one pin per wire required)	08-50-0106	724005

The other end of the cable uses a standard RS-232 DB-25 connector.

See Appendix A for cable length considerations.

TABLE 1. MARK 3 CABLE USAGE

	PIB Rev A-C Ports 0-3	PIB, Rev D (or later) Ports 0-3	All Port Expansion Ports 4-6
CRT	1 or 2	1 or 2	1 or 2
Printer	1 or 2	2	2
Modem	*	3	3
where			
1 - MARK 3 asynchronous CRT/printer cable for Ports 0-3 on Revision A thru C PIBs (see Figure 4).			
2 - MARK 3 asynchronous CRT/printer cable for Ports 0-3 on Revision D (or later) PIBs; and Ports 4-6 on all Port Expansion Boards (see Figure 5).			
3 - MARK 3 asynchronous modem cable for Ports 0-3 on Revision D (or later) PIBs; and Ports 4-6 on all Port Expansion Boards (see Figure 6).			
*A modem may function on Rev A-C PIBs if the modem does not require a control line from the computer (no DTR required); in that case, use cable 3.			

SIGNAL DIRECTION	MUX END		PINS	CRT/PRINTER END
→	(TRANSMIT DATA)	TXD	1—3	RCD (RECEIVE DATA)
←	(RECEIVE DATA)	RCD	4—2	TXD (TRANSMIT DATA)
←	(CARRIER DETECT)	DCD	2	BUSY*
←	(CLEAR TO SEND)	CTS	5	
	SIGNAL GROUND		6—7	SIGNAL GROUND

***BUSY:**

CRTs - NOT REQUIRED
 PRINTERS - NORMALLY PIN 19 OR 20
 MAY ALSO BE 11 OR 14
 (CONSULT YOUR PRINTER MANUAL)
 PRINTER BUSY MUST BE:
 NORMAL = HIGH
 BUSY = LOW

NOTE

THIS CABLE SHOULD ALSO WORK WITH CRTs ON REV D OR LATER PIB BOARDS FOR ALL SEVEN PORTS; IT WILL NOT WORK WITH PRINTERS ON REV D OR LATER BOARDS.

MARK 3 IRIS PRINTER DRIVER DOES NOT SUPPORT X-ON, X-OFF.

Figure 4. MARK 4 Asynchronous CRT/Printer Cable Ports 0-3, PIB Revisions A thru C

SIGNAL DIRECTION	MUX END	PINS	CRT/PRINTER END
→	(TRANSMIT DATA) TXD	1—3	RCD (RECEIVE DATA)
←	(RECEIVE DATA) RCD	4—2	TXD (TRANSMIT DATA)
←	(CARRIER DETECT) (CLEAR TO SEND) DCD/CTS	5—	BUSY*
	SIGNAL GROUND	6—7	SIGNAL GROUND

***BUSY:**

CRTs - NOT REQUIRED
 PRINTERS - NORMALLY PIN 19 OR 20
 MAY ALSO BE 11 OR 14
 (CONSULT YOUR PRINTER MANUAL)
 PRINTER BUSY MUST BE:
 NORMAL = HIGH
 BUSY = LOW

NOTE

MARK 3 IRIS printer driver does not support X-ON, X-OFF.

**Figure 5. MARK 3 Asynchronous CRT/Printer Cable
 Ports 0-3, PIB Revision D (and later)
 Ports 4-6, All Port Expansion Boards**

SIGNAL DIRECTION	MUX END	PINS	MODEM END
←	(TRANSMIT DATA) TXD	1—2	TXD (TRANSMIT DATA)
→	(RECEIVE DATA) RCD	4—3	RCD (RECEIVE DATA)
→	(REQUEST TO SEND) (DATA TERMINAL READY) RTS/DTR	2—20	DTR (DATA TERMINAL READY)
←	(CARRIER DETECT) (CLEAR TO SEND) DCD/CTS	5—8	DCD (CARRIER DETECT)
	SIGNAL GROUND	6—7	SIGNAL GROUND

NOTE

IF A MODEM IS REQUIRED ON A REV A-C PIB, AND EXPANSION PORTS ARE NOT AVAILABLE, THE MODEM USED MUST NOT REQUIRE ANY CONTROL LINE FROM THE COMPUTER. IT MUST BE JUMPED OR SWITCHED TO BE READY CONSTANTLY (NO DTR REQUIRED).

**Figure 6. MARK 3 Asynchronous Modem Cable
Ports 0-3, PIB Revision D (and later)
Ports 4-6, All Port Expansion Boards**

APPENDIX A

CABLE LENGTH CONSIDERATIONS

The following considerations apply to the specification of maximum cable length between the POINT 4 MARK 3 MUX and a CRT or other terminal, using the RS-232 interface.

The Electronics Industries Association (EIA), in Recommended Standard RS-232C, states, "The use of short cables (each less than approximately 50 feet...) is recommended; however, longer cables are permissible, provided that the resulting load capacitance...does not exceed 2500 picofarads." The 50-foot recommendation is generally viewed as extremely conservative.

In normal noise environments, the limiting factor determining maximum cable length is waveshape distortion due to resistance-capacitance effects. This factor is directly proportional to line length and baud rate. The following maximum line lengths represent safe engineering practice:

<u>Baud Rate</u>	<u>Maximum Length</u>
9600	500 feet
4800	1000 feet
2400	1/2 mile
1200	1 mile

The same relationship should continue for several miles, after which the limiting factor will become resistive voltage drop.

Ordinary unshielded wire may be used such as telephone company interior wiring. In foot-traffic areas, standard 3-wire a.c. line cord with heavy insulation makes a sturdy, inexpensive cable.

In noisy environments (cable runs in close proximity to fluorescent lights or air conditioning or elevator motors), the limiting factor becomes noise pickup and shielded wire should be used. The same line lengths may be employed.

The only effect of excessive cable length will be the occasional incorrect transmission of a character. If this happens too frequently to be acceptable, a lower baud rate should be used.

TECH SUPPORT

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.7

TO: MARK 3 Users
FROM: Hardware Customer Support
DATE: Reissued November 10, 1985
SUBJ: MARK 3 PROM SELECTION GUIDE

This tech memo provides PROM selection information for the MARK 3 CPU. There are two sets of PROMs on the CPU board:

1. Microcode PROMs at locations 8B, 9B, 10B, 11B, 13B, 14B, 9C and 10C. Figure 1 shows the features supported by the various revisions of the microcode PROMs.
2. MANIP/Self-Test PROMs at locations 5E and 6E. Table 1 describes the functions supported by the various PROM sets.

PROM markings are defined in the following example:

C8B14A
┌───┐
│ │
│ │
│ │
└───┘
Option code
Revision number
Location on board
Product (MK3 CPU)

FEATURE	PROM REVISION																				
	1	2	3A	3A/ 11B5A	4A	4A/ 11B6A	7A	7F	8A	8F	9A	9F	10A	10F	11A	11F	12A	12F	13A	14A	
32KW(64KB)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
64KW(128KB)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4 PORTS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7 PORTS				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STREAMER TAPE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
FLOPPY DISC							Y		Y			Y					Y	Y	Y	Y	Y
LARK DRIVE						Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DRIVES WITH SECTOR PULSES DOWN TO 800ns (FUJITSU 168MB)												Y					Y	Y	Y	Y	Y
DRIVES WITH SYNC TIMING (KENNEDY 40MB MODEL 7300)																	Y	Y	Y	Y	Y
BLM/COSOL SOFTWARE							Y										Y	Y	Y	Y	Y
ALL 8M/10M/LMD																					
2803A (FASTER CHIP)																					
CIPHER 548 5-1/8" STREAMER																					

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Figure 1. MARK 3 Microcode PROM Selection

TABLE 1. MARK 3 MANIP PROMS

PROM Set	Functions
C5E1 C6E1	32KW Max CPU Self Test CMD/SMD Boot Capability (P Command) CTU Boot Capability (R Command)
C5E2 C6E2	32KW Max CPU Self Test CMD/SMD Boot Capability (P Command) Streamer Tape Boot Capability (H Command) (Corrects inconsistent boot from BASF Disc)
C5E3A C6E3A	32 or 64KW CPU Self Test CMD/SMD Boot Capability (P Command) Streamer Tape Boot Capability (H Command) (Does not move MANIP into upper memory on a 64KW system)
C5E3C C6E3C	32 or 64KW CPU Self Test CMD/SMD Boot Capability (P Command) CTU Boot Capability (R Command) (Does not move MANIP into upper memory on a 64KW system)
C5E4A C6E4A	32 or 64KW CPU Self Test CMD/SMD Boot Capability (P Command) Streamer Tape Boot Capability (H Command)
C5E4C C6E4C	32 or 64KW CPU Self Test CMD/SMD Boot Capability (P Command) CTU Boot Capability (R Command)
C5E4F C6E4F	32 or 64KW CPU Self Test CMD/SMD Boot Capability (P Command) Floppy Disc Boot Capability (F Command)
C5E5A C6E5A	32 or 64KW CPU Self Test CMD/SMD Boot Capability (P Command) Streamer Tape Boot: <ol style="list-style-type: none"> 1. Default Mode Use H Command 2. QIC11 Read on Cipher 45MB use H11 3. QIC11 Read on Archive 45MB use H46

TECH SUPPORT

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.8

TO: MARK 9 Users
FROM: Tech Support
DATE: Reissued June 10, 1985
SUBJ: MARK 9 SYSTEM NOTES

MARK 9 CPU BOARDS

VERSIONS OF BOARD

There are currently three part numbers of the MARK 9 CPU board. The p/n is located to the left of the dip switches on the front edge of the board.

p/n 61903 - IRIS map only

p/n 61913 - Nova map only (used by Blis/Cobol)

p/n 61923 - IRIS or Nova map on same board (IRIS or Blis/Cobol)
(all shipments are now the 61923 board)

DIAGNOSTICS

61903 boards - use diagnostic Version 1.1 (note these boards should fail the Nova single-cycle test and pass all other tests successfully)

61913 boards - use diagnostic Version 1.1 (should pass all tests)

61923 boards - use diagnostic Version 2.1 (should pass all tests)

NOTE

Diagnostic Version 2.0 has been replaced by Version 2.1.

If these diagnostics are not included with your Operating System, they can be ordered as stand-alones on cassette or streamer tape. Contact your Sales Representative to order them.

MANIP VERSIONS

There are currently two versions of MANIP (Manipulator or virtual front panel) PROMs used on the MARK 9 CPU Boards.

<u>PROM ID</u>	<u>Description of Features</u>
I6E1 I8E1	Same MANIP as the MARK 5/8 CPU including the F command. This is the MANIP on most of the 61903 boards.
IN6E1 IN8E1	F command removed and replaced with feature to clear mapped memory when executing the P command. This MANIP is on a few 61903 boards and is on all 61913 and 61923 boards.

SYSTEM POWER SUPPLY

All MARK 9 systems require a MARK 9 power supply or a factory-upgraded MARK 8 power supply.

MARK 9 power supplies are fully compatible with MARK 5 or 8 systems.

MARK 9 POWER SUPPLIES

MARK 9 power supplies are:

p/n 63003 - Rev BA only
p/n 63023 - all revs

Any other revision of the p/n 63003 power supply must be factory upgraded for use with a MARK 9.

UPGRADED MARK 8 POWER SUPPLIES

MARK 8 power supplies that have been factory upgraded should have a label near the serial number that says "MARK 9".

MARK 5 POWER SUPPLIES

The MARK 5 power supply, p/n 64003, is not upgradable for use with MARK 9.

CHASSIS

The MARK 9 CPU requires a MARK 9 chassis or a factory upgraded MARK 5/8 chassis.

MARK 9 CHASSIS

MARK 9 chassis are:

p/n 65013 - all Revs
p/n 65003 - rev BA only

UPGRADED MARK 5/8 CHASSIS

MARK 5/8 chassis that have been upgraded to MARK 9 should have a label near the serial number label that says "MARK 9".

NOTE

In all cases, a chassis that is suitable for use with a MARK 9 will have:

A multicolor, 22-gauge cable that goes between the backplane and the power supply, instead of the 28-gauge, gray cable

100 CFM fans that push air out the left side, instead of 50 CFM fans that draw air in the left side.

A green, 18-gauge wire connected to pin A5 of the CPU slot

To ensure proper cooling, the front bezel must be installed on the chassis.

The MARK 9 chassis is fully compatible with MARK 5/8 CPUs.

MARK 9 PICO-N AND MAPPED IRIS

IRIS 8.2C and later have a SYSMAP driver to enable IRIS to use the MARK 9 map. The Pico-N requires a special key for operation of the map.

LOTUS CACHE MEMORY USED IN A MARK 9 SYSTEM

Field Change Notice #011 is required on LCMs with serial numbers below 1456. This modification may be field or factory installed.

This modification does not affect operation of MARK 5/8 systems.

LOTUS DISK CONTROLLERS

MARK 9 systems should use the LOTUS 710 or 730 Disk Controller.

GENERAL NOTES

1. All modifications except FCN#011 are "Factory Only" installed by POINT 4. Contact POINT 4 Customer Service for policy and pricing information to upgrade older equipment.
2. All MARK 9 CPUs draw more +5V current than MARK 5/8 CPUs. This may limit system configuration possibilities. Refer to HICS.9 for current requirements of POINT 4 boards.

MAX CURRENT DRAW IS 35 AMPS

TECH SUPPORT

HARDWARE INFORMATION, CUSTOMER SUPPORT

HITS.9

TO: MARK 5/8/9/12 System Users
FROM: Hardware Tech Support
DATE: Reissued November 10, 1986
SUBJ: MARK 5/8/9/12 VOLTAGES AND CURRENTS

This bulletin provides voltage and current information for MARK 5/8/9/12 systems. See Table 1 for a summary.

The following is some additional information relating to maximum current allowed, the LCM Power Supply, and the +5vBBU in the MARK 5/9 chassis.

Maximum Current Allowed

For MARK 5/8/9 Power Supplies, the maximum allowable current at +5vDC is 35 amps.

For MARK 12 Power Supplies, the maximum allowable current at +5vDC is 50 amps.

For External LCM Power Supplies, the maximum allowable current at +5vDC is 20 amps.

LCM Power Supply

The LCM board must be properly jumpered to use the external LCM Power Supply. This P/S supplies all voltage to the LCM(s), but only when AC line voltage is present; the supply does not have a battery backup feature.

+5vBBU on MARK 5/9 Chassis

On the MARK 5/9 chassis, +5vBBU is available only to the CPU slot; it is not available to any other slot. Thus, LCM boards in the MARK 5/9 chassis do not have battery backup.

TABLE 1. MARK 5/8/9/12 VOLTAGES AND CURRENTS

PCB ASSEMBLY	+5V	+5V BBU	-5V	-5V BBU	+15V	-15V	+12V BBU
MARK 5/8 CPU 128KB w/o BBU	9.3		10ma		600ma		
MARK 5/8 CPU 128KB w/BBU	9.0	0.3		10ma			600ma
MARK 9 CPU 512KB w/o BBU	14.0						
MARK 9 CPU 512KB w/BBU	11.0	3.0					
MARK 12 CPU	14.0						
2/4MB XMEM Operating Standby	2.3 2.3	4.0* 1.9*					
2/4MB LCM Operating Standby	2.3 2.3	4.0* 1.9*					
LCM 1MB	4.0						
LOTUS 700/710 Disk Ctrlr	5.0		0.8				
LOTUS 720 Tape Ctrlr	0.5						
LOTUS 725 Tape Ctrlr	4.0						
LOTUS 730 Disk/Tape Ctrlr	5.5		0.8				
LOTUS 740	10.3		1.16				
310-A8 MUX w/310 P/S	5.0				250ma	250ma	
310-A8 MUX w/o 310 P/S	5.0				**	**	
301-A8 MUX	1.0				**	**	
301-A16 MUX	2.0				**	**	
301-A24 MUX	3.0				**	**	

*For power calculations, assume the first board is operating, and the rest are in standby:
 6.3 amps total current for the first board
 4.2 amps total current for each additional board

**Mux 310 w/o onboard ± 12 vDC regulators and all Mux 301s use an external power supply (Model 340-xx) or the terminal block, TB1, on the back of the MARK 12 power supply for ± 12 vDC.

TECH SUPPORT

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.10

TO: MARK 5 Chassis/LOTUS 730 Users

FROM: POINT 4 Hardware Tech Support

DATE: January 10, 1985

SUBJ: MARK 5 CHASSIS FRONT BEZEL-TO-LOTUS 730 CLEARANCE

All MARK 5 chassis front bezels have two molded-in mounting posts for mounting the OCU (Operator Control Unit) cable/plug assemblies. These posts protrude into the 730's cabling when the 730 board is in slot two of the MARK 5 chassis as shown in Figure 1.

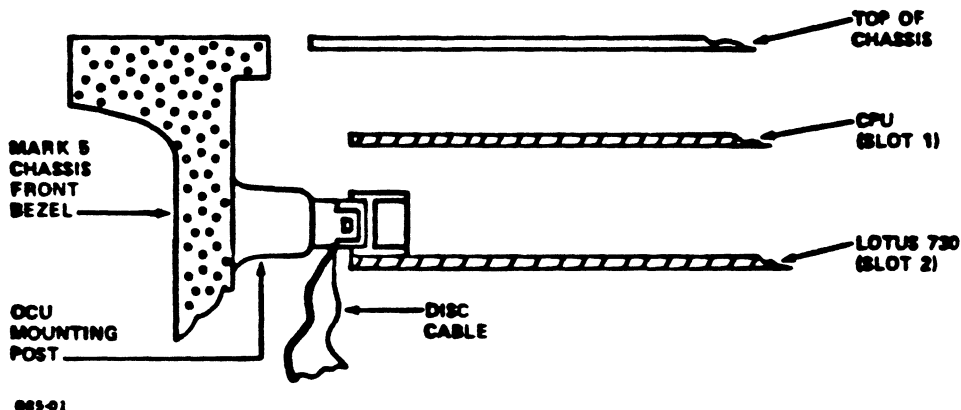


Figure 1. MARK 5 Chassis Front Bezel OCU Mounting Posts

The recommended solution is to relocate the LOTUS 730 to another slot.

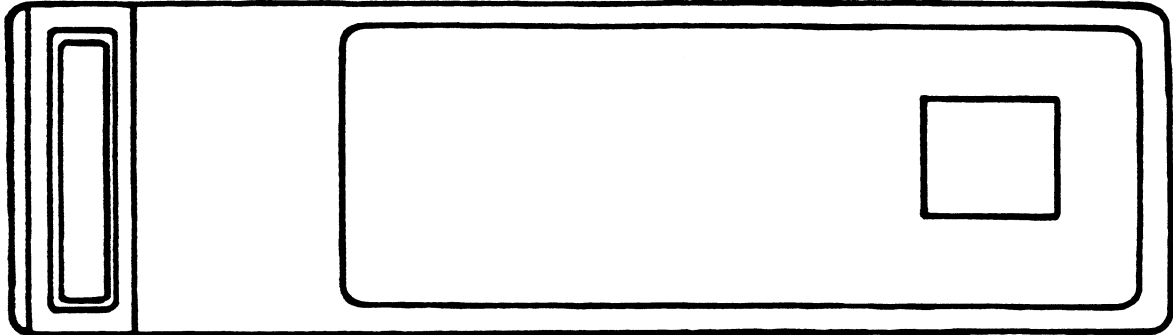
If the 730 board cannot be moved and the OCU is not installed, the OCU mounting posts can be cut away to provide the necessary clearance (see Figure 2).

If the OCU is to be installed, the solution involves reversing the chassis and power supply bezels. The front bezel of the power supply and the chassis are the same except that the chassis bezel has a slot cut in it for the OCU.

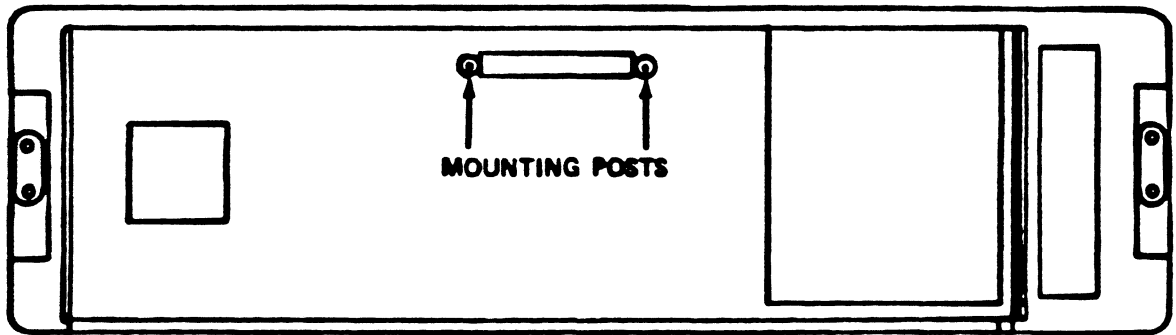
Mount the system power supply directly above the chassis. Put the slotted bezel and OCU on the power supply and run the OCU cable down to the CPU.

Cut away the mounting posts on the system power supply bezel, which is now being used as the chassis bezel.

FRONT VIEW



REAR VIEW



085-02

Figure 2. MARK 5 Chassis Front Bezel Modification

TECH SUPPORT

HARDWARE INFORMATION, CUSTOMER SUPPORT

HICS.11

TO: POINT 4 System Users
FROM: Hardware Customer Support
DATE: July 10, 1985
SUBJ: TECH TIPS FOR CARTRIDGE STREAMER TAPES

Since the streamer tape drive is used to load software supplied by POINT 4, to load diagnostics and utilities, and for backing up the system, it is important to use proper tapes and procedures to ensure that the drives will be able to read and write reliably.

45MB tape drives use narrower recording areas on the tape and less write-current than the 20MB tape drives. These newer drives will not tolerate poor media or handling procedures as well as the older drives.

There are several conditions that should be controlled to ensure trouble-free operation:

1. Use of "Archive certified" tape cartridges
2. Cartridge temperature
3. System/drive temperature
4. Tape tension
5. Cleaning the drive
6. Labeling cartridges
7. Cartridge wear

TESTED TAPE CARTRIDGES

A standard DC300XL tape cartridge may have flaws that can cause Read or Write errors.

POINT 4 recommends the use of tape cartridges that are "certified" by Archive.

POINT 4 no longer offers uncertified tapes. Effective June 1985, all tape cartridges from POINT 4 are certified by Archive. These Archive-certified tape cartridges will have the new P/N, 900213. The new cartridges can be identified by the label on the cartridge that says "Archive" (the old cartridges had a label that said "Scotch").

CARTRIDGE TEMPERATURE

Tape cartridges should be stored at a temperature close to that of the computer room. If this cannot be done, the tape cartridges should be allowed to temperature-stabilize in the room with the computer. The cartridge should be "conditioned" by exposure to the operating environment for a time equal to or greater than the time away from the operating environment (up to 8 hours maximum).

SYSTEM/DRIVE TEMPERATURE

A MARK 3, 5, or 9 system should be kept in an environment that is no more than 35°C or 95°F. A MARK 2 or 4 system should be kept in an environment that is no more than 40°C or 104°F. This will keep the streamer tape drives below the manufacturer's recommended maximum of 45°C.

ECOs

MARK 3 Tabletop Systems with Fujitsu 84 or 168MB disk drives run hotter than most of our systems. If problems are encountered with these systems, check the tape drive temperature. If the room temperature is 35°C or 95°F, or below, and the drive temperature is still over 45°C or 112°F, the tabletop peripheral box should have ECO 1363 factory-installed. ECO 1363 will improve the cooling of a Fujitsu tabletop peripheral box.

FRONT AND REAR COVERS

Front and rear covers must remain on the system to ensure proper air flow and cooling. Missing covers can have a dramatic effect on temperatures inside the system. Operating a system without the covers can cause the drive temperature to increase by 15°C or 45°F. Covers may be removed while troubleshooting, but the covers should be replaced when the system is returned to service.

TAPE TENSION

It is important that the tape be evenly wound on the spools inside the tape cartridge. The tape tension will change as the tape cartridge is subjected to:

1. Physical shock.
2. Temperature changes.
3. Sitting on the shelf (even for a few hours).
4. Start/Stop operation such as reading a stand-alone tape, or a tape that has errors.

It is important to "retension" a tape before each use, even if it is new or has only been a few hours since the last use. In some cases, multiple retensions will be required.

Use the "RETENSION" command in DISCUTILITY before any Save or Restore operation, or if errors are encountered during a Read or Write. Retension is an option in all recent versions of DISCUTILITY.

Retension can also be performed from MANIP on MARK 2, 3, or 4 systems by using the "H" command followed by 44 (e.g., H44).

DRIVE CLEANING

R/W heads should be cleaned periodically. Head cleaning should be done:

1. After every 8 hours of normal use.
2. After the initial retension pass, if new tapes are being used.
3. Whenever problems or errors are encountered in reading or writing a tape.

Heads can be cleaned with a lint-free swab and Freon TF. Solutions that contain alcohol or water should not be used.

For end-user sites, POINT 4 offers a head-cleaning kit that is easy to use.

LABELING CARTRIDGES

The metal baseplate of the cartridge is used to align the cartridge to the R/W head. Labels should not be placed on the metal base. Labels should be placed on the top plastic cover.

CARTRIDGE WEAR

Typical life of a cartridge is up to 5000 track passes. That is, 5000/4 or 1250 full tapes for a 20MB tape, 5000/10 or 500 full tapes for 45MB tape.

TECH SUPPORT

HARDWARE INFORMATION, TECH SUPPORT

HITS.12

TO: MARK 4 Users
FROM: Hardware Tech Support
DATE: Reissued September 10, 1986
SUBJ: TECH NOTES ON THE MARK 4

CPU Problems

A potential timing problem was discovered in MARK 4 CPUs. Systems that are affected by the problem have a variety of symptoms, particularly when Mapped Memory is active. All CPU boards, especially those having problems, should be sent to POINT 4 for upgrade to Rev A5.

Recent boards will have the revision level marked on the board following the part number. For example, a Rev A5 CPU will have a gum label indicating

53003 A5

If you wish to send a board in for upgrade, contact POINT 4 Customer Service for a return authorization number.

Using a Mixture of Baud Rates on the PIB

There was a problem with the MARK 4 PIB which caused problems when mixing low baud rates with faster rates, such as using equipment at 300 and/or 1200 bps with equipment at 9600 bps. If you are mixing baud rates and you cannot get all the ports to function, your PIB may need ECO 1378.

To ascertain whether ECO 1378 is on the PIB, check the ICs at locations 3C, 4C, 5C, and 6C. If the ECO has been installed, these ICs will be 74F161. If the ECO has not been installed, these ICs will be 74LS161.

If you are mixing baud rates and the ECO is not installed, call POINT 4 Hardware Technical Support; we will make arrangements to get your PIB corrected.

AC Line Fuse

On a few of the early MARK 4 Systems, a lower amperage fuse was used. The correct fuses are:

220 VAC	P/N 504130 3A/250v, Slow Blow
110 VAC	P/N 504060 6A/250v, Slow Blow

ST506 Disk Interface

The ST506 disk interface is provided by the Western Digital WD1002-05, which is mounted on the PIB. The WS1002-05 is modified by POINT 4 for use on the MARK 2 or the MARK 4. Because of differences in the various revisions of these boards, they are not necessarily interchangeable. Contact Hardware Tech Support for assistance before exchanging WD1002-05 boards between MARK 2s and MARK 4s.

MARK 2/4 DISCUTILITY

The current version of the MARK 2/4 DISCUTILITY is 2.11. If you are using version 2.8 (or earlier) with 86MB Fujitsu drives, the result could be that bad sectors are not chained. Users of these drives must use Rev 2.9 or later. See the September 1985 issue of the Software Customer Support News for information on the differences between versions 2.8 and 2.9.

TECH SUPPORT

HARDWARE INFORMATION, TECH SUPPORT

HITS.13

TO: Half-Inch Tape Streamer Users

FROM: Hardware Tech Support

DATE: July 10, 1986

SUBJ: JUMPER/SWITCH SETTINGS FOR LOTUS 725 1/2" TAPE STREAMERS

In order to use DISCUTILITY Version 5.3 (or later) with the LOTUS 725 (Poly-Rianda Model 2200 Controller), the board must be set for 128KB addressing as shown below.

The old and new configurations at board location 60A are:

OLD:

1	2	3	4	5	6	7	8
0	0	I	I	I	0	0	0

NEW:

1	2	3	4	5	6	7	8
I	0	0	I	I	0	0	0

The rest of the board remains the same:

Jumper/Switch

Location	1	2	3	4	5	6	7	8
50R	I	0	I	I	0	0	I	N/A
60F	I	0	I	I	0	I	0	N/A
70P	I	0	0	0	0	0	0	0
100N	0	0	0	0	0	0	0	I

where

- I - Jumper in or switch closed/on
- 0 - Jumper out or switch open/off
- N/A - Not applicable

TECH SUPPORT

HARDWARE INFORMATION, TECH SUPPORT

HITS.14

TO: MARK 9 Users

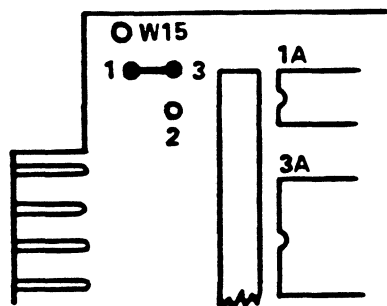
FROM: Hardware Tech Support

DATE: July 10, 1986

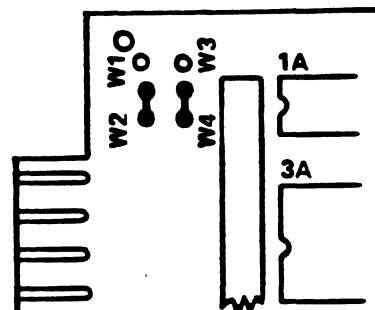
SUBJ: JUMPER INSTALLATION FOR MARK 9 WITH/WITHOUT BBU

In order to use Battery Backup, the MARK 9 CPU requires the MARK 9 power supply and chassis. This is the standard configuration shipped by POINT 4. With Battery Backup, install the jumpers as illustrated in Figure 1.

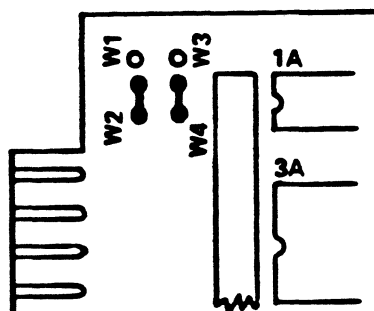
If your configuration is not as described above, Battery Backup cannot be used. Install the jumpers as illustrated in Figure 2.



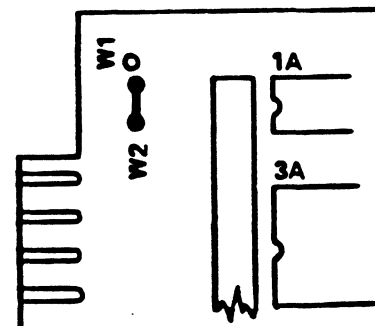
61903 REV P



61903 REV A and above

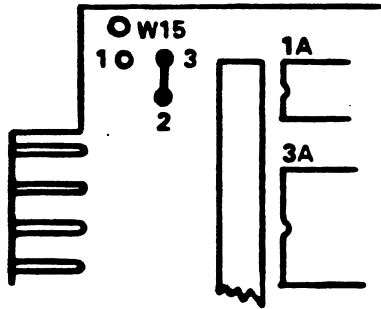


61913 REV A and above

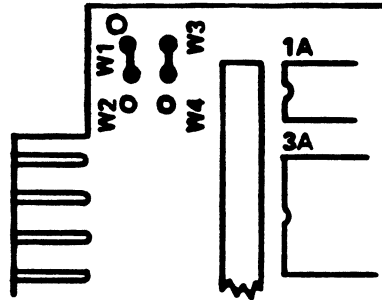


61923 REV A and above

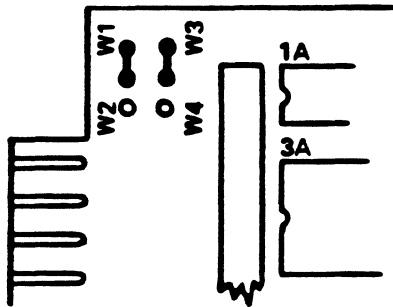
Figure 1. Jumper Installation with Battery Backup



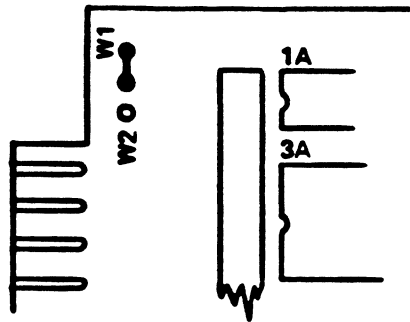
61903 REV P



61903 REV A and above



61913 REV A and above



61923 REV A and above

Figure 2. Jumper Installation with No Battery Backup

TECH SUPPORT

HARDWARE INFORMATION, TECHNICAL SUPPORT

HITS.15

To: Users of 2/4 Megabyte Lotus Cache Memory
From: Hardware Technical Support
Date: November 10, 1987 (Reissue)
Subj: Installing and configuring 2/4 MB LCM.

Part Number:

1. 53016-01 --- 2MB LCM with EDAC
2. 53016-02 --- 4MB LCM with EDAC

Power Requirements:

MODE	+5vBU	+5vBP	Total Current
Standby	1.9A	2.3A	4.2A
Operating	4.0A	2.3A	6.3A

NOTE: Use Operating mode for first LCM and Standby mode for all other LCMs in the system when determining total Power.

Power Jumpers:

1. Jumper configuration using the standard power source.

NOTE: If board has J1 connector and no external P/S, J1 connector should be covered to prevent injury.

Jumpers in: W1,W3,W8,W21,W4,W5,W6,W7
Jumpers out: W2,W14,W15,W20

2. Jumper configuration with External LCM Power Supply.

Jumpers in: W4,W5,W6,W7
Jumpers out: W1,W3,W8,W21,W2,W14,W15,W20

NOTE: To use the External Power Supply requires that the J1, 50 pin connector (PN: 500349) be installed on the LCM.

Data Channel hit rate:

- 1. 50% hit rate: Jumper W22 in.
 - 2. 100% hit rate: Jumper W22 out. (Standard)
- NOTE.** 100% hit rate requires that the LCM be the lowest in the Data Channel Priority chain to prevent tie-up of the Data Channel by the LCM.

Block decode switch settings:

One or more LCM boards may be used on a system. The beginning block address of each LCM board is set in an 4-position dip switch found at location A30. Start with the largest capacity LCM and proceed to the smallest, regardless of their installed order in the chassis.

The first LCM board to be defined, set all dip switches to off/open.

For the remainder of the LCMs to be defined, set the dip switch which indicates that board's beginning block address.

Switch Settings (SW1): Location A30

MegaBytes already in system:	Switch settings:			
	S1	S2	S3	S4
0 1st.Board (any size)	0	0	0	N/U
2	0	0	1	N/U
4	0	1	0	N/U
6	0	1	1	N/U
8	1	0	0	N/U
10	1	0	1	N/U
12	1	1	0	N/U
14	1	1	1	N/U

1 = on / closed
0 = off / open

2/4 MB LCM Diagnostic:

The new Lotus Cache Memory Diagnostic is **DI.LCM.2.3** . This diagnostic will work with **ALL** LCM Memory boards. **DI.LCM.2.0** and above will test all the logic on **ALL** the LCM boards.

The older LCM diagnostic, **DI.LCM.1.3**, will not test the 2/4 MB LCMs properly. The Error Detection and Correction tests will fail. If you change location 224 from 20000 to 40000 then the diagnostic will bypass checking EDAC. With this change you can verify that the boards are installed properly and the memory is O.K.

Diagnostic History of DI.LCM.XX:

- 1.3 OK with old 1MB LCM boards.
- 2.0 Add 2/4MB LCM.
Add Mk 12.
- 2.1 Minor changes to message.
- 2.2 Add Mk 6.
- 2.3 Minor changes to message.

Mixing different size LCMs:

In order for the Software to work properly the LCM memory must be addressed with the largest memory first and the smallest last. You can install both old and new style LCMs together as long as the above rule is followed.

TECH SUPPORT

HARDWARE INFORMATION, TECHNICAL SUPPORT

HITS.16

TO: All Point 4 System Users
FROM: Hardware Technical Support
DATE: November 10, 1987 (Reissue)
SUBJ: Power Ratings of Point 4 Systems

When installing computer systems it is necessary to figure the total maximum power consumed and from this the total BTU or heat created by the system.

To calculate total power (Watts) one should use a figure of the maximum power that each power supply on the system can consume. List 1 lists most power supplies for Point 4 systems and disk/tape subsystems. List 2 covers most common peripherals used on Point 4 systems. If a peripheral does not have a power supply then use the rating of the power supply used with that peripheral. If a power supply is supplied with the peripheral then use the MAX power (when given) rating when determining total power consumed. Other- wise use the TYPICAL rating.

When determining BTU or heat created by a system use the TYPICAL power rating of the peripheral in List 2 or just the power rating of the power supply given in List 1. Multiply this rating by 3.41 to find the BTU of that device.

This is not an absolute list. You may examine product spec. and determine a different rating. Use your best judgement when calculating system power and BTU.

POWER SUPPLY POWER RATINGS

TYPE EQUIPMENT	POWER SUPPLY MANUFACTURE	POWER RATING (note 1)	BTU/hr
MARK 2	Point 4 Data	180 Watts	614.0
MARK 2	Condor SPL-1120	85 Watts	290.0
Mark2E	Fortron FC5192	200 Watts	682.0
Mark 3	Point 4 Data	180 Watts	614.0
Disk/Tape Sub-Systems	DataPower DP200	200 Watts	682.0
	Cherokee QM2-I2	200 Watts	682.0
	Cherokee QX6-F1	325 Watts	1136.0
Mark 4	Power-One SPL200-4100P	350 Watts	1200.0
Mark 4/4E	CEC 0242-10	350 watts	1200.0
Mark 4/4E	Condor SPL-1120	85 Watts	290.0
Mark 5	Point 4 Data	625 Watts	2132.0
Mark 8/9	Point 4 Data	325 Watts	1400.0
Mark 12/6	Point 4 Data	425 Watts	1450.0
Mark 12/6 BBU	Point 4 Data	60 Watts	205.0
LCM	Point 4 Data	100 Watts	341.0

Note:

1. Power ratings for all Power Supplies are for maximum rating.

PERIPHERAL POWER CONSUMPTION

MANUFACTURE	TYPE	MODEL	POWER		BTU/hr
			TYPICAL	MAX	
Fuji	86MB Disk	M2243AS	43 W	70 W	147.0
	84MB Disk	M2312K	126 W	198 W	430.0
	168MB Disk	M2322K	140 W	227 W	478.0
	337MB Disk	M2333K	161 W	249 W	550.0
Maxtor	67/143MB Disk	XT-1000	28 W	64 W	94.0
MiniScribe	32/53/85MB Disk	6032/53/85	14 W	26 W	48.0
CDC	32/64/96MB Disk	9448	950 W	1725 W	3240.0*
	16/50MB Disk	Lark9455/7	195 W	318 W	665.0*
Atasi	46MB Disk	3046	35 W	60 W	120.0
Priam	35/70MB Disk	3450	190 W	207 W	650.0
	344MB Disk	807	77 W	190 W	263.0
Archive	20MB Tape 1/4"	Sidewinder	55 W	74 W	190.0
	45/20MB Tape 1/4"	Scorpion	33 W	62 W	113.0
Cipher	20MB Tape 1/4"	420-CT	30 W	62 W	103.0
	45MB Tape 1/4"	525-CT	27 W	34 W	93.0
	Tape 1/2"	F880	270 W	270 W	920.0*
	Tape 1/2"	M990	400 W	400 W	1364.0*
Negatape	Tape 1/2"	MT-500	300 W	300W	1023.0*
Okidata	Printer	Micro 84	150 W		512.0*
Dataproducts	Printer	M200	275 W		940.0*
Printronic	Printer	P-300	810 W		2762.0*
Texas Instruments	Printer	850	100 W		341.0*
Point 4 Data (Note 2)	Terminal	WS-100	100 W		341.0*

Note:

- * Indicates peripheral has a self-contained power supply.
- 2. Most terminals consume approx. 100 watts of power.

TECH SUPPORT

HARDWARE INFORMATION, TECH SUPPORT

HITS.17

TO: MARK 4 Users
FROM: Hardware Tech Support
DATE: September 10, 1986
SUBJ: MARK 4 POWER SUPPLIES

All MARK 4s have a primary or main power supply that provides DC power to the card cage, cabinet fans, disc drive #0, tape drive, and (optional) floppy disk drive.

The MARK 4 will have an Auxiliary power supply to power additional hard disc drive(s) if more than one hard disc is installed in the cabinet.

MAIN POWER SUPPLY

There are two main power supplies in use for MARK 4 systems. The original power supply used a switching power supply module manufactured by Power One. The later power supply uses a switching power supply module manufactured by CEC. The two power supply assemblies have different AC and DC terminal pin-outs and use different DC cable harnesses. The power supply assemblies are interchangeable if the entire assemblies are changed.

	<u>Complete Power Supply Assembly P/N</u>	<u>Basic Switching P/S Module P/N</u>	<u>DC Cable Assembly P/N</u>
Power One power supply assembly	82002	513530	88001
CEC power supply assembly	82030	513531	88065

The complete power supply assembly includes: chassis/mounting frame, basic switching power supply module, AC power switch/relay board, and DC cable assembly.

Replacing an Old Main Power Supply with a New Power Supply

If you are replacing an old main power supply with a new power supply it is recommended that you replace the entire power supply assembly. The old power supply assembly is part number 82002. The new (replacement) power supply assembly is part number 82030. The new (82030) power supply assembly includes the 88065 DC cable.

The basic switching power supply module (513530) in the old power supply assembly (82002) can be replaced with a new basic switching power supply module (513531). If the basic switching power supply module is updated, the old DC cable (88001) will have to be replaced with a new DC cable (88065).

POWER ONE POWER SUPPLY

The following is a description of the 82002 power supply with Power One module; see Figure 1.

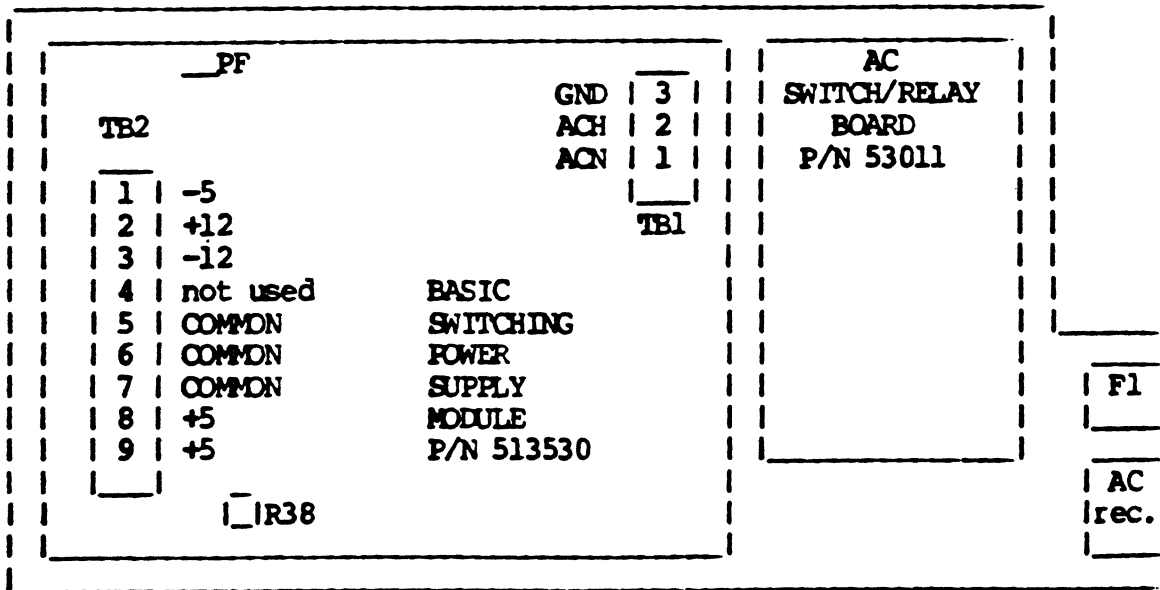


Figure 1. P/N 82002, Complete Main Power Supply Assembly with Power One Basic Switching Power Supply Module

POWER ONE POWER SUPPLY (CONT)

Pin Assignments for TB2 (DC Voltages, Output)

<u>Pin #</u>	<u>Voltage</u>	<u>Wire Color* in DC Cable Assemblies</u>
**	Power fail	Violet
1	-5vDC	Yellow
2	+12vDC	Orange
3	-12vDC	Blue
4	unused	
5	Common	Brown
6	Common	Brown
7	Common	Brown
8	+5vDC	Red
9	+5vDC	Red

*Color refers to wire color in cable harness.

**Located above pin 1.

The wires to the DC fans are both black. The ribbed wire should go to the -12 volts and the smooth wire should go to ground. Make sure that the fans blow air out the back of the cabinet.

Pin Assignments for TB1 (AC Voltages, Input)

<u>Pin #</u>	<u>Voltage</u>	<u>Wire Color*</u>
1	AC Neutral	Blue
2	AC High	Brown
3	AC Ground	Green/Yellow

*Color refers to the wire color in cable harness.

POWER ONE POWER SUPPLY (CONT)

Checking/Adjusting 513530 Main Power Supplies

In the Power One switching power supply modules (P/N 513530), the pot that adjusts the +5vDC also adjusts the +12vDC output. Whenever the pot is adjusted, both outputs must be checked.

Voltages should be measured with the disc drive up to speed and the system running Self Test.

The +12vDC should be measured at the terminal block on the power supply.

The +5 volts should be measured at the terminal block on the backplane.

PROCEDURE:

Remove the right side panel.

All devices should be connected, e.g., the disc drive, tape drive, CPU and PIE. The disc should be up to speed and the system should be running Self Test when checking or adjusting voltages.

Measure the +5 and +12 volt outputs.

The +5 should be 5.05 volts at the terminal block on the backplane.

The +12 should NOT EXCEED 12.5 volts at the terminal block on the power supply.

CAUTION: Because one adjustment pot effects both outputs, caution must be taken to make sure neither voltage goes too high during the adjustment procedure.

WARNING: the adjustment pot is very sensitive.

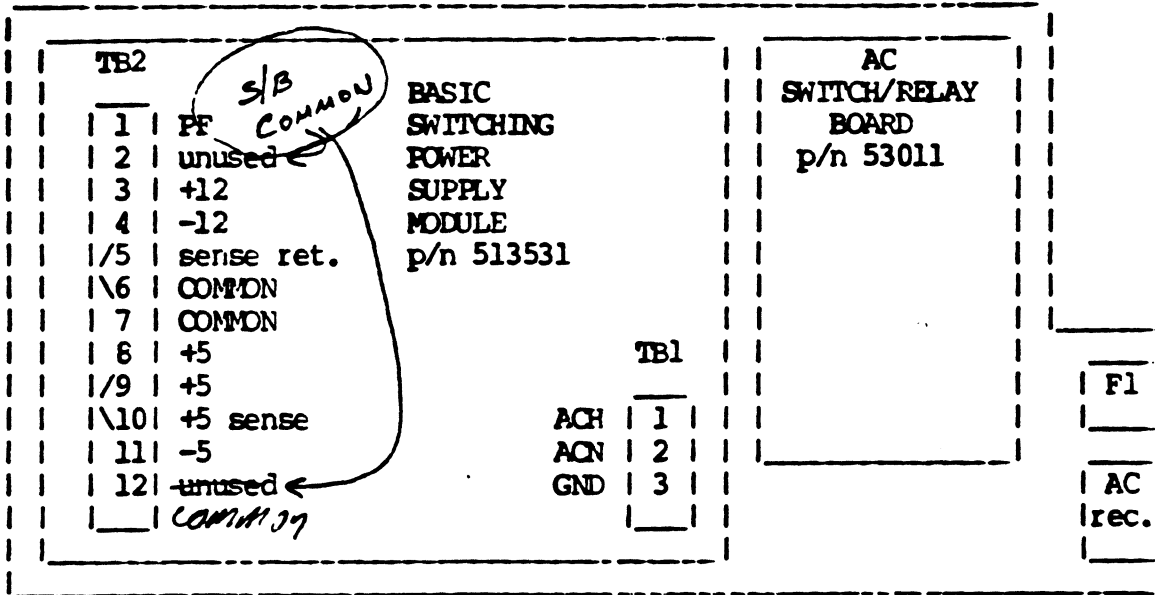
Adjust R38 (located just below TB2) on the switching power supply module for +12vDC output to be 12.5 volts.

Check the +5v at the backplane; if it is above 5.05, adjust it down to 5.05.

If you cannot get the +5 up to 5.05 and keep the +12 below 12.5 volts, call POINT 4 Tech Support for assistance.

CEC POWER SUPPLY

The following is a description of the 82030 Power Supply, with CEC module; see Figure 2.



Note: Pins 5 and 6, and pins 9 and 10 are bridged.

Figure 2. P/N 82030, Complete Main Power Supply Assembly with CEC Basic Switching Power Supply Module

Pin Assignments for TB1 (AC Voltages, Input)

<u>Pin #</u>	<u>Voltage</u>	<u>Wire Color*</u>
1	AC High	Brown
2	AC Neutral	Blue
3	AC Ground	Green/Yellow

*Color refers to the wire color in the cable harness.

CEC POWER SUPPLY (CONT)

Pin Assignments for TB2 (DC Voltages, Output)

<u>Pin #</u>	<u>Voltage</u>	<u>Wire Color* in DC Cable Assemblies</u>
1	PF	Violet
2	unused	
3	+12	Orange
4	-12	Blue
5	Sense ret.	
6	Common	Brown
7	Common	Brown
8	+5	Red
9	+5	Red
10	Sense	
11	-5	Yellow
12	unused	

*Color refers to wire color in cable harness.

The wires to the DC fans are both black. The ribbed wire should go to the -12 volts and the smooth wire should go to ground. The fans should blow air out the back of the cabinet.

TECH SUPPORT

HARDWARE INFORMATION, TECHNICAL SUPPORT

HITS.18

TO: 8 Slot Chassis & Power Supply Users
FROM: Hardware Technical Support
DATE: December 10, 1987 (Reissue)
SUBJECT: 8 SLOT CHASSIS AND POWER SUPPLIES.

Power Monitor Board:

1. Assembly No. 53015

The latest revision of this power monitor board is -A8. This rev board has all the latest ECO's and does not have the power fail sensitivity problem. This rev board is better than boards with R45 adjusted fully CCW. The assembly number and revision is located at the bottom middle of the board. Customers are encouraged to upgrade to the latest revision. Contact Customer Service at ext. 551.

2. Assembly No. 53046

This is the new Power Monitor board. This board is required if you are going to upgrade to Battery Backup. See requirements for Battery Backup in this same HITS bulletin.

Keyswitches:

The keyswitch is not a field replaceable item for two reasons:

- 1. The nut behind the keyswitch requires a special tool to install it correctly.**
- 2. There are different styles of keyswitch/cable assemblies that go with different minipanel. Therefore the entire minipanel assembly should be replaced as the smallest part.**

Requirements for Battery Backup:

1. If used with a Mark 12 CPU its Firmware must be revision 91011-XX. All Mark 6 CPUs will work with BBU.
2. Main Power Supply (P/N: 513550) must be revision R or higher. This is the manufactures (CEC) revision and is located within the CEC label.
3. Extended Memory must have revision 91010-XX Firmware and the Assembly must have ECO 1606 installed. ECO 1606 is only installed on Extended Memories if BBU is to be used. If resistor pack is installed at location 25D-1 then you have ECO 1606 on your Extended Memory. All Extended Memories boards must have ECO 1606 if they are in a system with BBU Power Supply.
4. The 8 slot chassis Mini-Panel (P/N: 82021) must have a key switch that can go from 'On' to 'Auto' without a power loss. Mini-Panel pcb with revision D or higher will work. If your Mini-Panel pcb is not at Revision D then the **ENTIRE** Mini-Panel Assembly must be returned for upgrade.
5. The Power Monitor must be a 53046 Assembly.
6. The Battery Backup AC line fuse installed. This is a 2 Amp slow blow (P/N: 504120).
7. IRIS R9 and above is required for Battery Backup.

Reference:

Further information on Point 4 Data Power Supplies can be found in Marketing Bulletin 37. Dated January 21, 1987.

TECH SUPPORT

HARDWARE INFORMATION, TECH SUPPORT

HITS.19

TO: POINT 4 Equipment Users
FROM: Hardware Tech Support
DATE: Reissued March 10, 1987
SUBJ: RS232, SERIAL INTERFACES, AND NEW MODULAR CONNECTORS

GENERAL NOTES ABOUT RS232-C

EIA Recommendations

The EIA RS232-C spec recommends that the cable length does not exceed 50 feet. The capacitance of the line should not exceed 2500 pF; this includes the cable, transmitter, and receiver chips.

Adhering to these recommendations should allow baud rates up to 19,200. The EIA recommendations are usually considered to be extremely conservative, and these recommendations are routinely exceeded. Cable lengths up to 500 feet will usually work at 9600 baud. If cable length is excessive, the baud rate may need to be lowered.

Voltages

The RS232-C spec says that positive voltages should be at least +3 volts (not to exceed +25 volts), and negative voltages should be at least -3 volts (not to exceed -25 volts). Voltages between +3 and -3 volts may cause undesirable results.

Some devices use voltages that are not in compliance with the RS232-C spec. For example, some devices use +12 or +5 volts as a high signal level and 0 volts as a low level; 0 volts is not a legitimate voltage. Devices that use 0 volts as a low level on the status line will not work with most POINT 4 equipment. Most POINT 4 equipment requires -3 volts as a low signal level on the status lines.

CABLING

Unused Wires

If a cable has wires that are not being used by the device, the wires should be disconnected at both ends. If these wires are left connected to the system and are not held high or low by an RS232 driver in the device, the wires will pick up crosstalk from adjacent wires and send the crosstalk to the system. If the crosstalk is picked up on status input or on data input lines, the changing input will cause unnecessary interrupts. The effect could be BASIC errors, system halts, or system slowdown. MARK 2E, MARK 4, and MARK 4E systems may also fail self test if there is crosstalk on unused wires.

A/B Switches

A manual switch that allows one CRT or printer to be connected to multiple systems is commonly called an A/B switch.

The commonly available A/B switches switch all 24 signals, leaving the lines to the unselected port open. This kind of switch leaves both the status line to the system and the data line to the system open. These lines can pick up crosstalk and send it to the system.

Any unused lines should be cut at the system end of the cables. However, the lines that are used are open and are therefore susceptible to crosstalk.

POINT 4 Tri-Tail Switch P/N 977013

This switch is intended for use with one CRT and two systems. The unselected data line is grounded inside the switch and should cause no problems. Status lines are not passed through or switched; the status lines should be cut at the system end of the cables. If the tri-tail plugs directly into the system, cut the status line in the connector of the tri-tail. If the tri-tail is connected to the system through an intermediate cable, cut the status line at the system end of the intermediate cable. If the status lines are cut at the system end of the cables, these switches should not cause any problems.

Shielding

POINT 4 recommends the use of shielded RS232 cables. The shield is required for FCC compliance. The shield will also help to protect the system and device from static discharges, and from induced voltages (lightning).

We have received calls from the field about systems that have been damaged by lightning. While there is no absolute protection from a direct lightning strike, shielded cables should eliminate the damage in most cases and reduce the damage in more severe cases.

The shield of the cable should have a good electrical connection to earth ground at both ends of the cable.

When a cable leaves a building, the shield should be tied to earth ground at the point of exit.

NOTE: **POINT 4** products have separate signal ground and chassis ground. The shield should be connected to the chassis ground.

On the **POINT 4** model 322 connector panel, the shield should be connected to pin 1. On an unmodified 322 panel, all pin 1's are connected together, but are not connected to chassis ground. **POINT 4** is in the process of creating an Engineering Change to add a ground wire to the 322. When the ECO is complete, a Field Change Notice will be published showing how and where to add the ground wire to the 322.

MODULAR CONNECTORS

POINT 4 has recently incorporated a new type of connector for the RS232 serial interface. The DB25 connector is being replaced by a modular RJ series connector similar to the modular telephone connectors. The RJ connectors are much smaller than the DB25s and will allow more connectors in a smaller space. The new RJ connectors are used on the MARK 2E, and will be used on products to be released in the near future.

The connectors are of two types: plug and jack. A jack is the female connector, like the connector at the back of a MARK 2E or a telephone outlet mounted in the wall; a plug is the male connector, like on the end of a telephone cord or data cable.

It is our expectation that you will be using the new modular data jacks when wiring new sites. The following discussion should be useful to you when installing this kind of wiring, making your own cables, and dealing with this new type of connector.

Possible Hazards

There is a possible hazard in using connectors that are similar to telephone connectors; a telephone may get plugged into a data jack or a CRT may get plugged into a telephone jack. The hazard arises from the differences in voltage:

- RS232 uses + and -12 volts (typically).
- Regular outside phone lines use 48 and 90 volts.
- PBX systems (internal phone systems) use voltages varying from 5 volts to 90 volts.

The possibilities for damage resulting from connecting unlike connectors and jacks are given below:

- If a CRT is plugged into a regular outside phone line, the phone line will probably be OK but the CRT will probably be severely damaged (especially if the phone line tries to ring the phone; regular phones take 90 volts to ring).
- If a CRT is plugged into an inside (PBX) line, both the PBX and the CRT may be damaged.
- If a regular phone is plugged into a data jack, both will probably survive (but there are no guarantees).
- If an inside (PBX) phone is plugged into a data jack, both may be damaged.

Fortunately, there are data plugs and jacks available that are keyed so a CRT cannot be plugged into a telephone jack. A telephone can still be plugged into a data jack, even if the data jack is keyed.

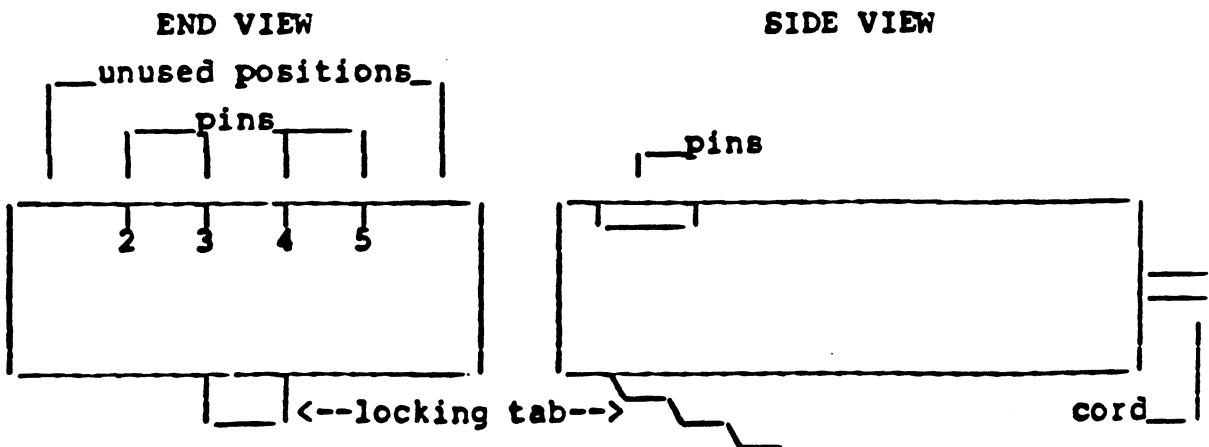
In our own facility, we use different shapes and colors for data and phone jacks. The jacks are also clearly labeled, "PHONE" and "DATA".

Variations of RJ Connectors

The RJ series of connectors has several variations. The easiest way to describe the variations is to describe the number of possible pin positions and the number of pins installed. Numbering is by position, not by installed pins. The first possible position is always position 1 even if no pin is installed. For example in a 6-position, 4-pin plug, the first pin is at position 2 as illustrated below.

The available connectors are described below for your general information. Please note that only the 8-position, 8-pin connector meets FCC requirements.

- 4-position, 4-pin - These are physically smaller than all the other connectors and are not compatible. This is frequently called a handset connector in the telephone industry. We do not use this connector.
- 6-position, 4-pin - This is frequently called a linecord connector in the telephone industry, it is slightly larger than the handset connector. There are 6 possible pin positions, but only the inner 4 have contact pins. The outer positions have no contacts. These plugs will fit into any 6, 8, or 10-position jack.



- 6-position, 6-pin - This is like the 6-position, 4-pin plug, except the outer 2 positions have contact pins. These will fit into any 6, 8, or 10-position jack.

The 6-position, 6-pin plug provides all of the signal lines available on POINT 4 asynchronous ports, but it does not provide the shield connection. The shield is recommended for protection, and is required for FCC compliance.

- 8-position, 8-pin - These are very similar to the 6-position plugs, but are slightly wider. These will fit into 8 or 10-position jacks. They will not fit into any 4 or 6-position jack.

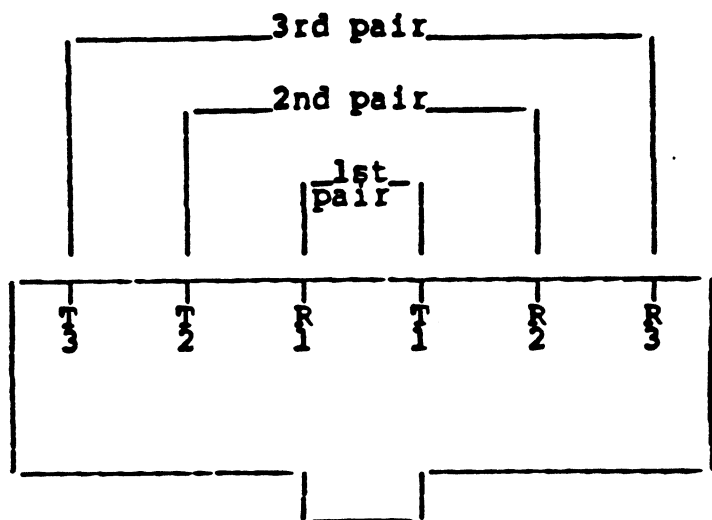
The 8-position plug has the following advantages:

- It provides all the signal lines for asynchronous ports, and provides a pin for the shield, which will meet FCC requirements.
- It is available with a small key on the side to prevent it from being plugged into a 8-position, unkeyed jack (the telephone company sometimes uses an 8-position unkeyed jack for modem lines).
- Neither keyed nor unkeyed 8-position plugs will fit into a regular (6-position) telephone jack.
- 10-position, 8-pin - The jacks that POINT 4 uses on the MARK 2E are 10-position, 8-pin jacks. These jacks will accept any 6 or 8-position plug. At this time we do not know of any 10-position plugs that are available.
- British Telco Connectors - These are similar to the U.S. Telco connectors except the locking tabs are on the side instead of the bottom of the connector as shown in these diagrams. The British Telco connectors are not compatible with U.S. Telco connectors.

POSITION NUMBERING IN MODULAR PLUGS AND JACKS

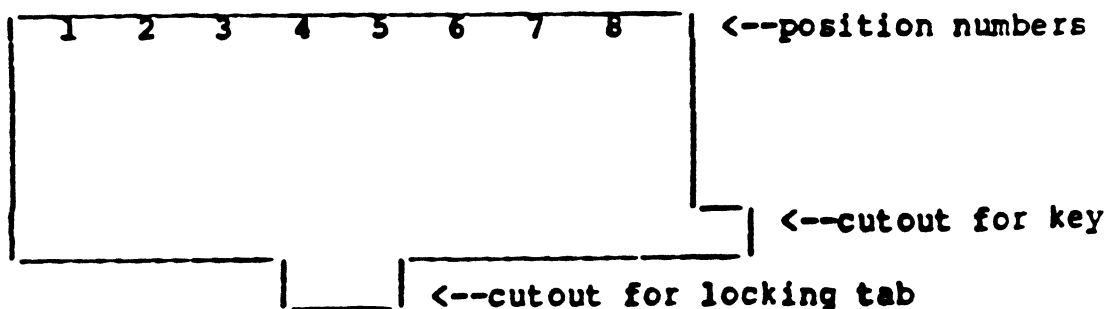
The modular plugs and jacks were designed by the telephone industry, which deals with wire in pairs. There will always be an even number of positions and pins in these connectors. The first pair is the innermost pair of pins.

The following illustrates the way the telephone company considers the pinouts:



NOTE: T and R represent Tip and Ring circuits in Telco terminology.

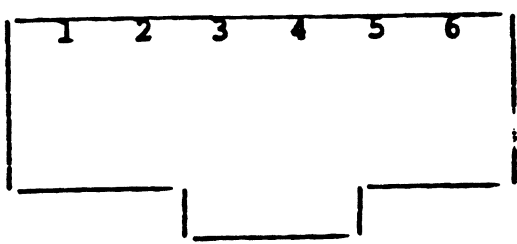
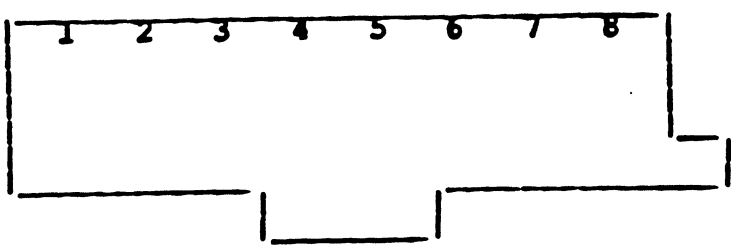
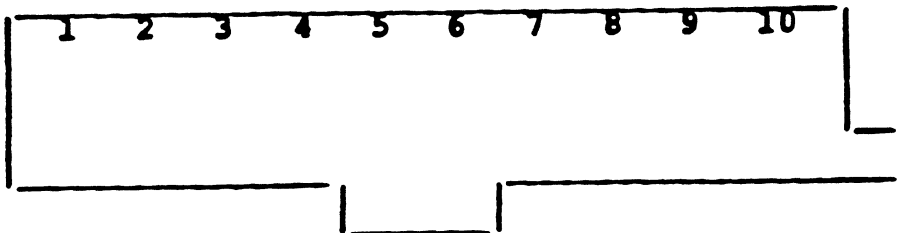
The position numbers are easiest to remember by viewing the jack. Looking into the hole in the face of the jack with the cutout for the locking tab at the bottom, the positions are numbered from left to right, as shown in the following diagram:



8-Position, Keyed Jack - Looking Into the Hole

Position Numbers

A connector is always numbered by position (not by pin), starting with position 1, regardless of how many pins are in the connector. This means that the inner positions will have different numbers in different size connectors. The position numbers for 6, 8, and 10-position jacks are shown below:



The following is another way of showing the position number relationships:

10- pos #	8- pos #	6- pos #
1		
2	----- 1	
3	----- 2	----- 1
4	----- 3	----- 2
5	----- 4	----- 3
6	----- 5	----- 4
7	----- 6	----- 5
8	----- 7	----- 6
9	----- 8	
10		

<-- This signal is on different position #s depending on how many positions are in the jack.

CRIMPING TOOLS FOR MODULAR PLUGS

Standard modular plugs are crimped onto the end of cables. There are several crimp tools on the market. From our experience, the plastic tools that are available in hardware and electronics stores are of very poor quality. They may not crimp the pins all the way and sometimes miss some of the pins entirely. Plugs with these poor crimps may damage the jacks into which they are plugged. The crimp tools that are available in hardware and electronics stores will crimp only the 6-position plugs. Tools to crimp the recommended 8-position plugs are available from distributors of telephone wiring equipment and distributors of the connectors. If you are going to be making your own cables with modular connectors, you will need to find a local distributor.

A good crimp tool costs about \$150. It will make good crimps every time, and will outlast dozens of the cheap tools. If you intend to make your own cables, you should have at least one good crimp tool in the shop.

If you don't want to buy a \$150 tool for every technician in the field, consider making up some long cables using the good tool, then have the Field Technicians cut them to the length needed in the field. This should work out well for cables that have a modular plug at one end and a DB25 at the other end.

CABLE FOR USE WITH MODULAR PLUGS

When ordering cable for use with modular plugs, keep the following in mind:

- Most 8-position plugs are designed to take a cable jacket that is no larger than 0.165 inch, some will take cable up to 0.190 inch.
- Most 8-position modular plug contacts are designed to take an insulated wire no larger than 0.035 inch.

Known Sources

The following are some known sources for the recommended crimp tools, 8-position modular plugs, field-installable plugs, cable, and wiring supplies:

CRIMP TOOLS

- AMP, Telephone: (717) 564-0100
AMP p/n 231652-1 Hand tool assy. for 8-position plugs
- GMP, Telephone: (215) 357-5500
GMP p/n 17063-B Tool with die for 8-position plugs

8-POSITION MODULAR PLUGS

- AMP, Telephone: (717) 564-0100
AMP p/n 5-641339 8-position, 8-pin plug with key, for use with 30 Ga. stranded wire
AMP p/n 5-641338 8-position, 8-pin plug without key, for use with 30 Ga. stranded wire
- GMP, Telephone: (215) 357-5500
GMP p/n 17077 Clear plastic, 8-position, 8-pin plug for use with 28 Ga. stranded wire.
GMP p/n 24062 Grey plastic, 8-position, 8-pin plug for use with 24 Ga. solid wire.

FIELD-INSTALLABLE MODULAR PLUGS

- T&B, Telephone: (201) 469-4000
TCNP8 Field-installable plug, narrow style, requires no special tools, made for use with 24 Ga. solid wire; should also work with 28 Ga. stranded wire

(Also available from Anixter and many other sources)

CABLE FOR USE WITH MODULAR PLUGS

● **Belden, Telephone: (317) 983-5200**

28 Ga., PVC insulation, 100% foil shield plus braid shield, bare drain wire, 28 pF/ft, 0.035-inch wire insulation

Belden p/n		Jacket Diameter
New 9628	3-wire plus shield	0.165 inch
New 9629	4-wire plus shield	0.178 inch
New 9630	5-wire plus shield	0.188 inch

● **Virginia Plastics, Telephone: (703) 985-3811**

Wide variety of cable that is compatible with modular connectors

Variations available in:

No. of conductors: 3, 4, 5, 7 (plus shield)
Colors: jacket and wire insulation
Gauges: 26, 28, 31 Ga.
Capacitance: 20 to 30 pF/ft

Examples (28 Ga., Black PVC Jacket, 0.035 Wire and Insulation, 28 pF/ft):

VP p/n 010.000.324	3-wire plus shield
VP p/n 010.000.327	4-wire plus shield
VP p/n 010.000.392	5-wire plus shield

Also available, cord/connector sets (cable with modular connectors, factory-installed on one or both ends)

All orders are factory direct; expect

1000-foot minimum for stock items
5000-10,000-foot minimum for special items

GENERAL WIRING SUPPLIES

Source for general wiring supplies:

- Anixter, Telephone: (312) 677-2600
(800) 323-8167

Mod plugs, jacks, crimp tools, wire + cable (including Belden), telephone cabling, telephone wiring supplies; offices nationwide

MODULAR DATA WIRING SUPPLIES

- Mod Tap, Telephone: (617) 456-3500

Various DB25-to-modular adapters, distribution wiring, modular patch panels, tools, and many other items

- Nevada Western, Telephone: (408) 737-1600

DB25-to-modular adapters, distribution wiring, modular patch panels

MODULAR-TO-DB25 SIGNAL LIST

SYSTEM END Modular Plug				DEVICE END DB25 Pin #
10- Pos	8-* Pos #	6- Pos #	Signal Name	
1			CHASGND	
2	----- 1		CHASGND (SHIELD)	--- 1
3	----- 2	----- 1	CONTROL OUT	--> 8
4	----- 3	----- 2	DATA OUT	--> 3
5	----- 4	----- 3	STATUS IN	<-- 20
6	----- 5	----- 4	DATA IN	<-- 2
7	----- 6	----- 5	SIGNAL GND	--- 7
8	----- 7	----- 6	SIGNAL GND	
9	----- 8		SPARE (N/C)	
10			SPARE (N/C)	

*The 8-pin connector allows for the use of shielded cables. Shielded cables must be used to meet FCC requirements.

MODULAR-TO-DB25 CABLES (to go from the system to CRTs, printers & modems)

Cables that meet FCC requirements can be ordered from POINT 4 (see discussion below) or you may decide to make your own. The following subsections describe the POINT 4 cable and provide cabling diagrams for both CRTs and printers. Please note that shielded cables and 8-pin connectors, in which the shield is connected to chassis ground, are required for FCC compliance. The readily available 6-position connectors have only the inner four pins (3-6) or six pins (2-7) of the 8-position connectors shown in the diagrams. The 6-position connectors do not provide the connection for the shield and thus would not meet FCC requirements.

POINT 4, 8-pin Modular-to-DB25 Cable, p/n 88075

POINT 4 offers cables that are already assembled with an 8-pin modular connector at one end and a DB25 at the other end. The cables are fully shielded and have been tested to meet FCC requirements. These cables have wires for all of our signals and are appropriate with any device that drives both the status-in and data-in signals.

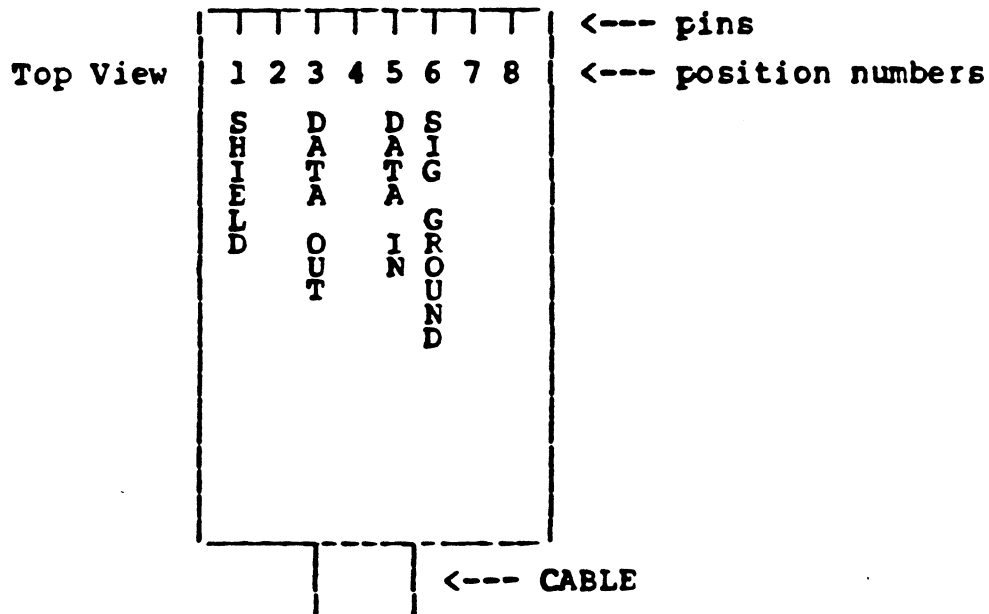
SYSTEM END Position # in 8-position Modular Plug	Wire Color	EIA Signal Name	POINT 4 Signal Description	DEVICE END DB25 Pin #
1	BARE	PROTGND	SHIELD ---	1
2	ORANGE	DTR/RTS	CONTROL -->	8
3	GRAY	TXD	DATA OUT -->	3
4	RED	DSR/CTS	STATUS IN <--	20
5	GREEN	RXD	DATA IN <--	2
6	YELLOW	SIGNAL GROUND	---	7
7	BLUE	NOT USED		
8	BROWN	NOT USED		

Recommended Wiring Diagram for CRT Cables

The CRT cable should have all the signals required for a CRT. Unused wires should not be connected at either end of the cable.

This cable should also work with printers that use X-ON/X-OFF instead of a busy line.

SYSTEM END Position # in 8-position Modular Plug	EIA Signal Name	POINT 4 Signal Description	DEVICE END DB25 Pin #
1	PROT GND	SHIELD ---	1
2			
3	TXD	DATA OUT -->	3
4			
5	RXD	DATA IN <--	2
6	SIGNAL GROUND	---	7
7			
8			



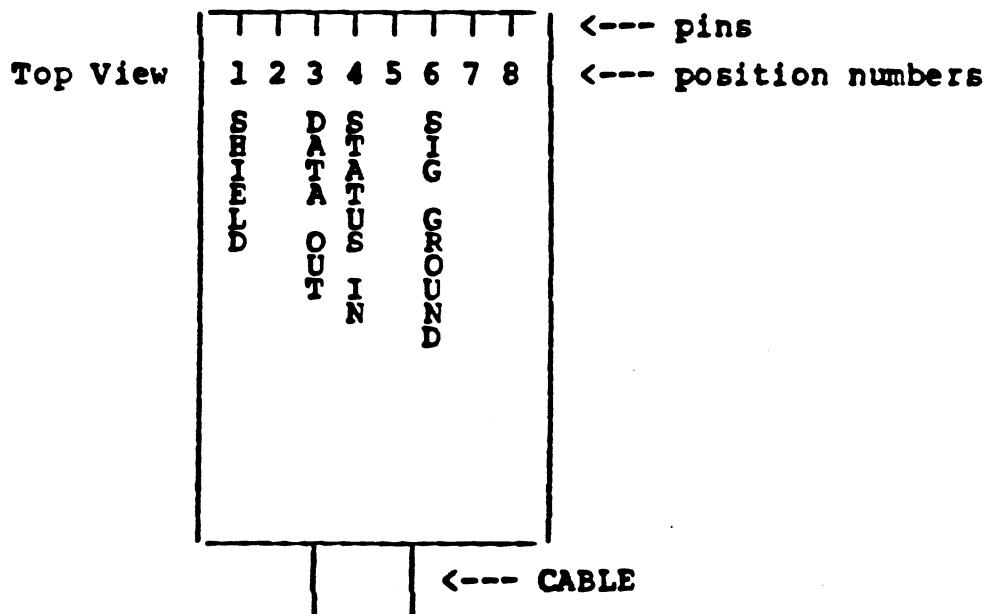
8-Pin CRT Connector, with Locking Tab Down

Recommended Wiring Diagram for Printer Cables

The printer cable should have all of the signals required for a typical printer that uses a busy line and not X-ON/X-OFF. The status-in line may have to be moved at the printer end of the cable (some printers use other pins for the busy signal).

Unused wires should not be connected at either end of the cable.

SYSTEM END Position # in 8-position Modular Plug	EIA Signal Name	POINT 4 Signal Description	DEVICES END DB25 Pin #
1	PROT GND	SHIELD ---	1
2			
3	TXD	DATA OUT -->	3
4	DSR	STATUS IN <--	20
5			
6	SIGNAL GROUND	---	7
7			
8			



8-Pin Printer Connector, with Locking Tab Down

Recommended Wiring Diagram for Modem Cable - Asynchronous Port

SYSTEM END Position # in 8-position Modular Plug	EIA Signal Name	POINT 4 Signal Description	Direction	DEVICE END DB25 Pin #
1	PROTGND	SHIELD	---	1
2	DTR/RTS	CONTROL OUT	--->	20
3	TXD	DATA OUT	--->	2
4	DSR/CTS	STATUS IN	<---	8
5	RXD	DATA IN	<---	3
6	SIGNAL GND		---	7
7	NOT USED			
8	NOT USED			

HARDWARE INFORMATION, TECHNICAL SUPPORT**HITS.20**

To: Users of 2/4 Megabyte Extended Memory P/N: 53009
From: Hardware Technical Support
Date: March 1988 (Reissue)
Subj: Installing and Configuring 2/4 MB Extended Memory

Part Number:

A. 53009-01 --- 2MB Extended Memory with EDAC
B. 53009-02 --- 4MB Extended Memory with EDAC

NOTE: Extended Memory requires the use of either a Mark 12 or Mark 6 CPU. Also required is the 8 Slot chassis with a 425 Watt Power Supply. Extended Memory must be installed in slots 2 through 5 only.

Power Requirements:

MODE	+5vBU	+5vBP	Total Current
Standby	1.9A	2.3A	4.2A
Operating	4.0A	2.3A	6.3A

NOTE: Use Operating mode for first Extended Memory and Standby mode for all other Extended Memories in the system when determining total Power.

Power Jumpers:

Jumpers in: W1,W3,W8,W21,W2,14,15,W20
Jumpers out: W4,W5,W6,W7

NOTE 1: See page 3 for requirements to operate with BBU.

NOTE 2: The jumper configuration can be used without a BBU power source if the jumper plug is installed at J6 located on the back of the 8 Slot Chassis.

Block decode switch settings:

One or more Extended Memory boards may be used on a system. The beginning block address of each Extended Memory board is set in a 4-position dip switch found at location A30. Addressing should start with the largest capacity Extended Memory and proceed to the smallest, regardless of their physical order in the chassis.

The first Extended Memory board to be defined, set all dip switches to off/open.

For the remainder of the Extended Memorys to be defined, set the dip switch which indicates that board's beginning block address.

Switch Settings (SW1): Location A30

MegaBytes already in system:		Switch settings:			
		S1	S2	S3	S4
0	1st.Board (any size)	0	0	0	N/U
2		0	0	1	N/U
4		0	1	0	N/U
6		0	1	1	N/U
8		1	0	0	N/U
10		1	0	1	N/U
12		1	1	0	N/U

1 = on / closed
0 = off / open

Mark 6/12 Data Channel Map/Extended Memory Diagnostic:

The Mark 6/12 Data Channel Map/Memory Diagnostic (DI.MK12.1.5) Revision 1.5 will test both the Mark 6 and the Mark 12 with Extended Memory. The diagnostic tests both transfers from/to CPU/Extended Memory and Data Channel Map/Extended Memory.

The method used to check data transfers from Data Channel Map and Extended Memory is to use the Mighty Mux (M310), ports 1 & 2 (with port 0 the first port). Because of this the Mighty Mux Diagnostic Cable is required. The test transmits from port 1 and receives via port 2. For a diagram of this cable reference Mighty Mux User Manual page A-1.

Firmware Requirements:

Firmware Location: 31B thru 31F

Prom ID = 910rr.xxx rr = revision xxx = IC location

Revision:

Comments:

91002-xxx

Initial Release

91010-xxx

Allow simultaneous access by
Data Channel Map & the CPU.

Installation of Extended Memory Firmware, P/N: 91010-XX

The Firmware can be installed in the field, return of the Extended Memory board to Point 4 Data is not required. If you do install this Firmware you must also remove Resistor R44 which is situated next to LED labeled 'CERR'. Do this with a pair of wire cutters. Refer to FCN 12 for this change.

Important NOTE:

If you upgrade your Extended Memory Firmware to 91010-XX then be sure your Mark 12 (if that is your CPU) Firmware is 91011-XX. Its location on the Mark 12 CPU is 25F thru 28F, 24J thru 29J and 26K thru 29K. These firmware levels are a requirement to operate IRIS Revision 9.0. Again you can order the Firmware from Point 4 Data and install it yourself.

Minimum Firmware Requirments:

Mark 12	Mark 6	Extended Memory
91011-XX	91019-XX	91010-XX

Using Extended Memory with the IRIS Operating System:

Using the Mark 6 and Extended Memory requires IRIS minimum revision R8.3E, with software patch HCON83-02.

Using the Mark 12 and Extended Memory requires IRIS minimum revision R8.3C.

More about Extended Memory and Battery Backup (BBU):

Extended Memory with BBU must have ECO 1606 installed.

NOTE: To verify that ECO 1606 is installed on **ALL** of your Extended Memories check to see if there is a Resistor Pack at location 25D.

Extended Memory with BBU requires IRIS minimum revision R9.0.

As noted on page 1 the Extended Memory can be jumpered for BBU voltages and still work without BBU installed. The only requirement is that jumper plug P6, PN 088045, be installed at J6 on the backplane of the 8 Slot Chassis.

HARDWARE INFORMATION, TECH SUPPORT

HITS.21

TO: Users of Mark 12 CPU P/N: 53008
FROM: Hardware Tech Support
DATE: March 1988 (reissue)
SUBJ: Mark 12 CPU AND Firmware

Part Number:

CPU Assy. 53008

Power Requirement:

+5 volts at 14 amps of current. No battery backup voltage is used.

Firmware Revisions:

Location: 25F thru 28F, 24J thru 29J, 26K thru 29K.

Prom ID = 910rr.xxx rr = revision xxx = IC location

<u>Revision</u>	<u>Comments</u>
91004-xxx	Initial release
91007-xxx	Corrects ext. memory interface problem
91011-xxx	Corrects intermittent data channel errors, required for BBU and minimum revision for IRIS 9.0 and above. Extended Memory must have Firmware 91010-xxx.

Note: Upgrading from 91007 to 91011 requires changing only location 27J and relabeling the remainder.

Manip Prom:

Location: 17B and 17E.

<u>Revision</u>	<u>Comments</u>
91005-xxx	Initial release
91006-xxx	Corrects Extended Memory sizing error when 16MBytes is installed.

Expansion Memory:

Refer to HITS.20 for information.

Diagnostics:

MANIP / Self-test for CPU function testing and DI.MK12.1.3
(minium rev) for CPU to Ext. Memory testing.

Hardware Manuals:

There are two excellent hardware manuals avialable that will greatly aid in the maintenaince of your hardware.

1. Mark 12 Installation / Technical Document.
Part Number: HM-0812-0061-A
2. Mark 6/12 CPU Self-test / MANIP Manual. This manual includes information on the use of MANIP and Self-test as well as listings for Self-test and MANIP.
Part Number: HM-0812-0064-A

TECH SUPPORT

HARDWARE INFORMATION, TECH SUPPORT

HITS.22

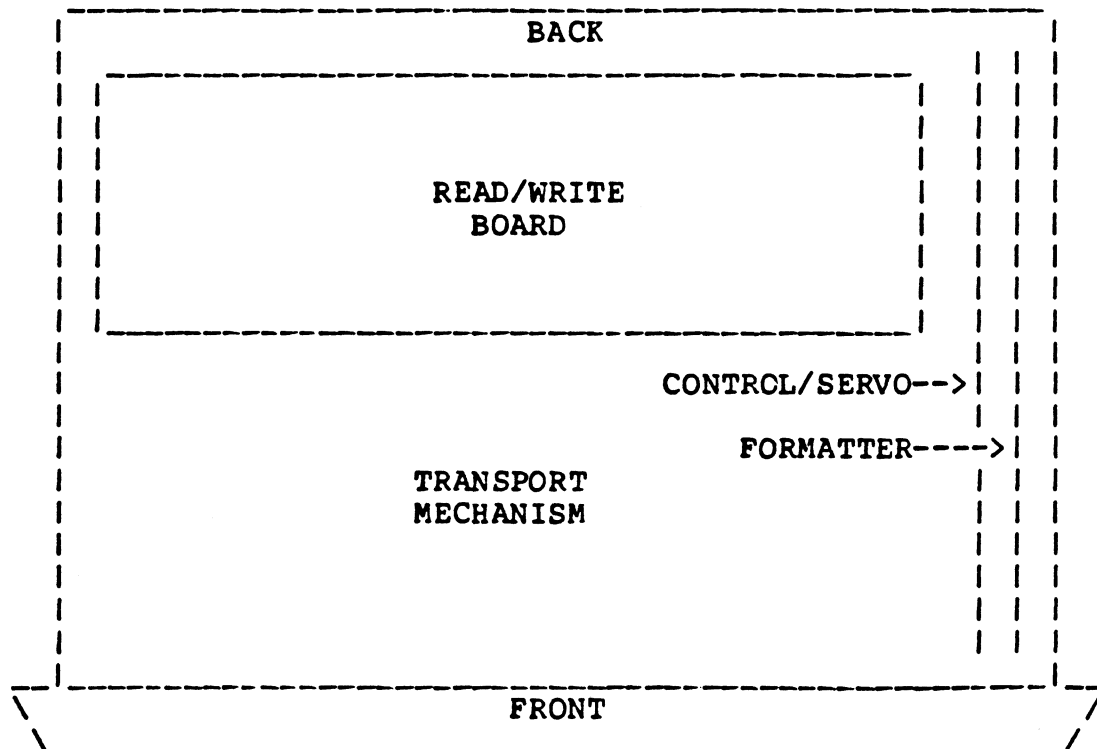
TO: MEGATAPE Users
FROM: Hardware Tech Support
DATE: November 10, 1987
SUBJ: SWITCH SETTINGS AND CABLING FOR MEGATAPE DRIVES

BOARD LOCATIONS

The Megatape MT-500C drive has 5 major PC boards.

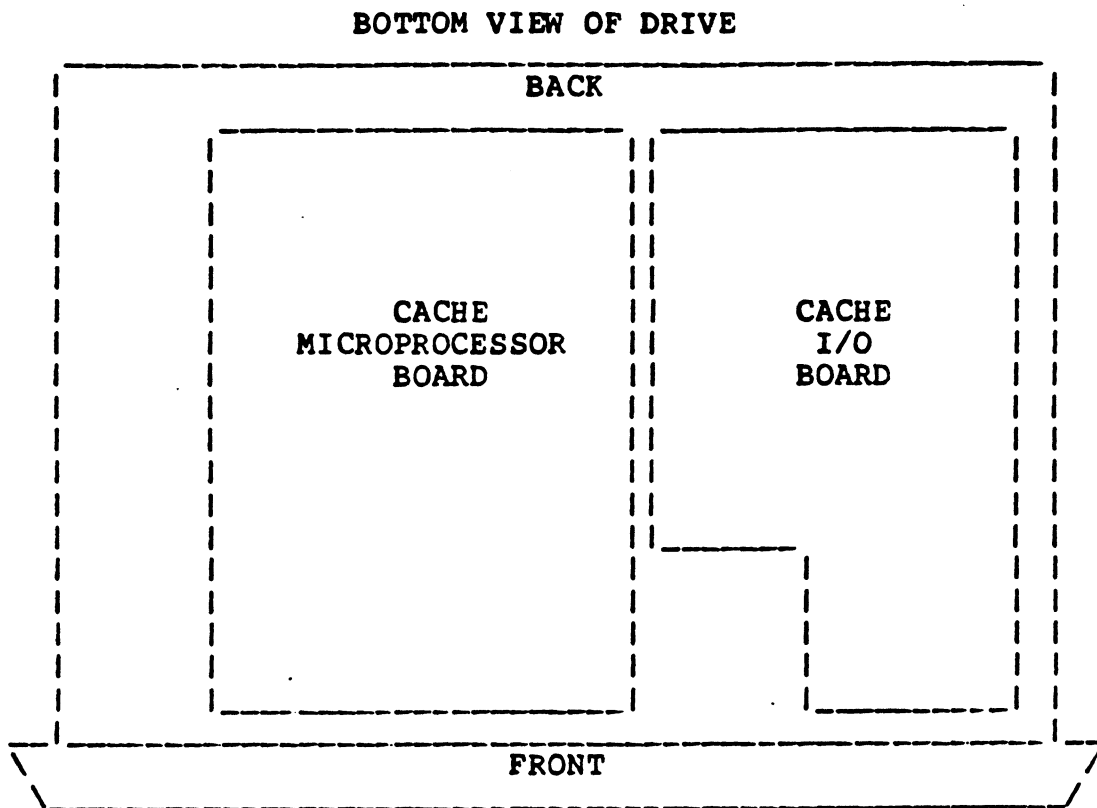
The READ/WRITE, CONTROL/SERVO, and FORMATTER boards can be seen by removing the top cover.

TOP VIEW OF DRIVE



BOARD LOCATIONS (CONT)

The CACHE MICROPROCESSOR and CACHE I/O boards can be seen by removing the bottom cover.



READ/WRITE BOARD SWITCHES

The four switches located in the left rear corner should all be set on (closed).

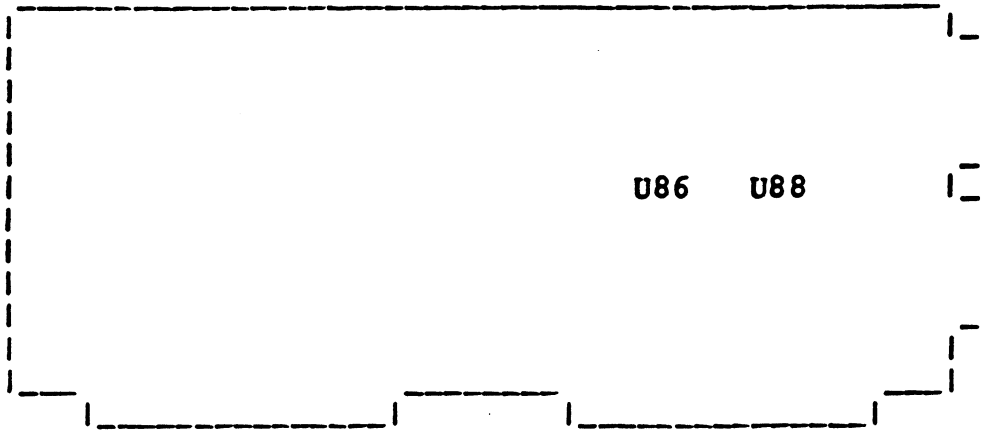
CONTROL/SERVO BOARD SWITCHES

S1 (located at the top edge of the board), may have a switch package or solder pads for jumpers.

- 1 ON
- 2 OFF
- 3 OFF
- 4 ON

ON = closed or jumper in
OFF = open or jumper out

FORMATTER BOARD SWITCHES



SWITCH U86

1 ON
2 ON
3 ON
4 ON
5 ON
6 ON
7 OFF
8 N/U

SWITCH U88

1 ON
2 OFF
3 OFF
4 OFF
5 OFF
6 DO NOT CHANGE *
7 ON
8 ON

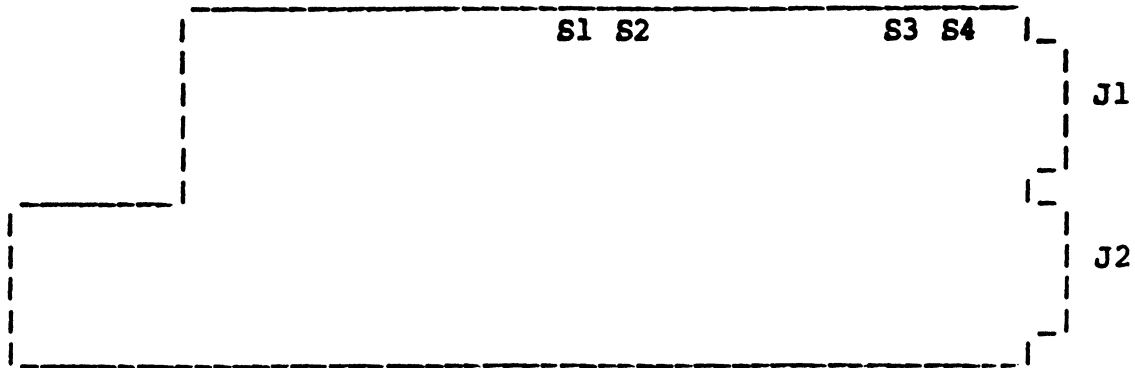
* U88 key 6 is set at the factory for the specific drive configuration. This switch should not be changed

CACHE MICROPROCESSOR BOARD

No switches.

CACHE I/O BOARD SWITCHES

BOTTOM VIEW



SWITCH S1	SWITCH S2	SWITCH S3	SWITCH S4
1 OFF *	1 ON	1 ON	1 OFF
2 ON *	2 ON	2 ON	2 OFF
3 OFF *	3 OFF	3 ON	3 OFF
4 ON *	4 OFF	4 ON	4 OFF
5 ON	5 ON	5 Not used	
6 ON	6 ON	6 OFF	
7 ON	7 ON	7 ON	
8 ON	8 ON	8 ON	

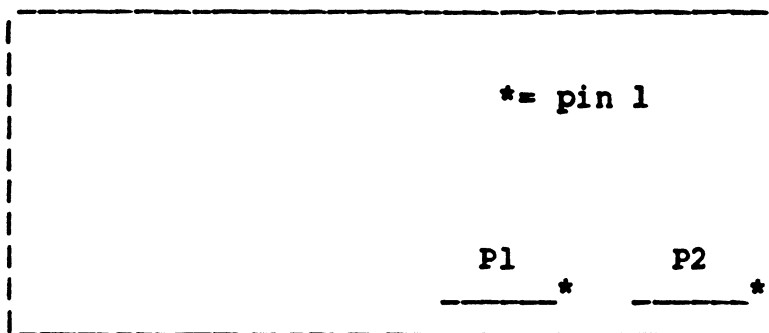
* Switch S1 keys 1-4 set the transfer rate. If the drive is going to be used with Discutility as a backup device only, the maximum rate (250KB/sec) can be used. If the drive is going to be used as an IRIS device (eg. \$MTax), the transfer rate must be set lower (120KB/sec). The 120KB/sec rate will work with both \$MTax and with Discutility.

SWITCH S1	120 KB/sec	250 KB/sec (STANDARD)
1	OFF	OFF
2	OFF	ON
3	ON	OFF
4	ON	ON

INTERFACE CABLES

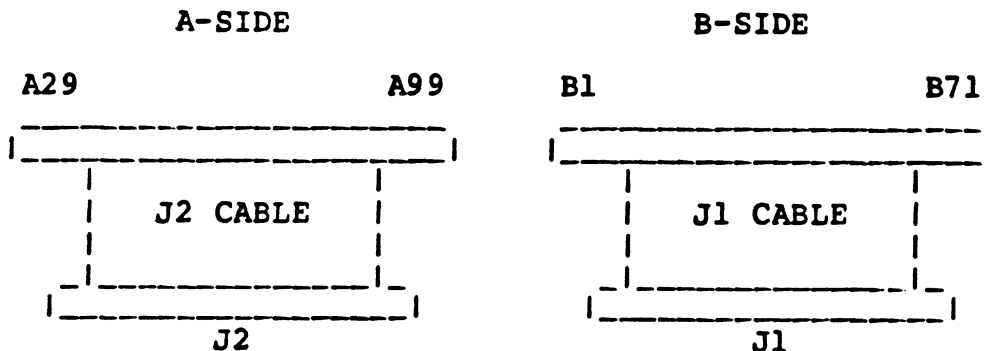
The tape drive has two interface connectors at the rear of the drive. Cable J1 goes to connector P1 and Cable J2 goes to connector P2.

REAR VIEW OF TAPE DRIVE

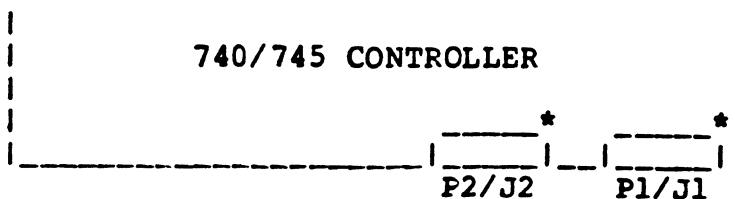


CABLES FROM LOTUS 725 (RIANDA) CONTROLLER

BACKPLANE CONNECTORS



CABLES FROM LOTUS 740/745 (SPECTRALOGIC) CONTROLLER



TAPE CARTRIDGES

Megatape cartridges that have worn tape can be refurbished. Refurbishing consists of loading new tape into your existing cartridge, and costs considerably less than a new cartridge. Contact Point 4 Customer Service for pricing.

CLEANING

Megatape drives are shipped with a cleaning kit. Megatape heads get dirty much faster than a 1/4" streamer, and regular head cleaning is important to insure reliable operation.

TAPE CONTROLLER PRIORITY

The tape controller should be placed as the highest priority board in the chassis. This is especially important in systems that use the tape drive as an IRIS device (eg \$MTAx). Placing other controllers above the tape controller may cause the tape to stop and restart (oscillation), or cause data channel problems.

TAPE CONTROLLER MEMORY ADDRESSING

Later versions of Discutility require the tape controller to use 64KW (128KB) memory addressing. If the controller is set to 32KW addressing, discutility will not SAVE data correctly. The SAVE utility will not catch the error. VERIFY after a SAVE will detect the error.

See HITS.13 for switch settings on the Lotus 725 controller.

TECH SUPPORT

HARDWARE INFORMATION, TECHNICAL SUPPORT

HITS.23

TO: MARK 4/4E Users
FROM: Hardware Technical Support
DATE: December 18, 1987
SUBJECT: BOARD COMPATIBILITY CHART AND PROM REVISIONS.

The following is some technical information on the Mark 4/4E telling you what boards are compatible, descriptions of the boards, and the different prom sets.

MARK 4 AND MARK 4E BOARD TYPES

Original Mark 4

CPU, 53003	Addresses up to 512KB memory
Memory, 53002	512KB max
PIB, 53001	Supports ST506 disk drives, 1MB floppy disk drive, QIC-02 streamer interface and 8 asynchronous ports
Port Expansion, 53000	Supports 8 asynchronous ports

Extended Mark 4

CPU, 53027*	Addresses 1 or 2MB memory
Memory, 53026-01	1MB memory
53026-02	2MB memory
PIB, 53018	Same as PIB 53001 with added bisynchronous capability
Port Expansion, 53019-01	Supports 8 asynchronous ports
Port Expansion, 53019-03	Supports 8 asynchronous ports and one bisynchronous port

Mark 4E , 8/16 port version

CPU, 53027-02*	Addresses 1 or 2MB memory and contains Mk 4E proms for 8/16 ports
Memory, 53026-01	---
53026-02	:
PIB, 53018	: :___ Same as for Extended Mk 4
Port Expansion, 53019-01	:
Port Expansion, 53019-03	: ---

MARK 4 AND MARK 4E BOARD TYPES, continued

MARK 4E , 16/32 PORT VERSION

CPU, 53027-01*	Addresses 1 or 2MB memory and contains Mk 4E PROM set for 16/32 ports
Memory, 53026-01 53026-02	1MB memory 2MB memory
PIB, 53037	Supports 16 asynchronous ports and one bisynchronous board
Port Expansion, 53038	Supports 16 asynchronous ports
Bisynchronous, 53039-02	Stand-alone bisynchronous board, 1 port

* NOTE:

1. CPU 53027 to 53027-01 needs ECO 1910 and PROM set change.
2. CPU 53027 to 53027-02 needs ECO 1957 and PROM set change.
3. CPU 53027-01 to/from 53027-02 requires only PROM set change.

PORT CONNECTOR PANELS:

53004	DB-25, 8 ports
82048-01	RJ-45, 16 ports
82048-02	RJ-45, 32 ports
82048-03	RJ-45, 8 ports

MARK 4/4E PROM REVISIONS

FIRMWARE	CPU Assy.	Revision
Locations 8D through 17D		
Initial release	53003	1
Timing problem with disk cont.; No alternate sectors w/IRIS	53003	2
Correct data channel; Also must have ECO 1395	53003	3
Not issued		4
Allows Bisync	53027	5
Correct streaming tape w/Bliss-Cobol software	53027	6
Initial release for Mk 4E w/16-32 ports; new prom code ID	53027-01	091022
Initial release for Mk 4E w/8-16 ports	53027-02	091028

VECTOR at location 19D	CPU Assy.	Revision
EXCEPTION at location 17B		
Initial release for Mk 4	53003 53027	1
Initial release for Mk4E: 16/32 ports (new prom code ID) 8/16 ports	53027-01 53027-02	091023

MARK 4/4E PROM REVISIONS, continued

APL-MANIP Locations 4F and 6F	CPU Assy.	Revision
Initial release for Mk 4	53003	1
Added "F" command for floppy disk boot	53003	2
Enhancements to MANIP and Self-Test program	53003	3
Change Self-Test to test 1 and 2MB memory	53027	4
Initial release for Mk 4E w/16-32 ports; new prom ID	53027-01	091024
Initial release for Mk 4E w/8-16 ports	53027-02	091030

MARK 4 AND MARK 4E Compatibility Chart

Board	Part No.	Original MARK 4 CPU Memory 512kb PIB 8-port Port Exp 8-port	Extended MARK 4 CPU Memory 1-2MB PIB 8-port Port Exp 8-port Port Exp w/bisync	MARK 4E PIB 16-port Port Exp 16-port Bisync CPU 16/32 port CPU 8/16 port
Original MARK 4 CPU Memory 512kb PIB 8-port Port Exp 8-port	53003 53002 53001 53000	5 Y / Y Y / Y Y Y /		
Extended MARK 4 CPU Memory 1-2MB PIB 8-port Port Exp 8-port Port Exp w/bisync	53027 53026-01/02 53018 53019-01 53019-03	/ Y Y Y N / Y Y Y Y / Y Y Y 1 / 4 Y N /	/ Y / Y Y / Y Y Y / 2 Y Y Y /	
MARK 4E PIB 16-port Port Exp 16-port Bisync CPU 16/32 port CPU 8/16 port	53037 53038 53039-02 53027-01 53027-02	N Y / N N Y N / N Y N / / Y N N / Y Y Y	3 Y / N N 3 Y N / / 3 Y N N / / Y N N N / Y Y Y Y	/ Y / Y Y / Y Y Y / N N Y / /

Symbols:

- / - Not Applicable
- Y - Compatible
- N - Not Compatible
- 1 - PIB must be revision P3 or later
- 2 - CPU must have firmware of revision 5 or later
- 3 - CPU must have a complete MARK 4E prom set and ECO 1910
- 4 - Async ports will work but not the bisync
- 5 - For firmware rev. 3 or higher, must have ECO 1395 and 1678.
These ECO's may correct a mapactivate problem.

HARDWARE INFORMATION, TECHNICAL SUPPORT

HITS.24

TO: Users of 310 Mux P/N 31003
and 301 Mux expansion P/N 30103

FROM: Hardware Technical Support

DATE: March 1988

SUBJECT: NOTES ON 310/301 MUX

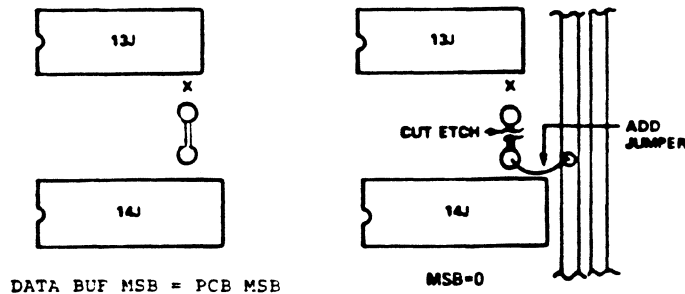
MASTER PORT DEFAULT BAUD RATE SWITCH (Location 10M)

<u>Setting</u>	<u>Baud Rate</u>
0	110
1	150
2	300
3	600 (19.2K Baud if option is installed)
4	1200
5	2400
6	4800
7	9600
8,9	Not Used

X OPTION (SET MSB OF DATA BUFFER AREA)

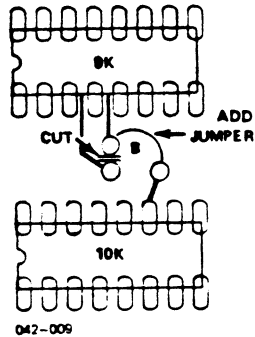
The MSB of the data buffer can follow the MSB of the Port Control block base address (X etch intact), or the MSB of the data buffer can be forced to 0 (X etch cut and jumper installed).

IRIS systems with more than 100 ports require MSB=0 (also requires IRIS R9.0 or above).



B OPTION (19.2K BAUD RATE)

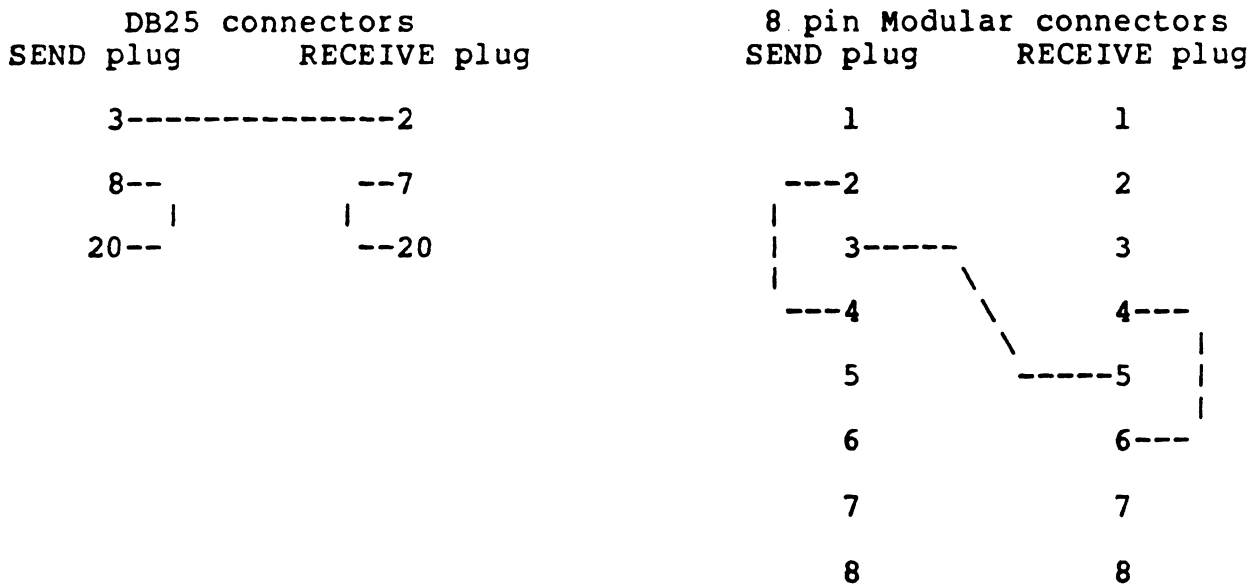
This option allows the user to sacrifice 600 baud and replace it with 19.2K baud. The option is enabled by cutting the etch between I.C. 9K and I.C. 10K, and installing a jumper over B, as shown.



Effect on Diagnostic: See section on Mux diagnostic revisions.

MUX DIAGNOSTIC TEST CABLE

This test cable is required to do port to port tests with the Mux diagnostic. This same cable is also used to run the simultaneous CPU/DMA test in the Mark 6/12 Memory diagnostic.

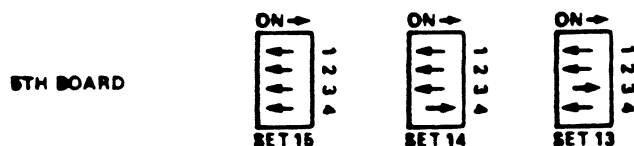
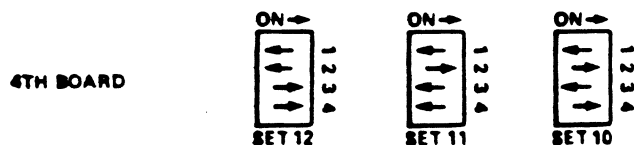
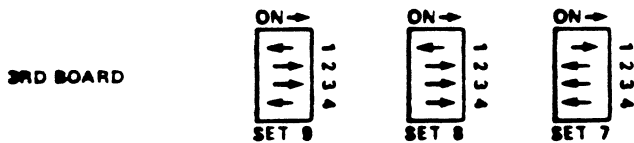
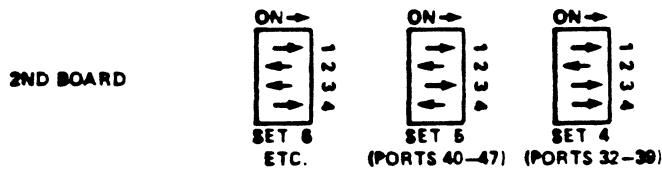
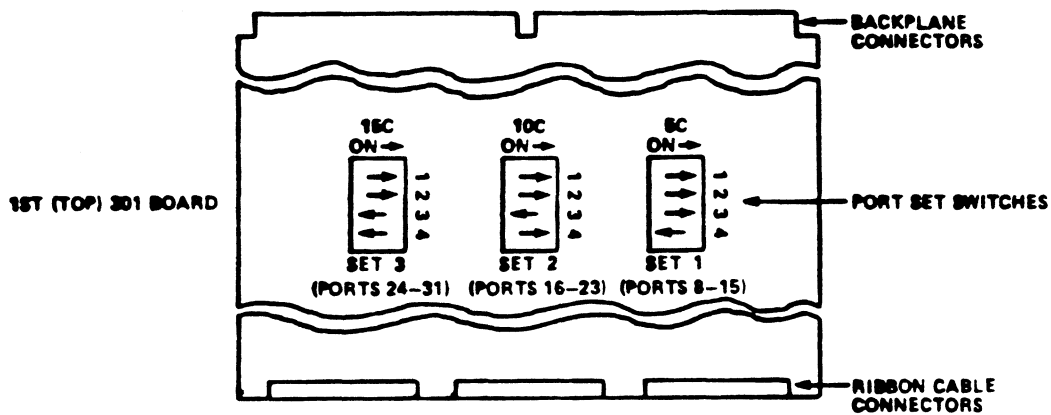


NOTE: There is only one wire between the two plugs.
No extra wires should be connected.

PORT SET SWITCHES ON 301 EXPANSION BOARDS

301 boards are available in multiples of 8 ports. The starting port number for each set is determined by a 4 position switch.

NOTE: adding 301 expansion ports requires backplane "Z" cables, connector panels, connector panel brackets, and power from 340 power supply or 8 slot chassis power supply.



042-027

MUX DIAGNOSTICS, REVISIONS AND FEATURES

REV 1.X

Works with WD1502-01 FIFO chip, may require patch for
WD1502-10 FIFO

May require patch for 19.2K baud option

Fails 110 baud test when using Mark 9 CPU, user can continue
past error

Will not run with Mark 6 CPU

REV 2.0

Completely new diagnostic

Works with all CPU's

Is menu driven, user can select different CPU speeds and
different options like 19.2K baud rate.

TECH SUPPORT

HARDWARE INFORMATION TECH SUPPORT

HITS.25

**TO: Users of Lotus 740 Disc/Tape controllers p/n 901705
and Lotus 745 Disc only controllers p/n 901706**

FROM: Hardware Tech Support

DATE: 4-1-88

SUBJ: PROMS AND SWITCH SETTINGS

PROM I.D. CONVENTION for Lotus 740/745 boards

```
                XXXXyyyZZZ
                :   :   :
Location on board----: : :
                :   :   :
Product I.D.-----: : :
    310=Lotus 745   :   :
    320=Lotus 740   :   :
                :   :   :
Revision level-----: : :
```

FIRMWARE REVISIONS

The firmware is located at 4H thru 4M, and 4Y thru 4AB.

Rev. LD0, This is the original firmware for these boards.

Rev. LD1, Enhanced firmware, gives increased data throughput.

NOTE: Firmware is field upgradable. Complete prom sets are available from Point 4 Spare Parts. Prom set for Lotus 740 is p/n A40740. Prom set for Lotus 745 is p/n A40745. To upgrade firmware, simply install the new proms; no other hardware or software changes are required. If the Drive configuration prom (location 8AE) is changed, see the section on drive configuration prom.

DRIVE TYPE SWITCH SETTINGS ON THE CONTROLLER

Switches SW4 and SW5 perform three functions:

1. Describe first drive type (SW4 Keys 1-7).
2. Describe second drive type (SW5 Keys 1-7).
3. Describe how the two drive types are allocated to the four drive ports on the controller (SW4 Key 8 and SW5 Key 8).

DRIVE CONFIGURATION SELECTIONS (SW4 and SW5, Keys 1-7)

Drive	switch setting for original (LD1) drive configuration prom.							switch setting for expanded drive configuration proms. (740D3, 310/320LD2, 310/320LD3)						
	Keys							Keys						
	7	6	5	4	3	2	1	7	6	5	4	3	2	1
Fuji M2312K (84MB)	0	1	0	1	0	1	1	0	0	0	1	0	1	1
Fuji M2322K (168MB)	0	1	0	1	1	1	1	0	0	0	1	1	0	1
Fuji M2333K (337MB)	0	1	1	0	0	0	1	0	0	1	1	1	0	0
Fuji M2344K (690MB)	Not supported							0	0	1	1	1	1	0
Fuji M2372K (824MB)	Not supported							0	0	1	1	1	1	0

PORT ALLOCATION (SW4 Key 8 and SW5 Key 8).

These keys determine how the two drive types are assigned to the 4 drive ports on the controller.

SW4, Key 8	SW5, Key 8	Drive numbers of first drive type	Drive numbers of second drive type
OFF	OFF	0,1,2,3	NONE
OFF	ON	0,1,2	3
ON	ON	0,1	2,3
ON	OFF	0	1,2,3